Name of Company	Country of Origin	Sector	Stock Price	Target Price
3M COMPANY	United States	Industrials / Industrial Goods & Services	USD239.79 @ 08 Jan 2018	USD219.99

COMPANY PROFILE

Stock Code	U:MMM
Annual Dividend Yield	1.9%
Market Capitalization	USD145.00 billion
Nature of Business	3M Company is a technology company. It operates through five segments. The Industrial segment serves a range of markets, such as automotive original equipment manufacturer and automotive aftermarket, , appliance, paper and printing, packaging, food and beverage, and construction. The Safety and Graphics segment serves a range of markets for the safety, security and productivity of people, facilities and systems. The Health Care segment serves markets that include medical clinics and hospitals, pharmaceuticals, health information systems, and food manufacturing and testing. The Consumer segment serves markets that include consumer retail, office business to business, home improvement, drug and pharmacy retail, and other markets.

SUMMARY

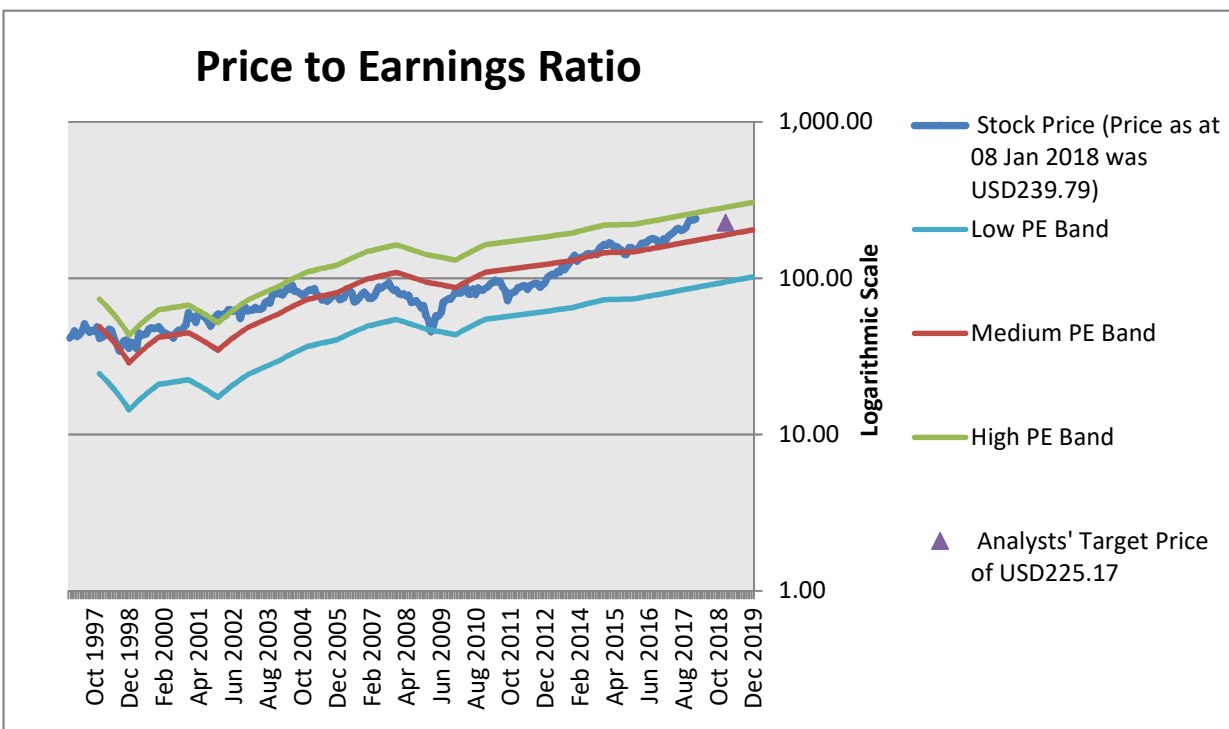|	
Valuation	Based on the Composite Valuation Indicator, the stock has a Target Price of USD219.99. Our Target Price represents downside of 8.3% based on stock price of USD239.79 as at 08 Jan 2018.
Growth	EPS Growth for the company is moderately positive.
Momentum	Stock price momentum is neutral.
Financial Condition	The company's financial condition is very strong.
Quality of Earnings	The quality of the company's earnings is very high.
Business Excellence	Business excellence indicator of the company is moderately high.
Analysts Opinion	Analysts opinion on the stock is positive.
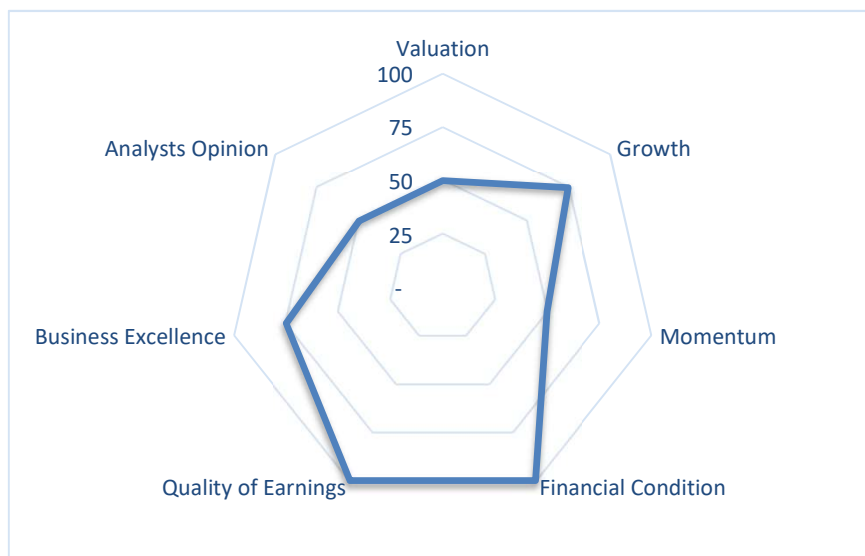
Valuation

ProThinker believes in using a combination of valuation methods to arrive at a suitable valuation for the stock. This is because while each valuation method has its benefits, it also has its shortcomings. Price to Earnings and Price to Cash Flow Ratios are meaningless when the comany has negative earnings or cash flows. Price to Sales Ratio is more stable because sales are never negative. However, this does not tell us whether the company is able to sell profitably. Price to Book Ratio gives us an indication as to how much we are paying for the company's assets but it is not directly related to the company's profitability.
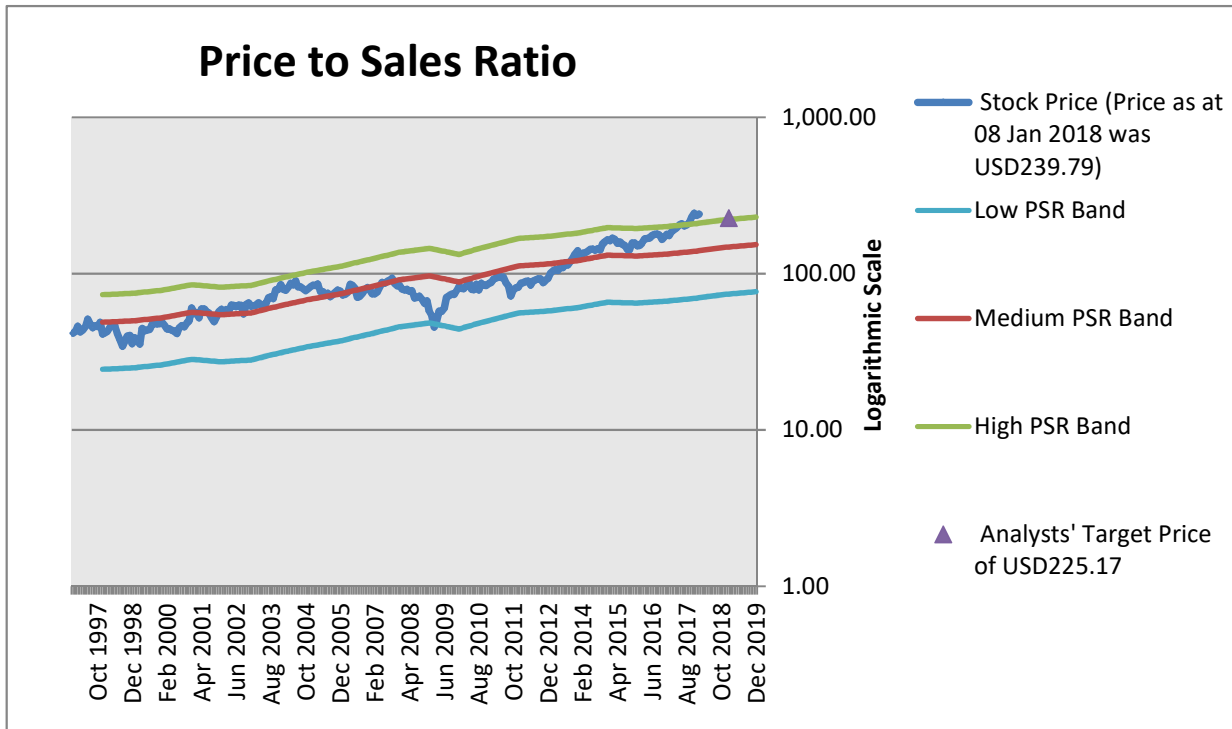
While it is important to value stocks based on multiple indicators, they sometimes lead to differing views on valuation. That is why we use our proprietary Composite Valuation Indicator, which gives you one conclusion based on the best combination of the different indicators, to tell you whether a stock is under or over valued. The graphical format allows you to determine whether or not the composite valuation accurately values the stock and gives you confidence to act on the decision.

In addition, we go all the way back 20 years (or as much as information is available) to give you a meaning "average" valuation of the company that takes extreme periods of the dot.com bubble and global financial crisis. Without this long a period, you won't know the extreme highs and lows and therefore will not be able to determine the norm.

Price to Earnings Ratio

Legend:
- Stock Price (Price as at 08 Jan 2018 was USD239.79)
- Low PE Band
- Medium PE Band
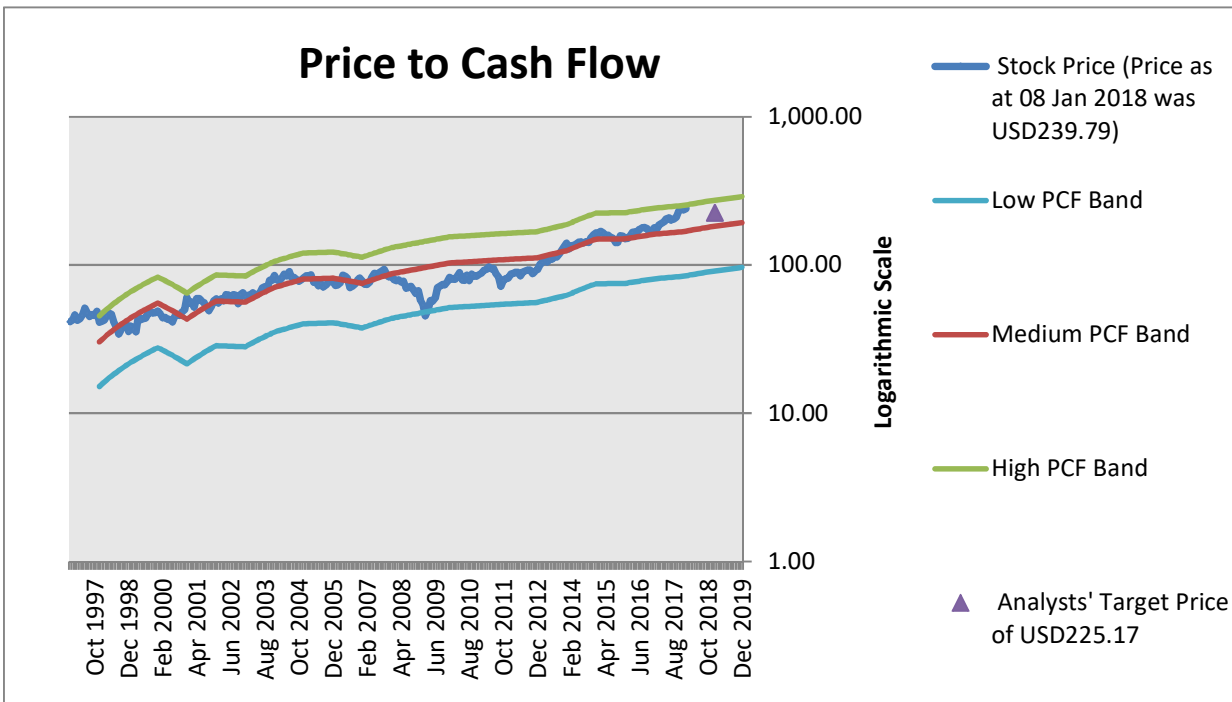- High PE Band
- ▲ Analysts' Target Price of USD225.17

The Price Earnings (PE) Ratio is the most frequently used valuation indicator for a stock. However, there are times when this ratio cannot be used e.g. when the company reports a loss or profit is so minimal that it results in an abnormally high PE Ratio. We use the PE Band to show whether a stock is overvalued or undevalued based on its historical PE. The low, medium and high PE Band have been calculated after analyzing the stock's PE history as far back as 20 years. We don't assume a stock will continue to trade at its average PE but make adjustments to the future PE appropriately if the growth of the company is slowing down.

