# ECE-568: Software Engineering of Web Applications

# Technical Analysis Report

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# What is Technical Analysis?

In finance, technical analysis is a security analysis methodology for forecasting the direction of prices through the study of past market data, primarily price and volume. In technical analysis, we are interested in the movement of price in market and ignore the characteristics of the company. In other words, technical analysis attempts to understand the emotions in the market by studying the market itself, as opposed to its components.

In the following sections we'll explain important components of technical analysis.

# Trends

In technical analysis, it is the movement of the highs and lows that constitutes a trend. Trend is really nothing more than the general direction in which a security or market is headed.

## Classification of Trends

There are three types of trend:

- Uptrends
- Downtrends
- Sideways/Horizontal Trends

**Uptrends:** When each successive peak and trough is higher, it's referred to as an upward trend. An uptrend is a signal that the demand for the asset is greater than the supply, and is used to suggest that the price is likely to continue heading upward.


**Downtrends:** When each successive peak and trough is lower, it's referred to as an downward trend. Downward sloping trend line suggest that there is an excess amount of supply, a sign that market participants have a higher willingness to sell an asset, than to buy it.

**Sideways/Horizontal Trends:** When there is little movement up or down in the peaks and troughs, it's a sideways or horizontal trend. This indicates there is no action in the market. By

Sideways Trendline: Reliance Capital Ltd.

default if the trend doesn't fall in Uptrend and Downward trend, then it's said to be a sideways trend.

# Trendlines

In finance, a trend line is a bounding line for the price movement of a security. It is formed when a diagonal line can be drawn between a minimum of three or more price pivot points. A line can be drawn between any two points, but it does not qualify as a trend line until tested. Hence the need for the third point, the test. Trend lines are commonly used to decide entry and exit timing when trading securities.

## Creating Trend Lines

Now that we have a good understanding of what trend lines are, let's discuss how to draw them. The very first thing to know about drawing trend lines is that you need at least two points in the market to start a trend line. Once the second swing high or low has been identified, you can draw your trend line. But the general rule in technical analysis is that it takes two points to draw a trend line and the third point confirms the validity.


The chart of Microsoft (MSFT) shows an uptrend line that has been touched 4 times. After the third touch in Nov-99, the trend line was considered a valid line of support.

Keys to drawing effective trend lines

- **Spacing of Points:** The lows used to form an uptrend line and the highs used to form a downtrend line should not be too far apart, or too close together. The most suitable distance apart will depend on the time frame, the degree of price movement, and personal preferences. If the lows (highs) are too close together, the validity of the reaction low (high) may be in question. If the lows are too far apart, the relationship between the two points could be suspect. An ideal trend line is made up of relatively evenly spaced lows (or highs).

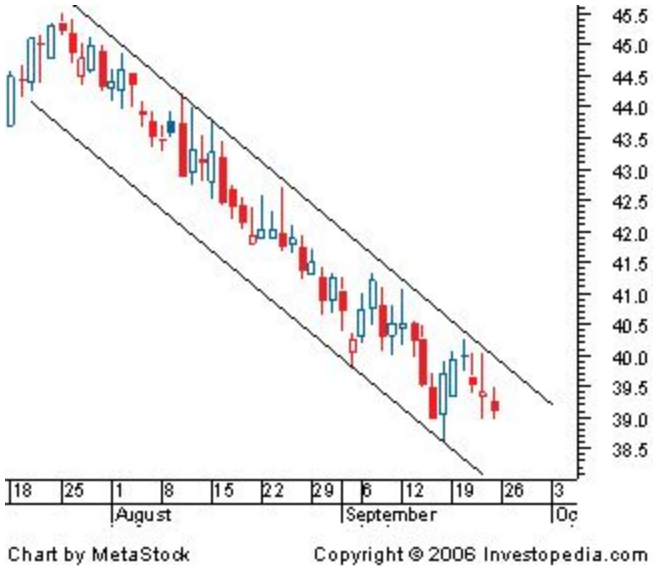

In example above, the second high point appears to be too close to the first high point for a valid trend line; however, it would be feasible to draw a trend line beginning at point 2 and extending down to the February reaction high.

- **Angles:** As the steepness of a trend line increases, the validity of the support or resistance level decreases. A steep trend line results from a sharp advance (or decline) over a brief period of time. The angle of a trend line created from such sharp moves is unlikely to offer a meaningful support or resistance level. Even if the trend line is formed with three seemingly valid points.

The trend line for Yahoo! (YHOO)[Yhoo] was touched four times over a 5-month period. The spacing between the points appears OK, but the steepness of the trend line is unsustainable, and the price is more likely than not to drop below the trend line.

- **Never Try to Force a Trend Line to Fit:** This is perhaps the most common pitfall traders make when drawing trend lines. We call this “curve fitting” and it happens when a technical trader is so convinced that a level should exit, that the trader begins to try to make the level fit the price action on the chart. The best trend lines are the most obvious ones. So if a trend line doesn’t fit well, it’s probably best to move on to another pattern.

A **channel**, or channel lines, is the addition of two parallel trendlines that act as strong areas of support and resistance. The upper trendline connects a series of highs, while the lower trendline connects a series of lows. A channel can slope upward, downward or sideways but, regardless of the direction, the interpretation remains the same.




It illustrates a descending channel on a stock chart; the upper trendline has been placed on the highs and the lower trendline is on the lows. The price has bounced off of these lines several times, and has remained range-bound for several months. As long as the price does not fall below the lower line or move beyond the upper resistance, the range-bound downtrend is expected to continue.

