FIN11 – Trading and Market Microstructure

POTENTIAL TRENDS ON THE OSLO STOCK EXCHANGE

s145362 – Ba-Can Kevin Doan Vo
s145131 – Emil Westli
s155177 – Ørjan Rykkje
s145259 – Håkon Andreas Rykkje

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INTRODUCTION

"Sell in May and go away" is a well-known adage in the trading industry. The adage tells the investors to sell their stock holdings in May, and come back in November, to avoid seasonal decline in equity markets. Although research has shown that the effect is strongest in the European countries (Bouman & Jacobsen, 2002), it is not necessarily the best approach to maximize profit in the Norwegian stock market. *Therefore, based on the essence of the "Sell in May and go away"-adage, we will conduct an analysis with the intent of locating potential trends within the different industries on the Oslo Stock Exchange, and test them for the 2011-2015 period.*

In order to look for trends within each of the different industries, we need to extract data from each stock on Oslo Stock Exchange. Our analysis will be based on data from the 15-year period 1st of January 2001 to 31st of December 2015. We will start off by locating potential trends in the first ten years, between the 1st of January 2001 and the 31st of December 2010. If we manage to locate any potential trends, they will serve as the foundation when forging possible strategies. Then we will test the strategies by applying them to the 2011-2015 period. By comparing and testing whether the potential trends identified for the first period corresponds with the development in the following five years, we will be able to say something about the credibility and persistence of the potential trends in the market.

SOURCE DATA

For our analysis, we gathered source data for all stocks listed on the OSE within the period 1st of January 2011 to 31st of December 2015. We acquired the data we needed from the program "Bloomberg Terminal". This is a service where users can monitor and analyse the financial market in real time, but also collect obsolete financial data. The first piece of information we extracted was the "last price" for each stock on the market. We also imported OSEBX (Oslo Stock Exchange Benchmark Index) because it gives us information about the general market development. This Index includes a representative sample of all listed stocks on OSE. By extracting data on OSEBX, we would also have the opportunity to compare the performance of each individual industry to the Norwegian stock market.

The Bloomberg Terminal has a function that links the extracted data directly to Microsoft Excel, which meant we could transfer all our data here for further analysis and filtering. After the desired information was imported to Microsoft Excel, we used various tools, such as PowerPivot, to filter and link all the information together. This allowed us to create a data-model that could sort and categorize the stocks by their respective industries.

THOUGHTS AND EXPECTATIONS

According to Investopedia (2016), trends differ from one country to another, which implies that there should be trends occurring in the Norwegian market that are more prominent here than elsewhere. The purpose of our analysis is to locate these potential trends based on historical data, and to test whether they comply in the following years or not.

There are also a couple of factors that we have to take into consideration when conducting the analysis. Our analysis will be somewhat limited because we base it exclusively on the development of the stock price for each stock in each industry alone. This means we will leave out external factors that might also affect a person's trading habits, like the brokerage fees, taxes and other accruing costs. This is merely because the factors would influence the results with variations depending on the exact magnitude of the trades. This will again depend on the person doing the trading. This is of significance because entering- and exiting-costs, as well as taxes, can affect for how long an investor remains in the market.

In addition, we only extracted stock-data for the stocks that has was listed on OSE on the 31st of December 2015. This means that the companies that has declared bankruptcy, or has been declared bankrupt, in the time-period, or for some reason is no longer listed on the Exchange, won't have any impact on the analysis. Companies listing on the Exchange after 2001 will however affect the analysis if they are still listed at the end of 2015. Lastly, since our source data is dated all the way back to 2001, we have to take into consideration that extraordinary events, such as the financial crisis of 2007-2008, might have an impact on our analysis.

ANALYSIS

INTRODUCTION TO THE ANALYSIS

In this part of the paper, we will conduct our analysis, and present our findings. In the following pages, we will present the data extracted from Bloomberg with two different approaches: one month-to-month approach, from here on referred to as "*short term*", and one three-month approach, from here on referred to as "*long term*". Before presenting the different approaches individually, we will present how we went about filtering and preparing the data in general, and clarify some essential definitions. This is necessary insight when following the procedures on which the analysis is built.

CRITERIA AND REQUIREMENTS

The main objective with this paper is to identify and test potential adages equivalent to the "Sell in May and go away"-adage. The decisive factor in such an exploration is the identification of potential trends, as trends is what the adage is built upon: The historical prices and their fluctuations constitutes the foundation of which the adage was identified. Therefore, we need to start off by clearly defining what the minimum standards of a potential trend is. We have chosen two main requirements for a potential trend:

1. If reoccurring incidents are to be evaluated as "trend"-candidates, the return in one industry in a particular month must be consistently positive or negative more than 7 times over the course of 10 years. Meaning, if we review the "Consumer Discretionary"-industry in January 2001–2010 and the return is consistently positive or negative 9 of these 10 years, then "Consumer Discretionary" in January accommodates the first requirement. The intent is to reveal incidents that over time shows signs of being consistent and therefore are somewhat predictable. Figure 1 provides an example of the positive returns for the "Consumer Staples"-, "Energy"-, "Equity Certification"-, and "Finance-industries. We see that only three incidents reoccur 8 times or more between 2001 and 2010, and all of these are ascribed December. We tested each of the industries and each of the months in the same way

as figure 1 depicts.

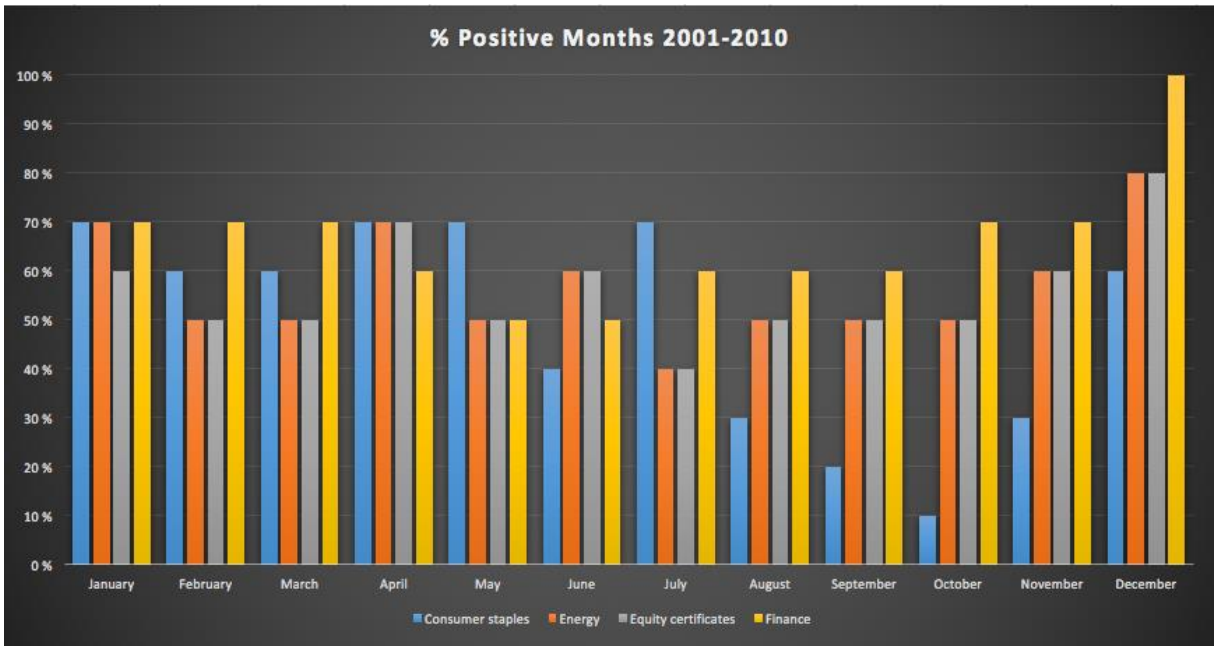


Figure 1 – The amount of months showing consistently positive profits in four different industries.

