### PROCESS:

1. pick 3 stocks from top 3 performing sectors
2. EVALUATE:
   * QUALITY RATING - Stick to stocks with ratings of B+ or better, just to be on the safe side.
   * DEBIT TO CURRENT ASSET RATIO - Benjamin Graham advised buying companies with [Total Debt to Current Asset ratios](https://cabotwealth.com/daily/value-investing/bargain-stocks-net-current-asset-value/) of less than 1.10. In value investing it is important at all times to invest in companies with a low debt load. Total Debt to Current Asset ratios can be found in data supplied by Standard & Poor’s, Value Line, and many other services.
   * CURRENT RATIO - Check the Current Ratio (current assets divided by current liabilities) to find companies with ratios over 1.50. This is a common ratio provided by many investment services.
   * POSITIVE EARNINGS PER SHARE GROWTH - Criteria four is simple: Find companies with positive earnings per share growth during the past five years with no earnings deficits. Earnings need to be higher in the most recent year than five years ago. Avoiding companies with earnings deficits during the past five years will help you stay clear of high-risk companies.
   * PRICE TO EARNINGS PER SHARE (P/E) RATIO – Invest in companies with price to earnings per share (P/E) ratios of 9.0 or less. Look for companies that are selling at bargain prices. Finding companies with low P/Es usually eliminates high growth companies, which should be evaluated using [growth investing](https://cabotwealth.com/daily/growth-stocks/10-rules-for-growth-investing/) techniques.
   * PRICE TO BOOK VALUE (P/BV) - Find companies with price to book value (P/BV) ratios less than 1.20. P/E ratios, mentioned in rule 5, can sometimes be misleading. P/BV ratios are calculated by dividing the current price by the most recent book value per share for a company. Book value provides a good indication of the underlying value of a company. Investing in stocks selling near or below their book value makes sense.
   * DIVIDENDS - Invest in companies that are currently paying dividends. Investing in undervalued companies requires waiting for other investors to discover the bargains you have already found. Sometimes your wait period will be long and tedious, but if the company pays a decent dividend, you can sit back and collect dividends while you wait patiently for your stock to go from undervalued to overvalued.

**FURTHER ACTION:**

One last thought. We like to find out why a stock is selling at a bargain price. Is the company competing in an industry that is dying? Is the company suffering from a setback caused by an unforeseen problem? The most important question, though, is whether the company’s problem is short-term or long-term and whether management is aware of the problem and taking action to correct it. You can put your business acumen to work to determine if management has an adequate plan to solve the company’s current problems.

2. get stock data -> <https://www.alphavantage.com> -> API key: QLBGBER1QDELTK51

EX: <https://www.alphavantage.co/query?function=TIME_SERIES_DAILY_ADJUSTED&symbol=AAPL&apikey=QLBGBER1QDELTK51&datatype=csv>

3. Write code -> "reeds\_stock\_exchange.py"

4. Analyze Graph

### 5. Predict best Buy option using Technical analysis indicators

(volatility & price)

General Items of interest:

* Probability Density Function

The predictive variables are calculated using TA indicators on asset prices.TA indicator is composed of data derived from the application of a certain formula to the past prices of a stock

* The Simple Moving Average (SMA) is the [arithmetic mean](https://www.sciencedirect.com/topics/economics-econometrics-and-finance/statistical-measures) of T past prices – alphavantage api
  + Support is established when a price is trending downward. There is a point at which the selling pressure subsides, and buyers are willing to step in. In other words, a floor is established.
  + Resistance happens when a price is trending upward. There comes a point when the buying strength diminishes, and the [sellers](https://www.investopedia.com/terms/s/seller.asp) step in. This would establish a ceiling. (For more explanation, read [*Support & Resistance Basics*](https://www.investopedia.com/trading/support-and-resistance-basics/).)
* Weighted Moving Average (WMA), used in this study, assigns higher weightings to more recent prices alphavantage api

The Weighted Moving Average (WMA) places more emphasis on recent prices than on older prices. Each period’s data is multiplied by a weight, with the weighting determined by the number of periods selected.

* The Relative Strength Index (RSI) is a comparison indicator between losses and recent gains and determines an overbought or oversold market - alphavantage api

Relative Strength Index (RSI) is a momentum indicator that measures the magnitude of recent price changes to evaluate overbought or oversold conditions in the price of a stock or other asset. The RSI is displayed as an oscillator (a line graph that moves between two extremes). It can have a reading from 0 to 100. The indicator was originally developed by J. Welles Wilder Jr. and introduced in his seminal 1978 book, New Concepts in Technical Trading Systems.