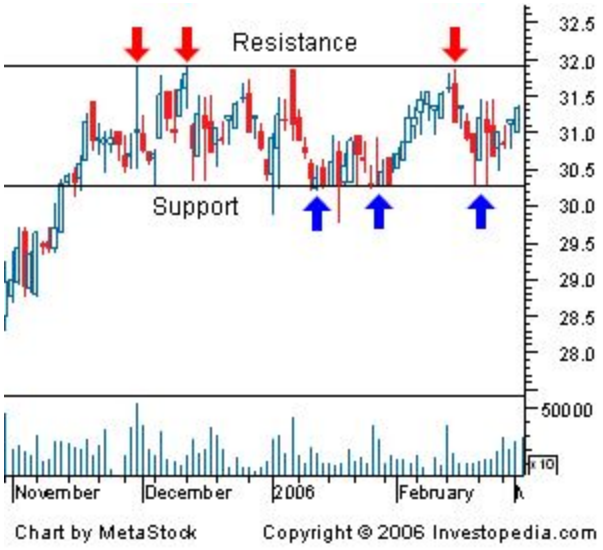
Now that we understand concept of a trend, we’ll look at the next major concept which is that of support and resistance.

# Support and Resistance

In technical analysis, support and resistance is a concept that the movement of the price of a security will tend to stop and reverse at certain predetermined price levels.

A **support** level is a level where the price tends to find support as it falls. This means the price is more likely to "bounce" off this level rather than break through it. However, once the price has breached this level, by an amount exceeding some noise, it is likely to continue falling until meeting another support level.

A **resistance** level is the opposite of a support level. It is where the price tends to find resistance as it rises. This means the price is more likely to "bounce" off this level rather than break through it. However, once the price has breached this level, by an amount exceeding some noise, it is likely to continue rising until meeting another resistance level.




As you can see in the figure above, support is the price level through which a stock or market seldom falls (illustrated by the blue arrows). Resistance, on the other hand, is the price level that a stock or market seldom surpasses (illustrated by the red arrows).

The support/resistance of an identified level, discovered with a trendline, is deemed to be stronger the more times that the price has historically been unable to move beyond it. Many technical traders will use their identified support and resistance levels to choose strategic entry/exit prices because these areas often represent the prices that are the most influential to an asset's direction. Most traders are confident at these levels in the underlying value of the asset so the volume generally increases more than usual, making it much more difficult for traders to continue driving the price higher or lower.

## Methods to Establish Support and Resistance?

Support and resistance are like mirror images and have many common characteristics.

## Highs and Lows

Support can be established with the previous reaction lows. Resistance can be established by using the previous reaction highs.


The above chart for Halliburton (HAL)[HAL] shows a large trading range between Dec-99 and Mar-00. Support was established with the October low around 31. In December, the stock returned to support in the mid-thirties and formed a low around 33. Finally, in February the stock again returned to the support scene and formed a low around 32 1/2.

After each bounce off support, the stock traded all the way up to resistance. Resistance was first established by the September support break at 42.5. After a support level is broken, it can turn into a resistance level. From the October lows, the stock advanced to the new support-turned-resistance level around 42.5. When the stock failed to advance past 42.5, the resistance level was confirmed. The stock subsequently traded up to 42.5 two more times after that and failed to surpass resistance both times.

## Support Equals Resistance

Another principle of technical analysis stipulates that support can turn into resistance and vice versa. Once the price breaks below a support level, the broken support level can turn into resistance. The break of support signals that the forces of supply have overcome the forces of demand. Therefore, if the price returns to this level, there is likely to be an increase in supply, and hence resistance.

The other turn of the coin is resistance turning into support. As the price advances above resistance, it signals changes in supply and demand. The breakout above resistance proves that the forces of demand have overwhelmed the forces of supply. If the price returns to this level, there is likely to be an increase in demand and support will be found.


In this example of the NASDAQ 100 Index [$NDX], the stock broke resistance at 935 in May-97 and traded just above this resistance level for over a month. The ability to remain above resistance established 935 as a new support level. The stock subsequently rose to 1150, but then fell back to test support at 935. After the second test of support at 935, this level is well established.

