

IT.ENG.9

COINTEGRATION MODELING OF THE NEXUS AMONG ELECTRICITY CONSUMPTION, SERVICE GDP, TRADE AND POPULATION AGES 15-64 YEARS IN SRI LANKA

R. Shanthini

*Department of Chemical and Process Engineering,
Faculty of Engineering, University of Peradeniya*

Reliability of the forecasted electricity demand is crucial in composing meaningful electricity generation policies for Sri Lanka. The Ceylon Electricity Board (CEB) uses the ordinary least square regression methodology in modelling electricity demand in Sri Lanka with gross domestic product (GDP), population and electricity price as explanatory variables. It has been shown in the literature that service GDP, trade and population ages 15-64 years are better suited as explanatory variables than what CEB uses. The objective of this study is to develop a reliable model among the natural logarithms of electricity consumption, service GDP, trade and population ages 15-64 years, denoted by E , G , T and P , respectively. All data used are obtained from World Development Indicators for the period 1978 to 2008.

Using autoregressive distributed lag (ARDL) bound-testing approach to cointegration, the presence of a long-run equilibrium relationship among the variables studied is confirmed in this study at a very high level of significance. Fully modified least squares is used to estimate the long-run equilibrium relationship as follows:

$$E(t) = -0.012 + 0.835G(t) + 0.241T(t) + 0.481P(t) + \hat{v}(t)$$

where, $\hat{v}(t)$ is the error-correction term. Short-run dynamic estimated using ordinary least square is as given below:

$$\Delta E(t) = -1.174\hat{v}(t-1) + 0.463\Delta G(t) + 0.259\Delta T(t) + 1.497\Delta P(t) + \varepsilon(t)$$

with adj $R^2 = 71.5\%$ and Durbin-Watson statistic = 2.03, where, Δ denotes first-difference.

The long-run equilibrium model reveals that 1% growth in service GDP causes 0.835% growth in electricity consumption in the long-run. It also reveals that in the long-run, 1% growth in trade causes 0.24% growth in electricity consumption and 1% growth in population ages 15-64, causes 0.48% growth in electricity consumption. The adjustment parameter of the equilibrium correction term, $\hat{v}(t-1)$ of the short-run dynamics, reveals that any deviation from the long-run equilibrium following a short-run disturbance is corrected within the year, which further testifies the strength of cointegrating relationship among the variables studied. Short-run dynamics are such that 1% growth in service GDP, trade and population ages 15-64 causes 0.46%, 0.26% and 1.5% growth in electricity consumption, respectively.

It is evident from this research that, in Sri Lanka, there exists a very strong cointegrating relationship among electricity consumption, service GDP, trade and population ages 15-64 years, which is the consuming population. The high elasticity values reported above could be explained by the present rapid growth in the electricity-consumption based lifestyles of the households and the commercial sectors, which is a common feature among middle-income economies such as Sri Lanka.

Funding: University Research Grant RG/2011/22/E.