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# 新兴大国交通运输溢出效应 与区域经济增长

以中国为例

罗会华 著

格致出版社 上海人民出版社

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# 总 序

经济学发展历史表明,经济理论的重要程度往往取决于被解释现象的重要程度。中国的崛起被称为“东亚奇迹”,“金砖国家”的崛起已成为“世界奇迹”,这说明大国经济现象的重要程度是毋庸置疑的。如果将典型的大国经济发展现实和经验的研究提升为普遍性的理论体系和知识体系,那么,中国经济学就有可能掌握国际话语权。

一般地说,掌握国际话语权应该具备三个条件:一是研究的对象具有典型意义,被解释的现象不仅对某个国家的发展具有重要意义,而且对世界的发展具有重要意义;二是取得的成果具有创新价值,在学术上有重要发现,乃至创造出新的科学理论和知识体系;三是交流的手段具有国际性,研究方法符合国际规范,可以在世界范围交流和传播。

在大国经济研究领域,第一个条件是已经给定的,因为大国经济发展具有世界意义。关键是要在第二个条件和第三个条件上下功夫。要通过创造性的思维和研究,深刻把握大国经济的特征和发展规律,构建大国经济的理论体系和知识体系,追求深层次的学术创新和理论突破;要使用国际化的交流手段,运用规范的研究方法和逻辑思维开展研究,从中国与世界关系的角度来看待大国经济问题,并向世界传播大国经济理论和知识体系,从而使大国经济理论具有世界意义和国际影响力。

我们将联合全国的专家学者,致力于探索超大规模国家经济发展的特征和规律,进而构建大国经济理论体系和知识体系。格致出版社以深邃的目光发现了这个团队的未来前景,组织出版这套《大国经济丛书》,国家新闻出版总署将其列入

“十二五”国家重点图书出版规划,为大国经济研究提供了展示成果的平台。

我们拥有这样的梦想,并且在集聚追求梦想的力量。我们期望这个梦想成为现实,并用行动构建中国风格的经济学话语体系,为中国经济学走向世界做出积极的贡献。

歐陽曉

# 前 言

中国改革开放后,特别是 20 世纪 90 年代以后实施财政分权政策和积极的财政政策,中央政府及地方政府对交通基础设施进行了大量的投资。2003 年,中国铁道部提出“推动中国铁路跨越式发展”,开启了中国铁路发展的新时代。在 2008 年应对金融危机而推出的 4 万亿经济刺激计划中,将近一半经费投向了铁路、公路等交通基础设施,因此,中国的交通运输业得到了高速发展。当前我国交通运输供需紧张的状况基本得到缓解,运输瓶颈制约基本消除,基本上能为经济社会发展需要提供基础保障。

虽然大部分研究肯定了交通基础设施建设对我国经济增长的重要性,但随着我国交通基础设施的建设规模的扩大,部分研究认为,地方政府存在过度投资、重复建设、资源浪费等问题,为了“要想富、先修路”和政绩竞争,我国交通基础设施投资建设出现了不协调趋势。国内学者对我国交通基础设施的溢出效应进行了大量的实证研究,就结论而言,大部分研究认为我国交通基础设施的溢出效应显著为正,但也有研究指出溢出效益显著为负或者不存在溢出效应。现有的研究围绕交通基础设施对经济增长的研究展开了大量的研究,得出许多有益的结论,但在以下方面仍需进一步回答:(1)交通运输对区域经济的影响机理是怎样的?现有的研究较少从空间的视角来展开,需要从新的理论框架、新的视角进行系统研究,特别是从理论上阐述交通运输溢出效应的存在。(2)我国交通运输对区域经济增长是否具有空间溢出效应,溢出效应是正向的还是负向的,其作用有多大?(3)改革开放以来,我国的区域经济经历了不同的阶段,交通基础投资在区域上也存在倾斜,那么我国交通基础设施的溢出效应是否随着时间的推移发生变化,是

否在不同的经济板块上具有不同的表现？

基于新的理论与方法,对发展中大国的交通运输与经济增长间的关系进行研究,回答上述问题是非常必要和有意义的。本书采用理论分析与实证研究相结合的方法,对我国交通运输对区域经济增长效应展开了系统研究,主要的研究内容有以下几个部分:

第一,构建了交通基础设施促进区域经济增长的理论模型。构建了一个简单两区域模型,基于柯布—道格拉斯生产函数分析了区域间交通基础设施改善对两个区域经济增长的影响,及其对区域间的专业分工和产业结构变迁的影响机理以及引致的经济增长效果。并采用新经济地理学理论来拓展两区域模型,基于标准自由资本模型将空间相关性纳入交通运输与经济增长的分析框架,分析区域内和区域间的交通基础设施对区域间产业空间布局和经济增长的影响,并从中推导出交通基础设施存在的直接效应和溢出效应。

