

What is supply?

- Supply is the quantity of a product that producers are willing and able to provide at different market prices over a period of time
- It is what they provide from scarce resources available
- Through supply, producers are aiming to meet the unlimited wants of consumers

The Law of Supply

- According to the law of supply, the higher the price, the larger the quantity produced.



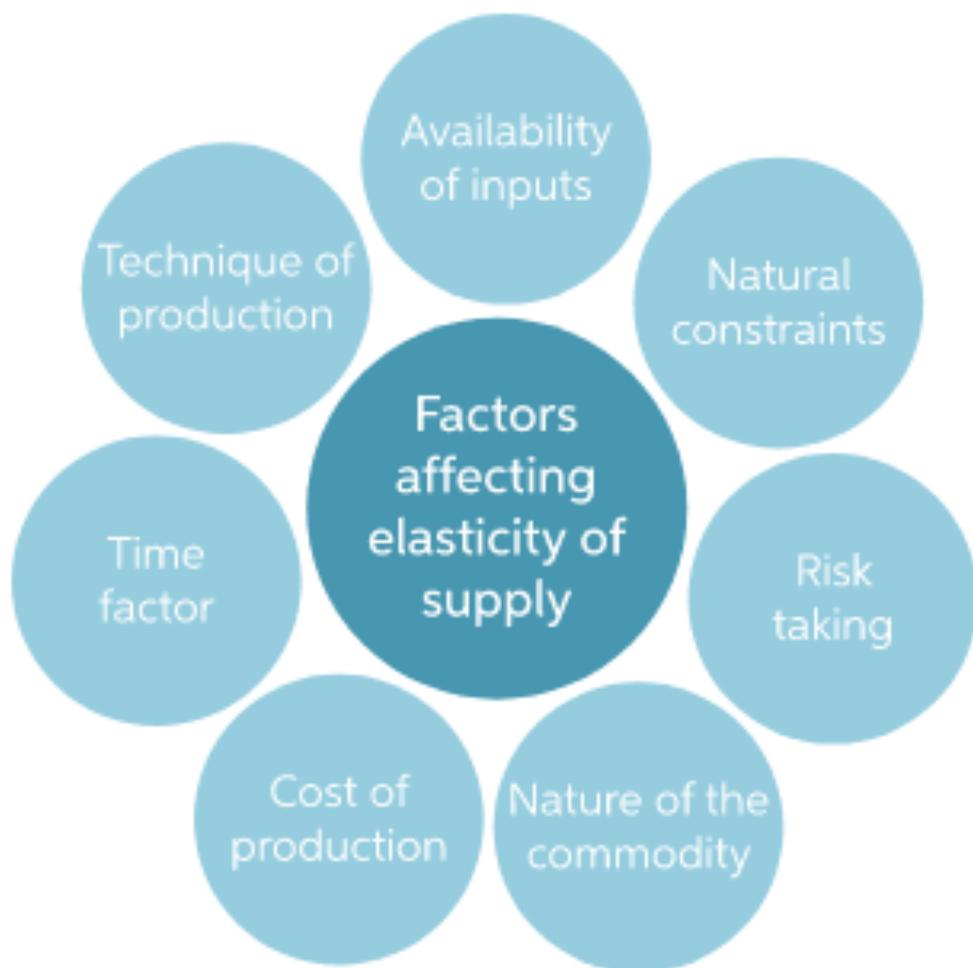
ELASTICITY OF SUPPLY – Meaning and its Types

It is a measure of change in supply of a commodity due to changes in other economic variables such as price of that commodity, the price of related goods, cost of production and sellers' expectations etc.

