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Advancing the experiment to reality: Perspectives on Shanghai pilot carbon emissions trading scheme

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HIGHLIGHTS

- This paper gives a thorough overview on the progress and key elements design of Shanghai ETS.
- This paper conducts an evaluation on the potential uncertainties with Shanghai ETS development.
- This paper highlight the importance of symmetric information disclosure and participation of non-regulated entities.

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ABSTRACT

Shanghai, as the most advanced mega city in China, has launched a pilot carbon emission trading scheme (SH-ETS) that is designed to achieve a compromise between the domestic context in Shanghai, and a need for national policy appeal. This paper gives an overview of the latest progress of the SH-ETS and sheds some light on the features of key design components, such as the threshold for inclusion, sector coverage, cap setting, allowance allocation and the Monitoring, Reporting and Verification (MRV) system. Based on a concern that manipulative principles and economic dynamics may lead to uncertainties and ultimately influence the emission reduction effect of the scheme, this paper conducts an evaluation of potential uncertainties, such as those caused by changes in patterns of economic growth, strategic trading activities related to the bankable allowances, carbon leakage risks and insufficient MRV capabilities. To advance the experiment to reality, this paper suggests some changes are made to the pilot, which include adjusting the allowance allocation principles to facilitate change in the domestic energy structure, improving the disclosure of emission data to guarantee information symmetry, gauging the carbon leakage risks to strengthen compliance, and introducing risk management for non-regulated players and derivatives products.

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1. Introduction

As one of the pilot cities and provinces designated by the Chinese central government for a carbon emissions trading scheme (ETS), Shanghai has laid out a regional scheme to facilitate its accomplishment of a 19% carbon intensity reduction target over the period of the 12th Five Year Plan (FYP) (SMPG, 2013). After more than two years of preparation, the Shanghai carbon emissions trading scheme (SH-ETS) was formally launched on 26 November, 2013. The Shanghai experiment is a trial of an ETS in a mega city with high population density, concentrated production and consumption activities, and a relatively mature market environment. In principle, to build a well-functioning cap and trade system, several conditions should be met to ensure the efficient pricing of carbon, achieve emission reduction and avoid leakage.

Such conditions include an elastic factor and commodity market, differentiated abatement costs, a sufficient amount of participants, effective governance, an appropriate market and institutional environment and rigorous Monitoring, Reporting and Verification (MRV) systems (Benkovic and Kruger, 2001). The Chinese ETS has drawn great attention within the academic community regarding the performance of these necessary conditions. Han et al. (2012) give an overview of the development of the Chinese ETS and focus specifically on several key issues, such as the choices between intensity targets and absolute targets, the lack of a mature market environment and prospects in the 13th FYP. Lo (2013) argues that the socialist market, but not the liberal political economic system, will cause uncertain viability. Qi and Wang (2013) discusses the allowance allocation, pricing mechanisms and state owned enterprises (SOEs) of the Chinese ETS and provides some solutions to

the problem of the monopoly of SOEs. Most of the existing literature focusses on national level analysis and little goes into detail with respect to the pilot cities and provinces to look at how their system design can compromise the national policy appeal and local social and economic context.

This paper offers an overview of the progress of the SH-ETS and sheds light on some features of the key design components, such as sector coverage, cap setting and allowance allocation. Compared with the other six pilot cities and provinces, Shanghai has specific advantages but also some limitations in building a well-functioning carbon market. It has a relatively mature financial market, an efficient administrative system, advanced manufacturing technologies for clean energy equipment and a large number of applications for renewable energy: electric vehicles, smart grid, etc. On the other hand, it has a limited number of participants, relatively high abatement costs and rapidly changing economic growth patterns, which bring about a series of challenges for the design of the ETS. In fact, all of China's pilot cities and provinces, including Shanghai, are seeking a way to design the trading system according to their own social, economic and institutional context. Detailed analysis is definitely needed to make a more comprehensive evaluation of China's pilot ETS development from a regional perspective. By taking the endogenous factor design and exogenous socioeconomic context into consideration, this paper makes an evaluation of the potential uncertainties for the development of the SH-ETS and identifies their likely impact on market performance.

