



# THE UNIVERSITY OF CHICAGO

Department of Statistics

## MASTER'S THESIS PRESENTATION

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Modeling Economic and Environmental Time Series in Three East  
Asian Countries

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Jones 304, 5747 S. Ellis Avenue

### ABSTRACT

The time series of gross domestic product (GDP) per capita and carbon dioxide (CO<sub>2</sub>) emissions per capita for Japan, South Korea and the People's Republic of China are modeled for the period between 1960 and 2010. The series' stationarity and relative distribution are first assessed to establish the applicability of an autoregressive integrated moving average (ARIMA) model. Log transformations to stabilize skewness and an order of differencing are taken to achieve weak stationarity. ARIMA models are then fitted, with terms added stepwise until residual serial correlation is eliminated. A grid search over different combinations of autoregressive and moving average terms is conducted using the Akaike Information Criterion (AIC) as a metric to assess goodness of fit while penalizing for complexity. An algorithmic detection of outlier effects is also implemented to locate different types of outliers in the series.

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