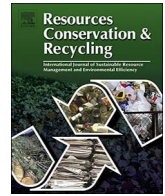




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The clean development mechanism and corporate financial performance: Empirical evidence from China

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ABSTRACT

The Clean Development Mechanism (CDM) is one of the “flexibility mechanisms” defined in the Kyoto Protocol to deal with global climate change. This paper uses the event study methodology to determine the relationship between corporate CDM adoption and financial performance. We conjecture that implementing CDM projects is beneficial for non-core business returns but not corporate profitability because firms often have an ulterior motive in obtaining direct economic revenue from CDM projects without expending due effort on environmental protection and efficiency improvement. We extract a list of companies with operational CDM projects in China and identify them as the sample group. Using the propensity score methodology, we establish a control group based on estimations using a probit regression model that verifies the factors determining industrial companies’ participation in CDM projects. The control group comprises non-adopters of CDM projects that have a similar propensity score to CDM adopters based on their corporate financial indicators. The results from Wilcoxon signed-rank tests and one-sample binomial tests show that the major positive financial effect of CDM adoption is obtained from the growth of non-core business revenue. The profitability of the adopters is not significantly changed after the CDM adoption. There are no remarkable changes in sales growth after CDM certification.

1. Introduction

The Clean Development Mechanism (CDM) is an important and substantial tool that promotes firms to decrease their carbon emissions. It is one of the Kyoto “flexibility mechanisms” organized under the United Nations Framework Convention on Climate Change (Zhang and Wang, 2011). CDM projects have become increasingly popular in China over the past decade. As of May 2015, there were 5073 CDM projects approved by the government, 3807 of which were eventually registered. China has evolved into the world’s largest supplier of CDM projects. Such projects are attractive in China, as they are helpful for many industrial firms in tackling their heavy carbon emissions problems. There are around 782 million tons of CO₂ reduced from CDM projects in China every year,¹ which account for around 8% of total emissions of China. CDM projects involving energy recovery from waste management are also very popular (Unnikrishnan and Singh, 2010; Wang et al., 2016), which benefit both carbon emission reduction and environmental protection.

There are also other incentives for firms in China to reduce their carbon emissions. For instance, the command-and-control from government forces firms to envisage their emission problems. Since the year 2005, China government initiated the program for closing down backward production facilities. From the year 2011–2014, there were 23.65 million kilowatt of thermal power, 77 million tons of iron, 77 million tons of steel and 600 million tons of cement compelled to be shut down,² due to their energy intensive production and/or heavy carbon emissions. However, the marginal cost for closing down these energy intensive production capacities is increasingly growing. Firms are often reluctant for the program because of the loss of economic benefits from the closed capacity. Another program motivating firms to reduce carbon emissions is carbon trading market. There are 7 regional carbon markets in China, and a national carbon trading market will be built at the end of 2017. Firms can sell their reduced carbon emission in the carbon market for extra economic revenue. However, the carbon market in China is still in an initial stage, and the trading scale is small.

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E-mail address: wangzhaohua@bit.edu.cn (Z. Wang).¹ The data source is available at <http://cdm.ccchina.gov.cn/NewItemList.aspx>.² The data is available at <http://www.scio.gov.cn/xwfbh/xwfbfh/wqfbh/33978/34172/zy34176/Document/1468938/1468938.htm>.

Taking the year 2015 for example, the total carbon credits traded in the 7 regional carbon markets were only 37.86 million tons.³

Compared with the above programs, CDM projects have advantage in economic benefits for reducing corporate carbon emissions. For one thing, CDM provides a platform facilitating inter-firm collaboration on carbon emissions reduction (CER) between developing countries and developed countries listed in Annex I of the protocol.⁴ Industrial firms in developing countries can contribute to climate change mitigation through the CDM by either selling certified emissions reduction credits to their counterparts in developed countries (Leme et al., 2014) or cooperating directly with investors in these countries to decrease emissions (MacKenzie et al., 2011). Because the marginal carbon abatement costs in developing countries are relatively lower than those in developed countries, it is beneficial for industrialized countries to reduce their compliance costs using emissions reduction credits from CDM projects. Meanwhile, the reduced carbon emissions can be sold to project buyers from developed countries or traded in the global carbon market, generating extra revenue for the enterprises in developing countries. For another, advanced technology related to energy efficiency and renewable energy can be transferred from developed countries through CDM projects (Dechezleprêtre et al., 2009). For example, technology for the decomposition of animal effluents is diffused via CDM projects on animal breeding farms to mitigate biogas emissions. The CDM provides industrial firms in developing countries with access to the advanced technology necessary for reducing carbon emissions (Seres et al., 2009), thereby avoiding innovation costs or licensing expenses on similar technologies.