2. To refine the selection further, we also included a required minimum fluctuation. A potential trend does not only need to be consistent in terms of occurrence, but also in terms of size and strength. The two different approaches – long term and short term – will operate with different minimum requirements. The intent is to filter out the strongest candidates, that potentially yield the highest consistent return. Figure 2 illustrates the various average returns in the same industries as figure 1. Notice that the return can be negative as well as positive. We tested all average returns accordingly, for all months and all industries.



Figure 2 – The average return in different industries for the different months of the year.

The actual implications of this goes as follows; if we identify that, say, March have positive returns in the "Health Care"-industry, reoccurring 9 times between 2001 and 2010, this is not a trend if their positive return on average is below the minimum fluctuation stipulation. Similarly, if February has an average return accommodating the minimum requested change in the "Utilities"-industry, this is not classified as a trend if "Utilities" only obtained 5 positive returns in March over the ten-year period. Both stipulations must be met to get a potential trend, or else the alternative is discarded.

The information presented in figure 1 and 2 only represents examples of how our analysis was conducted. We applied these exact stipulations and procedures when searching for potential market trends in all months and all industries combined. To summarize, the trend-candidates must have occurred 8 times or more for a given month and a corresponding industry, *and* the price fluctuations must have been higher than a minimum demand, on average, in order to be classified as potential trends.
As a general side note, we will consistently advise buying and selling on the last trading day of the *previous month*. This will allow for us to start the period with the inventory required to reap the total benefits of the fluctuations for that particular month or three-month period. If we were to buy on the first day of the month, and the biggest fluctuation occurred on this very day, the return generated would be substantially lower.

APPROACH: MONTH BY MONTH

We start off by looking at all the industries combined. The intent is to identify some reoccurring incidents that seem to happen with a relatively equal frequency and strength, meaning that we are looking for symmetries in the data. For instance, we have identified that the month of July on average has positive returns in *all* industries in the period 2001–2011, which not only directly contradicts staying away from the market until November, but can indicate a pattern worth taking into consideration when investing as well. This means that the price has increased, both historically and on average, in all industries in July. Keep in mind, this is an accumulated average from a ten-year period, including the major market recession of 2008, providing further credibility and strength to the fact that July accumulates positive returns.

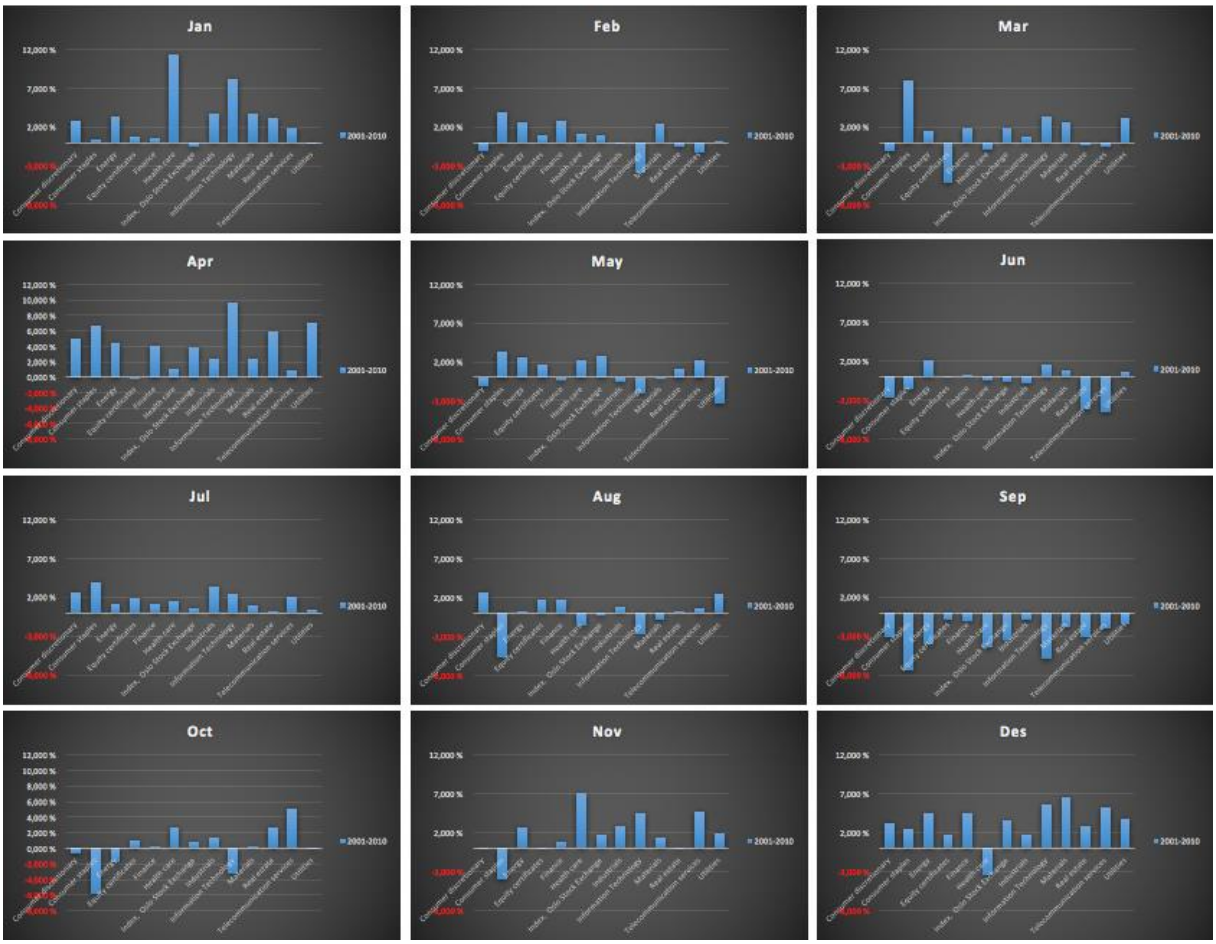
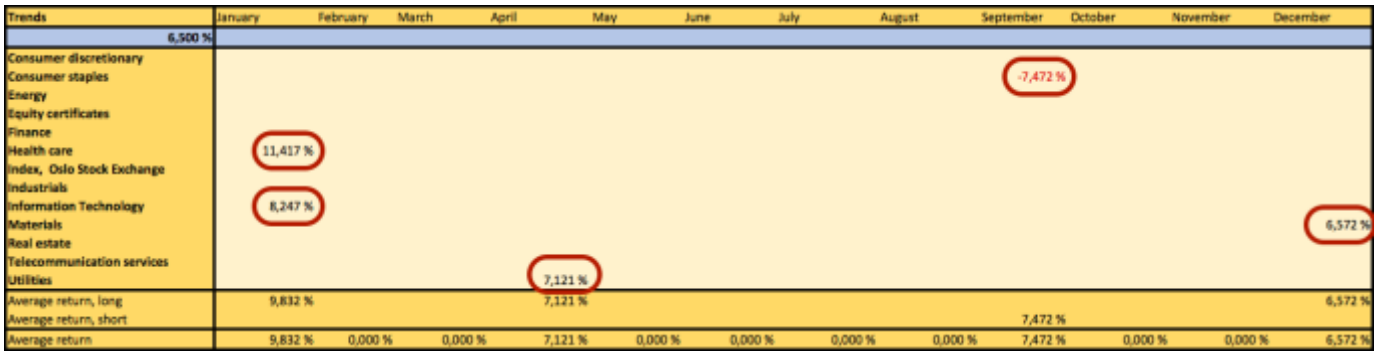


Figure 3 – All the different industries depicted by month.

