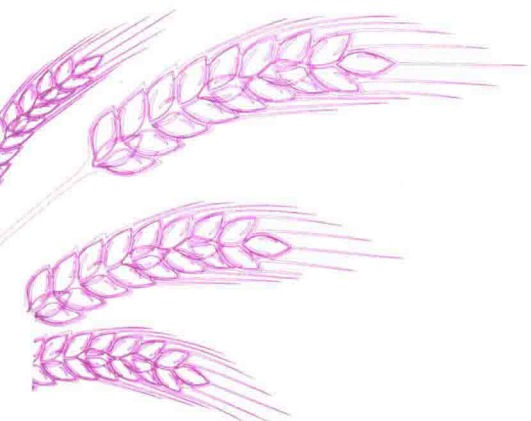
QUYU NONGYE SHENGCHAN
JISHU XIAOLÜ JIQI DUI QUANYAOSU
SHENGCHANLÜ GONGXIAN YANJIU

区域农业生产技术效率及其对全要素生产率贡献研究

郑循刚◎著



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前　言

中国人口多，耕地少，要解决13亿人口的吃饭生存问题，必须提高农业生产技术效率。随着时代的发展，农业已经不在局限于普通的劳作，而是更多地依赖于科学技术，不断提高农业生产技术效率作为发展的原动力，以满足我国日益增长的农业需要，农业生产技术效率是我国现阶段需要解决的首要问题，连续几年的中央“1号文件”都提出发展现代农业是社会主义新农村建设的首要任务，提高土地产出率、资源利用率和农业劳动生产率，提高农业效益和竞争力是发展现代农业的主要目标，农业发展不能再单纯依靠扩大资源投入，而应更多地依靠技术进步和生产技术效率的改进，走内涵式的发展道路。本书利用随机前沿和共同前沿生产函数分析方法，测算了区域农业生产技术效率水平，并进行了纵向和横向比较分析，对区域农业生产全要素增长率进行了分解，探讨了农业生产技术效率对全要素生产率的贡献，总结了区域农业生产技术效率的特征，提炼了农业生产技术效率的影响因素，为农业管理部门提供决策参考。

本书的研究分为东部、中部、西部、四川和农户层次的农业生产技术效率测算和相应区域的农业生产技术效率对全要素生产率增长的贡献，分析了区域农业生产技术效率水平的时间变化和区域差异，探索了影响区域和微观农户的农业生产技术效率的影响因素，将区域农业生产全要素生产率增长分解为：技术进步、技术效率的变化、规模经济性和资源配置效率四个部分，探求区域农业生产全要素生产率增长的动力来源，在理论与实证分析的基础上，探讨了区域农业生产技术效率提高的路径选择。

(1) 利用随机前沿和共同前沿生产函数分析方法，测算了我国东部、中部、西部区域的农业生产技术效率，利用随机前沿生产函数模型，测算了四川的农业生产技术效率，提炼了东部、中部、西部和四川的农业生产技术效率动态变化发展的特点和规律，探讨了区域农业生产技术效率的影响因素。根据东部、中部、西部、四川的农业生产面板数据，利用随机前沿生产函数分析方法测算了区域农业生产技术效率水平，以此为基础，构建了东部、中部、西部农业生产技术效率的共同前沿生产函数模型，计算了区域农业生产技术差距比率，测算了区域共同前沿农业生产技术效率，对区域农业生产技术效率特点进行了比较分析，分析了区域农业生产技术效率水平的时间变化和区域差异，总结了东部、中部、西部及四川农业生产技术效率动态变化发展的特点和规律，探讨了区域农业生产技术效率的影响因素。

(2) 建立了农户随机前沿生产函数模型——微观面板数据模型，利用四川农户微观面板数据，测算了农户农业生产技术效率，分析了四川农户农业生产技术效率的影响因素，测算了各投入要素对产出的弹性。根据抽样调查所得四川样本农户 2005—2007 年的农业投入产出的微观面板数据，建立了农户随机前沿面板生产函数模型，测算了农户的农业生产技术效率，分析了农户农业生产技术效率的分布差异和时间变化特征，探讨了影响四川农户农业生产技术效率的主要因素和各投入要素对产出的弹性。

(3) 利用随机前沿生产函数模型，将东部、中部、西部、四川、农户的农业生产全要素生产率增长率分别分解为：技术进步、技术效率的变化、规模经济性和资源配置效率四个部分，分析了区域农业生产技术效率变化对全要素生产率增长影响的差异，讨论了区域农业生产全要素生产率增长率的收敛性。分解结果表明，2000—2007 年，农业生产技术效率变化对区域全要素生产率增长贡献较小，且是负影响，技术进步是区域农业生产全