Considering these economic incentives, many industrial firms undertake CDM projects as a tool of improving their corporate financial performance. Firms often tend to adopt CDM projects primarily for the sake of direct economic benefits from trading carbon credits. However, economic benefits from trading carbon credits in CDM projects are attributed to corporate non-core business returns. The literature remains controversial on whether a positive relationship also exists between corporate profitability and CDM project adoption. CDM projects are often designed to lower the abatement costs of carbon emissions and promote sustainable development for industrial firms (Rahman and Kirkman, 2015). In light of this ulterior motive, pro-environment and efficiency improvement activities become subordinate objectives. Few firms take CDM projects as a tool for improving their competitiveness and profitability. Additionally, implementation of CDM projects also leads to “hidden costs of reward,” which offset some of the benefits of environmentally friendly corporate activities (Kunz and Pfaff, 2002). For instance, there is a strict approval process for CDM projects that covers project design, validation, registration, monitoring, and issuance of CER credits (Uddin et al., 2015). Industrial firms need to demonstrate their potential carbon abatement ability in their application for CDM registration. It is usual to incur extra investment costs in relation to CER during the preparation of CDM projects. In particular, when considering corporate financial performance measures such as sales growth and profitability, the contributions from CDM adoption remain unclear, and theoretical development of the performance value of CDM for adopters is seriously lacking in the literature.

This paper employs an event study approach to determine the relationship between CDM project adoption and the financial performance of industrial firms in China. We differentiate between corporate non-core business returns and sales growth and return on assets (ROA) to evaluate the changes attributable to CDM adoption. The empirical data were collected from 96 firms listed on the Chinese stock exchange

³ The data is available at <http://www.tanpaifang.com/tanguwen/2017/0117/58301.html>.

⁴ There are 43 Parties to the UNFCCC listed in Annex I of the protocol. These parties include industrialized (developed) countries, as well as the “economies in transition” countries, which are the formerly centrally planned economies of Russia and Eastern Europe.

that operated certified CDM projects or holding firms that had received certification for CDM projects in China. To the best of our knowledge, this is the first paper to empirically evaluate the financial effect of the CDM at the firm level for industrial firms that undertake CDM projects in developing countries. Further, we explore whether there is an ulterior motive in firms seeking CDM projects for non-core business gains rather than performance enhancement.

The rest of the paper is organized as follows. Section 2 provides the theoretical background with developed hypotheses to guide our research. Section 3 gives a comprehensive description of the research methodology, data collection, and statistical tests. Section 4 reports and discusses the empirical results and some limitations of this study. Conclusions are presented in Section 5.

2. Theory and hypotheses

Corporate financial responses to the adoption of CDM projects may not be altogether positive or negative for several reasons. Although the CDM can bring economic benefits from selling CER credits (Bayer et al., 2013), extra investment costs or expenses can be incurred during the CDM implementation process. In recognizing the contribution of CDM adoption as a revenue source by trading the CER credits generated, the performance value to adopters is limited to non-core business income. In response to the research void regarding the impact of CDM adoption on corporate sales growth and profitability, this study aims to determine the performance impact of CDM adoption from the perspective of non-core business returns, sales growth, and ROA.

2.1. Relationship between CDM adoption and non-core business returns

Firms have ulterior motives in implementing CDM projects with a view to obtaining non-core business returns. Corporate social and environmental responsibility initiatives are often pursued for the sake of achieving business goals rather than seeking social and environment solutions (Ellen et al., 2006). Although CDM adoption is an environmentally friendly activity in terms of reducing corporate carbon emissions, few firms implement CDM projects with the intention of decreasing their carbon footprint. Their ultimate motivation for the implementation is underpinned by the potential economic benefits from CDM projects. According to the fundamental principle of CDM projects, this mechanism allows industrial firms in developed countries to fulfill their emissions reduction commitments and reduce their cost of carbon abatement by buying carbon credits from their counterparts in developing countries or cooperating with them on CER (Olsen, 2007). On this basis, CDM project providers in developing countries can gain economic benefits from selling credits for reduced carbon emissions to needy firms in developed countries. In addition, advanced technologies for CER can be transferred to developing countries with lower costs through cooperative exchanges on carbon abatement with firms in developed countries. The transferred technologies represent cost savings on technological innovations or patent license fees for the adopters of CDM projects in developed countries such as China. As CDM projects are not the core business for most industrial firms in China, corresponding revenues are often allocated to non-core business returns. This leads us to develop the following hypothesis:

H1(a). The adoption of CDM projects is positively correlated with the growth of non-core business returns.

Firms in the energy production industry dominate CDM projects in China, with over 50% of projects being registered by energy-related industries including power generation and coal mining. The majority of these projects are related to energy efficiency improvements or the application of renewable and sustainable energy, generating economic benefits from carbon credits. Such credits are tradable only after CDM certification, with non-core business returns only being realized after certification. By comparison, there are more CDM projects related to

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