

公共经济与公共政策 齐鲁文库

环境

王文普 著

规制与 经济增长研究

——作用机制与中国实证

Environmental Regulation and
Economic Growth
-Mechanism and China's Evidence



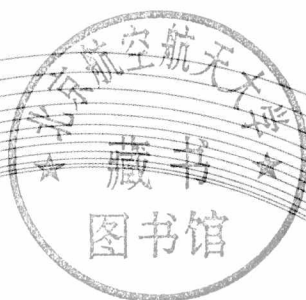
经济科学出版社
Economic Science Press

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北航

C1637769

X321.2
53

图书在版编目 (CIP) 数据

环境规制与经济增长研究：作用机制与中国实证/
王文普著. —北京：经济科学出版社，2013. 3

(公共经济与公共政策齐鲁文库)

ISBN 978 - 7 - 5141 - 3044 - 7

I. ①环… II. ①王… III. ①环境管理 - 关系 -
中国经济 - 经济增长 - 研究 IV. ①X321. 2②F124. 1

中国版本图书馆 CIP 数据核字 (2013) 第 036365 号

责任编辑：柳 敏 段小青

责任校对：徐领柱

版式设计：代小卫

责任印制：李 鹏

环境规制与经济增长研究

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经济科学出版社出版、发行 新华书店经销

社址：北京市海淀区阜成路甲 28 号 邮编：100142

总编部电话：88191217 发行部电话：88191537

网址：www. esp. com. cn

电子邮件：esp@ esp. com. cn

汉德鼎印刷厂印刷

华玉装订厂装订

710 × 1000 16 开 15. 25 印张 210000 字

2013 年 3 月第 1 版 2013 年 3 月第 1 次印刷

ISBN 978 - 7 - 5141 - 3044 - 7 定价：27. 00 元

(图书出现印装问题，本社负责调换。电话：88191502)

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总 序

2012 年终岁尾，山东省公共经济与公共政策重点研究基地和山东大学公共经济与公共政策研究中心推出的《公共经济与公共政策齐鲁文库》第六批专著及《中国公共经济与公共政策研究报告》第四辑付梓面世。我们以此作为献给读者的新年礼物吧！

此次入选齐鲁文库的三本专著都是青年学者的倾心之作。他们的研究选题无不指向我国经济社会发展的大问题、新问题，而又无不从基本理论层面进行了认真探讨，视角独到，分析系统，方法新颖，给人以耳目一新之感。王文普博士特别关注经济发展中的环境污染及其规制问题，不仅分析了环境规制的作用机制，而且主要运用实证方法，分别基于生产率、技术创新、产业竞争力的视角，运用省级数据，集中分析了环境规制对中国经济增长的影响，进行了提高环境规制经济激励效应的政策设计，由此形成了《环境规制与经济增长研究——作用机制与中国实证》。左根永博士的《我国农村地区基本药物供应保障体系研究——制度设计、运行结果和交易费用》，基于制度经济学的交易费用理论，从人性假设和行为逻辑出发，将基本药物供应保障体系交易关系整合为交易环节、路径、机制，建立了解释该体

系的制度分析新框架；以山东和安徽为例，揭示了我国农村样本地区基本药物供应保障体系的制度设计特点，分析现行制度设计下基本药物供应保障体系运行结果，模拟测算基本药物供应保障体系交易费用及其结构，探索制度设计与实际运行结果产生差距的原因及路径，提出完善基本药物供应保障体系的政策建议。张靖会博士的《农民专业合作社效率研究——基于俱乐部理论视角的分析》，着眼于我国现阶段蓬勃发展的农民专业合作社，将其视为农民自愿供给和分享公共品的组织，运用公共经济学的俱乐部产品理论，集中分析了农民专业合作社的社员构成（同质性和异质性）、信息状况（管理者占优及社员占优）以及排他成本（水平高或低）等因素如何影响合作社效率的机理，并通过样本和案例进行了实证分析。此次入选研究报告系列的《建立健全与事权相匹配的财税体制研究》则是李齐云教授主持完成的国家社科基金项目的结题报告，它凝聚了课题组成员多年来关注研究中国财政体制演化改革的成果。该课题不是仅仅关注于如何明晰各级政府的事权和如何划分财力支配权等操作层面的问题，而是把研究基点放在厘清市场与政府的关系、科学界定政府职能上，明确政府事权范围，再以公共产品的层次性和不同级次政府行为目标的差异性为理论依据，界定各个级次的政府职能，确立正确划分各级政府职责和事权的基本准则，揭示出与事权相匹配的财税体制运行的一般特点和规律性，努力构建一套财税体制模式和基本制度框架的理论体系。

