中国地级市（地区）财产保险市场状况

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摘　要：财产保险的市场状况具有空间分异性，采用经济地理的视角和研究方法具有意义。中国保险业的数据披露在系统性、准确性和延续性上均是较好的，包括地区、企业、产品和年度 4 个维度。本文基于《中国保险年鉴》和《中国城市统计年鉴》的数据，进行多种交叉验证后，从保险监管部门和行业性组织、企业年度报告或其他公开披露信息获得辅助数据，进而计算了中国地级市（地区）财产保险市场整体发展程度、赔付水平、企业结构和产品结构这 4 个方面的 9 个指标。该数据集为.xlsx 储存格式，数据量为 21.9 MB。该数据集既能够用于研究中国财产保险的话题，也能为研究经济地理、区域和空间经济、产业组织等领域的一些话题，提供样本。

关键词：地级单位；财产保险；企业结构；产品结构

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1　前言

财产保险的市场状况与地理因素的关联很大，且这种关联在金融业的主要子行业（银行、产险、寿险、证券、信托、基金、金融租赁等）中或许是最大的[1]。以中国财产保险的前 5 大产品为例，机动车险的赔付率和费用率在各地差别较大，这受到了各地区不同人口、道路状况的影响。企业财产保险的市场运行状况受到所在地的气象、地质、水文等因素的较大影响。农业生产有“靠天吃饭”的特点，其经营成果高度依赖于所在地的农业生产环境；在信用保证险中，信用险主要是出口信用险，而进出口情况较大程度上取决于地理位置（如是否有港口、与哪些国家或地区临近）；保证险承保投保人自身的违约风险，而较大规模的违约风险往往具有区域性特征。责任险的特点是与法治环境息息相关，而法制受到文化的巨大影响，进而也受到地理环境的影响。因此，以经济地理的视角和方法研究财产保险市场具有意义。

中国保险业的数据披露工作较好，可以收集到包括地区、企业、产品和年度 4 个维度的数据，数据在系统性、准确性和延续性上也较好。中国地级市（地区）财产保险市场状况数据集[2]可为学者提供参考使用的样本。

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[2] 王向楠. 中国地级市(地区)财产保险市场分析数据集(2016) [DB/OL]. 全球变化科学研究数据出版系统, 2018. DOI: 10.3974/geodb.2018.05.14.V1.

2　数据集元数据简介

中国地级市（地区）财产保险市场分析数据集（2016）[2]的名称、作者、地理区域、数据年代、数据集组成、数据出版与共享服务平台、数据共享政策等信息见表 1。

表 1　中国地级市（地区）财产保险市场数据集（2016）元数据简表

条　目	描　述
数据集名称	中国地级市（地区）财产保险市场分析数据集（2016）
数据集短名	PropertyInsuranceMarketAnalysisChina2016
作者信息	王向楠 E-7193-2017, 中国社会科学院金融研究所, jaffwang@126.com
地理区域	中国内地的直辖市、计划单列市或地级单位所辖地区
数据年代	1998、2016
数据格式	.xlsx
数据量	21.9 MB
数据集组成	（1）财产保险整体发展程度，包括 3 个指标；（2）赔付水平，包括 1 个指标；（3）企业结构，包括 2 个指标；（4）产品结构，包括 3 个指标；（5）9 个指标空间分异性的分解结果；（6）3 张附表，为经过整理的原始数据
基金项目	国家社会科学基金项目（18CJY063）
出版与共享服务平台	全球变化科学研究数据出版系统 http://www.geodoi.ac.cn
地址	北京市朝阳区大屯路甲 11 号 100101，中国科学院地理与资源研究所
数据共享政策	全球变化科学研究数据出版系统的“数据”包括元数据（中英文）、实体数据（中英文）和通过《全球变化数据学报》（中英文）发表的数据论文。其共享政策如下：（1）“数据”以最便利的方式通过互联网系统免费向全社会开放，用户免费浏览、免费下载；（2）最终用户使用“数据”需要按照引用格式在参考文献或适当的位置标注数据来源；（3）增值服务用户或以任何形式散发和传播（包括通过计算机服务器）“数据”的用户需要与《全球变化数据学报》（中英文）编辑部签署书面协议，获得许可；（4）摘取“数据”中的部分记录创作新数据的作者需要遵循 10%引用原则，即从本数据集中摘取的数据记录少于新数据集总记录量的 10%，同时需要对摘取的数据记录标注数据来源[3]

3　数据研发方法

3.1　数据来源和整理说明

原始数据有 3 类来源。（1）主要的原始数据来自《中国保险年鉴》。该年鉴由中国保险监督管理部门主管和负责审核，中国保险年鉴社主办，创刊于 1998 年，是一部较系统地反映中国保险市场面貌的年度出版物[4–5]。（2）各地区的常住人口数和国内生产总值的数据来自《中国城市统计年鉴》[6]。该年鉴由国家统计局城市社会经济调查司主办的，创刊于 1985 年，报告了中国建制城市（含地级及以上城市和县级城市）社会经济发展和城市建设等方面的信息。由于该年鉴直接报告的是户籍人口数，“常住人口数”是根据国内生产总值和人均国内生产总值（国内生产总值/常住人口数）计算得到。（3）在数据的补充和校正环节，笔者从保险监管部门及其派出机构、保险行业组织、企业年度报告或其他公开披露信息中获得了一些信息。

