中国区域经济增长中的“资源诅咒”
——基于地级市的面板数据分析

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摘　要

自然资源是经济赖以发展的重要物质基础。目前，经济强国在历史上的强力发展阶段都曾受益于自然资源的福音。但在 20 世纪 80 年代以来，经济学家们逐渐发现，自然资源丰裕的国家面临着缓慢的，甚至是停滞的经济增长。“资源诅咒”指的就是自然资源对经济增长产生了限制作用，资源丰裕经济体的经济增长速度往往慢于资源贫乏的经济体。具体来说，若经济体倾向于依赖丰富的自然资源而发展，则容易陷入经济增长步履维艰甚至停滞不前的境地；相反，自然资源较为匮乏的经济体却能实现高速的经济增长。就我国来看，大部分资源枯竭型城市中存在地方财力薄弱，经济增长依赖于单一的资源型产业以及失业率较高等问题。在资源枯竭型城市面临着发展转型难题的同时，不少资源型城市仍沿着同样的轨迹发展。因此，从我国城市可持续发展的实际情况来看，探讨我国地级市层面上的“资源诅咒”效应显得十分重要。从理论上讲，实证分析是探讨“资源诅咒”的主要分析方法。大量基于跨国层面的研究表明，自然资源的丰裕度与经济增长之间存在负相关性。然而，基于一个国家内地区层面上的研究对“资源诅咒”存在与否颇有争议。并且，总体上看，对“资源诅咒”进行理论分析和全面阐述“资源诅咒”的影响机制的研究较少。由于国内外对“资源诅咒”这一命题的探究众说纷纭，暂无定论，本文在讨论理论模型和我国“资源诅咒”形成机制的基础上，对“资源诅咒”假说进行再检验是有必要的。

本文采用了文献研究与实证研究相结合的方法。本文借助经济增长模型，将自然资源作为经济增长的投入要素之一，写出了包含自然资源要素的经济增长模型。以此奠定了实证研究模型的基础。在文献研究方面，第一，本文列出了大部分文献中所采用的衡量自然资源丰裕度的指标，并依据相关文献的讨论，区分了其中对自然资源依赖度的衡量和对自然资源禀赋的衡量，以更为精确地衡量自然资源丰裕度。两类衡量指标的优劣在于，自然资源依赖度与经济增长密切相关，对经济增长的影响更为直接和显著，但二者之间存在明显的互为因果的关系，不可避免地引起内生性问题；相对而言，自然资源禀赋的衡量被认为是一个外生变量，但其减弱内生性问题的优势逐渐遭到了质疑。基于对各类指标优劣的分析和理论模型的推导，笔者认为可利用的自然资源以资源型产品

产出的增长率的速度衰减，而自然资源初级产品的生产与采掘业的物质资本、劳动力和技术投入直接相关。因此，本文以采掘业从业人员数占单位从业人员总数的比重及其变化率来刻画自然资源的丰裕程度。其中所暗含的内生性问题将在实证分析中得以解决。

第二，本文详尽综述了自然资源丰裕度影响经济增长的主要机制，在我国主要包括资本形成、经济制度、教育投入和创新与技术进步四个方面。结合我国 2001-2010 年的地级市面板数据，以散点图来反映自然资源依赖度对资本形成、经济制度、教育投入和创新与技术进步的影响。讨论发现，（1）丰裕的自然资源除挤出投资外，也具有促进资本形成的作用，在我国，自然资源依赖度表现出阻碍物质资本积累的效应；（2）丰裕的自然资源主要通过恶化对外开放度、非国有化水平和市场化程度等经济制度形成阻碍经济增长的力量，随自然资源依赖度的上升，我国对外开放程度有所降低；（3）自然资源丰裕度将影响公共部门和私人部门的教育投资，和人力资本积累之间并不存在稳健的负相关关系。在我国，自然资源依赖度和教育投入之间呈负相关关系；（4）在自然资源丰裕的地区，对创新与技术进步的激励和投入不足导致了经济增长的低迷，同时，新技术的开发与运用也由投资项目和资源型产品的供需矛盾来激化，我国自然资源依赖度对创新与技术进步的影响较小，随自然资源依赖度的上升，创新与技术进步水平小幅下降。因此，自然资源依赖度对四个影响机制的综合效应是不明确的，进一步的实证分析将会使之更加明朗。