第二,分析了我国区域经济与交通运输的时空演化及现状。在我国区域经济发展阶段的基础上,利用 Stata 15.2 软件得到区域经济时空演化图,分析每一阶段我国区域经济空间格局的变迁,并从经济总量、经济增长率等方面对我国区域经济的空间格局现状进行了分析。从铁路密度和公路密度来考察 1978—2016 年间我国基础设施的空间分布与变迁情况,以及对铁路、公路、水路和航空四种交通运输的相关指标进行系统分析,并在区域层面和国际层面进行了比较分析。

第三,对交通运输与经济增长的动态关系进行了理论和实证研究。实证检验了经济增长率、客货周转量增长率与交通运输基础设施增长率之间的动态关系。基于全国时间序列数据,采用 Johansen 协整检验方法对实际人均 GDP、交通网络里程与换算周转量的长期与短期关系进行了检验;基于省级面板数据,采用面板 VAR 模型,检验了交通网络密度增长率、换算周转量增长率与实际人均 GDP 增长率之间的动态关系。

第四,实证研究了交通基础设施对本地经济增长的影响。选取了宜万铁路途径恩施市作为研究对象,分析了宜万铁路路线选择和立项背景,认为宜万铁路途径恩施市可视为外生冲击事件。基于合成控制法评估了宜万铁路的开通对恩施

市人均 GDP 增长的处理效应,并采用双重差分法(DID)进行了稳健性检验,证实 SCM 结果的稳健性,并探索性分析了恩施市受益于宜万铁路的主要条件。

第五,分析研究了我国区域经济的空间自相关性。选取各省级行政区域 1978—2016 年实际人均 GDP 的自然对数作为分析指标,利用 Geoda 软件计算出的全局 Moran's I 指数值及进行了检验,并根据其变化趋势把我国区域经济的空间自相关关系分为三个阶段;根据 Moran 散点图分析了我国区域经济空间集聚的时空变迁情况;以 LISA 聚类地图和显著性地图检验了空间分布格局及其显著性。

第六,实证检验了我国交通运输对区域经济增长的溢出效应。对纳入了交通运输变量的空间面板计量模型进行了相关的检验,检验显示具有随机效应的空间面板计量一般模型是最优的模型。基于空间面板计量模型,采用地理距离空间权重矩阵,检验我国交通运输溢出效应与区域经济增长的关系,并分阶段、分区域和分阶段分区域进行了模型的估计并测算溢出效应。

通过对上述内容的研究,得出如下的主要结论和观点:(1)区域间和区域内的交通基础设施改善所导致的区域产出变化存在差异。区域内和区域间交通基础设施的改善会对区域的产出产生不同的后果,其直接效应和间接效应存在差异,与区域间的经济优势和交通基础设施优势对比相关。(2)我国区域经济与交通基础设施具有相似的时空演进和空间布局。对我国区域经济和交通运输的时空演进分析发现,实际人均 GDP 较高的地区的交通网络密度也较高,而且随着人均 GDP 空间格局的变迁,交通网络密度的空间布局也发生变迁,表明我国区域经济和交通基础设施间存在一定的关联性。(3)我国交通基础设施供给具有强外生性。采用 VECM 和 PVAR 模型均发现,交通网络里程增长率没有受到人均 GDP 增长率的显著影响,在一定程度上表明我国交通基础设施供给表现为外生,并非由经济发展水平和基础设施存量来推动,而是主要由中央政府的建设规划和地方政府的“晋升锦标赛”来推动。(4)交通基础设施产生正向直接效应需具备一定的条件。评估宜万铁路对恩施市经济增长的处理效应为正,但在溢出效应实证研究中发现存在交通基础设施对本地经济增长存在负向直接效应的证据。因此,交通基础设施促进本地经济增长具有区域异质性,需要具备一定的条件。(5)我国区

域经济增长存在较强的空间自相关性。1978—2016年期间,我国30个省级行政区实际人均GDP存在着显著的正向空间自相关,表明我国区域经济增长存在较强的空间自相关性,并且我国区域经济的空间格局主要以空间集聚为主,而且空间集聚格局有进一步强化的趋势。(6)我国交通基础设施的溢出效应具有时空异质性。分阶段、分区域的实证表明:东部地区的铁路只在第3阶段存在正向溢出效应,公路仅在第1阶段存在正向溢出效应;中部地区的铁路在3个阶段均存在正向溢出效应,公路在第1阶段和第3阶段均存在正向溢出效应;西部地区的铁路前2个阶段的溢出效应为正,在第3阶段为负,公路在3个阶段均没有溢出效应。由此,得出我国交通基础设施的溢出效应具有时空异质性的结论,交通基础设施产生溢出效应的条件需要进一步深入研究。

