区域技术效率论

基于技术效率的区域经济竞争力提升研究

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本书摘要

本书是在作者博士论文基础上修改而成的。

区域技术效率触及区域生产、区域经济竞争力与区域经济发展，是一个涉及面很广的课题。技术效率与区域经济竞争力的提升问题是最具现实意义的核心问题，也是本书研究的主题。

区域经济竞争力是一个区域在其所属的大区域中吸引资源和争夺市场的能力，也是这个区域在政治、经济、环境、科技、社会基础建设等各个领域所能达到的先进程度的综合反映。不断提升与强化区域经济竞争力，是确保在市场经济条件下一个区域较之于其他区域更快速、持续、健康发展的战略举措。因此，区域经济竞争力研究已成为近年来我国经济学研究的一个热点。

以往对区域经济竞争力差异的研究偏重于对区域差异的现有格局及演变进行分析，并从地理位置、资源禀赋、文化背景、经济体制、人口素质、技术水平和原有基础等条件的差异方面进行分析，而对影响区域差异的生产率（尤其是技术效率）因素的分析相对不足，所以这些研究只能反映结果，而不能对未来发展趋势有所把握。

技术效率是指在给定的投入下，一个经济单元的实际产出与生产边界（规定技术上该投入量所能达到的最大产出量）之比，可以用来衡量在现有的技术水平下，经济单元获得最大产出的能力。技术效率的高低可以影响一个区域的产出从而影响其经济竞争力，因此有必要从技术效率这一新的角度对区域经济竞争力进行

研究，并就提升区域经济竞争力的途径提出建议。

国内外对区域经济竞争力与技术效率的研究自成体系，目前尚未有学者把两者结合起来进行研究。当然在各自体系的研究中已经形成了一批重要成果，但在总体上，这些研究大多是以规范分析为主，定量分析较少，即使是少数的定量分析，其方法也是值得商榷的，很少有运用各种最新的经济计量法进行深入实证分析的成果，更少有学者用不同方法进行分析相互验证。我们认为，区域经济竞争力与技术效率的规范性研究成果的政策参考价值是有限的，而对其在规范分析基础上进行实证研究更具有现实意义，这也是各级政府部门所需要的。因此，本书在国内外学者已有的研究基础上，以浙江省的相关统计数据为线索，就区域经济竞争力与技术效率的提升问题进行了系统的理论与实证研究，重点是对两者关系进行理论阐述并应用国外目前常用的主成分分析法、随机前沿分析法、数据包络分析法和格兰杰因果分析法等进行探索性的定量分析，得出有价值的实证结论。

本书认为，基于技术效率的区域经济竞争力提升取决于以下相互联系的三个方面的问题：第一，区域经济竞争力如何评价，哪些因素对其产生影响；第二，区域技术效率如何评价，又有哪些因素对其产生作用；第三，区域经济竞争力与技术效率的关系如何，技术效率的提高能否有效地提升该区域的经济竞争力。

具体而言，本书研究的主要内容如下：

一是区域经济竞争力的研究。区域经济竞争力是一个区域相对于其他同级区域在上一级的大区域中的经济竞争能力，即占有、配置资源并最终获取经济利益的能力，这种竞争能力可以通过经济增长速度、人均国内生产总值、外贸依存度、财政收入等指标反映出来。同时，区域经济竞争力应综合一个区域现实的和未来的竞争能力：一方面，区域经济竞争力是特定利益主体在国内外市场上

相对于其他主体所具有的生存发展及获益的能力，另一方面，区域经济竞争力应反映一个区域的现实竞争力和潜在竞争力。如何有效地对区域经济竞争力进行量化比较是这一内容的关键。

从总体上看，无论是理论研究还是经验研究，国内外学者对于区域经济竞争力的研究远没有取得一致的结论，分歧较大。这些分歧除了关于区域经济竞争力的构成内容外，还存在于哪些原因从根本上影响竞争力这一问题上。有的从资本、劳动角度，有的从技术、知识积累角度，有的则从制度或创新角度来分析影响区域经济竞争力差异的原因，本书则试图从技术效率角度进行分析。

二是区域技术效率的研究。技术效率是用来衡量在现有的技术水平下，生产者获得最大产出的能力的。在现有的技术水平下，生产者的产出能否达到理论最大产出，依赖于技术效率水平的高低。因此，在投入不变，不考虑技术进步的情况下，一个评价单元的产出取决于技术效率的高低。如何有效地衡量与评价技术效率及其主要影响因素是这一部分的重点。