2. Progress of the SH-ETS

After more than two years preparation, Shanghai commissioned its pilot ETS on 26 November, 2013. The Shanghai Municipal Government released the *Guidelines of Implementing Pilot Emissions Trading Scheme* in July 2012 (SMPG, 2012), which details the sector coverage, pilot period, fundamental allowance allocation mechanisms, MRV principles, trading platform and key milestones of the development of the SH-ETS. At the end of November 2012, a listing of 197 participants was publicly announced (SMDRC, 2012k).¹ In order to facilitate the allowance allocation and MRV processes, the Shanghai Municipal Development and Reform Commission (SMDRC) released the *Guideline on Measuring, Reporting and Verification of Shanghai ETS* at the end of 2012 (SMDRC, 2012a). In line with these general guidelines, detailed methodologies of carbon accounting for nine key sectors – steel, power and heat generation, chemistry, non-ferrous metals, textile and paper making, manufacture of non-metallic mineral products, aviation and transportation, commercial and public buildings – were also announced (SMDRC, 2012b–j). Just before the official commissioning of the pilot ETS, SMDRC released the *Allocation and Administration Guidelines on Carbon Emission Allowances over the period of 2013 to 2015* (SMDRC, 2013). This document details the principles of allowance allocation, trading and banking, and off-setting. Procedures of allowance issuing, registration, monitoring and verification are also included.

In addition to these policy making and capacity building activities, the SH-ETS is also producing legal umbrellas to make up for the lack of national legislation on carbon emission control

and ETS establishment. Like most of the pilot cities and provinces, except Shenzhen city, Shanghai has no legal right to law enactment. As an alternative, the municipal government issued a regional normative document on the ETS in November 2013,² the *Administrative Principles of Shanghai Carbon Emissions* (SMPG, 2013). This normative document comprises six sections, including allowance administration, allowance verification and clearance, trading principles, protective and simulative mechanisms, legal responsibilities and monitoring mechanisms. It legalizes a series of penalty standards regarding non-compliance, including a fine amounting to 100,000 RMB, suspension of new production capacities and the cancelation of national subsidies on energy conservation projects.

3. Overview of the key features of the pilot SH-ETS

To develop a cap and trade system, the principles relating to several key elements need to be clarified, these include: sector coverage, cap setting, permit allocation, the MRV system, the compliance mechanism, and the banking, borrowing and off-setting mechanisms. Hereafter, this paper will give an overview of the SH-ETS in regard to the key design elements mentioned above. Table 1 summarizes the key features of the pilot scheme.

3.1. Threshold for inclusion and sector coverage

In general, a two-step filtering mechanism is utilized by the SH-ETS. First, sectoral carbon intensity is used to filter the high intensity sectors, and then a carbon emission scale as the criterion that determines which entity should be regulated. The SH-ETS sets the threshold of CO₂ emission at 20,000 t for industrial sectors and 10,000 t for non-industrial and service sectors.

In terms of the carbon emissions from final energy use, including electricity and heat, in 2010 the industrial sectors covered by the scheme accounted for 51% of total emissions and the transportation and service sectors that are covered accounted for 26.1%.³ To calculate the exact emission contribution from regulated entities, we need further information about the ratio of regulated to non-regulated entities. Since the Shanghai government has not released the relevant information, this paper makes a rough estimation based on expert interviews.⁴ The regulated entities account for almost 61.7% of Shanghai's total emissions (Fig. 1). As for the GDP share, it seems that the regulated entities only account for 37.8% of total GDP (Fig. 1). Obviously, the regulated industrial sectors are characterized by high carbon emission levels but low GDP contribution, while the regulated transportation and service entities make higher contributions to GDP.

3.2. Cap setting and allowance allocation in the SH-ETS

The SH-ETS announced the general principles for cap setting and allowance allocation (SMDRC, 2013). For most of the involved industrial entities and commercial buildings, overall allowances are determined in accordance with their record over the period

¹ Among these 197 participants, eight are ferrous companies, 16 are non-ferrous companies, 56 are petro-chemical, chemistry and fiber companies, 14 are power generation companies, 32 are construction materials companies, 6 are paper making companies, 8 are clothing and textile companies, 15 are aviation, shipping and logistic companies, 42 are public and commercial buildings, for detail, please see: (http://www.shdrc.gov.cn/main?main_colid=326&top_id=312&now_id=380&now_id_top=&main_artid=22036).

² According to China's legal and political system, the compulsory force of various legislation is ordered as follows: national law, national and regional statute, government rules and regulations and government normative documents. Normative documents have their legal position in regional governance.

³ Carbon dioxide emissions are estimated by the authors using the emission coefficient provided by IPCC; energy data is from the Shanghai Energy Statistical Year Book (2011).

⁴ The interview was conducted with experts from the Shanghai Municipal Commission of Development and Reform, Shanghai Energy and Future Exchange. It is indicated that the ratio is about 4:1.

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