

# APPLICATIONS OF MATHEMATICS IN ECONOMICS - A STUDY

Mrs. A.S. Salunkhe,

D.P.Bhosale College Koregaon.

Mathematics used every where in the world . Mathematics plays an important role in Business and economics. Without *mathematics* one feels helpless in every aspect of economic relations So calculus plays a vital *role* in taxes, profit and revenue calculations which are very *important* for any *business* . In Economics there are two purposes to apply mathematics, one is the mathematical tools needed to make and understand economic arguments, the second one is, to make you comfortable talking about economics using the shorthand of mathematics. The application of mathematical techniques to the analysis of economic problems is a methodological possibility. This technique often called as Mathematical economics. This Mathematical economics is the application of mathematical methods to represent theories and analyze problems in economics. Mathematics allows economists to form meaningful, testable propositions about wide-ranging and complex subjects which could less easily be expressed informally. Differentiation: Rate measurer: most of the economic decisions are based on mathematical concepts "Derivatives". Slope: Graphically the value of  $dy/dx$  is the slope or gradient of a curve. Parabola: quadratic Function or second Degree function is yet another mathematical concept. The graph of this function is a parabola. Functions : A mathematical function describes the relation between two or more than two variables

The purpose of this paper to study basic mathematical instruments that are commonly used in all fields in economics - microeconomics, macroeconomics, econometrics

**Key words:** Mathematics, Business and Commerce, Business Mathematics.

## Introduction :

Mathematical economics is a model of economics that utilizes math principles and methods to create economic theories and to investigate economic quandaries. Mathematics permits economists to conduct quantifiable tests and every academic subjects have its own standards by which it judges the merits of what researchers claim to be true. In Economics there are two purposes to apply mathematics, one is the mathematical tools needed to make and understand economic arguments, the second one is, to make you comfortable talking about economics using the shorthand of mathematics. Use of Mathematics helps in systematic understanding of the relationship and in derivation of certain results which would either be impossible through verbal argument, or would involve complex, tedious and difficult processes. Mathematics now a day a very important tool used in economic analysis. Use of mathematics gives a better understanding about different economic . The application of mathematical techniques to the analysis of economic problems is a methodological possibility. This technique often called as Mathematical economics. This Mathematical

economics is the application of mathematical methods to represent theories and analyze problems in economics.

### Objectives of the Study

1. To study the application of Mathematics in Economic theory concepts.
2. To observe the different use of Mathematical tools in the research of economics.

**Methodology :** The author refers the articles, Books, Journals and Websites. The use of Mathematical techniques and tools in economic theoretical concepts are explained through illustrations

### Some Application of Mathematics in Economics:

a) **Functions :** A mathematical function describes the relation between two or more than two variables. That is, a function expresses dependence of one variable on one or more other variables. Thus, if the value of a variable  $y$  depends on another variable  $x$ , mathematically we may write:

$$y=f(x)$$

The above expression implies that every value of the variable  $y$  is determined by a unique value of the variable

In the function (1)  $y$  is known as the dependent variable and  $x$  is the independent variable.

In economics Demand is a function of price and production is a function of factors of production. In usual language we say that demand ( $D$ ) depends on the price,

b) **Differentiation:** Rate measurer: most of the economic decisions are based on mathematical concepts "Derivatives" this process is called "marginal analysis". The concept of "margin" is a basic concept in economics For example if the total utility function  $U=f(Q)$  then the marginal utility is the first order derivative of the total utility function i.e.  $du/dq$ . Similarly all marginal concepts such as marginal productivity, marginal revenue, marginal cost, marginal rate of substitution (MRS), marginal propensity to consume (MPC), marginal propensity to save (MPS) are the first order derivatives of the relevant functions. In short, differentiation is helpful to derive the marginal functions from the total functions.

c) **Slope:** Graphically the value of  $dy/dx$  is the slope or gradient of a curve. This technique is used in economics, to know the "rate of change" or the "slope" of the curves like demand curves, revenue curves, cost curves, indifference curves

d) **Parabola:** quadratic Function or second Degree function is yet another mathematical concept. The graph of this function is a "parabola" i.e U shaped. This technique is applied in Economics in cost "functions" since, cost curves in economics are U shaped

**Economics is a social science.** It does not just describe what goes on in the economy. It attempts to explain how the economy operates and to make predictions about what may happen to specified economic variables if certain changes take place, e.g. what effect a crop failure will have on crop prices, what effect a given increase in sales tax will have on the price of finished goods, what will happen to unemployment if government expenditure is increased. It also suggests some guidelines that firms, governments or other economic agents might follow if they wished to allocate resources efficiently. Mathematics is fundamental to any serious application of economics to these areas. Applications of Mathematics in Economics presents an overview of the (qualitative and graphical) methods and perspectives of economists. It provides concrete form to economic laws and relationships and made more practical.

## Conclusion :

- Without the use of mathematics economical concepts are incomplete.
- To understand economics properly we need to use mathematics in each point.
- With the use of mathematical techniques, economical concepts are understood in such a way that one can grow their interest in the subject

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