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of Chinese Life Insurance Industry

中国

寿险业

效率研究




人民出版社

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序

现代寿险业经过几百年的发展，目前已经达到相当高的水平。据瑞士再保险公司主办的《西格玛》（SIGMA）杂志统计，2008年世界寿险保费收入达24904亿美元，占世界总保费收入的58.33%。寿险在世界各国的经济、政治和社会生活中扮演着越来越重要的角色。中国的寿险业虽然起步较晚，但发展非常迅速，2009年中国寿险业保费收入达到了8261.5亿元人民币，在经济发展和人民生活中的作用日益明显。中国寿险业的健康有序发展对于我国经济体制改革，对于现代企业制度的建立、金融体制的改革和深化、资本市场的成熟和完善，都起着重要作用。

尽管中国寿险业高速增长，并且在转移风险、资金融通和社会管理等方面发挥了重大作用。但长期以来大多数寿险公司的经营方式仍然停留在粗放阶段，以“保费收入”扩张为目标追求市场份额和市场占有率、重视速度而轻视质量是中国寿险公司普遍的经营策略，这一经营策略和经营模式的直接后果是中国寿险业的经营效率普遍不高。随着我国经济体制改革的不断深入和寿险市场机制的逐步完善，市场对寿险公司的硬约束逐步增强。因此，对寿险公司的经营效率进行评价和测度，探讨影响寿险公司效率的因素，进而从理论层面和操作层面使寿险公司转变经营方式，优化资源配置，提高寿险公司的经济效益和盈利能力，保证寿险市场的健康、稳定和持续发展，是中国寿险业发展中面临的重大课题。

刘璐的《中国寿险业效率研究》一书，就是针对这一领域的有益尝试。全书以经济学、金融学理论为指导，在阐释中国“经济转轨、市场开放和渐进改革”的宏观经济背景下，从新制度经济学视角，分析了中国寿险业恢复、发展并逐步壮大的历史演进路径。作者以大量翔实的数据为基础，利用基于财务指标的因子分析法和基于DEA模型的非参数法建立效率评价模型，从横向和纵向两个方面展现各个寿险公司的效率状况和中国寿险业效率变动的整体趋势。作者结合中国寿险业的发展现状、遇到的问题，在宏观和微观的不同层面上，运用寿险业固有的运行机理，分析了不同因素对中国寿险业效率的影响方

式、影响机制和影响程度。揭示了符合中国国情的、市场经济增长发育条件下的中国寿险业的运行规律，并提出了提升中国寿险业效率的主要对策。这将有益于中国人寿保险业的蓬勃发展，有益于推动经济改革的深入，具有重要的理论价值和实践指导意义。

本书在理论和方法上有一定创新。在该书写作之前，关于中国寿险业效率问题也有一些研究，但是这些研究往往偏重实务，理论建树不足；定性研究较多，定量研究较少，缺乏对中国寿险业效率变动机理的深入研究，缺乏对中国寿险业效率内部机制与外部环境的系统分析，也缺乏切合中国实际的对策探讨。本书运用经济学、金融学、保险学的有关理论和方法，对中国寿险业效率演变的制度基础、寿险公司效率测度方法等进行了深入分析。本书具有以下几个特点：

第一，选取了独特的研究视角。本书从经济转轨的宏观背景下探讨中国寿险业发展历程、中观寿险产业市场结构、市场行为及绩效以及寿险企业微观经营特征三个层面，探讨了中国寿险业效率发展演变的制度背景、行业基础和微观原因。可以说，没有对中国经济环境和金融体制的深刻理解就不可能对中国寿险业效率变动路径进行准确把握。而制度经济学的分析视角的关键在于：将其变迁中的制度安排与经济想象联系起来，从而揭示其中的内在逻辑。因此，面对经济转轨这一特定时期我国所面临的特定经济环境，本书尝试在国有金融制度变迁、市场开放和渐进改革这一真实前提下对中国寿险业效率问题进行分析，研究视角新颖。