Traditional interpretation and usage of the RSI is that values of 70 or above indicate that a security is becoming overbought or [overvalued](https://www.investopedia.com/terms/o/overvalued.asp) and may be primed for a trend [reversal](https://www.investopedia.com/terms/r/reversal.asp) or corrective [pullback](https://www.investopedia.com/terms/p/pullback.asp) in price. An RSI reading of 30 or below indicates an oversold or [undervalued](https://www.investopedia.com/terms/u/undervalued.asp) condition.

### Overbought and Oversold Levels

In terms of market analysis and trading signals, RSI moving above the horizontal 30 reference level is viewed as a [bullish](https://www.investopedia.com/terms/b/bull.asp) indicator, while the RSI moving below the horizontal 70 reference level is seen to be a [bearish](https://www.investopedia.com/terms/b/bear.asp) indicator. Since some assets are more volatile and move quicker than others, 80 and 20 are also frequently used overbought and oversold levels.

* The Accumulation/Distribution Oscillator (ADO) is an indicator of momentum – alphavantage api

Chaikin A/D oscillator (ADOSC) values

### KEY TAKEWAYS

* The accumulation/distribution line gauges [supply and demand](https://www.investopedia.com/terms/l/law-of-supply-demand.asp) by looking at where the price closed within the period's range, and then multiplying that by volume.
* The A/D indicator is cumulative, meaning one period's value is added or subtracted from the last.
* A rising A/D line helps confirm a rising price trend.
* A falling A/D line helps confirm a price [downtrend](https://www.investopedia.com/terms/d/downtrend.asp).
* If the price is rising but A/D is falling, it signals underlying weakness and a potential decline in price.
* If the price of an asset is falling but A/D is rising, it signals underlying strength and the price may start to rise.

### The Bottom Line

The Chaikin Oscillator generates technical output that supports sound buy or sell decisions but is best used in conjunction with [fundamentals](https://www.investopedia.com/terms/f/fundamentals.asp) and other indicators. (For additional reading, check out: [How to Use Volume to Improve Your Trading](https://www.investopedia.com/articles/technical/02/010702.asp).)

* Average True Range (ATR). This indicator seeks to measure bull and bear price trends – alphavantage api

### Conclusion

The ATR is a versatile tool that helps traders measure volatility and can provide entry and exit locations. An entire trading system can be built from this single idea. It's an indicator that should be studied by serious market students

TTM figures can also be used to calculate financial ratios. For example, the price/earnings ratio is often referred to as P/E (TTM), which is calculated as the stock's current price divided by a company's trailing 12-month [earnings per share (EPS)](https://www.investopedia.com/terms/e/eps.asp).

Much of fundamental analysis is about comparing a measurement against a like measurement from a prior term to see how much growth was realized. For example, a company reporting $1 billion in revenues is impressive. However, consider that the same company's revenues increased from $500 million to $1 billion within the last 12 months; the marked improvement provides more information about the degree of growth.

### Where to Find the TTM

Models:

SVM - Support Vector Machine - linear separator (classification)

SVR - Support Vector Regression is a type of SVM - next point (prediction)

Euclidean distance:

In mathematics, the Euclidean distance or Euclidean metric is the "ordinary" straight-line distance between two points in Euclidean space. With this distance, Euclidean space becomes a metric space. The associated norm is called the Euclidean norm. Older literature refers to the metric as the Pythagorean metric

**DATA SETS:**

* **Training** set – set used to create model
* **Validation** set – set used to choose the algorithm
* **Test** set – assess model performance before production use.

SVR model includes the following notations:

* **x**: vector with predictor variables;
* *y*: sample classification;
* **w**: weight vector;
* *b*: constant;
* *C*, *c*: model parameters.

Here gamma is a parameter, which ranges from 0 to 1. A higher value of gamma will perfectly fit the training dataset, which causes over-fitting. Gamma=0.1 is considered to be a good default value. The value of gamma needs to be manually specified in the learning algorithm.

Note that the shape of the kernel function directly influences the values obtained by the SVR regression. Similarly, the constant c in Eq. [(19)](https://www.sciencedirect.com/science/article/pii/S2405918818300060" \l "fd19) and the parameters γ and din Eqs. [(24)](https://www.sciencedirect.com/science/article/pii/S2405918818300060" \l "fd24), [(25)](https://www.sciencedirect.com/science/article/pii/S2405918818300060" \l "fd25) should be optimized. For this purpose, a training data set is divided into two new sets: the first is used to choose the optimal parameters, and the second is used to validate the smallest error possible, given these choices. This process, called k-fold cross validation, selects the parameters c, γ and d, according to the lowest RMSE.