## Trading Range

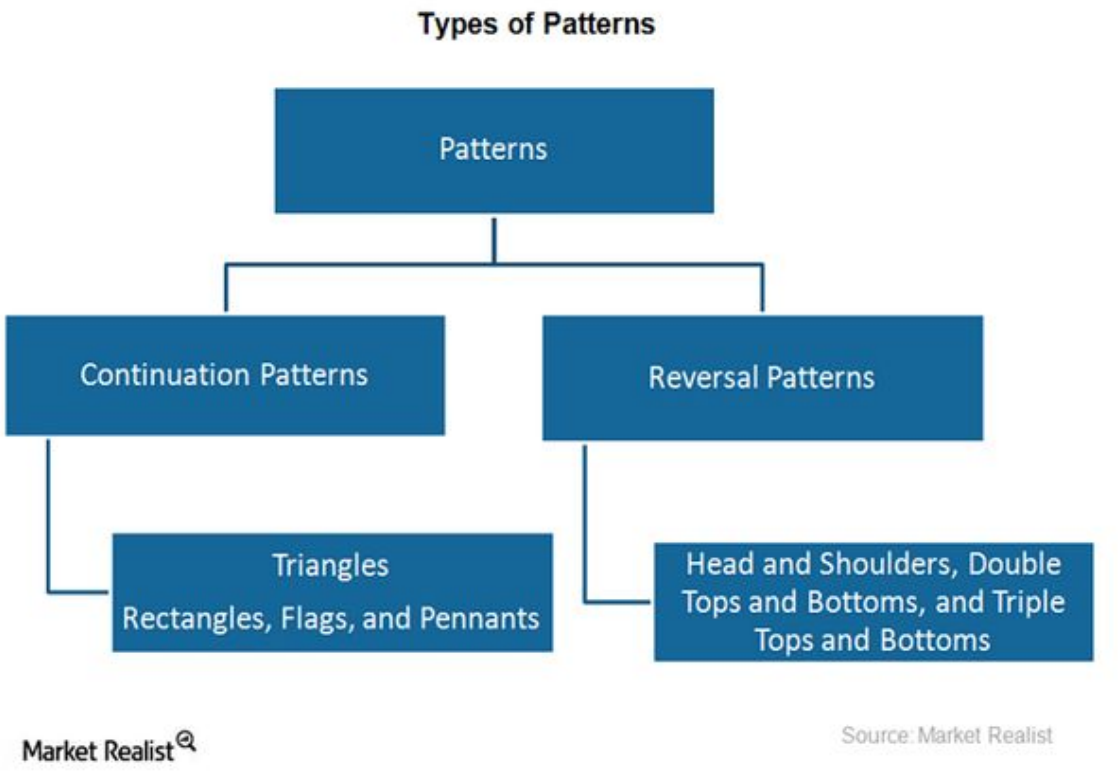
Trading ranges can play an important role in determining support and resistance as turning points or as continuation patterns. A trading range is a period of time when prices move within a relatively tight range. This signals that the forces of supply and demand are evenly balanced. When the price breaks out of the trading range, above or below, it signals that a winner has emerged. A break above is a victory for the bulls (demand) and a break below is a victory for the bears (supply).


After an extended advance from 27 to 64, WorldCom (WCOM)[WCOM] entered into a trading range between 55 and 63 for about 5 months. There was a false breakout in mid-June when the stock briefly poked its head above 62 (red oval). This did not last long and a gap down a few days later nullified the breakout (black arrow). The stock then proceeded to break support at 55 in Aug-99 and trade as low as 50. Here is another example of support turned resistance as the stock bounced off 55 two more times before heading lower. While this does not always happen, a return to the new resistance level offers a second chance for longs to get out and shorts to enter the fray.

# Technical Analysis: Patterns

Patterns are trends that occur in stock charts. The charts are used in technical analysis. The patterns form recognizable shapes. The most common patterns repeat. Price patterns are used to forecast the prices. Patterns are formed because of market participants' behavior. The stock price changes because of investors' collective trading actions. The price changes are recorded. They're shown as shapes.

Pattern formation trends are also important. The patterns and trends are combined to analyze the stocks.




**Explanation of the flowchart above:**

Price patterns are separated into continuation patterns and reversal patterns.

A pattern that continues its trend in the direction of a major trend—even after the pattern breakout—is called a continuation pattern. Continuation patterns are formed because investors think the price may not increase more in an uptrend or decrease more in a downtrend. As a result, they start selling the stock. The selling and buying activity causes a consolidation in the stock. This results in the respective price patterns.

Reversal patterns are a **major trend's reversal patterns**. The pattern is formed at the peak or at the bottom of a major trend. Reversal patterns are formed because the perception of the stock in the market changes. The investors think the fundamentals are changing at the peak of an uptrend and at the bottom of a downtrend. This selling and buying activity causes a consolidation in the stock. This results in price patterns.

Predicting the pattern breakout or breakup direction helps identify the original trend direction. This is used to forecast price movements.

# Continuous Pattern

In technical analysis, the major types of continuation price patterns are:

