



Public appeal, environmental regulation and green investment: Evidence from China



Xianchun Liao^{a,*}, Xunpeng (Roc) Shi^{b,c,d}

^a Business School and Institute of Green Development, University of Jinan, Jinan, Shandong 250022, China

^b Australia-China Relations Institute, University of Technology Sydney, Ultimo, NSW 2007, Australia

^c Center of Hubei Cooperative Innovation for Emissions Trading System, Hubei University of Economics, Wuhan, Hubei Province 430205, China

^d Energy Studies Institute, National University of Singapore, Singapore 119620, Singapore

ARTICLE INFO

Keywords:

Green investment
Public appeal
Environmental regulation
Econometric model
China

ABSTRACT

While China has enjoyed rapid economic growth, its environment is deteriorating. One critical solution is to shift from fossil fuels to renewable energy. Although carbon markets may provide some financial sources, other financial institutions are needed to raise green investment in order to achieve low carbon growth. This study examines the determinants of green investment in China from the perspective of public appeal by employing economic and econometric models with a panel dataset for 30 provinces over the period from 1998 to 2014. Our results demonstrate that public appeal tends to have a positive effect on increasing green investment in China's context. Other findings show that industry structure, population, and regional Gross Domestic Product have significantly positive impacts on green investment, while openness, energy mix, carbon markets, and Foreign Direct Investment have significantly negative effects on green investment. Importantly, the results of channel analysis suggest that public appeal promotes local governments' enforcement of stricter environmental regulation, thereby encouraging firms to increase their green investment.

1. Introduction

It is widely believed that climate change is mainly caused by human-induced greenhouse gas (GHG) emissions. While climate change can produce severely negative outcomes such as rising sea levels, extreme temperatures, environmental disasters, and so on (International Monetary Fund, 2008; Parry, 2011; Eyraud et al., 2013) there is no consensus on a solution for mitigating climate change worldwide, with Trump's withdrawal from the Paris Agreement as a salient example. In China, the environment is getting worse because GHG emissions are accompanied by severe air pollution. In 2006, China surpassed the US to become the world's largest GHG emitter (NEAA, 2008). Meanwhile, a report from The State Environmental Protection Administration of China (SEPA) points out that about 70% of more than 300 large and medium size cities in China fail to meet the air quality standards set by the World Health Organization (WHO) and seven out of the ten most polluted cities in the world are in China (WHO, 2016).

While some previous studies recommend policies to solve China's worsening environment on the consumption side, their actual implementation may be challenging. For example, Lenzen et al. (2004) reveal a clear correlations between energy use and income, household

size, age, and degree of urbanity. They find the significant differences in lifestyles between inner and outer areas of Sydney require different quantities of natural resources and lead to different energy use and environmental stresses such as air and water pollution. While intervention on the consumption side is necessary and effective in the long term, considering green consumption in China is still lacking and residents have low environmental awareness compared to developed countries (Shi, 2014), developing a mechanism to facilitate green consumption behavior is challenging and may not be effective in the short term. Therefore, although Wang et al. (2014) find that the growing domestic final demand level is the strongest contributor of China's growth in raw material consumption, particularly urban consumption, they suggest promoting dematerialization through changing production patterns and production-related technology.

The Chinese government has made substantial efforts to reduce GHG emissions and air pollution emissions by various measures, such as establishing carbon markets, implementing environmental taxes/charges, developing emission treatment programs, and shutting down inefficient power/industrial facilities. Moreover, under the 13th Five-Year Plan (2016–2020), China has established a new set of targets including: a 16% reduction in energy intensity (energy consumption per

* Corresponding author.

E-mail address: liaoxian2@yahoo.com (X. Liao).

unit of GDP); an increase in non-fossil energy up to 20% of total energy consumption, a 60–65% reduction in carbon intensity (carbon emissions per unit of GDP) compared to 2005 and the peak of carbon emissions by 2030, and an increase in forest reserves by 4.5 billion cubic meters compared to 2005 (Mi et al., 2017a, 2017b). Meanwhile, the environmental goal of the five-year plan is to improve environmental quality by focusing on good atmosphere, water, soil pollution prevention and control. In 2015, however, China still recorded the world's largest increment in energy consumption for the thirteenth consecutive year and became the world's largest emitter of both carbon dioxide (CO₂) and sulfur dioxide (SO₂) emissions.

Achieving those targets associated with climate change and environmental treatment requires significant investment. Globally, green investment has risen considerably, from \$7 billion to \$154 billion between 2000 and 2010 (Eyraud et al., 2013). Interestingly, the majority of green investment has shifted from the United States and Europe in the 1990s to China more recently. However, despite of rapid growth of green industry in China, it is estimated that the gap between the demand for green investment and financial resources from 2014 to 2020 in China is 24.3 trillion Chinese Yuan (\$3.6 trillion dollars) by a Vice President of the People's Bank of China (Chen, 2015). In order to mobilize green investment, it is necessary to understand how green investment in China is determined. This is a key question to be investigated in this paper. Another question to be investigated is how public appeal may increase green investment? This question is related to the growing concerns and complaints among China's middle class and try to understand how increasing public appeal might change the outlook of green investment in the future.

