

Preface

Since the *Doi moi* (renovation) programs, which were initiated by the Sixth Party Congress in 1986, Vietnam has made impressive social and economic achievements in its transformation from a centrally-planned economy into a market economy. Over the past decade, the economy recorded rapid growth at about 8 percent per annum. The economic structure has been changing rapidly, from being predominantly agricultural to having significant contributions from industrial and service sectors. Moreover, Vietnam has also actively integrated itself into the regional and global economies; it became a member of such important associations as the Association of South East Asian Nations (ASEAN) and the ASEAN Free Trade Area (AFTA) in 1995, and the World Trade Organization (WTO) in 2006. These swift changes mean that the competitiveness of the country in general must be improved. To achieve this improvement the business firms in all sectors need to become more competitive. To this end, comprehensive studies on the productive efficiency of firms are necessary.

As a leading and multi-disciplinary institution in Vietnam, the mission of the National Economics University (NEU) is to provide up-to-date economic education and training, as well as social and economic policy analyses for the country. We have expanded our training and research co-operation with a number of universities and research institutions around the world, including the National Graduate Institute for Policy Studies (GRIPS) in Tokyo, Japan, and Thammasat University in Bangkok, Thailand. Among the various constructive co-operations between us, the Vietnam Development Forum (VDF) is an on-going joint research project between NEU and GRIPS. The National Project, namely “Assessment of Technological Impacts on Economic Growth and Productivity in Vietnam,” was conducted by NEU and Thammasat University during 2004–2006. This book is a specific result from our research activities.

The book presents two important tasks, which have been our research purposes. First, it provides thorough analyses on the technical efficiency and productivity growth of firms in different economic sectors in Vietnam, and suggests policy implications to improve their productive efficiency, and thus the industries and economy as a whole. These results are in turn crucial for policy makers in designing economic development strategy. Second, this book also presents a successful academic task by using both parametric and non-parametric frameworks, which have been used only recently in Vietnam.

With a hope that this book will disseminate useful information for both academia and policy-making institutions to have more productive policy discussions, we sincerely introduce it to you.

Prof. Dr. Nguyen Van Thuong
Rector, National Economics University

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Contributors

NGUYEN KHAC MINH is an Associate Professor at the National Economics University (NEU), Hanoi. He is currently Director of the Vietnam-Netherlands Master's Program in Development Economics in Hanoi. He earned a Ph.D. in Economics from the Faculty of Economics, Thammasat University, Thailand. During 2002–2006, he was Dean of the Faculty of Economics, and Lead Researcher of the National Project.

GIANG THANH LONG is an on-leave Lecturer of the Faculty of Economics, NEU, and is currently a Ph.D. Candidate in Public Policy at the National Graduate Institute for Policy Studies (GRIPS), Tokyo. He is also a researcher of the Vietnam Development Forum (VDF)-Tokyo. He earned a Master's Degree in Public Policy (MPP) from Hitotsubashi University, Japan.

NGUYEN VIET HUNG is a Lecturer of the Faculty of Economics, NEU. He is currently a Ph.D. Candidate in Economics at the Faculty. He earned a Master's Degree in Public Administration (MPA) from the Vietnam-Belgium Master's Program in Public Administration at NEU.

TRUONG TRI VINH is a member of the Vietnam's Association of Seafood Exporters and Producers.

BACH NGOC THANG is a Researcher at the Business School, NEU. He earned a Master's Degree in Development Economics from the Vietnam-Netherlands Master's Program in Development Economics at NEU.

DAU THUY MAI is working at the Department of International Economics, Academy of Finance. She earned a Master's Degree in Development Economics from the Vietnam-Netherlands Master's Program in Development Economics at NEU.

VU QUANG DONG is now a Ph.D. Candidate in Economics at Georgetown University in the U.S. He earned a Master's Degree in Development Economics from the Vietnam-Netherlands Master's Program in Development Economics at NEU.

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Nguyen Khac Minh and Giang Thanh Long
Editors

Introduction

Nguyen Khac Minh and Giang Thanh Long

The early years of the 21st century have witnessed rapid development and significant contributions in science and technology to every sphere of humanity. This progress has made changes in productive processes, and these changes have improved standards of living. New technologies have helped to diversify existing products and create new ones, reduce raw material consumption, and protect the environment. Experiences from both industrial and high-performing economies have shown that technology plays an important role in promoting sustainable economic growth. For developing countries like Vietnam, whose economies started from very low bases, technological development provides both opportunities and challenges in the catching-up process.

With remarkable achievements from the renovation policy programs since the late 1990s, Vietnam is making its best efforts to integrate more into the regional and global economies. To do so, Vietnam needs to improve the competitiveness of the business firms in particular, and of the country in general. Therefore, technological transfers and applications are necessary in promoting quality of products and services, productive efficiency, and economic growth. Guided by such important facts, assessments of technical efficiency and productivity of firms in different economic sectors will provide useful pieces of information in choosing appropriate productive technologies. These assessments will also be useful for designing realistic economic development strategies for the country as well.