第二，构建了一个统一完整的分析框架。通过探究效率的理论解释、效率的评价和测度方法、影响效率的因素与机理以及提升效率的对策，本书构建了微观主体效率分析的完整框架。首先，本书对效率的内涵进行深入解读，对经济学理论中关于效率问题的思想和原理进行系统梳理与归纳。其次，本书对保险机构效率的测度方法——财务指标法和前沿分析法（包括参数和非参数两种方法）的基本原理及其算法进行系统阐述，从工具选用、变量选择和模型设定等方面系统评价了三种方法的优劣和适用条件。再次，对影响寿险公司效率的宏观基础、中观结构和微观特征进行了深入阐述，准确揭示了影响寿险公司经营效率的因素，以及这些因素的影响方式和影响程度。最后，提出了具有较强针对性和操作性的中国人寿保险公司效率提升的路径和措施。因此，本书通过构建统一完整的分析框架对中国寿险业效率问题进行了深入研究。

第三，采用了多种分析方法。首先是理论与实践的结合。本书既从理论上

探讨了金融体制的演进对中国寿险业发展的影响，又从实践上分析了这种影响在中国寿险业市场结构、寿险公司经营模式和经营策略上的具体表现形式，注重把理论分析应用于实践。其次是实证分析与规范分析相结合。例如，在分析中国寿险业效率变动的背景中，本书运用规范分析方法，遵循历史演进的逻辑，依据新制度经济学的相关理论总结了我国寿险业发展演变的制度背景及内在规律。在效率评价方法及运用上，本书运用基于因子分析的财务指标法和数据包络分析法等实证分析方法，构建了我国寿险公司效率测度的指标体系，借助统计学、计量经济学及运筹学的有关方法及专业软件（SPSS、Matlab）对我国寿险公司的效率进行了测算。再次，比较分析、历史分析与逻辑分析相结合。在横向上通过对我国寿险业与部分发达国家和发展中国家的寿险业在总体规模、发展深度等方面进行国际比较，在纵向上对我国寿险业不同发展阶段运行效率进行动态分析，并对中资与外资寿险公司、入世前成立的寿险公司与入世后成立的寿险公司的经营效率进行比较分析，同时结合逻辑推理的运用，更深刻地揭示了我国寿险业效率演变的内在规律，为我国寿险业进一步改革与发展提供有益的经验借鉴。

本书是一部有价值的学术性与对策性相结合的力作。这显示了作者扎实的理论功底、宽广的知识和较强的开拓性科研能力。我相信，本书的出版，必将受到读者的欢迎，并对我国寿险业效率理论研究和实际工作有所裨益。同时，我国寿险业效率的测度与评价是一个涉及面很广的复杂课题，本书的研究不可能涉及所有的相关问题，也存在一些不足之处，期望作者今后继续深化这一领域的研究。作为刘璐的导师，我为本书的出版感到由衷的高兴，特表祝贺。是以为序。

孙刚

2010年1月

| 摘 要 |

自 1980 年恢复国内保险业务以来，中国的保险业（尤其是寿险业）飞速发展，保费收入的年均增长率达到近 30%。中国保险市场作为发展中国家的新兴市场引起了世界各国的高度关注，取得了令人瞩目的巨大成就。一是保障了经济社会平稳运行，2003 ~ 2008 年七年间，保险公司累积赔偿和给付保险金 9700 多亿元；二是提高了社会保障水平，截至 2008 年底，保险业为人民群众未来养老和健康积累准备金 1.9 万亿元，成为多层次的社会保障体系的重要组成部分；三是支持金融体制改革，保险机构已经成为债券市场的第二大机构投资者和股票市场的主要机构投资者。保险公司作为战略和财务投资者，参与多家商业银行上市重组，为提高银行资本充足率、推动商业银行改革提供了有力支持。四是保险市场体系和组织体系得到了很大的改善，中外资保险公司并存、多家保险公司竞争的格局逐步形成。

尽管改革开放 30 年来，中国寿险业成绩斐然，但是从客观的立场看，中国寿险业的独立经营不过 10 多年的时间，寿险业的发展和保险公司的经营还面临着重大挑战。

一是“竞争”的压力。经济全球化已是世界性的大趋势，金融国际化、自由化、网络化是其重要标志。在这样的背景下，保险公司之间的竞争表现为国内中资保险公司之间的竞争，国内中资与外资保险公司之间的竞争，甚至是中国保险公司与外国保险公司之间的国际竞争。中国 2001 年加入 WTO，如今已经步入了第八个年头，对外开放的过渡期已经结束，中国保险业已经进入了全面开放的时代。尽管从全国整体来看外资保险公司所占市场份额还有限，但是它们对国内保险公司、保险市场以及社会大众的文化与理念所带来的震撼与冲击已经显现出来。