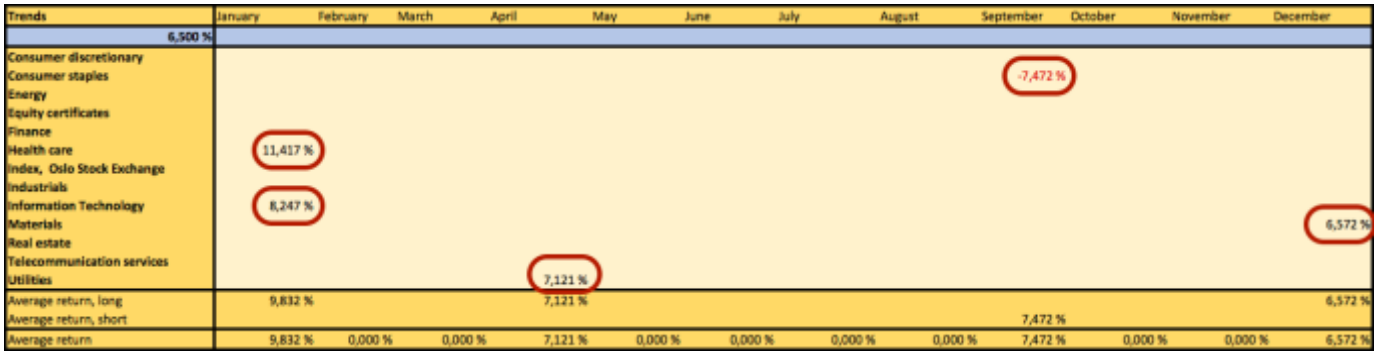
As figure 3 shows, July is not the only interesting month worth reviewing closer. Four additional months stand out as well when we target average return. On average, January shows positive returns in 11 industries, while December and April both show positive returns in 12 of the industries. September is also interesting in its own manner, as the profit yielded is exclusively negative, meaning no industry on average generated profits in September between 2001 and 2011. In the following figure, the returns of all the months in each industry are depicted. January, April, July, September and December all stand out and show high degrees of consistency when considering the average return generated.



Trends	January	February	March	April	May	June	July	August	September	October	November	December
6,500 %												
Consumer discretionary												
Consumer staples									-7,472 %			
Energy												
Equity certificates												
Finance												
Health care	11,417 %											
Index, Oslo Stock Exchange												
Industrials												
Information Technology	8,247 %											
Materials												6,572 %
Real estate												
Telecommunication services												
Utilities					7,121 %							
Average return, long	9,832 %				7,121 %							6,572 %
Average return, short									7,472 %			
Average return	9,832 %	0,000 %	0,000 %	7,121 %	0,000 %	0,000 %	0,000 %	0,000 %	7,472 %	0,000 %	0,000 %	6,572 %

Figure 4 – The potential trends withstanding the stipulations, with a minimum fluctuation of 6.50% on average.

With the definition of a trend clearly stipulated, we started filtering data. The results were not surprising: out of 156 possibilities, 21 incidents have occurred 8 times or more, showing a consistent change in returns. By applying the second stipulation – where we distinguish the better alternatives from the rest – this number is further diminished to just 5 incidents. These are depicted in figure 4. We used the "Goal Seek"-function in Excel to determine the minimum rate of return required on average. As the table shows, this value was 6.50%. This means that an investment in an industry with consistent returns 8 out of 10 times, would be classified as a potential trend if the average return was 6.50% or above.



Trends	January	February	March	April	May	June	July	August	September	October	November	December
6,500 %												
Consumer discretionary												
Consumer staples									-7,472 %			
Energy												
Equity certificates												
Finance												
Health care	11,417 %											
Index, Oslo Stock Exchange												
Industrials												
Information Technology	8,247 %											
Materials												6,572 %
Real estate												
Telecommunication services												
Utilities					7,121 %							
Average return, long	9,832 %				7,121 %							6,572 %
Average return, short									7,472 %			
Average return	9,832 %	0,000 %	0,000 %	7,121 %	0,000 %	0,000 %	0,000 %	0,000 %	7,472 %	0,000 %	0,000 %	6,572 %

Figure 5 – The potential trends withstanding the stipulations, with a minimum fluctuation of 6.50% on average.

We can see that two of the identified trend-candidates are ascribed to January, one to April, one to September and the last to December. This pattern is compatible with four of the five months we earlier defined as the interesting ones to consider due to their consistency. An interesting side note is that July is *not* among the months with clear trends, although that was the only month with positive return on average in all 13 industries simultaneously. This is obviously because the returns lacked the required growth minimum of 6.50% to be considered an interesting trend-candidate for our analysis. Regardless, July may very well

represent an investment associated with lower risk and consistent returns for the risk averse investor, and further analysis of the volatility in this month could elaborate on this.

If we take a closer look at figure 5 (above) or figure 6 (below), we see four positive trends and one negative trend. This calls for different investment strategies. In January, April and December we would take on a long position as the return is expected to go (significantly) up.

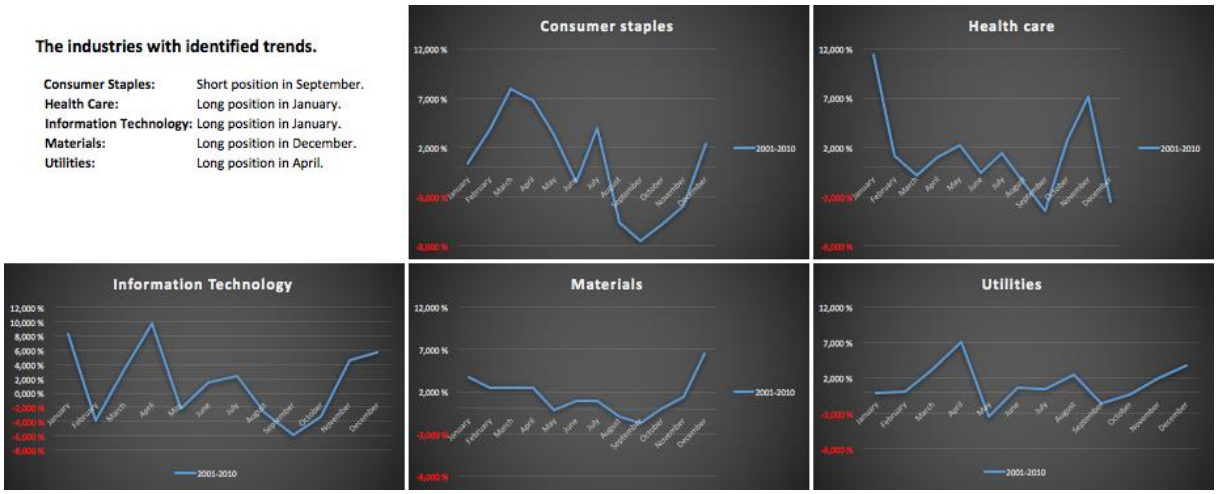


Figure 6 – The different industries and their trends. The graphs show the change at the end of each month.

