AN ASSESSMENT OF ENERGY SUBSTITUTION POSSIBILITIES IN THE SRI LANKAN ECONOMY

M.N. DISSANAYAKE AND H.M. GUNATILEKA

Department of Agricultural Economics, Faculty of Agriculture, University of Peradeniya

Energy is a very important input in the production process of a country. Sri Lanka imports its entire requirement of crude oil and oil products. Domestic energy resources consist of only biomass and hydropower. Higher dependency of an economy on a particular input, especially when large amount of that input are imported, renders the economy vulnerable to external price shocks. Sri Lankan energy importation statistics show that the demand for imported energy is increasing by 9% per annum and nearly 3% of the country's GDP is spent on energy imports. Therefore, external energy price shocks can have a profound impact on the Sri Lankan economy. In fact, the current economic slow down in Sri Lanka is partly due the higher energy prices. There are many ways to reduce the dependency of an economy on imported energy. This study explored one such possibilities; substitution of energy with other inputs.

The objectives of this study were to examine substitution possibilities between energy and non energy inputs in Sri Lanka and to identify the responsiveness of factor demand to price changes. The specific aim was to estimate the elasticity of substitution for the basic factors of production in the Sri Lankan economy to check the substitutability among them. In addition, own price and cross price elasticities of demand were estimated to examine the price responsiveness of energy inputs.

The selected factors of production for the analysis were labour, capital and petroleum based energy. Data on GDP, quantity of labor, quantity of petroleum energy, amount of capital, price of petroleum, interest rates and wage rates were collected from different secondary sources. Quarterly data for the period of 1990-1999 were used in the analysis. Data limitations did not allow extension of the data set for the periods before 1990. Factor share equations for labor, capital and petroleum energy, derived from a Translog production function, were estimated. The estimation was carried out as a system of equations using Seemingly Unrelated Regression method. Price elasticities and elasticities of substitution were calculated using estimated share equation parameters.

The results reveals that the petroleum energy is price inelastic and it behaves as a complement with other two inputs. Hence, the results imply that, substitution possibilities of both labor and capital, in place of energy, do not exist given the structure of the economy. Of the two ways to reduce energy dependency, i.e., energy conservation and substitution, these results suggest that energy conservation is the only possible way to deal with the situation. To achieve higher efficiency from energy conservation practices, various educational, administrative and fiscal measures can be used as part of the government policy. Results also show that the use of price as a mechanism to reduce energy consumption will not be an effective reform strategy due to price inelasticity of energy.