二是“转型”的挑战。我国的保险业，尤其是寿险业的经营方式仍然停留在粗放型的阶段。以开机构、铺摊子、注重保费收入扩张为导向，追求市场份额、强调市场占有率、重视发展速度而忽视发展质量的外延式发展模式，是中国寿险公司普遍实施的经营发展策略。这种经营模式的结果一方面导致中国寿险市场上的产品差异小、同构现象严重，保险公司在产品、服务、技术、管

理和机制上的创新不足；另一方面导致中国寿险业业务能力较弱，经营效益不高。2008 年保险退保金达 970 亿元，占全国总保费的 10%。同年，中国寿险公司利润率不到 1%，保险全行业出现数额比较大的亏损。

三是外部环境的冲击。2008 年 3 月开始，以美国次级贷款链条断裂、投资银行倒闭或转型、多家商业银行破产、实体经济下滑为表象的金融危机爆发。这给美国、欧盟乃至整个世界经济带来了巨大的冲击。在当前经济全球化、一体化的背景下，中国的经济难免受到影响。我国寿险业发展快、开放早、市场化进程快，但起步晚、基础差，行业没有经受过大的系统性风险的考验，很多新公司没有经历过完整的经济周期，风险意识不强，抗风险能力不足。在这种情况下，面对当前复杂多变的经济金融形势，要保障行业实现平稳健康发展，寿险公司更需要加强风险防范、转换经营思路，保持经营稳定和绩效提升。

为了应对日益激烈的竞争，完成结构转型以及减缓外部冲击的影响，中国寿险公司必须转变经营模式，提高自身竞争力。寿险公司竞争力的核心内涵是效率的提升，只有持续增强自身的成本控制和利润创造能力才能在市场的优胜劣汰中生存和发展。从宏观的角度看，保险市场作为金融的重要组成部分及资源配置的枢纽，其体系运行效率的提高，对于国家经济增长方式的转变以及经济结构的优化也具有重要价值。

正是基于以上思考，笔者以“中国寿险业效率研究”为题，在对中国寿险业制度变迁以及寿险业经营规律梳理与总结的基础上，辨析中国寿险业发展中存在的问题，运用财务指标法和非参数 DEA 方法两种实证分析方法，测算中国寿险业效率演变趋势，为提高中国寿险业效率提供决策依据。

在研究方法方面，本书以实证分析为主，理论分析为辅。实证分析已经成为现代经济研究的重要方法，它可以使所做的研究在很大程度上摆脱个人情感和主观愿望的干扰，清晰地刻画事物的本质特征，进而准确揭示事物的发展规律。实证分析的特点是将经济研究过程数学化和模型化，通过严密的数学计算得出科学的结论。鉴于以往对中国寿险业效率的研究偏重于定性分析和文字表述，本书在加强定性分析的同时，重视定量分析。通过较多地采用详尽的数据，运用统计学和计量经济学方法进行实证分析，并反复计算，力求得到较为客观的结论。因此，本书不是简单地重复现有结论，或凭借市场感觉或主观判断得出结论，而是从具体数据的采集做起，按照一定的标准将样本进行分类，然后建立模型展开经济研究，最终得出一般性结论。本书的结论可能与现实不

完全吻合,但是力求能从一个侧面反映中国寿险业效率的真实状况。

全文共分八章,沿着从宏观背景到微观特征、从理论梳理到实践探讨、从定性分析到定量分析的思路,以中国改革开放30年宏观经济发展的客观背景出发,阐释中国寿险业制度变迁的历史路径,总结寿险公司特殊的经营规律,进而以截面数据和面板数据为基础,利用基于财务指标的因子分析法和基于DEA模型的非参数法建立效率评价模型,从横向和纵向两个方面展现各个寿险公司的效率状况和中国寿险业效率变动的整体趋势,并以此为基础建立Tobit回归模型探求影响中国寿险业效率的企业特征因素,进而提出提升中国寿险业的效率的具体路径和政策建议。具体的结构设计如下:

第一章 绪论。从选题的背景及意义、保险机构效率研究、国内外文献综述、研究思路、研究方法和论文结构等方面综合阐述本书的全貌。

第二章 中国寿险业发展评述。首先,从中国寿险业制度变迁的宏观背景出发,探讨了中国经济30年来经济转轨、市场开放和渐进改革的特质对寿险业发展产生的深刻影响,以及在这一背景下中国寿险业的发展历程,力图对后文中国寿险业效率的实证分析打下坚实的宏观基础和制度基础。其次,从寿险业竞争格局入手,分析寿险业的经营主体状况;以市场份额、市场集中度指数和赫芬达尔指数为指标分析了中国寿险业的市场结构。从寿险公司的微观行为特征出发,分析承保和投资这两项寿险公司的核心业务,进一步分析和比较主要寿险公司的保费规模、产品结构、营销渠道、资金运用渠道与结构、投资风格与绩效,对中国主要寿险公司的竞争态势做出了概括。最后,总结寿险公司作为经营“人身风险”这一特殊产品的企业具有独特的经营和运作规律。

第三章 效率理论与保险机构效率测度方法,以西方经济学中效率思想的梳理和总结为切入点,探寻效率分析的逻辑基础与理论框架,深化寿险公司效率的本质认识,并从微观角度对寿险公司的各类效率进行界定。同时,这一章从工具选用、变量认定和模型设定等三个方面阐述测度寿险公司效率的三种方法,即财务分析法、参数法和非参数法。分析这三种不同方法的优点与不足,以及每种方法的适用条件。此外,这一章还详细阐述了测算全要素生产率变动的Malmquist指数法的理论解释和具体算法。

第四章 基于财务指标和因子分析的中国寿险公司经营效率综合评价,采用因子分析方法,以2007年在我国境内开展业务的34家寿险公司作为样本,选择17个财务指标(包括总资产、保费收入、市场份额、费用率、资产毛利率、资金运用率、资本充足率、投资收益率、人均保费等)构建截面数据体

系,提取规模实力、盈利能力、偿付能力、成长性和资产管理能力五个公共因子,从多角度对样本公司进行综合绩效评价。在此基础上,进一步把样本公司分成中外资公司(两组)、新老公司(两组)以及以上两者组合(四组)等几个子样本集合,结合寿险公司特殊的经营规律;对不同类型寿险公司的规模实力、盈利能力、成长性、资产管理能力进行深入分析。

第五章 基于非参数法的中国寿险业效率实证研究。首先,阐述了样本期间选择为1998~2007年这10年的历史背景,样本寿险公司选择标准以及一些需要说明的问题。其次,详细论证了寿险公司投入和产出变量选取的微观经济理论依据以及具体的计算方法。特别定义了投入变量的价格因素。再次,提出了研究假设和具体的研究设计方案,在此基础上运用投入导向型DEA模型考察了中国寿险业效率变动的整体趋势,而且为了保证研究的科学性和合理性,进一步引入大边界DEA模型分析和比较中国寿险业效率的整体变动趋势,以及对这一趋势形成的原因和背景解释,分析入世前后中国寿险业效率变动的趋势。接下来,进一步把全部样本划分为老寿险公司(入世前成立)和新寿险公司(入世后成立)、中资寿险公司和外资寿险公司两组子样本,实证分析和比较了老公司与新公司、中资公司与外资公司的技术效率、规模效率、配置效率和成本效率。最后,利用Malmquist指数方法分析了中国寿险业全要素生产率的变化。印证了尽管受到新竞争者和外资寿险公司的严峻冲击和挑战,中国寿险业无论是在技术进步(生产边界的外移),还是技术效率的改进方面都取得了积极的进展,整体的经营绩效正逐步改善。

第六章 中国寿险公司效率影响因素研究。财务指标法与DEA方法测算效率的一个不足之处就在于无法找到影响决策单元效率的因素。因此,这部分基于前面章节中对寿险公司特征的总结,以寿险公司的整体规模、股权结构、组织形式、营销体系、产品多元化程度、人力资源状况等作为解释变量,建立回归方程,利用Tobit回归模型分析了影响寿险公司效率的微观因素。

