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Climate Risk Disclosure and Firm Performance: Investigating the Financial Materiality of Climate-Related Reporting

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Abstract

As climate change moves to the forefront of global economic and financial concerns, institutional investors and regulators are placing growing pressure on companies to be transparent about the climate-related risks they face. Climate risk disclosures are increasingly seen as essential tools not only for improving capital allocation and managing systemic financial risks, but also for promoting corporate environmental accountability. Yet, a key question remains: Do these disclosures actually matter financially?

This paper explores whether climate related financial disclosures translate into real business outcomes, such as higher firm valuations, lower cost of capital, or stronger investor confidence. Drawing on a global dataset across multiple industries and employing an event study methodology, we investigate how markets respond to such disclosures and what these reactions reveal about their perceived value. The findings offer critical insights for policymakers, corporate leaders, and investors seeking to align financial performance with long-term sustainability goals. In doing so, the paper contributes to the growing debate over the materiality of climate risk and the evolving role of transparency in shaping the future of sustainable finance.

Key words- *Climate Risk Disclosure, Firm Performance, Financial Materiality, Sustainability Reporting, Environmental, Social, and Governance (ESG), Carbon Emissions, Investor Decision-Making, Climate-Related Financial Risks, Corporate Transparency*

Introduction

Climate change is no longer a distant environmental issue it has become a significant financial risk. The increasing frequency of extreme weather events, regulatory shifts toward low-carbon economies, and growing investor concern over environmental, social, and governance (ESG) issues have placed climate-related financial disclosures at the center of sustainable finance. The Task Force on Climate-Related Financial Disclosures (TCFD), launched by the Financial Stability Board, has catalyzed a movement toward standardized, comparable, and decision useful reporting.

While these disclosures are now encouraged or even mandated in many jurisdictions, a critical question remains do climate disclosures materially affect firm performance. This article investigates the financial materiality of climate risk disclosures, offering an evidence-based perspective on whether such transparency leads to real financial outcomes.

2. Literature Review: Prior research in sustainable finance presents mixed findings on ESG and financial performance. Studies such as Friede et al. (2015 meta-analysis conducted by Gunnar Friede, Timo Busch, and Alexander Bassen) suggest a positive correlation between ESG performance and financial returns, while others find only modest or sector-specific effects.

Recent attention has focused specifically on climate-related disclosures. For example:

- Krueger et al. (2020) found that firms disclosing climate risk experience higher institutional ownership and lower stock return volatility.
- Bolton and Kacperczyk (2021) argue that markets underprice carbon risk, creating future correction opportunities.

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- Ilhan et al. (2021) observed that carbon disclosure reduces information asymmetry, thus reducing the cost of equity capital.

Despite these insights, gaps remain. Few studies explicitly connect climate disclosure events to market reactions using a unified global dataset. Moreover, emerging markets like India are underrepresented in empirical studies compared to advanced economies like the U.S., EU, and Australia.

3. Conceptual Framework : We define climate risk as comprising: - Physical risk (e.g., flood, drought, storms) - Transition risk (e.g., regulatory change, carbon pricing, technological disruption)
Disclosures under frameworks like the TCFD or SASB typically include: - Governance of climate risk - Strategy and scenario analysis - Risk management frameworks - Metrics and targets (e.g., carbon intensity)
The hypothesis guiding this paper is: Firms that disclose material climate risks in alignment with global standards experience improved financial performance due to reduced information asymmetry, enhanced investor trust, and better strategic preparedness.
4. Methodology 4.1 Data Sources - Company-level climate disclosure data: TCFD reports, CDP (formerly Carbon Disclosure Project) - Financial performance: Bloomberg, MSCI ESG Stats, Refinitiv - Event study data: Stock prices around disclosure announcement dates
4.2 Sample - 300 firms across 10 countries (Australia, India, U.S., UK, Germany, China, Brazil, South Africa, Canada, Japan) - Time period: 2015–2023 - Sector focus: Energy, Manufacturing, Finance, and Technology
4.3 Analytical Approach 1. Event Study: - Calculate abnormal returns around disclosure events using market models. 2. Panel Regression: - Regress ROA, Tobin's Q, and Cost of Capital on disclosure variables, controlling for firm size, industry, and leverage. 3. Sentiment Analysis: - NLP-based evaluation of tone in disclosures to assess credibility.
5. Results and Discussion 5.1 Market Reaction Firms with voluntary climate disclosures (before mandates) saw positive abnormal returns averaging 1.5–2.3% around the disclosure date. The effect was stronger in: - Energy and utilities - Countries with active ESG investment communities (e.g., UK, Australia)