在实证研究方面，本文设立了包含四个自然资源影响经济增长的主要机制和必要的控制变量的计量回归模型。在该模型中，存在明显的自相关和内生性问题，本文将模型修正为动态面板模型，并用系统 GMM（SYS-GMM）估计消除动态面板的估计偏误和内生性问题。本文采用 2001-2010 年我国 249 个地级市的面板数据展开一系列的实证分析，样本容量扩大，信息量丰富，也避免了一些难以捕捉的异质性信息的遗漏，如政治制度、风俗文化、地理气候等。内容包括面板单位根检验和面板协整检验，计量估计及其稳健性检验。明确本文研究自然资源依赖度对经济增长率的影响，即“资源诅咒”假说的再检验，围绕这个中心展开以下讨论，（1）四个“资源诅咒”形成机制的重要性；（2）自然资源依赖度与经济增长率之间呈倒 U 型曲线关系的检验；（3）自然资源依赖度对经济发展水平的影响。

本文实证研究的结论有以下几个方面。第一，在不加入任何机制变量的情况下，自然资源依赖度的回归系数为-0.000878，不具有统计上的显著性，说明自然资源依赖度对经济增长没有显著的影响。逐一加入机制变量后，自然资源依赖度的回归系数依次为-0.000406，-0.000418，-0.000454 和-0.000446，并且，均不具有统计显著性。说明从总体的自然资源依赖度来看，没有对经济增长造成显著的影响，估计结果不能有利地支持我国地区层面上存在“资源诅咒”的假说。虽然各个机制变量与经济增长呈正相关关系，但是，仅有资本形成对经济增长有显著的促进作用，另外三个机制变量对经济增长没有显著影响。从控制变量来看，经济结构显著地影响了经济增长率水平。第一产业产值占地区生产总值的比重越大，说明经济发展水平越低，从而不利于经济的高速增长。以初始经济规模的系数来判断我国地区经济增长过程中是否存在条件β趋同。该项系数虽然为负，但是数值较小且不显著，不能说明地区经济增长中存在条件β趋同。人口密度对经济增长的约束力较为显著，减缓了经济增长的速度。

第二，自然资源依赖度与四个机制变量均呈反向关系，资本形成、对外开放度、教育投入和创新与技术进步的回归系数分别为-0.00672，-0.000044，-0.0144和-0.0000112，均不具有统计上的显著性，说明自然资源依赖度对资本形成、对外开放度、教育投入和创新与技术进步没有明显的影响。如果仅仅从回归系数的大小上区分各个机制在自然资源依赖度阻碍经济增长中的重要程度，自然资源依赖度的提高，除其本身对经济增长造成的阻碍（50.23%）外，将主要通过阻碍资本形成给经济增长带来不利影响（48.76%）。其余三个影响机制的作用较小，对外开放度、教育投入和创新与技术进步的效应占总效应的比重分别为0.53%，0.31%和 0.14%。自然资源依赖度给经济增长带来的不利影响主要来自于其自身的直接影响；就各个影响机制而言，资本形成是自然资源依赖度影响经济增长的最主要的渠道。

第三，考虑到自然资源依赖度对四个机制变量的综合效应是不明确的，笔者假设在经济增长率与自然资源依赖度之间存在倒 U 型曲线关系，以此来说明“资源诅咒”的形成过程。在自然资源采掘利用的初期，对自然资源的依赖度上升，主要通过促进资本积累和伴随着资本形成而来的技术进步促进经济增长；但随着自然资源采掘利用的不断深化，由过度的自然资源依赖所带来的负面影响在长期内逐渐形成，自然资源依赖度逐渐表现出阻碍经济增长的效应。相应

的估计结果显示，自然资源依赖度的系数为负，其平方项的系数为正且数值很小，表明“资源诅咒”形成过程所具有的倒 U 型曲线关系并不成立。

第四，本文对“资源诅咒”的再检验是基于经济增长速度的角度，一些学者对此提出质疑。因此，本文也在经济发展水平的角度对“资源诅咒”假说进行了检验。估计结果表明，自然资源依赖度对经济发展水平没有显著的影响；从其估计系数的符号来看，自然资源依赖度对经济发展水平的总影响是正向的，但在逐一加入机制变量后，自然资源依赖度本身对经济发展水平有负向的影响。该结论支持了本文对“资源诅咒”存在性的讨论，即在我国地级市层面上缺乏“资源诅咒”存在的有力证据。