September's expected return however, is –7.47%, and the ideal approach would be to take on a short position. This means that we should buy stocks in "Health Care" and "Information Technology" for January, "Utilities" for April, and "Materials" for December, and that we should sell "Consumer Staples" for September. Figure 7 illustrates how the return changes on average in the different months over the course of 10 years.

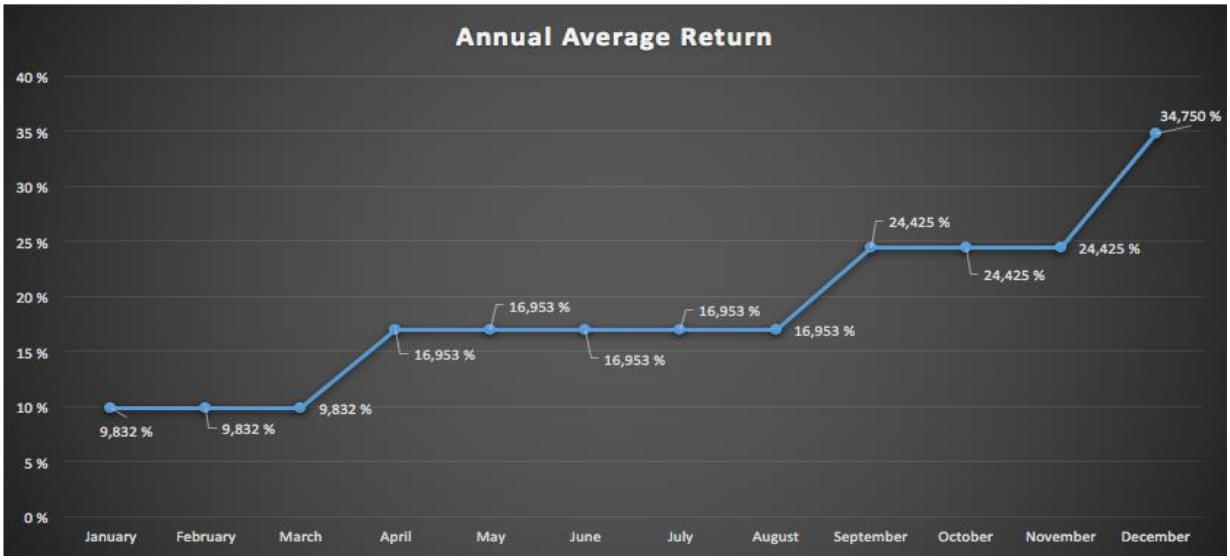


Figure 7 – The total annual return if trading in accordance with the monthly trend-candidates. The percentages show the development of the return from January throughout December.

According to this, we should buy and sell our stocks on the final trading day of the month. For instance, in order to be prepared for the expected growth in the “Health Care”- and “Information Technologies”-industries in January, we should fill our inventory on the final trading day of December, and empty it again on the final trading day of January. Similarly for the short position: we should sell on the last trading day of August, and buy on the last trading day of September. If this information were handed to us in December 2000, and we had used this trading strategy for the following 10 years, we could have achieved an annual return of 34.75%.

In this section, we have identified different trends using our own definition, and displayed the profits one could have yielded by acting on the information these trends supply. This way of investing is not applicable or desirable for all, as it is relatively short term. In the following section, we will introduce a different approach, where we try to identify seasonal rather than monthly patterns. This means that the timeframe is expanded to involve three months rather than just one.

APPROACH: QUARTERLY (SEASONAL)

Once again we start off by looking at all the industries combined in order to identify some sort of symmetry. The first thing we need to look at, is how the average returns in the different industries vary in the different three-month-periods.

If we look at figure 8, we see that three quarters have exclusively positive net profit in every industry. These are the Mar–May, Nov–Jan and Dec–Feb. This means that the total profit generated over these three-month periods between 2001 and 2010, on average has been positive for all ten years. Furthermore, we have an additional three quarters with positive returns in 12 of the 13 industries. Once again the interpretation of these are fairly straight forward: if you invested equally much in each of the 13 industries on the last trading day of February in any year between 2001 and 2010, and held onto the stocks throughout May, you would on average earn a profit of 6.97%. These six quarters are potential market trends, as they show a higher reoccurring consistency than the rest. Figure 8 illustrates the patterns visually, making it easier to process the information.