At the price of USD239.79 as at 08 Jan 2018, 3M Company is trading at a PE Ratio of 26.2 times last 12 months earnings. This is a 37.6% premium to its historical average Price to Earnings Ratio of 19.1 times. (Price based on the history average and expected future PE of the company is indicated by the red line.)

Price to Sales Ratio

Stock Price (Price as at 08 Jan 2018 was USD239.79)

Low PSR Band

Medium PSR Band

High PSR Band

▲ **Analysts' Target Price of USD225.17**

Logarithmic Scale

1,000.00
100.00
10.00
1.00

Oct 1997, Dec 1998, Feb 2000, Apr 2001, Jun 2002, Aug 2003, Oct 2004, Dec 2005, Feb 2007, Apr 2008, Jun 2009, Aug 2010, Oct 2011, Dec 2012, Feb 2014, Apr 2015, Jun 2016, Aug 2017, Oct 2018, Dec 2019

The Price to Sales Ratio is another commonly used valuation indicator for a stock. It overcomes some of the limitations of the Price Earnings Ratio in that it can be used even when the company is not making a profit or only making minimal profits. However, it should not be used by itself because a company may be achieving sales but not profits.

At the price of USD239.79 as at 08 Jan 2018, 3M Company is trading at a Price to Sales Ratio of 4.6 times last 12 months sales. This is a 71.0% premium to its historical average Price to Sales Ratio of 2.7 times.

Price to Cash Flow

Stock Price (Price as at 08 Jan 2018 was USD239.79)

Low PCF Band

Medium PCF Band

High PCF Band

▲ **Analysts' Target Price of USD225.17**

Logarithmic Scale

1,000.00
100.00
10.00
1.00

Oct 1997, Dec 1998, Feb 2000, Apr 2001, Jun 2002, Aug 2003, Oct 2004, Dec 2005, Feb 2007, Apr 2008, Jun 2009, Aug 2010, Oct 2011, Dec 2012, Feb 2014, Apr 2015, Jun 2016, Aug 2017, Oct 2018, Dec 2019

Accounting profits can be subject to manipulation. Therefore, some investors prefer to value a company based on cash flows generated by the operating activities of the company. Furthermore, a company that generates high sales but not operating cash flows could be heading for trouble because it is cash that pays the operating expenses. The Price to Cash Flow ratio of most firms are volatile and should not be used in isolation to determine the valuation of the stock.

At the price of USD239.79 as at 08 Jan 2018, 3M Company is trading at a Price to Cash Flow Ratio of 20.7 times last 12 months cash flow. This is a 42% premium to its historical average Price to Cash Flow Ratio of 14.6 times.
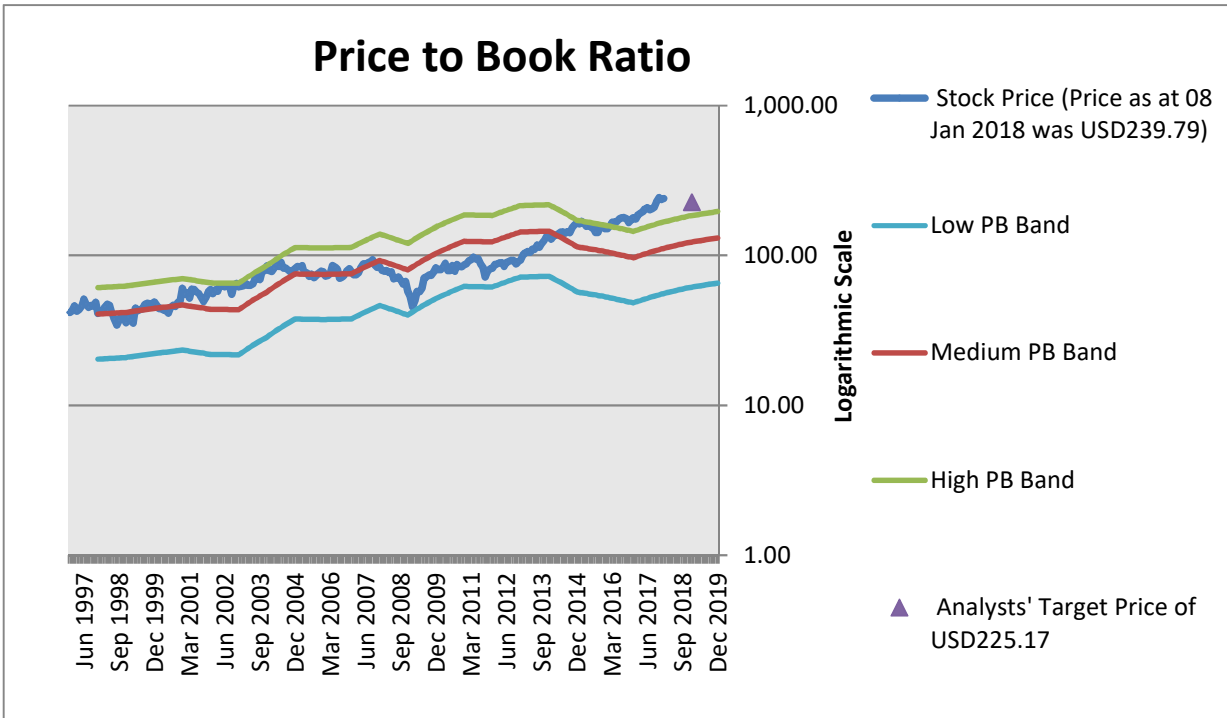

While the above three indicators value a company based on what it is generating (i.e. profits, sales or cash flow), Price to Book ratio values a company based on what it owns (i.e. its net tangible assets).

At the price of USD239.79 as at 08 Jan 2018, 3M Company is trading at a Price to Book Ratio of 12.2 times current book value. This is a 115% premium to its historical average Price to Book Ratio of 5.7 times.
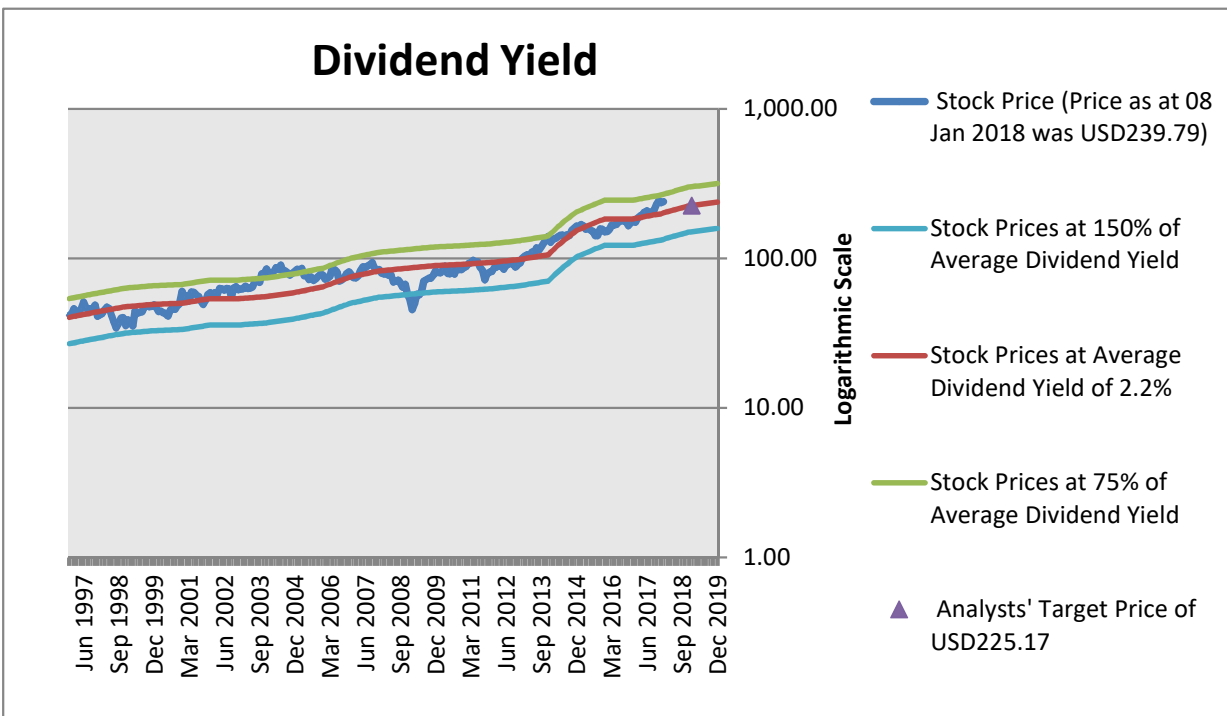
For stocks that has a history of paying meaningful dividends, the stock price is dependent on how much dividend the investor expects to get from the company.

At the price of USD239.79 as at 08 Jan 2018, 3M COMPANY is trading at a Dividend Yield of 1.9%. This is a 16.2% premium to its historical average Dividend Yield of 2.2%. (Note: The lower/higher the dividend yield, the more expensive/cheaper the stock is.)
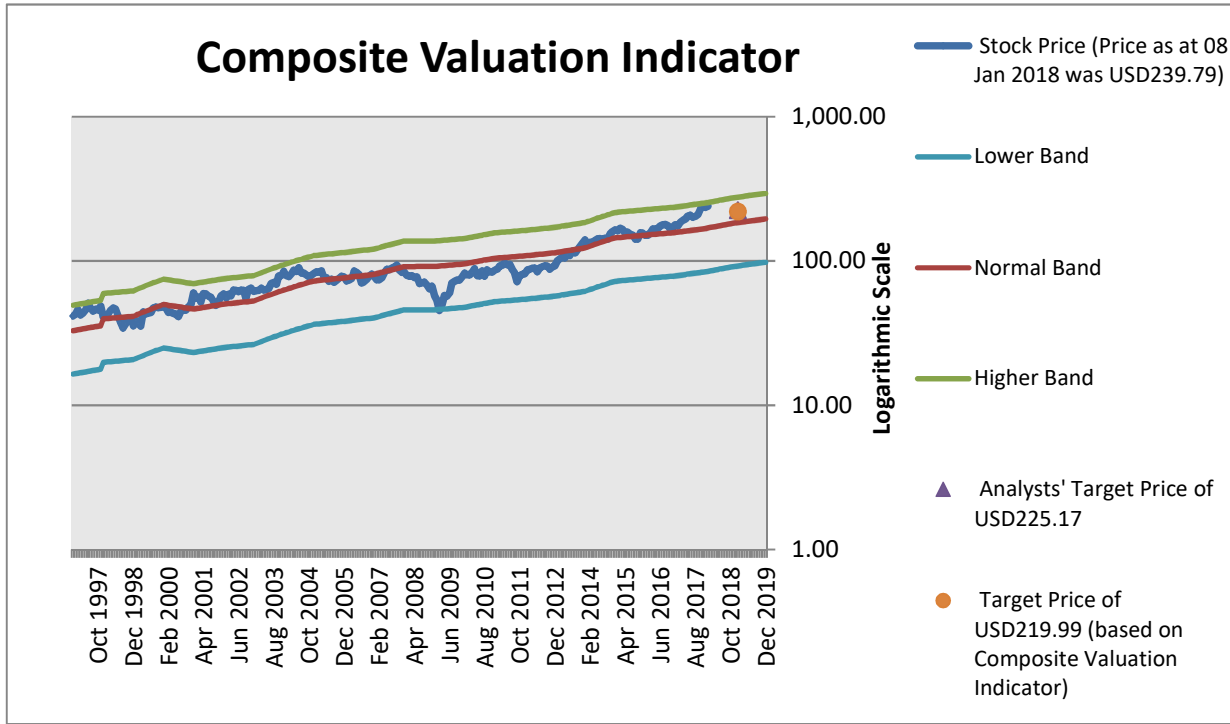
The Composite Valuation Indicator is derived using our proprietary method to put all the valuation indicators in a way that explains the stock price best. It recognizes that looking at a single indicator is dangerous and inadequate. It also overcomes the difficulty of different indicators pointing giving different signals and difficult to act upon if you do not have a composite valuation.

