省际信息流动空间结构及其对区域等级体系的影响

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总　序

　　一个没有思想活动和缺乏学术氛围的大学校园，哪怕它在物质上再美丽、再现代，在精神上也是荒凉和贫瘠的。欧洲历史上最早的大学就是源于学术。大学与学术的关联不仅体现在字面上，更重要的是，思想与学术，可谓大学的生命力与活力之源。

　　中南财经政法大学是一所学术气氛浓郁的财经政法类高等学府。范文澜、嵇文甫、潘梓年、马哲民等一代学术宗师播撒的学术火种，五十多年来一代代薪火相传。世纪之交，在合并组建新校而揭开学校发展新的历史篇章的时候，学校确立了"学术兴校，科研强校"的发展战略。这不仅是对学校五十多年来学术文化与学术传统的历史性传承，而且是谱写21世纪学校发展新篇章的战略性手笔。

　　"学术兴校，科研强校"的"兴"与"强"，是奋斗目标，更是奋斗过程。我们是目的论与过程论的统一论者。我们将对宏伟目标的追求过程寓于脚踏实地的奋斗过程之中。由学校斥资资助出版《中南财经政法大学青年学术文库》，就是学校采取的具体举措之一。

　　本文库的指导思想或学术旨趣，首先在于推出学术精品。通过资助出版学术精品，形成精品学术成果的园地，培育精品意识和精品氛围，以提高学术成果的质量和水平，为繁荣国家财经、政法、管理以及人文科学研究，解决党和国家面临的重大经济、社会问题，作出我校应有的贡献。其次，培养学术队伍，特别是通过对一批处在"成长期"的中青年学术骨干的成果予以资助推出，促进学术梯队的建设，提高学术队伍的实力与水平。再次，培育学术特色。通过资助出版在学术思想、学术方法以及学术见解等方面有独到和创新之处的科研成果，培育科研特色，以形成有我校特色的学术流派与学术思想体系。因此，本文库重点面向中青年，重点面

向精品，重点面向原创性学术专著。

　　春华秋实。让我们共同来精心耕种文库这块学术园地，让学术果实挂满枝头，让思想之花满园飘香。

2009 年 10 月

Preface

A university campus, if it holds no intellectual activities or possesses no academic atmosphere, no matter how physically beautiful or modern it is, it would be spiritually desolate and barren. In fact, the earliest historical European universities started from academic learning. The relationship between a university and the academic learning cannot just be interpreted literally, but more importantly, it should be set on the ideas and academic learning which are the so – called sources of the energy and vitality of all universities.

Zhongnan University of Economics and Law is a high education institution which enjoys rich academic atmosphere. Having the academic germs seeded by such great masters as Fanwenlan, Jiwenfu, Panzinian and Mazhemin, generations of scholars and students in this university have been sharing the favorable academic atmosphere and making their own contributions to it, especially during the past fifty – five years. As a result, at the beginning of the new century when a new historical new page is turned over with the combination of Zhongnan University of Finance and Economics and Zhongnan University of Politics and Law, the newly established university has set its developing strategy as "Making the University Prosperous with academic learning; Strengthening the University with scientific research", which is not only a historical inheritance of more than fifty years of academic culture and tradition, but also a strategic decision which is to lift our university onto a higher developing stage in the 21st century.

Our ultimate goal is to make the university prosperous and strong, even through our struggling process, in a greater sense. We tend to unify the destination and the process as to combine the pursuing process of our magnificent goal with the practical struggling process. The youth's Academic Library of Zhongnan University of Economics and Law, funded by the university, is one of our specific

measures.

The guideline or academic theme of this Library lies first at promoting the publishing of selected academic works. By funding them, an academic garden with high – quality fruits can come into being. We should also make great efforts to form the awareness and atmosphere of selected works and improve the quality and standard of our academic productions, so as to make our own contributions in developing such fields as finance, economics, politics, law and literate humanity, as well as in working out solutions for major economic and social problems facing our country and the Communist Party. Secondly, our aim is to form some academic teams, especially through funding the publishing of works of the middle – aged and young academic cadreman, to boost the construction of academic teams and enhance the strength and standard of our academic groups. Thirdly, we aim at making a specific academic field of our university. By funding those academic fruits which have some original or innovative points in their ideas, methods and views, we expect to engender our own characteristic in scientific research. Our final goal is to form an academic school and establish an academic idea system of our university through our efforts. Thus, this Library makes great emphases particularly on the middle – aged and young people, selected works and original academic monographs.