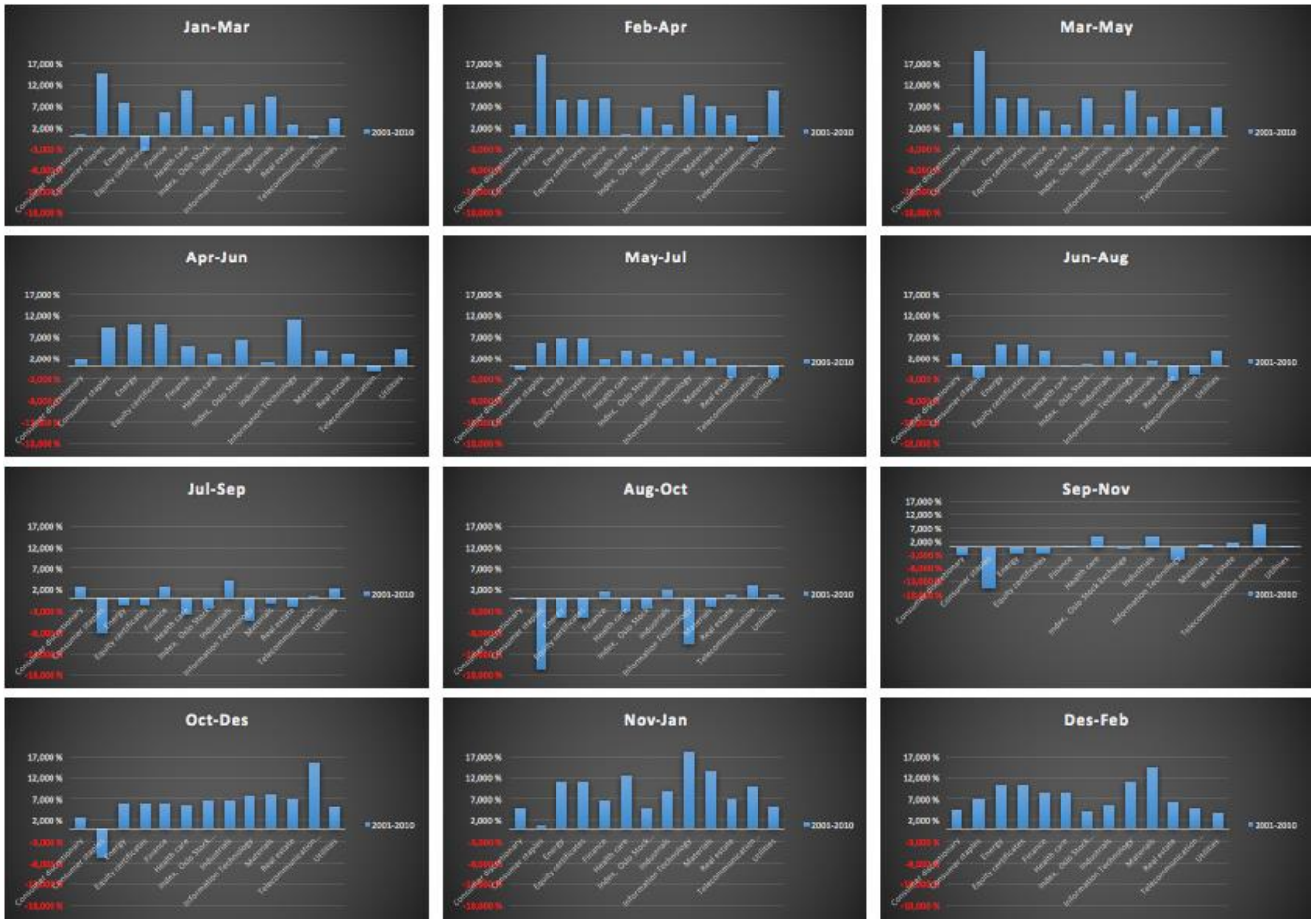


Figure 8 – All the different industries depicted by three-month periods

We will apply the same steps as before when identifying the potential trends. Figure 8 shows the filtering of data, leaving us with the only three-month periods that in a given industry generated a positive or a negative return 8 times or more. We see that this first filtering once again leaves us with approximately 20 possibilities.

Trends	Jan-Mar	Feb-Apr	Mar-May	Apr-Jun	May-Jul	Jun-Aug	Jul-Sep	Aug-Oct	Sep-Nov	Oct-Des	Nov-Jan	Des-Feb
80 %												
Consumer discretionary											4,956 %	
Consumer staples		19,062 %						-16,869 %	-15,691 %			
Energy		8,268 %										
Equity certificates	-3,610 %	8,268 %										
Finance		8,946 %									6,519 %	
Health care											12,276 %	
Index, Oslo Stock Exchange		6,485 %								6,530 %		
Industrials												
Information Technology												
Materials											13,529 %	
Real estate										7,159 %		
Telecommunication services										15,631 %	9,939 %	
Utilities		10,513 %								5,351 %	5,347 %	

Figure 9 – The identified trend-candidates when reviewing the data in three-month periods (quarterly).

We apply the other stipulation as well – the minimum average price fluctuation – but the minimum change requirement has been slightly modified. This is because the chances of getting consistent positive or negative average returns increases when the average is based on three individual months rather than one. When the timespan increases, the required rate of return for an investor obviously increases as well – if not, he or she could just invest short term for the same returns, but with less exposure to the time-dimension and the uncertainty associated with remaining in the market for too long. By using the "Goal Seek"-function yet again, Excel suggested using a required rate of return at 13.00% – twice of that in which we used before.

Trends	Jan-Mar	Feb-Apr	Mar-May	Apr-Jun	May-Jul	Jun-Aug	Jul-Sep	Aug-Oct	Sep-Nov	Oct-Des	Nov-Jan	Des-Feb
13,000 %												
Consumer discretionary												
Consumer staples		19,062 %						-16,869 %	-15,691 %			
Energy												
Equity certificates												
Finance												
Health care												
Index, Oslo Stock Exchange												
Industrials												
Information Technology												
Materials											13,529 %	
Real estate										15,631 %		
Telecommunication services												
Utilities												
Average return, long		19,062 %								15,631 %	13,529 %	
Average return, short								16,869 %	15,691 %			
Average return	0,000 %	19,062 %	0,000 %	0,000 %	0,000 %	0,000 %	0,000 %	16,869 %	15,691 %	15,631 %	13,529 %	0,000 %

Figure 10 – The potential trends withstanding the stipulation, with a minimum fluctuation of 13.00%or more on average.

We are once again left with only five plausible alternatives accommodating the stipulated requirements. All five occur in different quarters, and, interestingly enough, only one of them coincide with one of the three potential trends identified before. This emphasizes just how misleading the visualization and the numbers alone can be when they are not compared relatively to one another.

When analysing quarterly we see that only three industries stand out in terms of significant, repeating fluctuations. In Figure 11, the "Consumer Staples"-industry alternates between +19.98% and –16.87%, meaning that the total movement is 36.85%. Acting correctly on such a trend could yield a substantial return. If we could have traded on all the information about seasonal trends between 2001 and 2010, we could have obtained a return of 111.33%.

In other words, investing with a three-month perspective could spur an annual growth rate of 2.1133, or 211,33%, if we exploit all the potential trends. This is depicted in figure 12.

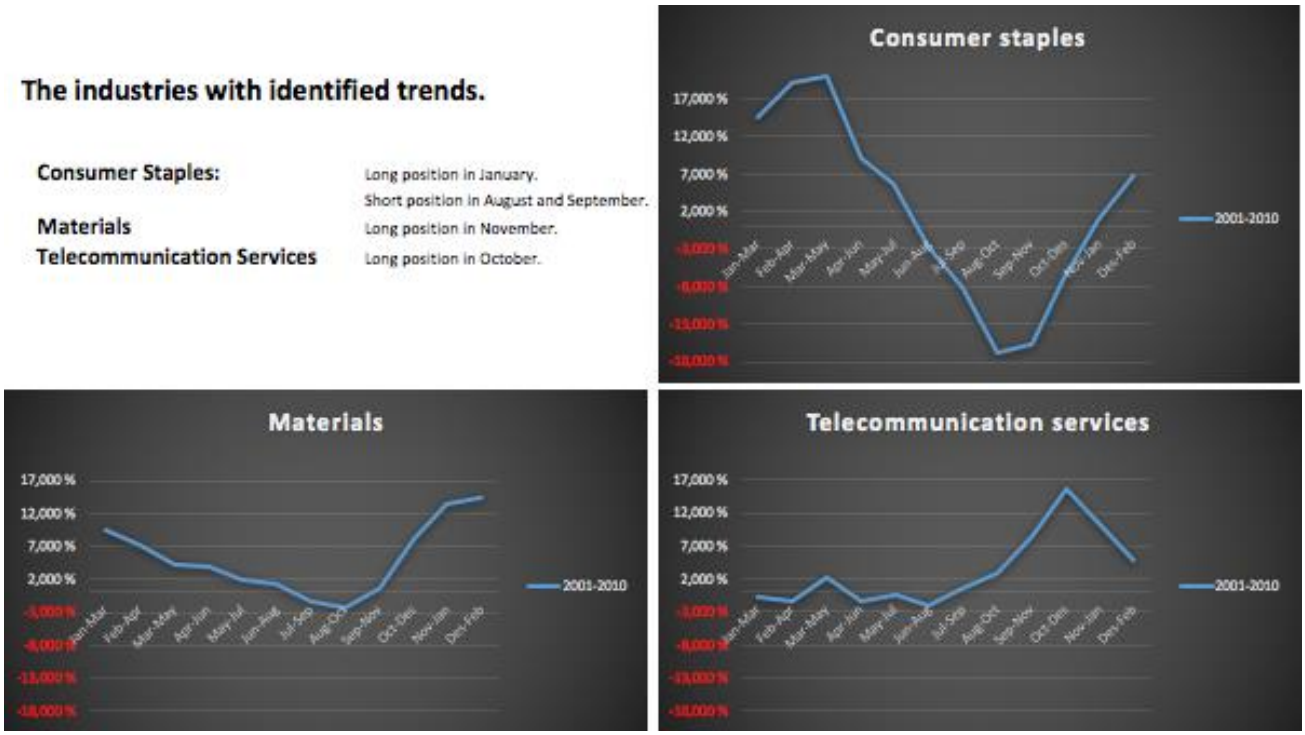


Figure 11 – The different industries and their trends. The graphs show the change at the end of the month.



