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Venus Khim-Sen Liew

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Performances of Various Order Selection Criteria for Autoregressive Process

Venus Khim-Sen Liew
Faculty of Economics and Business, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia.
Email: ksliew@unimas.my

Abstract
In most economic researches, the selection of autoregressive order based for an economic time series is an essential task. Specifically, many econometric testing procedures, for instance, all forms of linearity, unit root, cointegration and causality tests, require the determination of optimal lag length selection in the first place. This study investigates the performances of various order selection criteria in selecting order of autoregressive (AR) process via a simulation study. Some 1000 independent time series for each AR process of known orders are first simulated and then subjected to lag length selection using various order selection criteria. The major findings of this study are as follows: First, the performance of various criteria in correctly estimated the true AR order deteriorates as the order grows. Second, the performance of various criteria in correctly estimated the true AR order improves as sample size grows. Third, Akaike's information criterion family (AICC, AIC) and final prediction error (FPE) are superior to other criteria for sample of size not exceeding 150 observations. Fourth, Hannan-Quinn criterion (HQC) performs better than others for sample size larger than 150 observations. Fifth, Schwarz information criterion (SIC), and Bayesian information criterion (BIC) could be useful in cases whereby a parsimony order, rather than true order is of interest; while Akaike's information criterion (AIC) and final prediction error (FPE) are better options to avoid autocorrelation in our ultimate results.
Keywords: Autoregressive Process, Autoregressive Order, Order Selection Criteria, Simulation

Introduction

Autoregressive (AR) process is a very simple but useful process in the study of the behaviour of a time series. A time series is said to be generated by an AR process if its current value is a function of its own lagged (or past) values. AR process is widely applied in economic studies as most of them are conducted using time series data. It is worth pointing out that the very first thing in the application of AR process is the determination of AR order. In this respect, an AR process of order p refers to a time series in which its current value is dependent on its first p lagged values and is normally denoted by AR (p). However, in real observations, the AR order p is always unknown and therefore has to be estimated somehow. Various order selection criteria have been proposed