我们期待着读者的评论，也期待更多的精彩之作问世。

樊丽明

2012 年岁尾

环境与经济发展关系失衡给当今人类社会提出了严峻的挑战。一系列重大环境生态问题，不仅严重制约了社会经济发展的可持续性，而且对人类生存构成威胁。对于正处于发展中的中国来说，现阶段面临两种巨大压力，一种来自国内压力。快速的工业化和城市化伴随着大规模的自然资源消耗，也带来了极大的国内环境压力。另一种压力来自国际。随着中国国际地位的提高，中国签署的国际环保公约数量与公约所覆盖的范围将不断扩大，中国将承担更多的国际环保义务。

国内和国际环境压力促使中国不断加强环境治理力度，同时中国经济发展所处的国际环境复杂多变。随之而来的，是对我国经济增长的隐忧，即环境规制是否会影响中国的经济增长。在这一背景下，研究环境规制对中国经济增长的影响，探索经济增长与环保相容的均衡发展模式，具有十分重要的理论和现实意义。

环境污染是一种“有害”的公共产品，且有很强的外部负效应。本研究以外部性理论和经济增长理论为基础，分析了环境规制的作用机制。环境规制不是消除污染，遏制经济增长，而是将污染控制在生态系统可承载的限度之内，实现环境与经济的协调发展。基于这一目标界定，从企业来看，环境规制通过直接传导机制和间接传导机制（环境效果）对企业产生影响。无论哪种传导机制在给企业带来成本的同时，也带来了潜在利益（或商机）。环境规制的潜在收益与成本效应构成其对企业的净影响（如产出变化，生产率

变化、技术创新力变化等),所有企业的净影响总和形成了部门或产业的净效果,进而构成国家或地区的最终影响结果。在部门和地区或国家水平上看,环境规制对经济的净影响结果可由生产率、技术创新和产业竞争力等相关指标来反映,由于生产率、技术创新能力和产业竞争力等指标的变化不仅能反映一个部门和国家/地区的经济质量和效率水平,也是文献中常用的最为重要的经济指标。总之,环境规制对经济增长的影响,既有积极影响,也有不利影响,只有综合考察环境规制的各种影响因素,才能对环境规制对部门和地区/国家的最终影响结果做出正确的判断和解释。

本书以中国环境规制的现实为背景,利用中国省级面板数据,通过实证方法回答“环境规制对中国经济增长究竟有何影响”这一问题。考虑到环境规制对经济的净影响结果衡量的复杂性,单一指标的固有缺陷,采用不同方法,从不同角度测度环境规制对经济增长的净影响。基于本研究的需要,将从生产率、技术创新和产业竞争力等层面来审视这种净影响。根据实证分析结果,得出以下主要结论:

第一,中国的环境规制并没有妨碍经济增长,反而竞相降低环境标准的竞争会在一定程度上阻碍经济的良性发展。实证结果表明,就平均水平而言,二氧化硫规制强度每提高1%,效率变化和技术进步将分别增加0.021%和0.016%,生产率将提高0.03%。然而,提高工业化学需氧量规制强度对经济增长效率有不利影响,这并不意味着工业化学需氧量的规制竞争能带来更高的经济增长效率。因为这种不利影响不是由环境规制本身造成的,而是环境治理策略上的“误配”造成。分位数分析进一步发现,总体上看,二氧化硫规制竞争不利于生产率增长和效率变化,而对技术进步的影响较为复杂多变。当二氧化硫规制强度向高分位点变动时,对生产率增长的不利影响有增大趋势,对效率改善的不利影响逐渐减弱。工业化学需氧量的规制竞争对生产率增长和效率变化有正影响,而且随着规制强度越低,正向作用逐渐减弱;而对技术进步的影响方向随分位点不同而变化。