第七章 提升中国寿险业效率的途径,提出提高中国寿险公司效率的措施,探寻中国寿险业加速结构调整、实现又好又快发展的具体路径。按照前述对中国寿险业发展宏观制度背景和微观主体特征的分析以及实证分析的结论,本书提出四点政策建议:(1)转变经营观念、转换经营模式;(2)完善产权结构、改进公司治理;(3)实施寿险公司组织架构与业务流程再造;(4)推进寿险公司信息技术建设。希望对政府和监管部门提供决策参考。

第八章 结论与展望。总结全文的主要观点,对今后继续研究的问题做出

展望。

论文主要在以下方面有所创新：第一，总结了寿险公司经营的特殊规律。通过分析发现，相对于一般制造企业而言，寿险公司的经营具有如下一些特征：（1）盈利周期长；（2）高负债性；（3）利润的估计性；（4）交易双方严重信息不对称；（5）产品包含内置选择权；（6）对资本金要求高。这些特征一方面对效率分析的方法及应用提出了要求，另一方面也对实证分析结果的深入解释提供依据。

第二，把因子分析法移植到基于财务指标的寿险公司效率测度方法中，在构建反映寿险公司规模实力、偿付能力、盈利能力等指标体系的基础上，综合评价中国寿险公司的经营效率。这种方法的一个很好的副产品是，监管部门可以利用因子分析法，同时结合已经建立的非现场监管指标体系对寿险公司的偿付能力状况以及综合经营状况进行测算和评价，从而解决原来指标体系中定性指标偏多和主观赋权的不足。

第三，采用 DEA 测度方法，分别从经济（财务）和技术（生产）的角度，测算 1998 ~ 2007 年中国主要寿险公司共计 182 个样本的技术效率、纯技术效率、规模效率。此外，还引入投入要素的价格因素，测度全部样本公司的配置效率和成本效率。样本区间更大、样本寿险公司数量更多，投入产出变量的选择更合理。而且在分组分类测算各类寿险公司的效率时，为了保证计算结果的严谨与可信，使用方差分析、两样本 Wilcoxon 秩和检验和 Kolmogorov-Smirnov 检验三种方法来确定各组寿险公司是否适用同一技术边界，从而大大提高了实证分析的可信度和可靠性，在一定程度上弥补了 DEA 方法过于依赖数据的问题。

关键词：寿险业，技术效率，成本效率，财务指标分析，数据包络分析

Abstract

Since the domestic insurance business restarted in 1980, the life insurance industry in China has grown rapidly, and the growth rate of insurance premium has got up to nearly 30%. As an emerging insurance market of developing countries, China's insurance industry has become the focus of attention all over the world. Firstly, the insurance industry paid about 900 billion yuan worth of insurance benefits from 2003 to 2008, which contributed a great deal to the stability of the national economy. Secondly, the insurance industry has played an important role in multi-level social security system, and accrued 1.9 trillion yuan as reserves for retirement and medical benefits. Thirdly, the insurance companies have been the second institutional investors in the bond market and the important institutional investors in the stock market. As strategic or financial investors, insurance companies supported the reform of commercial banks by improving the financial strength of banks. Fourthly, the insurance market system and organization system have been improved greatly. Domestic life insurance companies and their foreign counterparts exist and compete in the same market.

Although the life insurance industry in China has developed rapidly in the past three decades, the operations of life insurance companies are facing a lot of challenges. One is the hot competitions. With the rapid emergence and continuing evolution of a global economy, any country that intends to play an important role in world trade must ultimately remove the protection and restrictions on its insurance market. Specifically, under the rules of the World Trade Organization (WTO) agreements regarding liberalization in financial service industries. Domestic insurance companies face competitions among themselves and from foreign entrants. Although the market share of foreign companies is still limited, its influence on the local market and the public is remarkable. The other is the need of restructuring the insurance industry. The operation model of the insurance industry, especially the life insurance industry is characterized by extensive cultivation, which means that the insurance companies pay more attention to total premium amount, development speed and market share rather than the

development quality. As a result, the insurance market in China expresses homogeneity of products and lack of innovation in products, services, management and technology. Furthermore, the performance of overall life insurance industry of China is unsatisfactory. The cash surrender value in 2008 was 97 billion yuan, which accounted for 10% of the total premium. The profit margin of all life insurance companies is less than 1%, and most of the companies are still losing money. The third is external shock. The economic crisis resulting from US secondary loan crisis brought negative impact on Chinese macro-economy. Life insurance industry of China is young, and the ability of risk bearing is low. So the life insurance companies must enhance risk-proof, transfer operation model, keep the business stable, and improve the performance.