Tutor's Tips

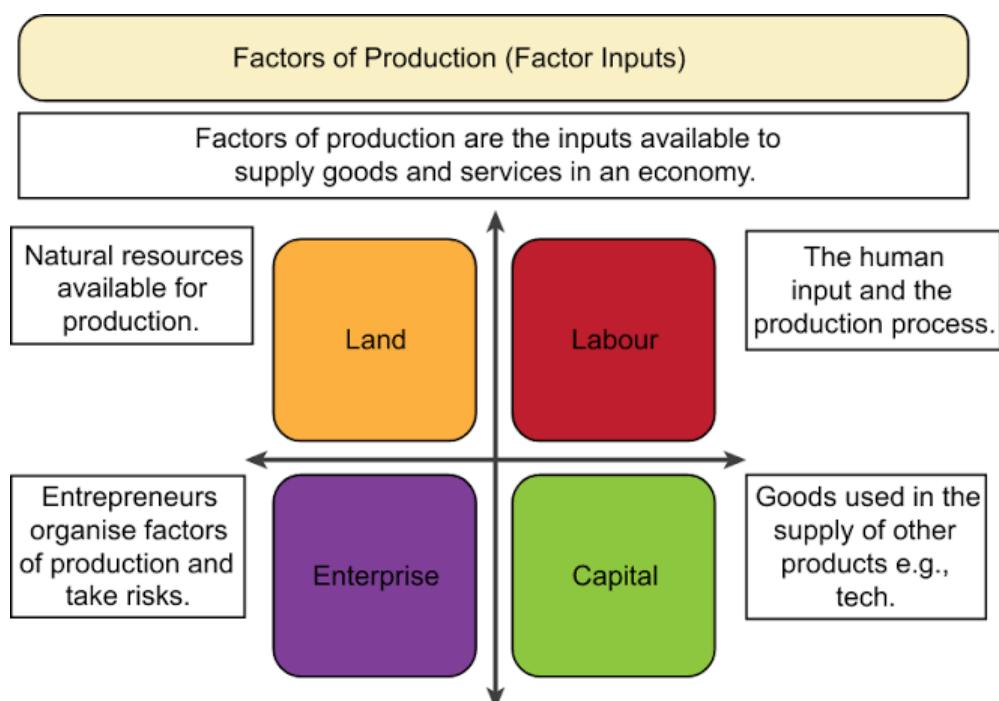
Types of Elasticity of Supply

- Perfectly Elastic
- Perfectly Inelastic
- Unitary Elastic
- Relatively Elastic
- Relatively Inelastic



Production Function

- Production function is defined as the transformation of physical input into physical output where output is a function of input.
- It can be expressed algebraically as;
$$Q = f(K, L \text{ etc.})$$
- Where,
- Q = the quantity of output produced during a particular period
- K, L etc. are the factors of production
- f = function of pr depends on.



What is the Law of Variable Proportions?

Imagine that a farmer is cultivating wheat only by using more and more labour in a circumstance where land is a fixed factor and labour is a variable factor. Here's a crucial query: Will the amount of wheat produced by each additional unit of labour used in the given area be equal? Will the MP of the labour remain the same for each and every new unit of labour used, in other words? Never say "maybe." It is not possible.

A country like India would have produced more and more wheat by employing more and more labour on the same piece of land if the MP of labour remained constant (regardless of how much labour is used). There would never have had a food shortage. The reality shows that MP must eventually decrease. The reason is simple: There is always some perfect ratio of the factors of production. The optimum ratio can only be maintained by adjusting L if L(Labour) and K(Capital) are both present and K is a constant. MP_L should be at its highest value to correspond to the optimal K:L ratio. But when the ideal ratio is reached, any increase in L would indicate overuse of the variable component. Alternately, it would imply decreasing fixed factor availability for every unit of the variable component. It could also refer to overusing the fixed factor. Therefore, MP_L must begin to decrease. It might eventually get to the point where adding a new labour unit (on the same land) has no effect on overall output. This implies that MP_L becomes zero. As previously stated, MP might even become negative in exceptional circumstances. This is how the Law of Returns or the Law of Varying Proportions works.

Returns to Factor: Law of Variable Proportions

Returns to a factor refer to the rise in the total product that results from increasing just one factor while holding the other factors constant. The production of the firm displays the Law of Variable Proportions in the short term when one input is variable, and the other inputs are fixed.

Statement of Law of Variable Proportions

The Law of Variable Proportions states that as we increase the quantity of only one input while keeping other inputs fixed, the total product increases initially at an increasing rate, then at a decreasing rate, and finally at a negative rate.

As per the law of variable proportions, the changes in TP and MP can be categorised into three phases:

Phase 1: TP rises at an increasing rate, and MP increases.

