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## Abstract

How accurate financial analysts are in their earnings forecasts, and how share prices are affected by whether a company is able to outperform market expectations or not, has been researched extensively in the US. This thesis aims to analyze these questions as well, but by comparing firms with the highest market capitalizations from the US and Norway, as well as across the respective industries within the samples. The largest sample is of the Norwegian companies, which is the main focus, covering 22 large firms in many different industries. The US sample covers 8 large companies, and provides a meaningful comparison to the Norwegian sample, like a benchmark or control group. Historical data, for each company, stretches back at least 7 to 8 years, with a goal of 10 years, where the historical data covers daily share prices and quarterly earnings (EPS) estimates and reported values.

The data show that US financial analysts are on average significantly more accurate in their earnings forecasts, than their Norwegian counterparts, where the comparison is made using the Mean Absolute Percentage Error statistical technique. The high accuracy of US analysts is shown to have a connection with the number of estimates per quarter. US sample firms were also significantly more consistent in beating earnings estimates, but although the hypothesis was that an earnings surprise would lead to an increase in share prices and vice versa, no strong correlation can be implied and the effect of an earnings surprise, or vice versa, on share prices is shown to be negligible. The rest of the paper poses views and explanations on why US sample companies outperform Norwegian sample companies so consistently, and how this extrapolates to the broader market.

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# 1 Introduction

Every financial quarter, public corporations in Norway and the US will release their quarterly statements containing a wealth of information about their financial wellbeing. This is known as “earnings season” and provides important information to shareholders about the companies they are invested in, which could greatly affect the share prices. For financial analysts, who follow and analyze these companies, it is also an important time, as this is the time where they find out how accurate their estimates, about certain financial metrics for each company, were. Investors also follow reputable analysts who again follow the companies which these investors have bought shares in, thus analysts have a certain power over how well received a quarterly statement from a company will be received, based on their own predictions and analysis. When many analysts have provided an estimate for a company’s revenues, sales or the most important one; profits (hereafter called “earnings”), it is called a “consensus estimate”, and a company reporting earnings below these consensus estimates, may result in decreasing share prices or vice versa. A good example, for illustration of how severe this effect could be, was when eBay, a large online retailer, reported in 2005 that the company had missed consensus estimates, for the last quarter of 2004, by one penny (0,01 British pound) which resulted in share prices decreasing by 22 percent.<sup>1</sup> Most cases are not this severe, but meeting consensus estimates can be a priority for a company’s management team, because of frightening examples like these, as shareholders typically don’t like when the value of their shares decrease due to the current performance of management, even though the cause of poor performance might have been outside of their control. Nevertheless, consensus estimates for earnings and the relationship to share prices, provides for an interesting case to study for a thesis.

Thus, my research aims to quantify how accurate earnings estimates are on average for a selection of large Norwegian and American companies, and how much the share price is influenced whether these companies meet expectations or not. My hypothesis was that earnings estimates by analysts are, on average, not very reliable and accurate, and that a company beating consensus estimates (called an “earnings surprise”) would see an increase in share prices and a company missing consensus estimates would see a decrease in share prices, based on anecdotal evidence such as for eBay and other examples.

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<sup>1</sup> <https://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/avoiding-the-consensus-earnings-trap>

## 2 Theory

### 2.1 Profit vs. Earnings and EPS

These two terms are often used as synonyms and are mostly differentiated by the adjectives used to describe them. Profit is often used to describe gross, operating or net profit which belong on a company's income statement and indicates a company's operational efficiency. However, "earnings" can be used interchangeably for these metrics, although it is most associated with the bottom line of a company's income statement, which is when all expenses have been subtracted, also called "net earnings", which again is a term that can be used interchangeably for profits.<sup>2</sup> Terms such as profit, net income, bottom line and earnings refer to the same thing<sup>3</sup>. To be able to compare earnings between companies, investors and analysts utilize a ratio called "Earnings per Share (EPS)", which is the earnings of a company (minus preferred dividends) divided by the outstanding shares of common stock. Since companies have different amounts of outstanding shares, EPS is the ratio which shows how earnings compare between companies, both small and large, and works as an indicator for profitability, the higher the better.<sup>4</sup> The equation is as follows:

$$EPS = \frac{\text{Earnings} - \text{preferred dividends}}{\text{Common shares outstanding}}$$

EPS is also an important variable because it can be used to determine a share's price, in addition it is used for the "Price-to-Earnings (P/E)" ratio, where the "E" refers to EPS, which is an important ratio for determining if a company's shares are overpriced or not.

If a company's capital structure involves more complicated financial instruments, such as stock options, they also report "diluted EPS" as basic EPS doesn't take into account the dilutive effect that issuing more shares from a company could have (McConnell 2012, p.81).

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<sup>2</sup> <https://www.investopedia.com/ask/answers/070615/what-difference-between-earnings-and-profit.asp>

<sup>3</sup> <https://www.investopedia.com/articles/basics/03/052303.asp>

<sup>4</sup> <https://www.investopedia.com/terms/e/eps.asp>

## **2.2 Stock Markets and the Efficient Market Hypothesis**

Stock markets are a key place for buyers and sellers to meet in order to trade shares (pieces of ownership) of a company. Today this mainly happens digitally through online brokerages and other portals. Prices of shares are determined by a range of factors, such as a company's financial health and performance including revenue streams, profits, sales, growth, future outlook, market share, competitors' strength et cetera, but in effect the most important determinant of share prices are the number of buyers and sellers on each side. How attractive a stock looks to potential investors is governed by the same number of factors as above, in addition to information that finds its way to the market about new micro and macroeconomic factors, such as new developments for a company, competitors, supply or demand side changes et cetera, that could all affect the share price of a company. The Efficient Market Hypothesis (EMH) proposes that a financial assets current price reflects all available information in the market (Ross, Westerfield, Jaffe and Bradford, 2011, p.432), meaning that any new information available to investors, about new developments affecting a company, will alter the share price of said company, to reflect the new information in the market. The arrival of new information is however unpredictable, thus changes in share prices will also be unpredictable and so no investor can predict how share prices are going to evolve over time. Random variation in an asset's price also makes it difficult to profit from in relatively short amounts of time. In addition, in an efficient market the price will adjust instantaneously to any new information, while the other options are a delayed response, where the price adjusts slowly, or an overreaction, where the price over adjusts. The assumption for this research is that the market is efficient.

Many banks and brokerages also employ financial analysts who spend a lot of time analyzing companies' finances and share prices, as mentioned in the introduction, so they can give outlooks on the market and buy and sell recommendations on different companies for their clients and investors. These analysts are important because they improve decision-making for investors and reduce uncertainty due to their reports and recommendations on the stock market. Analysts also use statistical techniques to make predictions on for instance future earnings, as mentioned previously, and these predictions have baked in all of the available information in the market to make them as accurate as possible. Nevertheless, analysts have to make corrections to their estimates over the course of time as new information becomes available, especially if some companies provide earnings guidance themselves, which are also known as



“forward-looking statements”, to temper the markets expectations for the next quarter.<sup>5</sup> One reasonable assumption is that the last day before a new earnings announcement, the consensus estimates for a company should fully reflect all information available in the market, and once the earnings results are known, the price should instantaneously adjust to the new information, in an efficient market according to the Efficient Market Hypothesis (ibid.).

### 2.3 The Mean Absolute Percentage Error (MAPE)

As shall be seen in this paper, analysts’ consensus estimates are sometimes far from being accurate, and the best way to measure the prediction accuracy of earnings, is to use a statistical technique known as the “Mean Absolute Percentage Error (MAPE)”, which expresses accuracy as a percentage, the lower the better, with the following formula:

$$MAPE = \frac{100\%}{n} \sum_{t=1}^n \left| \frac{A_t - F_t}{A_t} \right|$$

Where  $A_t$  and  $F_t$  are the actual and forecasted value respectively, for each point in time.

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<sup>5</sup> <https://www.investopedia.com/articles/analyst/03/012903.asp>

## 3 Methodology

### 3.1 Selection

My hypothesis was that on average financial analysts are not very accurate in their earnings estimates (EPS), and secondly that an earnings surprise would lead to an increase in share price and an earnings miss would result in a decline in share price. Thus, my two research questions became:

1. How accurate are analyst's EPS estimates on average?
2. How frequent does an earnings surprise and an increase in share price (and vice versa) happen, and how large are these effects? Can correlation be implied?

This research would be conducted within the Norwegian market and compared (benchmarked) to a few large American public corporations in a 10-year span, stretching from first quarter 2009 to fourth quarter 2018.

To answer my research questions, it was necessary to perform a quantitative analysis of financial data collected from the “Thompson Reuters Eikon” software<sup>6</sup>, available through University of Stavanger. Eikon is a financial analysis and trading software, which is by more than 300.000 financial professionals worldwide<sup>7</sup>, with access to a wide range of data on different asset classes and industry sectors. Together with financial data on Norwegian companies from the Oslo Stock Exchange<sup>8</sup>, and other sources such as tradingview.com for American companies, it was possible to begin gathering data from Eikon and organize it in Excel for further analyzing.

The criterion for a public corporation to be selected for the data gathering and analysis, was that any company included in the research should have at least 7 to 8 years' worth of historical data on EPS estimates, actual (reported) EPS and share prices, but preferably 10 years of data if possible. In addition, any company considered for the study would preferably have only one class of shares listed on stock exchanges (or Eikon) and preferably not split up into

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<sup>6</sup> <https://eikon.thomsonreuters.com/index.html>

<sup>7</sup> <https://www.refinitiv.com/en/products/eikon-trading-software>

<sup>8</sup> <https://www.oslobors.no/>

multiple public entities. Any public corporation outside this criterion would only be included if deemed necessary or beneficial to the research. The selection of companies was based on market capitalization, ranging from the highest to lowest market-cap, and any corporation with a lack of key data, such as sufficiently incomplete historical values for instance, would be excluded. One goal was to include as many different industrial sectors as possible, to get a wide analysis of companies on the Oslo Stock Exchange, thus being able to compare results across different sectors in the Norwegian market, as well as to American companies, and get a more accurate understanding and comparison of the estimates and financial data for the market as a whole, as the Oslo Stock Exchange is fairly skewed towards oil, offshore, marine and salmon activity in the high market-cap range.

Thus, a public corporation must satisfy these criteria to be included in the final sample:

- 7 to 8 years' worth of historical data on EPS estimates, actual (reported) EPS and share prices (but preferably 10 years of data if possible).
- No significant holes in the data between each financial quarter (subjective assessment).