第二, 中国的环境规制对环境技术创新有显著的促进作用, 而对总技术创新活动却存在不利影响。当使用国内三种专利授权数来衡量总的技术创新活动时, 二步差分广义矩估计结果显示, 时期 I (1990 ~ 1999 年) 中, 当期环境变量系数平均为 -0.011 , 滞后一期系数平均为 0.018 , 且在统计上均不显著; 时期 II (2000 ~ 2009 年) 中, 当期环境变量系数平均为 0.269 , 滞后一期环境变量系数平均为 -0.046 。尽管随着中国环境规制体系的不断创新, 加大了市场化工具的应用, 但因环境规制体系中存在严重缺陷, 使得环境规制对总的技术创新活动造成不利影响。当环境规制强度每增加 1 单位时, 环境规制对专利成功申请数的长期边际贡献: 时期 I 平均约为 0.01 个单位, 时期 II 平均约为 0.43 个单位, 后者高于前者。然而, 考虑到环境规制直接针对环境问题, 利用计数模型分析环境规制对环境技术创新的影响, 发现环境规制对环境专利成功申请数存在显著的促进作用。表明环境规制为企业环境技术创新提供了很强的内在动力, 因为环境技术创新不仅能给企业带来巨大的创新收益, 也有助于推动绿色经济的发展。

第三, 中国的环境规制对产业竞争力产生一定的积极影响, 进而推动经济增长质量的提高。在一国内部, 地区间可能更直接地通过环境介质相互联系, 这就产生一个问题: 一个地区的环境决策如何影响另一个地区的经济决策。为了考察污染溢出的影响, 在控制地区特征后, 将污染溢出引入竞争力模型, 分离出环境规制的“真实”影响。对此, 分别进行了空间自回归误差设定和多因素模型设定来剔除污染溢出的影响, 估计结果表明, 环境规制变量对产业竞争力的影响系数为 $0.022 \sim 0.036$, 远低于统计分析结果 (0.193)。说明环境规制通过成本效应给企业带来了创新的激励, 进而产生了创新等经济利益, 进而对产业竞争力造成积极影响, 同时也表明, 如果忽略污染因素等因素, 有可能高估环境变量的系数值, 进而导致不正确的推断。

根据上述分析, 为提高中国环境规制的质量和水平, 实现环境与经济更为均衡发展的目标, 需要切实发挥环境规制在实现这一发

展模式过程中的积极作用，我们从完善环境与发展综合决策机制，提高环境规制政策实施的有效性和效率，贯彻污染者付费原则，明确中央和地方政府环保事权和责任，完善跨部门、跨区域的利益协调机制等 5 个方面提出政策建议。

关键词：环境污染 环境规制 经济增长 政策设计

ABSTRACT

Imbalanced relationship between environment and economic development brings about severe challenges to current human society. A series of important ecological issues not only restrict sustainability of social and economic development, but also put a threat to the survival of mankind. As far as China in development is concerned, Now it faces with two enormous pressures: one is from domestic pressures. Rapid industrialization and urbanization, with large-scale consumption of natural resources, have caused great domestic environmental pressures. Another is from international pressures. With heightening China's international status, the numbers and coverage of international environmental conventions that China signs, will be expanding, thus China will take on more international environmental obligations.

Domestic and international environmental pressures push China to strengthen the stringency of environmental governance. At the same time, the international environment of China's development is complicated and variable. This would generate the worries on Chinese economic growth. Would environmental regulation affect China's economic growth, thereby weakening China's economic strength? In order to find the problem, it is of great theoretical and practical significance to research the impacts of environmental regulation on China's economic growth, and to explore a balanced development pattern, which can achieve compatible mode of

economic growth and environmental protection.

Environmental pollution is a “bad” public product, and it has strong negative external effects. On the basis of externality and economic growth theories, the paper analyzes the mechanism of environmental regulation. Environmental regulation doesn’t eliminate pollution, and constraint economic growth, but will control pollution under the carrying limits of the ecosystem to achieve the coordinated development of environment and economy. According to the definition of the target, environmental regulation, from the enterprise’s point of view, exerts the impacts on enterprise’s economic performance through direct and indirect transitive (environmental performance) mechanism. Either transitive mechanism brings the cost to the enterprise, in the meantime it brings the potential benefits (business opportunities). These benefit and costs cause the net effects (i. e. change in output, productivity changes) to the enterprise. The sum of all enterprises’ net effects in the same sector forms the sector’s net impacts, further these constitute the country’s or region’s ultimate outcomes. From the perspectives of sector and region or country level, the net economic effect of environmental regulation can be represented as related indicators such as productivity, technological innovation and industrial competitiveness. These indicators not only reflect economic quality and efficiency of a sector and country (or region), but also are commonly used and most important economic indicators in the literature. Because of positive and negative impacts of environmental regulation on economic growth, only through comprehensive investigation of various factors, can we make the correct inference and explanation on the ultimate impacts of environmental regulation on sector’s and regional or national performance.