In order to deal with the hot competitions, accomplish the restructure process, and release the impact of external shock, life insurance companies must change their operation model and improve the competitiveness. The key of core competitiveness is efficiency improvement. In the market economy, one of the essential rules is that only the competent ones can survive and those incompetent ones are bound to eliminate through selection. Only the company that continues to strengthen its ability of cost control and profit creation can win in the market economy. From the macro-economy viewpoint, the insurance industry is the an important part of financial services industry and resource allocation, so the efficiency promotion of the insurance industry is important to the change of economic growth model and optimization of economic structure.

Taking the above issues into consideration, the author chooses to work on this topic— “Study on the efficiency of the Chinese life insurance industry” . After theoretically explaining the institutional evolution and specific rule of the life insurance operation, the author analyzes the issues and contradictions in the life insurance industry of China, calculates the efficiency scores of all life insurance companies using financial indices method and data envelopment analysis (DEA) method so as to provide ways of enhancing the life insurance firms’ performance.

The most distinct feature of the paper is combining the empirical analysis with the theoretical study. The empirical study becomes the main method to analyze economy in modern economics. Admittedly, the empirical study is more persuasive, because it emphasizes facts. In fact, the empirical study can help to shake off distur-

bing of personal emotion and subjective wishes and be propitious to depict major characters in mathematics and modeling of economics which emphasize drawing conclusions by precise computing. The previous researchers do more for the qualitative analysis and emphasize literal narration when discussing the efficiency of Chinese life insurance industry, so the author adds more quantitative analysis in this paper, to describe the subject with more detailed data and introduce statistics and econometrics to calculate and validate. The author took a lot of time to collect data for this paper. In order to draw a comparatively impersonal conclusion, the author calculated repeatedly when processing data. This paper is not to simply reiterate the old viewpoints or make conclusions by market perception, but to get a general conclusion on the basis of collecting data, classifying the samples according to different standards, and building up models. Although the difference exists between the conclusion and reality, the paper tries to show us the trend and situation of the efficiency of the Chinese life insurance industry.

The paper consists of the following eight chapters:

Chapter 1: Introduction. It provides the general picture of this paper including background and significance of the theme, overseas and domestic literature review on the study of the efficiency of insurance institution, research emphasis, empirical methods, detailed outline and framework.

Chapter 2: The life insurance industry in China. This chapter provides a comprehensive overview of the Chinese life insurance industry. Firstly it examines the deep impact of Chinese economic reform during the past three decades whose characters are economic transition, market opening and gradual reform on the development of the life insurance industry. Its purpose is to gain a deeper understanding of insurers' operations in terms of their production and investment performance. It explains the unique characteristics of insurers to justify the selection of input and output variables necessary in constructing accurate insurance models. It also reports the current trends and development, along with the industry's restructuring process as it pertains to the Chinese life insurance market.

Chapter 3: Theory and measurement methodology of insurance firms' efficiency. It summarizes the efficiency ideas and theories of western economies, examines the logic basis and theoretical framework of efficiency analysis, and defines the vari-

ous efficiencies of life insurance firms. Then this chapter explains the three principal types of efficiency estimation methodologies: financial ratios, parametric approach, and nonparametric (mathematical-programming) approach. Ratio analysis is a relatively simple tool in assessing the financial condition of a firm. Ratios are somewhat proficient indicators of direction and change patterns, however, they give a one-dimensional incomplete indication of performance. While frontier analysis techniques provide more comprehensive and reliable information, and sources and magnitude of inefficiency can be determined that may ultimately lead to reduction in cost of operations or an increase in the services provided without expending additional resources. Malmquist index analysis which is used to analyze the productivity and efficiency changes overtime is explained at last.