[Anyone can learn how to find low risk, high potential investment opportunities in an uncertain market, so long as they have the right skillset.](https://adclick.g.doubleclick.net/pcs/click?xai=AKAOjstcFRQP3bXBKuIq8_DEaaJ5PT3S7xRtCmj_QQuEqwXXSlZV2z9cqbja_2Ls6X-ItzA1mBWhVRBWuy5Ca2y6U9udoHJzNcs2toIrgIsoBgCIJVWfTNteElxv0cjiRBSFd8mg_vVQu0peQENgw_ASEKRVag6Kd1XuGARlDMF1yoeAw-wdUWMm27FKuA_yKVuC3ZwOxb3So_kEE9bYB0kmMj10JQ97VqLwkCg7ev-XuQZgHo1G8vNvHfwX70Dz-juspXcI0TiGyr_liODhGXs0Jf7Do3CAWpUxHK2FGD2M6OQj&sig=Cg0ArKJSzFe3qrzZKHkVEAE&urlfix=1&adurl=https://ad.doubleclick.net/ddm/trackclk/N32602.110872INVESTOPEDIAUS/B22037336.234698186;dc_trk_aid=432721953;dc_trk_cid=109291090;dc_lat=;dc_rdid=;tag_for_child_directed_treatment=;tfua=)At Online Trading Academy, you can learn the secrets of the pros and learn how to make money like they do, no matter which way the market turns. [Sign up for a free half-day class.](https://adclick.g.doubleclick.net/pcs/click?xai=AKAOjstcFRQP3bXBKuIq8_DEaaJ5PT3S7xRtCmj_QQuEqwXXSlZV2z9cqbja_2Ls6X-ItzA1mBWhVRBWuy5Ca2y6U9udoHJzNcs2toIrgIsoBgCIJVWfTNteElxv0cjiRBSFd8mg_vVQu0peQENgw_ASEKRVag6Kd1XuGARlDMF1yoeAw-wdUWMm27FKuA_yKVuC3ZwOxb3So_kEE9bYB0kmMj10JQ97VqLwkCg7ev-XuQZgHo1G8vNvHfwX70Dz-juspXcI0TiGyr_liODhGXs0Jf7Do3CAWpUxHK2FGD2M6OQj&sig=Cg0ArKJSzFe3qrzZKHkVEAE&urlfix=1&adurl=https://ad.doubleclick.net/ddm/trackclk/N32602.110872INVESTOPEDIAUS/B22037336.234698186;dc_trk_aid=432721953;dc_trk_cid=109291090;dc_lat=;dc_rdid=;tag_for_child_directed_treatment=;tfua=)

*RATE THE STOCK:  
• QUALITY RATING - Stick to stocks with ratings of B+ or better, just to be on the safe side.  
• DEBIT TO CURRENT ASSET RATIO ( liabilities/assets)s- Benjamin Graham advised buying companies with Total Debt  
 to Current Asset ratios of less than 1.10. In value investing it is important at all times to invest in companies  
 with a low debt load. - (  
• CURRENT RATIO - Check the Current Ratio (current assets divided by current liabilities) to  
 find companies with ratios over 1.50.  
 This is a common ratio provided by many investment services. - (finviz row 8, col 3)  
• POSITIVE EARNINGS PER SHARE GROWTH - Criteria four is simple:   
 Find companies with positive earnings per share growth during the past five years with no earnings deficits.  
 Earnings need to be higher in the most recent year than five years ago.   
 Avoiding companies with earnings deficits during the past five years  
 will help you stay clear of high-risk companies. - (finviz - row 5, col 5)  
• PRICE TO EARNINGS GROWTH (PEG) RATIO – PEG is a widely employed indicator of a stock's possible true value.  
 Similar to PE ratios, a lower PEG means that the stock is undervalued more.  
 It is favored by many over the price/earnings ratio because it also accounts for growth. - (finvis - row 2, col 3)  
• PRICE TO EARNINGS PER SHARE (P/E) RATIO – Invest in companies with price to earnings per share (P/E) ratios of 9.0   
 or less. Look for companies that are selling at bargain prices. - (finviz - row 1 )  
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 Investing in stocks selling near or below their book value makes sense. - (finviz - row 4, col 3)  
• DIVIDENDS - Invest in companies that are currently paying dividends.  
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 Sometimes your wait period will be long and tedious, but if the company pays a decent dividend,  
 you can sit back and collect dividends while you wait patiently for your stock to go from undervalued to overvalued.  
 - (finviz - row 6 & 7, col 1)  
• SHARP RATIO - Measure for calculating risk-adjusted return. This has become industry standard.  
 Generally, the greater the value of the Sharpe ratio, the more attractive the risk-adjusted return.  
  