Phase 2: TP rises at decreasing rate, MP decreases and is positive.

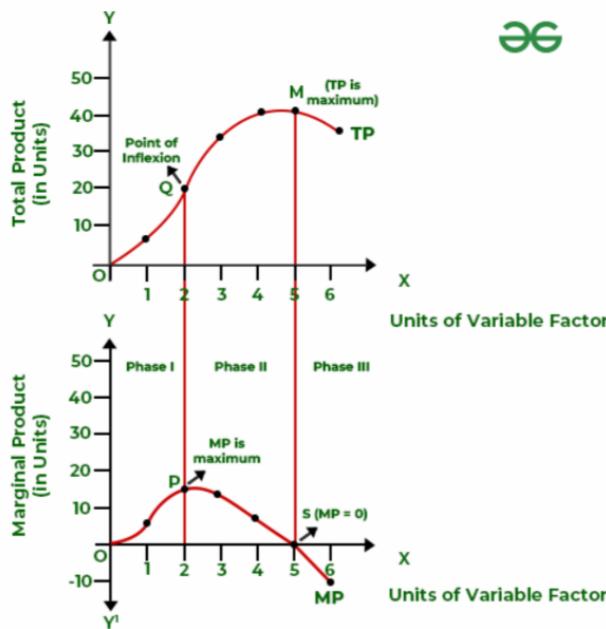
Phase 3: TP falls, and MP becomes negative.

Assumptions of the Law of Variable Proportions

1. It operates in the short run because the factors are categorised as variable and fixed.
2. The law is applicable to all fixed factors, including land.
3. The law of variable proportions allows for the combination of several variable units with fixed factors.
4. This law primarily applies to the production sector.
5. It is simple to calculate the impact of a change in output caused by a change in variable factors.
6. It is considered that after a certain point, factors of production become imperfect substitutes for one another.
7. In order for this law to function, it is assumed that the state of technology would remain constant.
8. All variable factors are thought to be equally effective.

For example, Let's say a farmer has 1 acre of land (i.e., fixed factor) and wants to use labour (i.e., variable factor) to improve the production of rice there. The output increased initially at an increasing rate, then at a decreasing rate, and finally at a negative rate as he employed more and more units of labour. The below table displays the output behaviour in this case.

| Fixed Factor | Variable Factor | TP (units) | MP (units) | Phase |
|--------------|-----------------|---------------|---------------|--|
| (Land) | (Labour) | | | |
| 1 | 1 | 5 | 5 | Phase I: Increasing |
| 1 | 2 | 20 | 15 | Returns to a Factor |
| 1 | 3 | 32 | 12 | Phase II: |
| 1 | 4 | 40 | 8 | Decreasing Returns to a Factor |
| 1 | 5 | 40 | 0 | Phase III: Negative Returns to a Factor |
| 1 | 6 | 35 | -5 | |



Phase I: Increasing Returns to a Factor (TP increases at an increasing rate):

In the initial stage, each additional variable component raises the total production by an increasing amount. This indicates that each variable's MP rises and that TP rises at an increasing rate.

- It occurs as a result of the initial variable input quantity being too small in comparison to the fixed input. Due to the division of labour, efficient use of the fixed input during manufacturing increases the productivity of the variable input.
- One labour generates 5 units, as shown in the schedule and diagram, whereas two labours produce 20 units. It means that MP rises until it reaches its maximum point at point P, which signifies the end of the first phase, while TP rises at an increasing rate (up to point Q).

Point of Inflexion: A point from where the slope of TP curve changes is known as point of inflexion. Till the point of inflexion, TP increases at an increasing rate, and from this point downwards, it increases at a diminishing rate.

Phase II: Decreasing Returns to a Factor (TP increases at a decreasing rate):

Every extra variable in the second phase increases the output by a less and smaller amount. This indicates that when the variable factor increases, MP decreases, and TP rises at a decreasing rate. This stage is known as the diminishing returns to a factor.

- This occurs as a result of pressure on fixed inputs that results in a decline in variable input productivity after a certain level of output.
- When MP is zero (point S), and TP is at its maximum (point M) at 40 units, the second phase comes to an end.
- The second phase is highly important because a rational producer will always try to produce during this time because MP and TP are both positive for each variable factor.