Chapter 4: On life insurance companies' efficiency: application of financial ratios and factor analysis method. This chapter applies one of the multi-analysis methods—factor analysis method to life insurance companies' efficiency and performance estimates, which can overcome the problems of setting weights in advance. We select 34 life insurance companies which are operating in China in 2007 as samples and 17 financial ratios as indexes (including total asset, premium income, market share, operating expense ratio, asset growth rate, investment rate, total capital, investment return and so on), and evaluate the risk status and overall efficiency of the sample companies.

Chapter 5: Empirical study on efficiency of the Chinese life Insurance industry: data envelopment analysis application. It uses a nonparametric frontier approach DEA to calculate efficiency scores of all Chinese life insurance companies from 1998 to 2007 and Malmquist productivity indices to examine productivity changes before and after entering WTO. The paper constructs a single grand frontier to compare the efficiency change before and after entering WTO and between the different types of ownership (old domestic, foreign, and new local life insurers). Our results are summarized as follows. First, both the DEA and Malmquist results show that old domestic firms have been slightly impacted by the new competitors around 1998-2007. However the existing firms cope with new challenges well. Specifically, the Malmquist cumulative results show the increasing trend from 2002 to 2007. The old domestic firms' frontier dominates new firms' frontier for producing their output in terms of

technology, scale, allocation, and cost efficiency. The overall performance of Chinese life insurance industry is improving gradually.

Chapter 6: The analysis of influencing factors of the efficiency of the Chinese life insurance industry. This chapter employs Tobit regression analysis to investigate the relationship between various firms characteristics and efficiency measures. The technical efficiency, pure technical efficiency, scale efficiency, allocation efficiency and cost efficiency which are estimated in the previous chapter are used separately as dependent variables. Various independent variables are included in the regression to control for the effect of a variety of firms characteristics. The independent variables include: business size, ownership type dummy, organization structure, distribution system, product mix, human resource, operating expense ratio, investment portfolio, and leverage ratio.

Chapter 7: The ways to promote the efficiency of the Chinese life insurance industry. It provides some measures to promote the efficiency of the Chinese life insurance industry. They are: (1) changing operation ideas and patterns from pursuing quantity to improving quality; (2) perfecting ownership structure and corporate governance; (3) starting up organization framework and business process restructure of life insurance firms; (4) enforcing the information technology construction of life insurance firms.

Chapter 8: Conclusions and direction of further research. The last chapter is the conclusions which conclude the main points of the paper and prospects the problems to be researched in the future.

This paper has some contributions in the following aspects: To begin with, it summarizes the unique operating mechanism of the life insurance industry, such as the longer profit-making cycle, the higher liability level, the bigger uncertainty in estimating future profits, the serious information asymmetry between the insurers and insureds, the inclusion of embedded options in the products and the higher capital investment. All these characteristics calls for better efficiency analysis methods; on the other hand, they form the foundation for the in-depth explanation of the results of empirical analyses.

Secondly, this paper applies the factor analysis to estimate life insurance companies' efficiency by appealing to financial indicators. It evaluates life insurance com-

panies' efficiency by taking advantage of various index systems such as those that can indicate the size, solvency and profitability of life insurance companies. By combining this method with the existing off-site supervision systems, the supervising and administrating agency can estimate the solvency and overall operation of life insurance companies so that the disadvantage of the original method such as the overuse of qualitative indices and the setting weights subjectively will be offset.

Thirdly, using DEA method, this paper measures and calculates the technical efficiencies, pure technical efficiencies and scale efficiencies of 182 sample life insurance companies, which existed in China from 1998 to 2007. In addition, it introduces the prices of input factors into the calculation of the allocation efficiencies and cost efficiencies of the sample companies. Larger sample intervals, more sample companies and higher reasonability in selecting input and output variables contribute to the success of this method. To ensure the preciseness and reliability of the results, the author uses three different test methods to determine whether separate frontier or pooled frontier should be applied to various groups of life insurance firms: analysis of variance, two-sample Wilcoxon test and Kolmogorov-Smirnov test. In this way, the disadvantage of the EDA method that it depends too much on data is somewhat offset and the results of empirical analyses become more reliable and dependable.

Key Words: Life insurance industry; Technical efficiency; Cost efficiency; Financial index analysis; Data envelopment analysis