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Corporate carbon emissions and market valuation of organic and inorganic investments

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ABSTRACT

We empirically examine the impact of a firm's carbon emissions level on the market valuation of organic and inorganic investments. We document that the market reacts negatively to corporate investment announcements by companies with high carbon emissions levels. Further analysis indicates that the discount on market valuation is more pronounced for the set of organic investments, within which only asset acquisitions and product launches are negatively affected by the high carbon emissions level at the announcement.

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1. Introduction

Burgeoning studies in the broader accounting and finance literature have investigated the nexus between corporate environmental performance and investors' behaviour (Heinkel et al., 2001; Gollier and Pouget, 2009; Krueger et al., 2020). However, several questions regarding whether investors consider firm environmental performance in the pricing of corporate investment announcements remain unaddressed. We draw on the climate risk literature and leverage a unique dataset of organic and inorganic corporate investment announcements to provide empirical evidence of the market perception of corporate emission levels. In recent years, environmental, social and governance considerations have become increasingly prevalent factors that have the potential to dictate portfolio allocation choices. Investors desire to engage in more socially responsible investments based on environmental performance (Chava, 2014). The stock markets' perception of corporate environmental performance is valuable for gauging the preference and role of investors and other market participants in the race for net zero.

The literature on carbon emissions and stock market returns has increased in recent years (Luo and Wu, 2016; Tian et al., 2016). However, the literature overlooks the relationship between the market valuation of corporate investment announcements and a firm's carbon emissions level. High carbon emissions introduce additional risk factors such as compliance risks, regulatory risks, and potential adverse changes in consumer preferences, leading to investors' desire for a carbon premium (Bolton and Kacperczyk, 2021; Pedersen et al., 2021). The implications of carbon emissions on market valuation of corporate events are critical for market participants and managers as they can guide risk modelling. Corporate investments also have significant implications on the carbon footprint of firms. This study advances the literature by investigating the relationship between the market valuation of corporate investment announcements and a firm's carbon emissions level.

First, the results advance the notion that markets price the implications of high carbon emissions at the announcements of corporate investments, with the impact more pronounced in the case of organic investments. Second, we show that the valuation effect of organic investment is different from inorganic investments since the proximity of control implicitly vested in both categories of announcement differs (Jones et al., 2004, 2022). The findings indicate that the market perceives high carbon emissions

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Table 1
Summary statistics.

	Full sample	Acquisition of companies	Asset acquisition	Product launches	R&D
CAR _{it}	0.008	0.008	0.015	0.003	0.004
Emission	0.169	0.172	0.275	0.039	0.028
Log emission	11.715	11.653	12.593	11.008	12.562
Size	14.986	14.903	14.886	14.970	17.148
ROA	0.137	0.138	0.143	0.070	0.122
Leverage	0.234	0.231	0.279	0.194	0.254
Market to book	1.425	1.436	1.101	1.452	1.435

The table reports the mean of the sample and subsample for this study.

levels negatively for firms in the consumer discretion industry and consumer staples industry.

The structure of the paper is organized as follows. Section 2 describes the data and estimation strategy. Section 3 reports the empirical analysis, and the last section concludes.

2. Data and estimation strategy

The study employs data on company investment announcements from the Financial Conduct Authority's (FCA) official national storage mechanism from the period 2004 to 2019. The sample consists of 161 organic corporate investment announcements and 1847 inorganic investment announcements. Organic investment announcements comprise 70 asset acquisition announcements, 16 R&D announcements, and 75 product launch announcements. We sourced firm-level data from Thomas Reuters and Refinitiv Eikon. We estimate abnormal returns for each investment announcement using the market-adjusted model which is specified as:

$$AR_{i,t} = R_{i,t} - R_{m,t} \quad (1)$$

where $AR_{i,t}$ refers to the abnormal returns of investment event i at time t and $R_{i,t}$, the returns of firm i over the relevant event window. $R_{m,t}$ refers to the FTSE All Share return during the period of the announcement. We estimate the cumulative abnormal returns (CAR) over the period $[T-1]$ to $[T+1]$ using the following equation:

$$CAR_{i(T-1,T+1)} = \sum_{t=1}^T (AR_{i,t}) \quad (2)$$

where $CAR_{i(T-1,T+1)}$ refers to the cumulative abnormal returns of event i at time $t-1$ to $t+1$. The results from the $CAR_{i(T-1,T+1)}$ calculation are employed to estimate the pooled OLS regression below.

$$CAR_i = \alpha + \beta Emission_{it} + \delta' X_{it} + \gamma' Year Dummy_t + \nu' Industry Dummy_j + \varepsilon \quad (3)$$

CAR represents the cumulative abnormal returns of event i . Emission is the carbon emission of firm i at year t deflated by total assets. X_{it} is a vector of control variables. We include year and industry dummies which are represented by ν and δ in the equation. Our empirical model is motivated by Jones et al. (2004) and Jones et al. (2022).

3. Empirical analysis

Table 1 presents the summary statistics of all the variables. The results suggest that on average, a corporate investment announcement yields a cumulative abnormal return (CAR) of 0.8% for an event window of $[T-1]$ to $[T+1]$. The values are comparable with previous studies (Jones et al., 2004, 2022).