财产保险类方面的原始数据包括地区、企业、产品和年度4个维度。(1)“地区”是指地级(及以上)的市(地区),包括4个直辖市辖区、5个计划单列市辖区、27个省会(自治区首府)辖区和若干个地级市(地区)。地区数目在1998年为216,在2016年为337。1998年的地区数较少,主要是由于《中国保险年鉴》才创办,有几个省份没有报告所辖地级市(地区)的数据。此后,《中国保险年鉴》覆盖的地区要多于《中国城市统计年鉴》,比如四川包括了阿坝、甘孜、凉山3个自治州。(2)“企业”是指实际开展了业务(保费收入>0)的保险企业,1998年有14家,2016年有86家(包括航运保险中心)。(3)“产品”是指财产保险的产品种类,不包括人身保险产品和再保险产品。1998年的产品种类包括5种,2016年的产品种类包括8种。(4)“年度”是指从1998年到2016年的各年。

为了提高数据的完整性和准确性,笔者在输入原始数据后,进行了多种交叉验证(cross validation)。具体包括:各产品的收入(赔付)之和等于总收入(赔付),各企业的收入(赔付)之和等于全行业的收入(赔付),低一级地区的收入(赔付)之和等于高一级的总收入(支出);从年度上看,各地区、各企业或各产品的保费收入和赔付是否有异常变动;各地区是否缺失了某些企业的数据;地区或企业的名称有无重复;保费收入与赔付支出的相对大小是否异常等。原始数据的质量是非常高的,但是对于可能的遗漏或误差,通过逻辑判断,再从保险监管部门及其派出机构网站、保险行业组织、企业年度报告或其他公开披露信息的方式获得相关数据,进行补充和矫正。

3.2 指标设计

从整体发展程度、赔付水平、产品结构、企业结构4个方面分析2016年的财产保险市场状况。

财产保险的整体发展程度有3个指标(数据集的表1)。(1)财产保险密度,其定义为各地区的“财产保险保费收入”/“常住人口数”。(2)财产保险深度,其定义为各地区的“财产保险保费收入”/“国内生产总值(GDP)”。该指标是在保险密度指标的基础上多考虑了经济发展因素。(3)财产保险增速,其计算方法为各地区的(“2016年财产保险保费收入”/“1998年财产保险保费收入”)$^{(1/19)}$–1,即是1998–2016年期间采用几何平均法(Geometric Average)计算的财产保险保费收入的年均增长率。该指标反映财产保险市场的增长状况。

财产保险的赔付水平有1个指标(数据集的表2),其计算方法为各地区的“财产保险赔付支出”/“财产保险保费收入”。它是反向衡量财产保险市场盈利程度的一个简易指标。需要说明的是,由于《中国保险年鉴》的原始数据中保费收入和赔付支出“四舍五入”到1万元或10万元,所以计算小地区、小企业和小产品的赔付水平时,误差会较大;此时,为了提高赔付水平计算的精确性,可以考虑剔除保费收入或赔付支出低于50万(或其他设置值)的观测。

财产保险的企业状况有2个指标(数据集的表3)。(1)企业数目,即经营财产保险业务的保险企业数目。该指标直观反映财产保险供给方面的繁荣程度,也是正向衡量保险市场竞争程度的一个简易指标。(2)企业集中度,其计算方法为各地区中各企业的保费收入的赫希曼-赫芬达尔指数(Herschman-Heffendahl Index,HHI),其是衡量集中度的常用指标。

$$HHI_{Firm_i} = \sum_j s_{ij}^2 \tag{1}$$

式中，s_{ij} 表示地区 i 的财产保险市场中企业 j 的保费收入的份额。HHI_{Firm} 的取值范围为 0–1，取值越大表示企业集中度越高。当市场中仅有 1 家企业时，为垄断市场，HHI_{Firm}=1；当市场中有无穷多企业时（是完全竞争市场的一个条件），HHI_{Firm}=0。集中度还可以采用其他的多种计算指标，可以分为无参数和有参数两大类[7–9]。