  
What is risk free return. Return on money in savings account or Treasury Bonds. Currently in U.S. 0 - 1%  
Rf approx. 0*

*K-Factor based pm sampling rate:  
 Daily: K - Sqrt(252)  
 Weekly: K - Sqrt(52)  
 Yealy: K - Sqrt(12)  
  
AST = K \* SR  
  
FURTHER ACTION:  
 One last thought. We like to find out why a stock is selling at a bargain price.  
 Is the company competing in an industry that is dying?  
 Is the company suffering from a setback caused by an unforeseen problem?  
 The most important question, though, is whether the company’s problem is short-term or  
 long-term and whether management is aware of the problem and taking action to correct it.  
  
PLAN:  
 1. Use Meaningful Moving Average Crossover to evaluate overall market performance  
 (e.g. use 200-day and 50 day moving averages) bear\_or\_bull.py  
 2. Use StockPicker to evaluate individual stocks.  
 3. Using items 1. & 2, determine what stock to buy.  
  
INFO:  
 Meaningful Moving Average Crossover:  
  
 There is some variation of opinion as to precisely what constitutes this meaningful moving average crossover.  
 Some analysts define it as a crossover of the 100-day moving average by the 50-day moving average;  
 others define it as the crossover of the 200-day average by the 50-day average.  
 Analysts also watch for the crossover occurring on lower time frame charts as confirmation of a strong,  
 ongoing trend.  
 Regardless of variations in the precise definition or the time frame applied,  
 the term always refers to a short-term moving average crossing over a major long-term moving average.  
  
 Golden Dross:  
  
 Signals long-term bull market going forward.  
 Occurs when a short-term moving average crosses over a major long-term moving average to the upside and is  
 interpreted by analysts and traders as signaling a definitive upward turn in a market.  
 Basically, the short-term average trends up faster than the long-term average, until they cross.  
  
 Stages:  
 A downtrend that eventually ends as selling is depleted.  
 A second stage where the shorter moving average crosses up through the longer moving average.  
 Finally, the continuing uptrend, hopefully leading to higher prices.  
  
 Death Cross:  
  
 Signals long-term bear market.  
 Conversely, a similar downside moving average crossover constitutes the death cross and is understood to signal  
 a decisive downturn in a market.  
  
 Occurs when the short term average trends down and crosses the long-term average,  
 basically going in the opposite direction of the golden cross.  
 Preceded the economic downturns in 1929, 1938, 1974, and 2008.  
 There have been many times when a death cross appeared,  
 such as in the summer of 2016, when it proved to be a false indicator.  
  
  
 False crossings or false crossovers happen when the moving average lines cross one another briefly,  
 but then revert back again.  
  
 Evaluate SMA 10, 100 & 50, 200 cross overs:  
 Plot SMA 10, 100 & 50, 200 & Daily Mid Point*

**Long Position vs. Short Position: An Overview:**

When speaking of stocks, analysts and market makers often refer to an investor having long positions or short positions. Rather than a reference to length, long positions and short positions are a reference to haves and have nots, meaning stocks that an investor owns and stocks that an investor needs to own.

Here we break down the differences and explain how they work when applied to practical trading.

### Long Position:

If an investor has long positions, it means that the investor has bought and owns those shares of stocks. By contrast, if the investor has short positions, it means that the investor owes those stocks to someone, but does not actually own them yet.

For instance, an investor who owns 100 shares of Tesla ([TSLA](https://www.investopedia.com/markets/stocks/tsla/)) stock in his portfolio is said to be long 100 shares. This investor has paid in full the cost of owning the shares.

### Short Position:

Continuing the example, an investor who has sold 100 shares of TSLA without yet owning those shares is said to be short 100 shares. The short investor owes 100 shares at settlement and must fulfill the obligation by purchasing the shares in the market to deliver.

Value Stock Indicators:

### Price-to-Earnings Ratio

The [price-to-earnings ratio](https://www.investopedia.com/terms/p/price-earningsratio.asp) (P/E) helps investors determine the market value of a stock compared to the company's earnings. In short, the P/E ratio shows what the market is willing to pay today for a stock based on its past or future earnings. A high P/E could mean that a stock's price is high relative to earnings and possibly overvalued. Conversely, a low P/E might indicate that the current stock price is low relative to earnings.

The P/E ratio is important because it provides a measuring stick for comparing whether a stock is [overvalued](https://www.investopedia.com/terms/o/overvalued.asp) or [undervalued](https://www.investopedia.com/terms/u/undervalued.asp). However, it's important to compare a company's valuation to companies within its sector or industry.

