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Business perspective to the national greenhouse gases emissions trading scheme: A survey of cement companies in China

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ABSTRACT

Applying data gathered from 105 cement companies, this paper gives an analysis of how business views the upcoming national greenhouse gases emissions trading scheme in China. Despite a good overall understanding, the surveyed companies have not been able to prepare properly for the implementation of this policy. They still need training to enhance their related capacity. Probably due to strict competition, it is difficult for cement companies to pass the policy cost on to their clients. The sampled companies intend to make self-mitigation efforts for compliance. It is highly likely that cement companies would mitigate emissions themselves if the carbon price is higher than 108% of the self-abatement cost. The surveyed cement companies anticipate an increase in the carbon price in China, from about 35 Yuan/t-CO_2 in 2020, to 60 Yuan/t-CO_2 in 2025 and 90 Yuan/t-CO_2 by 2030. The analysis provides reference for the smooth introduction and effective implementation of national carbon market in China from the business viewpoint.

1. Introduction

China launched pilot schemes for carbon trading in seven municipalities and provinces in 2013. Overall, the pilot markets reflect regional features and economic differences (Qi and Cheng, 2015). As one of the core climate policies to realize the country's intended nationally determined contributions (INDCs), China announced the start of its national greenhouse gases emissions trading scheme (GHG ETS) in 2017 by targeting the most energy-intensive industries. The scheme would cover companies in 8 sectors and 18 subsectors, which used no less than 10,000 tce (ton of standard coal equivalent) of energy in any year between 2013 and 2015 (NDRC, 2016). This scheme will become the largest carbon market in the world, with an estimated emissions coverage of around 3–4 billion t-CO_2 per year, equaling to the annual emissions of the EU or the combined emissions of India, Brazil and Japan.

To establish this nationwide GHG ETS, the National Development and Reform Commission (NDRC) issued the 'Interim Management Measures for Carbon Emissions Trading' on December 10, 2014, to clarify the responsibilities of relevant institutions (NDRC, 2014). Among which, target emitting entities are required to develop their emissions monitoring plans and put them on record; prepare emissions reports for the previous year, and duly submit the emissions verification reports to provincial governments; and submit an emissions quota for compliance. Eleven national standards for the measurement and reporting of GHG emissions of major industries were issued on November 19, 2015, including general guidelines and specific requirements individually for 10 sectors (AQSIQ and SAC, 2015). The previous two years, 2015 and 2016, may be viewed as the preparatory period for China's national GHG ETS. The period from 2017 to 2020 will be the phase for launching and initial operations. The coverage of this scheme will be expanded and links to the international market will be explored after 2020 (Qi and Cheng, 2015).

There remain great challenges for the national GHG ETS in China. One critical issue is to establish a strong legal basis. NDRC is well aware of this and has been working with the Office of Legislative Affairs under the State Council to upgrade the provisional management measures. The accuracy and consistency of emissions measurement is a prerequisite for carbon trading, and there is a pressing need to enhance capacity for developing the measurement, reporting and verification (MRV) system. It is also important to address the policy coherence between the energy saving programs under implementation and the national GHG ETS for China to peak its emissions by 2030 or even sooner (Duan, 2015).

The introduction of a carbon pricing policy, i.e., GHG ETS, is largely determined by the understanding and acceptability of industrial companies as the major policy targets. Clarification of their opinions is crucial to facilitate the ongoing discussions about GHG ETS in China.

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However, it is surprising that there has been very limited research on the viewpoints of companies. Aiming to close this research gap, a questionnaire survey was conducted in 2016 targeting the cement industry in China, to qualitatively measure current understanding of the industry on the national GHG ETS. The cement industry was focused in this research since China is the largest producer and consumer of cement worldwide. Carbon emissions of China's cement industry accounted for around 60% of this sector globally. Different with the previous studies on this sector, i.e., analyses of driving force, environment impact and sustainable development of China's cement industry and its tendency of eco-efficiency (Xu et al., 2012; Shen et al., 2017; Long et al., 2017), this research gathered the opinions of cement companies on the main attributes of GHG ETS for the reference in policy development.

This paper consists of the following sections. Section 2 gives an overview of related literature. Section 3 explains the methodology for estimating the possibility of companies to make self-mitigation and their anticipated carbon prices in the near future. Section 4 describes the detailed questionnaire format, survey process and the statistics about respondents. Section 5 outlines the analysis results and corresponding discussions. Lastly, Section 6 provides the summary and research policy implications.

2. Literature review

Carbon trading in Europe over the past 10 years has resulted in the accumulation of large amounts of data allowing the ex-post analysis of the EU-ETS. Accordingly, many studies have been carried out focusing on the impacts of this scheme on CO_2 emissions, economic performance and innovation of regulated companies.

Based on the aggregate emissions data, Ellerman et al. (2010) and Anderson and Di Maria (2011) showed that abatement varied greatly across countries, and emission reductions over Phase I of the EU-ETS across all the sectors and countries were close to 3%. Using microdata from administrative sources, Petrick and Wagner (2014) found that the EU-ETS had a significant impact on emissions between 2008 and 2010, causing the participating companies to reduce their emissions by 26% relative to non-participating companies.

