Title: Econometric Modelling of Carbon Dioxide Emissions and Concentrations, Ambient Temperatures and Ocean Deoxygenation

Speaker: Alok Bhargava, University of Maryland

Area: Economics

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Abstract:

This paper analysed several longitudinal data sets for investigating the dynamic inter-relationships between CO2 emissions and atmospheric concentrations, ambient temperatures and ocean acidification and deoxygenation. The methodological framework addressed issues such as the use of temperature 'anomalies', diffusion of CO2 to atmospheric stations, distributional misspecification and non-stationarity of errors affecting empirical models, and use of spline functions for modelling trends in temperatures. Longitudinal data on CO2 emissions for 163 countries and atmospheric CO2 concentrations at 10 stations, ambient temperatures from over 8,500 weather stations and seawater composition from over 380,000 oceanographic stations were analysed for 1985–2018 by estimating dynamic random effects models using maximum likelihood methods. The main findings were that CO2 emissions exhibited rapid upward trends at the country level, while minimum and maximum temperatures showed cyclical patterns; economic activity and population levels were associated with higher CO2 emissions. Second, there were gradual upward trends in annual and seasonal temperatures compiled at weather stations, and atmospheric CO2 concentrations were significantly associated with higher temperatures in the hemispheres. Third, there was a steady decline in dissolved oxygen levels, and the interactive effects of water temperatures and pH levels were significant. Overall, the results underscore the benefits of reducing CO2 emissions for ambient temperatures and for ocean deoxygenation. Synergies between CO2 emissions, ambient temperatures and ocean acidification are likely to exacerbate the melting of polar ice.

Speaker Profile:

Alok Bhargava received his PhD in econometrics in 1982 from the London School of Economics. Dr. Bhargava has taught at University of Pennsylvania, Harvard University, University of Paris, and University of Houston. His research has applied econometric methods for tackling complex policy issues in economic development, health, nutrition, child development, AIDS, obesity, environmental sciences, climate change, and corporate finance. Most of his research articles have been published in top tier academic journals in disciplines such as economics, anthropology, nutrition, psychology, and health sciences.

Dr. Bhargava has advised international agencies such as the World Bank, International Food Policy Research Institute, Organization for Economic Cooperation and Development, US Department of Agriculture, Centers for Disease Control and Prevention, and National Institutes of Health.

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