***P/E Ratio = Market value per share****​ /* ***Earnings per share***

*Yahoo Finance – get\_stats(), attribute = “Trailing P/E”*

*Yahoo Finance API*

### Price-to-Book Ratio

The [price-to-book ratio](https://www.investopedia.com/terms/p/price-to-bookratio.asp) or P/B ratio measures whether a stock is over or undervalued by comparing the net assets of a company to the price of all the outstanding shares. The P/B ratio is a good indication of what investors are willing to pay for each dollar of a company's assets. The P/B ratio divides a stock's share price by its net assets, or total assets minus total liabilities.

The reason the ratio is important to value investors is that it shows the difference between the market value of a company's stock and its book value. The market value is the price investors are willing to pay for the stock based on expected future earnings. However, the book value is derived from a company's assets and is a more conservative measure of a company's worth.

A P/B ratio of 0.95, 1 or 1.1, the underlying stock is trading at nearly book value. In other words, the P/B ratio is more useful the greater the number differs from 1. To a value-seeking investor, a company that trades for a P/B ratio of 0.5 is attractive because it implies that the market value is one-half of the company's stated book value. [Value investors](https://www.investopedia.com/terms/v/valueinvesting.asp) often like to seek out companies with a market value less than its book value in hopes that the market perception turns out to be wrong.

***P*/*B* *Ratio* = *Market* *Price* *per* *Share*​﻿ / *Book* *Value* *per* *Share***

*Yahoo Finance – get\_stats(), attribute = “Price/Book”*

### Debt-to-Equity

The [debt-to-equity ratio](https://www.investopedia.com/terms/d/debtequityratio.asp) (D/E) helps investors determine how a company finances its assets. The ratio shows the proportion of equity to debt a company is using to finance its assets.

A low debt-to-equity ratio means the company uses a lower amount of debt for financing versus equity via shareholders. A high debt-equity ratio means the company derives more of their financing from debt relative to equity. Too much debt can pose a risk to a company if they don't have the earnings or cash flow to meet its debt obligations.

As with the previous ratios, the debt-to-equity ratio can vary from industry to industry. A high debt-to-equity ratio doesn't necessarily mean the company is run poorly. Often, debt is used to expand operations and generate additional streams of income. Some industries, with a lot of fixed assets such as the auto and construction industries, typically have higher ratios than companies in other industries.

​***Debt/Equity = Total Liabilities​​ / Total Shareholders’ Equity***

*Yahoo Finance – get\_stats(), attribute = “Total Debit/Equity”*

*Yahoo Finance API – get\_statistics(), attribute = “properties”->“debitToEquity” -> properties”*

### Free Cash Flow

Free cash flow (FCF) is the cash produced by a company through its operations, minus the cost of expenditures. In other words, free cash flow is the cash left over after a company pays for its [operating expenses](https://www.investopedia.com/terms/o/operating_expense.asp) and [capital expenditures](https://www.investopedia.com/terms/c/capitalexpenditure.asp) or CAPEX.

[Free cash flow](https://www.investopedia.com/terms/f/freecashflow.asp) shows how efficient a company is at generating cash and is an important metric in determining whether a company has sufficient cash, after funding operations and capital expenditures, to reward shareholders through [dividends](https://www.investopedia.com/terms/d/dividend.asp) and [share buybacks](https://www.investopedia.com/terms/b/buyback.asp).

Free cash flow can be an early indicator to value investors that earnings may increase in the future, since increasing free cash flow typically precedes increased earnings. If a company has rising FCF, [it could be due to revenue and sales growth, or cost reductions](https://www.investopedia.com/ask/answers/033015/what-formula-calculating-free-cash-flow.asp). In other words, rising free cash flows could the stock reward investors in the future which is why many investors cherish FCF as a measure of value. When a company's share price is low and free cash flow is on the rise, the odds are good that earnings and the value of the shares will soon be heading up.

*Yahoo Finance – get\_stats(), attribute = “Levered Free Cash Flow”*

* **PEG Ratio**

The [price-to-earnings-to-growth (PEG) ratio](https://www.investopedia.com/terms/p/pegratio.asp) is a modified version of the P/E ratio that also takes earnings growth into account. The P/E ratio doesn't always tell you whether or not the ratio is appropriate for the company's forecasted growth rate.

The PEG ratio measures the relationship between the price/earnings ratio and earnings growth. The PEG ratio provides a more complete picture of whether a stock's price is overvalued or undervalued by analyzing both today's earnings and the expected growth rate.