The paper makes several contributions. The first contribution is to demonstrate that public appeal has a positive impact on green investment and environmental regulation is the bridge between these two factors in China. Second, it introduces a three-stage game theoretical model to explain the theoretical relationship between public appeal and green investment. Third, it introduces a Principal Component Analysis (PCA) to construct an environmental regulation (ER) index representing the stringency of implementation in environmental regulations, which is largely ignored in the literature.

This paper is organized as follows: Section 2 explores the driving force in green investment and explains the role of public appeal in determining green investment. In Section 3, we present the methodology, mainly focusing on empirical model. Section 4 discusses empirical procedures and major findings. Finally, Section 5 makes some concluding remarks and policy implications. Theoretical frameworks, data, and variable construction are put in Appendix A and B, respectively.

2. Driving forces of green investment and the role of public appeal

There is a significant amount of literature on China's growing demand of energy, resources and associated pollution and carbon emissions and their evolving patterns, including driver factors. For example, Wang et al. (2014) demonstrate that material impact "over the full global production chain" goes up as development proceeds and construction and heavy industry is replaced by personal consumption driven by rising incomes by employing input-output models. Wu and Chen (2017) further use a systems cross-scale input-output analysis and find that 40% of embodied energy (i.e. in goods and services) used in China is imported from other countries. Current economic literature, mostly for lesser developed countries, continues to defend and prove the existence of an "Environmental Kuznets Curve (EKC)" Hypothesis. Thus there is no evidence of EKC once data represent the full global production chain as Wu and Chen (2017) present. Furthermore, Liang et al. (2017) apply the physical input-output (PIO) model to analyze consumption-based material flows of Chinese sectors and reveal the higher importance of rural household consumption. Lenzen et al. (2004) come to a similar conclusion that energy embodied in the

consumption of goods and services by city residents can be regarded as being as important as direct energy use for Sydney households.

In order to manage the challenges from growing pollution and emissions, many studies in the economic literature focus on investment issues, particular green investment. Up until now, some studies tried to assess the economic and environmental outputs of the green investment scheme in the Czech Republic and find that subsidies for biomass boilers and heat pumps can achieve the most cost effective GHG abatement (Karásek and Pavlica, 2016). Likewise, Carraro et al. (2012) examine the impacts of carbon taxation on investments and public finance of a transition to a green and low carbon economy using an integrated assessment model. They conclude that total investments decline with respect to the reference scenario and the power sector is a net recipient of subsidies to absorb GHG emissions in all scenarios. In contrast, Campiglio (2016) argues that while carbon pricing in itself may not be sufficient, banking and finance policy play more important roles in financing the transition to a low-carbon economy. After considering feasibility and sustainability as the most important dimensions in the assessment framework, Shi et al. (2016) reveal that local engagement in operation and maintenance, loan guarantees, start-up grants, end-user financing, and concessional finance are the top five instruments to facilitate investment in off-grid renewable energy projects.

To the best of our knowledge, studies of the driving forces of green investment remain limited. Traditional specification of this subject includes income per capita (the so-called "income-green investment" relationship), interest rates, and production costs. More recently, some empirical studies add to the model the cost of fossil energy sources and public policies to support green investment. For example, Eyraud et al. (2013) define green investment from three aspects: (i) investment in renewable technologies (including large hydroelectric projects), (ii) selected energy-efficient technologies, and (iii) research and development (R&D) in green technologies and analyze the determinants of green investment over the last decade for 35 advanced and emerging countries. They find that economic growth, low interest rates, and high fuel prices promote green investment.

The existing literature uses cross-country data to investigate the determinants of green investment and does not address issues in China specifically. Few studies have sought to isolate the independent effects of various factors on green investment in China's context. For example, Xu et al. (2017) use panel data for five sectors in China to test determinants of green investment and suggest that investment does not become green: Chinese climate policies have no influence on investment in the agriculture sector or construction sectors, while having a positive effect on investment in the transportation sector.

Important but perhaps less widely recognized in the literature is the possibility that public appeal could be an important driving factor of green investment in China. In developed countries, people can vote to choose governments as their representatives to increase public spending in improving environmental quality. In contrast, China is a top-down political system and thus public choice is not applicable. However, China's central government is willing to listen to public appeal and set up strict environmental regulations on carbon and air pollution emissions in order to maintain social stability. Then, the central government pushes provincial and local governments to implement these regulations, through a "pressure transmission mechanism". Firms as implementers of environmental regulations are forced to increase investment in environmental treatment or renewable energy sources (e.g. hydropower) so on. Thus, public appeal as a variable should be accounted for when estimating determinate factors in China's green investment. Zhang et al. (2016) employ data from public (A-share) listed companies of heavy pollution industry in China and find that strict government environmental regulations promote firm's green investment and media monitoring can significantly push the exertion of environmental regulations power and thereby, increasing green investment. However, their study has a small sample of 152 A-share listed companies in heavy polluting industries and ignores small and medium

Download English Version:

<https://daneshyari.com/en/article/7397128>

Download Persian Version:

<https://daneshyari.com/article/7397128>

[Daneshyari.com](https://daneshyari.com)