- Triangles
- Rectangles
- Flags
- Pennants

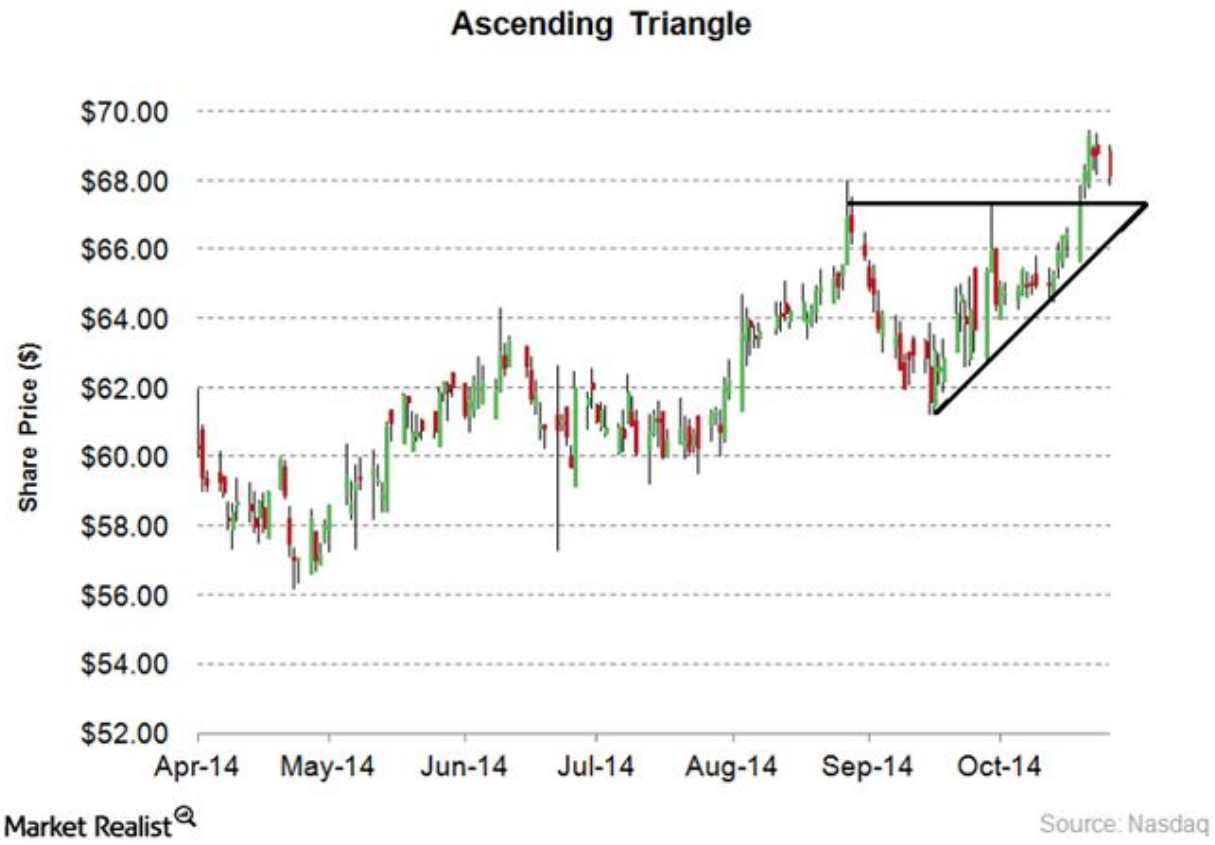
## Triangle pattern

The triangle pattern looks like a triangle. It forms in the middle of a trend. The triangle pattern forms because investors think that the stock price won't go much higher in an uptrend or lower in a downtrend. This trading activity causes a consolidation phase in the stock trend.

There are three types of triangle patterns:

- Ascending triangle
- Descending triangle
- Symmetrical triangle

Ascending Triangle Pattern




The above chart shows the ascending triangle pattern for a NASDAQ stock.

In this triangle pattern, one trend line connects the consecutive bottoms and another horizontal line connects the price peaks. Both of the lines meet to form an ascending triangle. In an uptrend, ascending triangles form when there's consistent selling pressure at a resistance level. High sell orders are placed at resistance levels that increase the supply of stock compared to the demand. The price decreases. An example is a hedge fund selling stock at a specific price level. Buying and selling activity causes the stock price to rise and fall. This forms the ascending triangle.

Ascending triangles occurs in an uptrend. The breakout and trend identification is useful for entry and exit signals.

**Duration:** The length of the pattern can range from a few weeks to many months with the average pattern lasting from 1-3 months.

**Volume:** As the pattern develops, volume usually contracts. When the upside breakout occurs, there should be an expansion of volume to confirm the breakout. While volume confirmation is preferred, it is not always necessary.

## Descending Triangle Pattern

In the descending triangle pattern, one trend line connects the consecutive peaks and another horizontal line connects the price bottoms. Both of the lines meet to form a descending triangle.

The following chart shows the descending triangle pattern for a NASDAQ stock.


In a downtrend, descending triangles form when there's consistent buying around a support level. At this price point, some investors place high buy orders as the prices correct. This buying and selling activity forms a descending triangle. In this pattern, consecutive peaks will be lower than previous peaks. In some situations, descending triangles may lead to a trend reversal if the fundamental outlook or sentiment improves.

This pattern breakdown and trend identification is useful in entry and exit signals.

**Duration:** The length of the pattern can range from a few weeks to many months, with the average pattern lasting from 1-3 months.

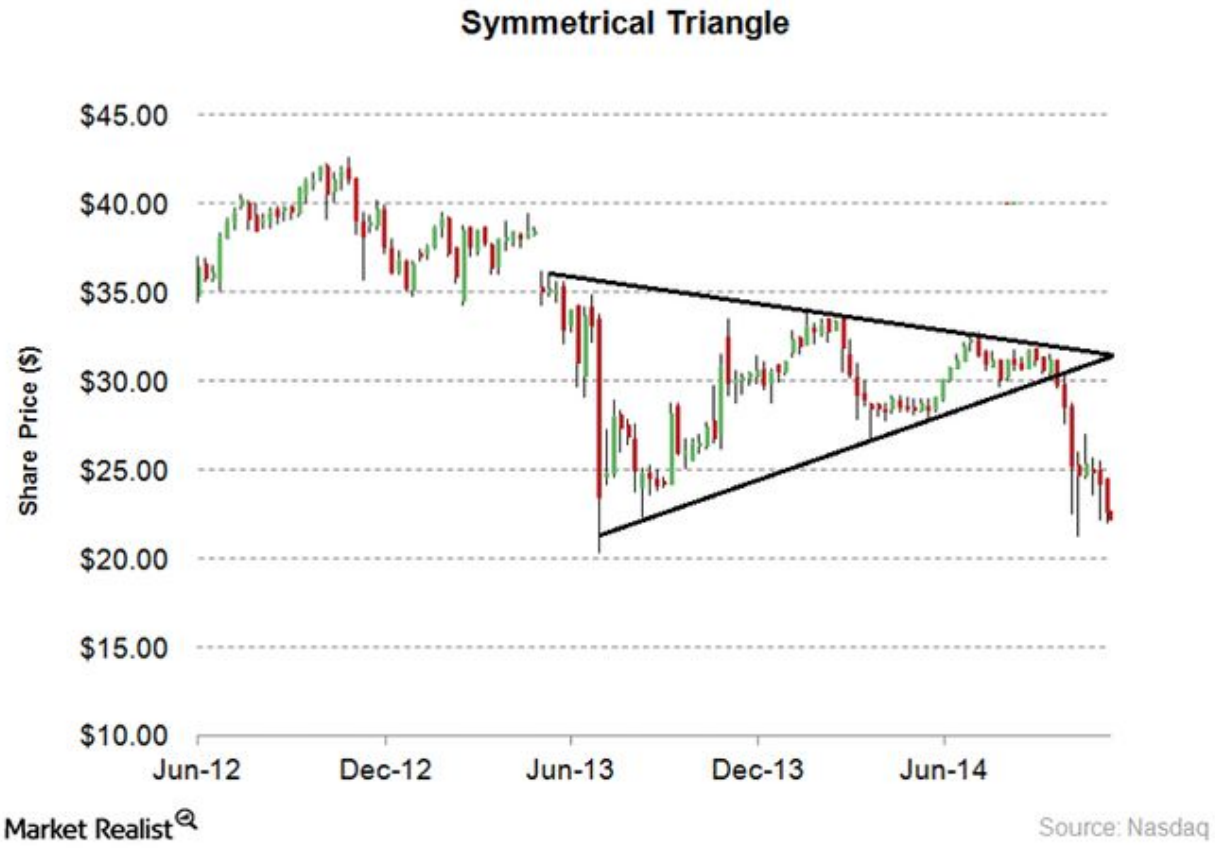
**Volume:** As the pattern develops, volume usually contracts. When the downside break occurs, there would ideally be an expansion of volume for confirmation. While volume confirmation is preferred, it is not always necessary.