目前国内外对区域技术效率的评价一般选择随机前沿分析法或数据包络分析法进行测算，但由于两种方法各有缺陷，如果运用不当可能使结果大大偏离现实情况，本书在考虑到这一因素的情况下，在实证检验中同时运用了这两种方法进行相互验证。在分析区域技术效率的影响因素时，以往的研究一般集中于一个方面（如人口密度、工业化程度）对技术效率进行分析。由于影响区域技术效率的因素是多方面的，只局限于一两个方面显然不够全面，因此，本书从金融发展、对外贸易、产业集聚与城市化、科技创新等角度较为系统地进行了理论与实证的分析研究。

三是对区域经济竞争力与技术效率的关系研究。区域经济竞争力也是一个区域提供的产品和服务在上级区域及国内外市场上所特有的不易被模仿和学习的优势。产品与服务的竞争优势在一

定条件下将由该类产品的价格决定，从而在很大程度上由其生产成本决定，要素投入的成本和要素的转化效率（全要素生产率）则决定了生产成本，在其他要素投入成本一致的情况下，生产成本由劳动力成本和生产率决定。总而言之，一个区域的经济竞争力主要表现为产品的生产成本，由于（国内）区域间的资本自由流动，生产资料价格也无太大差异，所以生产成本最终由生产率，也就是技术效率和技术水平（进步）两个部分决定，在本书假设（国内）区域间的技术进步一致的前提下，生产率的差异就主要表现为技术效率的差异，也就是说区域经济竞争力在很大程度上取决于该区域的技术效率。由于区域经济竞争力是区域的经济实力、国际化程度、基础设施情况、政府管理能力、金融环境和创新等因素的综合反映，所以一地经济竞争力的增强在一定程度上反映了该地的经济外向度提高、科技投入增长及产业集聚的提高，而这些因素都可能影响区域技术效率，所以区域经济竞争力对技术效率也有反作用。在上述分析的基础上，本书从实证的角度进行了检验。

在全书结构上，本书做如下安排：

第一章，导论。提出本书研究的选题背景和现实意义，描述本书研究的方法和研究思路，并讨论了研究内容和结构安排，最后对本书的创新和不足之处作了介绍。

第二章，文献综述。对区域经济竞争力与技术效率的国内外研究进行了较为全面的回顾与评述。首先介绍了区域经济与竞争力的核心理论并进行了简要的评述，对国家竞争力、城市竞争力、企业竞争力等方面的典型经验研究进行了较为全面的回顾并进行简单的评价；随后对技术效率相关理论进行了回顾，分别对技术效率及其度量及技术效率测算的参数与非参数方法进行了介绍，其中重点介绍了目前在国内外技术效率测算中最常用的数据包络分析方法和随机前沿模型方法，随后对微观、中观层面的技术效率的经验研究进行了较

为系统的回顾与评述。对这些研究成果进行系统的分析和评述，以便更好地为我们进一步深入地研究提供借鉴和指导。

第三章，区域经济竞争力评价模型与实证研究。创新地提出了竞争力的“涡轮”模型，认为区域经济竞争力是一个综合系统，由众多子系统组成，如果把区域经济竞争力看成是一个区域发展的涡轮，其动力的大小就依赖于每个叶片的正常工作，而这一区域的经济实力、国际化程度、基础设施情况、政府管理能力、金融环境和创新因素就是这些叶片，只有各个子因素的共同协调发展才能最有效地提高该地的经济竞争力。在此基础上设定了竞争力的评价体系，分 6 个子体系选择 26 个重要指标对浙江省区域经济竞争力进行评价，并对引起区域经济竞争力差异的因素从区位因素、产业集聚、政府作用、人力资本等方面进行了一般分析。

第四章，区域技术效率评价模型与实证研究。首先用评价技术效率最常用的数据包络分析方法与随机前沿分析方法，基于浙江省的面板数据，对区域技术效率进行了测算，发现两种方法下结果基本一致，能够相互支持；然后对影响区域技术效率的因素进行了较为全面的分析，认为经济外向度、金融发展、产业集聚与城市化进程及科技投入等方面对区域技术效率的影响较大。

第五章，区域经济竞争力与技术效率关系研究。首先对技术效率与经济增长、技术进步及生产率关系的理论与经验研究进行回顾与评述，然后从理论上论述技术效率对区域经济竞争力的影响机理以及区域经济竞争力对技术效率的反作用。通过实证研究，对浙江省技术效率与区域经济竞争力的两组数据的格兰杰因果分析发现：区域技术效率可以促进区域经济竞争力的提高，而区域经济竞争力的提高反过来对技术效率也有一定的促进作用，只是存在一定的时滞。

第六章，研究结论与对策建议。在理论研究与实证检验结论

的基础上，从对外贸易、城市化、产业集聚、科技创新及金融改革等五个方面针对性地提出建议，以提高区域技术效率，进而提升该区域的经济竞争力。

区域经济竞争力与技术效率提升问题是一个涉及面很广的课题，对其进行系统、深入的分析所具有的难度是可想而知的。本书在已有的国内外大量相关文献及浙江省实际数据的基础上，力图在以下几个方面做出贡献：