In terms of the policy impact on economic competitiveness, Kenber et al. (2009) interviewed senior managers of six large manufacturing companies and confirmed that the EU-ETS neither resulted in significant costs nor induced a fundamental shift in strategy such as relocation. Martin et al. (2014) collected data from interviews with 761 managers of the EU-ETS and non EU-ETS companies in six European countries. Most companies reported that carbon pricing has no impact on their location decisions. Using an event study, Jong et al. (2014) found that the impact of the EU-ETS on the share prices of companies arose from their production carbon intensity. Since emission allowances are given for free to energy-intensive industries under the current EU-ETS rules, the cement industry in 20 European countries was estimated to have made €5 billion in windfall profits from the EU-ETS between 2008 and 2015 (CWM, 2016).

Regarding the impact of the EU-ETS on innovation, Martin et al. (2013) confirmed that the allocation method of emissions allowances influenced a company's innovation decisions. Borghesi et al. (2012) analyzed innovation data of 1000 Italian companies and suggested that the EU-ETS encouraged companies to innovate but only in sectors for which the allowances allocation has not been too stringent. Rogge et al. (2011a) conducted interviews with managers of 36 companies in the pulp and paper sector in Germany. The EU-ETS was ranked only the seventh among the determinants of R & D activities, whereas two-thirds of them expected that the relevance of R & D would rise due to climate policy by 2020. Rogge et al. (2011b) qualitatively analyzed the impact of the EU-ETS on technology innovation in the power sector by carrying out case studies in Germany. The innovation effect of the EU-ETS was confirmed to be limited due to the lack of stringency and predictability at the initial phase. Targeting two Nordic pulp and paper companies, Gulbrandsen and Stenqvist (2013) examined the influence of the EU-ETS on the business climate strategies. The enhancement of procedures in CO_2 emissions monitoring and price accounting of the companies was confirmed to be significant, but the scheme has not triggered any business efforts to search for innovative low-carbon solutions. Fontini and Pavan (2014) evaluated the technology change for CO_2 reduction in the pulp and paper industry in Italy over the early two phases of the EU-ETS. They found that technology improvement occurred only in the second phase.

Some other studies discussed the methods for improving the practices of the EU-ETS. Using the samples in the second phase and first year of the third phase, Freitas and Silva (2015) found a long-running relationship between energy prices and carbon prices under the EU-ETS. It has been suggested that the EU-ETS should be shaped to prevent excessively low carbon prices over time. Based on interviews with plant managers from almost all Belgian ceramics, lime and cement producers, Venmans (2016) suggested that the EU-ETS should aim to reduce the uncertainty of carbon prices to lower barriers for abatement investment. Applying a multi-criteria evaluation approach, Clò et al. (2013) identified the options enhancing the function of the EU-ETS. Carbon credit buying and price floor setting were ranked as the best options for supporting the carbon price and improving the flexibility of the scheme. Zetterberg (2014) argued that the allocation with updated outputs and ex-ante benchmarks would provide economic incentives as high as the auction. Benchmarking allocation might also protect against production leakage.

The development of GHG ETS in China more recently has attracted increasing research attention. Several studies have focused on China's pilot carbon markets. Jotzo and Lösche (2014) clarified the differences in design and operation of the seven pilot markets, and discussed the related challenges such as the risk of over-allocation of permits, unpredictable emission growth trends, robust measurement and verification procedures, and the interaction with regulation of the energy sector. Yang et al. (2016) identified the factors determining company perceptions of GHG ETS by conducting an online survey in the pilot areas of China. The results indicated that business attitudes to the ETS were positively influenced by government regulations, public relations management and the estimated economic benefit. Based on the information from local regulators and experts, trading data and literature, Munnings et al. (2016) evaluated how the three most developed pilot ETS in Guangdong, Shanghai and Shenzhen had adapted to China's economic and political context. Cong and Lo (2017) assessed the actual outcome of the carbon market in Shenzhen. More regulatory attention and economic fixes were recommended to improve market efficiency and eliminate market distortions. Guan et al. (2016) applied the latest energy and emissions data to explore the impact of emission trading toward absolute emissions and emission intensity changes in the pilot regions. Decelerated growth in carbon emissions since 2010 has been mainly driven by economic slowdown, and the pilot ETS played a minor role in emissions reductions.

A few additional analyses aim to provide evidence for the development of the national GHG ETS in China. Tang et al. (2017) proposed a multi-agent-based model for the auction of carbon emissions allowances in China. Their simulation indicated that the uniform-price design would be relatively moderate, while the discriminative-price design would be quite aggressive in economic damage and emissions reduction. The prices under the two auction rules would fluctuate at about 40 Yuan/t-CO_2. Zhu et al. (2017) presented a quantitative assessment of GHG ETS for China's iron & steel industry using a partial equilibrium model. This study demonstrated that free allocation of allowances might cause a competitiveness distortion among the normal and outdated capacities. An output-based allocation approach was suggested.

According to the literature review above, there do exist fruitful studies targeting the EU-ETS. Nevertheless, at the current stage, the lack of policy practices would not allow the similar and ex-post analysis of