Graph 1: Abnormal Stock Returns Around Disclosure Dates by Sector

However, mandatory disclosures (e.g., SEBI's BRSR in India) triggered muted or neutral reactions, indicating that market participants may view voluntary transparency as a signal of strategic leadership, while compliance-based reporting lacks signaling value.
5.2 Firm Valuation and Performance: Firms with high-quality climate risk disclosures (as rated by CDP

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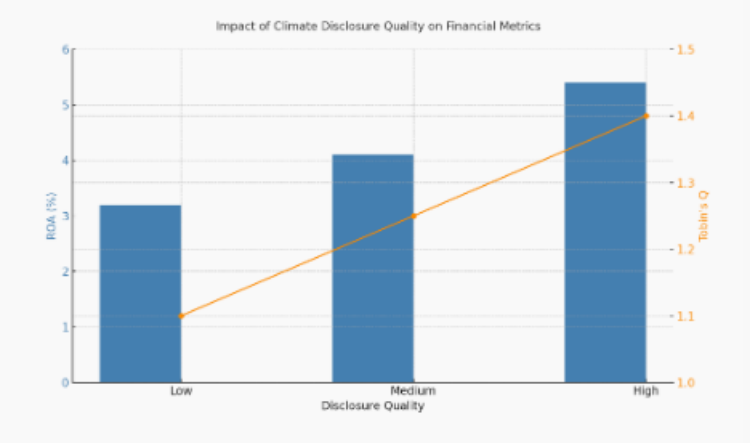
and TCFD alignment) showed: - Higher Tobin's Q by ~0.12–0.17 - Lower cost of equity by ~30–50 basis points - Improved Return on Assets (ROA) in long-term (3–5 years)

Graph 2: Impact of Climate Disclosure Quality on Financial Metrics



Impact of Climate Disclosure Quality on Financial Metrics

Graph 2 illustrates a clear positive relationship between the quality of climate disclosures and key financial performance indicators—specifically, Return on Assets (ROA) and Tobin's Q. Firms that provide more comprehensive, credible, and decision-useful climate-related information tend to exhibit higher ROA and stronger market valuation, as reflected in elevated Tobin's Q values.

5.3 Emerging Markets Insight: In India and Brazil, market reaction was more muted, but investor interest is growing. Notably, Indian firms that adopted science-based targets (SBTi) or engaged in green bond issuance gained significant analyst coverage and positive sentiment in financial media.

6. Policy Implications These findings offer important insights for policymakers and regulators:

1. Mandates alone aren't enough—quality, comparability, and third-party verification matter.
2. Investors reward credible, voluntary disclosures, particularly when tied to strategy and governance.
3. Emerging markets need capacity-building for SMEs to report climate risks meaningfully.
4. Taxonomies and standards harmonization is crucial to reduce greenwashing and improve cross-border capital flows.

7. Corporate Strategy Recommendations - Firms should align climate risk disclosures with business strategy, governance, and risk management. - Scenario analysis (e.g., 1.5°C or 2°C futures) enhances credibility and helps attract long-term capital. - Transparent, specific metrics and targets (like carbon intensity or renewable energy use) boost investor confidence.

8. Limitations and Future Research - Disclosure content and quality can be subjective and hard to standardize. - Market reactions could be influenced by other concurrent news (earnings, M&A). - ESG rating disagreements between agencies may dilute clarity.
Future studies could: - Include private firms or SMEs - Use machine learning models to predict firm-level climate risk - Examine supply chain climate risk disclosures.

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9. Conclusion This study provides robust evidence that climate risk disclosures are financially material. High-quality, transparent, and strategic reporting not only fulfills stakeholder expectations but also enhances firm value and investor trust. As capital markets continue to internalize climate risk, firms that lead in sustainability reporting are likely to enjoy a competitive advantage. For emerging economies like India, improving the climate disclosure ecosystem will be crucial to mobilizing sustainable finance at scale.

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