Sowing seeds in the spring will lead to a prospective harvest in the autumn. Thus, let us get together to cultivate this academic garden and make it be opulent with academic fruits and intellectual flowers.

Wu Handong

摘　　要

本书试图揭示我国 31 个省、市、自治区间信息流动的空间格局以及形成机理。作为信息价值得以实现的保证，信息的流动成为当今社会的重要特征。对信息经济的研究包括情报学（主要为宏观信息经济）和经济学（主要为微观信息经济）两个角度，本书从情报学角度对信息资源宏观空间配置这一分支的研究，总结了信息流和信息流量的概念与特征以及信息流动的规律；在把信息流动看作源于区域间相互联系的基本思想下构建模型，揭示出信息流的宏观空间分布格局——多中心网络化。分析信息流动空间格局形成的内在机制，以及信息流对数字鸿沟的影响，并据此提出政策建议。

第一章提出研究内容、技术路线和创新之处。从实际背景来看，我国已经进入信息经济时代，信息化、网络化的发展使信息流动的作用日益凸显。从掌握的文献资料来看，区际生产要素流动与区域发展相伴而生，目前研究仍集中于对物流、人流、资金流等空间结构和影响上，信息流的研究由于其非实物的形态，数据获取的困难性影响了它的发展。为解决这一问题，本书试图构建一般模型揭示区域间信息流动的规模进而得到信息流动的空间结构特征，并分析这一空间格局形成的内在机制，讨论信息流动带来的区域等级体系的变化。

第二章介绍理论基础和相关研究述评。由于信息与信息流概念在不同学科领域的不一致是阻碍信息空间流动研究的一个因素，本章首先对信息和信息流以及信息量和信息流量概念进行梳理，给出本书对信息流的理解。研究以信息流动源于区域间相互作用为基本假说，以空间相互作用理论和社会网络理论为理论基础。通过对文献的梳理发现过去的研究多为静态的、孤立的分析，方法上主要利用实证调查数据进行分析。本书认为信息流动受到区域经济地位、产业发展以及在城镇体系中地位等因素的影响，因此应基于动态的、整体的视角，引出下面的研究。

第三章是对信息流的现状分析，并据此提出本书的研究框架。现状分析

包括信息存量的空间极化和信息需求的空间分层两部分。发现现阶段信息存量已明显形成三个发展极：京津地区、沪苏浙地区和广东省。北京市的信息化指数最高，广东地区的信息网络建设最好，沪苏浙地区在信息技术应用上领先。现代信息载体空间集聚非常明显，其中又尤以现代电器和电信设备的波动较大。传统载体中图书期刊的普及程度波动较大，说明我国现阶段加大信息基础设施和科学教育的投资能够更明显地弥补信息资源分布的不均衡。对信息需求的讨论发现不同行业、社会背景、学术背景的人群间信息需求产生明显分层；不同地区间网络信息的需求从应用深度和需求种类上也分层明显。信息化发展较好的区域实现了对信息的主动反馈、整合和应用，而信息化较弱的区域还停留在被动接受阶段。信息需求的空间分层形成多元化的信息流向，即在"质"上的数字鸿沟。结合我国主要城市间航空客流的分析，本书提出假说：我国信息的空间流动已经形成多中心网络化的格局。

第四章研究区域信息流总体趋势。从信息流与实物流关系、信息流的社会性和信息流的地域衰减性几个角度分析区际信息流的邻近效应。因此某区域与周围区域信息化发展的相互关系决定了信息流的方向，可以利用空间自相关方法分析我国现阶段区际信息流动的总趋势。实证发现，我国信息化程度的全局空间自相关指数正显著，揭示出信息流动不是随机的，而是有显著的相互依赖性；信息化程度的局部空间自相关指数揭示各区域对周围区域信息化发展的影响进而得出各区域信息流动的趋势，并以"极化中心""扩散中心""局部扩散"和"低洼地"对各区域的信息流动状况进行分类。发现我国已经形成三个发展极，而在其周围都出现"低洼地"。