From the 36 largest companies on the Oslo Stock Exchange initially selected for analyzing, 22 were left which met the criteria and goal of the study (11 of these 22 companies selected operate in either the energy or consumer staples segments on the exchange, where 5 are oil related and 5 are salmon related, hence the assessment of fairly skewed data)<sup>9</sup>. The 22 companies also cover a considerable share of the exchange's net worth.

The 22 Norwegian companies are as follows (arranged from highest to lowest market-cap, as of May 21, 2019, Eikon/exchange ticker in parentheses):

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<sup>9</sup> <https://www.oslobors.no/markedsaktivitet/#/list/shares/quotelist/ob/all/all/false>.

*Table 1 Norwegian Public Corporations Sample*

1. Equinor (EQNR)	12. Lerøy Seafood Group (LSG)
2. Telenor (TEL)	13. Subsea 7 (SUBC)
3. DNB (DNB)	14. Storebrand (STB)
4. Mowi (MOWI)	15. SpareBank 1 SR-bank (SRBANK)
5. Yara International (YAR)	16. TGS-NOPEC Geophysical Company (TGS)
6. Aker BP (AKERBP)	17. Schibsted ser. A <sup>10</sup> (SBSTA)
7. Gjensidige Forsikring (GJFS)	18. Kongsberg Gruppen (KOG)
8. Orkla (ORK)	19. Bakkafrøst (BAKKA)
9. Norsk Hydro (NHY)	20. Austevoll Seafood (AUSS)
10. SalMar (SALM)	21. DNO (DNO)
11. Tomra Systems (TOM)	22. AF Gruppen (AFGRA)

For the American companies, the selection was based on the same criteria, however the goal of including as many industrial sectors as possible was less important, as the inclusion of American companies in the research was more focused on having something meaningful to compare to, as a benchmark or control group, in relation to overall company size and how many analysts and investors follow, analyze or invest in the different companies, especially when it comes to the accuracy of EPS estimates and how an earnings surprise or miss affects the share price, compared to Norwegian companies. From the 14 largest companies registered on American exchanges (measured in market-cap as before), 8 remained, fulfilling the selection criteria and goal.

The eight American companies are as follows (arranged from the highest to lowest market-cap, as of May 21, 2019, Eikon/exchange ticker in parentheses): <sup>11</sup>

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<sup>10</sup> Schibsted was included despite being listed as two entities on the Oslo Stock Exchange. However as only Schibsted ser. A-shares are listed on Eikon and was important for the goal of including more sectors in the study, the company was included in the data.

<sup>11</sup> <https://www.tradingview.com/markets/stocks-usa/market-movers-large-cap/>

*Table 2 US Public Corporations Sample*

1. Microsoft Corp (MSFT)	5. Johnson & Johnson (JNJ)
2. Amazon Com Inc (AMZN)	6. JPMorgan Chase & Co (JPM)
3. Apple Inc (AAPL)	7. Exxon Mobil Corp (XOM)
4. Alphabet Inc class A <sup>12</sup> (GOOGL)	8. Walmart Inc (WMT)

Similarly to how the largest companies on the Oslo Stock Exchange, and the sample of companies collected, are fairly skewed towards oil and salmon activities, these American companies selected are fairly skewed towards information technology. In this sample there are what can be characterized as four information technology (commonly referred to as “tech”) companies and four non-information technology (“non-tech”) companies.

### **3.2 Procedure**

From the Eikon software it is possible to import data on historical share prices and reported EPS (called “actual EPS” in the software), which is the EPS reported by the company in their quarterly reports, using the “Financial Chart (NEW)” selection under “Price & Charts”. The data was collected from a 10-year span or as close to this target as possible for each company, meaning 40 quarters (data points), first quarter (Q1) 2009 to fourth quarter (Q4) 2018, or as close to this target as possible based on the selection criteria as previously mentioned. The data was exported to Excel.

Using the “Detailed Estimates” selection, under “Estimates”, it is possible to collect and export data to Excel on Earnings per Share (EPS), both estimates and actual (reported), in addition to historical values and forecasts if applicable. This tool also gives information on how many estimates exist for each company per quarter and the accuracy score for different analysts who follow each company. The data was collected for the same 10-year span, or as close to this target as possible, and exported to Excel.

In Excel the data was organized for each company first. For each company the number of estimates, mean estimate for EPS, actual reported EPS, share price on the last available date

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<sup>12</sup> Alphabet Inc was included despite being listed on the stock exchange with two different classes of shares, however as only Alphabet Inc’s class A shares are listed on Eikon and was important to include for the goal of comparing it to the other tech companies, the firm was included in the data.

before a new EPS and quarterly report announcement (T-1) and share price on the following available date after the announcement (T0), were available and had been imported from Eikon. This is similar to an event study, where you measure the impact of an event to the returns of some sort of asset, but the time or event window, is very limited in this study as the assumption is that on the last date before a quarterly announcement all of the information available in the market is baked into the earnings forecasts, and on the following day by market close, the share prices will have fully adjusted to the new information of how a company performed in comparison with market expectations, per the definition of an efficient market and the Efficient Market Hypothesis.

The variables of interest for this study were calculated from the available data, which includes, percentage of earning surprise or miss based on mean estimated EPS and actual EPS, change in share price following announcement (percentage change between T-1 and T0), and Mean Absolute Percentage Error (MAPE) between estimated EPS and actual EPS, for each quarter. This data was then further calculated into average values and other variables for the entire time span, such as median and average surprise, standard deviation, number of negative and positive cases (surprise or miss) and the ratio between these factors. The same procedure was done for share prices in the same time span, in order to compare them. MAPE was especially important as a measure of prediction accuracy and testing how accurate the mean EPS estimates from analysts were. In addition, the average number of estimates for the time span were included to test how this relates to the prediction accuracy.

To see how share prices moved with an earnings surprise or miss, a second table was made using the “Count IF” function in Excel. If an earnings surprise happened in one quarter and in the same quarter the share price increased, that would be counted as a case double positive, conversely for earnings miss and a decline in share price it would be a double negative. In other words, this table was testing for how many cases where the earnings and share prices shifted in the same direction, which was also important to quantify for the sake of studying how often this happened for each quarter.

Lastly, all 22 Norwegian and 8 American companies were compiled and analyzed in one master spreadsheet, following the same template and procedure. The purpose of the master spreadsheet was to look at the median and average of the average for all companies, divided into a Norwegian and an American section, and further divided into different industrial sectors,

as to obtain a varied set of data able to compare across different industries and borders. The Norwegian industrial sectors consisted of: Energy, Communication services, Financials, Consumer staples, Materials and Industrials, as categorized on the Oslo Stock Exchange. The American industrial sectors were divided into information technology and non-information technology companies (commonly referred to as “tech” and “non-tech” companies), in order to simplify the comparison between the two nations and its industries, which leads to the following table:

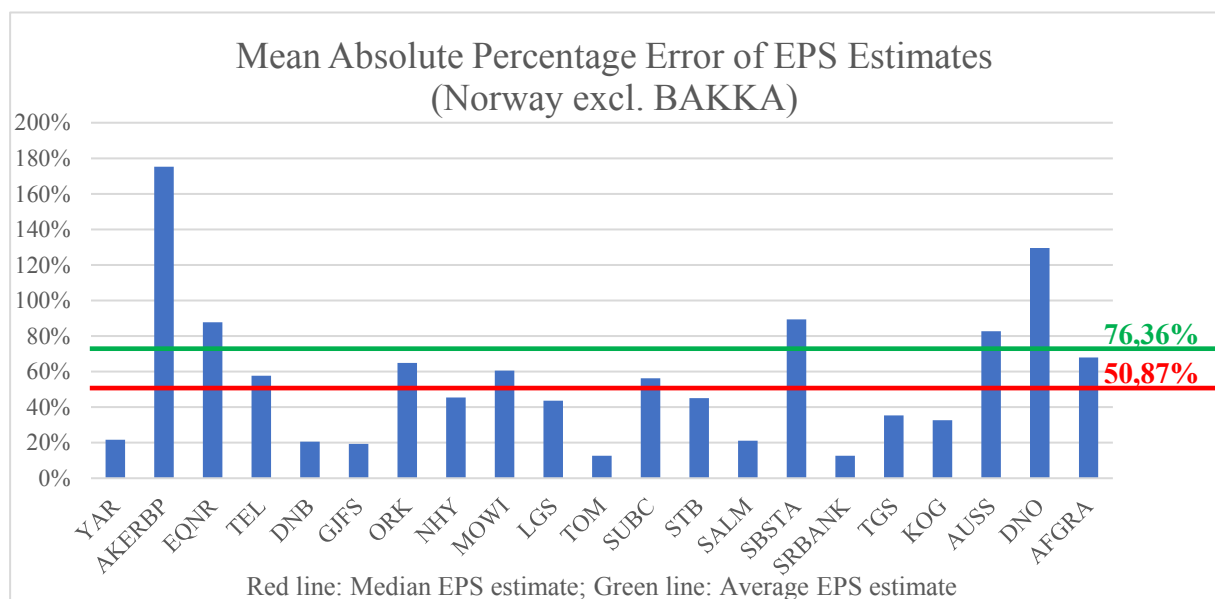
*Table 3 Companies and Their Industry Sectors*

Energy	Equinor, AkerBP, Subsea 7, TGS-Nopec Geophysical Company, DNO
Communication services	Telenor, Schibsted ser. A
Financials	DNB, Gjensidige Forsikring, Storebrand, Sparebank 1 SR-Bank
Consumer staples	Mowi, Orkla, Salmar, Lerøy Seafood Group, Bakkafrøst, Austevoll Seafood
Materials	Yara, Norsk Hydro
Industrials	Tomra Systems, Kongsberg Gruppen, AF Gruppen
Technology	Microsoft Corp, Amazon Com Inc, Apple Inc, Alphabet Inc (class A)
Non-technology	Johnson & Johnson, JPMorgan Chase, Walmart, Exxon Mobile

## 4 Results

### 4.1 Analysts and Prediction Accuracy

The first research question was related to how accurate analysts' earnings estimates are on average. A goal of this study was also to obtain sufficient data in order to compare analysts' prediction accuracy across industries. The results obtained are interesting in that they differ significantly between Norwegian and American companies, as well as across different industries. The first graph presented shows the Mean Absolute Percentage Error of earnings estimates for Norwegian companies, excluding the company Bakkafrøst (salmon producer), due to its extremely high MAPE value, which distorted the graph below too much. A lower MAPE value means more accurate estimates, thus analysts' prediction accuracy is highly dependent on their own skill, the companies they are following and what industries they are located in.