Based on the Composite Valuation Indicator, the stock has a Target Price of USD219.99. Our Target Price represents downside of 8.3% based on stock price of USD239.79 as at 08 Jan 2018.
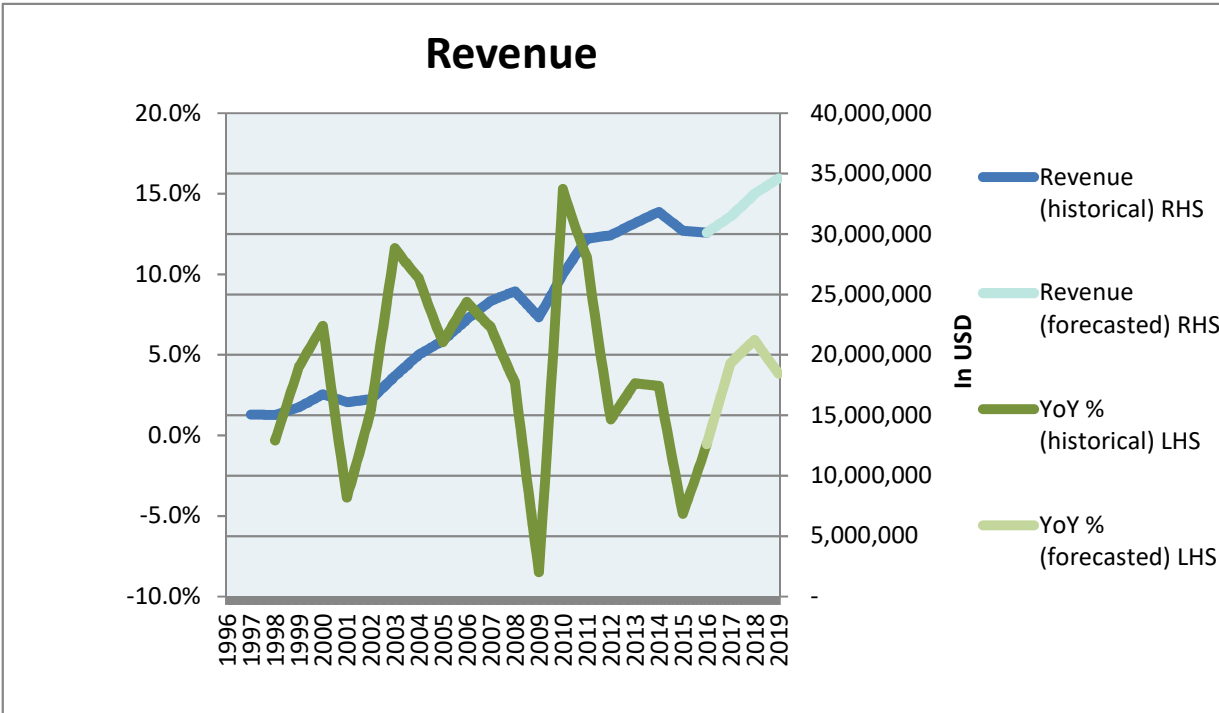
Revenue

Revenue has been on an uptrend since 1996. Revenue growth has been on a downtrend since 2010. Below are analysts' forecasts of revenue for the next few years.

	Revenue		YoY growth
2017	31,463,110	USD	4.5%
2018	33,327,910	USD	5.9%
2019	34,605,460	USD	3.8%
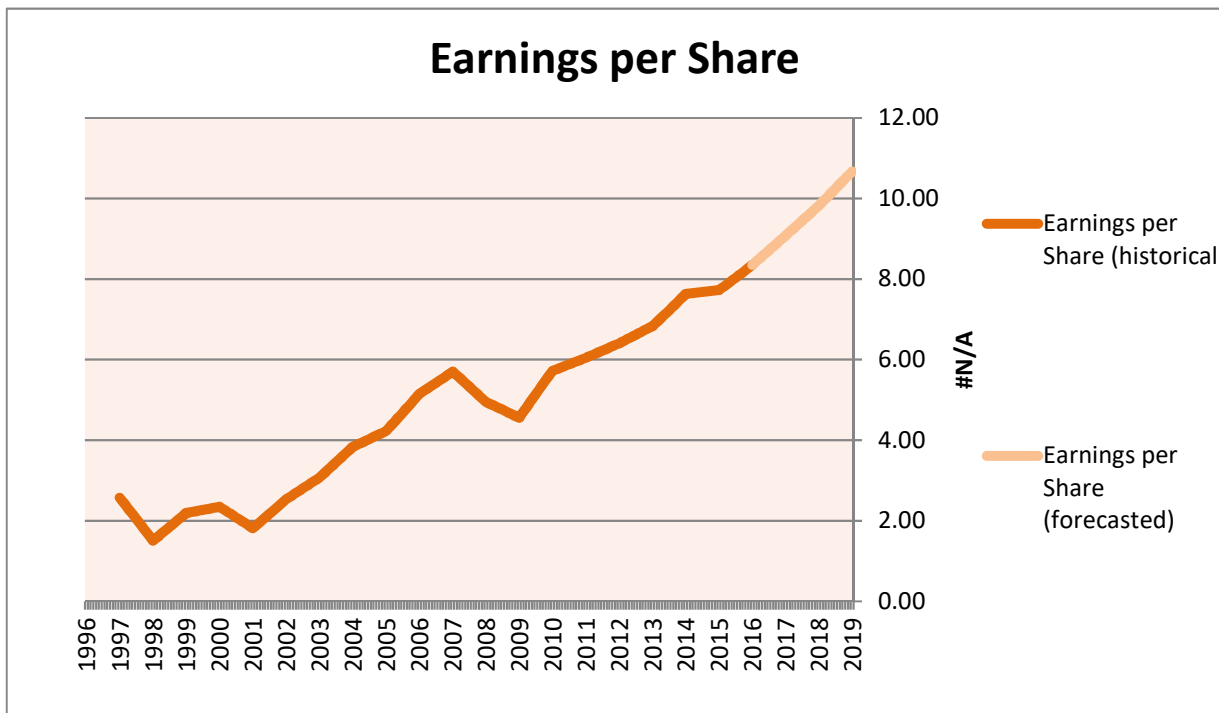
Earnings per Share

Earnings per Share has been on an uptrend since 2009. Below are analysts' forecasts of the growth in EPS for the next few years.

	Earnings per Share		YoY growth
2017	9.08	USD	8.7%
2018	9.83	USD	8.2%
2019	10.67	USD	8.6%

Return on Equity (ROE)
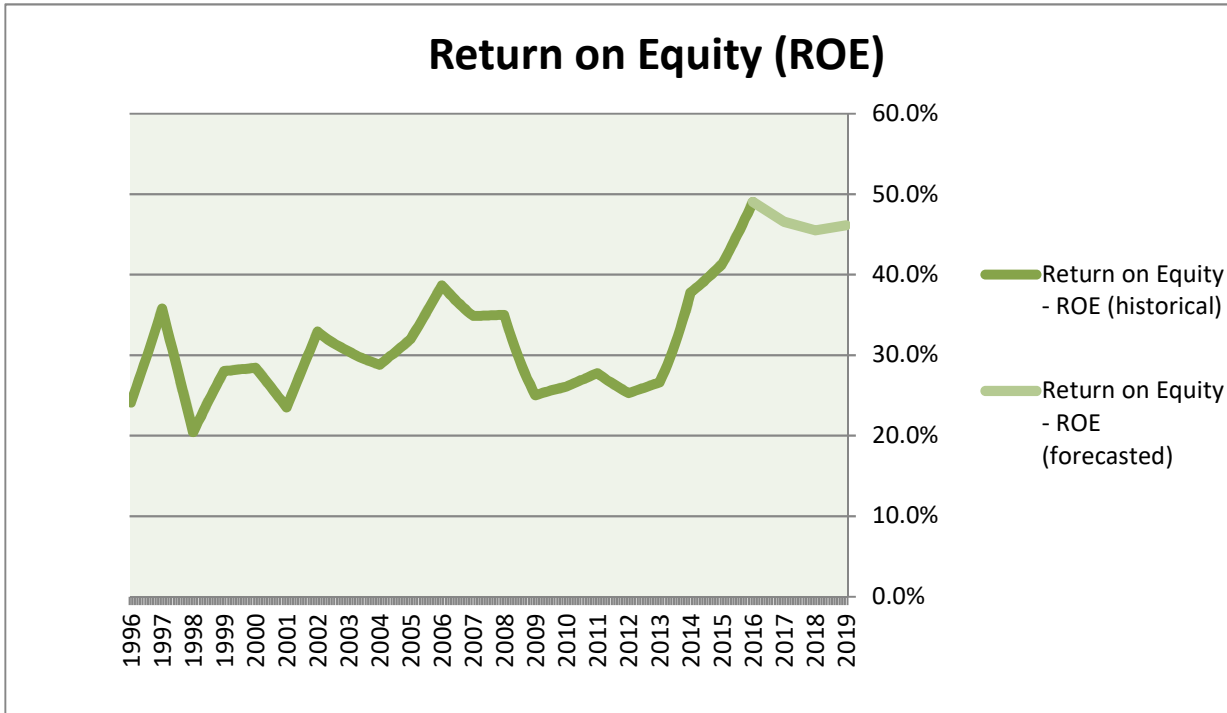
Return on Equity (ROE) measures the amount of profit a company makes with the money that shareholders have invested. A rising ROE is an indication of improving management efficiency. It is also an indication of how fast the company can grow in future through profits that are retained and not distributed as dividends.

The company's Return on Equity has been improving since 2012. During this period, Asset Turnover contributed negatively, Equity Multipler contributed positively and Net Profit Margin contributed positively to ROE.
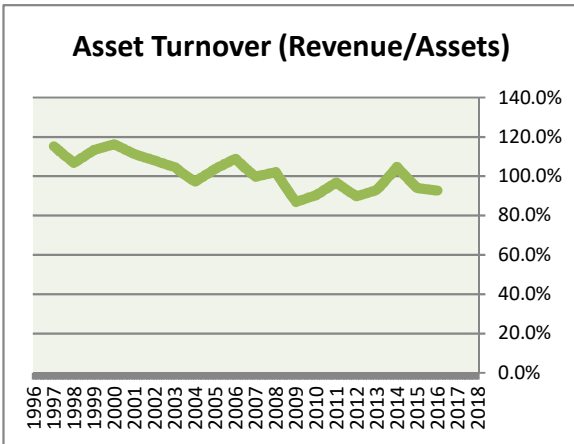
Asset Turnover measures the amount of revenue a company is generating from its assets. Uptrend/downtrend indicates that the company is becoming more/less efficient in the use of its assets.
The company's Asset Turnover has been deteriorating since 1997.
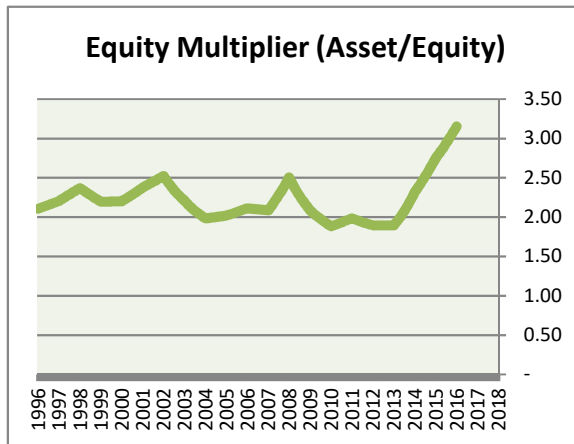
Equity Multiplier measures the extend of borrowings the company has vs. its assets. Uptrend/downtrend indicates that the company is borrowing more/less. Companies borrow more to help them to leverage their operations and improve ROE.

On the other hand, companies may choose to reduce their leverage and have lower ROE. The company's Earnings Multipler has been on an uptrend since 2012, which means the company is borrowing more.

Net Profit Margin (Net Income/Revenue)
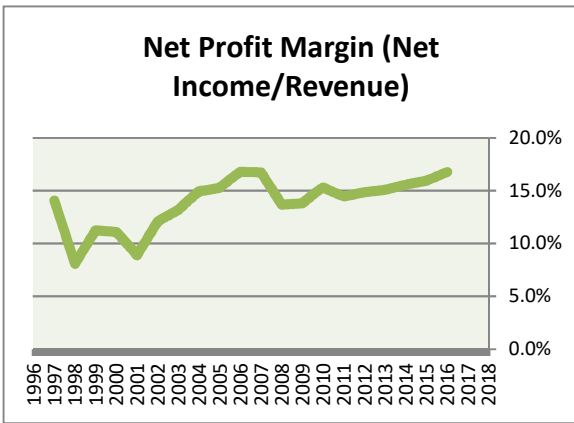
Net Profit Margin measures the amount of money the company makes after it deducts all expenses. Uptrend/downtrend indicates that the company is more/less profitable. The company's Net Profit Margin has been on an uptrend since 2011

A company may be growing at a fast rate historically but how do I know this rapid growth rate is sustainable? Is the company inflating its earnings through suspicious accounting practices. These questions requires that we look in greater detail at the Quality of Earnings.

