UNIT – 2
NOTES

Microeconomics

Microeconomics is a branch of economics that contemplates the attributes of decision makers within the economy, such as households, individuals, and enterprises.

The concept of microeconomics shows how and why different commodities have different values, how individuals make more practical or efficient decisions, and how individuals organise and cooperate with each other.

Who is the Father of Microeconomics?

Adam Smith is considered the father of microeconomics, who is also the father of economics. According to Smith's philosophy of free markets, there should be minimum government intervention and taxation in free markets.

His idea of an invisible hand- which is the tendency of free markets to regulate themselves by means of competition, supply and demand, and self-interest was popular at that time.

Examples of Microeconomics

Microeconomics analyses the traits of the small economic factors (like workers, households, companies), and macroeconomics analyses the large economic units (like capital investment, consumption, GTP, unemployment). However, microeconomics and macroeconomics study the corresponding concepts at various levels. The representative examples of microeconomics are:

1. Demand: This is how the demand for commodities is determined by income, choices, cost prices, and other circumstances, such as expectations.
2. Supply: This is to ascertain how manufacturers determine to enter markets, scale production, and exit markets.
3. Opportunity cost: It is the compromises or the trade-offs that the individuals and enterprises make to accomplish restrained resources such as money, time, land, and capital. For instance, an individual who decides to go to an academy and begin a company may not have enough time or money for both.
4. Consumer choice: This is to determine how the needs, assumptions, and data influence shape the customer choices. The notion that customers maximise their anticipated utility of purchases implies that they purchase the things they assume to be most useful to them.
5. Welfare economics: It refers to creating the influence of social programs on economic choices such as labour participation or risk-taking.

Utility

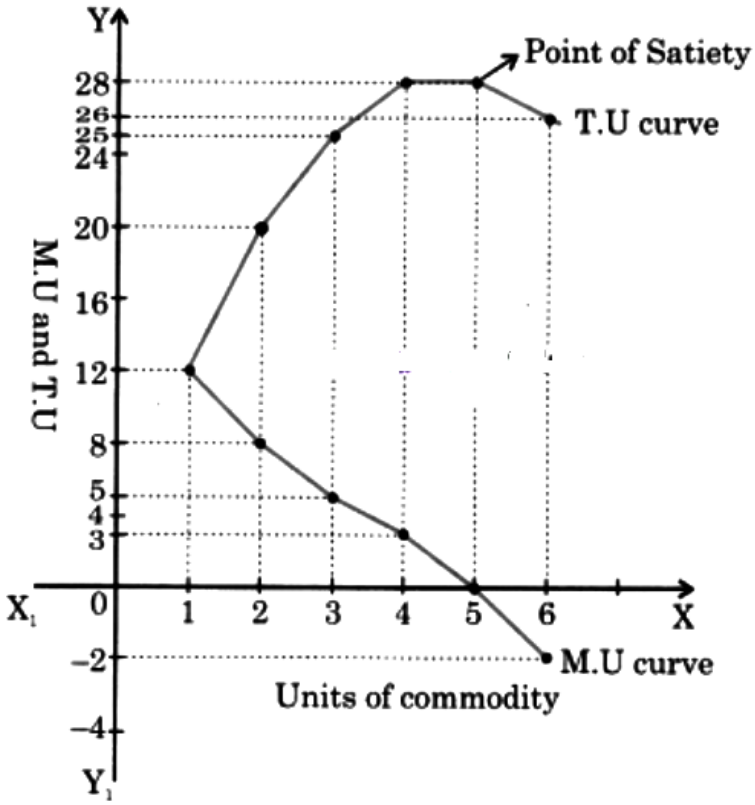
Utility is the want satisfying power of a commodity.

Total Utility determines the overall satisfaction obtained after consuming every single unit of that commodity.

Marginal Utility is the utility obtained from the last unit of a product or service.