财产保险的产品结构有 3 个指标（数据集的表 4）。（1）车险业务比重，其计算为各地区的“机动车险保费收入”/“财产保险保费收入”。近些年，居民是机动车的主要拥有者，所以车险主要是服务于生活的，而财产保险中的企业财产保险、工程保险、货物运输保险、责任保险、信用保证保险、农业保险等主要是服务于生产的。（2）产品集中度，其计算为各地区中各产品的保费收入的赫希曼-赫芬达尔指数，

$$HHI_{Prod_i} = \sum_k s_{ik}^2 \tag{2}$$

式中，s_{ik} 表示地区 i 的财产保险市场中产品 k 的保费收入比重。HHI_{Prod_i} 的取值范围为 0–1，取值越大表示产品集中度越高。（3）产品专业度。前两个指标仅是关注单个地区，但是研究中可能更关注各地区在产品结构上与全国相比的特殊性，其往往决定于该地区在地理因素或其他因素上的特殊性。产品的特殊性常称为“产品专业度”。将 s_k 表示全国的财产保险市场中产品 k 的保费收入比重。采用常用的 Manhattan 距离测量向量相似度[10]，地区 i 的产品专业度定义为：

$$Specialization_i = \frac{1}{2}\sum_k \left| s_{ik} - s_k \right| \tag{3}$$

产品专业度（$Specialzation_i$）的取值范围为 0–1。如果地区 i 与全国的产品结构完全相同，即对于任何一种产品，该产品在地区 i 的财产保险市场上的比重与在全国的财产保险市场上的比重相同，那么 $Specialization_i$ 取最小值 0。随着地区 i 与全国的财产保险的产品结构的差异性逐渐提高，$Specialization_i$ 将趋近于 1。$Specialization_i$ 无法等于 1，这是因为，全国是各地区的加总，在地区 i 存在的财产保险产品必然被统计入了全国的财产保险市场中。

数据集中 4 张表的 9 个指标均是以地区为分析对象。不同学科或不同话题关注的对象有所差别，有些研究更关注企业问题或产品问题。对于除财产保险密度和财产保险深度的 7 个指标，均可以“企业”为分析对象，如研究各企业的增速、赔付水平、地理结构和产品结构。对于这 9 个指标，均可以“产品”为分析对象，如研究各产品的整体发展程度、赔付水平、地理结构[11]和企业结构。

为了分析这些指标是否存在空间分异性（Spatial Stratification Heterogeneity），本文采用 q 统计量检验[12]进行严格的检验，计算公式如下：

$$q_y = 1 - \sum_{h=1}^{7} N_y^h \left(\sigma_y^h\right)^2 \Big/ N_y \sigma_y^2 \tag{4}$$

式中，y 表示 9 个指标中的某一个，h 表示 7 个地理区域[1,13–14]（划分标准见数据集的表 5），N_y 和 σ_y^2 分别表示指标 y 的样本总量（地级市（地区）总数）和样本总方差，N_y^h 和 σ_y^h 分别表示地理区域 h 中指标 y 的样本量和方差。q_y 表示总体方差被各层解释的比重，q_y 的取值范围为[0,1]，q_y=0 表示不存在空间分异，q_y=1 表示存在完全的空间分异，q 的值越大表示空间分异性越明显。借鉴王少剑等[15]的方法，本文采用 q 指标的核心思想是：影响某个指

标的相关因素在空间上具有差异性，若某因素和该指标的强度在空间上具有显著的一致性，则说明该因素对该指标的形成可能具有重要的影响。这 9 个指标的空间分异性的测算结果报告于数据集的表 5，经检验，均存在显著的空间分异性（P<0.001）。

4 数据结果及讨论

表 2 的第 2 列到第 10 列分别报告了 2016 年 9 个财产保险市场状况指标取值最大的 5 个地级市（地区）和取值最小的 5 个地级市（地区）。此外，各地区的财产保险深度、赔付水平和企业数目的情况（2013 年）可参考文献[1]。可见，中国不同地级市（地区）之间财产保险市场状况差别很大。

表 2 各地级市（地区）财产保险市场状况（最高的 5 个和最低的 5 个）

	密度（元/人）	深度	年均增速	赔付水平	企业数目	企业集中度	车险业务比重	产品集中度	产品专业度
最高的 5 个地级市（地区）	沈阳	沈阳	张家界	黑河	上海	果洛	温州	温州	大兴安岭
	2,234.18	3.34%	59.20%	142.44%	54	1	88.41%	0.784,7	0.850,5
	深圳	鞍山	娄底	本溪	北京	阿里	榆林	榆林	果洛
	2,184.02	2.62%	59.01%	127.57%	51	0.958,8	88.19%	0.781,3	0.821,3
	北京	拉萨	长沙	海北	广州	黄南	金华	金华	黄南
	1,803.85	2.60%	58.96%	102.29%	47	0.864,7	86.88%	0.758,5	0.814,9
	上海	阜新	贵港	黄南	南京	甘南	大同	大同	兴安
	1,719.07	2.52%	56.87%	95.07%	43	0.760,3	86.77%	0.756,7	0.814,5
	厦门	阜阳	湖州	鞍山	杭州	昌都	许昌	许昌	山南
	1,683.22	2.52%	56.53%	90.82%	40	0.712,9	86.62%	0.754,3	0.805,8
最低的 5 个地级市（地区）	昭通	开封	牡丹江	崇左	阿里	枣庄	那曲	海口	本溪
	179.69	0.50%	11.08%	36.68%	2	0.107,7	0.24%	0.332,7	0.046,5
	陇南	三门峡	白山	玉树	昌都	淄博	黔西南	铁岭	丹东
	174.15	0.49%	10.72%	30.82%	2	0.106,8	0.21%	0.324,0	0.046,4
	汕尾	包头	伊春	昌都	那曲	杭州	海南	喀什	昆明
	166.04	0.49%	10.52%	26.99%	2	0.104,0	0.20%	0.321,9	0.046,0
	商洛	辽源	抚顺	那曲	克孜勒苏	济南	玉树	甘孜	南宁
	158.79	0.46%	8.78%	26.22%	2	0.098,8	0.07%	0.321,4	0.045,7
	宿州	鄂尔多斯	本溪	果洛	果洛	临沂	果洛	拉萨	湘潭
	105.10	0.39%	8.45%	22.83%	1	0.077,2	0.00%	0.270,5	0.038,1