Quality of Earnings
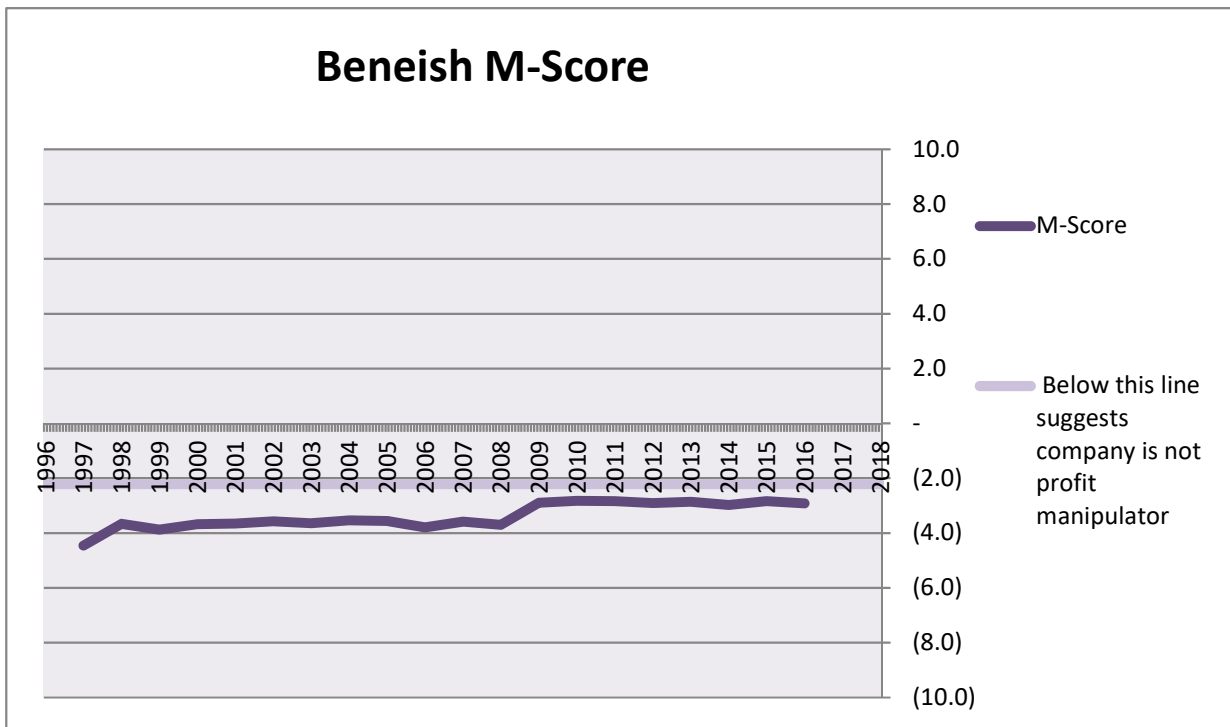
Beneish M-Score

The Beneish score is a measure the likelihood of a company manipulating its earnings. A score of less than -2.22 suggests that the company is not a profit manipulator and a score above -2.22 suggests that the company might be manipulating its profits.

M-score has been deteriorating since 1996. However, the latest M-Score of the company as at Dec 2016 was -2.91, which suggests that the company has not been been manipulating its profits. Below are some key concepts used in the Beneish M-Score that are helpful in determining whether a company is likely to have manipulated its profits.

## Days Sales in Receivables Index
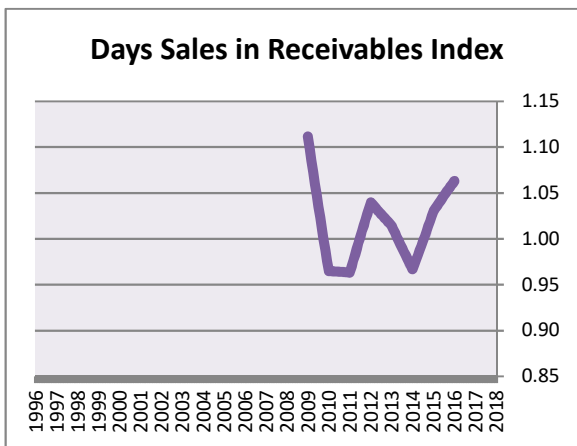
This index measures the amount of receivables a company has compared to its sales. A rising index may be an indication that the company is falsifying sales, which it cannot collect.

The company's Days Sales in Receivables Index has been erratic.

Sales/Revenue Growth Index
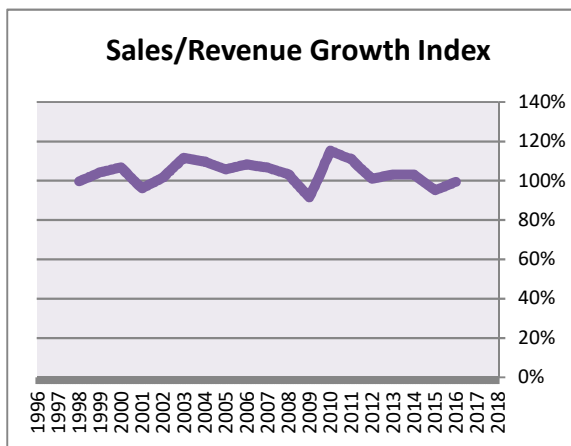
The Sales/Revenue Index measures the rate of sales growth. A rising index is indicative of higher sales growth. The higher the sales growth, the higher the probability that sales have been inflated. Of course, it is true that a company can also genuinely experience rapid sales growth.

The company's Sales/Revenue Index has been on downtrend since 2010, which points to a lower probability that revenue has been inflated.
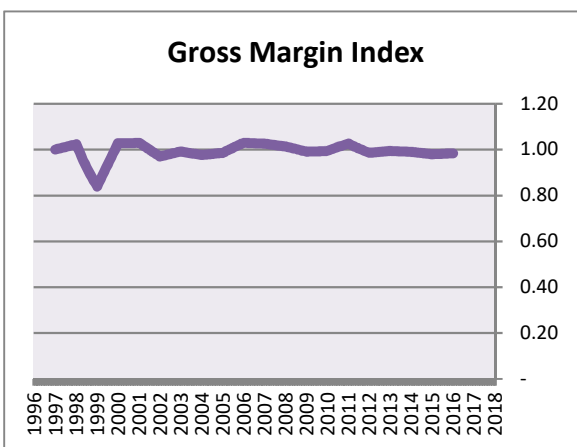
Gross Margin Index

The Gross Margin Index takes the gross profit margin in a certain year and divide it by the gross profit margin in the following year. Therefore, a rising/falling index is indicative or falling/rising profit margins.

The company's Gross Margin Index has been deteriorating since 2006, which means declining margins may give rise to pressure to inflate profits.

Depreciation Index
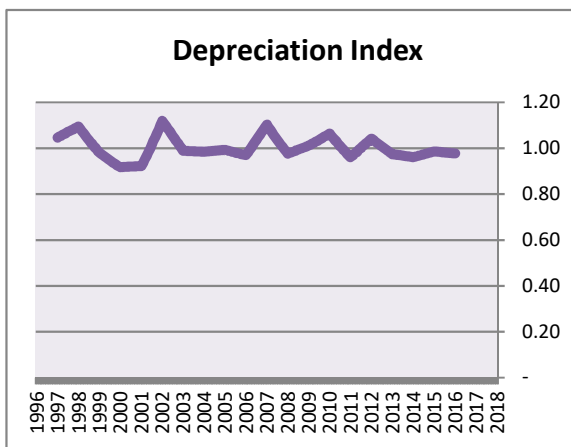
One way a company can inflate its earnings is by lengthening the useful life assumptions of its assets and reporting less depreciation or amortization expense. A rising/falling index is indicative of the company the company depreciating less/more.

The company's Depreciation Index has been erratic.

Asset Quality Index
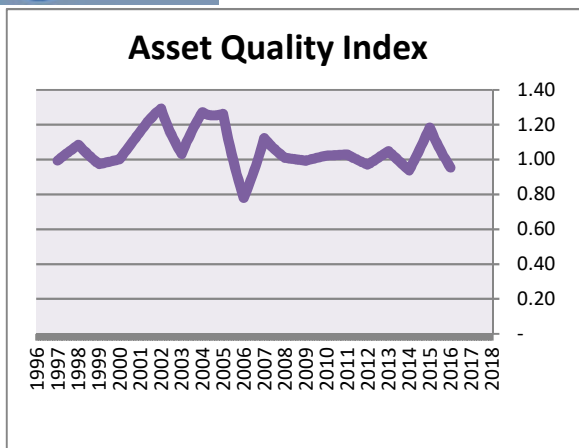
Some companies create intangible assets (e.g. by revaluing its assets) and then write-off expenses against these assets so that earnings are inflated. The Asset Quality Index measures the amount of these likely assets compared to the previous year. A rising/falling index is indicative more/less such assets and higher/lower likelihood of the company artifically boosting its profits.
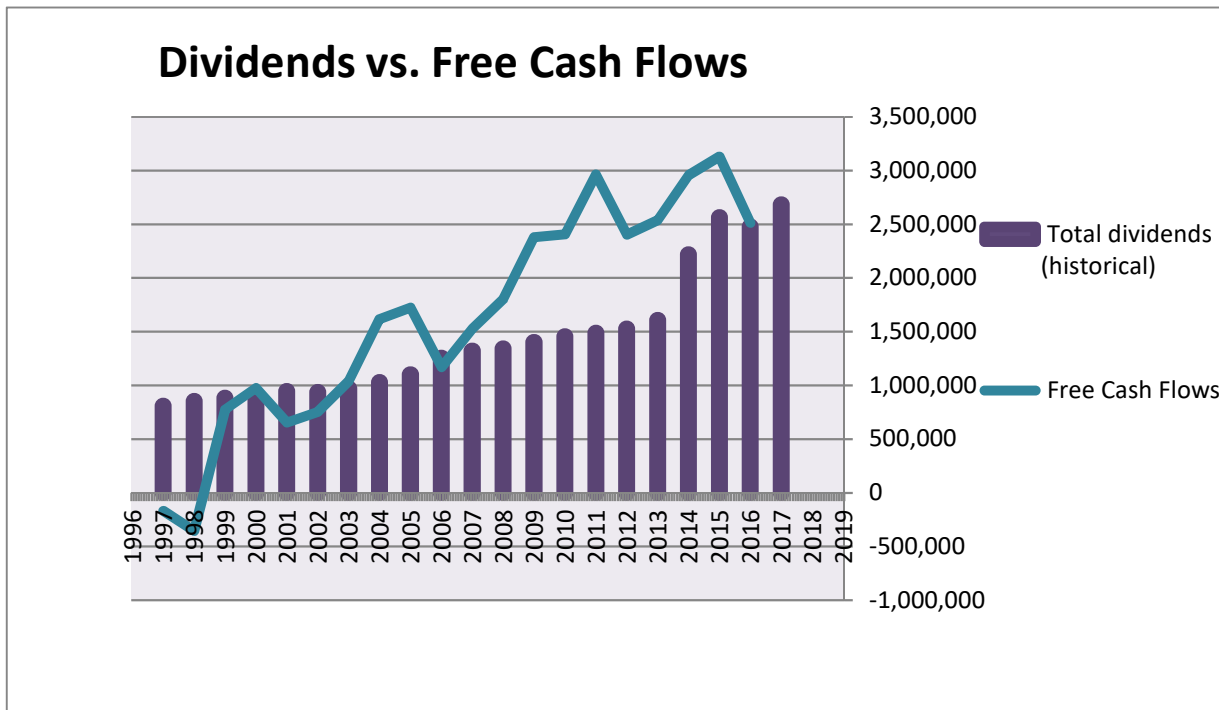The company's Asset Quality Index has been erratic.

Dividends
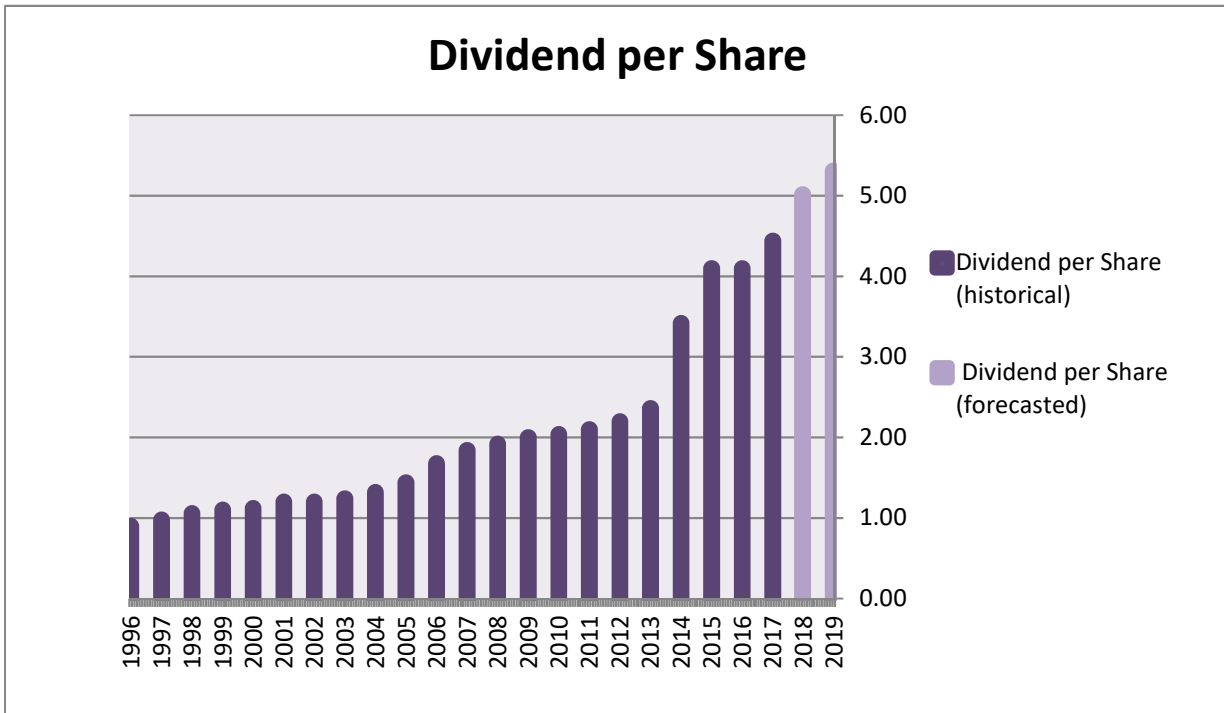
Dividend per Share

Dividend per share has been on an uptrend since 2002.

