

Inflation rate analysis and predictions of Bangladesh using Monte Carlo Simulation

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Abstract—The Monte Carlo method is based on the idea of repeatedly sampling random numbers from a given probability distribution and using these numbers to simulate the behavior of a system. By running the simulation many times, the method can estimate the probability distribution of the system's outputs, and provide insights into the range of potential outcomes and their associated probabilities. In this project, I have shown inflation rate analysis of Bangladesh using numpy, pandas and seaborn library of python on a dataset that has data on the inflation rate from 1980 till 2019.

Index Terms—Tentative Keyword 1. Inflation rate 2. Simulation 3. Probability

I. INTRODUCTION

The rate at which the price of goods and services increases over time is known as inflation. Inflation is also described as a decline in the value of a particular currency. When inflation occurs, consumers may make fewer purchases with the same amount of money than they previously could. When an economy's money supply expands more quickly than its ability to produce goods and services or when demand exceeds supply, inflation results. This results in a decline in the currency's value, which might raise the price of consumer products. There are numerous unknowns in life. Whether it will be sunny on someone's wedding day is something we can't say for sure. We have no idea how much money we will make from the stock we buy. The future trajectory of property prices is unknown to us with certainty. There are a number of causes for uncertainties. For instance, they can result from incomplete information or a complicated system where a small change in one factor can have a big impact on the ultimate result. Despite these uncertainties, we can still calculate the likelihood that various scenarios will occur. By creating models using random samplings, Monte Carlo simulations are a strategy to simulate the uncertainties. Probability distributions are used to model the uncertainty. Because we are working with stochastic (random) processes, a typical simulation involves repeatedly doing the calculations. A Monte Carlo simulation could entail thousands or tens of thousands of calculations, depending on the amount of uncertainties and the parameter ranges supplied by the model. Distributions of potential outcomes are generated by the simulation, and they can subsequently be used to produce meaningful statistics. Professionals from a variety of disciplines, including banking, insurance, science, and engineering, frequently employ the Monte Carlo method.

II. RELATED WORDS

In particular, the Carlson and Parkin (1975) method is discussed in this study along with the measurement error of conversion methods used to transform survey data to a quantitative index. We frequently have to rely on survey data and transform it into a quantitative index when we wish to summarize economic circumstances using a numerical number. Survey data undoubtedly contain a specific inaccuracy, though, because survey research limits responses to certain classes and respondent response density may not be consistent. [1] In this study, regression analysis and Bayesian inference were used to produce more precise inflation rate predictions for the Romanian economy. The National Bank of Romania's inflation targeting policy and the fulfillment of the economic requirements for membership in the eurozone both call for the use of the most accurate inflation rate projections possible. In this article, they blended multiple projections from different models utilizing prior information, expectations of experts, on the basis that basic econometric models produce better forecasts than complex ones. [2]

III. RESEARCH METHODOLOGY

I have used a dataset which contains GDP, GDP per capita, inflation rate and many parameters from year 1980 to 2019. Using pandas processed the data and visualized graph of the transition of inflation rates in the 40 years. After that constructed a monte carlo simulation model that predicted what can be the inflation rate after the year 2019. Here, the technique is divided into multiple steps. For constructing the modelling we have to setup a probability of distribution for important variables. Secondly, building a cumulative probability distribution for each variable. Then establishing an interval of random numbers for each variable and finally simulating a series of trials.

IV. RESULTS

After running the model The Bangladesh inflation rate forecast for 2020 I've got is 3.11 percent and standard error of sample mean is 0.028 percent. 50000 random paths have been generated after running the simulation. For pre-processing the data I've got the result for The monthly volatility of the inflation rates is: 1.734 percent, The annualized volatility of the inflation rates is: 6.007 percent, The spot GDP per capita

as of the valuation date is: 500.0 and The real risk free rate is: 0.573 percent.

A. Discussion

The Monte Carlo model is a complex model where we need to use the correct variable to calculate the results. Without having proper variable in the formula the result can get error. Considering the advantages the Monte Carlo Simulation is a strong way of estimating uncertainty. Given the correct boundaries this model can survey the parameter space of problem and the approach of the model can easily be understood. But the limitation of this model is that it is computationally inefficient since it takes a long time and numerous computations to approximate a solution when there are many variables limited by distinct constraints. In this regard we need higher specified PC to run this model. Secondly, bad inputs of parameters and restrictions will result in bad outputs from the model.

V. CONCLUSION

This model can be useful for risk and uncertainty analysis and decision making. It furnishes the decision maker with a range of possible outcomes and the probabilities they will occur for any choice of action. Today's application for Monte Carlo methods include cancer therapy, traffic flow, Dow-jones forecasting, and oil well exploration, as well as more physics application like stellar evolution, reactor design and quantum chromo dynamics.

REFERENCES

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