Figure 12 – The total annual return if trading in accordance with the three-month trend-candidates. The percentages show overall change return from throughout the year.

Some thoughts before proceeding

In the analysis above, multiple trend-candidates have been identified. It is interesting to once again point out that the potential trends – meaning those who actually made it through our demarcations –not necessarily were the ones standing out when reviewing the data visually or in the tables. For instance, when trading with a three-month perspective, two of the identified trends had just 5 and 7 inclining industries of a total of 13 – which is a 38%- and a 54%-chance of increasing, respectively. With just a 54% chance of a positive return, the chance of a negative return would be approximately the same. It is therefore interesting to see that this would turn out to be a trend, when both the numbers and the illustrations conceal and dismiss this so well.

No trend-candidates were identified in the Index (Oslo Stock Exchange) when applying our stipulations. This means that all the potential trends mentioned above are *better* alternatives individually than trading the Index, and that they combined are way better than the Index. In fact, the Index barely makes the minimum requirement for return consistency of 80.00%, with only three investments making the cut. The strategies we are going to identify next are therefore all better alternatives than trading the Index, given that the period of 2001–2010 represents a sufficiently comprehensive basis for forging general trading strategies.

WHAT CAN THE DIFFERENT CANDIDATES TELL US?

A rule of law among many traders, is “A trend is your friend” (Investopedia, 2003). The idea is to identify and determine the direction one believes the price is headed, based on historical movements. This will work as a guide, telling you when to buy and when to sell. Assuming these trends actually exist, identifying and applying them can therefore be extremely valuable. In the following sections, we will formally stipulate investment strategies based on the trends we identified, before testing them on the period 2011-2015.

WHAT STRATEGIES CAN BE MADE?

Our findings generally allow for us to stipulate multiple strategies. For instance: combining the month to month perspective with the three-month perspective could allow for higher returns, but would at the same time expose us to higher risk and uncertainty. We will therefore abstain from combining strategies, and merely focus on seasonal and monthly strategies individually/separately.

We identified five potential trends when analysing the returns with a seasonal investment approach, all in different quarters. However, two of them intersect: we are advised to take on short positions both for Aug–Oct *and* for Sep–Nov. These would ideally come together when forging a strategy, so that we would short on the 31st of July, before buying back on the 30th of November. However, sticking to the plan of using three-month trend-candidates as the foundation when drawing up strategies discards this option. Therefore, the optimal long-term procedure recommended according to our findings, is to:

1. Buy stocks (long position) in "Consumer Staples" on the last trading day of January and sell out on the last trading day of April. Stay away from the market for the next four months, until the last trading day of August.
2. Sell stocks (short position) in "Consumer Staples" on the last day of August and on the last day of September. Even out your inventory by restocking on the last trading day of October and November.
3. Buy stocks (long position) in "Telecommunication Services" on the last trading day of September, and sell out on the last trading day of December.
4. Buy stocks (long position) in "Materials" on the last trading day of October, and sell out on the last trading day of January the following year. Keep in mind that this is also the day you should start buying again in the "Consumer Staples"-industry.

Of course, each of these points can be used as an individual strategy as well, in order to limit your return's dependence on the four other occurrences. The rational investor may also opt for the four-month perspective in the Aug–Nov period rather than separating them.

We also identified five trends in the month to month approach. The optimal short-term strategy according to our findings can be summarized by the following steps:

1. Buy stocks (long position) in “Health Care” and “Information Technology” on the last day of December. The inventories should be brought back to zero on the final day of the month for each of the steps.
2. Buy stocks (long position) in “Utilities” on the last day of March.
3. Sell stocks (short position) in “Consumer Staples” on the last day of August.
4. Buy stocks (long position) in “Materials” on the last day of November.

Once again, each of these steps can work as an individual strategy as well as combined.

TESTING FOR YEARS 2011-2015

With the strategies clearly defined above, we will start testing them. The idea is to see whether the strategies based on the 2001-2010 period would generate substantial returns in the next five-year period as well. This would clearly substantiate the credibility of our analysis.

We will start by applying our short-term strategy to the data collected from 2011-2015, in order to examine its persistence and continuity. If a potential trend was identified in a given month with a corresponding industry in the 2001-2010 period, we will see what total accumulated return would have been obtained had we applied it to the 2011-2015 period. We will also apply our long-term strategy to the filtered data to see what the total return would have been in this case as well. Keep in mind that this approach implies potential trends visible in 2011—2015 will not be discussed. We will merely focus on the same months and three-month periods as before.

As a final thought, we will review how the return varied between the periods. We will take the average return obtained in 2011-2015 and subtract the return obtained in 2001-2010, to see how substantial the difference is. To identify those with relatively similar average returns, the difference should be 5.00% or less. In other words, the difference must be

$$-5.00\% \leq \text{AVERAGE RETURN}_{2011-2015} - \text{AVERAGE RETURN}_{2001-2010} \leq 5.00\%.$$

This could imply that these investments are more likely to reoccur, as both the size and the

direction of the return appears to be approximately the same, on average, both in the first ten-year period and in the second five-year period.

TESTING SHORT-TERM STRATEGY

Figure 13 illustrates the obtained returns when applying the short-term strategy to 2011-2015. The actual symmetry in the illustration is no surprise, as we are reviewing the same months as before. What is interesting, however, is the fact that they appear in the same manner as before, meaning that we are advised to take short positions and long positions in the same months as in 2001-2010. This is by no means a foregone conclusion: investing in a predetermined manner does not imply the outcome is predictable. The fact that all five investments advise the same investment approach is therefore remarkable, and provides some strength to the stipulated strategy of before.