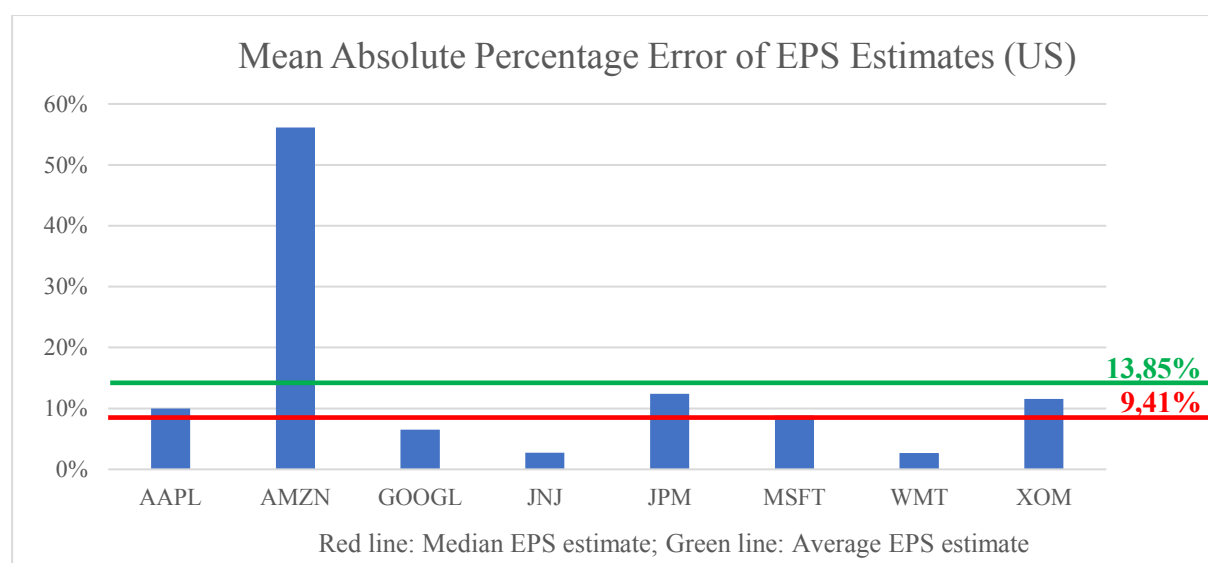
*Figure 1 Accuracy of Analysts' EPS Estimates (Norway excl. BAKKA)*

As Figure 1 shows the accuracy of analysts' estimates vary significantly between Norwegian companies, with a median EPS estimate value of 50.87% and an average EPS estimate value of 76.36%. This increase between the median and average value is caused by certain outliers with extreme MAPE values. One such company, which is excluded from this graph, is Bakkafrøst, a salmon producer with a MAPE value of 498%. AkerBP is another company with a relatively high MAPE value compared to the rest of this sample. In general, it



appears that companies dealing in commodities, like salmon and oil, are harder for analysts to provide accurate earnings estimates for, and they appear more often than not to either significantly beat or miss earnings expectations, leading to relatively high percentage errors. Financial services providers such as banks, and other well-established firms in stable industries, appear to have lower deviations from EPS estimates and low MAPE values, thus analysts' predictions are more accurate. In general though as the median and average MAPE values for all Norwegian companies show, the prediction accuracy by analysts are fairly low in the Norwegian market, and very few companies have a MAPE lower than 20%, which there is a probable explanation for which I'll come back to.

The next graph shows how accurate earnings estimates are for the American companies in this study. There is a significant difference in accuracy between the Norwegian and American market.

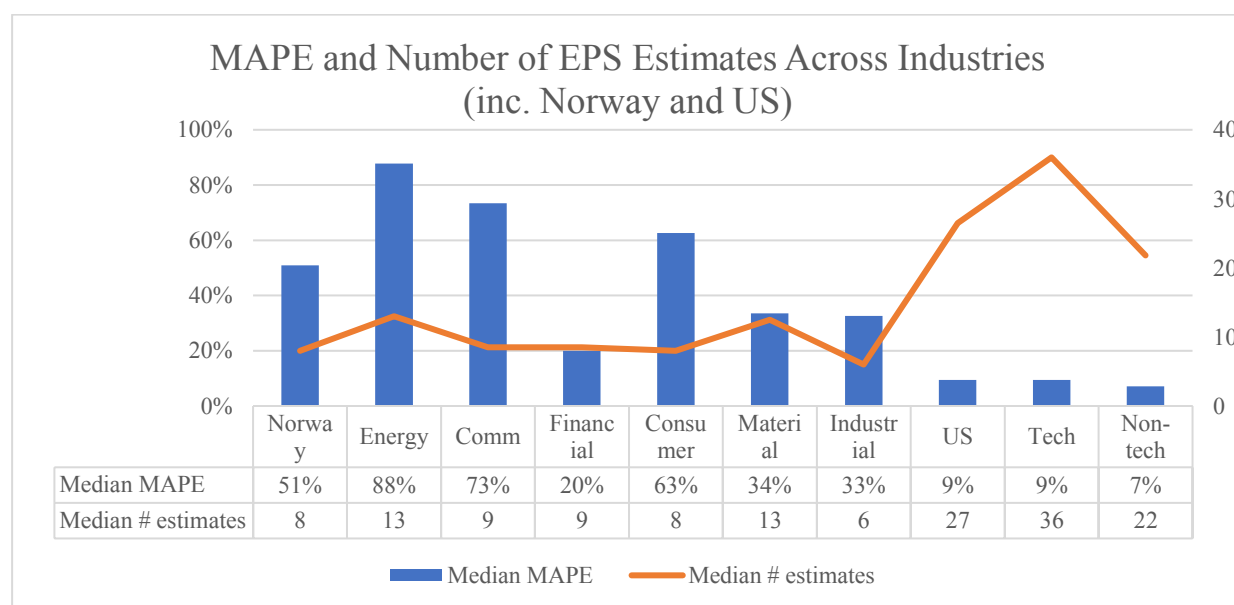


*Figure 2 Accuracy of Analysts' EPS Estimates (US)*

As Figure 2 shows the variation in MAPE values for American companies is significantly less, with the exception of the outlier Amazon, which was still included in this figure. With a median MAPE at 9,41% and an average MAPE at 13,85%, the analysts' earnings estimates are much more consistent and accurate for the American market represented by the companies in this sample. As earlier mentioned, this sample is fairly skewed by technology companies, just as the Norwegian sample is fairly skewed by oil and salmon companies. In general, it once again appears that well established companies in stable markets, such as

Johnson & Johnson and Walmart, have a relatively low MAPE value, thus prediction accuracy by analysts are high. The other companies in this sample, for instance Exxon Mobil, also have low MAPE compared to its Norwegian counterparts. Overall the accuracy of EPS estimates for American companies appear to be much higher than for Norwegian companies when median and average MAPE are compared, thus raising the question of what the cause of this can be. One probable explanation for this discrepancy could be the number of analysts following and analyzing companies, in addition to their skill measured by their prediction accuracy based on previous estimates.

The next graph shows the relationship between number of analysts and estimates accuracy across different industries for Norwegian and American firms.



*Figure 3 Accuracy of Estimates and Number of Estimates Across Industries*

Figure 3 shows how prediction accuracy relates to median number of estimates per quarter across industries, including the Norwegian and American samples. As demonstrated, there is a significant jump in prediction accuracy, meaning a low MAPE value, when the number of estimates per quarter is sufficiently high, as is the case for the US sample in addition to the American companies divided into technology and non-technology sectors. One small exception is the financial industry in Norway represented by four firms, which manages a relatively low median MAPE, despite the number of median EPS estimates per quarter being in line with the rest of the Norwegian industries. This could be due to the financial industry

being a mature one and the companies in it relatively stable, thus shielded from significant demand or supply shocks, which could drastically affect its revenues and earnings in a quarter. However, the figure shows a clear trend, that more (and perhaps better skilled) analysts on average are able to provide better earnings estimates with higher accuracy on the companies in this study, and to its clients who rely on these estimates to make investments and manage risks in addition to other sources of financial information and fundamentals.

## **4.2 Summary of Analysts and Prediction Accuracy**

Thus, the results for the first research question shows that for the Norwegian sample of companies, analysts' prediction accuracy is comparatively low when compared to the American sample of companies (51% and 9% MAPE respectively), although the American sample consist of significantly less companies than the Norwegian sample. The results also show a trend that EPS prediction accuracy increases with the average number of analysts, which is an important difference between the two markets as the size of the companies themselves and of the stock market as a whole differ vastly between Norway and the United States, as well as for the market capitalization of the companies in this study. The US stock market has a much higher concentration of analysts and a higher market capitalization, which could potentially attract even more financial analysts and investors, leading to better prediction accuracy, as shown in the figure. As for the first part of the hypothesis about how accurate analysts' estimates are, the hypothesis stated that on average analysts would not be very accurate, and this is true for the Norwegian market, but the analysts in the American market performs much better overall as shown above. It is unlikely that American financial analysts are more conservative in their estimates than their Norwegian counterparts, as following this line of thinking, it is more likely that Norwegian financial analysts are too optimistic in their predictions compared to their American counterparts, due to the lesser amount of manpower and perhaps expertise that the financial markets in the US exhibits.

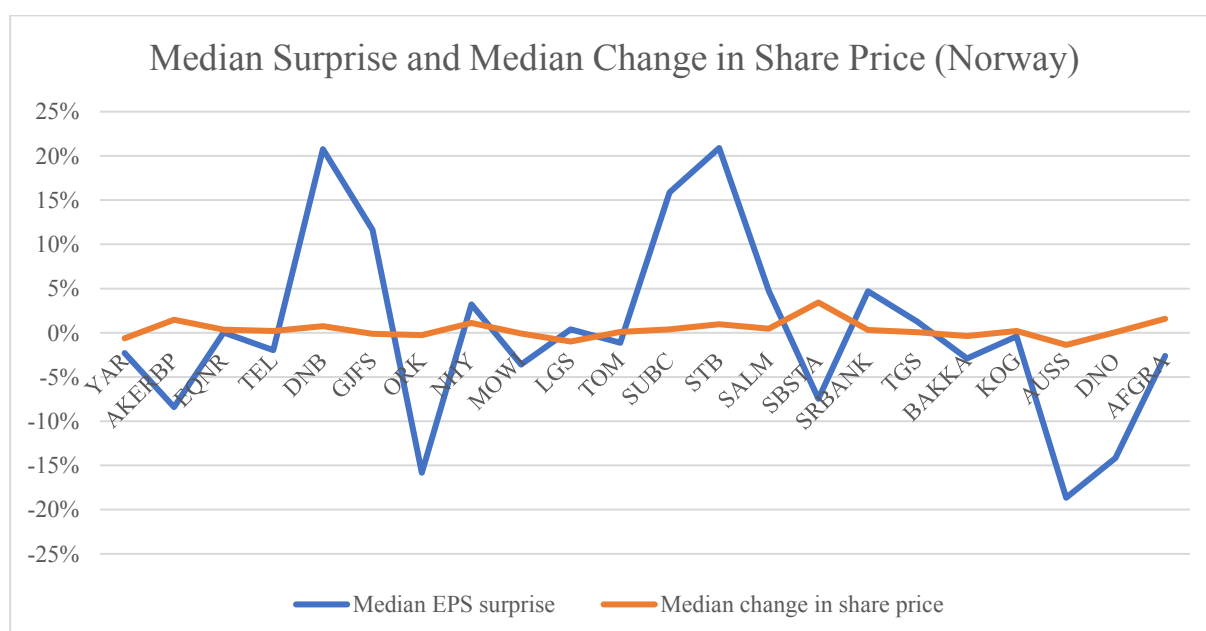
At the end of this paper is the master excel sheet located, as an appendix, where all the data used to make these figures can be found and examined more closely upon the readers wish.