图 1（a）-图 1（i）分别报告了 2016 年 9 个财产保险市场状况指标在各地理区域的均值情况，“均值”即是该指标在某个地理区域中所有地级市（地区）的算数平均值。

5 总结

本数据集基于中国财产保险行业的地区、企业、产品和年度的 4 维数据，以地级市（地区）为分析对象，计算和报告了财产保险的整体发展程度（4 个指标）、赔付水平（1 个指标）、企业结构（2 个指标）、产品结构（2 个指标）。结果显示，这些指标存在明显的空间分异性。本数据集既为研究中国财产保险的话题提供了丰富的数据，也为研究经济地理、区域和空间经济、产业组织等领域的一些话题提供了较为难得的样本。

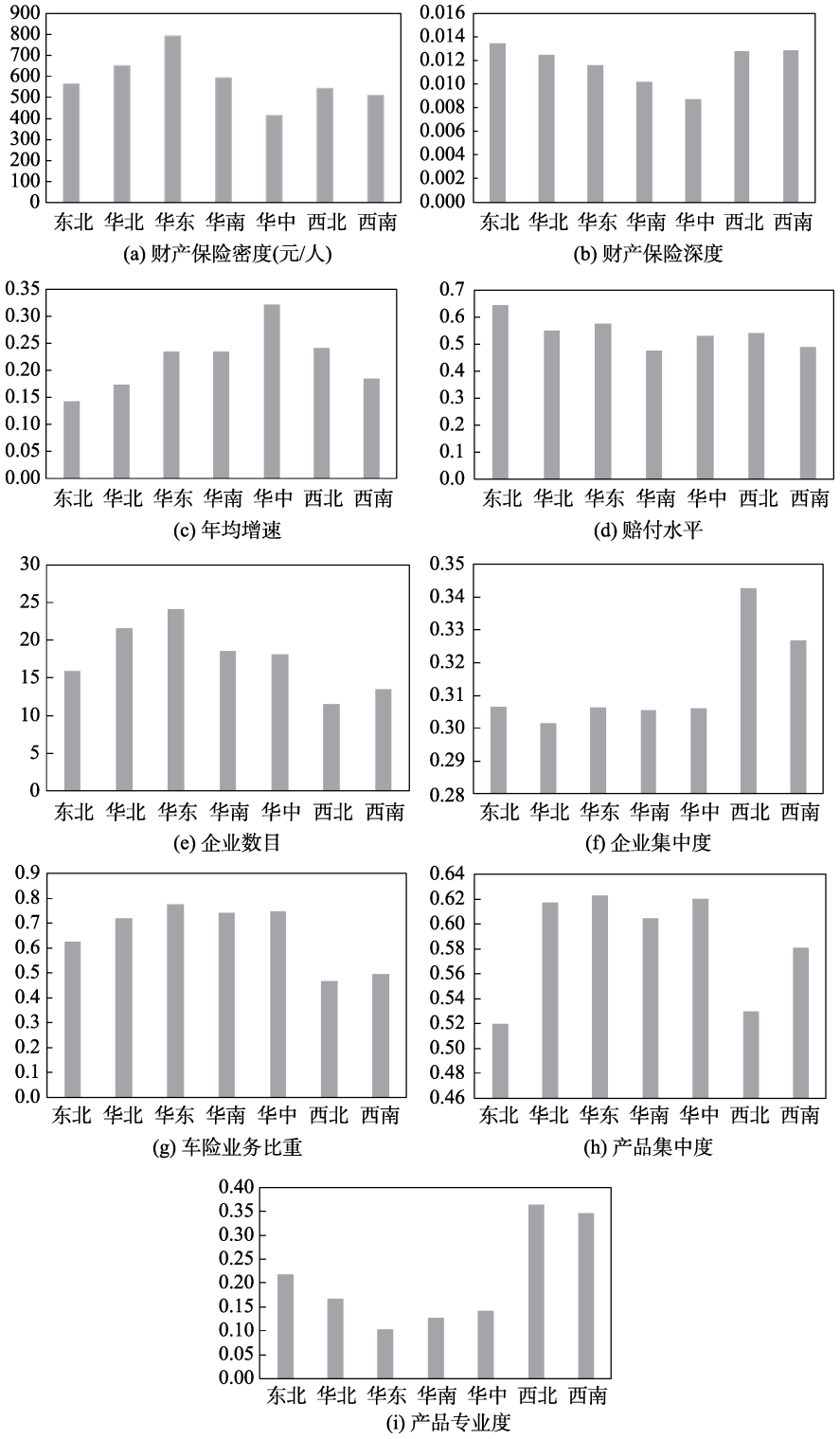

图 1　各地理区域的财产保险市场状况（2016 年）

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Property Insurance Market Analysis Dataset in Prefecture-level of China (2016)