一、在前人研究基础上，构建区域经济竞争力的“涡轮”模型及相应的评价体系，并以浙江省为例进行了区域经济竞争力的实证研究。

二、同时用两种目前最常用的测算技术效率的方法——数据包络分析法和随机前沿分析法，对浙江省的区域技术效率进行了测算，由于两种方法计算出的结果相互支持，增强了结论的说服力。此外还比较全面地从经济外向度、金融发展状况、产业集聚与城市化进程、科技投入等方面分析了对区域技术效率的影响，这些研究在国内区域技术效率的实证研究中属首次尝试。

三、从理论上论述了技术效率对区域经济竞争力的影响机理以及区域经济竞争力对技术效率的反作用，并通过实证分析，对浙江省的上述两组测算结果进行格兰杰因果分析证明上述理论。这一理论以及支持这一理论的实证研究在该领域里也属创新。

四、从提高区域技术效率的角度来研究如何提升区域经济竞争力，以往对于造成竞争力差异的原因大多从区位、资本、劳动、技术、知识积累、制度或创新角度进行研究。本书则从一个全新的角度——区域技术效率角度进行分析研究并提出针对性的建议。

关键词：区域经济　竞争力　技术效率　主成分分析　数据包络分析　随机前沿分析

Abstract

This book is rewritten on the basis of my dissertation.

Regional technical efficiency is a project widely involving in regional productivity, regional competitiveness and regional economic development. The promotion of technical efficiency and regional economic competitiveness is of primary practical importance, which is also the theme of the book.

Regional economic competence refers to an area's capability of attracting resources and competing in the market. Regional competence is also a comprehensive indicator which reflects the political, economic, environmental, scientific and social development in a region. Improving and enhancing regional economic competence is a strategic move for a region to have a quicker, more sustainable and sound development. This is why researches on regional economic competence have been a hot topic recently.

Existing researches on regional competence put emphases on current situations and their evolution of a region and try to analyze the regional differences on the bases of geographical location, resource endowment, cultural background, economic system, human resources and its original infrastructure. However, they ignore the role of productivity in leading to regional differences. So

current researches can explain the development results, but cannot guide a region to adapt to the future trends.

Given the input, technical efficiency is the ratio of an economic unit's actual output to its production frontier (the maximum output of certain input at a given technology). Technical efficiency can be used to measure the ability of an economic unit to realize maximum output. Moreover, technical efficiency can affect a region's competence by affecting its output. Therefore, it's necessary to study regional economic competence from the point of view of technical efficiency.

Currently, researches on regional economic competence and technical efficiency are separated. So far, there is no researchers have carried out a research to combine them together. In each field, there are important findings, but generally, they are much more qualitative researches than quantitative researches. If any, their methods are also questionable. It's hard to find researchers to study the regional competence via two different methods and compare their findings. Thus, the dissertation explores the regional differences in economic competences and technical efficiency and their dynamics for cities in Zhejiang province, by adopting combining research methods, such as normative analysis and positive analysis, qualitative analysis and quantitative analysis, static analysis and dynamic analysis. The dissertation mainly discusses the relationship between regional economic competence and technical efficiency and performs positive analysis by using Principal Component Analysis, Stochastic Frontier Analysis (SFA), Data Envelopment Analysis (DEA) and Granger Analysis.

The dissertation thinks that there are three related questions which have to be solved before discussing the improvement of regional economic competence based on technical efficiency. First, the article has to determine how to evaluate regional economic competence and its determinants. Second, the dissertation has to discuss how to evaluate technical efficiency and its determinants. Third, the dissertation has to explore what the relationship between regional economic competence and technical efficiency is and the possibility of improving regional economic competence by enhancing technical efficiency.

Main contents of the dissertation are as follows.

First, the dissertation discusses on regional economical competence and thinks that regional economic competence can be measured by indicators like economic growth rate, GDP per capita, dependence degree on export, financial income, etc. The key is how to quantify the regional economic competence. Theoretically, there is no common conclusion on regional economic competence. So is the positive analysis. There are differences on determinants of regional economic competence. Some try to find the reasons for the differences from the points of capital, technology, knowledge, etc. Others try to do so from the points of institution and innovation. The dissertation, however, tries to find the differences from the point of technical efficiency.

Second, the dissertation studies technical efficiency. Given the technology, technical efficiency can be used to measure the ability to get maximum output. Therefore, given the input, and ignoring the technical improvement, an economic unit's output is

determined by its technical efficiency. How to evaluate technical efficiency and its determinants are the key in this part. Currently, researchers adopt SFA or DEA to measure technical efficiency, however, both methods have flaws. If they are improperly used, the results can be far away from the reality. Under this condition, the dissertation uses both methods to comprehensively evaluate technical efficiency from points of view of financial development, foreign trade, industrial clustering, urbanization, scientific innovation, etc.