## **4.3 Earnings Surprises and Share Prices**

The second research question related to how frequent does an earnings surprise and an increase in share price (and vice versa) happen, and how large are these effects? A sub

question was if correlation could be implied? The hypothesis for this study also stated that if there was an earnings surprise the natural result would be an increase in share price and vice versa for an earnings miss. The results for this part show that this is not always the case.

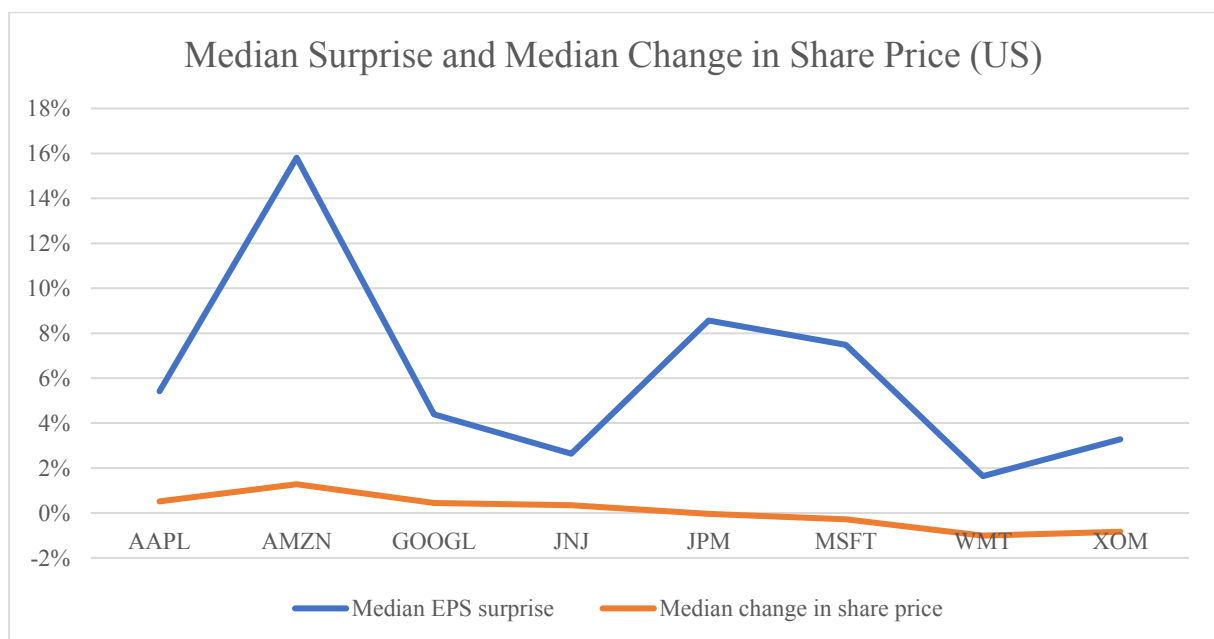
Just as the MAPE values for Norwegian companies vary significantly, so does the values for median surprises compared to median changes in share price, as the figure below illustrates. As there are several outliers in the data, the choice was made to focus on the median instead of average values for earnings surprises and misses, as some of these values vary extremely much (up to 412%) and would skew the results too much and distort any figure too much as well.



*Figure 4 Median Surprise and Median Change in Share Price for Norwegian Firms*

The first thing that becomes clear is that a strong positive or negative surprise does not guarantee an equally strong positive or negative change in a company's share price, after an earnings announcement. In fact, the percentage change in share prices compared to the percentage change in earnings surprises, is so low it's barely moving in this figure, and most of the values for the Norwegian companies fall in between -1,0% and 2,0%, which is also true for the average values. Compared to the median values for earnings surprises and misses, which lie in the region between -19% and 21%, there is a significant variation between companies, but the average values show an even more extreme variation which lie between -30% and 412%,

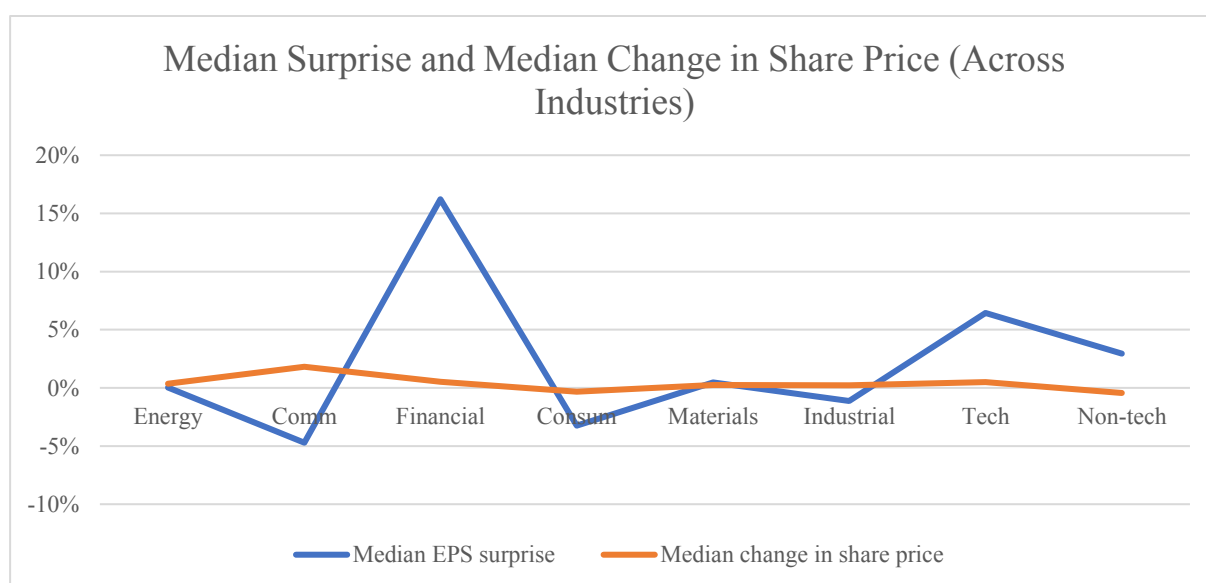
which is why the median values were chosen to more accurately represent the data. Thus, a company significantly beating or missing consensus earnings estimates does not seem to be significantly impacted on its share prices on the following day (T1) based on the firms in this sample. For two companies, Aker BP and Schibsted ser. A, results show that an earnings miss was followed by a positive change in share price, which is counterintuitive to the hypothesis of this study, that an earnings surprise must lead to an increase in share prices and vice versa for an earnings miss. This will be focused on more later. Financial services companies are the strongest performers in this sample. The next graph will show how the Norwegian companies compare to the American ones.



*Figure 5 Median Surprise and Median Change in Share Price for US Firms*

When compared to the previous figure for Norwegian companies, one thing becomes clear, the ability of Norwegian companies to beat or miss consensus earnings estimates varied significantly, but American companies as this figure shows, consistently beat earnings estimates (median value 4,90%, Norwegian median value -0,76%). Despite this, the median percentage change in share price remains negligible (median value 0,15%), in line with the results for the Norwegian companies. Data also show that the median surprise delta between American companies are much lower than for Norwegian companies, respectively between 3% and 16%, compared to -19% and 21%, so the few American firms in this sample are more consistent in beating consensus estimates. For comparison, to further highlight the extreme variation in the

average surprise values between the two countries, Norwegian companies had an average surprise of 29% with a standard deviation of 96%, while American firms managed an average surprise of 16% with a standard deviation of 22%, again showing more consistent results for the American sample compared to the Norwegian sample. US tech companies also seem to be performing better on average than non-tech companies. A question for later is why does US companies in this sample consistently beat earnings estimates compared to the Norwegian sample? The last figure will show how the median surprise and median change in share price compares across industries.

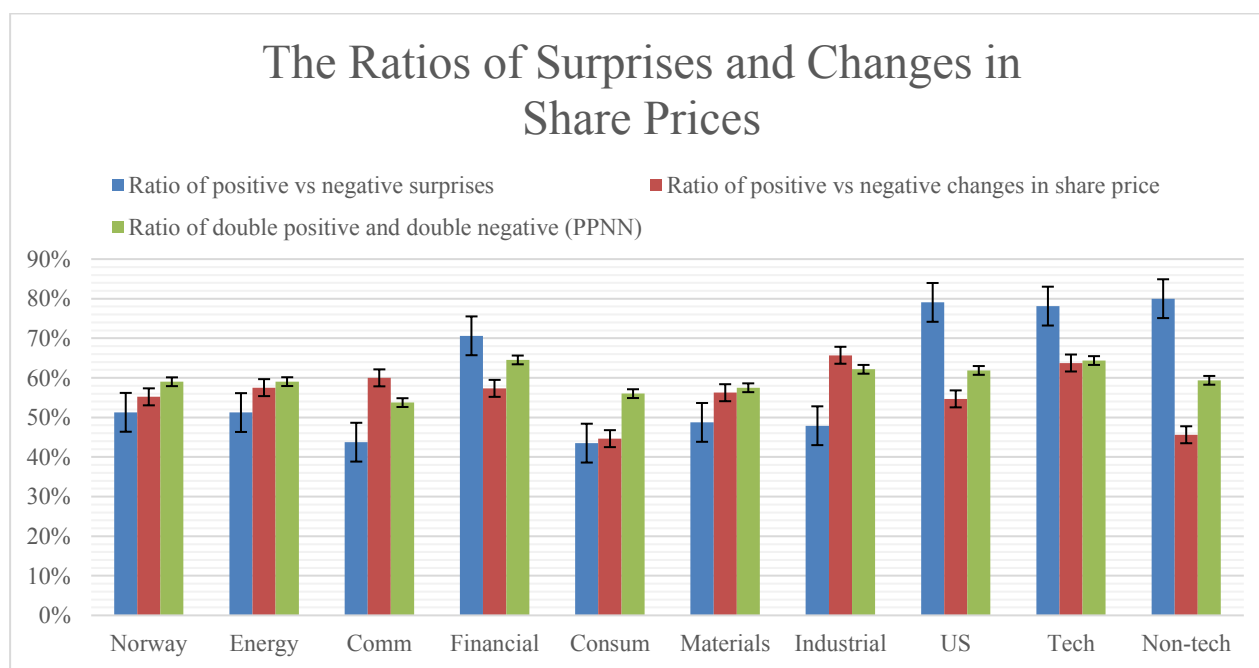


*Figure 6 Median Surprise and Median Change in Share Price Across Industries*

For all industries, it is the Norwegian financial industry that most significantly outperforms analyst's expectations (median surprise 16,22%). As the US non-tech sector only consists of one financial company it is difficult to make accurate comparisons, but JPMorgan Chase managed a median surprise of 8,57% in comparison. Next in line, of companies significantly outperforming market expectations, is the US tech companies which beat consensus estimates by a decent margin (median value 6,45%) as well as the non-tech companies in this sample (median value 2,96%). The other industrial sectors appear to struggle more with meeting market expectations, with the Norwegian companies in Communication Services and Consumer Staples, particularly failing to beat consensus estimates (respectively -4,71% and -3,24% median values). While Norwegian energy companies have a very low median surprise value (0,02%), it is the category with the largest delta (29%, values between -