Typically a stock with a PEG of less than 1 is considered undervalued since it's price is low compared to the company's expected earnings growth. A PEG greater than 1 might be considered overvalued since it might indicate the stock price is too high as compared to the company's expected earnings growth.

Since the P/E ratio doesn't include future earnings growth, the PEG ratio provides a more complete picture of a stock's [valuation](https://www.investopedia.com/terms/v/valuation.asp). The [PEG ratio is an important metric for value investors](https://www.investopedia.com/investing/use-pe-ratio-and-peg-to-tell-stocks-future/) since it provides a forward-looking perspective.

​PEG Ratio = (Price / EPS) / EPS Growth​EPS = The earnings per share​

*Yahoo Finance – get\_stats(), attribute= “PEG Ratio”*

* **Beta**

A beta coefficient is a measure of the volatility, or [systematic risk](https://www.investopedia.com/terms/s/systematicrisk.asp), of an individual stock in comparison to the unsystematic risk of the entire market. In statistical terms, beta represents the slope of the line through a regression of data points from an individual stock's returns against those of the market.

​Beta coefficient(*β*) = Covariance(*Re*​,*Rm*​) / Variance(*Rm*​)

​**where:**

*Re* ​= the return on an individual stock

*Rm* = the return on the overall market

Covariance = how changes in a stock’s returns are related to changes in the market’s returns.

Variance=how far the market’s data points spreadout from their average value

## **Altman Z-Score**

The Altman Z-score is the output of a credit-strength test that gauges a publicly traded manufacturing company's likelihood of bankruptcy.

### KEY TAKEAWAYS

* The Altman Z-score is a formula for determining whether a company, notably in the manufacturing space, is headed for bankruptcy.
* The formula takes into account profitability, leverage, liquidity, solvency, and activity ratios.
* An Altman Z-score close to 0 suggests a company might be headed for bankruptcy, while a score closer to 3 suggests a company is in solid financial positioning.

## Understanding the Altman Z-Score

The Altman Z-score, a variation of the traditional [z-score](https://www.investopedia.com/terms/z/zscore.asp) in statistics, is based on five financial ratios that can be calculated from data found on a company's annual 10-K report. It uses profitability, leverage, liquidity, solvency, and activity to predict whether a company has a high probability of becoming [insolvent](https://www.investopedia.com/terms/i/insolvency.asp).

NYU Stern Finance Professor Edward Altman developed the Altman Z-score formula in 1967, and it was published in 1968. Over the years, Altman has continued to reevaluate his Z-score. From 1969 until 1975, Altman looked at 86 companies in distress, then 110 from 1976 to 1995, and finally 120 from 1996 to 1999, finding that the Z-score had an accuracy of between 82% and 94%.1

In 2012, he released an updated version called the Altman Z-score Plus that one can use to evaluate public and private companies, manufacturing and non-manufacturing companies, and U.S. and non-U.S. companies. One can use Altman Z-score Plus to evaluate corporate credit risk. The Altman Z-score has become a reliable measure of calculating credit risk.2

## How to Calculate the Altman Z-Score

One can calculate the Altman Z-score as follows:

Altman Z-Score = 1.2A + 1.4B + 3.3C + 0.6D + 1.0E

Where:

* A = working capital / total assets
* B = retained earnings / total assets
* C = earnings before interest and tax / total assets
* D = market value of equity / total liabilities
* E = sales / total assets

A score below 1.8 means it's likely the company is headed for bankruptcy, while companies with scores above 3 are not likely to go bankrupt. Investors can use Altman Z-scores to determine whether they should buy or sell a stock if they're concerned about the company's underlying financial strength. Investors may consider purchasing a stock if its Altman Z-Score value is closer to 3 and selling or [shorting](https://www.investopedia.com/terms/s/shortselling.asp) a stock if the value is closer to 1.8.3

In more recent years, however, a Z-Score closer to 0 indicates a company may be in financial trouble. In a lecture given in 2019 titled "50 Years of the Altman Score," Professor Altman himself noted that recent data has shown that 0—not 1.8—is the figure at which investors should worry about a company's financial strength.4 The [two-hour lecture](https://www.youtube.com/watch?v=iV6yaDMPMKM) is available to view for free on YouTube.

* **Piotroski F-Score**

Number between 0-9 which is used to assess strength of company’s financial position. The Score is used by financial [investors](https://en.wikipedia.org/wiki/Investor) in order to find the best [value stocks](https://en.wikipedia.org/wiki/Value_stocks) (nine being the best). The Score is named after Stanford Accounting Professor, [Joseph Piotroski](https://en.wikipedia.org/wiki/Joseph_Piotroski).