Example:

Consumption of commodity X	TU_X	MU_X
1	12	12
2	20	8
3	25	5
4	28	3
5	28	0
6	26	-2



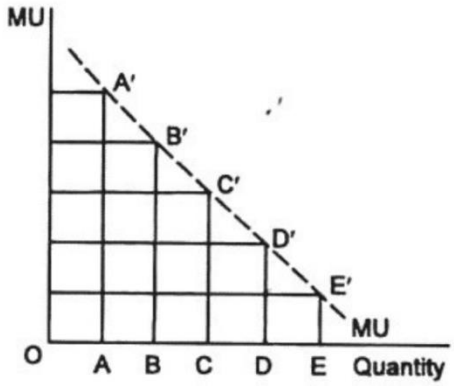
Relationship between TU & MU

- As long as MU (marginal utility) is positive, the TU (total utility) increases with an increase in the consumption of a commodity.
- As MU from each successive unit diminishes, at that time TU increases but at a diminishing rate.
- When TU is maximum, the MU reaches zero.

Law of Diminishing Marginal Utility

The law of diminishing marginal utility explains that as a person consumes an item or a product, the satisfaction or utility they derive from the product wanes as they consume more and more of that product. For example, an individual might buy a certain type of chocolate for a while. Soon, they may buy less and choose another type of chocolate or buy cookies instead because the satisfaction they were initially getting from the chocolate is diminishing.

Law of diminishing Marginal Utility



Consumer's Equilibrium means a state of maximum satisfaction. A situation where a consumer spends his given income purchasing one or more commodities so that he gets maximum satisfaction and has no urge to change this level of consumption, given the prices of commodities, is known as the consumer's equilibrium.

➢ *Consumer Equilibrium In case of Single Commodity*

In the case of a single commodity, the consumer equilibrium can be explained on the basis of the law of diminishing marginal utility. The law of diminishing marginal utility states that as consumers consume more and more units of commodities, the marginal utility derived from each successive unit goes on diminishing. Therefore, how consumers decide how much to purchase depends on the following two factors.

- The price for each unit which he/she pays is given
- The utility he/she gets

While purchasing a unit of a commodity, a consumer compares the price of the given commodity with its utility. The consumer will be at an equilibrium stage when marginal utility (in terms of money) gets equal to the price paid for the commodity say 'X' i.e.

MUx = Px

Note: Marginal utility in terms of money is calculated by dividing marginal utility in utils by marginal utility of one rupee.

In case MUx > Px, :- In the case when MUx is greater than price, the consumer goes on buying the commodity because she is paying less for each additional amount of satisfaction he is getting. As she buys more, MU will fall and situations will arise when the price paid will exceed marginal utility (the concept of the law of diminishing marginal utility is applied here). In order to avoid this situation i.e. dissatisfaction, he will minimize his consumption and MU will go on increasing till MUx = Px. This is the state of equilibrium.

In case MUx < Px, :- In the case when MUx is less than price,, the consumer will have to minimize his consumption of the commodity to raise his total satisfaction till MU becomes equal to price. This is because she is paying more than the additional amount of satisfaction she is getting.

In the case of a single commodity, the consumer equilibrium can be well-explained with the help of an example given below.

Example:
In the below example, assume that the consumer wants to buy goods that are priced at Rs.10 per unit. Also, assume that MU obtained from each successive unit is determined. Assume that 1 util is equals to Re.1

Number of Units Consumed (X)	Price (Px)	MUx (Utils)	MUx (1 Util = Re.1)	Difference	Remarks
1	10	20	20/1 = 20	10	MUx > Px
2	10	16	16/1 = 16	6	Consumer will increase the consumption
3	10	10	10/1 = 10	0	MUx = Px Consumer Equilibrium
4	10	4	4/1 = 4	-6	MUx < Px
5	10	0	0/1 = 1	-10	Consumer will decrease the consumption
6	10	-2	-2/-1 = -2	-12	

In the above table, we can see that the consumer will be at equilibrium when he buys 3 units of commodity X. He will increase his consumption beyond 2 units as MUx > Px. The consumer will not consume 4 units or more of the commodity X as MUx < Px.