14% and 15%). Consumer staples companies also had a fairly large delta (24%, values between -19% and 5%). In addition, these Norwegian industrial sectors had some of the highest MAPE values and lowest prediction accuracies as earlier established, while the Norwegian financial industry had a relatively low MAPE as well as the US and its sectors, which had the absolutely lowest values and most accurate earnings estimates by analysts. Thus, there seem to be a connection.

Even though the figure shows that financial services companies performed best on average and typically beat consensus estimates by a significant margin, the effect on the share price remained negligible (median change at 0,53%), but still positive for both median and average values which was in line with the hypothesis. But as some of the results have hinted to, this is not always the case, and to investigate this issue three more charts were made which highlights how the ratio between earnings surprises and misses are distributed as well as for changes in share prices, and how often these move together in the same direction (both positive or negative; “PPNN”), as the figure below illustrates.



*Figure 7 Ratios of Earnings Surprises, Positive Changes in Share Prices and “PPNN” for All Sectors (inc. Norway and US)*

This figure is very information dense, but it highlights important information about how earnings, share prices and these together relate and are distributed for all industries including the US and Norway, in addition to displaying the standard error for clarity’s sake.

The previous figures and results have highlighted the magnitude of earnings surprises and changes in share price after an announcement, but the first part of the second research question asked how frequent these earnings surprises or misses and increases or decreases in share prices happen and how often they happened simultaneously as if correlation could be implied if that number was high enough. This figure breaks all of this down by industrial sector and for the two countries in this study. Worth noting is that these ratios represent average values, as there were no outliers in the data, thus the median and average values were very similar.

The ratio for positive vs. negative surprises confirm what was previously shown, that the US sample firms, and for both tech and non-tech sectors, manage to outperform market expectations more frequently than Norwegian sample firms, where US firms manage in 79% of cases (quarters) through 10 years to perform better than consensus earnings estimates, compared to 51% for Norwegian sample firms. The financial services industry, as previously shown, consistently outperform the other industries in Norway as well.

The magnitude of an earnings surprise or miss has little effect on the percentage change in share prices previous results show, but in how many cases (quarters) does the share price increase or decrease for each sector after an earnings announcement? For the Norwegian sample firms there are more cases (quarters) where there is an increase in share prices compared to an earnings surprise (55% vs. 51%). For the US sample firms, it is the opposite, where there are more cases (quarters) of beating earnings surprises than increases in share prices (79% vs. 55%), which displays a sharper decline between the two metrics than for the increase for Norwegian sample firms. Overall the data shows that in general there are more cases (quarters) for Norwegian firms and sectors where an increase in share price happen more frequently than an earnings surprise, while for US sample firms and its sectors the opposite is true.

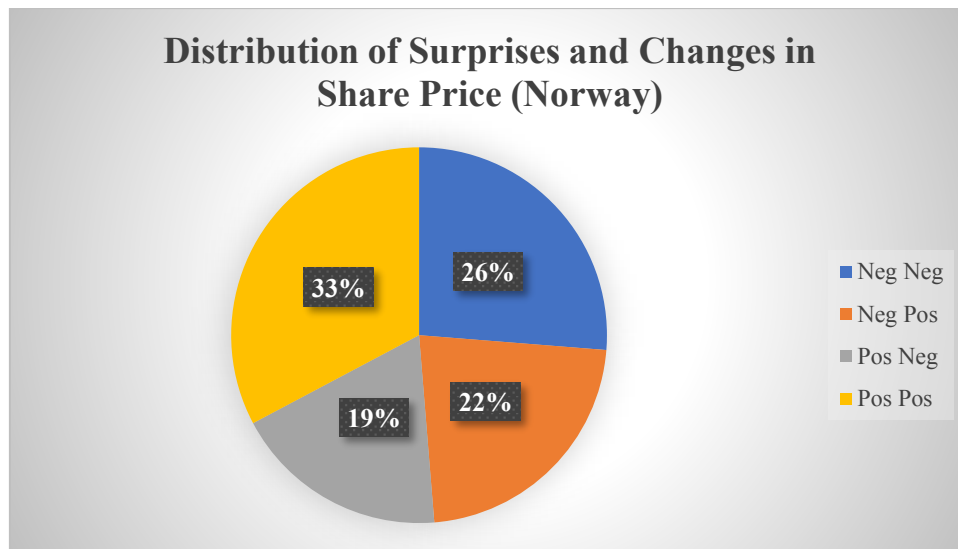
The last important metric to discuss is perhaps the most important one, especially in relation to the hypothesis, and second research question as explained on the previous page, underpinning this research. As it could be entirely random that an earnings surprise or miss happen in relation to an increase or decrease in share prices, this last ratio highlights in how many cases (quarters) do an earnings surprise and an increase in share price happen simultaneously and vice versa, referred to as the ratio of double positive or negative (“PPNN”). This ratio does not however prove correlation, as a regression analysis would have to be performed to establish that, involving several other important factors, which are also important



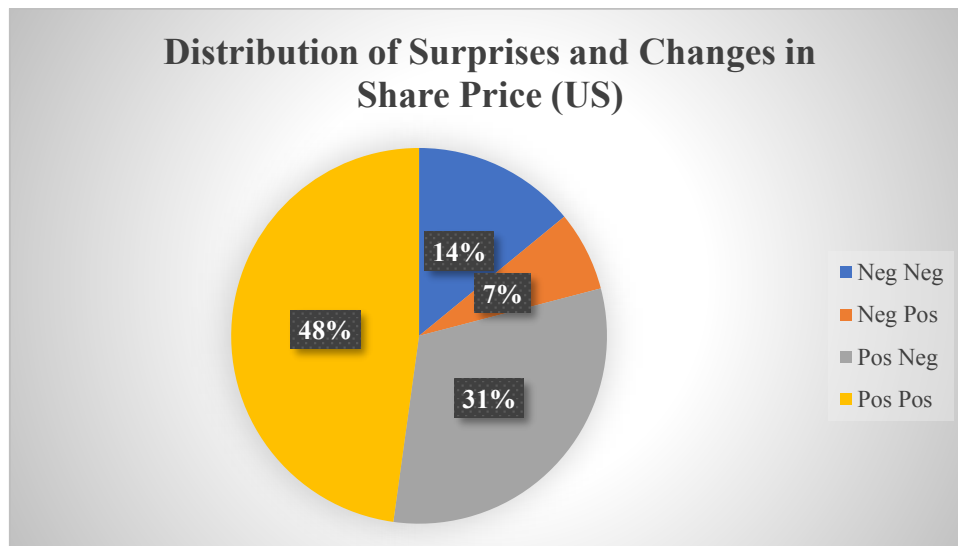
to analysts and investors alike, such as revenue, growth and dividends et cetera. This will be discussed more later on. Nonetheless it is an interesting metric to look at, and if numbers were sufficiently high could imply correlation, per the hypothesis that an earnings surprise results in an increase in share prices and vice versa.

The results are spread out, but nevertheless consistent. For Norwegian sample firms, the ratio of a double positive or negative (“PPNN”; earnings surprise and increase in share price or vice versa) is higher than for the individual metrics, at 59%. For US sample firms the same ratio is 62%, significantly lower than for the individual earnings surprise ratio, but still higher than the changes in share price ratio. This result is also similar for the tech and non-tech sectors while for the Norwegian industries the results are much more varied as the figure shows. Generally, the results for this ratio of double positive or negative across all industries and including Norway and the US, fall between 54% and 65%, which is not a sufficiently high number to imply correlation. Thus, on the low end it is a 50/50 chance that if an earnings surprise happens, the share price could move either way and vice versa for an earning miss. On the high end though, which is 65% for the Norwegian financial services industry and 64% for the US tech industry, there is a stronger possibility for an increase in share price given an earnings surprise or vice versa. Still this data is not sufficiently high to imply correlation, and a number of factors, as touched upon in the previous paragraph, could impact the movement of the share price after a quarterly result was known to investors regardless of the event of an earnings surprise or miss.

Two more figures further highlight the distribution of how an earnings surprise or miss relate to the movement of share prices. As already explained, the ratio of double positives and negatives was the most interesting metric as to study correlation, but this ratio is binary, and either a case of double positive or double negative happen or it does not. However, as the figures below illustrates, and as previous results have shown too, there are many cases where earnings and share prices move in opposite directions. Thus, the following figures highlight this distribution for both Norwegian and US sample firms.



*Figure 8 Distribution of relation between Earnings Surprises and Changes in Share Prices for Norwegian Sample Firms*



*Figure 9 Distribution of relation between Earnings Surprises and Changes in Share Prices for US Sample Firms*

As the figures show, there are more cases of an earnings surprise and an increase in share price (double positive or “Pos Pos”) for both US and Norwegian sample firms (respectively 48% and 33%) than for the other cases, where the US firms scores higher due to on average beating earnings estimates more often. For Norwegian companies the second largest metric is a double negative, while for US firms interestingly enough the second largest metric is “Pos Neg”, meaning an earnings surprise and a decline in share prices, thus running counter to the hypothesis. This could be due to US sample firms outperforming market expectations

more on average, thus more cases where other factors could impact the share price leading to a decrease in value. Comparingly a double negative only account for 14% of the distribution and cases (quarters). In 79% of cases (quarters) though US sample firms outperformed market expectations and beat estimates as previously discussed (“Pos Pos” plus “Pos Neg”; “PPNN”), which provides an important check that this distribution is correct and in line with the previous results. For both US and Norwegian sample firms, there are a significant portion of cases where an earnings surprise or miss is followed by the opposite movement in share prices (respectively 38% and 41%), thus correlation cannot be properly implied as the evidence of this is not strong enough, and there are many more financial factors and fundamentals at play in evaluating the correct valuation of shares for investors and analysts, than just earnings and profits even though these metrics are arguably the most important ones in showcasing how healthy a company’s bottom line remains at the end of each fiscal quarter.