要素增长率的源泉。对全要素生产率增长起主要作用的是技术进步，其次是资源配置效率和规模经济性，最小的是技术效率的变化。全要素生产率增长东部高于西部，西部略高于中部。各因素对全要素增长率的影响来看，技术进步对全要素增长率的影响，西部略高于中部，中部略高于东部；技术效率变化对全要素生产率增长的影响，中部高于东部，东部高于西部；规模效率变化对全要素生产率增长的影响，中部高于西部，西部略高于东部；配置效率对全要素生产率增长的影响，西部略高于中部，中部高于东部，区域农业生产全要素生产率增长率和技术进步均呈现绝对β收敛。

（4）在实证研究的基础上，探讨了区域农业生产技术效率提高的路径选择：巩固和加强农业的基础地位，根据农业生产的区域特征，制定有针对性的投资政策，加大农业基础设施建设的财政投入力度，促进农业科技创新与推广；结合区域实际，集中培训，提高农业生产者能力，就地消化与劳务输出相结合，合理有效地促进农村剩余劳动力转移；积极探索农业体制机制创新，完善土地流转以推进规模化经营，鼓励农民进行经营体制创新。

关键词：农业生产技术效率；随机前沿分析（SFA）；技术差距比率（TGR）；共同前沿分析（MFA）；全要素生产率增长分解

Preface

As we all known, China has a large number of population, but there is no enough cultivated land to use. The first thing to solve the problems on having a meal and surviving of 1 300 million people is to improve the agricultural production technology efficiency. With the development of society, agriculture is not only limited to ordinary work, but also depends more on constantly development of science and technology, agricultural production technology efficiency which are as motive force of the development in order to satisfy the growing agriculture needs of our courtry. Agricultural production technology efficiency is primary problem that our country needs solving at present stage. Developing modern agriculture is the primary task of new rural construction of the socialism that were putted forward in succession of central Files No. one for several years which suggested that improving land output rate, resource utilization ratio, agricultural labor productivity and agricultural benefit and competitiveness are main goals of developing modern agriculture, meanwhile, agriculture can't depend on expanding resource input simply again while developing, but should depend on the improvement of technological progress and production technology efficiency more and take the development path of the intension type. This study utilizes the stochastic frontier and meta frontier production function analytical method to examine

the regional agricultural production technology efficiency level. carries on vertical and horizontal comparative analysis, resolves regional agricultural production total factor productivity of increase, probes into the contribution to the total factor productivity of agricultural production technology efficiency, summarizes the characteristic of the agricultural production technology efficiency in the area and at last, refines the influence factor of agricultural production technology efficiency which can offer decisions for administrative department of agriculture to consult.

The research is divided into the east, middle, west, Sichuan and peasant household levels to calculate agricultural production technology efficiency, and resolves the contributions to the increasing in the total factor productivity of agricultural production technology efficiency of corresponding regions. analyses evolving and regional difference of the agricultural production technology efficiency level, explores the factors that influences the agricultural production technology efficiency of the region and micro peasant household, and divides increased regional complete ratio of factor productivity of agricultural production into four parts: technological progress, change of technological efficiency, scale efficiency and resource allocation efficiency in order to seek the motivational resource of the regional agricultural production total factor productivity growth, and finally probes into the route choice that the agricultural production technology efficiency in the area improving based on the theory and real example analysed.

(1) Examined the agricultural production technology efficiency of the east, middle, western using the stochastic

frontier analysis and meta frontier analysis method, and using stochastic frontier analysis, examined the agricultural production technology efficiency in Sichuan province. refined the characteristics and laws of the development of agricultural dynamic change of production technology efficiency of east, middle, west and Sichuan province, probes into the influence factor of the regional agricultural production technology efficiency. Utilized the stochastic frontier production function analytical method to examine the regional agricultural production technology efficiency level, according to the agricultural production panel data of the east, middle, west and Sichuan province, On this basis, setted up the meta frontier production function model of the east, middle and west. calculated the regional agricultural production technical gap ratio, examined the agricultural production technology efficiency of meta frontier analysis method, carried on comparative analysis on the regional agricultural production technology efficiency characteristic, analyses evolving and regional difference of the agricultural production technology efficiency level, and then summarized the production technology efficiency's characteristics and laws about the agricultural dynamic change development of the east , middle, western part and Sichuan province, and probes into the influence factor of the regional agricultural production technology efficiency.

