Game Theory: Indian Economy

Assignment 3

(Exploratory task)

Augmented Gravity Model for Inter-State Trade Relations

Please note this is an Exploratory task and doesn't require submission to be ratified,but we still encourage you to go through the assignment and try doing it in R/MATLAB/Python so that you get something finally about Augmented Gravity Model.

Problem 1

Prepare a trade analysis for inter-state trade in India using the augmented gravity model. Obtain a dataset containing trade values between Indian states, GDP of each state, and distances between state capitals. Clean the dataset by handling any missing values appropriately and merging the trade data with GDP and distance data to create a unified dataset. Ensure the necessary columns (State1, State2, TradeValue, GDP1, GDP2, Distance) are present. Use this prepared data for the subsequent problems.

Problem 2

Implement the gravity model for inter-state trade in India. Specify the model as follows:

LnXij =LnGDPi+LnGDPj+LnDistanceIj+(ANY OTHER FACTOR)

where XijX_{ij}Xij is the trade value, GDPi,GDP_i,GDPi and GDPj,GDP_j,GDPj are the GDPs, and Distanceij,Distance_{ij},Distanceij is the distance. Use linear regression to estimate the coefficients of the model. Log-transform the trade values, GDPs, and distances before estimation. Summarize and interpret the estimated coefficients to understand the influence of GDP and distance on trade values.

Problem 3

Visualize and analyze the results of the gravity model. First, calculate and plot the predicted trade values against the actual trade values to assess the model's accuracy. Then, plot the trade values against distances to analyze the relationship between distance and trade. Finally, create visualizations such as heat maps or network graphs to visualize trade flows between states, identifying any regional trade patterns or anomalies. Summarize your findings and discuss any interesting insights from the analysis.