Moving Averages

Moving Averages is considered a staple indicator to all technical traders. It is very often deployed for a variety of reasons. There are actually many types of Moving Averages out there, however, most traders choose settle into one type of Moving Average and then forget about the rest. In this article, we will be looking into the different types of Moving Averages and we can better appreciate each of them and possibly use them to guide our trading decisions. In order for all of us to better understand how they come about, there will be worked examples in this article.

There are 2 parts that are required for the calculations. Firstly, it is price. Prices that are used for calculation can be either opening or closing prices but closing prices are more commonly used. Secondly, it is the time period. This time period can be of any time period that we want. For instance, we can have 20 Day Moving Averages and then we need to calculate for the average (depending on which type of Moving Averages you choose) of the past 20 days to derive the current Moving Average value.

There are 3 different types of Moving Averages and they are as follows:

1. Simple Moving Averages
2. Weighted Moving Averages
3. Exponential Moving Averages

Example

Take note of the example shown in the table below. These are the prices of an asset over a period of 10 days. We will use these values to illustrate all the different types of Moving Averages work.

Day	1	2	3	4	5	6	7	8	9	10	11	12
Price	10	11	10.4	10.6	10.5	10.3	10.7	10.8	10.2	10.5	10.80	10.40

Simple Moving Averages (SMA)

This is the most basic and the most commonly used type of Moving Averages. It is also the simplest to understand. It is simply the average of all the prices of the asset over the specified period of time. Using the values from the table above, the average of the prices in table will be calculated and form the 10 day Simple Moving Average.

The formula to calculate SMA is as follows:

$$Value\ of\ Simple\ Moving\ Average\ = \frac{Sum\ of\ Prices\ over\ the\ Specified\ Period}{Number\ of\ Days\ in\ that\ Period}$$

In order to calculate the 10 day SMA, we need the prices for the past 10 days. So we can only find the first value of the 10 day SMA at Day 10. Moving on, to find the SMA for Day 11, we need the values from Day 2 to Day 11 and so on. The table below shows the results for 10 Day SMA for day 10, 11, 12 and 13.

Using Day 11 as example:

$$SMA\ for\ Day\ 11 = \frac{11 + 10.4 + 10.6 + 10.5 + 10.3 + 10.7 + 10.8 + 10.2 + 10.5 + 10.8}{10} = 10.58$$

Day	10	11	12
Price	10.50	10.80	10.40
SMA	10.50	10.58	10.52

This can be applied for any number of days. Hence, if you wish to find out about 50 days Simple Moving Average, then it will be the sum of prices in 50 days over 50.

Weighted Moving Averages (WMA)

To form up weighted Moving Averages, by what it means, we assign weights to the calculation by the age of the price. This means that the older prices get weighted lesser than the more recent prices. This weight will be multiplied with the price for that day to come up with the Weighted Moving Average. The weighing is actually quite easy to understand and the formula is given below.

$$Weight\ = \frac{Day}{Sum\ of\ the\ Days}$$

For "Day", we just need to put in which day it is in within that period while "Sum of the Days" is the sum of all the days in the specified period. So to find out the weight for 10 Day Weighted Moving Average, we need to first find out the "Sum of the Days".

$$Sum\ of\ the\ Days = 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 + 10 = 55$$

Using Day 10 as example:

$$WMA = 10 \times \frac{1}{55} + 11 \times \frac{2}{55} + 10.4 \times \frac{3}{55} + 10.6 \times \frac{4}{55} + 10.5 \times \frac{5}{55} + 10.3 \times \frac{6}{55} + 10.7 \times \frac{7}{55} + 10.8 \times \frac{8}{55} + 10.2 \times \frac{9}{55} + 10.5 \times \frac{10}{55} = 10.51$$

Combining all these information, we can derive the following table.

Day	10	11	12
Price	10.50	10.80	10.40
WMA	10.51	10.56	10.53

Weighted Moving Averages changes differently in price compared to Simple Moving Averages weights are assigned to it. Note that the weights are given based on whether it is Day 1 = ($\frac{1}{55}$), 2 = ($\frac{2}{55}$) or 8 = ($\frac{8}{55}$). This is important in differentiating WMA from EMA.

Exponential Moving Averages (EMA)

Exponential Moving Average is also a weighted moving average as there is a need to include a multiplier in the calculation. However, the way to calculate this multiplier is different compared to the Weighted Moving Average. To calculate the 10 day Exponential Moving Average, we need to go through 3 steps.

Step 1: Calculate the SMA value for Day 10. This will allow us to establish the first point for EMA.

Step 2: Calculate the multiplier using the formula shown below.

$$Multiplier = \frac{2}{(Time\ Period + 1)} = \frac{2}{(10 + 1)} = 0.181$$

Step 3: Calculate the EMA using the formula shown below.

$$EMA = (Today\ Closing\ Price - EMA\ of\ Previous\ Day) \times Multiplier + EMA\ of\ Previous\ Day$$

Using Day 11 as example:

$$EMA = (10.80 - 10.50) \times 0.181 + 10.50 = 10.55$$

Combining all the information, we can derive the table below.

Day	10	11	12
Price	10.50	10.80	10.40
EMA	10.50	10.55	10.52

As we can see, EMA will react different as a different set of calculation is used to calculate the values. Compared to WMA, the weights are calculated based on the time period, meaning the weights for 10 day EMA is different from 20 day EMA, which is 0.095 (use the formula above to find out) and so on.

When to use which one?

In general, the long the time period you use, the smoother the Moving Average line would be as we are taking into account more days with the exception of Exponential Moving Averages (as we use the previous day in the calculation instead). Weights in both Weighted and Exponential Moving Averages will become obsolete as we use longer periods of time as the weights given to each price become smaller and smaller. In contrast, Simple Moving Averages can be used for any time period as there are no weights to any data point.

In the comparison between Weighted and Exponential Moving Averages would be the degree of fluctuation that each of them captures. From the equations that we see, we can expect that Weighted Moving Averages will fluctuate more than Exponential Moving Averages because it captures 100% of the weight across the 10 Days. Hence, Weighted Moving Averages is more sensitive to large price changes in short term swing trading.

One favourite and common application of all Moving Averages is that they can be used as support and resistance. The difference is that both Weighted and Exponential Moving Averages will be more reactive towards any movement in prices compared to Simple Moving Averages. As mentioned in the paragraph above, Weighted and Exponential Moving Averages can capture fluctuations while Simple Moving Averages can capture the trend. Hence, it can be said that if we want to observe longer term investment, we would be sufficient to look at Simple Moving Averages while we should look at Weighted or Exponential Moving Averages if we want to do short term trading. Therefore, it really boils down to which trait and style you have towards trading. We should choose the one that suits us the most.

Conclusion

This article shows a single Moving Average in action. In reality, we often combine the different types Moving Averages and each using different time periods. We will discuss the combinations of Moving Averages as well as in combination with other indicators in another article. You can click on the link here to move that article.