Forecasted future dividend per share growth are as follows:

2017	8.3%
2018	13.0%
2019	5.8%

Dividends vs. Free Cash Flows

The company usually pays less dividends than its free cash flow, which is good.

Dividends & Share Buybacks
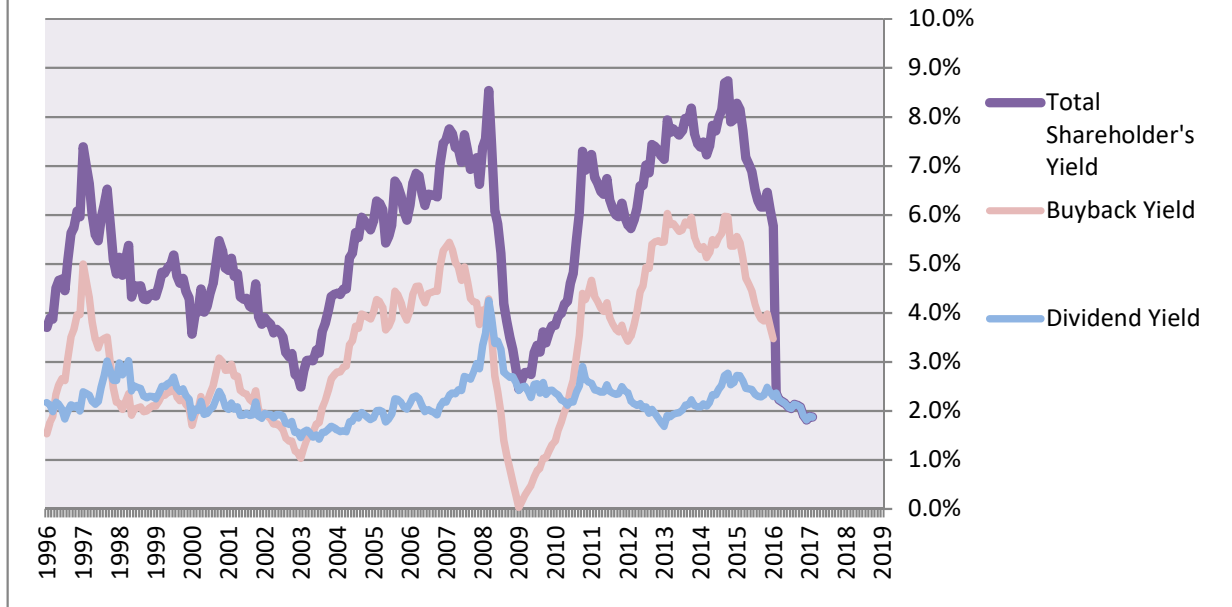
Dividend is not the only way that a company returns money back to shareholders. Any way it could do so is via share Dividend Yield has been erratic. Buyback Yield has been erratic. Total Shareholder Yield has been erratic.
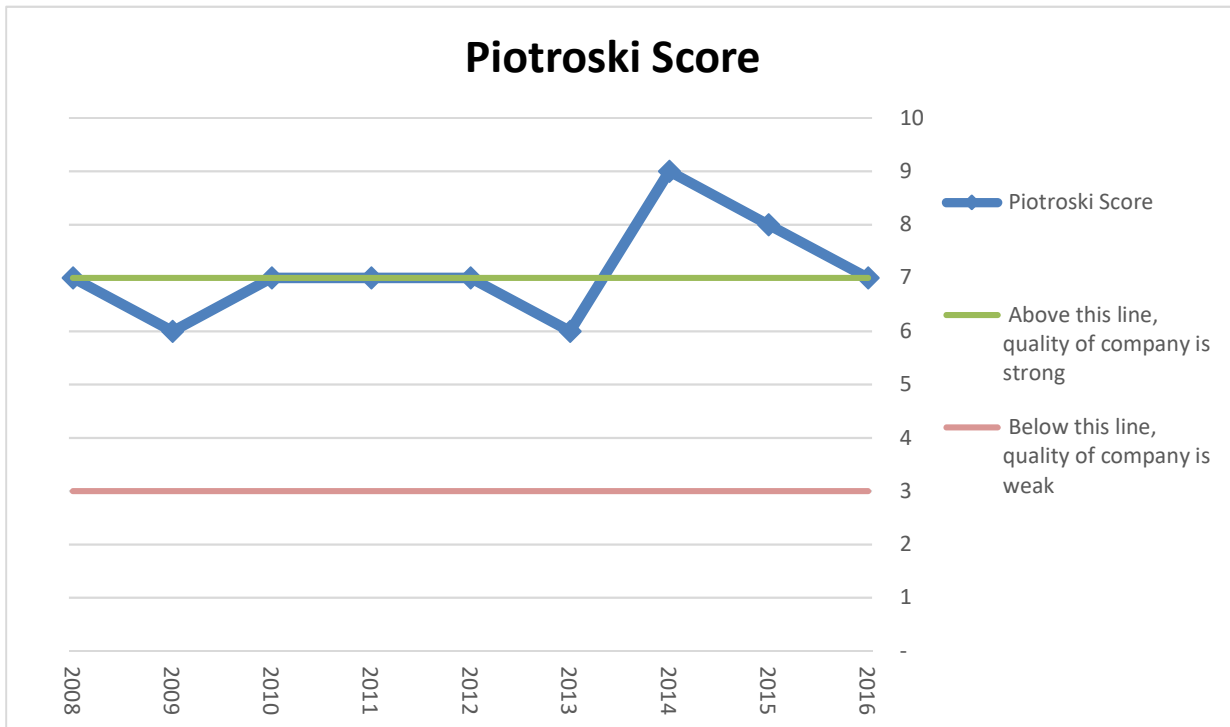
Piotroski Score

The Piotroski score measures the level of business excellence of a company. It is a well-rounded indicator that measures profitability, quality of earnings, financial condition and operating efficient. Research has show that companies with high Piotroski scores outperform those with low scores. Piotroski scores range from a low of zero to a high of nine based on whether the company passes or fails a criteria.

Return on Asset measures a company's ability to generate profits from the use of its assets. Cash Flow Return on Assets goes one step further to ensure that it is not just paper profits but cash flow that the company is generating. Current Ratio is a measure of a company's liquidity position and determines whether it has sufficient liquid assets to meet short-term liabilities. The number of shares is compared with the previous year as a company that is not generating healthy cash flow may end up raising new equity and this is indicative of the health of the company. Gross Profit Margin is a measure of whether the company is selling its products/services at a high enough margin to cover its operating expenses. Asset Turnover is a measure of how well a company uses its assets to generate sales.

| Criteria	Score
Return on Asset (Net Income / Asset) is positive	1
Cash Flow Return on Asset (Cash from Operations / Asset) is positive	1
Change in Return on Asset is positive over previous year	-
Cash Flow Return on Asset higher than Return on Asset	1
Change in long-term debt / Asset is positive (i.e. borrowing less)	1
Change in Current Ratio (Current Assets / Current Liabilities) is	1
Number of shares this year less than last year	1
Change in Gross Profit Margin is positive	1
Change in Asset Turnover (Sales / Assets) is positive	-
Total (Piotroski Score)	**7**

The company's Piotroski score has been erratic. The latest Piotroski score is 7, which is in the high zone.

Analysts Opinion

After studying the company's historical growth trend and analysts' estimates of earnings growth for a company, it is important to scrutinize analysts' expectations. For example, while analysts may be forecasting high earnings growth for a company, if they are constantly revising their estimates downwards, this will turn out to be negative for the stock price. The reverse is true for stocks that are constantly getting their earnings estimates revised upwards.
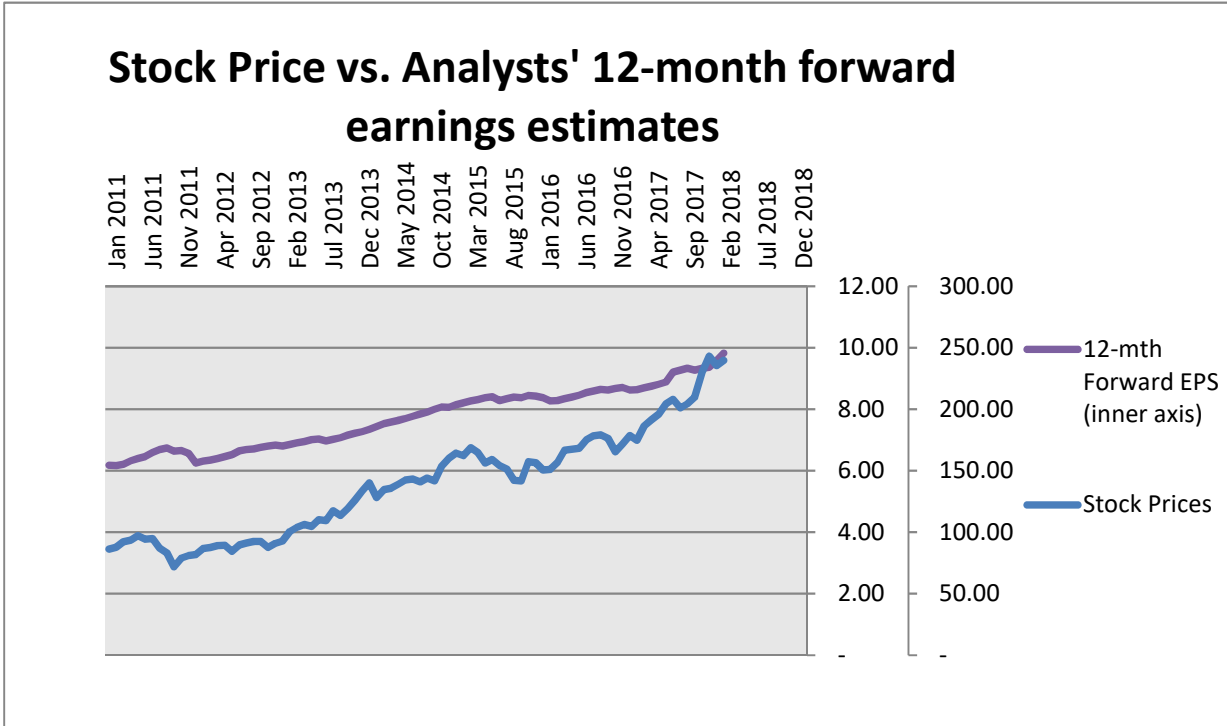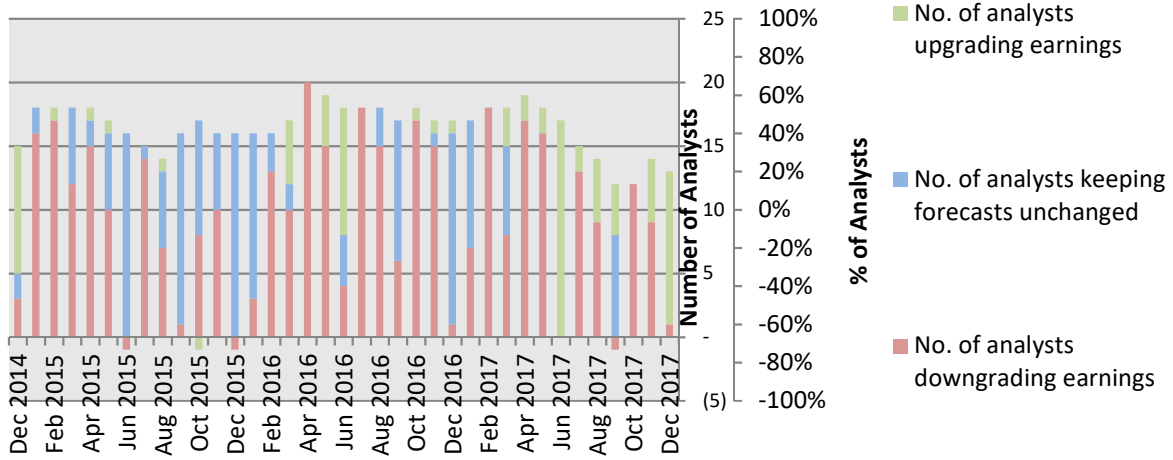