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Abstract: The property insurance market has spatial stratification heterogeneity, so it is meaningful to use the perspectives and research methods of economic geography to study it. Data disclosures of China's insurance industry are relatively excellent regarding systematicity, accuracy, and continuity, and represent data across four dimensions: area, firm, product, and year. Based on data drawn from the Yearbook of China's Insurance and the China City Statistical Yearbook, this paper adopts various cross validations and obtains auxiliary data from several channels, including insurance regulatory authority, insurance industrial organizations, annual reports of insurers, and other public available data sources, and then calculates nine indicators of the property insurance market in the prefecture level in China, comprising 9 indexes in four aspects, i.e., overall development, payment level, firm structure, and product structure. The data size is 21.9 MB in .xlsx format. The dataset can be used not only to study China's property insurance market but also to provide good samples for research focusing on economic geography, regional and spatial economies, and industrial organization, etc.

Keywords: prefectures of China; property insurance; firm structure; product structure

1 Introduction

The market status of property insurance is mainly associated with geographic factors, and this association is likely the greatest among major components of the financial industry, which includes banking, property insurance, life insurance, securities, trust, funds, and financial leasing[1]. Taking China's top five property insurance products as examples, the payment rate and expense ratio of automobile insurance vary significantly across different areas depending on population and road infrastructure conditions. The market operating status of enterprise property insurance is profoundly affected by meteorological, geological, and hydrological factors and by other factors that vary by regions. As agricultural production mostly depends on climate, agricultural harvests are highly dependent on the local production environment. Regarding credit and guarantee insurance, the former mainly relates to export credit insurance, which is largely dependent on geographic locations (e.g., whether there is a port nearby and which countries or regions are adjacent), while the latter covers the insured's own default risk, and large-scale default risk is often characterized by regional

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shocks. Liability insurance is closely related to the legal environment, which is significantly influenced by cultural patterns and thus influenced by the geographical environment. Therefore, it is pivotal to study the property insurance market using perspectives and methods of economic geography.

Data disclosures on China's insurance industry are preferable. Data from the dimensions of the area, firm, product, and year can be collected, and the systematicity, accuracy, and continuity of the data are relatively excellent. This paper describes the data on the property insurance markets of Chinese prefecture-level cities (regions)[2], which can be used by scholars.

2 Metadata of Dataset

The name, author, geographical region, year, dataset files, foundation(s), data publisher, data sharing policy, etc., for the property insurance market analysis dataset in prefecture level of China (2016)[2] are shown in Table 1.

Table 1 Metadata summary of property insurance market analysis dataset in prefecture level of China (2016)

Items	Description
Dataset full name	Property insurance market analysis dataset in prefecture level of China (2016)
Dataset short name	PropertyInsuranceMarketAnalysisChina2016
Author	Wang, X. N. E-7193-2017, Institute of Finance and Banking, Chinese Academy of Social Sciences, jaffwang@126.com
Geographical region	Municipalities under the direct administration of the central government, municipalities with independent planning status, and prefectural units in China
Year	1998, 2016 Data format .xlsx Data size 21.9 MB
Data files	(1) Overall development of the property insurance market, including 3 indicators; (2) payment level, including 1 indicator; (3) firm structure, including 2 indicators; (4) product structure, including 3 indicators; (5) decomposition results on the spatial stratification heterogeneity of the 9 indicators; and (6) three annexed tables showing the processed raw data
Foundation(s)	National Social Science Foundation of China (18CJY063)
Data publisher	Global Change Research Data Publishing & Repository, http://www.geodoi.ac.cn
Address	No. 11A, Datun Road, Chaoyang District, Beijing 100101, China
Data sharing policy	***Data*** from the Global Change Research Data Publishing & Repository includes metadata, datasets (data products), and publications (in this case, in the *Journal of Global Change Data & Discovery*). ***Data*** sharing policy includes: (1) ***Data*** are openly available and can be free downloaded via the Internet; (2) End users are encouraged to use ***Data*** subject to citation; (3) Users, who are by definition also value-added service providers, are welcome to redistribute ***Data*** subject to written permission from the GCdataPR Editorial Office and the issuance of a ***Data*** redistribution license, and; (4) If ***Data*** are used to compile new datasets, the 'ten percent principal' should be followed such that ***Data*** records utilized should not surpass 10% of the new dataset contents, while sources should be clearly noted in suitable places in the new dataset[3]

3 Methods

3.1 Data Collection and Processing

The primary data were drawn from three sources: (1) The majority of the primary data was drawn from Yearbook of China's Insurance. The yearbook was created in 1998 under the management and supervision of China's insurance regulatory authority, and sponsored by the Yearbook of China's Insurance Press. The yearbook is created as an annual publication that systematically reports on the status of the Chinese insurance market[4–5]. (2) Data on the

permanent resident population and gross domestic product of each area were from the China City Statistical Yearbook. The yearbook, created in 1985, is sponsored by the Urban Socio-economic Survey Division of National Bureau of Statistics, which reports information on social and economic development and urban construction in China's established cities (at the prefecture-and-above level cities and county level cities). (3) Through the data supplementation and correction process, the author obtained some information from the insurance regulatory authority and its branches, insurance industrial organizations, firm annual reports, and other publicly available materials.