前面的实证只是对区域信息流动总趋势的讨论，第五章具体给出各区域间信息流规模。区域的空间相互作用表现为信息的区际流动，因此本章以空间相互作用理论基本模型——引力模型为基础并进行修正，构建区际信息流动规模模型。结合上一章实证结论，发现我国现阶段信息空间流动形成多中心网络化的空间格局，网络以各层信息流集聚中心为节点，以三大集聚中心之间和集聚中心与邻近腹地间信息流动为连接边。具体到各区域，三大集聚中心信息流动活跃但流动方向不同，与各腹地的关系也不同，京津地区是信息辐射中心，沪苏浙地区和广东省是信息的吸收中心。中部地区内部诸省间信息流动不活跃，组成了稀疏的社会网络，使得信息资源配置效率不高，信息化难以发展，但"疏网"结构松散、利用吸收"异质"信息的特征也给中部地区信息化发展带来希望。和中部相反，西

部地区内部联系密切，但与外部交流甚少，属于联系紧密的社会网络，依赖于区内信任平台，加大与区外的联系是西部地区信息化发展的途径。总之，信息流形成三大中心，每一中心与腹地形成网络化信息流动结构，基本符合随距离衰减的规律，信息流作用下新的区域等级秩序形成。

第六章研究信息流形成多中心网络化空间结构的内在机制。首先，信息流动的信源和信宿双方在认知结构和宏观经济结构上的增值性（包括量和质）构成信息流的增值性，信息流动过程中物质载体、社会关系因素、信息时效、吸收能力等都会引起信息流的衰减。信息流的增值性和衰减性造成信息流的规模报酬递增，进而信息流势必集聚于信息化发展成熟的地区以及它们的邻近地区。其次，区域总是处于社会网络中，信息流动构成社会网络，发现不同结构和联系的网络信息流动的规律不同，处于网络不同位置的区域信息吸收或辐射也不同。强关系网络内信息流动意愿强、效率高，共同的背景有利于不可编码信息的传输，但也使信息冗余严重；弱关系网络适合可编码信息的传递，扩大了交流的范围，促进了创新。网络密度越大，信息流动越有效；区域间越"团结"，资源配置效率越高。而密度越小，信息吸收能力就越强。从而得出信息流动会在某些网络内或网络间集聚以及多层分化。

第七章研究信息流的经济效应，以 2001 年到 2007 年数字鸿沟的演变为代表。从信息流规模和层次上分别定性地讨论信息流动对数字鸿沟演变的影响，得出信息流的空间极化产生的"马太效应"扩大了信息中心与其他地区间数字鸿沟的结论。

第八章以就业信息为例分析信息流动的社会和经济效应。农民工群体进入城市，从寻职到就业，再到职业流动、社会和经济地位提升的全过程，体现了信息流动的效应。以职业搜寻理论为基础，结合中国当前劳动力市场和农民工群体的特征，构建农民工的职业搜寻模型。并在数理模型的基础上，以全国综合社会调查（CGSS）中对农民工寻职过程的跟踪数据，分析农民工职业搜寻过程对其职业流动状况的影响。

第九章为结论、局限与展望。在前面章节讨论的基础上，得出本书的结论，根据这些结论尽可能地提出一些切实的政策建议，最后指出本研究存在的不足和今后还有待进一步研究的问题。

关键词：信息流　空间自相关　引力模型　规模报酬递增　社会网络

Abstract

The spatial pattern and intrinsic mechanisms of information flow among the 31 provinces, cities and autonomous regions are analyzed in this dissertation. As the assurance to realize the information's value, information flow has been the most important character of the society. The research of information economy is from two aspects: informatics (mostly of macro-information-economy) and economy (mostly of micro-information-economy). This article is based on the research of information resource's spatial configuration. Firstly, the study described the conception and characters of information and information flow, and then summarized the disciplines of information flow. Based on the idea of contacts among areas causing information's flow, the hypothesis of "information's flow is prone to convergence in size, direction and arrangement" is advanced. By building several models, the article verified the hypothesis and the spatial pattern of information flow is uncovered profoundly.

Chapter 1 analyzs the necessity and significance of this study, showed the content and basic methodology, and pointed out potential contribution and deficiency. Our country entered the information society, information flow is important increasingly. Most of existing literatures about elements flow mostly focused on such aspects as the spatial pattern of objects, human and money's flow and the aspects to economy. The difficulty of dates'obtain has been the obstacle of information flow's research. To resolve the problem, the article tried to build a common model to analyze the reason of imbalance of informationization among areas from the aspects of information flow empirically.