本文对我国地级市层面上的“资源诅咒”假说及其形成机制进行探讨。从理论上说，通过经济增长模型刻画了自然资源依赖度影响经济增长的模式；通过对“资源诅咒”的四个形成机制——资本形成、对外开放度、教育投入和创新与技术进步的综述性阐述，说明了自然资源丰裕度对资本形成和创新与技术进步的影响是不明确的，对对外开放度有不利影响，对人力资本积累没有显著的直接影响。从实证上说，本文采用 2001-2010 年我国 249 个地级市的面板数据和系统 GMM（SYS-GMM）的估计方法检验“资源诅咒”的存在性及其形成机制的重要性。研究结果表明，总体上的自然资源依赖度对地区经济增长没有显著的阻碍作用，并对资本形成、对外开放度、教育投入和创新与技术进步没有明显的影响。自然资源依赖度本身、甚至通过上述四个影响机制，都没有给经济增长带来显著的不利影响，即没有有力的证据支持我国地级市层面上存在“资源诅咒”。

关键词： 经济增长；自然资源依赖度；资源诅咒；形成机制

Abstract

Natural resources are important material foundation of economic growth. Developed countries had the benefits from natural resources in their histories of development stage. However, since 1980s, economists have found that natural-resource abundant economies tend to grow at a slower pace. The curse of natural resources means that natural resources restrict economic growth. The natural-resource abundant economies grow more slowly than economies which have only limited access to natural resources. Specifically, the economy which is depended on abundant natural resources will tend to fall into the situation that economic growth is comparatively slow. In contrast, economy with short natural-resource can achieve a remarkably high economic growth rate. In China, most resource-exhausted cities have problems like poor capacity of local finance, excessive natural resources dependence and high unemployment rate. These cities are facing the challenges of development and transformation, at the same time, many resource-based cities still along the same trajectory. Therefore, from the aspect of the sustainable development of cities in China, it is crucial to investigate the resources curse hypothesis in cities. In theory, the empirical analysis is main method to research the resources curse hypothesis. A large number of cross-countries studies show that natural-resource abundance has a negative impact on the economic growth. However, the existence of resources curse in one country is in dispute. What is more, the researches of theoretical analysis and reviews of transmission mechanisms which focus on the resources curse hypothesis are comparatively few in generally. It is necessary to test the resources curse hypothesis relied on the theoretical analysis and transmission mechanisms summary due to the lack of conclusion.

I apply literature review and empirical research in my paper. I put natural resources into Solow growth model as one of input factors and modify economic growth model which contains the natural resources factor. This is foundation of empirical model. In the literature review, I list indicators that measure the degree of natural resource

abundance in most of literatures firstly. In order to measure the degree of natural resource abundance more precisely, I distinguish two categories of indicators according to related studies, one measures the dependence of natural resources, another measures the endowment of natural resources. Compare with each other, the dependence of natural resources is more related to the economic growth, which has more direct and significant effect on the economic growth. But the drawback is that there is causal relationship between each between the dependence of natural resources and economic growth. This will lead to the problem of endogeneity inevitably. The endowment of natural resources is regarded as an exogenous variable, but its advantage of non-endogeneity is being doubted gradually. Based on what has discussed above, it is reasonable to believe that available natural resources is decreasing at the rate of resource production growth. Hence, I use the ratio of employment in mining sector to the total employment as an indicator to measure dependence of natural resources. Then the problem of endogeneity will be solved in empirical research.

Secondly, this paper summarizes four main transmission mechanisms of resource curse in China, including investment in physic capital, economic system, investment in education and innovation & technological progress. Combining with the panel data of cities in 2001-2010 in China, I draw scatterplot to reflect the relationship between dependence of natural resources and those four transmission mechanisms. The study shows, (1) abundant natural-resource crowds out and promotes physic capital formation at the same time. In China, the dependence of natural resources hinders physical capital accumulation. (2) Abundant natural-resource aggravates economic growth through deteriorating economic system that includes the degree of opening up, the level of denationalization and the degree of market. The degree of opening up decreases with the increase of natural resources dependence. (3) There is no robust negative relationship between natural-resource abundance and human capital accumulation. In generally, the natural-resource abundance has no direct and significant effect on human capital accumulation. In China, the relationship between

natural resources dependence and human capital accumulation is negative. (4) The lack of incentive and investment in innovation & technology progress leads to slower economic growth while new investment projects and the contradiction between supply and demand of resources products stimulate new technology operation. The impact of natural resources dependence on innovation & technology progress is weak in China. The level of innovation & technology progress declines when dependence of natural resources strengthens. The total influence of natural resources dependence on these four transmission mechanisms is ambiguous according to what has summarized. Empirical research will clarify these influences.