Primary data on property insurance include information collected on four dimensions: area, firm, product, and year. (1) "Area" refers to cities (regions) at the prefectural level (or above), including 4 municipalities under the direct administration of the central government, 5 municipalities with independent planning status, 27 provincial capitals (autonomous region capitals), and several prefecture level cities (regions). The number of areas amounted to 216 in 1998 and to 337 in 2016. The number of areas was lower in 1998 because several provinces did not report data on prefecture level cities (regions) when Yearbook of China's Insurance was originally created. Since 1999, Yearbook of China's Insurance has covered more areas than those of the China City Statistical Yearbook. For example, the former includes information on the Aba, Ganzi, and Liangshan autonomous prefectures of Sichuan province. (2) "Firm" refers to insurers in operation (premium income > 0), amounting to 14 in 1998 and to 86 in 2016 (including shipping insurance centers). (3) "Product" refers to product lines of property insurance, excluding life insurance and reinsurance (five in 1998 and eight in 2016). (4) "Year" refers to successive years of the period running from 1998 to 2016.

3.2 Indicator Design

The status of the property insurance market in 2016 can be analyzed in four aspects: overall development, payment level, product structure, and firm structure.

Following indicators are applied to examine the overall development of property insurance (Table 1 of the dataset). (1) Property insurance density, which is defined as the *property insurance premium/residential population* of each area. (2) Property insurance penetration, which is defined as *property insurance premium/gross domestic product* (*GDP*) of each area. This indicator accounts for economic development factors based on the insurance density indicator. (3) The growth rate of property insurance, which is calculated as (*property insurance premium for 2016/property insurance premium for 1998*)$^{(1/19)}$–1. This indicator reflects the growth of the property insurance market from 1998 to 2016

There is one indicator for the payment level of property insurance (Table 2 of the dataset), calculated as *property insurance payment/property insurance premium* for each area. This simple indicator is used to reversely measure the profitability of the property insurance market.

There are two indicators of the firm structure for property insurance (Table 3 of the dataset). (1) The number of firms, or the number of insurers operating a property insurance business, which visually reflects the degree of prosperity in the supply of property insurance and is a simple indicator that positively measures the degree of competition in the insurance market. (2) Firm concentration, which is calculated as the Herschman-Heffendahl index (HHI) to determine the premium of insurers in each area. The HHI is a general indicator used to measure concentration.

$$HHI_{Firm_i} = \sum_j s_{ij}^2 \quad (1)$$

where s_{ij} denotes the share of the premium of firm j in the property insurance market in area i. The value of HHI_{Firm} ranges from 0 to 1. The larger the value is, the higher the concentration of a given firm is. When there is only one firm in the market, this reflects a monopoly market, and HHI_{Firm}=1. When there is an infinite number of firms in the market (a condition of a perfectly competitive market), HHI_{Firm}=0. Concentration can also adopt a variety of other calculation indicators, which can be divided into two categories: nonparametric and parametric[7–9].

Three indicators reflect product structure of property insurance (Table 4 of the dataset). (1) The proportion of automobile insurance business, which is calculated as the *automobile insurance premium/property insurance premium* of each area. In recent years, residents have become the main owners of motor vehicles, and thus, auto insurance mainly serves personal living activities, while enterprise property insurance, engineering insurance, cargo transportation insurance, liability insurance, credit guarantee insurance, and agricultural insurance of property insurance mainly serve productive activities. (2) Product concentration, which is calculated as the Hirschmann-Hefendal index of the premium of various products in each area, is measured as follows:

$$HHI_{Prod_i} = \sum_k s_{ik}^2 \tag{2}$$

where s_{ik} denotes the proportion of premium of product k of the property insurance market of area i. The value of HHI_{Prod_i} ranges from 0 to 1. The larger the value is, the higher the concentration of a firm will be. (3) Product specialization. While the first two indicators focus on individual areas, researchers may focus more on the particularity of product structure between an area and nationwide range, which often depends on the particularities of a given area in terms of geographic or other factors. The particularity of a product is often referred to as "product specialization". s_k denotes the proportion of premium of product k in the national property insurance market. The commonly used Manhattan distance is used to measure vector similarity[10], and the product specialization of area i is defined as:

$$Specialization_i = \frac{1}{2}\sum_k \left| s_{ik} - s_k \right| \tag{3}$$

The value of product specialization ($Specialzation_i$) ranges from 0 to 1. When the product structure of area i is the same as that for the whole country (i.e., for any product, the proportion of the product in the property insurance market of area i is the same as that in the property insurance market for the whole country), then $Specialization_i$ takes the minimum value of 0. As the difference in product structures of property insurance observed between an area's market and the national market increases, $Specialization_i$ approaches a value of 1. However, $Specialization_i$ cannot be equal to 1 because the national level is the sum of all areas, and the property insurance products existing in area i must be counted as part of the national property insurance market.