#### **4.4 Summary of Earnings Surprises and Changes in Share Prices**

Thus, the results have shown that the hypothesis was not correct in the assessment that an earnings surprise would lead to an increase in share prices and vice versa. The hypothesis holds true only in 59% and 62% of cases (quarters) for the Norwegian and US sample firms respectively, therefore correlation cannot be strongly implied, but nonetheless the results are consistent. The second research question aimed to discover how frequent does an earnings surprise and an increase in share price (and vice versa) happen, and how large are these effects? The results showed that US sample firms and its sectors were able to beat consensus earnings estimates more frequently than the Norwegian sample firms and its sectors (79% for US and 51% for Norway), but for the US there were fewer quarters where share prices moved upward than downward for the sample firms, while for Norway the opposite was true (both at 55% respectively). Lastly, the data showed that even major earnings surprises or misses had negligible impact on the movement of share prices on the following day after a quarterly report (as little as a half percentage), as seen by the median values used (due to many outliers and extreme earnings surprise values that would skew and distort the data too much). However, using the average values also confirmed this assessment. At the end of this paper is the master excel sheet located, as an appendix, where all the data used to make these figures can be found and examined more closely upon the readers wish.

## 5 Discussion

### 5.1 Limitations of data gathering and own research

The strongest argument against the grounds of the research for this paper, is that it does not take into account any other factors that could influence the share price after a quarterly statement and report. Like previously stated earnings (EPS) is the one metric analysts especially pay attention to as it best showcases the profitability of a company, thus analysts spend a lot of time analyzing several factors in fundamentals so they can come up with estimates for earnings, which will help issuing guidance and buy and sell recommendations for their clients and other investors who are looking to invest in profitable companies. Thus, after a quarterly report, investors look for changes in the actual reported EPS as an indicator for the present and future profitability of the company. However, many other factors influence how the share price move after such an event, for instance other key financial metrics like revenues (sales), dividends, growth year-on-year (YoY), earning calls (providing additional information and perspectives from management) et cetera. These metrics are not included in this research but influences the value of share prices to a significant degree as well and provides some of the reason why the hypothesis of double positive or double negative (“PPNN”) is not correct as the results show. In addition, any news events about new products with high growth potential or competitors’ financial results, which can significantly change the distribution of market share between competing firms, are not included as a separate variable in the data. This will be discussed further in the next section.

There are also room for errors in the data gathering itself, as the methodology of the research meant sifting through 10 years of data (or close to it) for all of the sample companies. Manually copying and entering share price data for each date before and after a quarterly result, may have led to the incorrect date being used, although that risk is minimal as certain checks were implemented to make sure the data ranges aligned correctly, it is nevertheless important to point out.

More importantly, one of the criteria for being included in the samples was that any company should not exhibit significant holes in their historical data, and all of the companies included in this research passed those criteria, however there were several cases where the last available date with share prices was not the last date before a quarterly results announcement,

or on the opposite where the date after the announcement was not the first available date with share price data, so some small degree of variation in the share prices could impact the results for each company, however for aggregated results the impact would be negligible. This data collection issue, however, proved hard to mitigate or eliminate, as even Eikon, with its vast financial database, displayed small holes in data for share prices, EPS and estimates, here and there. In the cases where some data, such as specific dates for EPS announcements, was lacking, the data was confirmed and extracted directly from quarterly reports, but this however was only an issue very few times. If all the companies with these small data holes were to be eliminated from the samples, there would be very few left to do research on.

For a few Norwegian companies, namely Equinor, Yara and Aker BP, the actual EPS was listed in American dollars (USD), with the share prices in Norwegian kroner (NOK). At first this was believed to be an issue, but after analyzing the companies, the results were in line with other sample firms, and it was deemed that it was important to include these three companies in the Norwegian sample, due to their market capitalization and the industries they are located in. However, there might be some small variation in results compared to if the actual EPS was listed in kroner, although this is an unknown, and how this relates to the changes in share prices which was also listed in kroner. The EPS estimates provided by analysts were also in dollars, thus in relation to MAPE and prediction accuracy there are no issues with the results, and on aggregate, the impact from EPS in dollars and share prices in NOK, would be miniscule and probably negligible. The reason for EPS being listed in dollars is that some of these companies have operations in the US, like Yara and Equinor, and thus issue quarterly reports for the American stock market as well with values listed in dollars. Why Eikon uses these two currencies for certain financial data together for these Norwegian companies is difficult to understand, however the overall effect on the results and the discrepancies this cause, are on aggregate miniscule and should be negligible.

The last important point to discuss is how sample size may have influenced the results. The Norwegian sample, with its 22 companies in various industries, should quite accurately paint a correct picture of analysts' prediction accuracy, earnings surprises and changes in share prices, although, as touched upon before, the sample is fairly skewed towards salmon and oil related companies, which does impact the aggregate results, for instance pushing the median and average values for prediction accuracy upwards due to the high MAPE values for the energy and consumer staples sectors, although this is also a result of both of these industries being

particularly susceptible to demand and supply shocks, thus heavily influencing sales prices and company revenue per quarter, resulting in more risk and making it more difficult to create accurate predictions for earnings. However, due to the data collection methodology, which was based on selecting companies based on their market capitalization, this is not an issue one can circumvent, as the Norwegian economy and stock market is significantly skewed towards commodities related companies, such as oil and salmon, in other words one can therefore say that the current results do paint an accurate picture of certain financial metrics for the Norwegian stock market. However, one cannot say this for the American sample, as it only involves 8 companies, where four of them are tech related. Like previously stated, the high-end of market capitalization for US firms, is also significantly skewed towards information technology, however the sample in this study only consists of 8 companies and thus does not provide enough data and variation to make any conclusions about the US stock market. As pointed out in the methodology section, that was not the intention either however, as the US sample was meant to be a benchmark or control group, and something meaningful to compare the Norwegian firms to, which provided for a more interesting comparison and results section, and thus creating better context for the results of the Norwegian sample. There is no denying however that more American companies would improve the research and comparisons, for instance if more financial services and oil related companies were included, to compare to the Norwegian counterparts.

## **5.2 More about the results**

As established in the results section, earnings prediction accuracy was much higher for American sample companies and the majority of this effect was attributed to the higher number of analysts following each company in the US stock market. Another possible explanation was that US analysts were more reliable in their predictions and had a better track record due to more experience and a larger knowledge base to draw from. How correct is this assessment? By looking into estimate details in Excel for select companies, specifically the biggest tech, financial and oil firms, where each analyst from a brokerage or bank providing an EPS estimate, is given a rating score from one to five stars based on their previous performance and accuracy, it shows that the earnings accuracy of analysts following American firms are noticeably more accurate, but mostly in the way that there are more 4 or 5 star rated analysts per American firm than there are for Norwegian firms, who often have very few analysts with

such high rating and instead a number of analysts with more or less a three star rating on average. Numerous studies have already examined how analysts' past forecast accuracy influences current forecast accuracy (Brown, 2001 & Sinha, Brown and Das, 1997), and there is a correlation between the two, thus a higher number of analysts with a higher reliability rating should make better predictions. This could help explain the results, showing that prediction accuracy for American firms were much better, due to higher accuracy rating between analysts and the higher number of analysts following each company, leading to better estimates on average.

Another interesting question posed by the results, which is also in relation to prediction accuracy, is why do US companies in this sample consistently beat earnings estimates compared to the Norwegian sample? Or in other words, what is the reason for this discrepancy in the ability of some companies to consistently perform better on average than the consensus estimates, compared between Norway and the US? Are financial analysts in America more conservative with their estimates than their Norwegian counterparts, leading to the companies in this sample significantly outperforming earnings expectations, although this would run counter to the fact that earnings estimates for US companies in this sample are significantly more accurate than for Norwegian companies, thus if US analysts were more conservative in their estimate it would reflect itself on MAPE values and the prediction accuracy on average whenever a company like Apple had an especially strong quarter, making the actual EPS vary significantly from the estimate and thus increasing MAPE values, leading to worse prediction accuracy on average. In addition, as previously discussed in the prediction accuracy section, it is unlikely that American financial analysts are more conservative than their Norwegian counterparts, leading to these American companies more easily beating market expectations, rather it is more likely that Norwegian financial analysts are too optimistic due to less experience, smaller knowledge base or shorter financial history of companies to draw data from to help make better predictions in the future, if that company has been located in a stable mature industry. However other research shows that US analysts indeed tend to be too optimistic about the earnings of companies they follow, and after the initial EPS estimate, they gradually revise the estimate downwards during the year (Chopra, 1998). Thus, it is likely that Norwegian analysts tend to show the same type of optimism bias, even though they are less accurate in their predictions. Another possible explanation of how US sample firms continually deliver earnings surprises, might be in how management uses investor guidance to downplay earnings for next quarter, making it easier to deliver an earnings surprise and thus making management

look better in the eyes of investors, providing better returns in the future.<sup>13</sup> This might be something management of US firms are better at than management of Norwegian firms, especially due to a larger focus on forecasts in the US than in Norway, given the weight it has in financial news and among analysts. Other researchers have further examined in what way analysts' bias influence their forecasts and how this reflects on companies' earnings on how they over or underperform according to market expectations (Abarbanell and Lehavy, 2003).

Some other possible explanations could be the US sample firms' financial strength and the fact that they have many times bigger market capitalizations and different divisions with unique revenue streams, than the Norwegian sample firms in this study, in addition to being stronger multinational corporations, and better vertically and horizontally integrated, with a bigger revenue base thus stronger earnings. This could help explain the big difference in the ability of the US sample firms in beating consensus estimates more often than the Norwegian sample firms, as the risk of failure in revenues streams are not as prevalent for the US firms due to their size and business reach compared to Norwegian firms, which are skewed towards commodities. Although the Norwegian sample is almost three times bigger than the US sample, providing more possibilities of companies with frequent earnings misses, this explanation seems probable as the Norwegian sample firms also have lower market capitalizations, are not as vertically or horizontally integrated, thus being unable to squeeze every drop of profit from their business in comparison with their American counterparts, and are more susceptible to demand or supply shocks depending on which industry they are located in, which is a great risk in commodity related industries such as salmon and oil. Tech firms on the other hand are not as susceptible to these factors, especially to seasonal variations which could greatly affect output for commodity industries and greatly impact revenue streams and earnings.