Basing on the background of the practices of China’s environmental regulation, we attempt to answer the question, i. e. what are exactly the impacts of environmental regulation on China’s economic growth? by

China's provincial panel data and empirical methods. Considering the complex of the net impacts of environmental regulation on economic growth and the flaws of single indicators, we measure the net effects of environmental regulation, by using various methods and from different points of view. As far as sector and region or country is concerned, the net effects are examined by using indicators such as productivity, technological innovation and industrial competitiveness. According empirical analytical results, we find the following main conclusions:

First, China's environmental regulation doesn't hinder economic growth, instead the race-to-the-bottom of environmental standards will impede the sound economic development. Empirical results show that on average regulatory strength of sulphur dioxide is increased by 1%, efficiency change and technological change are increased by 0.021% and 0.016% respectively, thus productivity will improve by 0.03%. However enhancing regulatory intensity of industrial chemical oxygen demand (COD) will be not conducive to the efficiency of economic growth, which doesn't mean that the race to the bottom of COD environmental standards could bring about higher efficiency of economic growth, because the negative effects are not caused by environmental regulation itself, but done by the mismatches of environmental governance strategy. Quantile analysis further shows that the environmental regulation competition in sulphur dioxides generally isn't conducive to productivity growth and efficiency change, and its impact on technological change is relatively complicated and variable. When regulatory strength of sulfur dioxides moves towards high quantile points, negative impact on productivity growth tends to rise, and that on efficiency change gradually weakens. Regulatory competition in industrial chemical oxygen demand has positive impact on productivity growth and efficiency change, and with the loser the regulation intensity, the smaller the positive impact. The directions of impact on technological change vary with different quantile

points.

Second. China's environmental regulation significantly promotes environmental technology innovation, however it causes adverse effects on the overall technological innovation activities. When the number of three kinds of domestic patents granted is measured as the overall technological innovation, two-step generalized method of moments estimates show that in the period I, i. e. 1990 ~ 1999, the coefficient of current environmental variable on average is -0.011 , the coefficient of lagged one on average is 0.018 , and these are not significant; in period II i. e. 2000 ~ 2009, the coefficient of current environmental variable on average is 0.269 , the coefficient of lagged one on average is -0.046 . The sum of these coefficients is greater than zero in the two periods, which indicates that although the application of market-oriented instruments is reinforced with the continuous innovation of Chinese environmental regulation system, it generally makes an adverse effect of environmental regulation to overall technological innovation activities because of severe flaws in environmental regulation system. As the environmental regulatory stringency is increased by one unit, the negative long-run marginal contribution of environmental regulation to the number of patent successful application is averagely about 0.01 unit in 1990 ~ 1999, and approximately 0.43 unit in 2000 ~ 2009. This shows that environmental regulation generates greater negative incentives to overall technological innovation in period II. However considering that environmental regulation is directly toward environmental issues, the paper analyzes the environmental technology innovation activities, we find that environmental regulation creates strong incentives to the number of environmental patent successful application. This shows that environmental regulation provides strong incentives to enterprises's environmental innovation, which can not only bring an enormous innovation gains, but also promotes the development of green economy.

Third. China's environmental regulation has a positive effect on industrial competitiveness, thus it promotes the quantity of economic growth. Within a country, inter-region may be more directly contacted through environmental media, which creates a problem: how do environmental decision-making in one region affect another region's economic decision-making. In order to investigate the impacts of pollution spillover, after controlling regional characteristics, we isolate the "real" impact of environmental regulation on industrial competitiveness by introducing pollution spillover into competitive model. The estimated results demonstrate that the coefficient of environmental variable on industrial competitiveness is 0.022 ~ 0.036, which is much less than the result of statistical analysis (0.193). These illustrate that if we ignore the factors such as pollution spillover, there is likely to overestimate the effect of environmental regulation, and further lead to incorrect inferences.

Therefore, we suggest five main measures to be taken to improve the quality and level of Chinese environmental regulation, and to achieve the more balanced developmental targets between environment and economy, which need to effectively play the positive role of environmental regulation in realizing the developmental pattern. Firstly, Perfect integrated decision-making mechanism of environment and development; Secondly, Heighten effectiveness and efficiency of environmental policy implementation; Thirdly, Effectively implement the polluter-pays principle; Fourthly, Clear powers and responsibilities of central and local governments' environmental protection; Finally, Perfect interest coordination mechanism of cross-sector and trans-region.

Key words: Environmental pollution Environmental regulation
Economic growth Policy design

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