Table 2 reports the regression results of Eq. (3). The results show that carbon emissions reduce the market valuation of investment announcements. Thus, a firm's carbon emissions level

Table 2
Carbon emissions and market valuation of corporate investment.

	Model (1)	Model (2)	Model (3)
Emissions	-0.0013** (-1.85)	-0.0101*** (-2.76)	-0.0011** (-1.95)
Size	-0.0032*** (-5.86)	-0.0049 (-1.51)	-0.0032*** (-6.20)
Share Price Run Up	0.0633 (1.70)	0.0928 (0.67)	0.0592 (1.61)
ROA	0.0224 (0.74)	-0.0430 (-0.55)	0.0322 (1.00)
Leverage	-0.0141 (-1.61)	0.0231 (0.58)	-0.0179** (-2.21)
Market to Book	0.0001 (0.33)	0.0047 (0.84)	-0.0000 (-0.10)
Relative Size			0.0481*** (3.75)
Year Dummies	YES	YES	YES
Intercept	0.0502*** (5.05)	0.0698 (1.85)	0.0489*** (5.15)
Observations	2008	161	1847
R-squared	0.031	0.137	0.033

The table presents the regression result of the impact of carbon emissions at an announcement on market valuation of corporate investment announcement. Column 1 reports the result of the full sample while columns 2 & 3 report the results of the category organic and inorganic investment announcements. Significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *, respectively. T-statistics are shown in parentheses.

Table 3
Carbon emissions level and market valuation of organic investment announcements.

	Model (1)	Model (2)	Model (3)
Emissions	-0.0110*** (-4.33)	-1.1206*** (-8.84)	0.0200 (0.49)
Controls	YES	YES	YES
Intercept	0.0731** (2.17)	-0.0437*** (-3.23)	0.1303 (1.22)
Year Dummies	YES	YES	YES
N	70	16	75
R-squared	0.235	0.998	0.319

The table presents the results of the relationship between carbon emissions level and market valuation of three subcategories of organic investment (asset acquisitions, product launches and R&D). Columns 1, 2, & 3 present results for asset acquisitions, product launches and R&D respectively. Significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *, respectively. T-statistics are shown in parentheses.

is priced negatively during corporate investment valuation. We further examine the impact of investment categories and find evidence that the effect of carbon emissions on market valuation of investment announcements is more pronounced for organic investments than inorganic investments. The result shows that the market accounts for the potential impact of the announcement on the company's environmental performance. The difference in magnitude mirrors the proximity of control implicitly vested in both categories of the announcement. Similarly, organic investments could worsen a firm's carbon footprint, unlike inorganic investments where synergies could be leveraged in acquisitions to minimize the level of carbon emissions.

Table 4
Industry classification, carbon emission and market valuation of corporate investment announcements.

	Basic materials	Consumer discretion	Consumer staples	Energy	Health care	Industrials	Technology	Telecommunications	Utilities
Emissions	−0.0060 (−1.09)	−0.0106** (−1.73)	−0.0393** (−1.79)	−0.0022 (−0.13)	−0.0817 (−0.77)	−0.0007 (−0.83)	−0.2710 (−0.71)	−1.2926 (−0.74)	−0.0066 (−1.19)
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES
Intercept	0.0433 (1.49)	0.0079 (0.37)	0.1274*** (3.76)	0.0588 (0.99)	0.0768*** (2.12)	0.0799*** (5.05)	−0.0308 (−0.36)	−0.5496 (−1.39)	0.0758 (0.37)
N	122	463	100	85	172	881	76	28	58
R-squared	0.112	0.084	0.215	0.069	0.076	0.025	0.061	0.732	0.082

The table presents the results of the impact of carbon emissions on market valuation of corporate investment as it varies across industries. Significance at the 1%, 5%, and 10% levels are indicated by ***, **, and *, respectively. T-statistics are shown in parentheses.

In Table 3, we subdivide organic investments. The results suggest that high levels of carbon emissions at announcement are only perceived negatively for the set of asset acquisitions and product launches, with the effect more severe for product launches. For R&D investment announcements, the relationship between carbon emissions and market reaction is insignificant. This is expected as R&D investments are less likely to increase a firm's carbon emissions and may involve strategies that reduce carbon footprint. Product launches on the other hand do little to improve firm environmental practice, whereas asset acquisitions may involve acquiring technologies that would reduce a firm's carbon footprint.

Finally, we evaluate whether the market valuation of investment announcements differs with industry. The results in Table 4 confirm our conjecture that the impact of carbon emissions varies with industry. The results also suggest that the negative impact of carbon emissions on market valuation of investment announcements is only significant for consumer staples and the consumer discretion industry. This implies that the relationship only holds for firms mostly in the public eye. To ensure our results are robust, we run our regression using the natural logarithm of emissions and our results remain largely unchanged.

4. Conclusions

We investigate whether carbon emissions levels during corporate investment announcements have varying impacts on market perception. The market reacts negatively to announcements by firms with high levels of carbon emissions and the magnitude of the relationship is higher for organic investments than inorganic investments. The findings show that the association between carbon emissions and market valuation of investment announcements is more pronounced for investment announcements related to product launches. Lastly, the impact of

industry on investors' pricing of carbon emission on investment announcement requires consideration as we find a significant effect in the consumer staples and consumer discretion industries.

Data availability

Data will be made available on request.

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