Analysts' forecasts of the profit of the company for the next 12 months usually have a direct impact on stock prices. Since Jan 2011, analysts are revising their earnings on the stock upwards.
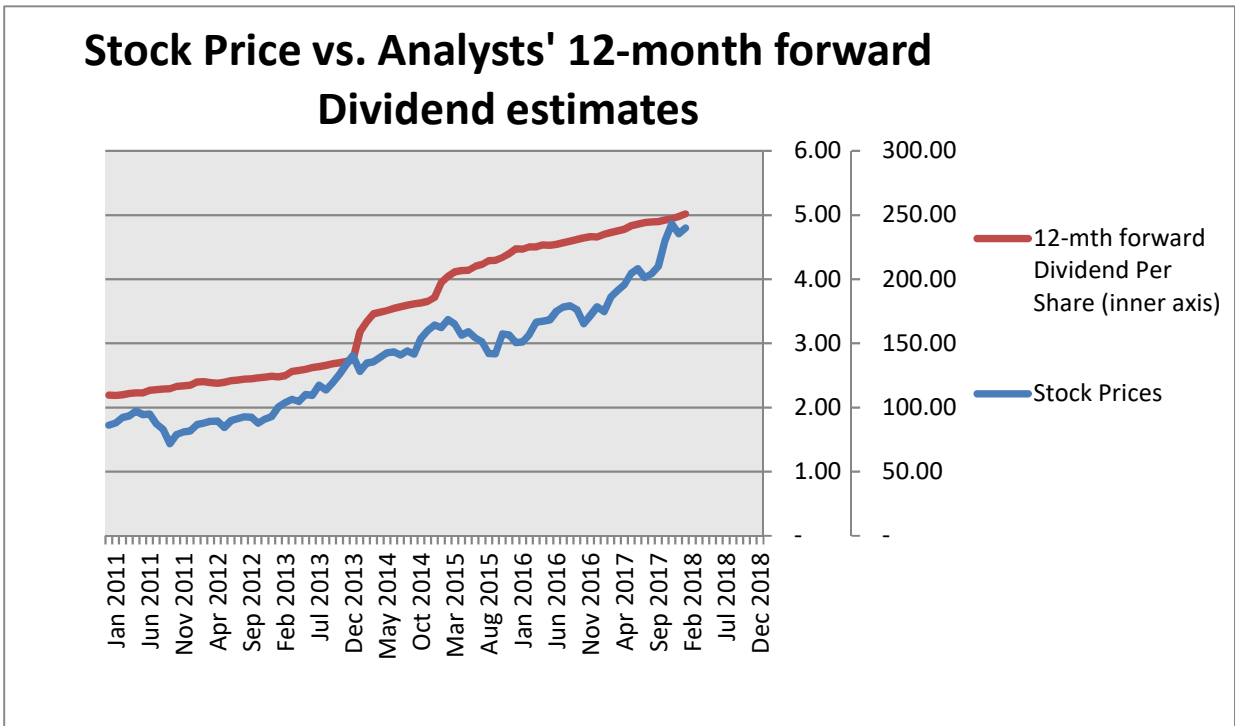
Since Jan 2018, analysts are revising their dividend forecasts upwards.

Number of Analysts Upgrading or Downgrading Estimates

Currently, there are 12 analysts upgrading the earnings of the company, 1 analysts downgrading earnings and zero analysts keeping earnings constant. Analysts upgrades and downgrades of the company's earnings have been erratic.

Analysts' Recommendation on the stock
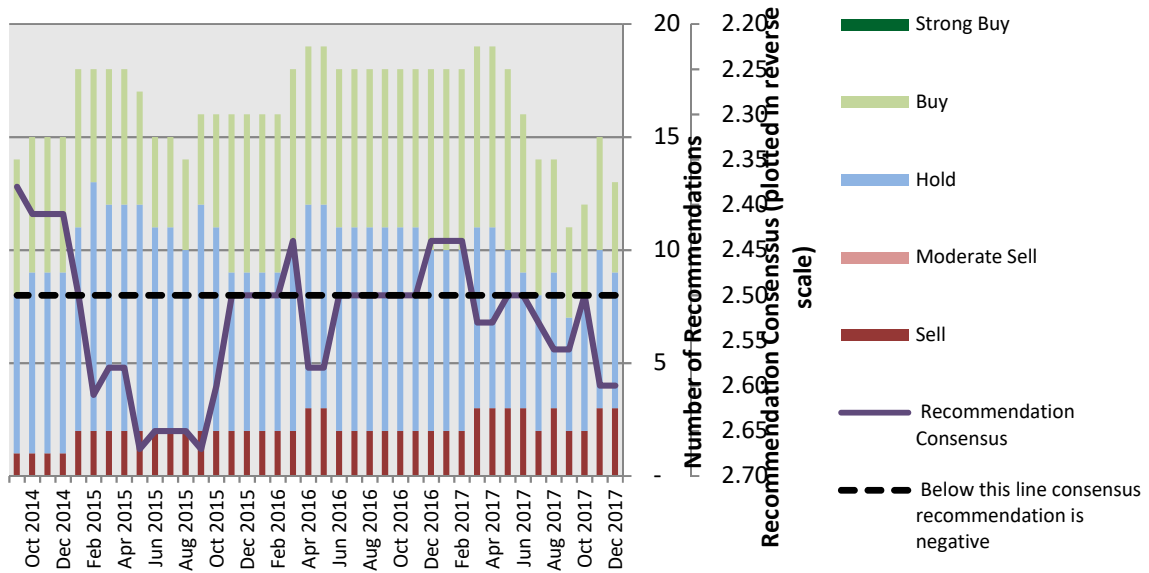
Recommendation consensus refers to the scoring of how analysts are recommending the stock. If all analysts recommend a Strong Buy, the recommendation consensus is 1 and if all recommend a Sell, it is 5. The number of analysts recommending Strong Buy, Buy, Hold, Moderate Sell and Sell will give a weighted score for the company. The lower the score, the more analysts are expecting the stock to go up. Analysts' recommendations are not just dependent on the growth prospects of the company but also on the share price. If share prices have gone up to close to its fair value, less analysts will be recommending a buy on the stock.

Since Aug 2016, analysts are downgrading their recommendations on the stock. Current recommendation consensus is above 2.5 or below the black dash line, which is a negative recommendation. At the moment, there are 3 analysts recommending Strong Buy/Buy, 6 analysts recommending Hold and 2 analysts recommending Moderate Sell/Sell.

Financial Condition
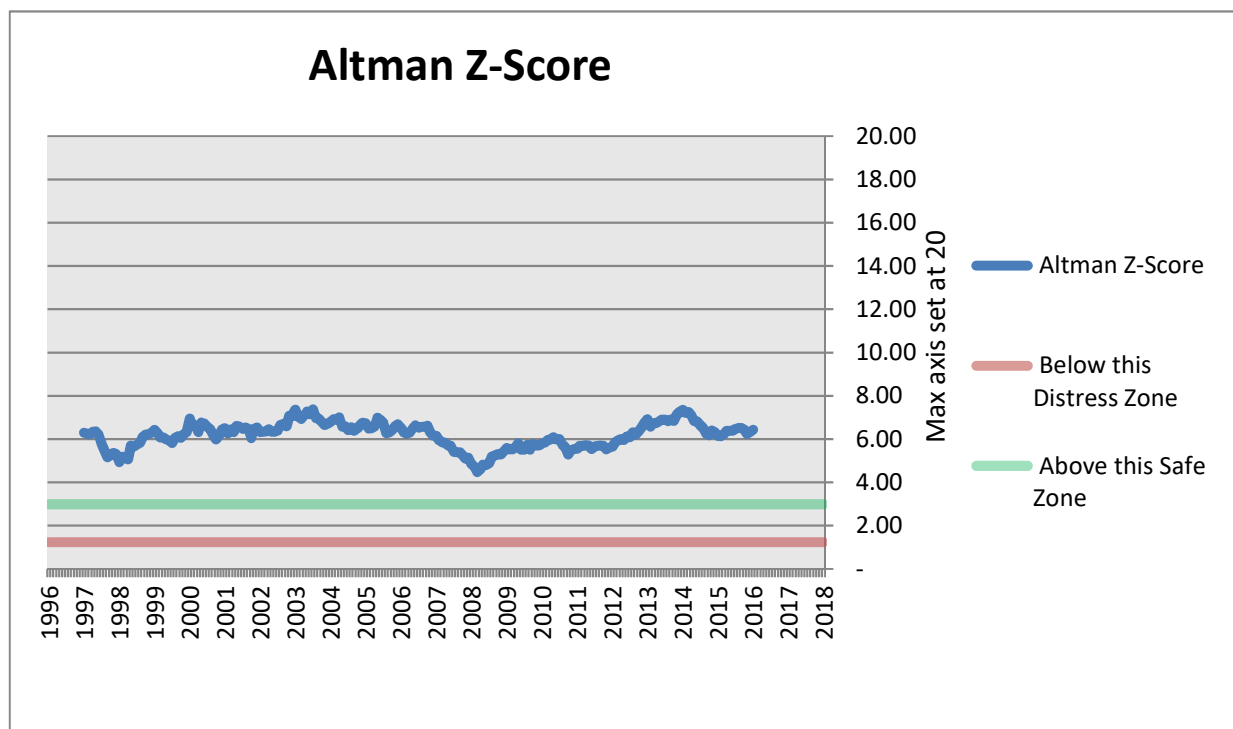
In order to determine the financial condition of the company, we usually use the Z score, which was introduced by Edward Altman, a Professor of Finance at New York University. This score is a composite measure of a firm's financial condition and has been proven to be able to predict with high accuracy whether a firm will go into bankruptcy within the next two years.

Z-score has been improving since 2008. The main reasons for this are:
* higher working capital
* higher retained earnings as a proportion of total assets
* higher EBIT as a proportion of total assets
* lower level of borrowings
.
The latest Z-Score of the company as at Dec 2016 was 6.4, which is still in the safe zone.

The various components that go into the Z-Score are shown below:

Revenue/Total Assets
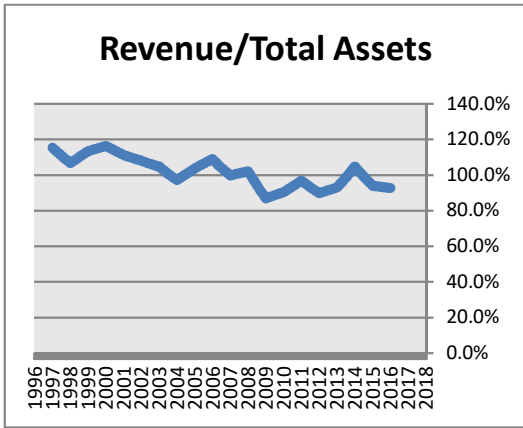
This is the Revenue Turnover ratio and it reflects the amount of revenue the company is able to generate from the use of its assets. Companies that have difficulty generating revenue cannot generate consistent cash flow to pay its bills.

The amount of revenue generated from assets has been on a downtrend since 1997.

Retained Earnings/Total Assets
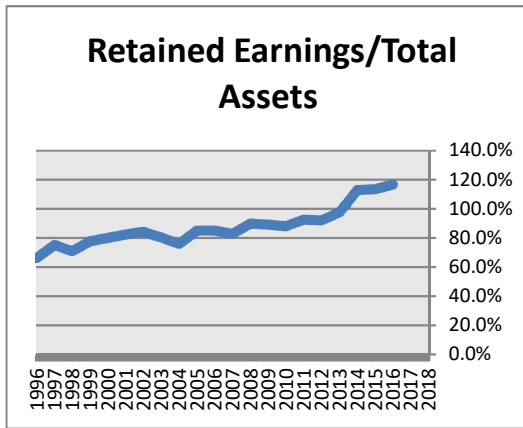
The more profits are retained within the firm, the greater the buffer of reserves for the company to weather difficult times.

The level of retained earnings relative to assets has been on an uptrend since 2010. Currently, retained earnings are at 116.7% of total assets.

Return on Asset
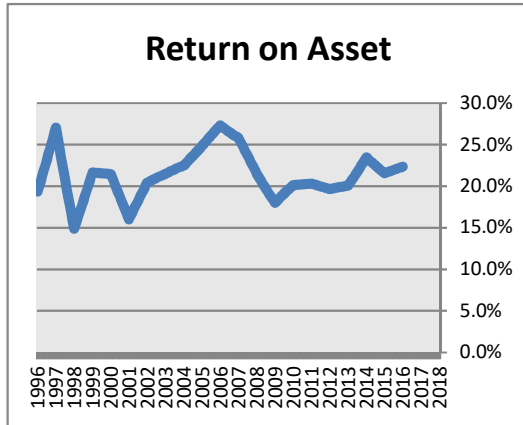
This measures the ability of the company to generate EBIT (earnings before interest and taxes) from its assets.

EBIT as a % of assets has been on an uptrend since 2009. Currently, EBIT is at 22.4% of total assets.

Market Cap/Total Liabilities
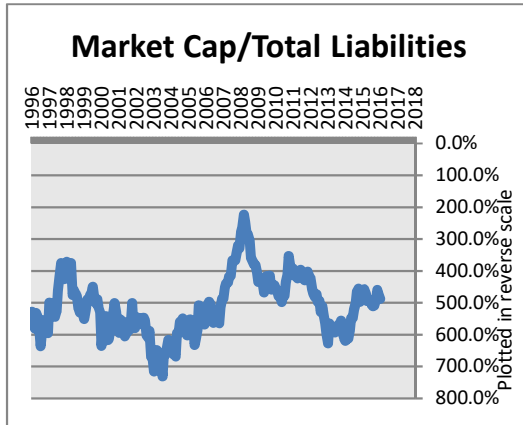
This is an indication of the level of borrowings of the firm. A high level of borrowings will affect survivability as it may not have enough cash flows to meet its debt obligations.