## Symmetrical Pattern

In the symmetrical triangle pattern, one trend line connects the consecutive peaks and another trend line connects the consecutive bottoms. Both of the trend line meets to form a triangle.

This pattern occurs in the uptrend and downtrend. The breakout or breakdown of this pattern decides whether its a continuation or reversal of the major trend. This pattern causes a consolidation phase in the major trend.

The following chart shows the symmetrical triangle pattern for a NASDAQ stock.



The symmetry pattern is formed when there's indecision in the price movements. At this price point, there's equal buying pressure and selling pressure. The prices form a zigzag shape. When the buying pressure is more than the selling pressure, breakout takes place and prices rise. When the selling pressure is more than the buying pressure, breakdown happens and the prices fall.

The pattern breakout and breakdown is useful for trend identification. It's also useful for entry and exit points.

**Volume:** As the symmetrical triangle extends and the trading range contracts, volume should start to diminish. This refers to the quiet before the storm, or the tightening consolidation before the breakout.

**Duration:** The symmetrical triangle can extend for a few weeks or many months. If the pattern is less than 3 weeks, it is usually considered a pennant. Typically, the time duration is about 3 months.

## Rectangle. Flag and Pennant Patterns

### Rectangle

In the rectangle pattern, the price moves in a sideways direction. It forms a rectangular trading range. In this pattern, stock price trade between two horizontal lines. The pattern looks like a rectangle.

There are many similarities between the rectangle and the symmetrical triangle. While both are usually continuation patterns, they can also mark trend significant tops and bottoms. As with the symmetrical triangle, the rectangle pattern is not complete until a breakout has occurred. Sometimes clues can be found, but the direction of the breakout is usually not determinable beforehand. We will examine each part of the rectangle and then provide an example with MU.


The rectangle pattern forms because the stock's supply and demand forces are at equilibrium. As a result, the prices move in a range. This pattern has a sideways trend that can form from days to years.

In the rectangle pattern, it's advisable to buy stock at support and sell at resistance. This pattern is formed in the uptrend and downtrend. The pattern breakout or breakdown will define the trend continuation or reversal.

**Volume:** As opposed to the symmetrical triangle, rectangles do not exhibit standard volume patterns. Sometimes volume will decline as the pattern develops. Other times volume will gyrate as the prices bounce between support and resistance. Rarely will volume increase as the pattern matures. If volume declines, it is best to look for an expansion on the breakout for confirmation. If volume gyrates, it is best to assess which movements (advances to resistance or declines to support) are receiving the most volume. This type of volume assessment could offer an indication on the direction of the future breakout.

**Duration**: Rectangles can extend for a few weeks or many months. If the pattern is less than 3 weeks, it is usually considered a flag, also a continuation pattern. Ideally, rectangles will develop over a 3-month period. Generally, the longer the pattern, the more significant the breakout. A 3-month pattern might be expected to fulfill its breakout projection. However, a 6-month pattern might be expected to exceed its breakout target.

## Flags

Flags are formed over short-term periods. They're a minor continuation pattern. In the flag pattern, prices move between two parallel lines. The pattern looks like a flag.

Flag patterns are formed in the uptrend and downtrend. The breakout or breakdown will be the direction of the major trend. The flag patterns are caused due to minor profit booking. They cause a minor consolidation phase. During the pattern breakout or breakdown there will be an increase in the volume of stocks traded.


**Volume:** To recap - volume expanded on the sharp advance to form the flagpole, contracted during the flag's formation and expanded right after the resistance breakout.

**Duration:** From a high at 38 to the breakout at 36, the flag formed over a 23-day period. Once a flag becomes more than 12 weeks old, it would be classified as a rectangle.

Pennants

The pennant pattern looks similar to the symmetrical triangle pattern. When the pattern formation is over a short-term period, it's called a pennant pattern. When the formation is over a long-term period, it's called a symmetrical triangle pattern.