Third, the dissertation tries to find the relationship between regional economic competence and technical efficiency. The cost of products in a region can reflect its economic competence. Due to the free capital flow, the prices of materials are nearly the same. So the production cost is determined by the productivity, namely, technical efficiency and technical development. The paper assumes that the technical development among regions is indifferent. The difference in productivity lies in the difference in technical efficiency. Theoretically , regional economic competence mainly depends on a region's technical efficiency. Since regional economic competence is a comprehensive indicator of a region's economical strength, internationalization, infrastructure, government management capability, financial environment and innovation. The improvement of regional economic competence is helpful for improving scientific input, industrial clustering and foreign trade, which in turn affect the technical efficiency of a region. Therefore, regional economic competence can affect technical efficiency as well. On the basis of the analysis above, the positive analysis is performed here, too.

There are seven chapters in total. Chapter one is the introduction to the thesis, which mainly presents the research objectives, research design, research methods, dissertation's structure and its original ideas.

Chapter two reviews the literatures related to regional economic competence and technical efficiency. Studies on regional economic competence are based on researches on national competence, urban competence and enterprise competence. This chapter introduces the main researches in each field. Domestic researches on technical efficiency mainly focus on enterprises and industries. Reviews on these researches guide the paper for the further study. We also introduce methods of technical efficiency evaluation. DEA and SFA are explained in detail and the paper compares them as well.

Chapter three establishes the model for regional economic competence and carries out the positive study. The "Turbine Model" of regional economical competence and its evaluation system are put forward in this chapter. Regional economic competence can be regarded as the turbine for regional development. Economic strength, internationalization, infrastructure, financial environment and innovation are drivers for regional development. Only when the drivers above can be integrated into a system, can regional economic competence be effectively improved. There are twenty-six indicators for evaluating regional competence.

Chapter four establishes the model for evaluating technical efficiency and performs the corresponding positive analysis by using panel data for Zhejiang province. Discussions on results of

technical efficiencies offered by SFA and DEA shows that results offered by SFA can be fairly confirmed by results offered by DEA. But, by comparison, estimations by SFA are better than those by DEA. Moreover, the paper finds that the degree of economic opening up to the world, financial development, industrial clustering, urbanization processes, and investment in science and technology, etc., has a clear effect on regional technical efficiency.

Chapter five discusses the relationship between regional economic competence and technical efficiency. The mechanisms of technical efficiency to regional economical competence and the counteraction effect of regional economic competence to technical efficiency are discussed here. Granger causality analysis to Zhejiang's technical efficiency and regional competence shows that improvement in technical efficiency can enhance regional economic competence which the enhancement of regional competence can improve technical efficiency only with a time lag.

Chapter six presents the research conclusions and puts forward sets of suggestions for improving regional economic competence and technical efficiency. Especially, the dissertation discusses how to improve foreign trade, urbanization, industrial clustering, scientific innovation and financial reform, thus, promoting regional technical efficiency and economic competence.

How to improve regional economic competence and technical efficiency is a comprehensive and complicated research topic. It's hard to systematically analyze both at the same time. Based on the literature and the positive analysis for Zhejiang province, the

dissertation has following contributions.

First, the dissertation puts forward the Turbine Model for evaluating regional economic competence and its evaluation system, on the basis of which the positive analysis for Zhejiang province is carried out.

Second, the dissertation measures the technical efficiency in Zhejiang province by using SFA and DEA. The results of both methods are consistent, which enhances the conclusions. Moreover, the paper has comprehensively studied the effect of the degree of economic opening up to the world, financial development, industrial clustering, urbanization processes, and investment in science and technology on technical efficiency, which is the first try of the positive analysis in domestic researches on technical efficiency.

Third, the dissertation theoretically presents the mechanisms of technical efficiency to regional economical competence and the counteraction effect of regional economic competence to technical efficiency. Granger causality analysis to Zhejiang's technical efficiency and regional competence shows that improvement in technical efficiency can enhance regional economic competence which the enhancement of regional competence can improve technical efficiency only with a time lag. The positive analysis and its conclusions are quite new in this field.

Fourth, the dissertation explores how to improve regional economic competence through the improvement of technical efficiency, which is quite different from previous researches. The previous researches focused on location, capital, labor, technolo-

gy, knowledge accumulation, institution and innovation.

Key words: Regional Economy; Competence; Technical Efficiency; Principal Component Analysis; Data Envelopment Analysis; Stochastic Frontier Analysis.