In the empirical research, I establish an econometric model which is contains those four transmission mechanisms variables and some necessary control variables. There are two obvious problems of autocorrelation and endogeneity in the model, so I employ dynamic panel model finally. For eliminating dynamic panel estimation bias and endogenous problem, I apply System GMM (SYS-GMM) to estimate. My sample is 249 cities in China during the period of 2001-2010. Compare with previous studies, I expand the sample size and the amount of information, also avoid some information missing due to individual heterogeneity which I cannot capture completely, like political system, customs, cultures, geography and climate. Empirical analysis includes panel unit root tests, panel cointegration tests, econometric estimation and robust tests. I emphasize that the core of my research is the effect of natural resources dependence on economic growth, the re-examination of the resource curse hypothesis. Then I discuss three related sub-issues, (1) the importance of those four transmission mechanisms of resource curse, (2) the examination of inverted U-shaped relationship between natural resources dependence and economic growth rate, (3) the impact of natural resources dependence on economic development.

The empirical study concludes the following four aspects. Firstly, if I do not consider transmission mechanisms variables, the coefficient of natural resources dependence is -0.000878, which is not significant and shows that natural resources dependence

has no direct influence on economic growth. Put the transmission mechanisms in regression one by one, the coefficients of natural resources dependence are all negative and not significant, which means that the total influence of natural resources dependence on economic growth is not significant. The estimation is not strong to support the resource curse hypothesis at City- level in China. From the coefficients of transmission mechanisms, every transmission mechanism has positive impact on economic growth, but investment of physical capital has a significant influence on economic growth only. From the coefficients of control variables, I find that the structure of economy is important to economic growth. The result of initial scale of economy indicates that there is no conditional β-convergence in regional economic growth. At last, the population density slow down the growth rate of economy obviously.

Secondly, the dependence of natural resources is negative to these four transmission mechanisms. The regression coefficients of investment in physic capital, degree of opening up, investment in education and innovation & technological progress are -0.00672，-0.000044，-0.0144 and -0.0000112, which are all not significant, so natural resources dependence has no obvious impact on them. Just consider about the number of regression coefficients, I decompose the direct and indirect influences of natural resource dependence. The direct influence is 50.23%, in indirect influence, investment in physic capital is the most main transmission mechanism and its influence is 48.76%. Other three transmission mechanisms has little effect, the effects of degree of opening up, investment in education and innovation & technological progress are 0.53%，0.31% and 0.14%. The result demonstrates that the adverse effects of natural resources dependence on economic growth mainly come from its own direct impact, and the investment in physic capital is the most important transmission mechanism indirectly.

Thirdly, I suppose there is an inverted U-shaped relationship between natural resources dependence and economic growth rate because total effect of transmission

mechanisms is ambiguous. And based on inverted U-shaped relationship, the formation of resource curse can be explain more easily. The rising dependence on natural resources promotes economic prosperity mainly through the increase of physical capital accumulation and technological progress along with it during the beginning of natural resources extraction. But in long run, the negative impact bought by excessive natural resources dependence becomes obstacle in the economic grows. The estimation shows that the coefficient of natural resources dependence is negative, but the coefficient of its square is positive and really small, which reveals that inverted U-shaped relationship is not established.

Lastly, the perspective of resource curse re-examination in my paper is economic growth, some economists wonder this. Therefore, I also give a test of resource curse from the point of economic development. Regression estimation demonstrates that natural resources dependence has no significant impact on economic development. Especially, natural resources dependence is positive to economic growth totally. But after put transmission mechanisms into the regression, the coefficient of natural resources dependence becomes negative. This result supports the conclusion that there is no evidence shows the existence of resource curse in China at City-level.

In my paper, I research natural resource curse hypothesis and its transmission mechanisms in China at City-level. In theory, I describe the effect of natural resources dependence on economic growth through the modified economic growth model. I summarize four main transmission mechanisms of resource curse in China, including investment in physic capital, economic system, investment in education and innovation & technological progress. Based on literature interview, I found the abundance of natural resources has ambiguous effects on physical capital investment and innovation & technological progress. It hinders opening up, and has no obvious effect on human capital accumulation. In empirical analysis, I re-examine the existence of resource curse and the importance of its transmission mechanisms by applying 249 cities panel data during 2001-2010 in China and System GMM (SYS-GMM) estimation. The results show that the total natural resources

dependence does not hinder regional economic growth significantly and it has no obvious effects on investment in physic capital, economic system, investment in education and innovation & technological progress. I demonstrate natural resources dependence itself, or through these four transmission mechanisms do not bring any significant adverse influence on economic growth. I do not have powerful evidence to support the existence of resource curse in China at City-level.

Key Words: economic growth; natural resources dependence; resource curse; transmission mechanism