Pennants are formed due to minor profit booking. These patterns are formed in the uptrend and downtrend. The breakout or breakdown will be in the direction of the major trend.


**Volume:** Volume should be heavy during the advance or decline that forms the flagpole. Heavy volume provides legitimacy for the sudden and sharp move that creates the flagpole. An expansion of volume on the resistance (support) break lends credence to the validity of the formation and the likelihood of continuation.

**Duration:** Pennants is a short-term pattern that can last from 1 to 12 weeks. There is some debate on the timeframe and some consider 8 weeks to be pushing the limits for a reliable pattern. Ideally, this patterns will form between 1 and 4 weeks. A pennant more than 12 weeks old would turn into a symmetrical triangle. The reliability of patterns that fall between 8 and 12 weeks is debatable

# Reversal Patterns

In technical analysis, there are three types of reversal patterns:

- Head and shoulders
- Double tops and bottom
- Triple tops and bottom patterns

## Head and Shoulders Pattern

The head and shoulder pattern is the most common reversal pattern. It forms at the trend's peak. The pattern has three peaks—left shoulder, head, and right shoulder. The pattern looks like a man's bust. As a result, it's called the head and shoulder pattern.

Description of each part of this pattern:

- **Left shoulder:** This part of the pattern rallies to form a peak and falls back to the price where it started. It looks like an inverted V.
- **Head:** In this part of the pattern, the price continues to rise and forms a peak. It's much higher than the left shoulder peak. Then the price falls back to the same price level from where it rallied.
- **Right shoulder:** This part of the pattern is the same as the left shoulder. It's formed on the right side of the head pattern.

The line connecting the bottom of the three peaks is called the neckline. The breakdown below the neckline will result in trend reversal. The neckline is the major support.

The diagram above illustrates each of the part of this pattern.

**Volume:** As the Head and Shoulders pattern unfolds, volume plays an important role in confirmation. Volume can be measured as an indicator or simply by analyzing volume levels. Ideally, but not always, volume during the advance of the left shoulder should be higher than during the advance of the head. This decrease in volume and the new high of the head, together, serve as a warning sign. The next warning sign comes when volume increases on the decline from the peak of the head. Final confirmation comes when volume further increases during the decline of the right shoulder.

## Inverted head and shoulder pattern

The Head and Shoulders Bottom, sometimes referred to as an Inverse Head and Shoulders, is a pattern that shares many common characteristics with its comparable partner, but relies more heavily on volume patterns for confirmation.

As a major reversal pattern, the Head and Shoulders Bottom forms after a downtrend, and its completion marks a change in trend. The pattern contains three successive troughs with the middle trough (head) being the deepest and the two outside troughs (shoulders) being shallower. Ideally, the two shoulders would be equal in height and width. The reaction highs in the middle of the pattern can be connected to form resistance, or a neckline.