All nine indicators in the above four tables of the dataset are analyzed based on areas. As researchers of different fields focus on different topics, some studies focus more on firm or product issues. For seven indicators except for those of property insurance density and property insurance penetration, all can use "firms" as analysis objects, for example, to study growth rates, payment levels, geographic structures, and product structures of firms. All nine indicators can use "products" as analysis objects, for example, studying development levels, payment levels, geographical structures[11], and firm structures of products.

To determine whether property insurance market indicators are spatially stratified heterogeneous, the q statistic (Wang *et al.*[12]) is used in formal test as follows:

$$q_y = 1 - \sum_{h=1}^{7} N_y^h \left(\sigma_y^h\right)^2 \Big/ N_y \sigma_y^2 \tag{4}$$

where y refers to one of the nine indicators; h refers the geographic areas[1,13–14] whose parti-

tion criterion is shown in Table 5 of the dataset; N_y and σ_y^2 refer to indicator y's total sample size (number of prefecture level areas) and sample total variance, respectively; and N_y^h and σ_y^h refer to indicator y's sample size and variance in geographic area h, respectively. Therefore, q_y presents the proportion of total variance explained by geographically stratified areas. q_y ranges from 0 to 1. In particular, q_y =0 denotes an absence of spatial heterogeneity, while q_y =1 denotes absolute spatial heterogeneity. A larger q_y expresses a more prominent level of spatial heterogeneity. The central implication of q_y is, according to Wang *et al*.[15], if the spatial distributions of a factor and the indicator are prominently consistent, then the factor probably impacts the formation of the indicator. The calculated results of the nine indicators' degrees of spatially stratified heterogeneity are shown in Table 5 of the dataset. The *P* values of the nine tests fall below a value of 0.001, and thus, all nine indicators are significantly spatially stratified heterogeneous.

4 Results

Table 2 reports the names of the top five cities and of bottom five prefecture-level areas for the nine property market indicators for 2016. In addition, Wang[1] reports on the penetration, payment level, and the number of firms of the property insurance market for prefecture-level areas for 2013. The evidence shows an apparent disparity in property insurance markets of prefecture-level areas in China.

Table 2 Property insurance market at the prefecture-level in China (Top five and Bottom five)

	Density (Yuan per capita)	Penetration	Average annual growth rate	Payment level	Number of firms	Firm concentration	Proportion of automobile insurance	Product concentration	Product specialization
Top five	Shenyang	Shenyang	Zhangjiajie	Heihe	Shanghai	Golog	Wenzhou	Wenzhou	Daxing'an ling
	2,234.18	3.34%	59.20%	142.44%	54	1	88.41%	0.784,7	0.850,5
	Shenzhen	Anshan	Loudi	Benxi	Beijing	Ngri	Yulin	Yulin	Golog
	2,184.02	2.62%	59.01%	127.57%	51	0.958,8	88.19%	0.781,3	0.821,3
	Beijing	Lhasa	Changsha	Haibei	Guangzhou	Huangnan	Jinhua	Jinhua	Huangnan
	1,803.85	2.60%	58.96%	102.29%	47	0.864,7	86.88%	0.758,5	0.814,9
	Shanghai	Fuxin	Guigang	Huangnan	Nanjing	Gannan	Datong	Datong	Xing'an
	1,719.07	2.52%	56.87%	95.07%	43	0.760,3	86.77%	0.756,7	0.814,5
	Xiamen	Fuyang	Huzhou	Anshan	Hangzhou	Qamdo	Xuchang	Xuchang	Lhokha
	1,683.22	2.52%	56.53%	90.82%	40	0.712,9	86.62%	0.754,3	0.805,8
Bottom five	Zhaotong	Kaifeng	Mudanjiang	Chongzuo	Ngri	Zaozhuang	Narqu	Haikou	Benxi
	179.69	0.50%	11.08%	36.68%	2	0.107,7	0.24%	0.332,7	0.046,5
	Longnan	Sanmenxia	Baishan	Yushu	Qamdo	Zibo	Southwest Guizhou	Tiding	Dandong
	174.15	0.49%	10.72%	30.82%	2	0.106,8	0.21%	0.324,0	0.046,4
	Shanwei	Baotou	Yichun	Qamdo	Narqu	Hangzhou	Hainan	Kashi	Kunming
	166.04	0.49%	10.52%	26.99%	2	0.104,0	0.20%	0.321,9	0.046,0
	Shangluo	Liaoyuan	Fushun	Narqu	Kizilsu	Jinan	Yushu	Ganzi	Nanning
	158.79	0.46%	8.78%	26.22%	2	0.098,8	0.07%	0.321,4	0.045,7
	Suzhou	Erdos	Benxi	Golog	Golog	Linyi	Golog	Lhasa	Xiangtan
	105.10	0.39%	8.45%	22.83%	1	0.077,2	0.00%	0.270,5	0.038,1

Figures 1(a) to 1(i) report the average value of the nine property insurance market indicators for each geographic area in 2016. The "average" refers to the arithmetic average of all prefecture-level areas of each geographic area.