The [Piotroski F-Score](https://app.stockopedia.com/content/piotroski-f-score-reviewing-joseph-piotroskis-accounting-based-value-investing-screen-55711" \t "_blank) is not intended to be used on its own, but rather as an additional filter for a value screen. The starting point is taking the companies which fall into the bottom 20% of the market in terms of their price to book/NAV(Number Of Outstanding Shares) value.

## **Calculation procedure:**

The score is calculated based on 9 criteria divided into 3 groups.[[1]](https://en.wikipedia.org/wiki/Piotroski_F-Score#cite_note-:0-1)

***Profitability***

1. Return on Assets (1 point if it is positive in the current year, 0 otherwise); - **yahoo stats**
2. Operating Cash Flow (1 point if it is positive in the current year, 0 otherwise);- **yahoo stats**
3. Change in Return of Assets (ROA) (1 point if ROA is higher in the current year compared to the previous one, 0 otherwise); - calc.
4. Accruals (1 point if Operating Cash Flow/Total Assets is higher than ROA in the current year, 0 otherwise); -

***Leverage, Liquidity and Source of Funds***

1. Change in Leverage (long-term) ratio (1 point if the ratio is lower this year compared to the previous one, 0 otherwise);

Debt-to-Equity Ratio = Total Liabilities​ / / Total Shareholders’ Equity - **yahoo stats**

1. Change in Current ratio (1 point if it is higher in the current year compared to the previous one, 0 otherwise); - **yahoo stats**
2. Change in the number of shares (1 point if no new shares were issued during the last year);

***Operating Efficiency***

1. Change in Gross Margin (1 point if it is higher in the current year compared to the previous one, 0 otherwise);
2. Change in Asset Turnover ratio (1 point if it is higher in the current year compared to the previous one, 0 otherwise);

* **Sharpe Ratio (SR):**

Measure for calculating risk adjusted return.

S = (*Rp*​ – *Rf / σp* )

*Rp* – Expected Portfolio return

*Rf* – Risk-Free Return (currently = 0)

*σp* – Portfolio Standard Deviation

**Annualized Sharpe Ratio (ASR) = K \* SR**

**K-Factors:**

Daily: sqrt(252)

Weekly: sqrt(52)

Monthly: sqrt(12)

**Acceptable to Good > 1.0**

**Very Good > 2.0**

**Excellent > 3.0**

* **Graham Number (GN):**

Maximum price value investor should pay for a given stock.

GN = sqrt((22.5) x (TTM EPS) x (MRQ Book Value per Share))

Earnings per share (EPS) - Calculated as a company's net profit divided by the number of [outstanding shares](https://www.investopedia.com/terms/b/bvps.asp) of its common stock.

Book value per share (BVPS) - Ratio of equity available to common shareholders divided by the number of outstanding shares. This figure represents the minimum value of a company's equity and measures the [book value](https://www.investopedia.com/terms/b/bookvalue.asp) of a firm on a per-share basis.

22.5 - Included in formula as a rule of thumb to account for Graham's assumption that price-to-earnings ratio should not be over 15 and price to book ratio should not be over 1.5 for an undervalued stock. Therefore: (P/E of 15) x (P/B of 1.5) = 22.5.

MRQ – Most Recent Quarter

**Good price/share < GN**

* **The Bottom Line**

No single financial ratio can determine whether a stock is a value or not. It's best to combine several ratios to form a more comprehensive view of a company's financials, it's earnings, and its stock's valuation.

# **Forward Price-to-Earnings (Forward P/E)**

Updated Nov 7, 2020

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## **What Is Forward Price-to-Earnings (Forward P/E)?**

Forward price-to-earnings (forward P/E) is a version of the ratio of [price-to-earnings](https://www.investopedia.com/terms/p/price-earningsratio.asp) (P/E) that uses forecasted earnings for the P/E calculation. While the earnings used in this formula are just an estimate and not as reliable as current or historical earnings data, there are still benefits to estimated P/E analysis.

### KEY TAKEAWAYS:

* Forward P/E is a version of the ratio of price-to-earnings that uses forecasted earnings for the P/E calculation.
* Because forward P/E uses estimated earnings per share (EPS), it may produce incorrect or biased results if actual earnings prove to be different.
* Analysts often combine forward and trailing P/E estimates to make a better judgment.

## **Understanding Forward Price-to-Earnings (Forward P/E)**

The forecasted earnings used in the formula below are typically either projected earnings for the following 12 months or the next full-year fiscal (FY) period. [The forward P/E can be contrasted with the trailing P/E ratio](https://www.investopedia.com/ask/answers/050115/what-difference-between-forward-pe-and-trailing-pe.asp).

