

Do Sustainable Operations through Energy Effectiveness Reduce Cost of Debt in Medium and High-tech Industries? Evidence from an Emerging Economy

Pranith Kumar Roy,^{,1} Kamalika Halder,² and Mohd Shadab Danish³*

✎ EXECUTIVE SUMMARY ✎

1. Motivations underlying the research

Sustainable operational practices that prioritise energy efficiency are crucial in addressing greenhouse gas emissions, combating climate change, and promoting sustainable economic development. The manufacturing sector, as a significant energy consumer and contributor to emissions, can play a pivotal role in this context. Improving energy efficiency in manufacturing not only yields substantial environmental benefits but also offers significant economic and social advantages for present and future generations (Bai et al., 2021). Simultaneously, the availability of capital is vital in driving business operations, exerting significant influence on firms' behaviours and decision-making processes (Wang & Tang, 2023). The active engagement of capital providers in financing energy-efficient projects can unlock multiple benefits, including reduced environmental impact, enhanced operational efficiency, and improved long-term financial performance for businesses.

The incentive in terms of reduced cost of debt (COD) is a significant factor that impacts a firm's financial viability and ability to secure capital for future investments. It represents the interest rate a firm pays on borrowed funds and is influenced by various factors, including its creditworthiness, market conditions, macroeconomic factors and competitive landscape. The competitive landscape can have a notable influence on the interest rates charged by banks when lending, and there are several potential reasons for this relationship.

However, with the evolving business landscape, firms are increasingly focused on energy efficiency, which has captured the attention of investors. Firms increasingly recognise the importance of energy efficiency for environmental and societal reasons, as well as its profitability considerations. The growing awareness of environmental concerns and energy consumption patterns has heightened investors' focus on the reputational risks associated with energy-intensive firms. This measure, in turn, has motivated lenders to incorporate sustainability metrics in their credit assessments. On the other hand, a higher COD can indicate a higher risk, potentially negatively influencing investors' interest. Therefore, gaining insight into energy efficiency in the business that influences the COD is crucial for firms to make informed financing decisions and improve their financial performance. The theoretical foundation is based on the premise that enterprises using less or alternatives are more likely to address social and environmental concerns effectively. On the contrary, firms that consume substantial endure an additional risk for investors. Firms that engage in energy-intensive practices may participate in activities that increase liabilities and impact the cost of their borrowings.

2. A short account of the research performed

To explore the impact of energy efficiency on the cost of debt (COD), we use panel data from 2011 to 2021 for all listed firms on the Bombay Stock Exchange (BSE). We conducted a panel data analysis using 7,603 observations classified as high- and medium-tech from 2010 to 2022, employing

¹ Corresponding author: email: pkroy@iimraipur.ac.in

² Email: 23dp0057@iitism.ac.in

³ Email: sdanish@iimraipur.ac.in

two-stage least squares Tobit regression models. We categorise the firms into two groups, high-tech and medium-tech, based on the classification by the Organisation for Economic Co-operation and Development (OECD) (Sandven et al., 2005). We also address the possible issue of endogeneity. The lack of agreement in the empirical literature on the relation between energy efficiency and the cost of debt can be partly attributed to endogeneity. If firms with lower debt costs are more inclined to invest in energy efficiency, this could create a reverse causality issue. In other words, firms with already lower borrowing costs may have the financial resources and incentives to implement energy-efficient practices rather than energy efficiency directly influencing the cost of debt. We employ an instrumental variable (IV) Tobit model to address these concerns and provide more reliable estimates to examine the link between energy efficiency and COD. This model is particularly suitable for analysing right-censored data, where the dependent variable is truncated and only observable within a specific range. By applying the IV Tobit approach, as suggested by Chesher et al. (2023), we aim to overcome the limitations associated with endogeneity and enhance the coherence and robustness of our findings.

3. Main conclusions and policy implications of the work

This research presents empirical evidence for adopting sustainable operational practices, such as energy efficiency (reductions in the energy-output ratio) and COD when making a financing decision. The study offers significant theoretical, practical, and policy implications for firms, investors, and regulators in emerging economies such as India. First, the study identifies operational initiatives that firms can adopt to achieve both environmental sustainability and financial gain. The firm's sustainability, measured through energy efficiency, reflects a summary metric of technology adoption and new investments in energy-saving measures. The research extends the analysis to explore the nature of this relationship across different industries and ownership structures. To demonstrate these linkages, we investigated the sample by splitting it into high-tech and medium-tech sectors. Distinctly studying these sectors enables policymakers to understand the unique dynamics and challenges that may develop regarding energy efficiency in each sector. The results suggest that the impact on COD varies depending on the degree of energy efficiency achieved (Fu et al., 2023). Although the influence is more pronounced in high-tech firms, it remains vital in medium-tech sectors. Medium-sized businesses must, therefore, carefully assess the investment size in energy-efficient technologies to achieve the intended economic benefit.

By recognising the financial benefits tied to energy efficiency, policymakers can create an ecosystem that fosters sustainable investment, enhances corporate creditworthiness, and ultimately stabilises the energy market by reducing dependency on fossil fuels. Policymakers in government can leverage this insight by introducing incentives, such as lowering taxes or subsidies, to firms that invest in energy-saving technology, potentially resulting in reduced greenhouse gas emissions and improved environmental performance. It also suggests that governments may strengthen regulatory frameworks to promote energy efficiency among businesses, thereby enhancing enterprises' environmental and financial performance. Since banks and financial institutions (FIs) are becoming more cautious of the reputational risks involved in lending decisions, especially to firms with inadequate environmental performance, regulators can mandate the inclusion of sustainable metrics in their lending processes. Further, FIs may be incentivised to foster sustainable business practices and possibly reduce financing costs for energy-efficient enterprises. Encouraging environmental regulations could potentially influence the sustainable business process and the resultant access to funding.