Journal of Cleaner Production xxx (2016) 1–9

Contents lists available at ScienceDirect

Journal of Cleaner Production

journal homepage: www.elsevier.com/locate/jclepro

Double externalities, market structure and performance: an empirical study of Chinese unrenewable resource industries

Jiachen Li*, Lihong Yu

School of Business, East China University of Science & Technology, Shanghai, China

ARTICLE INFO

Article history:
Received 19 July 2015
Received in revised form
29 February 2016
Accepted 25 March 2016
Available online xxx

Keywords:
Double negative externality
Market structure
Performance of resource industry
Administrative merger

ABSTRACT

Externality is always hard to evaluate and definition, but the sustainable development of resource-based industries is restrained by it; particular, externalities of unrenewable resources can be divided into intergenerational and environmental negative externalities. In this paper, double externalities are respectively estimated by the users' cost method and contingent valuation method with Chinese data separately. Then, SCP (structure-conduct-performance) model were built by added double externalities into the structure-conduct-performance econometric models based on panel data. The results showed that the administrative mergers and reorganization which were prompted by the government only increased the scale but not getting efficiency; large state-owned enterprises produced more externalities as well as less profits; development of China's economy had still mainly based on resource depletion rapidly and been paying a big price of environmental externalities.

© 2016 Elsevier Ltd. All rights reserved.

1. Introduction

In China, sustainable development will thus be constrained to preserve resources and protect the environment, not only in future. Specially, the Chinese exhaustible resource industries, such as coal, metal mining and rare earth mining and smelting, have already appeared excessive entry[1] and low-level redundant construction.[2] Thus the over-entry has been resulting in a series of problems, such as disorderly competition, excessive capacity, and distorted allocation, even inefficient. Regarding coal, for example, the "reserves and production ratio", which reflects the number of years for which a resource can be mined based on current yearly output, dropped from more than 200 in 2002 to 50 years in2012[3] (that's why we concluded the over-exploitation as intergenerational negative externalities [INEs] later), which reflects the over-depletion of coal currently. Moreover, the increasing environmental pollution resulting from resource industries, such as sewage emissions and smog, directly threatens public health (which we summarized as environmental negative externalities [ENEs] later). Thus, inefficient market structure of resources industry is the reason of market failure; therefore, how to treat the Chinese resources industries in efficiency ways in terms of double externalities has to be considered seriously.

Regulation is a method to treat the market failure. The consolidation of China's resources industry had been promoted by government several times. The central government enhanced industrial restructuring and integration based on administrative laws to increase enterprises' performance. For instance, the Coal mining industry was integrated and merged three times administratively in 1999, 2001, and 2009; some small and illegal coal mines were closed, and some negative-profit state-owned coal mining enterprises have been implemented bankruptcy by relevant policy. In May 2011, the integration of the rare earth industry in China was consolidated by the State Council, which mainly prohibited illegal mining export and forming a new pattern led by large enterprises. However, these administrative methods might generate ownership discrimination and unfairness, rent-seeking, and corruption, led to diminish the efficiency of state-owned corporations. Moreover, government intervention interrupts enterprises' operations and would like betray the principles of market economics. Therefore, to redress INEs and ENEs more efficiently, government needs switch

* Corresponding author. Tel.: +86 18801972220.
E-mail address: 18801972220@163.com (J. Li).

[1] Here excessive entry means too many resource enterprises exist in the same industry and lots of barriers of exiting even with negative-profits, the whole industry production are in efficiency.

[2] Here low-level redundant construction indicates that the construction of resources enterprise have been invested repeatedly without technologic progress and cannot bring out the output efficiently.

[3] Data resources: Ministry of Land and Resources Website "www.mlr.gov.cn" and the National Statistic Yearbook 2012.

http://dx.doi.org/10.1016/j.jclepro.2016.03.048
0959-6526/© 2016 Elsevier Ltd. All rights reserved.

Please cite this article in press as: Li, J., Yu, L., Double externalities, market structure and performance: an empirical study of Chinese unrenewable resource industries, Journal of Cleaner Production (2016), http://dx.doi.org/10.1016/j.jclepro.2016.03.048

to use market mechanisms to avoid regulatory failure with incomplete information.

In this paper, we would answer the following three questions: How to measure the double externalities accurately? How the externalities can be internalized? What is the effect of INEs and ENEs on the resource industry's performance? Then we would provide some recommendations. Some relative references would be reviewed.

Studies which concerned about the sustainability and social efficiency of industries had become an increasingly high profile issue, especially in mining industry (Jenkins and Yakovleva, 2006), we summarized the related references in three parts in terms of the externality's definition, measurement, and its affection on the industries' performance.

(1) The Definitions.

INEs was proposed in different ways by Hotelling (1931), Arrow (1969), and Solow (1974), etc. Based on different statements, INEs occur when the increasing costs of resource extraction producing in current generations (insider traders) are imposed on future generations (outside traders), then diminishing the interpersonal fairness among generations. Therefore, the unfair use of exhaustible nature resources will induce the externality in long terms. Some resources indicated that INEs is largely uncertain because we cannot ensure true resource reserves exactly (Gilbert, 1979; Arrow and Chang, 1982). In addition, two viewpoints exist from a substitution perspective: first, substituted resources (such as wind, solar, and other new energy sources) cannot play a leading role in the short and medium term; second, under current level of technologies, no substitute for scarce resources (such as rare earths) can be used. Therefore, over-exploitation will result depletion rapidly.

