MODELLING SECTORWISE ELECTRICITY DEMAND IN SRI LANKA USING VECTOR ERROR CORRECTION ANALYISIS

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Dissertation submitted in partial fulfillment of the requirement for the degree of Master of Science

Department of Mathematics
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DECLARATION

"I declare that this is my own work and this dissertation entitled "Modelling sector-wise electricity demand in Sri Lanka using Vector Error Correction analysis" does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any University or other institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text".

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"We assure that to the best of our knowledge, the information given above is true and correct."

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ABSTRACT

Electricity demand in Sri Lanka is mainly categorized into three main sectors as Domestic, Industrial and Commercial and the factors affecting on electricity demand may vary from sector to sector. Various methods have been developed to predict electricity demand for sector wise by many authors. The objective of this study is also model the sector wise electricity demand considering the quarterly data of Gross Domestic Product (GDP), Exchange Rate (USD) and Electricity Price (X1) (1994-2007) using Vector Error Correction analysis.

Dickey Fuller test confirmed that each series were non stationary. The Granger Causality test was applied to find the direction of causality between electricity demand (Y_t) in each sector and GDP, USD and X1. Cointegration test is used to identify linear combination of the integrated series for which is the best define for long run equilibrium relationships between the variables. Three separate VEC models were identified for each sector. By using the plots of histogram, Autocorrelation Function (ACF) and Augmented Dickey Fuller Test (ADFT) confirmed and that the errors of each models as random. Further, it was found each model less than 5% Mean Absolute Percentage Error for the data used.

Three main factors are identified as the significant contribution to electricity demand in Sri Lanka. Gross Domestic Product is the most important factor for electricity demand for three sectors as GDP of lag1, 2 and 3 found as significant variables for three sectors. Exchange rate only affects for the Domestic and Commercial sectors electricity demand and they can be described using one, two and three lag values of USD. There is no affect from electricity price on commercial sector electricity demand. Domestic sector electricity demand depends on one, two and three lag values of electricity price and Industrial sector electricity demand depends on two and three lag values of electricity price. The results obtained this study is useful for the awareness on the impacts of different external variables and so to set up the effective business strategy in the changing business environment.

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LIST OF ABBREVIATIONS

Abbreviation	Description
GDP	Gross Domestic Product
DW	Durbin Watson statistic
ACF	Autocorrelation Function
PACF	Partial Autocorrelation Function
ADFT	Augmented Dickey Fuller Test
GWh	Giga Watt hour
kWh	Kilo Watt hour
USD	United States Dollar
UK	United Kingdom
USA	United States of America
AIC	Akaike Information Criteria
SIC	Schwarz Information Criteria
JB	JarqueBera Statistic
OLS	Ordinary Least Square
VAR	Vector Auto Regression
VEC	Vector Error Correction
Mn	Million

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