



Security Analysis

Meaning of Security Analysis

- Security analysis is process of evaluating investments like stocks, bonds, or other financial assets to determine whether they are worth buying, holding, or selling.
- It involves studying a company's financial health, market trends, and risks to make informed decisions about investing.

There are 2 approaches for analysis a security

1. **Technical Analysis:** Technical analysis is like predicting the future price of a stock by looking at its past movements. It's similar to checking the weather forecast based on past patterns—investors use charts, trends, and indicators to guess whether a stock's price will go up or down.
2. **Fundamental Analysis:** Fundamental analysis is like checking a company's health before investing. It's similar to researching a restaurant before eating there—you look at its financial reports, earnings, industry position, and management quality to decide if it's a good long-term investment.

In this chapter we will learn 2 technical indicators which will help in deciding whether to buy share or not:

Arithmetic Moving Average:

Formula:
$$\frac{\text{Sum of Prices of n number of days}}{\text{Number of Days}}$$

Example: Price of share for 6 days are given and we have to calculate 3 Days moving average

Days	Price of share	3 Day Moving Average
1	100	-
2	150	-
3	120	123.33
4	170	146.67
5	200	163.33
6	220	196.67

Decision making on basis of Arithmetic Moving Average:

- **If this average is increasing day by day:** Then market is bullish and share's price is expected to increase in future and therefore we should buy share
- **If this average is decreasing day by day:** Then market is bearish and share's price is expected to decrease in future and therefore we should sell share

In our Eg above, 3 days moving average is increasing day by day, therefore market is bullish and we should buy share

Note: If for a particular day, no trading was done in share then AMA cannot be calculated for this particular day

Exponential Moving Average:

Formula: Previous Day EMA + {(Closing Price of share Today – Previous Day EMA) × Exponent}

Exponent = $\frac{2}{n+1}$, where n = Number of days for which average is to be calculated

Decision making on basis of Exponential Moving Average:

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This below concept is included in notes because practical questions from this concepts are tested for practical purpose in our Exams

Efficient Market Hypothesis (EMH) is a financial theory that says stock prices already reflect all available information, meaning it's impossible to consistently beat market because prices adjust instantly to new data.

Think of it like this: Imagine you're in huge online marketplace where millions of buyers and sellers instantly update prices based on latest news. If a product (or stock) is underpriced, people rush to buy it, pushing the price up. If it's overpriced, they sell, making the price drop. This happens so quickly that no one can consistently outsmart the market.

3 Levels of EMH:

Weak Form Efficiency

- Price reflects all information found in record of past prices and volumes.
- Example: If a stock went up last week, it doesn't mean it will continue rising.
- Technical analysis (studying charts) is useless here.

Semi-Strong Form Efficiency

- Price reflects not only all information found in record of past prices and volumes but also all other publicly available information.
- All public information (news, earnings reports, announcements) is already factored into stock prices.
- Example: If a company announces record profits, the stock price adjusts immediately, so you can't profit by trading on this news.

Strong Form Efficiency

- Price reflects all available information public as well as private
- All information, even insider info, is already reflected in stock prices.
- Example: Even if a CEO secretly knows their company will land a big contract, the stock price already includes this info, making insider trading useless.

In reality, markets are not perfectly efficient—some people do beat market (like Warren Buffett), and short-term inefficiencies exist. But overall, EMH suggests that trying to "outsmart" the market consistently is very difficult.

Three types of tests can be employed to verify weak form of Efficient Market Theory-

1. Serial Correlation Test,
2. Run Test
3. Filter Rule Test

Testing weak form of market efficiency using SERIAL CORRELATION TEST

The **Auto-Correlation Test** (also called the **Serial Correlation Test**) is used to check if past stock prices are related to future stock prices. This helps determine whether the market follows the **Weak Form of Efficiency** (i.e., past prices should not predict future prices).

Step 1: Divide the Time Period and Check Correlation

- Suppose you have stock price data for **20 days**.
- Divide this into **two equal periods**:
 - **First Period: Days 1 to 10**
 - **Second Period: Days 11 to 20**
- Now calculate co relation between price changes of data of First period and second period

Step 2: Check the Correlation Value

- If correlation is close to 0, it means that past prices do not influence future prices.
- This suggests that stock prices change randomly, supporting the **Weak Form of Market Efficiency** (i.e., you cannot predict future prices using past data).
- If correlation is high (positive or negative), it means past prices **do affect** future prices, indicating the market is **not efficient**, and patterns exist.

Testing weak form of market efficiency using FILTER TEST

The **Filter Rules Test** checks if simple trading strategy based on price movements can consistently beat the market.

It works like this:

1. Buying Rule:

- If a stock price **rises by at least N%**, buy it and hold it.
- Example: If N% is **5%**, and a stock rises from **\$100 to \$105**, you buy it.

2. Selling Rule:

- Keep holding the stock until its price falls by at least N% from its highest point. Then, sell it.
- Example: If the stock rises to \$120 but then drops by 5% (falls to \$114), you sell it.

What This Test Checks

- If stock prices **follow patterns**, this strategy should help make profits.
- If stock prices **move randomly**, this strategy **shouldn't** work better than simply **buying and holding** the stock long-term.

What Research Shows: After considering **transaction costs (broker fees, taxes, etc.)**, the profits from this method **aren't better** than simply holding the stock for the long term.

Conclusion

- If stock prices are **random**, this trading strategy **won't give better returns**.
- This supports the **Weak Form of Market Efficiency**, meaning **past prices don't help predict future prices**.

Testing weak form of market efficiency using RUN TEST

Run Test is used to check if stock price changes are random (which is expected in efficient market).

Step 1: Determine total of sign of price changes which is represented by (r)

It means we have to calculate the number of times sign of price changes

For Eg: In below case, total of sign of price changes (r) = 3

Date	Price of share	Sign of Price change
02.03.2030	2800	
03.03.2030	2780	-
04.03.2030	2795	+
05.03.2030	2830	+
06.03.2030	2760	-
07.03.2030	2700	-

- If r is too low, it suggests patterns exist in price changes, meaning past prices can predict future prices (which violates Weak Form Efficiency).
- If r is too high, again it indicates pattern in price changes, which is also not expected.
- Therefore for market to be in weak form efficiency state, r should be closer to average

Step 2: Determine total number of positive changes i.e. total number of plus signs (n_1)

Step 3: Determine total number of negative changes i.e. total number of minus signs (n_2)

Step 4: Calculate average and standard deviation of r:

$$\text{Average } (\mu) = \frac{2n_1n_2}{n_1 + n_2} + 1$$

$$\text{Standard Deviation } (\sigma) = \sqrt{\frac{2n_1n_2(2n_1n_2 - n_1 - n_2)}{(n_1 + n_2)^2(n_1 + n_2 - 1)}} \text{ OR } = \sqrt{\frac{(\mu - 1)(\mu - 2)}{n_1 + n_2 - 1}}$$

Step 5: We will calculate a range from step 4, within which if r falls then it will reflect weak form of market efficiency

$$\text{Lower Limit} = \mu - (t \times \sigma)$$

$$\text{Upper Limit} = \mu + (t \times \sigma)$$

Value of t at a particular **DEGREE OF FREEDOM** given in question will be taken for calculation of Lower limit and upper limit

$$\text{Degree of Freedom means} = n_1 + n_2 - 1$$