The Conditions for Consumer Equilibrium in the Case of Two or More Commodities (Law of Equi- Marginal Utility)

The law of diminishing marginal utility is not applied in the case of two or more commodities. In real-life scenarios, a consumer normally consumes more than one commodity. In such a situation, the law of equity-marginal utility is applied as it helps him to determine the optimum allocation of his income. The law of equi-marginal utility states that a consumer should spend his

limited income to purchase different commodities in such a way that the last rupee spent on each commodity provides him equal marginal utility in order to attain maximum satisfaction.

According to the law of equi-marginal utility, a consumer will be in equilibrium when the ratio of marginal utility of one commodity to its price is equal to the ratio of marginal utility of another commodity to its price.

Let us assume that consumers buy two goods i.e. X and Y. Then the equilibrium price stage will be at

MUx/Px = MUY/PY = MU of the last rupee spent on each commodity or simply can be said MU of Money.

Thus, to attain an equilibrium position
1. Marginal utility of the last rupee spent on each good is the same.
2. Marginal utility of a commodity falls as more of it is consumed.

Let us understand the consumer's equilibrium in the case of two commodities with an example. Suppose a consumer has to spend ₹. 24 on two commodities i.e. X and Y. Further, assume that the price of each unit of X is 2 and that of Y is 3 and his marginal utility schedule is given below.

Number of Units Consumed (X)	MUx	MUx/Px (A rupee worth of Mu)	MU_y	MUy/Py (A rupee worth of Mu)
1	20	20/2 = 10	24	24/3 = 8
2	18	18/2 = 9	21	21/3 = 7
3	16	16/2 = 8	18	18/3 = 6
4	14	14/2 = 7	15	15/3 = 5
5	12	12/2 = 6	12	12/3 = 4
6	10	10/2 = 5	9	9/3 = 3

To attain the maximum satisfaction from spending his income of ₹. 24, the consumer will buy 6 units of X by spending Rs. 12 (2 × 6 = Rs.12) and 4 units of Y by spending Rs. 12 (2 × 6 = Rs. 12).

This combination of goods gives him maximum satisfaction (or state of equilibrium) because a rupee worth of MU in the case of good X is 5 i.e.

$$MUx/Px = 10/2$$

In the case of good Y also. It is 5 i.e.

$$MUy/Py = 15/3$$

(= MU of the last rupee spent on each good)

Note: Consumer's maximum satisfaction is determined by the budget constraints i.e. the amount of money spent by consumers (₹24 in this example).

Indifference Curve: An indifference curve is a graphical representation of a combined products that gives similar kind of satisfaction to a consumer thereby making them indifferent. Every point on the indifference curve shows that an individual or a consumer is indifferent between the two products as it gives him the same kind of utility.

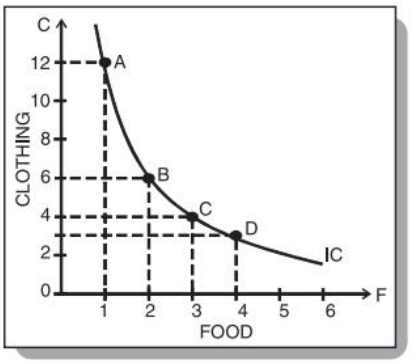


Fig. 1 : A Consumer's Indifference Curve

Properties of Indifference Curves

If a good satisfies all four properties of indifference curves, the goods are referred to as ordinary goods. They can be summarized as the consumer requires more of one good to compensate for less consumption of another good, and the consumer experiences a diminishing marginal rate of substitution when deciding between two goods.

Indifference curves never cross. If they could cross, it would create large amounts of ambiguity as to what the true utility is.

The farther out an indifference curve lies, the farther it is from the origin, and the higher the level of utility it indicates. As illustrated above on the indifference curve map, the farther out from the origin, the more utility the individual generates while consuming.