*\text{Forward } P/E = \frac{\text{Current Share Price}}{\text{Estimated Future Earnings per Share}}Forward P/E=Estimated Future Earnings per ShareCurrent Share Price​*

For example, assume that a company has a current share price of $50 and this year’s earnings per share are $5. Analysts estimate that the company's earnings will grow by 10% over the next fiscal year. The company has a current P/E ratio of $50 / 5 = 10x.

The forward P/E, on the other hand, would be $50 / (5 x 1.10) = 9.1x. Note that the forward P/E is smaller than the current P/E since the forward P/E accounts for future earnings growth relative to today's share price.

## **What Does Forward Price-to-Earnings Reveal?**

Analysts like to think of the P/E ratio as a price tag on earnings. It is used to calculate a [relative value](https://www.investopedia.com/terms/r/relative-value.asp) based on a company's level of earnings. In theory, $1 of earnings at company A is worth the same as $1 of earnings at company B. If this is the case, both companies should also be trading at the same price, but this is rarely the case.

If company A is trading for $5, and company B is trading for $10, this implies that the market values company B's earnings more. There can be various interpretations as to why company B is valued more. It could mean that company B's earnings are overvalued. It could also mean that company B deserves a premium on the value of its earnings due to superior management and a better [business model](https://www.investopedia.com/terms/b/businessmodel.asp).

When calculating the [trailing P/E ratio](https://www.investopedia.com/terms/t/trailingpe.asp), analysts compare today's price against earnings for the last 12 months or the last [fiscal year](https://www.investopedia.com/terms/f/fiscalyear.asp). However, both are based on [historical prices](https://www.investopedia.com/ask/answers/03/103103.asp). Analysts use earnings estimates to determine what the relative value of the company will be at a future level of earnings. The forward P/E estimates the relative value of the earnings.

For example, if the [current price](https://www.investopedia.com/terms/c/currentprice.asp) of company B is $10, and earnings are estimated to double next year to $2, the forward P/E ratio is 5x, or half the value of the company when it made $1 in earnings. If the forward P/E ratio is lower than the current P/E ratio, this implies that analysts are expecting earnings to increase. If the forward P/E is higher than the current P/E ratio, analysts expect a decrease in earnings.

## **Forward P/E vs. Trailing P/E**

Forward P/E uses projected EPS. Meanwhile, trailing P/E relies on past performance by dividing the [current share price](https://www.investopedia.com/ask/answers/061615/how-companys-share-price-determined.asp) by the total EPS earnings over the past 12 months. Trailing P/E is the most popular P/E metric because it's the most objective—assuming the company reported earnings accurately. Some investors prefer to look at the trailing P/E because they don't trust another individual’s earnings estimates.

However, trailing P/E also has its share of shortcomings—namely, a company’s past performance does not signal future behavior. Investors should thus commit money based on future [earnings power](https://www.investopedia.com/terms/e/earnings-power.asp), not the past. The fact that the EPS number remains constant while the stock prices fluctuate is also a problem. If a major company event drives the stock price significantly higher or lower, the trailing P/E will be less reflective of those changes.

## **Limitations of Forward P/E**

Since forward P/E relies on estimated future earnings, it is subject to miscalculation and/or analysts' bias. There are other inherent problems with the forward P/E also. Companies could underestimate earnings to beat the consensus estimate P/E when the next quarter's earnings are announced.

Other companies may overstate the estimate and later adjust it going into their next [earnings announcement](https://www.investopedia.com/terms/e/earnings-announcement.asp). Furthermore, external analysts may also provide estimates, which may diverge from the company estimates, creating confusion.

If you're using forward P/E as the central basis of your [investment thesis](https://www.investopedia.com/terms/i/investment-thesis.asp), research the companies thoroughly. If the company updates its guidance, this will affect the forward P/E in a way that might cause you to change your opinion. It is good practice to use both forward and trailing P/E to come to a more trustworthy figure.

One of the more important items: dynamically calculate how each position is doing relative to a trailing stop, e.g., if a position closes 25% below its closing high, consider selling the position on the next trading day.

Analyzer Acquisition Visualizations:

* Total Return Comparisons — % return of each position relative to index benchmark
* Cumulative Returns Over Time — $ Gain / (Loss) of each position relative to benchmark
* Cumulative Investments Over Time — given the above, how do the overall investment returns compare to the equal weighting and time period of S&P 500 investments?
* Adjusted Close % off of High Comparison — what is each position’s most recent close relative to its adjusted closing high since purchased?