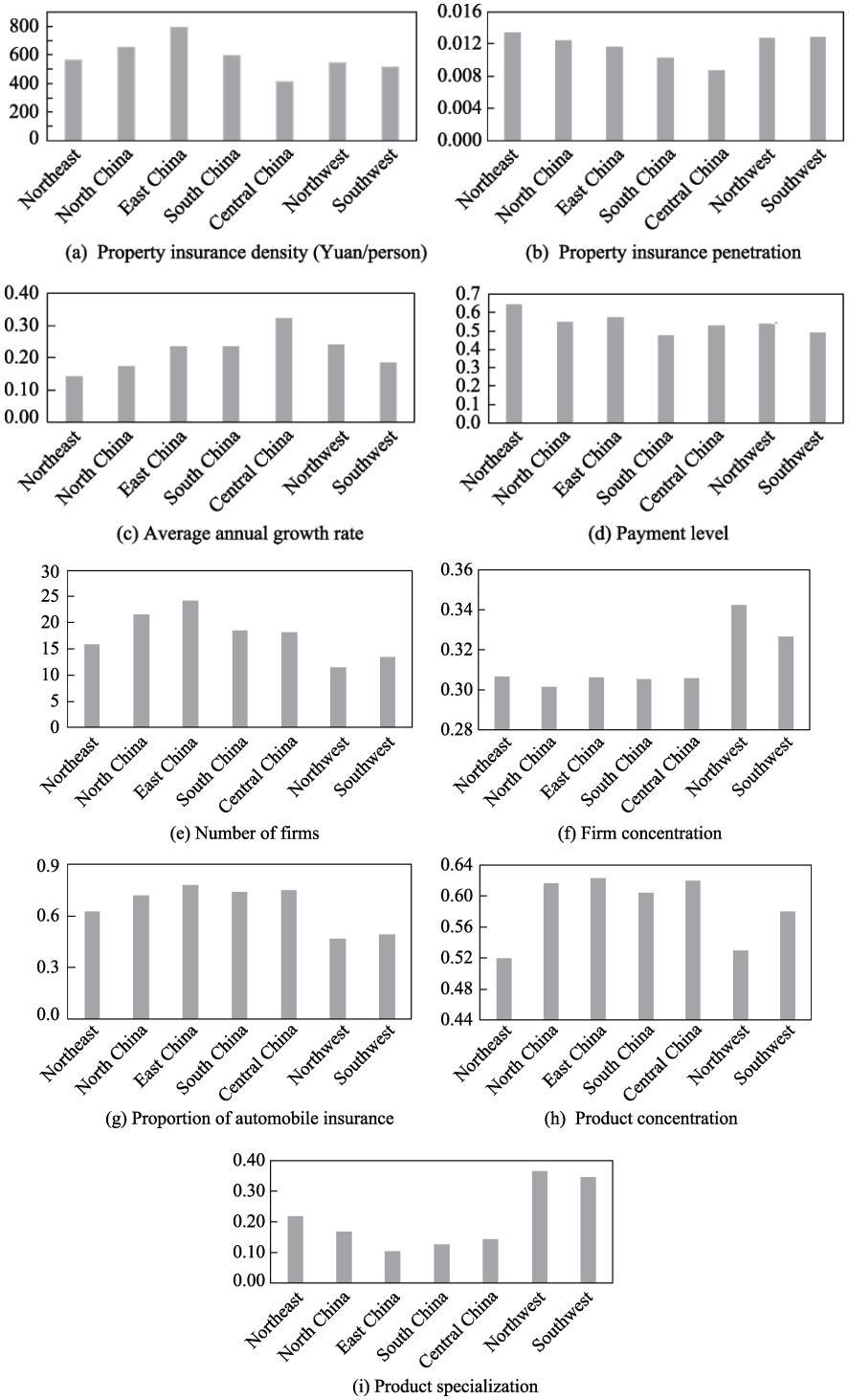

Figure 1 Property insurance markets of seven geographic areas in China (2016)

5 Conclusion

Based on four-dimensional data for China's property insurance industry covering areas, firms, products, and years, the dataset calculated and reported the overall development (3 indicators), payment level (1 indicator), firm structure (2 indicators), and product structure (3 indicators) of prefecture-level areas of China. The results showed that all of the indicators were significantly spatially stratified heterogeneous. The dataset can be used not only to study China's property insurance market but also to provide appropriate samples to explore issues of economic geography, regional and spatial economies, and industrial organization.

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