Use of Unobserved Components Model for Forecasting Non-stationary Time Series: A Case of Annual National Coconut Production in Sri Lanka

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ABSTRACT: *Forecasting a time series is generally done by using autoregressive integrated moving average (ARIMA) models. The main drawback of this technique is that the time series should be stationary. In reality, this assumption is rarely met. The Unobserved Component Model (UCM) is a promising alternative to ARIMA in overcoming this problem as it does not make use of the stationary assumption. In addition, it breaks down response series into components such as trends, cycles, and regression effects, which could be useful especially in forecasting the production of perennial crops. The present study was aimed at using UCM for annual national coconut production data from 1950 to 2012, which is non-stationary, and to forecast the coconut production in Sri Lanka. Results revealed that both the trend components, level and slope, have non-stochastic processes. Further, it revealed that the level was significant (p=0.0001) and slope was non-significant (p>0.1). The linear trend model zero variance slope was found to be the best fit for the data with 11.3 years of estimated period of the cycle. The forecasted error for 2011 and 2012 were 1.08% and 1.69%, respectively. From the fitted model, predicted annual coconut production for 2013 was 2739.1 million nuts and the 95% CI is 2048.7 to 3429.5 million nuts. Thus, the use of UCM is recommended for annual data series, too.*

Keywords: *Non stochastic process, predicted production, trend components*

INTRODUCTION

Box Jenkins and to a limited extent the exponential smoothing techniques are commonly used in the analysis of time series in agriculture. Main drawbacks in these models are that, they are suitable only for the stationary series (Box *et al.,* 1994), empirical in nature and fail to explain the underlying mechanism. It is not always possible to create a time-series stationary by differencing or by some other means. Hence, this approach could be limited to few data sets. Also, correlogram and partial auto correlation function specifying the models are not always very informative, especially in small samples. This could lead to inappropriate models and predictions.

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