

# Chapter 20

## Climate Risk and Firm Performance: Evidence From Transportation Firms

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### **ABSTRACT**

*In this study we investigate the relationship between climate risk and firm performance for 627 transportation firms from 45 countries. Our findings confirm significant negative relationship of climate risk on firm performance and such results have been robust to the battery of robustness tests. Also these results remain robust across all the three sectors (Marine, Air Freight Logistics and Airlines, and Road and Rail firms) of transportation industry. We also find significant moderating role of financial constraints and investment efficiency on the relationship between climate risk and firm performance. Specifically, we found that the negative relationship between climate risk and firm performance is more pronounced for transportation firms facing high financial constraints and having low investment efficiency.*

### **1. INTRODUCTION**

The literature concerning the effects of climate change has been divided into two camps where in one camp belongs to researchers that have examined the macroeconomic impact of climate change and other camp belongs to researchers that documented evidences of firm-level impact of climate change. Specifically, the researchers the examined the macroeconomic impact of climate change focused on the effect of climate change on economic activity (Kahn et al., 2021; Acevedo et al., 2020); financial stability

DOI: 10.4018/979-8-3693-9346-8.ch020

(Battiston et al., 2021; Carney, 2015); monetary policy (McKibbin et al., 2020; Cœuré, 2018); total factor productivity (Letta and Tol, 2019); economic production (Burke et al., 2015); social welfare (Arouri et al., 2015); income (Deryugina and Hsiang, 2014); economic growth (Dell et al., 2012; Fankhauser and Tol, 2005); energy consumption (Deschênes and Greenstone, 2011); international trade (Gassebner et al., 2010). Besides this the other camp of researchers that examined firm-level impact of climate change focused on the effect of climate change on firm performance (Ozkan et al., 2023; Huang et al., 2018); bank loan financing (Huang et al., 2022); physical and organizational capital (Kanagaretnam et al., 2022); financing choices (Huang et al., 2018); firm earnings (Hugon and Law, 2018); stock returns (Goetzmann et al., 2015; Hirshleifer and Shumway, 2003).

Although the above-mentioned literature documents significant firm-level impacts of climate change yet it is found that the damage caused by climate change is largely witnessed by vulnerable industries like agriculture, food manufacturing, business services and transportation (Challinor et al., 2014; Wilbanks et al., 2007; McCarthy et al., 2001) when compared to other Industries. Within these industries transportation industry is directly affected by climate changes (Wang et al., 2020). As such climate change can not only disrupt the normal operations of the transportation firms but can also cause damage to the transport infrastructure. Additionally, firms in transportation sector rely heavily on fossil fuels, such as airlines and shipping companies presenting them with additional regulatory and legal risks to operate in this sector.

Given that the climate change could have significant impact on transportation firms, we examine the relationships between climate risk and firm performance among 627 transportation firms (11,031 observations) from 45 countries for the period of 2006 to 2019. Our sample dissects into all the three sectors of transportation industry that includes Marine firms, Air Freight and Logistics and Airlines firms, and Road and Rail firms. Our main findings show that climate risk is negatively associated with firm performance. Also to an extensive array of robustness tests, we find that our main results continue to hold. It was also found that the main results hold true for all the three sub-sectors of transportation industry. Further, we conduct additional cross-sectional analysis by examining the moderating role of financial constraints and investment efficiency on the relationship between climate risk and firm performance. Our results demonstrate that the negative impact of climate risk on firm performance is more pronounced for transportation firms facing high financial constraints and having low investment efficiency.

Our study contributes to the literature in several important ways. First, it contributes to the emerging strand of the climate risk literature by examining the impact of climate risk on firm performance of most vulnerable industry. To our knowledge, this is the first study to exclusively examine the impact of climate risk on performance of transportation firms. Second, our study responds to Wang et al. (2020) call that majority of research about the climate impacts on transportation industry have focused only on road, rail and ports, therefore our study takes into consideration all the three forms of transportation firms (Marine, Air Freight and Logistics and Airlines, and Road and Rail firms). Thereby, providing in dept understanding of how climate risk affects firm performance of transportation firms. Third, given that access to finance and management of investment can help transportation firms to combat climate risk our study examines the moderation role of financial constraints and investment efficiency on the relationship between climate risk and firm performance.

The research problem is to examine the impact of climate risk on the performance of transportation firms, addressing a significant gap in the literature that has largely focused either on macroeconomic effects or on other sectors' vulnerability to climate change. The transportation sector, foundational to economic activity and heavily reliant on infrastructure, faces unique challenges due to its exposure to

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