Why are the changes in share price so miniscule compared to the significant earnings surprises or misses for some companies? Taking into account that the results presented mainly discussed median values, and that the average values were higher, there was still a significant difference between earnings surprises or misses and changes in share prices. Research done by McKinsey show that the market actually does not care that much about how well a company meets or misses earnings expectations, unless it happens repeatedly, otherwise missing a

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13 <https://www.spglobal.com/marketintelligence/en/news-insights/research/what-does-earnings-guidance-tell-us>



consensus estimate by 1% would lead to a 0,2% decrease in share prices after 5 days from the earnings announcement. In fact, according to their research, companies often miss consensus estimates, in fact more than 40%, which is sort of in line with the results in this study, which was 21% for the US sample and 49% for the Norwegian sample, but McKinsey's sample consisted of 266 US companies, so it would be significantly less skewed towards tech companies which display especially strong fundamentals. Another important remark was that changes in forecasted EPS are more important than beating earnings estimates, and in addition, a company's fundamentals are more important to investors than meeting or beating consensus estimates, which help explain how the share prices and earnings don't always move in the same direction as hypothesized in this paper and discussed previously. For instance, PPG industries which are a global supplier of chemicals, announce they missed consensus estimates by 4%, the share price rose 7%, which was due to the company's long-term outlook improving in addition to stronger than expected sales and new investment initiatives. In conclusion McKinsey urged companies, and management who are more stressed about meeting market expectations every quarter, to focus on growth and returns, instead of employing tactics to boost sales at the end of every quarter in order to meet consensus estimates.<sup>14</sup>

Lastly, as discussed previously as well, other factors like revenue, growth, return on invested capital and assets, in addition to other important fundamentals, are not included as variables in this research. Neither are important news events, guidance corrections or new product launches, which might all happen outside of the time windows for quarterly reports but have a significant impact on the movement of share prices. All of these factors influence the value of share prices to some degree and by utilizing more statistical methods like regression analysis one could examine more closely the correlation between these factors and the movement of share prices and find out which one is actually more important. Doing such a comprehensive research would be a considerable undertaking however, and might be more suitable for further research as part of a Ph.D degree or postdoctoral work. Nonetheless the results presented in this paper present interesting insights about analysts, prediction accuracy, earnings surprises or misses, changes in share prices and the frequency of these for the companies in the US and Norwegian samples and across industries. For the Norwegian sample these results paint a broader picture for the Norwegian stock market as a whole and for instance

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<sup>14</sup> <https://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/avoiding-the-consensus-earnings-trap>

show there is potential for improvements in the accuracy of Norwegian analysts' earnings estimates compared to their American counterparts.

## 6 Conclusion

The results show that US financial analysts are on average significantly more accurate in their earnings forecasts, than their Norwegian counterparts, which is shown to have a connection with the number of estimates per quarter, as well as strong indications that the earnings ratings of analysts also matter to a certain degree. US sample firms were also significantly more consistent in beating earnings estimates, but although the hypothesis was that an earnings surprise would lead to an increase in share prices and vice versa, no strong correlation can be implied and the effect of an earnings surprise, or vice versa, on share prices is shown to be relatively negligible. The size and financial strength of the US sample companies could be one explanation for how they consistently outperform market expectations, in addition it cannot be ruled out that financial analysts tend to be too optimistic about the companies they follow, which could explain how Norwegian analysts deliver fairly inaccurate earnings estimates on average. Due to many outliers and extreme values in the samples, the average value however is seldom used, instead median values are used due to their robustness and resilience against these outliers.

As a summary, the initial hypothesis for this study was proven wrong, no strong correlation can be implied between earnings surprises and increases in share prices, as there are too many other factors which can impact the price movement after a quarterly announcement. The first and second research questions were also answered, which show that especially Norwegian analysts perform poorly when it comes to earnings forecasts, in the majority of industries studied. Secondly, the magnitude of increases or decreases in a company's share price after a quarterly result is known, is miniscule no matter how large the earnings surprise or miss was. Lastly, the movement of share prices are unpredictable, and in many cases they moved in the opposite way of the earnings result, making it difficult to profit from buying shares or shorting a company in advance of a new quarterly result, which would become a risk-free profit maximizing investment strategy that cannot exist in efficient markets, as we assume the stock market is for this research.

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## Appendixes

The data sheet below was used to make all of the figures in the results section. This data sheet is the result of the data gathering from all 30 companies in this thesis.

“PPNN” refers to the ratio of double positives and double negatives.

### A. Raw data of Norwegian firms

Norway	Med Sur	Av Sur	St Dev	Ratio Sur	Med Chng	Av Chng	St Dev	Ratio Chng	PPNN	MAPE	Est#
YAR	-2,3 %	-1,3 %	30,9 %	42,5 %	-0,6 %	0,3 %	4,4 %	47,5 %	50,0 %	21,7 %	14
AKERBP	-8,4 %	412,8 %	1771,9 %	41,7 %	1,5 %	1,9 %	5,7 %	63,9 %	61,1 %	175,2 %	8
EQNR	0,0 %	-6,8 %	55,4 %	52,5 %	0,4 %	0,4 %	3,1 %	57,5 %	65,0 %	87,7 %	16
TEL	-2,0 %	4,4 %	45,5 %	50,0 %	0,2 %	-0,2 %	3,6 %	50,0 %	60,0 %	57,6 %	9
DNB	20,8 %	22,2 %	22,1 %	85,0 %	0,8 %	0,9 %	4,3 %	60,0 %	70,0 %	20,5 %	14
GJFS	11,7 %	9,6 %	27,6 %	62,5 %	-0,1 %	-0,6 %	5,0 %	46,9 %	65,6 %	19,4 %	10
ORK	-15,8 %	-29,5 %	93,0 %	30,0 %	-0,3 %	-0,7 %	3,8 %	42,5 %	52,5 %	64,9 %	8
NHY	3,2 %	10,3 %	86,6 %	55,0 %	1,1 %	0,6 %	3,8 %	65,0 %	65,0 %	45,5 %	11
MOWI	-3,6 %	-4,9 %	54,1 %	42,5 %	-0,1 %	0,2 %	3,6 %	50,0 %	42,5 %	60,5 %	9
LGS	0,4 %	6,6 %	58,8 %	50,0 %	-1,0 %	-1,2 %	2,3 %	32,5 %	62,5 %	43,7 %	8
TOM	-1,1 %	1,8 %	18,2 %	47,5 %	0,1 %	0,8 %	3,9 %	55,0 %	62,5 %	12,7 %	6
SUBC	15,9 %	25,7 %	61,2 %	64,5 %	0,4 %	0,7 %	4,0 %	61,3 %	51,6 %	56,3 %	13
STB	20,9 %	37,9 %	96,8 %	75,0 %	1,0 %	0,4 %	5,3 %	60,0 %	65,0 %	45,1 %	7
SALM	4,7 %	3,7 %	25,4 %	57,5 %	0,5 %	1,0 %	4,1 %	65,0 %	62,5 %	21,1 %	9
SBSTA	-7,4 %	-20,1 %	140,0 %	37,5 %	3,4 %	3,4 %	7,0 %	70,0 %	47,5 %	89,3 %	8
SRBANK	4,7 %	9,9 %	32,0 %	60,0 %	0,3 %	0,8 %	2,7 %	62,5 %	57,5 %	12,7 %	6
TGS	1,3 %	-0,4 %	99,4 %	55,0 %	0,1 %	-0,1 %	5,0 %	52,5 %	57,5 %	35,3 %	13
BAKKA	-2,9 %	-0,9 %	35,5 %	48,6 %	-0,4 %	-0,1 %	4,6 %	42,9 %	48,6 %	498,3 %	7
KOG	-0,4 %	-1,9 %	39,5 %	47,5 %	0,2 %	0,2 %	4,0 %	57,5 %	65,0 %	32,6 %	7
AUSS	-18,6 %	-30,4 %	129,9 %	32,5 %	-1,4 %	-1,7 %	3,2 %	35,0 %	67,5 %	82,7 %	5
DNO	-14,2 %	191,7 %	1476,5 %	42,5 %	0,1 %	0,5 %	5,0 %	52,5 %	60,0 %	129,4 %	6
AFGRA	-2,6 %	3,6 %	35,8 %	48,7 %	1,6 %	1,9 %	2,4 %	84,6 %	59,0 %	68,0 %	4
Median	-0,8 %	3,7 %	54,7 %	49,4 %	0,2 %	0,4 %	4,0 %	56,3 %	60,6 %	50,9 %	8
Average	0,2 %	29,3 %	201,6 %	51,3 %	0,3 %	0,4 %	4,1 %	55,2 %	59,0 %	76,4 %	9
St Dev	10,4 %	96,0 %	464,0 %	12,9 %	1,0 %	1,1 %	1,1 %	11,8 %	7,3 %	102,2 %	3

### B. Raw data of US firms

U.S.	Med Sur	Av Sur	St Dev	Ratio Sur	Med Chng	Av Chng	St Dev	Ratio Chng	PPNN	MAPE	Est#
AAPL	5,4 %	11,4 %	15,3 %	90,0 %	0,5 %	0,2 %	1,4 %	57,5 %	62,5 %	10,0 %	41
AMZN	15,8 %	76,3 %	287,2 %	70,0 %	1,3 %	1,2 %	3,0 %	72,5 %	72,5 %	56,1 %	35
GOOGL	4,4 %	3,9 %	8,4 %	65,0 %	0,4 %	0,4 %	2,0 %	60,0 %	55,0 %	6,5 %	37
JNJ	2,6 %	2,8 %	1,9 %	100,0 %	0,3 %	0,0 %	2,0 %	47,5 %	47,5 %	2,7 %	17
JPM	8,6 %	25,5 %	92,3 %	85,0 %	0,0 %	0,1 %	2,3 %	45,0 %	55,0 %	12,4 %	25
MSFT	7,5 %	8,4 %	9,9 %	87,5 %	-0,3 %	0,5 %	1,7 %	65,0 %	67,5 %	8,8 %	28
WMT	1,6 %	2,0 %	3,0 %	75,0 %	-1,0 %	0,1 %	4,1 %	47,5 %	67,5 %	2,7 %	25
XOM	3,3 %	3,4 %	15,7 %	60,0 %	-0,8 %	-0,6 %	2,0 %	42,5 %	67,5 %	11,5 %	19
Median	4,9 %	6,1 %	12,6 %	80,0 %	0,1 %	0,1 %	2,0 %	52,5 %	65,0 %	9,4 %	27
Average	6,2 %	16,7 %	54,2 %	79,1 %	0,1 %	0,2 %	2,3 %	54,7 %	61,9 %	13,9 %	28
St Dev	4,6 %	22,5 %	88,0 %	12,1 %	0,7 %	0,5 %	0,8 %	9,5 %	7,6 %	15,5 %	8