结合实证研究结论和我国交通基础设施发展现状,主要提出以下政策建议:第一,我国未来的交通基础设施投资应以完善综合交通运输体系为目标,而非传统的促进经济增长为目标。鉴于东部地区交通网络密度已达到较高水平,实证表明东部地区交通基础设施的经济增长效应已不显著。因此,交通基础设施投资应从促进经济增长为目标转向以完善现代化综合交通运输体系为目标。第二,提高交通基础设施建设决策的科学性。实证研究表明,我国交通基础设施建设具有强外生性,但这样有可能会造成重复建设,无法有效实现资源的有效配置,因此,建议决策时更多立足于经济和效益的视角,并且制定交通基础设施建设规划时,充分考虑交通基础设施的空间相关性和空间溢出效应。第三,未来优先并重点建设中西部地区交通基础设施。中西部地区的交通网络密度较低,实证表明提高西部地区的交通基础设施供给落后于交通运输需求;实证表明当前中部地区公路和铁路的直接效应均为正,因此,我国交通基础设施建设的重点应转向中西部地区。

上述对策建议可为相关政府部门制定交通基础设施发展规划,确定交通基础设施投资力度与方向等决策时提供参考。

## ABSTRACT

After China's reform and opening up, especially after the 1990s, the central government and local governments have invested a lot in transportation infrastructure. In 2003, China's Ministry of Railways put forward "promoting the leapfrog development of China's railway", which ushered in a new era of China's railway development. In 2008, nearly half of the 4 trillion economic stimulus plan launched in response to the financial crisis was invested in railway, highway and other transport infrastructure. Therefore, China's transport has developed rapidly. At present, the tension between supply and demand of transportation in China has been basically relieved, and the bottleneck of transportation has been basically eliminated, which can basically provide the basic guarantee for the needs of economic and social development.

Although most of the studies have affirmed the importance of transportation infrastructure construction to China's economic growth, with the expansion of the scale of transportation infrastructure construction in China, some of the studies believe that local governments have problems such as over investment, repeated construction and waste of resources. In order to "want to be rich, build roads first" and compete for political achievements, the investment and construction of transportation infrastructure in China is in an incongruous trend Potential. Domestic scholars have done a lot of empirical research on the spillover effect of China's transport infrastructure. In terms of conclusions, most of the studies believe that the spillover effect of China's transport infrastructure is significantly positive, but some studies have pointed out that the spill-

over effect is significantly negative or there is no spillover effect. The existing research focuses on the research of transportation infrastructure on economic growth, and draws many useful conclusions. However, further answers are needed in the following aspects: (1) What is the impact mechanism of transportation on regional economy? The existing research is rarely carried out from the perspective of space, which needs to be systematically studied from a new theoretical framework and a new perspective, especially the existence of the spillover effect of transportation. (2) Whether China's transportation has spatial spillover effect on regional economic growth, whether the spillover effect is positive or negative, and how much is the effect. (3) Since the reform and opening up, China's regional economy has gone through different stages, and the traffic infrastructure investment is also inclined in the region, so whether the spillover effect of China's traffic infrastructure changes with the passage of time, and whether it has different performance in different regional economic sectors.

Based on the new theory and method, it is necessary and significant to study the relationship between transportation and economic growth in developing countries. This book uses the method of theoretical analysis and empirical research to carry out a systematic study on the growth effect of transportation on regional economy in China. The main research contents are as follows:

The theoretical model of transportation infrastructure promoting regional economic growth is constructed. Based on Cobb Douglas production function, a simple two region model is constructed to analyze the impact of the improvement of the transportation infrastructure between regions on the economic growth of the two regions, as well as the impact mechanism of the improvement on the division of labor and industrial structure between regions and the effect of the economic growth. Based on the standard free capital model, the spatial correlation is incorporated into the analysis framework of transportation and economic growth, and the influence of transportation infrastructure on the industrial spatial layout and economic growth between regions is

analyzed.

This book analyzes the temporal and spatial evolution and current situation of regional economy and transportation in China. On the basis of the development stage of regional economy in China, the book uses Stata 15.2 software to get the spatial and temporal evolution map of regional economy, analyzes the change of spatial pattern of regional economy in each stage, and analyzes the current situation of spatial pattern of regional economy in China from the aspects of economic aggregate, economic growth rate, etc. From the perspective of railway density and highway density, the book investigates the spatial distribution and changes of infrastructure in China from 1978 to 2016, and makes a systematic analysis of the relevant indicators of railway, highway, waterway and air transportation, and makes a comparative analysis at the regional and international levels.