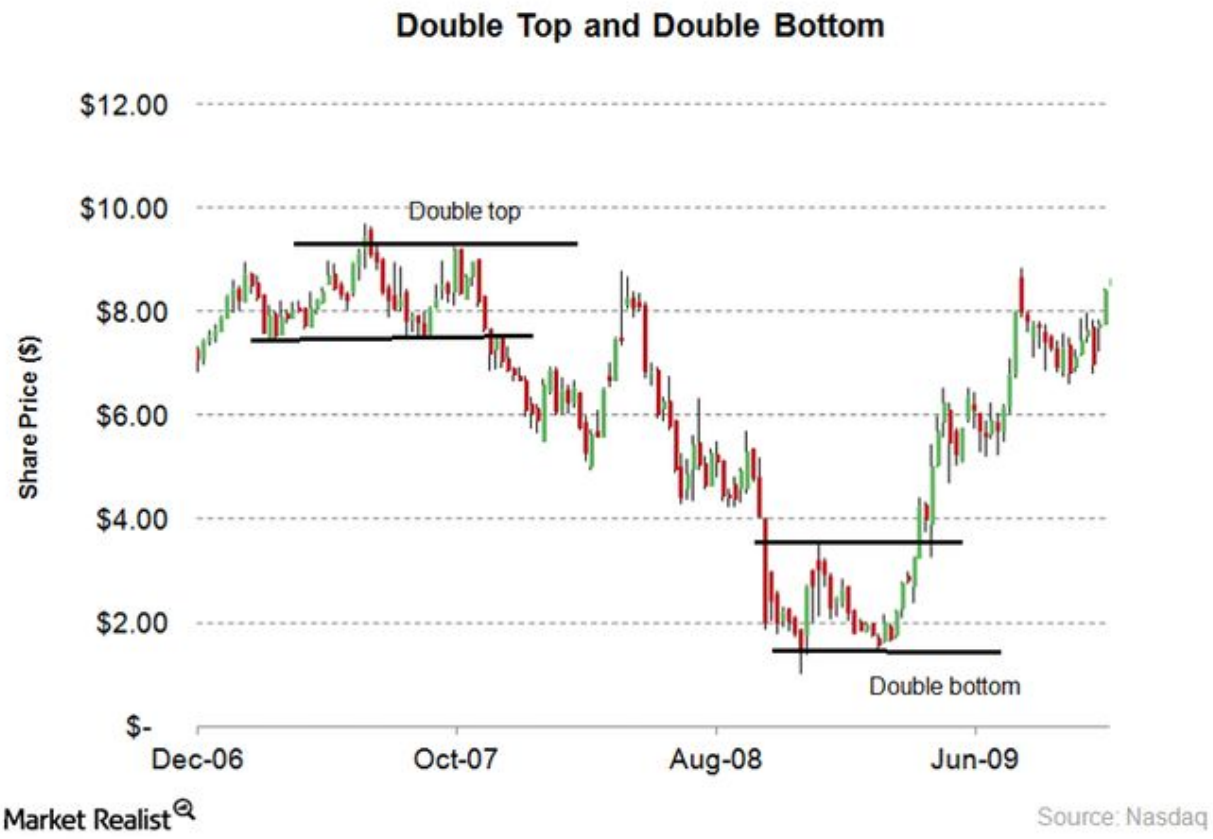

- Left shoulder: In the left shoulder, price falls and rises to the neckline to form a V shape.
- Head: In the head, price falls and rises to the neckline to form a bigger V shape bottom.
- Right shoulder: The right shoulder is similar to the left shoulder.

**Volume:** Volume levels during the first half of the pattern are less important than in the second half. Volume on the decline of the left shoulder is usually pretty heavy and selling pressure quite intense. The intensity of selling can even continue during the decline that forms the low of the head. After this low, subsequent volume patterns should be watched carefully to look for expansion during the advances.

## Double Top and Double Bottom patterns

The double top pattern forms in the uptrend. In this pattern, two consecutive peaks are formed. The peaks both have roughly the same price level. The breakdown will result in the trend reversal.

The double bottom pattern forms at the bottom of the trend. In this pattern, two consecutive bottoms are formed. The bottoms have roughly the same price level. In the double bottom pattern, a breakout will result in an uptrend.



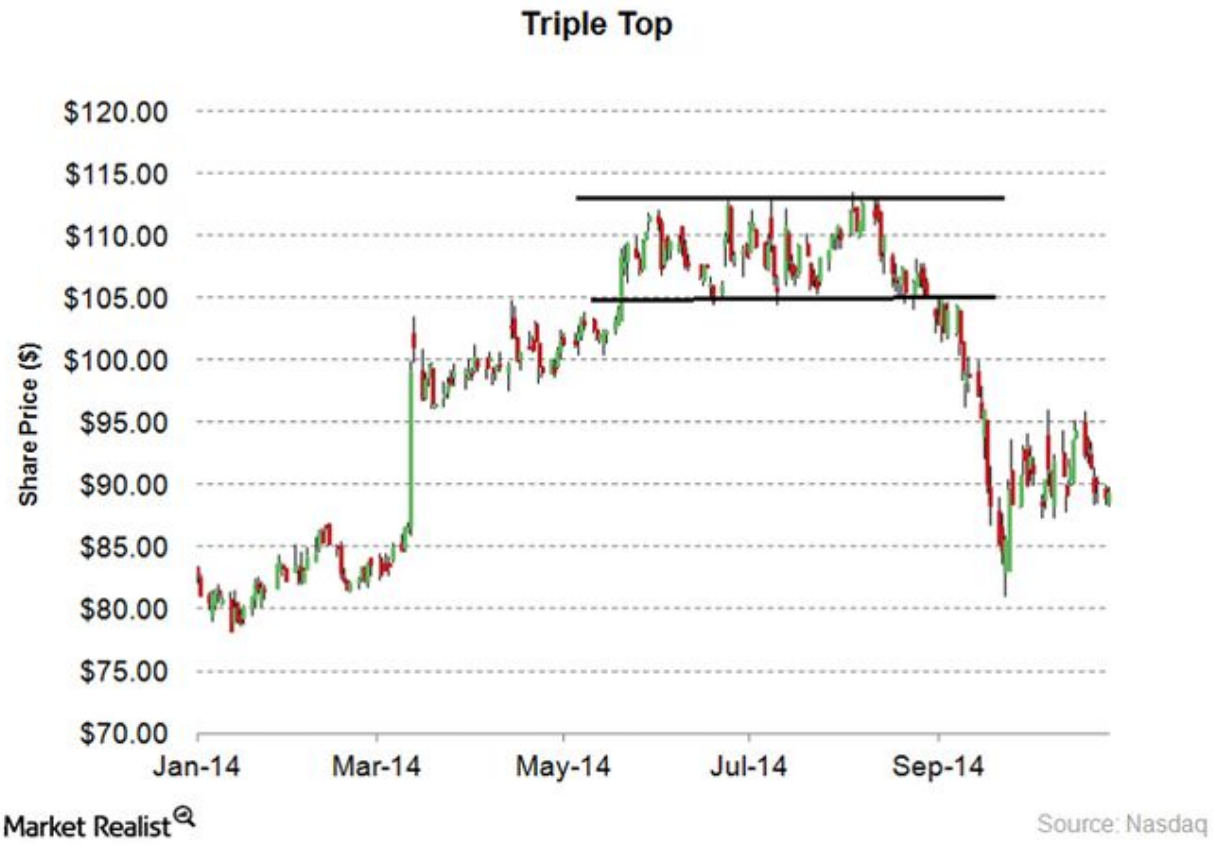
The double top forms because investors think the stock is expensive at the uptrend's peak. As a result, investors sell the stock. High selling pressure leads to a trend reversal.

The double bottom forms when investors think that stock is trading at a low price. Investors buy the stock. High buying pressure leads to a trend reversal.

## Triple Top and Triple Bottom

The triple top pattern is formed in the uptrend. In this pattern, three consecutive peaks are formed. The peaks have roughly the same price level. A breakdown below will result in the trend reversal.