Phase III: Negative Returns to a Factor (TP falls):

The third phase shows a decline in TP due to the use of more variable factors. MP has now become negative. As a result, this stage is referred to as negative returns to a factor.

- It occurs when the amount of variable input exceeds the fixed input by a great difference, which causes TP to decrease.
- The third phase in the above graph begins after points S on the MP curve and M on the TP curve.
- In the third phase, MP for each variable factor is negative. Therefore, no company would deliberately decide to operate at this phase.

Phase of Operation

A logical or rational producer will always attempt to operate in Phase II of the Law of Variable Proportion at all times.

- Every additional unit of a variable factor used in Phase I results in an increase in production or marginal product. Therefore, if production is increased with more units of the variable factor, there is scope for greater profits.
- In Phase III, each variable's marginal product is negative. Therefore, this phase is eliminated due to technical inefficiency, and a rational manufacturer would never engage in the third phase of production.

This leads us to the conclusion that a producer will seek to operate in Phase II since the MP of each variable factor is positive and TP is at its highest level.

Reasons for Variable Proportions

The reasons for the three phases of the law of variable proportions are:

Reasons for Increasing Returns to a Factor (Phase I)

The operation of increasing returns to a factor is carried out for three key reasons:

1. More Effective Use of Fixed Factor: In the initial stage, a number of fixed factors are available, while there aren't enough variable factors. The fixed factor is therefore not completely utilised. The fixed factor is better used, and output increases at an increasing rate when the variable factors are increased and combined with fixed factors.

2. Increased Efficiency of Variable Factor: The variable factors must be increased and combined with the fixed factor, in order to use the former more efficiently. Besides, there is a high degree of specialisation and increased cooperation among the different units of the variable factors.

3. Fixed Factor Indivisibility: In general, fixed factors that are integrated with variable factors are not divisible. It means that these elements cannot be divided into smaller parts. As more units of the variable components are given, the utilisation of the fixed factor improves after an investment has been made in an indivisible fixed factor. As long as the ideal level of variable and fixed factor combination is attained, increasing returns is applicable.

Reasons for Decreasing Returns to a Factor (Phase II)

The occurrence of diminishing returns to a factor is due to these three key reasons:

- 1. Optimum Combination of Factors:** There is only one optimal combination between a variable and a fixed factor where the overall product is maximum. The marginal return of the variable factor begins to decrease after the fixed factor has been utilised to its fullest potential. **For instance**, if a machine (fixed factor) is being used to its full potential with 4 workers, adding a fifth worker will only slightly improve TP, and MP will begin to decline.
- 2. Over-utilization of Resources:** The fixed component finally reaches its limits and begins to produce diminishing returns as one continues increasing the variable factor.
- 3. Imperfect Substitutes:** Fixed and variable factors are imperfect substitutes for one another, which results in diminishing returns to a factor. There is an extent to which one factor of production can be substituted for another. **For instance**, until a certain point, capital may be used in place of labour or labour may be used in place of capital. Beyond a certain point, they start to lag behind each other and produce declining returns.

Reasons for Negative Returns to a Factor (Phase III)

The occurrence of negative returns to a factor is due to these three major reasons:

- 1. Limitation of Fixed Factor:** The reason why some production factors have negative returns is that they are fixed in nature and cannot be raised in the short run together with an increase in the variable factor.
- 2. Lack of Coordination:** When the variable factor dominates the fixed factor, they interfere with one another. It causes a lack of coordination between the fixed and the variable factor. As a result, total output falls rather than rises, and the marginal product becomes negative.
- 3. Decrease in Efficiency of Variable Factor:** The benefits of specialisation and the division of labour begin to diminish as variable factors continue to increase. It causes inefficiencies of variable factors, which is another element that finally leads to negative returns.

