

Use of Mathematics in Economy (Mathematical Tools in Analyzing Economy)

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Abstract:-- As mathematics is the area which is widely used in almost all the areas of the life. Our main aim here is to know where still we are lagging in using the mathematics for economic analysis as it is very important topic of the current period. So on that contribution of mathematics to the area of economy is considerable. In this paper we will pass the light on the tools which are vastly used in finding the factors related to the economy and also to analyse the economy. There is discussion on how these tools helps in finding the factors (GDP, Interest Rate, Inflation, Repo Rate, Reverse Repo Rate etc.) and analysing the economy. Here we are also going through the drawbacks in the mathematical tools (Forecasting using Statistical methods such as Means, Regression Correlation, Percentages, Graphical Methods) while using in analysis. Finally, we will discuss and analyse the improvements need to increase the accuracy of the results and to reduce the mistakes in the results of the economic factors which are part of economic analysis.

INTRODUCTION

An economy is a system of organizations and institutions that either facilitate or play a role in the production and distribution of goods and services in a society.

A country economy depends on some factors they are: -

1) Institutions

Concepts related to protection of property rights, efficiency and transparency of public administration, independence of the judiciary, physical security, business effect and corporate governance.

2) Innovation

Capacity for and commitment to technological innovation.

3) Infrastructure

Quality and availability of transport, electricity and communication infrastructures.

4) Business Sophistication

Efficiency and sophistication of business possess in the country.

5) Market Size

Size of the domestic and export market.

6) Health and primary Education

State of public health, quality and quantity of basic education.

7) Higher education and training

Quality and Quantity of higher education and quality and availability of on-the-job training.

8) Goods market efficiency

Factors that drive the intensity of domestic and foreign competition and demand condition.

9) Labour market efficiency

Labour market efficiency and flexibility, meritocracy and gender parity in the workplace.

10) Financial market development

Efficiency, stability and trustworthiness of the financial and banking system

To know the above all terminologies of economy the role of mathematics is very important where it helps in finding all the above factors and also it helps to know the position of the economy in terms of statistics. So for that we have several mathematical tools which helps for the same which we are going to see below how mathematics helps economists in making their work done.

USAGE OF MATHEMATICS IN ECONOMICAL ANALYSIS

GROSS DOMESTIC PRODUCT(GDP)

GDP or gross domestic product is the market value of all final goods and services produced in a country in a given time period.

Calculation of GDP (by Expenditure Approach)

$$GDP = C + I + G + (X-M)$$

C = consumer spending

I = investment

G = government spending

X = exports
M = imports

Calculation of GDP (by income Approach)

$$GDP = COE + R + I + P + C + T + D + N$$

COE = compensation of employees

R = rent

I = interest

P = proprietor’s income

C = corporate profits

T = indirect business taxes

D = depreciation

N = net factor income

Consumer Price Index (CPI)

The consumer price index (CPI) is a measure of the overall cost of the goods and services bought by a consumer.

Calculation

$$CPI = (\text{Product price in current year} / \text{product price in base year}) \times 100$$

Example

Calculating the CPI of the expenses of the student on education taking 1990 as a base year.

Expenses	1990	1995
Tuition Fees	15000	20000
Hostel	5000	7500
Food	2500	4000
Personal	4000	7000

$$CPI = (\text{Product price in current year} / \text{product price in base year}) \times 100$$

$$CPI = (\text{Expenses in 1995} / \text{Expenses in 1990}) \times 100$$

$$CPI = (38500 / 26500) \times 100$$

$$CPI = 145.28$$

INFLATION

Inflation is the rate at which the general level of prices for goods and services is rising and, consequently, the purchasing power of person will lay down.

Steps for finding Inflation

- Look the average prices of the several products across a few years.
- Get the consumer price index.
- Choose the time period for which the inflation has to be calculated.
- Find out the consumer price index of your earlier state and your later date.

Calculation

$$INFLATION = (\text{Current CPI} - \text{Historical CPI}) / \text{Current CPI} \times 100$$

REPO RATES

- Repo rate is the rate at which the central bank of a country (RBI in case of India) injects money into the financial system or lend money to the bank.
- As fixation of repo rate depends on inflation and the availability of money in the system which can be found through mathematical tools only such as percentage, sum of terms

REVERSE REPO RATES

Reverse repo rate is the rate at which the central bank of a country (RBI in case of India) borrows the money from the cooperative banks. Here the fixation of interest rate to the money borrowed from the banks depends on the total investment in the banks by the people so based on that central bank of the country borrows some amount from the banks as security to the customers which is again calculated by using mathematical tools.

Applications of Mathematical model in forecasting

As forecasting is part of economic activity in any country to know the future development in any field like employability, output of industries, forecasting of rain or agriculture output etc.

Overall GDP can also be forecasted to plan the future steps to be taken if necessary. Even any countries budget will be prepared by using forecasted figures only. So for all this forecasting is so much important. Now to do forecasting depending on the situation, we use different mathematical methods to forecast in terms of statistical figures. Such as Regression method, correlation and different types of means.

DRAWBACKS OF MATHEMATICAL MODELS

Mathematical knowledge can just describe the economic phenomenon but cannot explain it. In easy words, it describes what has been observed not what will be observed, so it lacks predictive power, which is the core of the “Positive Economics”. As the ultimate goal of positive economics is the development of a theory that yields valid and meaningful predictions about the phenomenon not yet observed. By using mathematics, we can only find the present and future events in terms of figures but it won’t be possible to give explanation to the situation. It makes difficult to understand without explanation and also analysis of the economy is

incomplete as mathematics use only quantitative terms rather than qualitative terms which makes difficult to analyse the economy.

SUGGESTIONS FOR EFFECTIVE UTILISATION OF MATHEMATICS IN ECONOMY

Improvements in the tools are required such that self-explanation should be done by the figures which are found by using mathematics so that it will be helpful in analysing the situation or economy. In mathematics while finding the present and future events it is very much important to involve both qualitative and quantitative terms so that which will help not only to know the situation but also to analyse and understand the economy. Based on this if we improve mathematical tools which will help in taking the steps to improve the economy depending on the situation.

CONCLUSION

For any country it is very much important to know the condition of the economy and the dependent factors as the country's strength can be analysed by using economical position only (GDP, Inflation, Job rate, industrial growth, agriculture output, export and import etc.) but to know all this so we were using several mathematical tools. But still we are not so accurate in finding the figures and analysing the factors predicting the future and also the overall economy is still complex and not able to understand as our mathematical tools not so efficient in analysing the economy accurately. So we have passed light on some of those areas as we can't cover all the areas as it is very vast.