Indifference curves slope downwards. The only way an individual can increase consumption in one good without gaining utility is to consume another good and generate the same amount of utility. Therefore, the slope is downwards sloping.

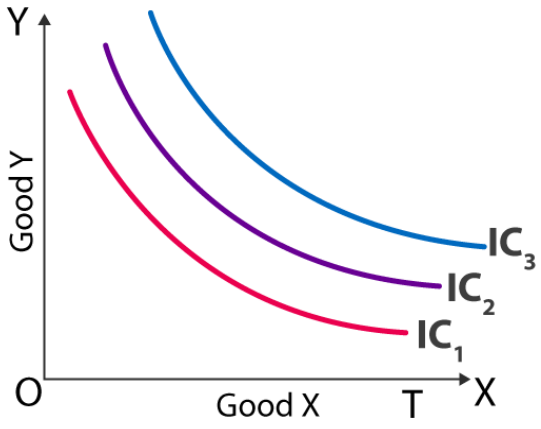
Indifference curves assume a convex shape. As illustrated above in the indifference curve map, the curve gets flatter as you move down the curve to the right. It illustrates that all individuals experience diminishing marginal utility, where additional consumption of another good will generate a lesser amount of utility than the prior.

What Defines the Convexity of Indifference Curves?

As you go down the curve of an indifference curve, the curve becomes flatter as one good is substituted for the other. It is the individual's marginal rate of substitution, which is defined as the more an individual consumes good A in proportion to good B, the less of good B the individual will substitute for another unit of good A.

Indifference Map

The Indifference Map refers to a set of Indifference Curves that reflects an understanding and gives an entire view of a consumer's choices. The below diagram shows an indifference map with three indifference curves.



Indifference Map

Budget Constraint

Budget constraints occur as a result of scarcity and trade-offs. Scarcity is the concept that all resources are limited, such as time and money. Because resources are scarce, people must make trade-offs to efficiently allocate their resources while prioritizing their most important needs and wants. For example, say a household budget is $2,000 per month. Because the money is not limitless and has a cap, the resource is scarce. Because there is only $2000 per month to cover expenses like rent and food as well as other wants, the household must make trade-offs to cover their most important needs. Most would consider rent and food to be a higher priority than going to the movies, so the family might decide to not go to the movies to be able to afford their rent and food. This is also an example of a budget constraint.

A budget constraint refers to the maximum combined items one can afford with the income generated by the individual. Based on the money available each month, an individual must allocate their funds efficiently to purchase goods and services.

To conceptualize this in a simple way, imagine having only two items that can be purchased with the budget: hot dogs and t-shirts. The budget can be spent entirely on hot dogs, entirely on t-shirts, or some combination of both. The quantity of either good that can be purchased is determined by the price of the good, as well as the quantity purchased, and the price of the other good.

Budget Constraint Formula

A budget constraint in the example with only two goods can be expressed as follows:

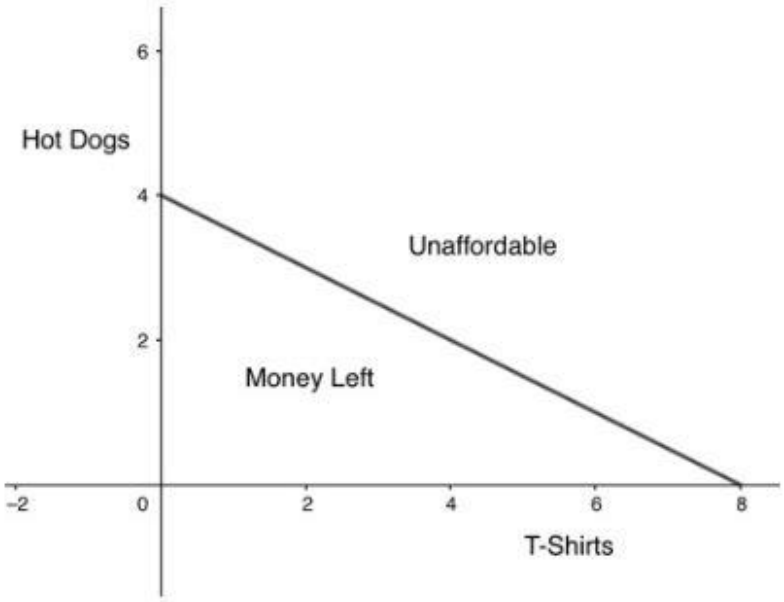
$(P1 \times Q1) + (P2 \times Q2) = M$

Where P1 is the price of the first good, P2 is the price of the second good, Q1 is the quantity of the first good, Q2 is the quantity of the second good, and M is the money available. This equation illustrates that the quantities of goods 1 and 2 to be purchased are determined by the price and the constraints imposed by the money available.

If there are more goods to be purchased with the available money, the equation can be expanded to include as many goods and prices as needed.

Budget Constraint Graph

The graph illustrates the budget constraint and how it impacts the number of hot dogs and t-shirts that can be purchased. With a budget constraint of Rs 24, 4 hot dogs can be purchased at Rs6 each, or 8 t-shirts can be purchased at Rs 3 each. Alternatively, any combination of the two goods can be purchased as long as the combination falls on or below the maximum of Rs24. Any combination below the line shows that there is still money available within the budget after the purchases, while any combination above the line is not affordable given the current budget constraint.



Budget Constraint Example

A budget constraint graph is helpful to visualize which combinations of goods are affordable and which ones are not. It can be created by using the formula for budget constraints discussed previously. Since prices are held constant in this example and the budget is known, different quantities can be plugged into the equation for good 1 to find out how many of good 2 can be purchased and vice versa.

The table below shows possible combinations of the two goods that may be purchased with the budget constraint of Rs24 - this schedule could be used to create the graph above as well.