This book studies the dynamic relationship between transportation and economic growth. Based on the national time series data, Johansen cointegration test method is used to test the long-term and short-term relationship between the actual per capita GDP, transportation network mileage and the converted turnover; based on the provincial panel data, the panel VAR model is used to test the dynamic relationship between the density growth rate of the transportation network, the converted turnover growth rate and the actual per capita GDP growth rate.

The book empirically tests the impact of transportation infrastructure on local economic growth. This book selects Enshi City as the research object, analyzes the selection of Yiwan railway route and the background of project approval, and considers that Yiwan railway passing through Enshi City can be regarded as an exogenous impact event. Based on the Synthetic Control Method(SCM), the book evaluates the treatment effect of the opening of Yiwan Railway on the per capita GDP growth of Enshi City, and uses the double difference method(DID) to test the robustness of the SCM results, and explores the main conditions for Enshi City to benefit from Yiwan railway.

The spatial autocorrelation of regional economy in China is analyzed. The natural logarithm of real per capita GDP of each provincial administrative region from 1978 to 2016 is selected as the analysis index, and the global Moran's I index value calculated by GeoDa software is used to test. According to its change trend, the spatial autocorrelation of regional economy in China is divided into three stages; the spatial and temporal changes of regional economic spatial agglomeration in China are analyzed according to Moran scatter diagram; and the spatial distribution pattern and its significance were tested by Lisa clustering map and significance map.

This book empirically tests the spillover effect of transportation on regional economic growth. In the book, the spatial panel measurement model with traffic and transportation variables is tested, which shows that the general spatial panel model with random effect is the optimal model. Based on the general spatial panel econometric model and the spatial weight matrix of geographical distance, the book tests the relationship between the spillover effect of transportation and regional economic growth in China, and estimates and calculates the spillover effect.

The book draws the following conclusions: (1) there are differences in regional output changes caused by the improvement of traffic infrastructure between and within regions. The improvement of transportation infrastructure in and between regions will have different consequences on the regional output, and its direct and indirect effects are different, which is related to the comparison of economic advantages and transportation infrastructure advantages between regions. (2) China's regional economy and transportation infrastructure have similar space-time evolution and spatial layout. It is found in this book that with the change of spatial pattern of per capita GDP, the spatial layout of traffic network density also changes, indicating that there is a certain correlation between regional economy and traffic infrastructure in China. (3) the supply of transportation infrastructure in China is exogenous. Using VECM and pvar models, it is found that the growth rate of traffic network mileage is not significantly affected

by the growth rate of per capita GDP. To a certain extent, it shows that the supply of traffic infrastructure in China is exogenous, not driven by the level of economic development and infrastructure stock, but mainly driven by the construction planning of government departments. (4) there are certain conditions for the positive direct effect of traffic infrastructure. The treatment effect of Yiwan Railway on the economic growth of Enshi City is evaluated as positive, but in the empirical study of spillover effect, it is found that there is evidence of negative direct effect of transportation infrastructure on the local economic growth. Therefore, transportation infrastructure to promote local economic growth has regional heterogeneity, which requires certain conditions. (5) there is a strong spatial autocorrelation in China's regional economic growth. During 1978—2016, there was a significant positive spatial autocorrelation in the real GDP per capita of 30 provincial administrative regions in China, indicating that there was a strong spatial autocorrelation in the regional economic growth in China, and the spatial pattern of regional economy in China was mainly spatial agglomeration. (6) the spillover effect of transportation infrastructure in China is spatiotemporal heterogeneity. The empirical results show that: the railway in the eastern region only has positive spillover effect in the third stage, while the highway only has positive spillover effect in the first stage; the railway in the central region has positive spillover effect in the three stages, and the highway has positive spillover effect in the first and third stages; the spillover effect in the first two stages of the railway in the western region is positive, negative in the third stage, and the highway only has positive spillover effect in the third stage. There was no spillover effect in all three stages.

Combined with the conclusion of empirical research and the current situation of China's transportation infrastructure development, the following policy recommendations are put forward: (1) China's future transportation infrastructure investment should take improving the comprehensive transportation system as the goal, rather than the traditional promotion of economic growth as the goal. (2) Improve the scien-

tific decision-making of transportation infrastructure construction. It is suggested that the decision-making should be more from the perspective of economy and benefit, and the spatial correlation and spatial spillover effect of transport infrastructure should be fully considered in the planning of transport infrastructure construction. (3) In the future, priority will be given to the construction of transportation infrastructure in the central and western regions. The empirical results show that the direct effects of highways and railways in the central region are all positive. Therefore, the focus of China's transportation infrastructure construction should be shifted to the central and western regions. The above suggestions can provide decision-making reference for the relevant government departments to formulate the development plan of transport infrastructure and determine the investment intensity and direction of transport infrastructure.

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