

Financial Market Evaluation of Firms Greenhouse Gas Emissions

Submitted by Shan Hua to the University of Exeter as a thesis for the degree of
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ABSTRACT

Climate change has been influenced more by human activities now than previously. These influences are largely attributed to industries, whose activities can potentially produce enormous amounts of carbon dioxide and other greenhouse gases, and exacerbate the speed of climate change.

This thesis examines how the financial markets evaluate corporations' greenhouse gas emission performance. We consider various emission criteria, and distinguish between the better and worse performers in different emission policy regimes, including the US, the UK and the rest of the EU. The investigations have been conducted at three stages, presented in chapter 3, 4 and 5.

Firstly, in chapter 3 we examine the carbon effects at the portfolio-level, where total return indices are our main concern. By adopting the long-short strategy, we report that investors in the UK and EU markets, can make an arbitrage profit at the lower cut-off levels, when applying various carbon screening policies and forming equally-weighted portfolios. However, no such profit opportunities can be achieved in the US market. We further consider the reason for such arbitrage opportunities, which is the link between corporate governance/management efficiency and different levels of carbon constraint.

Secondly, in chapter 4, the carbon effects are investigated at firm-level, where firms' financial market values act as the dependent variable. Our regression models are based on the Ohlson framework, which considers firms' financial market value in relation to its accounting performance, and the 'other information', which in our case is the carbon emission performance. We find a significant relationship between the US firms' values and their carbon emission performances; however, this relationship has been weakened for UK companies, and in fact becomes even unreliable for EU companies. Further, in order to explore the reason for this relationship, we have focused on energy efficiency and firms' reputation that are associated with carbon reduction activities. The scale effects have also been discussed in this chapter, as the various deflators are adopted.

Finally, in chapter 5, again at firm-level, cash flow expectation and cost of capital have been considered to possibly be the source that drives firms' value.

Cash flow expectation is measured at the short-, medium- and long- term, by profitability, earnings growth, and residual income growth rate, respectively. Two portfolios for each target parameters are constructed according to different carbon screening criteria at different cut-off levels, the differences between each pair of portfolios are then calculated and tested for significance. A sub-sample regression, which is based on the observations available from analysts' earnings forecast, has been conducted for each of the three regimes. After matching the portfolio and regression results, we report that the implied cost of equity is only reduced for the less carbon emission firms, in regimes where more stringent carbon constraints are applied; whereas in regimes where less stringent carbon constraints exist, the less carbon emission firms have not gained any advantage through their implied cost of equity. Also, cash flow expectations indicate diverse outcomes for different time horizon and regimes.

Furthermore, various market participants, such as governments, investors, distributors and clients etc, who could possibly influence firms' carbon behaviour, have also been considered in association with their roles in reducing greenhouse gas emissions. Our work contributes to the existing literature through a wide ranging examination of major financial evaluation methods relating to emerging carbon emission issues.

Keyword: Greenhouse gases (GHGs), Carbon emissions, Climate change, Firm valuations, Portfolio analysis, Cost of capital

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