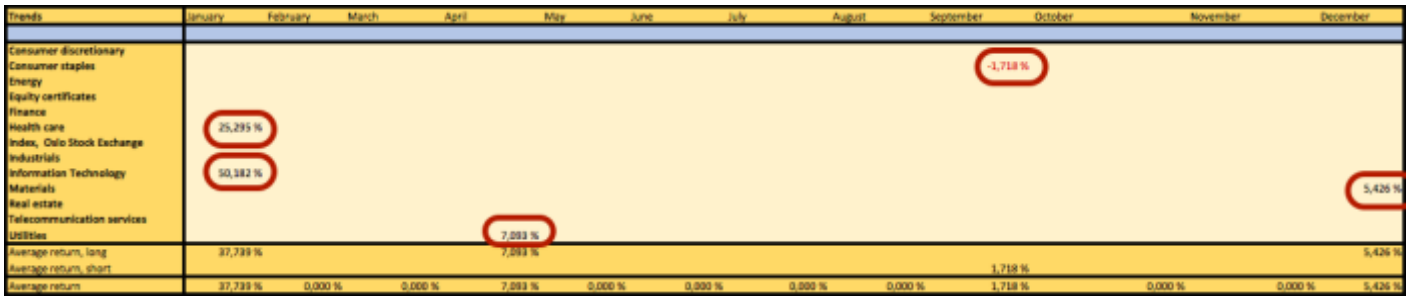


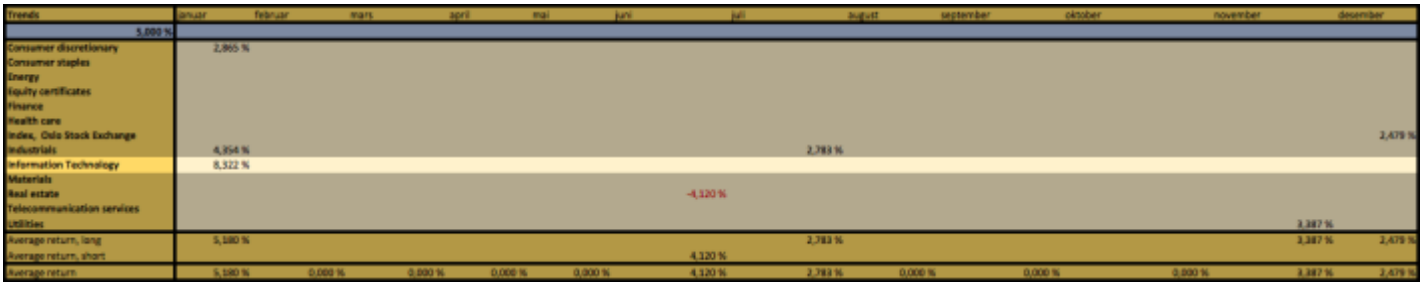
Figure 13 – The total accumulated return from 2011-2015 when applying the stipulated short-term strategy.

If we would have acted on this strategy, our overall return at the end of 2015 would have been 58.18%, equalling $\sqrt[5]{1.5818} - 1 \approx 9.60\%$ annually. This is substantially lower than the annual return in the period 2001-2010, which was 34.75%. Nevertheless, the strategy generates a steady annual growth.

We will now look at the difference in return between the five-year averages of the ten-year period and the average of the last five-year period. When stipulating

$$\text{AVERAGE RETURN}_{2011-2015} - \text{AVERAGE RETURN}_{2001-2010} \leq \pm 5.00\%$$

only *one* of the potential trends remain corresponding with the 2011-2015 period. That is, only one of the investment combinations – "Information Technology" in January – seemingly has a consistent return from 2001 throughout 2015. This is interesting, and relevant for investors, because that awards this investment as the one providing the safest and most predictable return of them all. Keep in mind that we have excluded the influence of volatility and other affecting factors in this paper, so this statement is based exclusively on the changes in the average annual return. This is elucidated in Figure 14.



Trends	januar	februar	mars	april	mai	juni	juli	august	september	oktober	november	desember
5,000 %												
Consumer discretionary		2,865 %										
Consumer staples												
Energy												
Equity certificates												
Finance												
Health care												
Index, Oslo Stock Exchange												2,479 %
Industrials		4,354 %						2,783 %				
Information Technology		8,322 %										
Materials												
Real estate							-4,120 %					
Telecommunication services												
Utilities											3,387 %	
Average return, long		5,180 %						2,783 %			3,387 %	2,479 %
Average return, short							4,120 %					
Average return		5,180 %	0,000 %	0,000 %	0,000 %	0,000 %	4,120 %	2,783 %	0,000 %	0,000 %	3,387 %	2,479 %

Figure 14 – "Information Technology" in January is the only investment that has consistent returns fluctuating less then 5.00% on average between 2001 and 2015.

As the figure shows, there are multiple alternatives with average return differences below 5.00%, but "Information Technology" in January is the only iterative combination consistently corresponding with the potential trends we identified earlier. This becomes apparent if one combines figure 13 and figure 14; the only reoccurring combination is "Information Technology" in January. Apart from that, there is no compliance between the two Figures. This does not mean that this combination is the best one, or the one yielding the highest return – it just means that it shows the highest degree of stability over time. This is in fact more noticeable if we illustrate the combination like this:

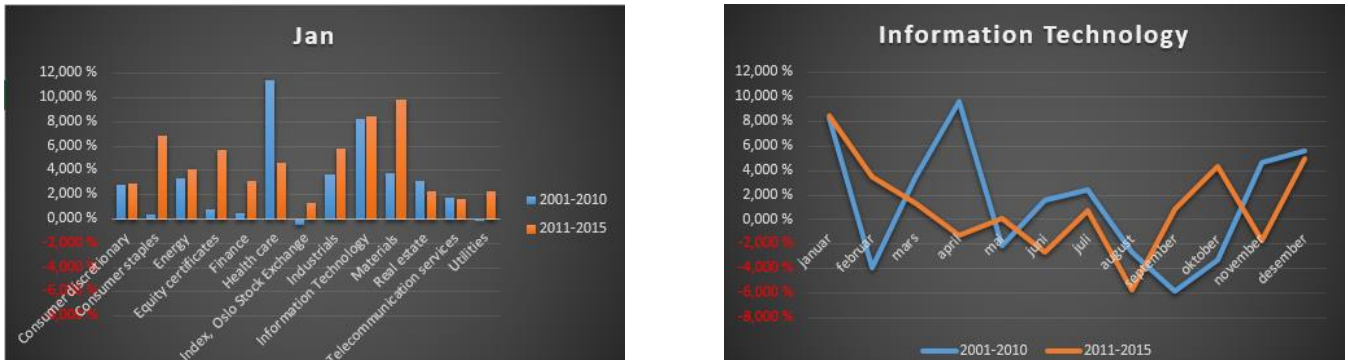


Figure 15 – Illustrations of the "Information Technology"-industry in January.

Figure 15 shows us how the return on average remains somewhat consistent. The bar charts on the left-hand side illustrates the average return as the height of the bars, and we can see them being somewhat equal just above 8.00%. The line chart on the right-hand side, depicts the development of the average return per month. We see that the average return on the 31st of January is almost the same, once again approximately 8.00%, and that the average value on the 31st of December is almost the same as well. The average return appears to converge in the first and the last month of the year.

We have now reviewed the test of the short-term strategy, and it shows signs of being relatively reliable: It grants an average annual growth of 9.60%, and has consistent recommendations regarding whether taking short or long positions are desirable.

TESTING LONG-TERM STRATEGY

Figure 16 illustrates the obtained returns when applying the long-term strategy to 2011-2015. Once again, the observed symmetry is not surprising as we are testing for the exact months where we identified potential trends earlier. However, the test does reveal something unexpected: we are advised to take on a long position in Sep–Nov in the "Consumer Staples"-industry, while the preceding analysis clearly recommend us shorting in this period. This substantiates the statement from above: investing in a predetermined manner does not imply the outcome is predictable. These deviations are therefore expected. The implications of this is simply that the Sep–Nov-period does not comply with our stipulated strategy, and that we therefore ought to exclude it when continuing the test.

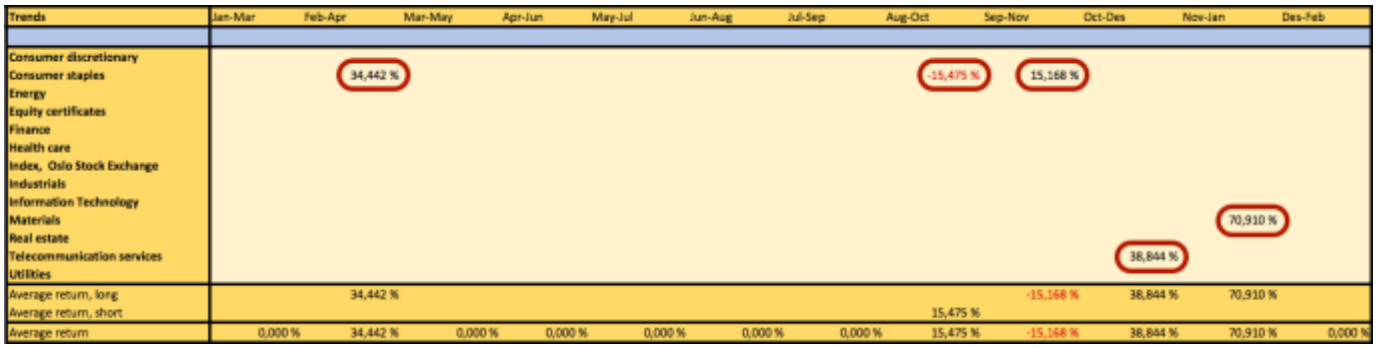


Figure 16 – The total accumulated return from 2011-2015 when applying the stipulated long-term strategy.