(2) Setted up peasant household's stochastic frontier production function model—Panel data model, utilized the micro panel data of peasant household of Sichuan province, examined peasant household's agricultural production technology efficiency, probed into the influence factors of the agricultural

production technology efficiency of peasant household of Sichuan and finally examined the elasticity of each invest element to the output. Setted up peasant household's stochastic frontier panel production function model, examined peasant households' agricultural production technology efficiency, analysed the distribution difference and temporal change characters of technological efficiency and probed into the main factor which influenced the agricultural production technology efficiency and examined the elasticity of each invest element to the output of peasant household in Sichuan province, according to the panel data that came from the sample survey of agricultural input and output from 2005 to 2007 in Sichuan.

(3) Divided the growth rate of the total factor productivity of agricultural production of the east, middle, west, Sichuan, peasant household into four parts: technological progress, change of technological efficiency, scale efficiency and resource allocation efficiency, utilizing the stochastic frontier analysis model. Then analysed the differences that the regional agricultural production technology efficiency change impactted on the growth of the total factor productivity and discussed the convergence property of the regional growth rate of total factor productivity of agricultural production. The empirical results suggest that, the agricultural production technology efficiency change contributes smaller to the regional total factor productivity from the year of 2000 to 2007, and it is the negative influenced. The technological progress is the source of the regional agricultural total factor productivity. It is technological progress that plays the most important role in the total factor productivity growth, secondly it is efficiency and scale economy

of resource distribution, the minimum one is the change of the technological efficiency. The total factor productivity increases of the east is higher than that in the west, and the west is slightly higher than the middle. The influence that technological progress impacts on the total factor productivity growth of the west is slightly higher than that of the middle, and the middle is slightly higher than the east from the view that factors impact on the total factor productivity growth; The influence that technological efficiency change impacts on the total factor productivity growth of the middle is higher than that in the east, and the east is higher than the west. The influence that the change of the scale efficiency impacts on the total factor productivity growth of the middle is higher than that in the west, and the west is slightly higher than the east. The influence that allocative efficiency impacts on the total factor productivity growth, of the west is slightly higher than that in the middle, and the middle is higher than the east. The regional total factor productivity growth rate of agricultural production and technological progress is present absolute β convergence.

(4) On the basis of positive research probed into the choice of the path in which the regional agricultural production technology efficiency improves: Consolidate and strengthen the fundamental position of agriculture, make the effective investment policy according to the regional characteristic of agricultural production, strengthen the financial input power of agricultural infrastructure construction, promote agricultural science and technology innovation and popularize; Meanwhile, Combine regional reality, concentrate on training , improving agricultural producer's ability , combining digesting labor force

nearby with exportting so as to promote the rural transfer of surplus labor effectively and rationally; At last, Explore the agricultural innovation of mechanism of system actively, perfect the land and circulate in order to advance the appropriate scale of operation, and encourage peasant operate system innovation.

Key words: Agricultural Production Technical Efficiency; Stochastic Frontier Analysis (SFA); Technical Gap Ratio (TGR); Meta Frontier Analysis (MFA); Growth Decomposition of Total Factor Productivity

目　录

第1章 绪 论

1.1 问题的提出与研究意义

1.1.1 问题的提出

农业是人们利用动植物体的生活机能，把自然界的物质和能量转化为人类需要的产品的生产部门，农业生产的对象是生物体，获取的是动植物产品，农业是国民经济的基础，农业稳则国家稳，农业富则国家富。农业是人类社会的衣食之源，生存之本，只有解决好吃饭问题，才有能力和精力发展其他产业，才能保证社会的稳定。中国是一个人口大国，解决十三亿人口的温饱问题，是关系我国发展壮大的关键问题，只有拥有了充足的食物才能不受制于人，才能在错综复杂的国际关系中谋求自己的繁荣和富强。农业是工业特别是轻工业原料的主要原料来源，是国家建设资金积累和出口物资的重要来源，同时为第二、三产业的发展提供广阔的市场。经济发展的历史经验证明，农业发展顺利，增长速度快，整个国民经济发展的速度就快，反之，如果农业生产出现倒退，经济发展和人民生活将受到严重的影响。

2000年以来，国内外粮食生产和消费正在发生重大变化，粮食供求关系偏紧，结构性矛盾突出，粮价总体持续上涨，粮食安全形势发生的新变化引起了人们的极大关注。一方面，随着经济社会发展和科学技术的进步，粮食消费和加工业进入新的发展阶段，我国粮食供需发生了新变化，由供求平衡、丰年有余转向粮食供求偏紧、适当进口。另一方面，我国加入世界贸易组织以后，粮食供求关系还受到了国际市场影响，粮食进口存在着明显的“大国效应”，粮食进口占国内需求量的1%，就相当于国际