

Marginal Rate of Technical Substitution

The rate at which one factor has to be decreased in order to retain the same level of productivity if another factor is increased. The marginal rate of technical substitution is different than the marginal rate of substitution (MRS). MRTS focuses on producer equilibrium, while MRS focuses on consumer equilibrium.

$$\text{MRTS}(L, K) = -\frac{\Delta K}{\Delta L} = \frac{\text{MPL}}{\text{MPK}}$$

where:

K =Capital

L =Labour

MP=Marginal products of each input

$\frac{\Delta Y}{\Delta L}$ = Amount of capital that can be reduced when labour is increased

The slope of the isoquant indicates the MRTS or at any point along the isoquant how much capital would be required to replace a unit of labour at that production point.

A decline in MRTS along an isoquant for producing the same level of output is called the diminishing marginal rate of substitution. The figure below shows that when a firm moves down from point (a) to point (b) and it uses one additional unit of labour, the firm can give up 4 units of capital (K) and yet remains on the same isoquant at point (b). So, the MRTS is 4. If the firm hires another unit of labour and moves from point (b) to (c), the firm can reduce its use of capital (K) by 3 units but remains on the same isoquant, and the MRTS is 3.



