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**EXPLORING DEMAND FOR ENERGY IN THE
SOUTH KOREAN INDUSTRIES**



ABSTRACT

South Korea imports all its primary energy leading to high dependency and vulnerability related to energy supply. Efficiency in use of energy is a way to reduce the dependency and emissions. This quantitative study provides empirical results of the stochastic production process in energy use. Special attention is given to the factors that increase the risk or variations of using more energy input in production. A dynamic panel model is specified and applied to 25 Korean industrial sectors over the period 1970-2007. The determinants of energy use are identified and their effects in form of elasticities of energy use are estimated. In addition the structural changes in energy demand pattern is explored. Stochastic production technology is applied to estimate two main models: A production model where the energy is a determinant of output and an energy demand model which is based on an inverted factor demand model where demand is a key determinant of level of energy use. The findings reveal that: First, there are large variations in the degree of overuse or inefficiency in energy use among the individual industries and over time; second, ICT (information and communication technology) capital and labor are substituting energy; third, ICT capital and value added services are two input factors decreasing the variability of energy demand while non-ICT capital, material and labor are increasing the variability of energy demand. Finally, the result suggests that technical progress contributes more to increase mean of energy demand than to reduce the level of risk. It is recommend that industries increase the level of ICT capital and digitalization and invest more in R&D activities and value added services to reduce the uncertainty related to their demand for energy. This study forms the structure of the stochastic production technology and the energy demand of South Korean industrial sector. The public research programs aimed at industrial sector should be concerned about both mean and risk properties in research on new technologies and in investigating the possible alternative inputs for energy.