If we would have acted on this strategy, our overall return at the end of 2015 would have been 212.52%, equalling $\sqrt[5]{3.1252} - 1 \approx 25.60\%$ annually. This is substantially lower than the annual return of 2001-2010, which was 111.33%. If we now discard the part of the

strategy where we short for the period Sep–Nov, the overall return would have been 270.55%, which equals 29.95% annually. Even though the stipulated strategy was wrong when applied to the 2011-2015 period, it still generated a substantial average annual profit. By removing the flaw, the average annual return naturally increased. The strategy is therefore, after being corrected, capable of generating a steady annual profit in the period we applied it to.

Moving on we will analyse the return difference between the five-year averages of the ten-year period and the average of the last five-year period. When we apply the stipulation

$$\text{AVERAGE RETURN}_{2011-2015} - \text{AVERAGE RETURN}_{2001-2010} \leq \pm 5.00\%$$

none of the potential trends we identified earlier withstand. Meaning, no investment combination previously identified as a potential trend, has consistent average returns from 2001 throughout 2010, that differs less than 5.00% from the average trends from 2011 throughout 2015. In general, the interpretation of this is that there among the defined trend-candidates is no investment combination – industry and three-month period – that will yield a more stable average return. As we can see from Figure 17, there is a couple alternatives with relatively stable returns between the two time periods, but these are not among the potential trends, which are marked in red.

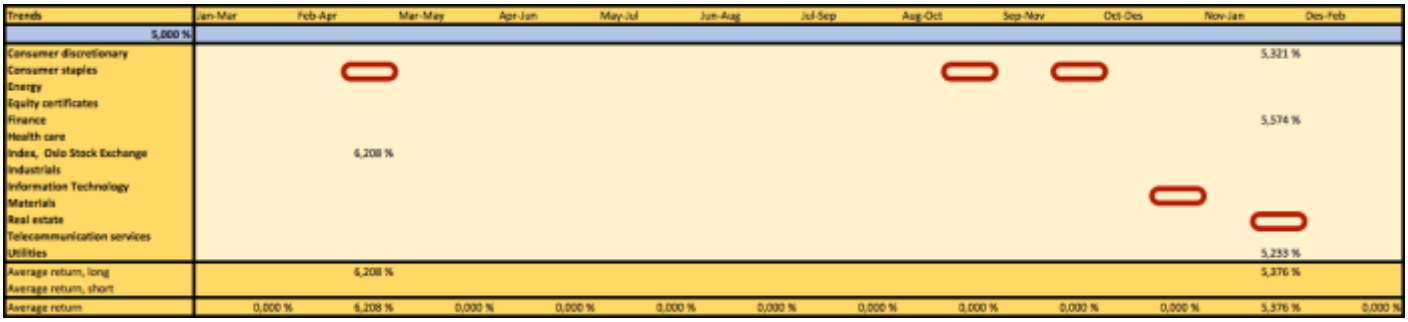


Figure 17 – The red ovals represent the combinations where potential trends were identified.

This does not imply that the long-term strategy is less suited as a strategy than the short-term strategy, it merely says that the uncertainty and variation of the return will increase when the timespan increases. When reviewing the two strategies, the long-term strategy yielded the highest average annual return in the 2001-2010 period and in the 2011-2015 period. This is according to expectations, as the premium for willingly taking on additional risk should be higher than the return obtained when the risk is lower. If this is not the case, the investor has no incentive to opt for the long-term investment(s) in the first place.

Identifying a potential investment strategy for maximizing the return of long-term investments is therefore expected to generate higher average returns and higher average differences between the returns.

We have now reviewed the test of the long-term strategy. Although it recommended us taking a short position in a time where a long position would have been desirable, the overall fit is relatively good. The three-month perspective implies a higher degree of uncertainty, and the deviation is therefore expected.

SUMMARY

In this paper, we have attempted to identify potential trends in the return yielded in different industries, in different months, based on data extracted from Oslo Stock Exchange. The potential trends would then be the foundation when we later forged investment strategies based on our findings. Finally, we would test these strategies on the 2011-2015 period to see whether they remained persistent when applied to another time interval.

Before reviewing the results generated when testing the strategies, it may be expedient to elucidate on the shortcomings of the paper and the data extracted. First of all, the analysis is based exclusively on the average returns, and does not incorporate other decisive factors, such as volatility and investment-related costs. In addition to this, our data has excluded all the companies that disappeared from the stock exchange before the 31st of December 2015. A more comprehensive analysis would include these factors, and get more generally applicable test results.

Our analysis revealed what there were five reoccurring investments in both the month-to-month approach and the three-month approach that accommodated the trend-definition. These potential trends were the investment options that on average yielded the highest returns, with the highest degree of consistency in the 2001-2010 period, and they worked as the foundation when we drew up the investment strategies. We developed one short-term strategy and one long-term strategy. On a general note, both strategies yielded positive

returns, but the long-term investment approach always generated higher returns than the short-term approach.

When testing, however, a flaw revealed itself about the long-term strategy. While the short-term strategy and the test-results perfectly corresponded in their recommendation, the long-term strategy lacked this conformity. By discarding the Sep–Nov period, the long-term strategy also corresponds with the recommendations from the test-results.

An interesting side note is that most of the potential trends we have identified coincide with the "Sell in May and go away"-adage. All the recommended investments ascribed the months from November to April are long term positions and reflects an expected increase in the price. The recommendation for the months in between is either to stay away from the market all together, or to take short positions to exploit the expected seasonal price drop.

CONCLUSION

This paper has identified 10 potential trends in the Norwegian stock market based on historical data from the period 2001-2015, which when combined constitutes two different investment strategies. The period from November throughout January consistently stands out as the best time to invest, both with a long- and a short-term perspective, as our potential trends are more prominent here and the returns yielded on average are higher than elsewhere. According to our findings, the stipulated strategies will, when applied to the years 2011-2015, both generate substantial annual average returns. Based on our definition of a potential trend, the analysis thus provides an investment approach, persistent over the course of last 15 years. Although historical returns are no guarantee for future returns, the persistence of the strategies implies that they potentially are applicable in the future as well.

BIBLIOGRAPHY

Bouman, S., & Jacobsen, B. (2002). The Halloween Indicator, "Sell in May and Go Away": Another Puzzle. *The American Economic Review,* 92(5), 1618-1635. Retrieved 14th December 2016 from http://www.emergingmarketsillustrated.com/wp-content/uploads/2013/04/HalloweenIndicator.pdf

Investopedia (2003). Trend. Retrieved 14th of December 2016 from http://www.investopedia.com/terms/t/trend.asp

Investopedia (2016). 4 factors that shape market trends. Retrieved 14th of December 2016 from http://www.investopedia.com/articles/trading/09/what-factors-create-trends.asp