This pattern formation is similar to the double top formation. However, three peaks are formed in the triple top pattern. The price keeps fluctuating between the support and resistance of these three peaks. The traders assume that stock is expensive. As a result, they sell stocks at the resistance levels.



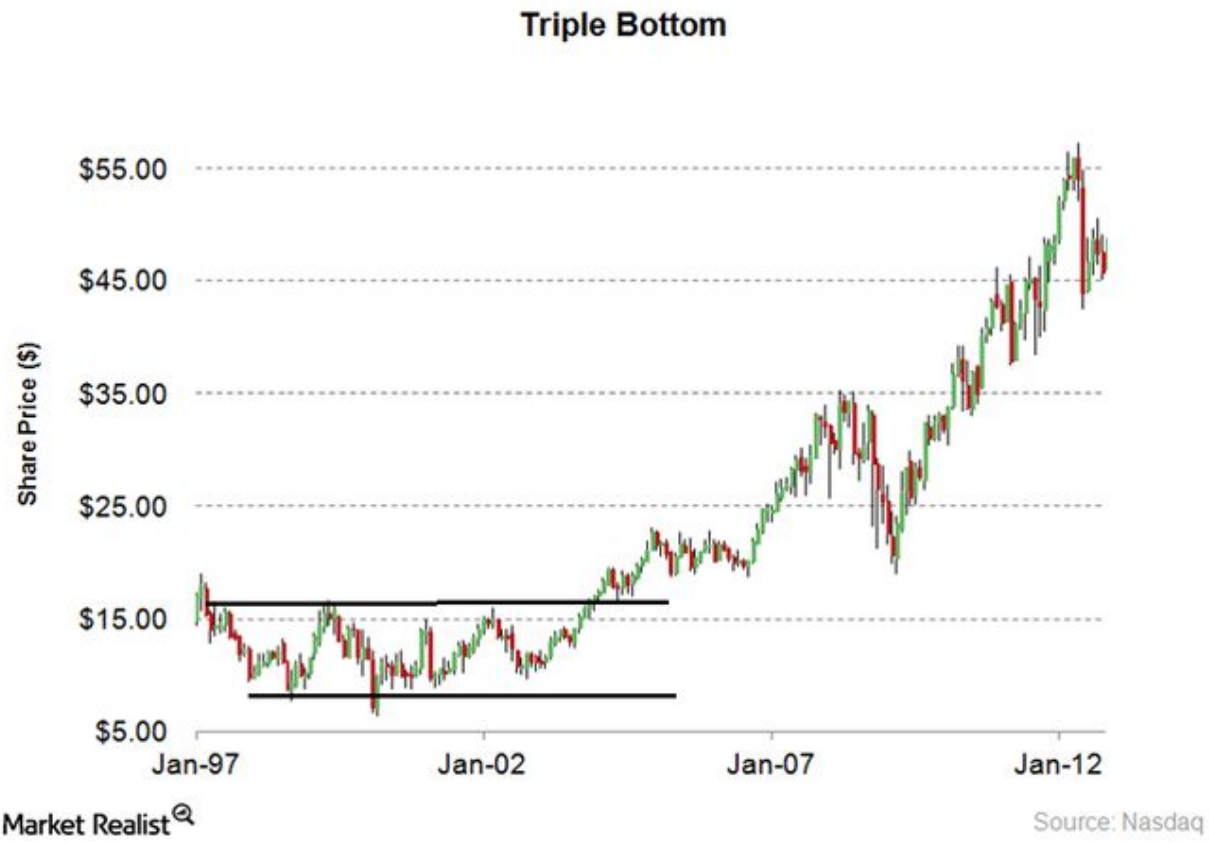
When the selling pressure is more than the buying pressure, breakdown happens in triple top pattern. As a result, trend reversal occurs.

This pattern is used, along with volume, to identify trends. It's also used for entry and exit signals.

**Volume:** As the Triple Top Reversal develops, overall volume levels usually decline. Volume sometimes increases near the highs. After the third high, an expansion of volume on the subsequent decline and at the support break greatly reinforces the soundness of the pattern.

The triple bottom formation is formed in the downtrend. In this pattern, three consecutive bottoms are formed. The bottoms have roughly the same price level. A breakout will result in the trend reversal.

The triple bottom formation is formed because investors and hedge funds think that there's a possible trend reversal. They think the stock is oversold. The buying activity starts and the price fluctuates between support and resistance. It forms a triple bottom.




When the stock's buying pressure is more than the selling pressure, the triple bottom pattern breakout happens and the uptrend begins. When there are more than three peaks, it's called

multiple bottoms in the downtrend. It's called multiple tops in the uptrend. They're similar to double and triple top and bottom patterns.

**Volume:** As the Triple Bottom Reversal develops, overall volume levels usually decline. Volume sometimes increases near the lows. After the third low, an expansion of volume on the advance and at the resistance breakout greatly reinforces the soundness of the pattern.

# Conclusion

Following is the summary of this report:

- Technical analysis is a method of evaluating securities by analyzing the statistics generated by market activity.
- One of the most important concepts in technical analysis is that of a trend, which is the general direction that a security is headed. There are three types of trends: uptrends, downtrends and sideways/horizontal trends.
- A trendline is a simple charting technique that adds a line to a chart to represent the trend in the market or a stock.
- A channel, or channel lines, is the addition of two parallel trendlines that act as strong areas of support and resistance.
- Support is the price level through which a stock or market seldom falls. Resistance is the price level that a stock or market seldom surpasses.
- A pattern is a distinct formation on a stock chart that creates a trading signal, or a sign of future price movements. There are two types: reversal and continuation.

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