This book contains selected papers from our National Project, namely “Assessment of Technological Impacts on Economic Growth and Productivity in Vietnam,” conducted during 2004–2006. All of the papers use the data from the Economic Census for Enterprises of the General Statistics Office of Vietnam (GSO) with a parametric approach (based on the stochastic frontier production function [SFPF] model) and/or a non-parametric approach (based on the data envelopment analysis [DEA] model) to measure the technical efficiency and productivity levels of firms in different economic sectors, and to identify their determinants in order to make policy suggestions. These papers were revised in light of comments made at numerous workshops and conferences held inside and outside Vietnam. It is the hope of the editors that the contents of this book will extend beyond those directly involved in the related field of research, and that it will provide crucial information about the Vietnamese economy and the current development of its economic sectors, especially in terms of technological development.

This book is made up of seven papers. The first four papers deal with firms in the manufacturing, processing, and construction sectors. The remaining three papers focus on firms in the service sector.

The contribution by Nguyen Khac Minh and Truong Tri Vinh uses the balanced panel data of 1,000 firms in the 23 manufacturing sectors during 2000–2003 with a DEA model to estimate technical efficiency levels. Their estimates show that only 3.4 percent and 8.9 percent of these firms were operating at full technical efficiency and at the optimal scale, respectively. In addition, to identify the confidence interval for the estimated technical efficiency, the authors apply the Löthgren and Tambour (1997) algorithm to bootstrap the DEA estimator. Going further to look for the possible factors associated with technical inefficiency for these firms, their paper uses a Tobit model. It is found that the firms in Ho Chi Minh city and neighboring areas, which have been industrially concentrated areas, were more efficient than their counterparts in other regions. Similarly, the quality of labor was a significant factor that influenced the technical

efficiency of the studied firms. Thus, improving the skills of laborers through training programs is one of the recommended policy directions. However, the findings indicate that none of the other variables, including firm size, capital-labor ratio, and ownership, was positively related and statistically significant to all efficiency measures.

The second paper by Nguyen Khac Minh, Dau Thuy Mai, and Vu Quang Dong focuses only on the firms of the metalware industry in Hanoi during the period 2000–2003 by using the DEA model with the Malmquist total factor productivity (TFP) index, and the time-variant SFPF model. The estimates from both methods confirm low relative efficiency among all firms and a significant dispersion in efficiency between these firms. In addition, the study period also observes a decreasing trend of the average TFP, which is mainly attributed to relatively low technical efficiency. To discover the factors that could influence such situations, a factorial effects model is introduced, in which per worker real wage, capital-labor ratio, revenue, firm age, and state ownership are considered. It is shown that capital-labor ratio, real wage, ownership, and firm age were not important factors to determine the technical efficiency of these firms. However, conversely to the results from the first paper of the book, the authors found that firm size was a significant factor that influenced the efficiency and productivity performance of the industry during the study period.

Also using both DEA and SFPF approaches, the paper by Nguyen Khac Minh and Vu Quang Dong focuses on measuring technical efficiency levels for 135 firms in the aquaculture-processing industry in the year 2002. Several interesting results are found in the paper. The average pure technical efficiency of these firms is found to be quite low: only about 41 percent for the DEA model and 68 percent for the SFPF model. To see the consistency of the results from both methods, the authors use only the pure technical efficiency estimate from the DEA model and the technical efficiency estimate from the SFPF model in their factorial effects model, in which the possible factors include regional differences, external cost ratio, capital-labor ratio, average wage, and firm size. The estimated results indicate that ownership seemed not to affect technical efficiency, although the southern non-private firms were the most efficient. In terms of regions and firm size, the results show that the northern firms were more efficient than the southern ones, and larger firms performed better than smaller ones in the study year. Another important finding is that capital-labor ratio was positively related to the technical efficiency of these firms. Therefore, increasing the capital-labor ratio might help increase productivity of these firms; increasing productivity is necessary for improving their competitiveness. In addition, average wage, which is considered to represent quality of labor, is found to be positively related to pure technical efficiency. This implies that human resource development policies to increase labor quality will be important to improving the efficiency of these firms.