Chapter 2 sums up the basic theories and the most representative claims of the spatial pattern of information flow. Just because of the disagreement of the concept of information, the study of information flow has been grown slowly, so

this chapter packs up the concepts of information, information flow and their quantity, then give the understand of information flow in this article. The research is based on the basic hypothesis that information's flow is rooting from the contacts of areas, and we all know information's flow come into being interpersonal network, so we choose space interaction theory and social network theory as the basic theory. By the tidying up the documents of information flow, we find that most of the researches are based on the static and isolated idea, and almost focus on one carrier of information. But we think that the research of information flow should be based on the dynamic and holistic idea.

Chapter 3 is the existing condition analysis of information flow, and then gives the research framework of the dissertation. The exising condition analysis consists of the polarization of information inventory and the delamination of information need. We find that information inventory condition has come into being three development centers: Beijing and Tianjin region, Shanghai Jiangsu and Zhejiang region and Guangdong province, and each region are good at information index, information technology and network built inspectively. The modern carriers of information are more concentrative than traditional ones. In the discussion of information need, we find that people with difficult background of society, profession and learning have difficult information need. The need of network information is layered too. Combining with the analysis of the air transportation's passenger flow among the big cities, we advance the hypothesis: our country's information flow has come into being the several centers and networked pattern.

Chapter 4 analyzes the neighbourhood effect of information flow from several aspects of the connection of informations with paracticality flow, the sociality and the range attenuation of information flow. So the interrelation of informatization development among areas decides the direction of information flow. Using the space autocorrelation indexs, we can find that the overall space autocorrelation index of information growth among areas is positivily significant, which reveals the flow of information is not randomness but being rely on each other. The local space autocorrelation index reveals the influence among the information development of areas. And we name the difficult flow condition with "polarization center", "diffusion center", "local diffusion" and "downfold". We find our

country has come into being three centers and near each can find "downfold" .

Chapter 5 gives the scale of information flow among the areas. Information's folw is originated from the intercorrelation of the areas, so we build the model based on the gravitation model and modifies it combining with the feature of information. We find that our country's information flow has formed the multicenter network pattern. The convergency centers of information flow of several layers are the nodes and the information flow among the convergency centers and their hinterlands are the links of the network. Specifically, the three centers are very active in information flow but difficult in direction. Beijing and Tianjin are output center and the other centers are input centers. The provinces in middle part are not active in information flow, and we can say they form a loose network which is inefficient in distribution of information resources but competent in absorbing new ideas. In a contrary, provinces in the west build a dense network, but lack communition with other areas. So depending on the belief inner the network, increasing the touch with other areas is the way of them to improve.

Chapter 6 reveales the mechanism of pattern of information flow. Firstly, the resources and the destinations of information flow cause the flow's increasing returns to scale from cognitive structure and economic structure's increasing in quantity and quality. The obstacle carrier of information, social relations factors, time effect and absorbency all can cause the attenuation of information in quantity and quality. Secondly, any area is in the social networks, and strong connections help the flow of information which are not decodable based on the strong wish of flow, high efficiency and the same background, but the information redundancy is a problem; weak connections help the flow of information which are decodable, which widen the scale of communication and speed the innovation. The density is also an aspect of social network which can influence the information flow. Just because of the force of unity's promotion to allocative efficiency, More density of the network, more efficiency of connection. And the thin network has higher absorption ability than thick one. So the difficult network structure and the difficult location in network all influence the flow of information. The article put forward to the hypothesis of "information flow is prone to convergence" .

Chapter 7 discusses the economic impact of information flow which is repre-

sentated by the digital divide from 2001 to 2007. By researching the impact of information flow to digital divide qualitatively in scale and layer, we find that information flow's polarization extends the digital divide.

Chapter 8 takes advantage of the employment information as an example to analy – ze the social and economic effects of information flow. Migrant workers come into the city, form job searching to be employed and to the occupational mobility, the progress of raise in both social and economic status reflects the effect of information flow. On the basis of job search theory, combined with the characteristics of the labor market and migrant workers in current China, the job search model of migrant workers is build. Using the tracking data of migrant workers from national General Social Survey (CGSS), on the ground of mathematical model, we analyze the impact of migrant workers' job search progress on their occupational mobility.

Chapter 9 explained the conclusion and limitation of this paper. Main conclusions were draw on based on preceding analysis. According to these conclusions, this paper posed some practical policy recommendations. Finally, the limitation and remaining problems of this study were pointed out.

Keywords: Information flow   space autocorrelation   gravity model   Increasing returns to scale   Social Network

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