

Preface

This book empirically models the impact that different input factors of production have on the market, as well as consumer and producer characteristics on energy demand in the industrial sectors with a special emphasis on the effects of information and communication technology (ICT) investment on the demand for energy.

The dynamic factor demand methodology described in this book is very advanced and up-to-date. It can be used in teaching advanced graduate courses and in empirically advanced research. Therefore, it is highly relevant in both teaching as main or supplementary text, and in particular as illustration and handbook in empirical research. This book is an important addition to the existing literature on industrial development. In addition, it deals with energy which is one of the most important production input.

A dynamic factor demand model is applied to link inter-temporal production decisions by explicitly recognizing that the level of certain factors of production cannot be changed without incurring some costs, so called adjustment costs, and are defined in terms of forgone output from current production. The objective of this study is to examine the structure of factors affecting productivity in these industries. In particular, the focus is on the ICT–energy relationship and their effects on the total factor productivity (TFP) growth. An appealing prospective is provided to investigate the relationships between energy demand and other input factors of production especially ICT as well as between energy demand and some industries' characteristics. The results of this study are expected to give useful information to policy makers who attempt to promote productivity in the industries and at the national level.

The overall consumption of energy worldwide is continuously increasing. According to the International Energy Outlook Report published in 2016 (IEO2016) by the U.S. Energy Information Administration (EIA), energy consumption will continue to increase worldwide by 48% in 2040. This steady increase in energy demand will negatively affect the environment and the availability of depletable energy sources of fuel, or, more specifically, the primary energy needed

to produce energy output such as electricity. South Korea imports all its primary energy leading to high dependency and vulnerability related to the energy supply. This quantitative research study investigates the impact that different input factors of production have on the market, as well as consumer and producer characteristics on energy demand in 30 industrial sectors for South Korea over the period 1980–2009, with a special emphasis on the effects of information and communication technology (ICT) investment on the demand for energy. A dynamic factor demand model is applied to link inter-temporal production decisions by explicitly recognizing that the level of certain factors of production cannot be changed without incurring some costs, the so called adjustment costs, and are defined in terms of forgone output from current production. The objective of this study is, hence, to examine the structure of factors affecting productivity in these industries. In particular, the focus is on the ICT and energy relationship and their effects on the total factor productivity (TFP) growth. The results are expected to reveal the state of productivity in each individual industry, which is an important basic knowledge for policy makers in designing industrial policy and allocating public investment and supports. The results of this study are expected to give useful information to policy makers who attempt to promote productivity in the industries and at the national level. The findings reveal that ICT and non-ICT capital investments are substitutes for labor and energy inputs. There is a significant contribution of ICT capital in both output and labor productivity growth, when considering the rate of ICT capital in the capital-investment ratio. The results demonstrate a high output growth rate and increasing returns to scale, in which its effects are higher than technological progress in the TFP component. Future studies will need to decompose the aggregated figures of the energy input by the different types of energy input in order to evaluate their individual effects on industrial production, to specify the substitution effects more precisely, and to consider the direct ICT effects on energy conservation more effectively.

Kurdistan, Region of Iraq

Nabaz T. Khayyat

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Khayyat, N.T.

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