The level of borrowings of the company has been erratic.
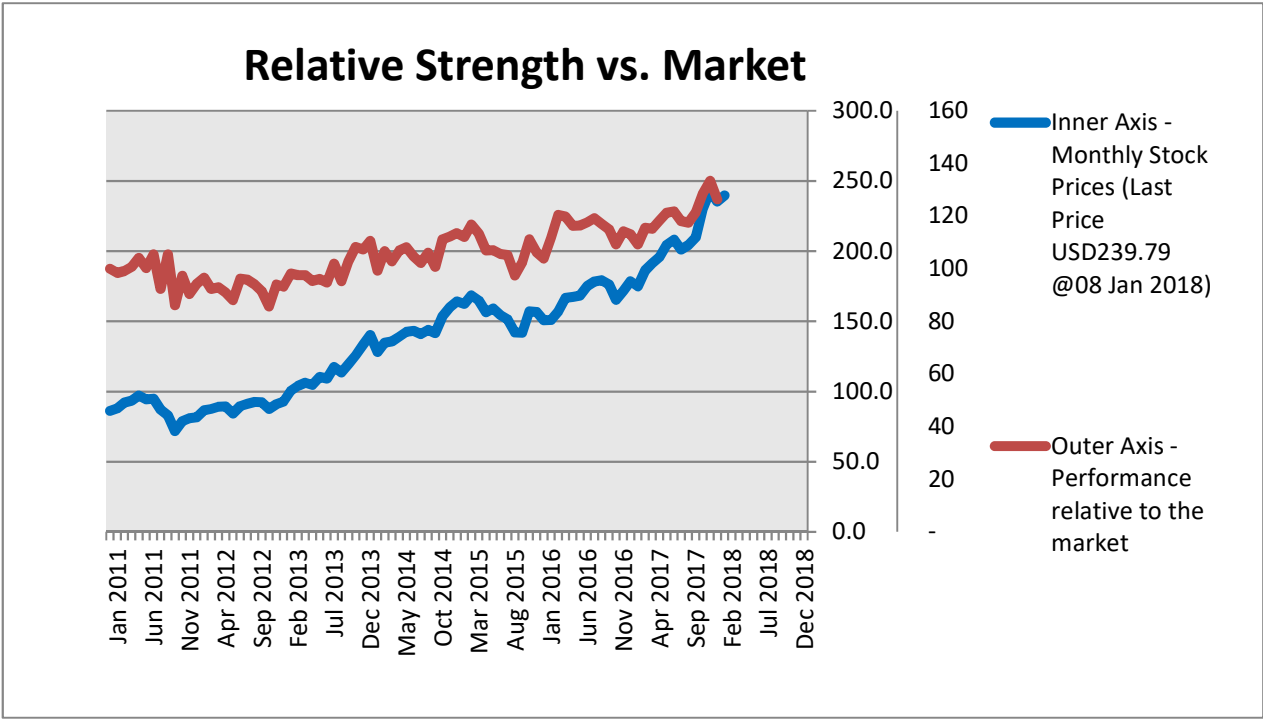
Working Capital/Total Assets
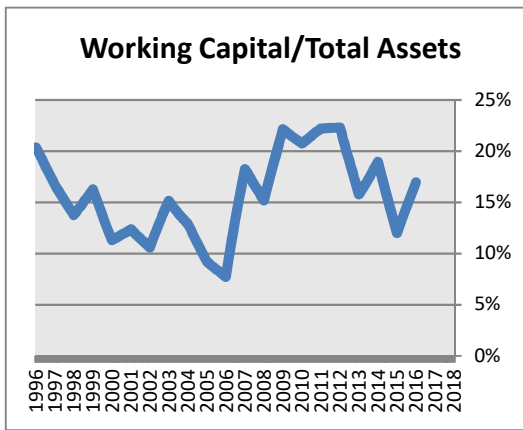
Working capital is essential to the operations of the company and a low level of working capital may result in liquidity problems. Working capital relative to total assets has been on a downtrend since 2009.

Stock Price & Technical Indicators
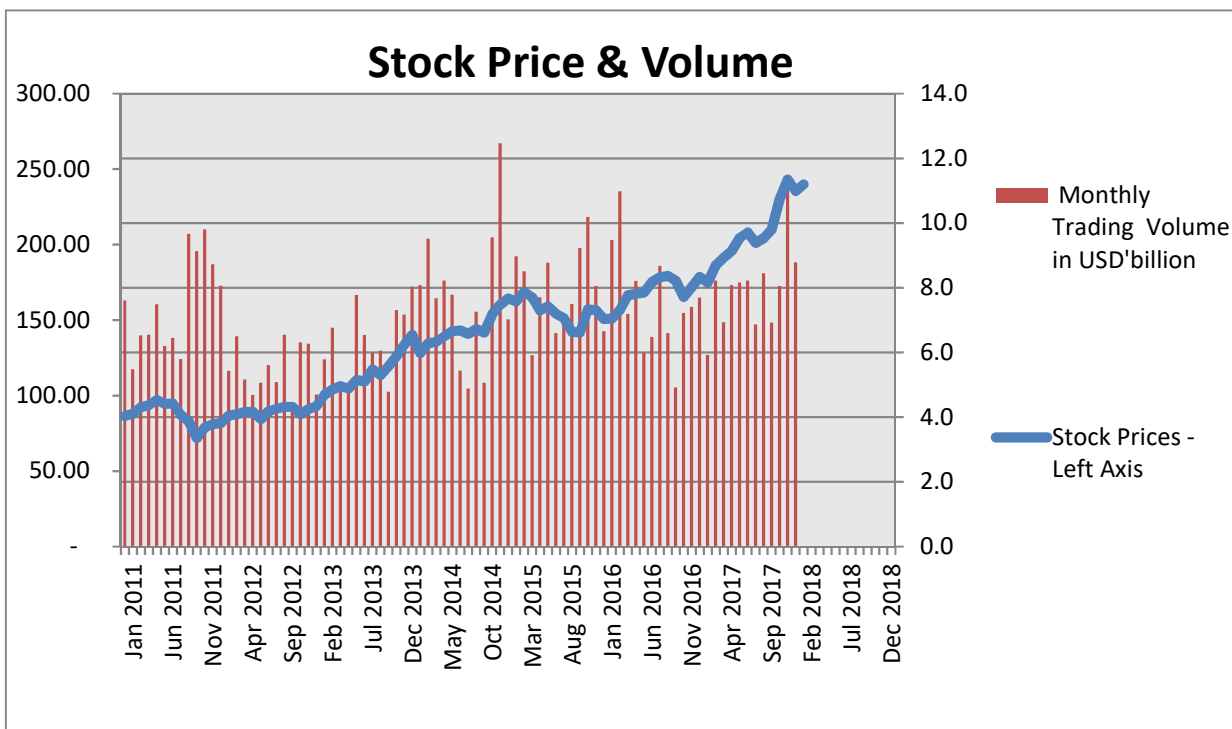
Stock Price & Volume

Since Oct 2016, stock prices have been on an uptrend. The average daily trading volume of the stock in the last three months is USD391.

Relative Strength vs. Market

Inner Axis - Monthly Stock Prices (Last Price USD239.79 @08 Jan 2018)

Outer Axis - Performance relative to the market

Since Sep 2011, the stock has been performing better than the market. The stock has a beta of 1.8 (based on last one year), which means that volatility of stock prices is greater than the volality of the market.

Stock Price & Volatility

Right Axis - 3-month rolling standard deviation

Left Axis - Stock Price
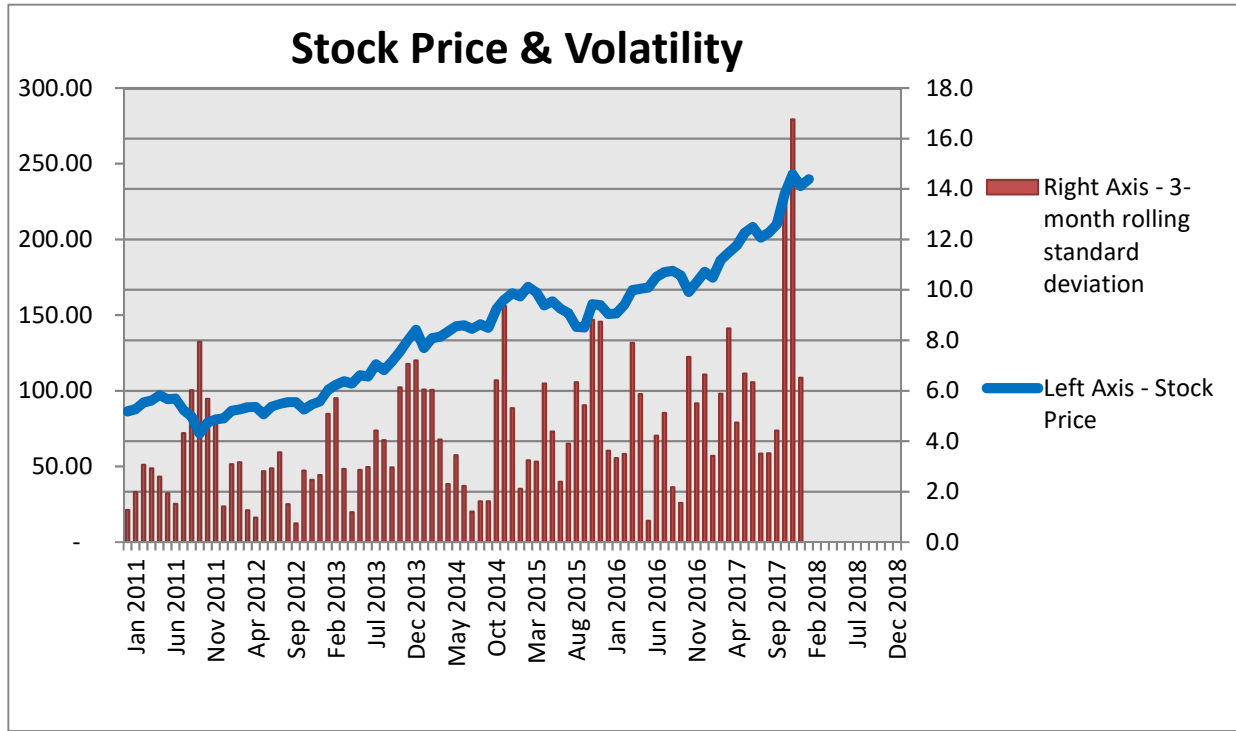
If the standard deviation of stock prices (as represented by the red bars) get higher (lower), it means that stock prices have become more (less) volatile.

Stock Prices & Moving Averages
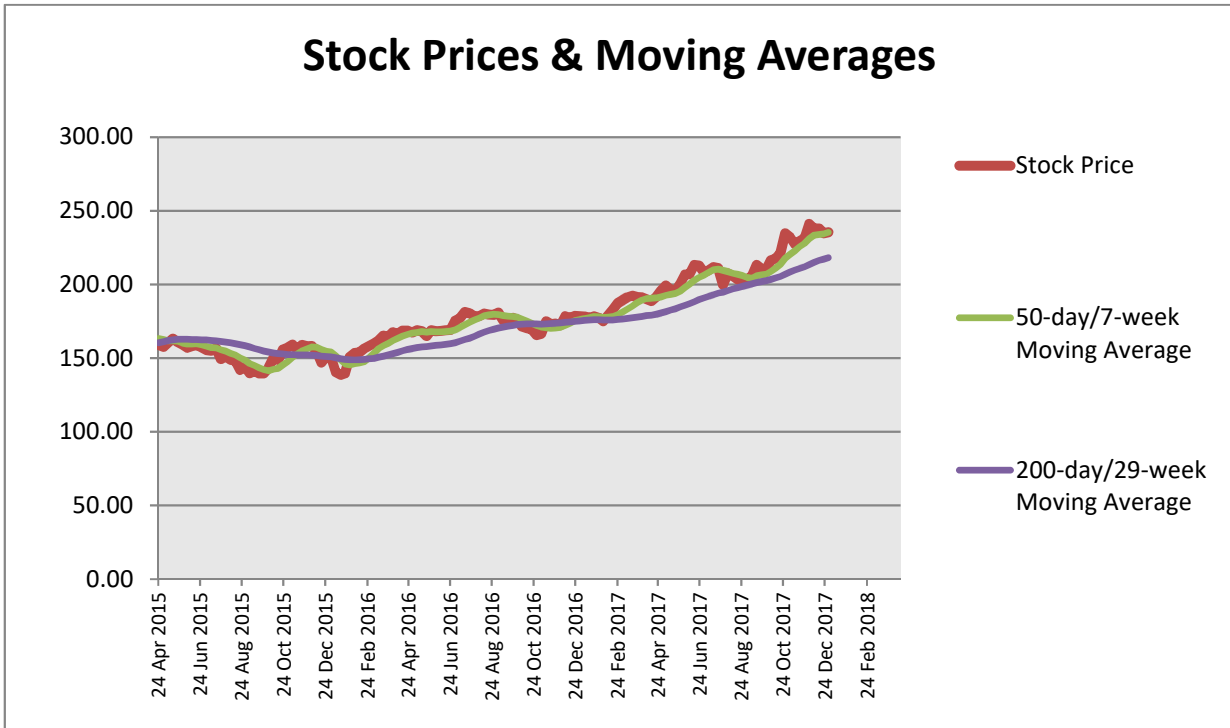
The 50-day moving average line crossed the 200-day moving average line from the bottom in Dec 2016, which is a bullish sign.