The fourth paper, by Nguyen Khac Minh and Giang Thanh Long, analyzes an industry that has become increasingly important in Vietnam in recent years: the construction industry. Using both DEA and SFPF approaches, the paper estimates technical efficiency for 2,298 construction firms in Vietnam in the year 2002. The estimates of the average pure technical efficiency from both approaches are consistent, with 58.6% estimated using the DEA model and 57.8% using the SFPF model. Examining this industry in detail by classifying business types, the authors find the building and civil engineering construction firms usually to have the lowest efficiency scores. This situation could be explained by the facts that they were operating with many inputs and construction time was usually long. The estimated results from the factorial effects model indicate that ownership influenced the technical efficiency of these studied firms, in which state firms were absolutely more efficient than non-state ones. This may be because the state firms usually could invest more capital and had better technical capacity than their non-state counterparts. In addition, location of firms in Hanoi and Ho Chi Minh city also had significant impacts on efficiency levels. This could be explained by the fact that the firms in these cities could obtain access to resources, such as labor and capital, more easily than the firms in other

areas and regions. A finding of this paper that differs from those in the previous papers is that the capital-labor ratio variable did not have a clear impact on technical efficiency based on the results from the two approaches; it did not influence efficiency levels in the DEA model, but it had a clear influence in the SFPF model.

Along with the integration process of the country, the banking sector in Vietnam has also been changed swiftly, and the domestic banks are facing more competition from their foreign counterparts. Therefore, evaluation of efficiency performance is necessary in providing policy implications for both bank managers and banking policy makers. The fifth paper in the book by Nguyen Viet Hung responds to this research need by measuring efficiency change, productivity growth, and technological change of 13 Vietnamese commercial banks using their panel data in the period 2001–2003. To pursue these objectives, he uses a DEA model with the Malmquist total factor productivity (TFP) index. The estimates show that the average cost efficiency of these banks was only 61 percent in the period. Moreover, the average annual growth of the Malmquist index was negative 2.2 percent over the period, due mainly to a 4.3 percent reduction in technological efficiency. The author finds that the TFP in 2003 was 15 percent higher than that in the year 2002, and it increased by about 6 percent in comparison with the base year 2001. This TFP improvement is attributed more to change in technical efficiency than to change in technology. In other words, operation efficiency of these banks had greater influence on their TFP changes than did their innovations in banking technology.

To estimate technical efficiency levels and to explore their determinants for the hotel industry in Vietnam, the paper by Bach Ngoc Thang follows the methodology of Battese and Coelli (1995), in which a frontier production function and a technical inefficiency model are simultaneously estimated. The author uses the unbalanced panel data of 474 firms in the period 2000–2003 for the estimation. The hypothesis testing for the functional form of production shows that the translog frontier model was more appropriate than the Cobb-Douglas frontier model in analyzing these firms' technical efficiency. In addition, the estimated results show that the average technical efficiency level of these firms in the study period was about 82 percent, in which the year 2000 had the highest average efficiency level (97 percent), while the lowest average efficiency level occurred in the year 2002 (84 percent). To investigate the factors that determined these efficiency levels, the author considers factors of firms including firm size, ownership structure, and geographic location. It is indicated that geographic location was positively related to technical efficiency; the firms located in Hanoi and Ho Chi Minh city tended to be less technically efficient than those located in other areas. This difference might be explained by the fact that many firms were concentrated in these cities, and thus they faced fiercer competition than those in the rest of the country. The findings of the paper also indicated that state-owned firms were more technically efficient than the firms in other forms of ownership, i.e., private, joint venture, and foreign direct investment (FDI). In terms of firm size, the estimated results show that firm size was positively related to technical efficiency improvement, meaning that the larger the firm size was, the lower the firm's inefficiency level. The author, therefore, argues that policies aimed at developing large firms in terms of employment should be encouraged in the industry because they generally employ a large number of laborers in operations.

The last paper in the book, another joint paper by Nguyen Khac Minh and Giang Thanh Long, analyzes the efficiency performance of the hospitals and medical centers in Vietnam by using a DEA model with the data of 44 observations in 2002. Of these observations, 17 were hospitals and the remaining 27 were medical centers. The estimated results indicate that the average scale efficiency of the hospitals was about 77 percent, while that of the medical centers was about 59 percent. In other words, these hospitals and medical centers could have achieved the same output with respectively 23 percent and 41 percent less inputs. In addition, the estimates also indicate that hospitals were clearly more efficient than medical centers. This

disparity may be due to several possible reasons, such as hospitals usually have better human resources, high-tech equipment, and better locations. Although all the sampled hospitals and medical centers were non-state firms, it is interesting to see that there was a significant dispersion of efficiency among them. The private firms had the highest average efficiency level, while the foreign-invested firms had the lowest average efficiency level. A factorial effects model is also applied to look for the determinants of the technical efficiency of the studied firms. It is unexpectedly found that location of firms in Hanoi and Ho Chi Minh city had no influence on either overall technical efficiency or scale efficiency. This result could be explained by the fact that because most of the hospitals and medical centers in the sample were located in these cities, there might not be significant differences between them. The testing results for the impact of capital-labor ratio on efficiency differ for hospitals and medical centers, but indicate that these firms appeared to operate in labor-intensive ways.