### C. Raw data arranged by Companies and Their Industry Sectors

Energy	Med Sur	Av Sur	St Dev	Ratio Sur	Med Chng	Av Chng	St Dev	Ratio Chng	PPNN	MAPE	Est#
EQNR	0,0 %	-6,8 %	55,4 %	52,5 %	1,5 %	0,4 %	3,1 %	57,5 %	65,0 %	87,7 %	16
AKERBP	-8,4 %	412,8 %	1771,9 %	41,7 %	0,4 %	1,9 %	5,7 %	63,9 %	61,1 %	175,2 %	8
SUBC	15,9 %	25,7 %	61,2 %	64,5 %	0,4 %	0,7 %	4,0 %	61,3 %	51,6 %	56,3 %	13
TGS	1,3 %	-0,4 %	99,4 %	55,0 %	0,1 %	-0,1 %	5,0 %	52,5 %	57,5 %	35,3 %	13
DNO	-14,2 %	191,7 %	1476,5 %	42,5 %	0,1 %	0,5 %	5,0 %	52,5 %	60,0 %	129,4 %	6
Median	0,0 %	25,7 %	99,4 %	52,5 %	0,4 %	0,5 %	5,0 %	57,5 %	60,0 %	87,7 %	13
Average	-1,1 %	124,6 %	692,9 %	51,2 %	0,5 %	0,7 %	4,5 %	57,5 %	59,0 %	96,8 %	11
St Dev	11,4 %	180,4 %	856,7 %	9,5 %	0,6 %	0,7 %	1,0 %	5,1 %	5,0 %	56,4 %	4
Comm	Med Sur	Av Sur	St Dev	Ratio Sur	Med Chng	Av Chng	St Dev	Ratio Chng	PPNN	MAPE	Est#
TEL	-2,0 %	4,4 %	45,5 %	50,0 %	0,2 %	-0,2 %	3,6 %	50,0 %	60,0 %	57,6 %	9
SBSTA	-7,4 %	-20,1 %	140,0 %	37,5 %	3,4 %	3,4 %	7,0 %	70,0 %	47,5 %	89,3 %	8
Median	-4,7 %	-7,8 %	92,8 %	43,8 %	1,8 %	1,6 %	5,3 %	60,0 %	53,8 %	73,4 %	9
Average	-4,7 %	-7,8 %	92,8 %	43,8 %	1,8 %	1,6 %	5,3 %	60,0 %	53,8 %	73,4 %	9
St Dev	3,9 %	17,4 %	66,8 %	8,8 %	2,3 %	2,5 %	2,4 %	14,1 %	8,8 %	22,4 %	1
Financial	Med Sur	Av Sur	St Dev	Ratio Sur	Med Chng	Av Chng	St Dev	Ratio Chng	PPNN	MAPE	Est#
DNB	20,8 %	22,2 %	22,1 %	85,0 %	0,8 %	0,9 %	4,3 %	60,0 %	70,0 %	20,5 %	14
GJFS	11,7 %	9,6 %	27,6 %	62,5 %	-0,1 %	-0,6 %	5,0 %	46,9 %	65,6 %	19,4 %	10
STB	20,9 %	37,9 %	96,8 %	75,0 %	1,0 %	0,4 %	5,3 %	60,0 %	65,0 %	45,1 %	7
SRBANK	4,7 %	9,9 %	32,0 %	60,0 %	0,3 %	0,8 %	2,7 %	62,5 %	57,5 %	12,7 %	6
Median	16,2 %	16,1 %	29,8 %	68,8 %	0,5 %	0,6 %	4,6 %	60,0 %	65,3 %	19,9 %	9
Average	14,5 %	19,9 %	44,6 %	70,6 %	0,5 %	0,4 %	4,3 %	57,3 %	64,5 %	24,4 %	9
St Dev	7,8 %	13,3 %	35,0 %	11,6 %	0,5 %	0,7 %	1,1 %	7,1 %	5,2 %	14,2 %	4
Consum	Med Sur	Av Sur	St Dev	Ratio Sur	Med Chng	Av Chng	St Dev	Ratio Chng	PPNN	MAPE	Est#
MOWI	-3,6 %	-4,9 %	54,1 %	42,5 %	-0,3 %	0,2 %	3,6 %	50,0 %	42,5 %	60,5 %	9
ORK	-15,8 %	-29,5 %	93,0 %	30,0 %	-0,1 %	-0,7 %	3,8 %	42,5 %	52,5 %	64,9 %	8
SALM	4,7 %	3,7 %	25,4 %	57,5 %	-1,0 %	1,0 %	4,1 %	65,0 %	62,5 %	21,1 %	9
LGS	0,4 %	6,6 %	58,8 %	50,0 %	0,5 %	-1,2 %	2,3 %	32,5 %	62,5 %	43,7 %	8
BAKKA	-2,9 %	-0,9 %	35,5 %	48,6 %	-0,4 %	-0,1 %	4,6 %	42,9 %	48,6 %	498,3 %	7
AUSS	-18,6 %	-30,4 %	129,9 %	32,5 %	-1,4 %	-1,7 %	3,2 %	35,0 %	67,5 %	82,7 %	5
Median	-3,2 %	-2,9 %	56,4 %	45,5 %	-0,3 %	-0,4 %	3,7 %	42,7 %	57,5 %	62,7 %	8
Average	-6,0 %	-9,2 %	66,1 %	43,5 %	-0,4 %	-0,4 %	3,6 %	44,6 %	56,0 %	128,5 %	8
St Dev	9,3 %	16,5 %	38,9 %	10,7 %	0,7 %	1,0 %	0,8 %	11,8 %	9,7 %	182,3 %	2
Materials	Med Sur	Av Sur	St Dev	Ratio Sur	Med Chng	Av Chng	St Dev	Ratio Chng	PPNN	MAPE	Est#
YAR	-2,3 %	-1,3 %	30,9 %	42,5 %	-0,6 %	0,3 %	4,4 %	47,5 %	50,0 %	21,7 %	14
NHY	3,2 %	10,3 %	86,6 %	55,0 %	1,1 %	0,6 %	3,8 %	65,0 %	65,0 %	45,5 %	11
Median	0,5 %	4,5 %	58,7 %	48,8 %	0,2 %	0,4 %	4,1 %	56,3 %	57,5 %	33,6 %	13
Average	0,5 %	4,5 %	58,7 %	48,8 %	0,2 %	0,4 %	4,1 %	56,3 %	57,5 %	33,6 %	13
St Dev	3,9 %	8,2 %	39,4 %	8,8 %	1,2 %	0,2 %	0,4 %	12,4 %	10,6 %	16,8 %	2
Industria	Med Sur	Av Sur	St Dev	Ratio Sur	Med Chng	Av Chng	St Dev	Ratio Chng	PPNN	MAPE	Est#
TOM	-1,1 %	1,8 %	18,2 %	47,5 %	0,1 %	0,8 %	3,9 %	55,0 %	62,5 %	12,7 %	6
KOG	-0,4 %	-1,9 %	39,5 %	47,5 %	0,2 %	0,2 %	4,0 %	57,5 %	65,0 %	32,6 %	7
AFGRA	-2,6 %	3,6 %	35,8 %	48,7 %	1,6 %	1,9 %	2,4 %	84,6 %	59,0 %	68,0 %	4
Median	-1,1 %	1,8 %	35,8 %	47,5 %	0,2 %	0,8 %	3,9 %	57,5 %	62,5 %	32,6 %	6
Average	-1,4 %	1,2 %	31,2 %	47,9 %	0,6 %	1,0 %	3,4 %	65,7 %	62,2 %	37,7 %	6
St Dev	1,1 %	2,8 %	11,4 %	0,7 %	0,8 %	0,9 %	0,9 %	16,4 %	3,0 %	28,0 %	2

Tech	Med Sur	Av Sur	St Dev	Ratio Sur	Med Chng	Av Chng	St Dev	Ratio Chng	PPNN	MAPE	Est#
AAPL	5,4 %	11,4 %	15,3 %	90,0 %	0,5 %	0,2 %	1,4 %	57,5 %	62,5 %	10,0 %	41
AMZN	15,8 %	76,3 %	287,2 %	70,0 %	1,3 %	1,2 %	3,0 %	72,5 %	72,5 %	56,1 %	35
GOOGL	4,4 %	3,9 %	8,4 %	65,0 %	0,4 %	0,4 %	2,0 %	60,0 %	55,0 %	6,5 %	37
MSFT	7,5 %	8,4 %	9,9 %	87,5 %	-0,3 %	0,5 %	1,7 %	65,0 %	67,5 %	8,8 %	28
Median	6,4 %	9,9 %	12,6 %	78,8 %	0,5 %	0,5 %	1,8 %	62,5 %	65,0 %	9,4 %	36
Average	8,3 %	25,0 %	80,2 %	78,1 %	0,5 %	0,6 %	2,0 %	63,8 %	64,4 %	20,4 %	35
St Dev	5,2 %	34,3 %	138,1 %	12,5 %	0,6 %	0,4 %	0,7 %	6,6 %	7,5 %	23,9 %	5
Non-tech	Med Sur	Av Sur	St Dev	Ratio Sur	Med Chng	Av Chng	St Dev	Ratio Chng	PPNN	MAPE	Est#
JNJ	2,6 %	2,8 %	1,9 %	100,0 %	0,3 %	0,0 %	2,0 %	47,5 %	47,5 %	2,7 %	17
JPM	8,6 %	25,5 %	92,3 %	85,0 %	0,0 %	0,1 %	2,3 %	45,0 %	55,0 %	12,4 %	25
WMT	1,6 %	2,0 %	3,0 %	75,0 %	-1,0 %	0,1 %	4,1 %	47,5 %	67,5 %	2,7 %	25
XOM	3,3 %	3,4 %	15,7 %	60,0 %	-0,8 %	-0,6 %	2,0 %	42,5 %	67,5 %	11,5 %	19
Median	3,0 %	3,1 %	9,4 %	80,0 %	-0,4 %	0,0 %	2,2 %	46,3 %	61,3 %	7,1 %	22
Average	4,0 %	8,4 %	28,2 %	80,0 %	-0,4 %	-0,1 %	2,6 %	45,6 %	59,4 %	7,3 %	21
St Dev	3,1 %	11,4 %	43,1 %	16,8 %	0,6 %	0,3 %	1,0 %	2,4 %	9,9 %	5,4 %	4