Relative Strength Index
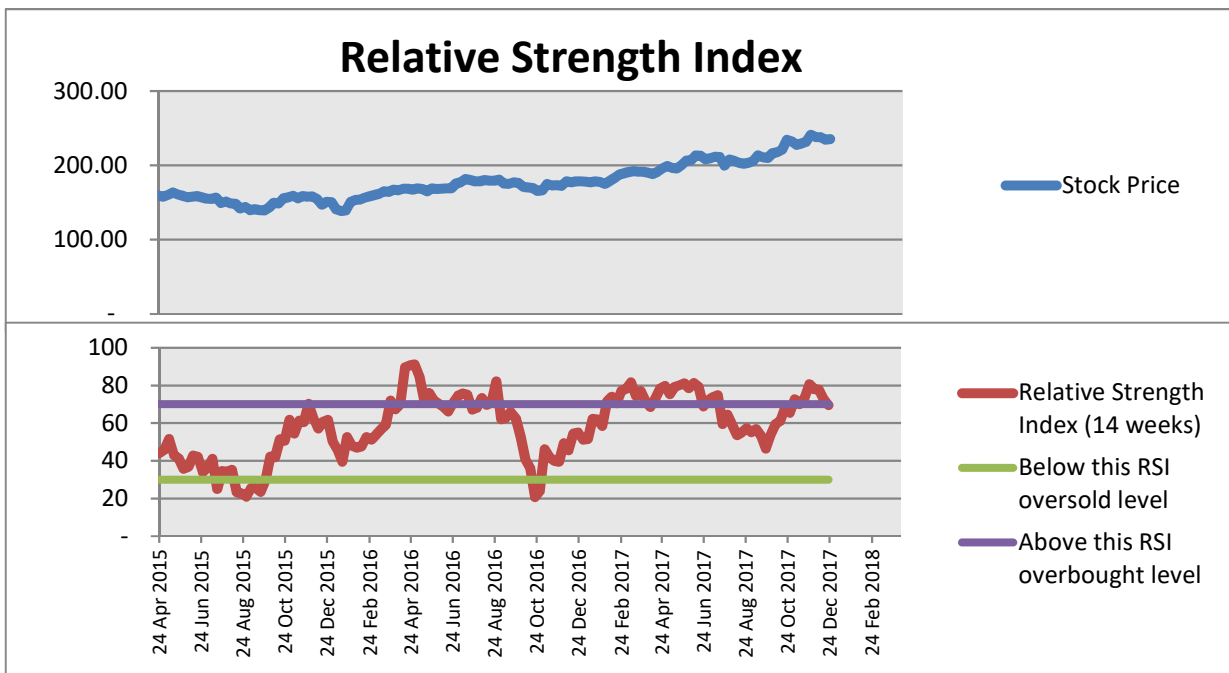
The Relative Strength Index is a momentum indicator that measures the speed and magnitude of price changes to detect whether the stock has reached overbought or oversold levels.

Based on the 14-week Relative Strength Index, the stock is in the neutral territory since 22 Dec 2017.
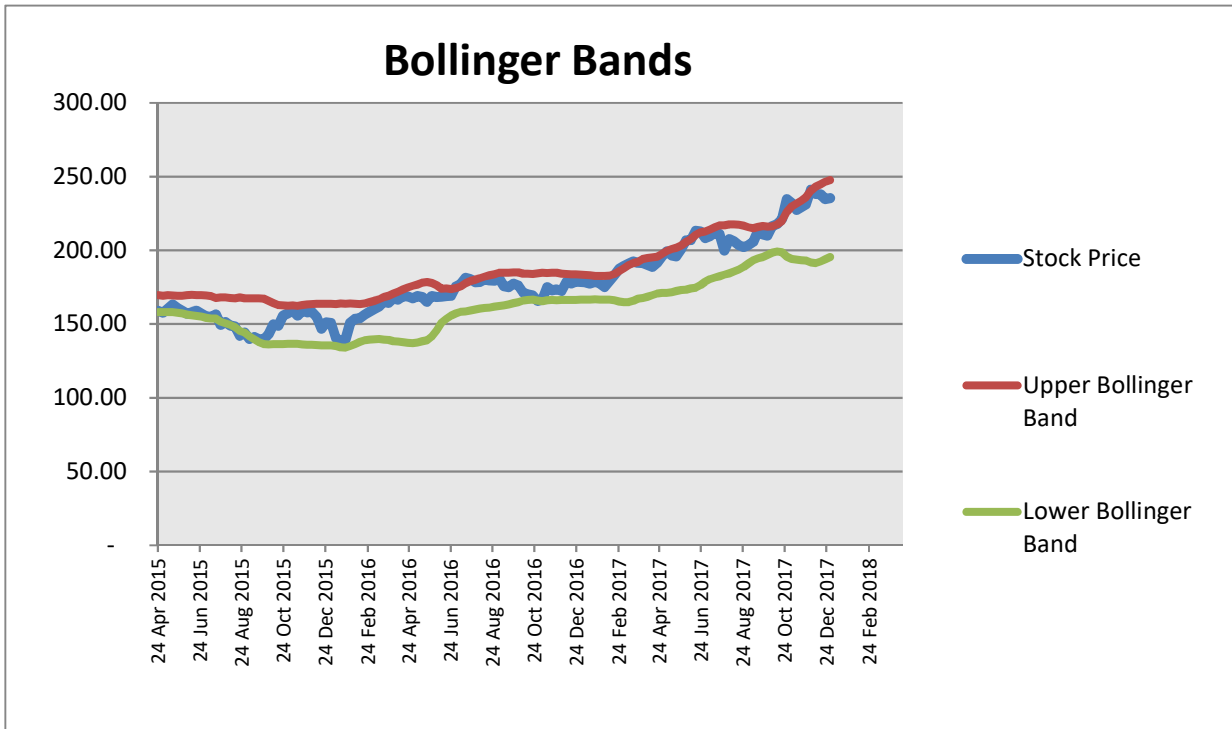
Bollinger Bands

This Bollinger Band is a plot of two standard deviations (a measure of stock volatility) above and under the stock price. Based on this technical indicator, the closer the stock price is to the upper band, the more overvalued it is and the closer it is to the lower band, the more undervalued.

As at 6 Apr 2018, the stock is nearer to the upper band, which is an overbought situation.

Moving Average Convergence/Divergence (MACD)
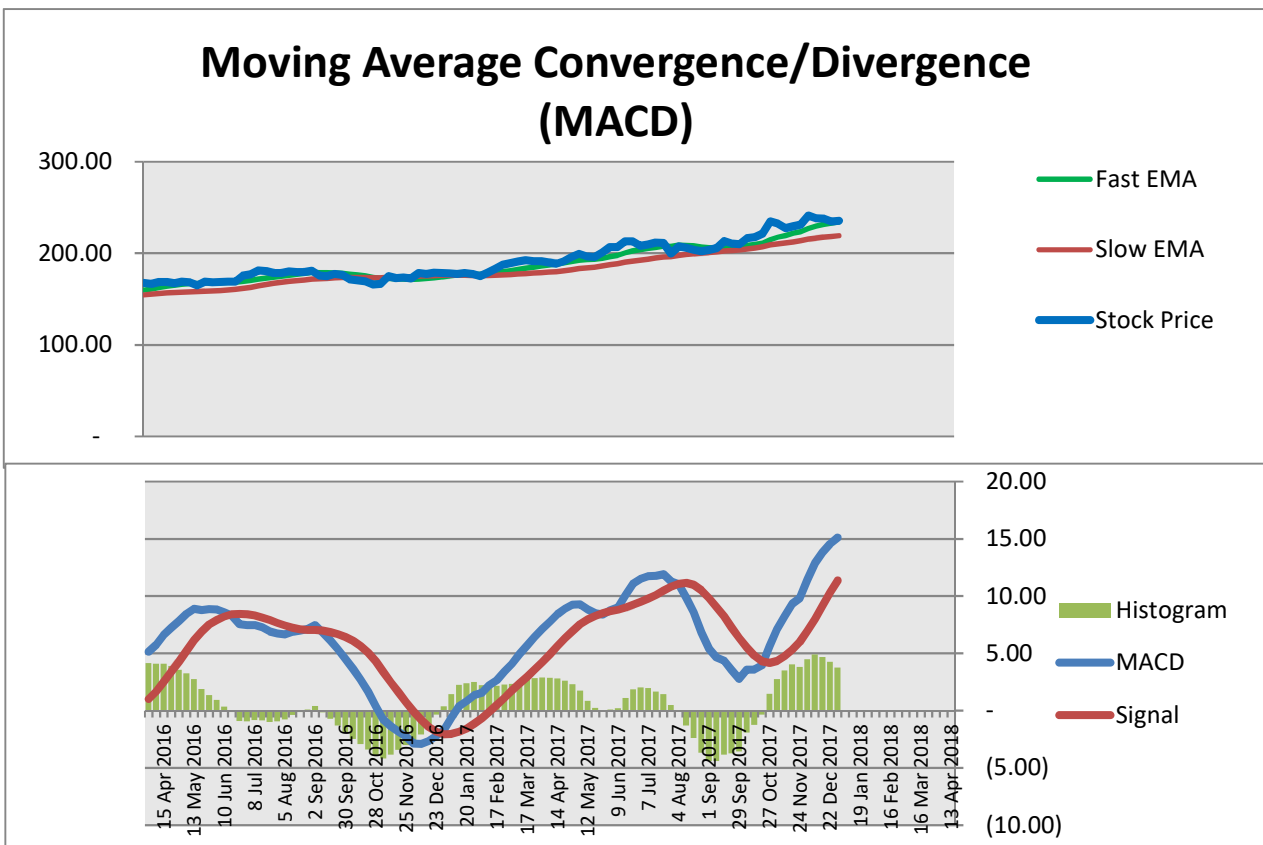
The MACD is a momentum indicator that shows the difference between two moving averages of stock prices, a longer one for 26 periods and a shorter one for 12 periods. This "difference" is then smoothened out to trigger buy and sell signals as indicated by the histograms. If the histogram turns positive, it is a bullish signal and if it turns negative it is a bearish indicator.

As at 27 Oct 2017, the histogram has turned positive, which is a bullish indicator.
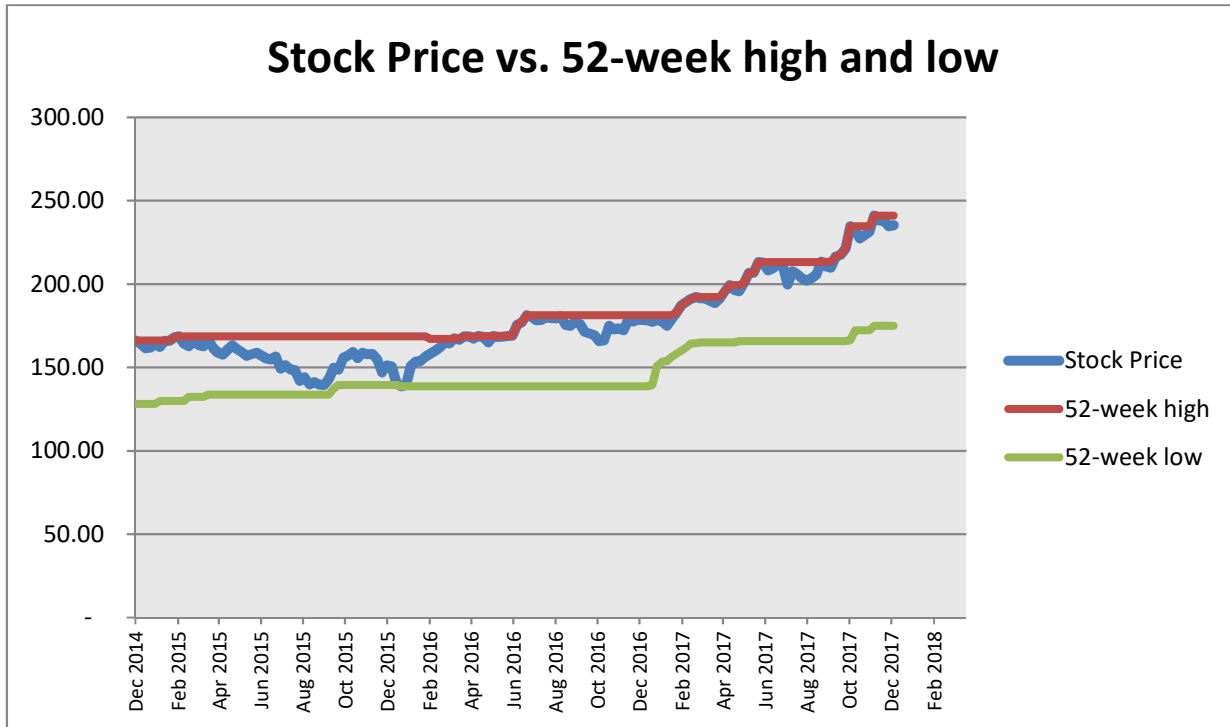
This is a technical indicator whereby a stock that is trading near its 52-week high is bought and a stock that is trading near its 52-week low is sold.

The stock, which is trading at USD239.79 as at 8 Jan 2018, is nearer to its 52-week high, which is a bullish indicator.

Disclaimer