Law of Returns to Scale: Meaning and Stages

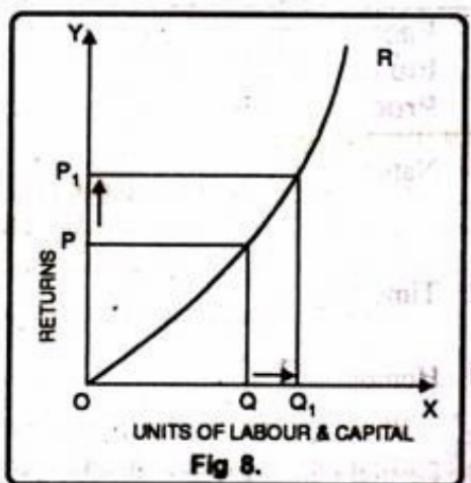
What is the Law of Returns to Scale?

Returns to scale refer to the change in output that results from a change in the factor inputs simultaneously in the same proportion in the long run. Simply put, when a firm changes the quantity of all inputs in the long run, it changes the scale of production for the goods.

1. Increasing Returns to Scale:

Increasing returns to scale or diminishing cost refers to a situation when all factors of production are increased, output increases at a higher rate. It means if all inputs are doubled, output will also increase at the faster rate than double. Hence, it is said to be increasing returns to scale. This increase is due to many reasons like division external economies of scale.

Increasing returns to scale can be illustrated with the help of a diagram 8.

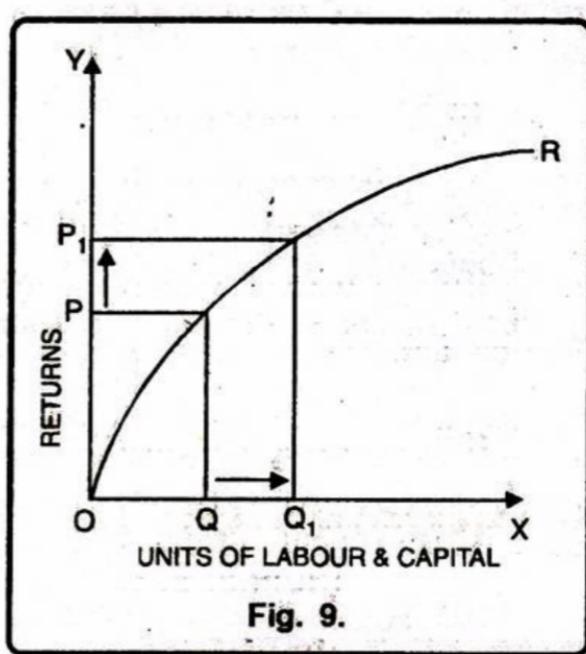


In figure 8, OX axis represents increase in labour and capital while OY axis shows increase in output. When labour and capital increases from Q to Q_1 , output also increases from P to P_1 which is higher than the factors of production i.e. labour and capital.

2. Diminishing Returns to Scale:

Diminishing returns or increasing costs refer to that production situation, where if all the factors of production are increased in a given proportion, output increases in a smaller proportion. It means, if inputs are doubled, output will be less than doubled. If 20 percent increase in labour and capital is followed by 10 percent increase in output, then it is an instance of diminishing returns to scale.

The main cause of the operation of diminishing returns to scale is that internal and external economies are less than internal and external diseconomies. It is clear from diagram 9.



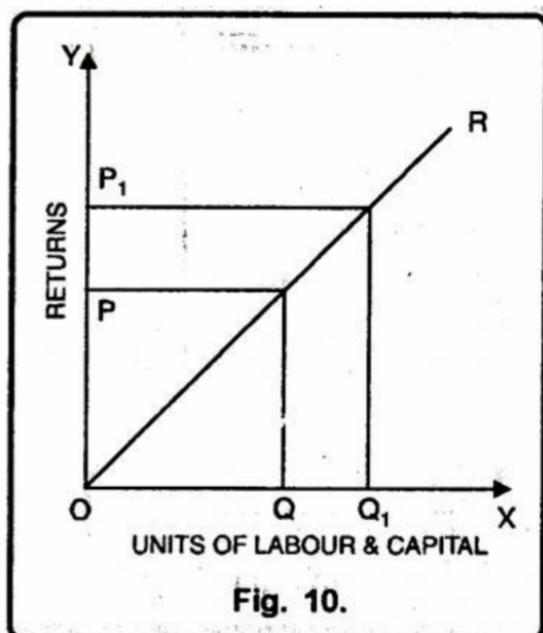
In this diagram 9, diminishing returns to scale has been shown. On OX axis, labour and capital are given while on OY axis, output. When factors of production increase from Q to Q_1 (more quantity) but as a result increase in output, i.e. P to P_1 is less. We see that increase in factors of production is more and increase in production is comparatively less, thus diminishing returns to scale apply.