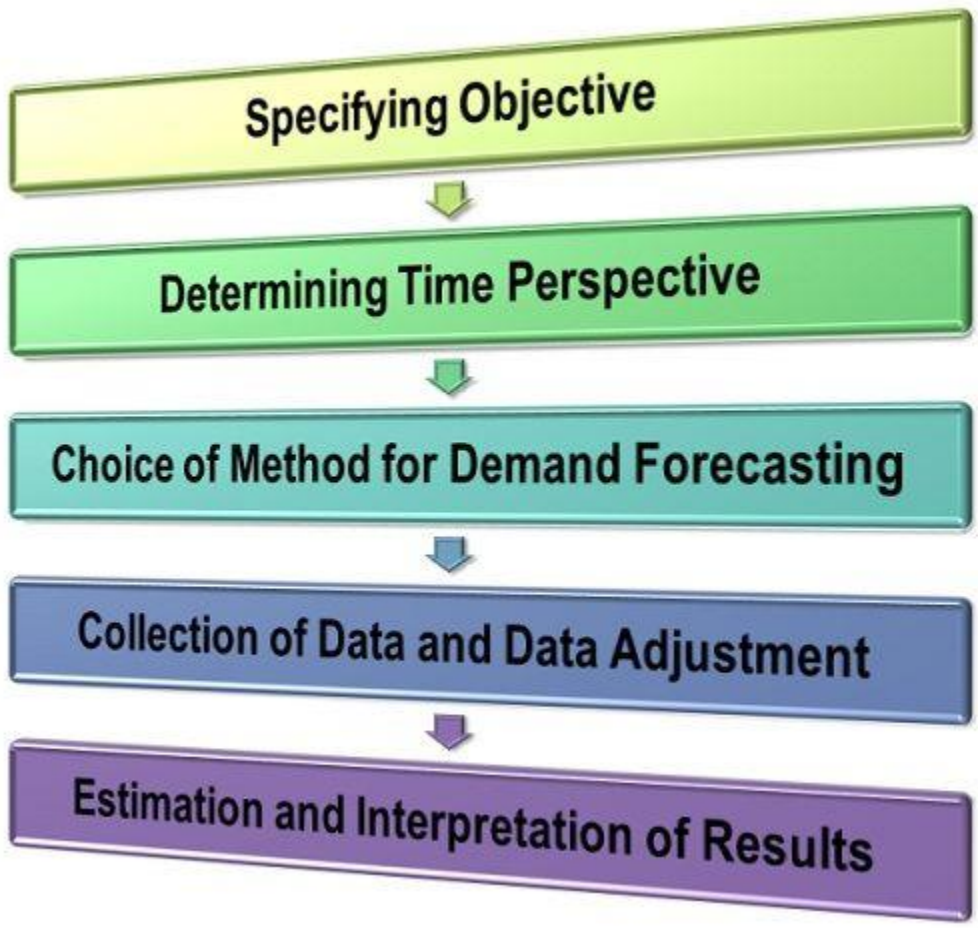
Demand forecasting

Demand forecasting is the process of using predictive analysis of historical data to estimate and predict customers' future demand for a product or service. Demand forecasting helps the business make better-informed supply decisions that estimate the total sales and revenue for a future period of time.

Definition: Demand Forecasting is a systematic process of predicting the future demand for a firm's product. Simply, estimating the potential demand for a product in the future is called as demand forecasting.

Steps in Demand Forecasting

The demand forecasting finds its significance where the large-scale production is involved. Such firms may often face difficulties in obtaining a fairly accurate estimation of future demand. Thus, it is essential to forecast demand systematically and scientifically to arrive at desired objective. Therefore, the following steps are taken to facilitate a systematic demand forecasting:



1. **Specifying the Objective:** The objective for which the demand forecasting is to be done must be clearly specified. The objective may be defined in terms of; long-term or short-term demand, the whole or only the segment of a market for a firm's product, overall demand for a product or only for a firm's own product, firm's overall market share in the industry, etc. The objective of the

demand must be determined before the process of demand forecasting begins as it will give direction to the whole research.

2. **Determining the Time Perspective:** On the basis of the objective set, the demand forecast can either be for a short-period, say for the next 2-3 year or a long period. While forecasting demand for a short period (2-3 years), many determinants of demand can be assumed to remain constant or do not change significantly. While in the long run, the determinants of demand may change significantly. Thus, it is essential to define the time perspective, i.e., the time duration for which the demand is to be forecasted.
3. **Making a Choice of Method for Demand Forecasting:** Once the objective is set and the time perspective has been specified the method for performing the forecast is selected. There are several methods of demand forecasting falling under two categories; survey methods and statistical methods.The Survey method includes consumer survey and opinion poll methods, and the statistical methods include trend projection, barometric and econometric methods. Each method varies from one another in terms of the purpose of forecasting, type of data required, availability of data and time frame within which the demand is to be forecasted. Thus, the forecaster must select the method that best suits his requirement.
4. **Collection of Data and Data Adjustment:** Once the method is decided upon, the next step is to collect the required data either primary or secondary or both. The primary data are the first-hand data which has never been collected before. While the secondary data are the data already available. Often, data required is not available and hence the data are to be adjusted, even manipulated, if necessary with a purpose to build a data consistent with the data required.
5. **Estimation and Interpretation of Results:** Once the required data are collected and the demand forecasting method is finalized, the final step is to estimate the demand for the predefined years of the period. Usually, the estimates appear in the form of equations, and the result is interpreted and presented in the easy and usable form.

Techniques of demand forecasting:

- **Regression method** is also one of the popular methods of predicting the future demand for the product.In this method the estimation of demand is done through the past data available as well as through the factors influencing the demand. We have seen how the demand for the product is affected by several factors. The demand function is stated with respect the factors influencing demand. Let's see what are the steps involved in regression method.