ENEs are defined easily as the environmental affection of utility and costs which do not account besides the market mechanism during the resources producing and consumption process.[4] Intuitively, ENEs is uncompensated losses of environmental pollution, ecological damage, and threats to public health during resource extraction.

(2) Externalities' measurement.

Some issues need to be concerned during measuring externalities. First, information regarding the cost of an externality is hidden, and regulators and consumers have incomplete information rather than firms. Second, externalities have no reasonable market to trade (Arrow, 1969), so the real price (or shade price) of externalities was hard to measure.

Some studies had tried to figure out replaced methods to estimate the externalities. EI Serafy (1981) first measured the real value of resources and calculated the losses of unfair use of resources by the *user cost approach* (UCA), they estimated the value losses of unrenewable resource depletion through calculating the discounted differences from real value to nominal value. In other words, the user cost is introduced of the opportunity cost for future generations when the current generation uses much more exhaustible resources, then Eatwell et al. (1996) asserted that the UCA can be used to analyze INEs of nonrenewable resources. Based on that, Common and Sanyal (1998) and EI Serafy (1999) estimated the depletion of oil and gas in Australia by applying UCA.

Another approach for estimated the real value of resources is the *net price approach* (NPA), which reflects the opportunity cost of capital put in the resource industry, particularly the fixed cost. Othman and Jafari (2012) used the NPA to estimate the loss of oil and gas resources in Malaysia. Young and Motta (1994) contemporary estimated the depletion of mineral resources in Brazil by UCA and NPA and got the similar result.

Hence, we did not choose the NPA method because we are not only concern on the capital value and losses, but more on unfair using. That's why we applied the UCA to estimate the INEs of Chinese unrenewable resources. **Since neither of these two approaches has been used in externalities research of Chinese resource before, this is the first contribution of this paper.**

Measurements of ENEs are diversity; here we referred the contingent valuation method (CVM), which is always used to estimate the value of public goods, such as highway, health care, etc. Two essential papers have been referred directly in this study, they measured the losses of environmental pollution by CVM and got the environmental losses ratio in coal mining and metal smelting industries in China (Mao, 2008; Zhou and Ding, 2012). Based on these results of ratio of environmental losses, we would calculate the ENEs of three kinds of exhaustible resources.

(3) The structure-conduct-performance hypothesis.

The structure-conduct-performance relationship (SCP) hypothesis is classical issue in industrial organization (Bain, 1950; Stigler, 1963, which offers a causal theoretical explanation for firm performance through firm's conduct on incomplete markets. According to the SCP hypothesis, the market structure has direct influences on the conduct, which in turn affects its market performance. Therein, feedback effects occur such that market performance may impact conduct and structure. Additionally, external factors such as legal or political interventions affect the market framework: Domowitz et al. (1986, 1987) used economic cycle variables to reveal the reason for different industrial margins based on SCP hypothesis.

Most Chinese studies have used the basic SCP paradigm analyzing the causal relationship between market concentration and margins in coal mining and steel smelting industry (Xu and Han, 2006; Dai, 2007; Yang, 2012; Chen and Zhou, 2011). Zhang and Yu (2012) introduced environmental regulatory variables into basic SCP paradigm and found that the average profit and enter-and-quit barrier positively affect the industry concentration. Even there are some innovational studies regarding other industries, such as finance, transportation, etc (Min and Han, 2008), few people studied the resources industries in terms of externalities affection.

Therefore, the basic SCP hypothesis in resources industry can be perfected by adding external variables. **We will combine the double externalities, firm's scale, economic development background, and indirect regulation into basic SCP paradigms to analysis the China's unrenewable resource industry. This is the second contribution of this paper.**

The **three highlights** of this study are as follows. First, we use the increased ratio of electricity consumption (EL) to present the economic development based on Keqiang Indexes,[5] instead of GDP (GDP is not very reliable, and kinds of resources are inputs of electricity). Second, we use dummy variables (CP, 0 = private, 1 = state-owned) and public shares (PSs) in listed corporations to reflect the corporate property and the indirect regulation power separately. Third, the data sources are collected firsthand from the each annual report of China's listed enterprises.

[4] The definition is based on OECD's explanation (Organization for Economic Co-operation and Development). https://stats.oecd.org/glossary/detail.asp?ID=824.

[5] The Keqiang Index, presented by LI Keqiang, the Chinese premier, in 2014, is reflected in the economic growth by EL and other essential indexes.

Please cite this article in press as: Li, J., Yu, L., Double externalities, market structure and performance: an empirical study of Chinese unrenewable resource industries, Journal of Cleaner Production (2016), http://dx.doi.org/10.1016/j.jclepro.2016.03.048

Download English Version:

https://daneshyari.com/en/article/8102093

Download Persian Version:

https://daneshyari.com/article/8102093

Daneshyari.com