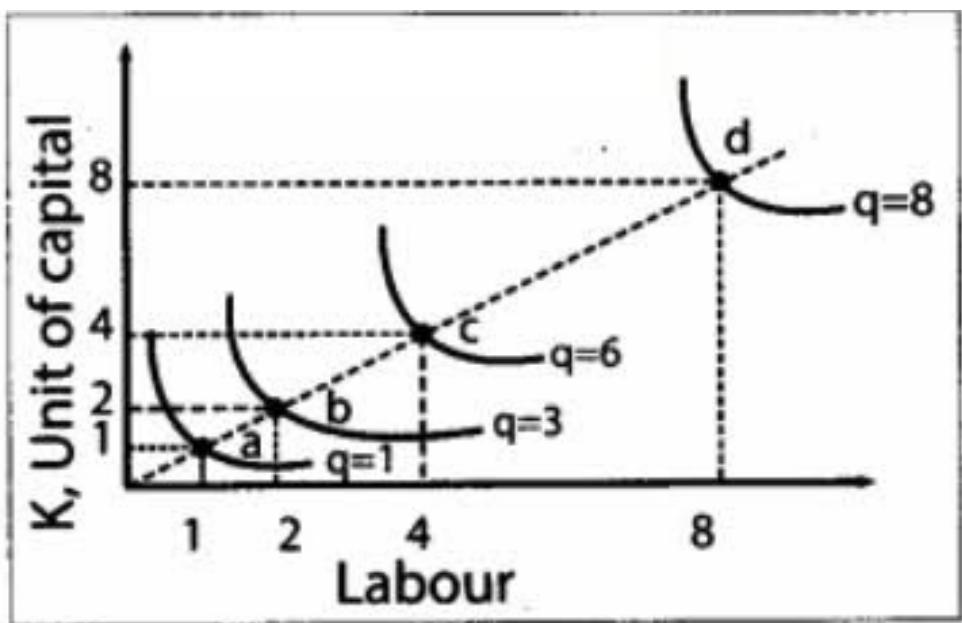
3. Constant Returns to Scale:

Constant returns to scale or constant cost refers to the production situation in which output increases exactly in the same proportion in which factors of production are increased. In simple terms, if factors of production are doubled output will also be doubled.

In this case internal and external economies are exactly equal to internal and external diseconomies. This situation arises when after reaching a certain level of production, economies of scale are balanced by diseconomies of scale. This is known as homogeneous production function. Cobb-Douglas linear homogenous production function is a good example of this kind. This is shown in diagram 10. In figure 10, we see that increase in factors of production i.e. labour and capital are equal to the proportion of output increase. Therefore, the result is constant returns to scale.

ADVERTISEMENTS:





| Stages | Input | Output | Returns to Scale |
|---------------|-----------------|-------------------|-------------------------|
| a to b | 100% \uparrow | 200% \uparrow | Increasing |
| b to c | 100% \uparrow | 100% \uparrow | Constant |
| c to d | 100% \uparrow | 33.33% \uparrow | Decreasing |

Types of Market Structure:

- 1. Perfect Competition-** There are large number of buyers and sellers selling homogeneous product and the price of the product is determined by the industry ,there are no barriers to entry and buyers have the perfect knowledge about the market.
- 2. Monopoly Market-** There is only a single seller of the product where firms have full control over the supply of the product, there is absence of entry of firms and no close substitutes are available.
- 3. Monopolistic Market-** It is a mid-way between perfect competition and monopoly, in this the number of buyers and sellers is relatively low, there is freedom of entry and exit of firms and buyers have no perfect knowledge about the market.
- 4.Oligopoly Market-** It is a market structure in which there are few sellers of a product selling identical or differentiated products, they relatively have small number of sellers with interdependence of the firms and there is difficulty in entry and exit of firms.