Variables detection: The first and foremost task is to recognise the variables that would impact the product for which demand forecasting has been undertaken. Let us consider a hypothetical example and state the demand function for a commodity Z.

$$Qd_Z = f(P_Z, Y, A, P_S, P_C,)$$

Where

Qd_Z= Demand for the commodity Z

Price of Commodity Z (P_Z)

Consumer Income (Y)

Advertising expenditure incurred on commodity Z (A)

Prices of Substitute (P_S)

Prices of Complement (P_C)

- Single regression : A model with a single independent variable is called a simple regression model.
- Multiple regression : It refers to a model with one dependent and two or more independent variables.

Time series forecasting

Time series forecasting is a set of methods in statistics and data science to predict some variables that develop and change over time. The underlying intention of time series forecasting is determining how target variables will change in the future by observing historical data from the time perspective, defining the patterns, and yielding short or long-term predictions on how change occurs – considering the captured patterns.

Time series is composed of trend, seasonal fluctuations, cyclic movements, irregular variations etc.

- If data available is quarter/month wise then we identify seasonal effect.
- If data available for long time then we identify trend cyclical pattern.

Data Smoothing Techniques

Data smoothing refers to a statistical approach of eliminating outliers from datasets to make the patterns more noticeable. It is achieved using algorithms to eliminate statistical noise from datasets. The use of data smoothing can help forecast patterns, such as those seen in share prices.

During the compilation of data, it may be altered to reduce or eliminate any wide variances or other statistical noises. Data smoothing helps traders or statisticians look at a lot of data – which can be complicated to process – to find trends or patterns they would've otherwise overlooked.

Such an approach uses simplified improvements to forecast various patterns better. It focuses on creating a basic direction for the main data points by avoiding any volatile pieces of data and drawing a smoother curve across data points.

- Data smoothing can be defined as a statistical approach of eliminating outliers from datasets to make the patterns more noticeable.
- The random method, simple moving average, random walk, simple exponential, and exponential moving average are some of the methods used for data smoothing.
- Data smoothing can help in identifying trends in businesses, financial securities, and the economy.

Data Smoothing Methods

The random method, simple moving average, random walk, simple exponential, and exponential moving average are some of the methods that can be used for data smoothing. The commonly used methods are discussed below:

1. Simple Exponential

The simple exponential method is a popular data smoothing method because of the ease of calculation, flexibility, and good performance. It uses an average calculation for assigning the exponentially declining weights beginning with the most recent observation. The method can be easily learned and applied.

The predictions are considered accurate since the difference between the real projections and what really happens is accounted for in the simple exponential approach. However, the method is not capable of managing trends well. Hence, it is used when cyclical variations are not present.

2. Moving Average

The moving average approach is best used when there is slight or no seasonal variation. Moving average data smoothing is used for separating random variation.

It is a simple data smoothing approach that economists use to help assess the underlying patterns in building permits and other volatile datasets. Moving average consolidates the month-long data points into time units longer than a month, such as an average of data of several months.

3. Random Walk

The random walk data smoothing method is commonly used for describing the patterns in financial instruments. Some investors think that the past movement in the price of a security and the future movements cannot be related. They use the random walk method, which assumes that a random variable will give the potential data points when added to the last accessible data point.

4. Exponential Moving Average

In the exponential moving average approach, weights are applied to historical observations after using the exponential smoothing method. It focuses more on the latest data observations. Hence, the exponential moving average responds faster to price changes than the simple moving average method.

Furthermore, the predictions only need the previous volatility prediction and the previous cycle price shift. The forecast is not needed to be recalculated using a long price returns history.

Smoothing Techniques

In situations where time series analysis does not work or lacks trends, smoothing techniques are used. They are facilitated to eliminate random variation from the historical demand. Guides with identifying demand levels and demand patterns used to predict future demand. Common demand forecast methods of smoothing technique are the weighted moving average method or simple moving average method.

Simple Moving Average Method:

It is determined by calculating the mean of average prices over a period and plotting them on the graph which acts as a scale. For example, the six-day simple moving average counts as the sum of all six days divided by six.

Weighted Moving Average Method:

It accounts for the use of a predefined number of periods to find out the average, all of which have the same significance. For example, in a four-month moving weighted average, every month represents 25% of the average.