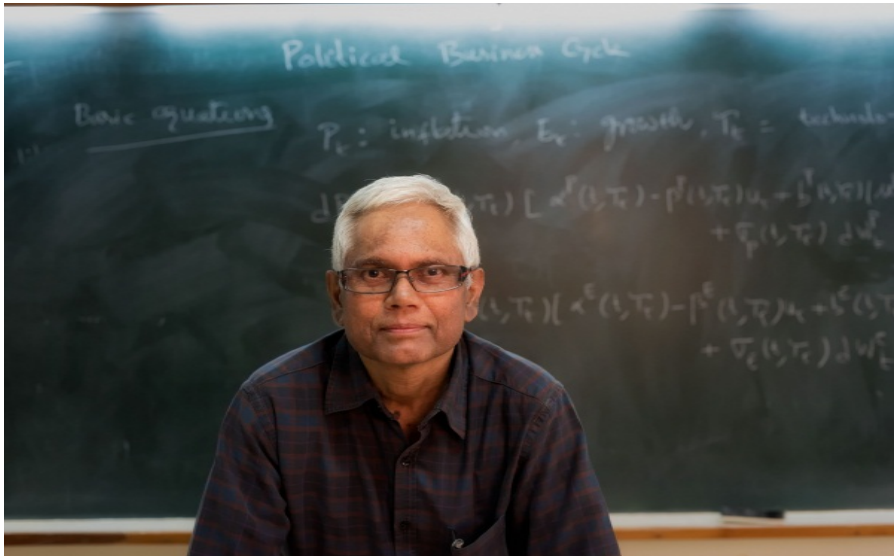


MRINAL GHOSH (Professor, Department of Mathematics)

HOW TO BEAT ANTI-INCUMBENCY



As an election approaches, most ruling political parties, unsurprisingly, try to stimulate the economy for short-term gains. Elections, therefore, cause an economic pattern known as the political business cycle. This phenomenon is described by models which are typically deterministic—they consider the average value of the inflation in their equations. A more realistic mathematical model has been developed by Mrinal Ghosh and his collaborators, one which considers inflation as having a fluctuating value, given by a stochastic differential equation.*

A more realistic mathematical model of the political business cycle has been developed by Mrinal Ghosh and his collaborators

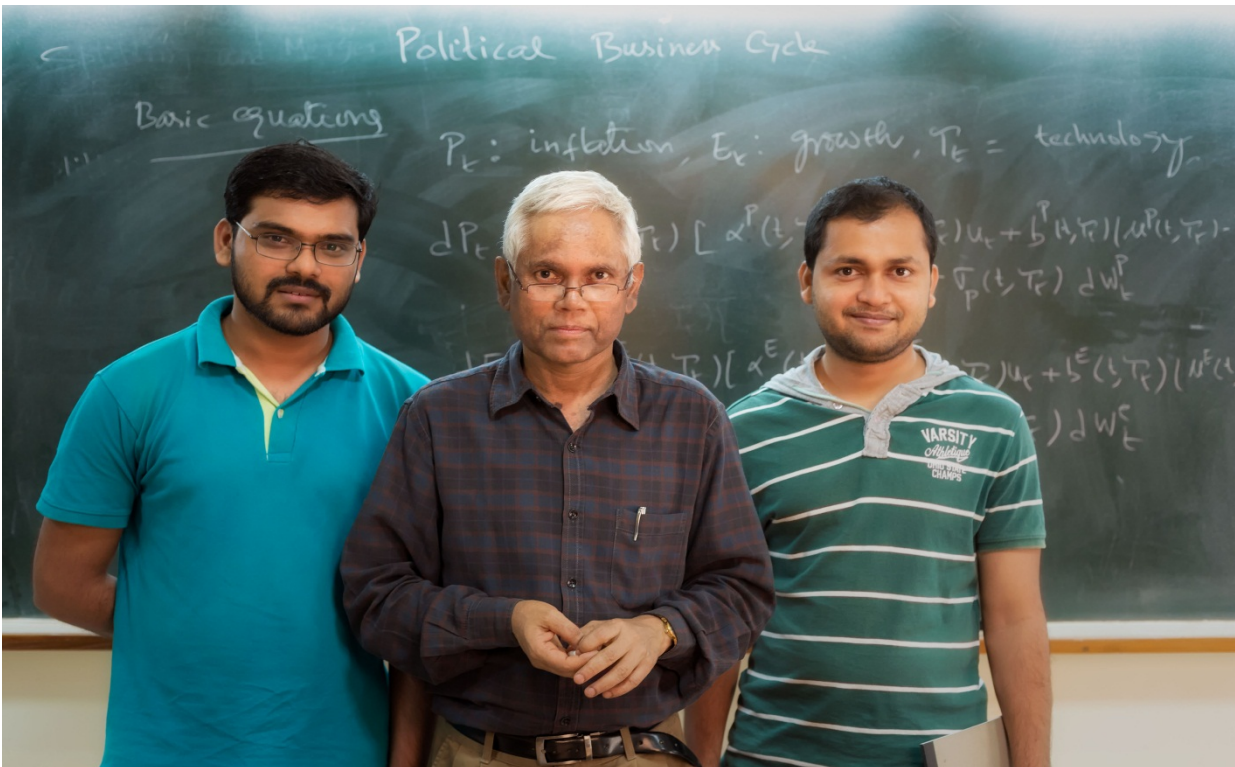
In this model, besides inflation, the other macroeconomic variable of importance is the unemployment rate. But these two variables are not independent. “Suppose you curb unemployment too much, inflation will go up—because people will have more money. And then the government pays a price for that,” says Ghosh. In their model, this is encoded using a “cost” function; and minimizing the cost is the objective.

The model can then be analyzed using the techniques of stochastic control theory, which is Ghosh’s area of expertise. In the broader field of optimal control theory, the idea is to control a system using feedback in order to optimize its output. In the above model, the unemployment rate is the feedback in the control process.

Working out the implications, Ghosh and collaborators found that controlling the unemployment rate is most crucial if a party is to remain in power. Their model also allows for a special case—

dubbed “perfect myopia”—which, as is sometimes the case in the real world, implies that only those policy decisions announced just before elections have any impact in shoring up voter support.

Ghosh has been applying stochastic methods to mathematical finance for about a decade now. But at college, he was more interested in chemistry than mathematics. Until, that is, he started his PhD, in 1984, at the TIFR Bangalore Centre. “I certainly don’t regret leaving chemistry to take up mathematics,” he says.



*Gopal K Basak, Mrinal K Ghosh, and Diganta Mukherjee. 2016. A mean-reverting stochastic model for the political business cycle, *Stochastic Analysis and Applications*. 34(1):96-116.