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The Impact of Climate Change Performance on Dividend Payout Ratio

***Dr.Madan Mohan Varshney**
Associate professor (commerce)
Damyanti Raj Anand Government P.G. College Bisauli

Abstract

This paper analyses the effect of climate change performance, which includes physical climate risk exposure, climate change initiatives, carbon emission intensity and climate transition risk, on dividend payout ratio based on panel data of 100 listed companies in India during 2018–2024. The fixed-effects panel regressions show that exposure to physical climate risks and carbon emission intensity significantly and negatively impact dividend payout ratios, and improved climate change initiatives are significantly and positively related to payout ratios. The negative but less strong association between payout ratios and climate transition risk may be explained by valuation discounts and reinvestment pressures on transition-exposed companies. Firms with greater climate initiatives and firm size are less affected by the adverse impacts of climate risk and carbon intensity. The results are stable across various alternative specifications, industry subsamples, and lagged climate variables. The results are consistent with risk-based, signalling and agency theories, suggesting that climate risks limit capacity to pay dividends while proactive climate strategies can help to maintain dividend sustainability in emerging markets such as India.

Keywords: climate change performance, physical climate risk, carbon emissions, climate initiatives, dividend payout ratio, Indian listed companies, panel data, fixed effects, signalling theory, agency theory

1. Introduction:

Corporate payouts have become a crucial factor in global response to climate change, given the physical risks, transition risks, and carbon-related exposures it poses (Javadi & Masum, 2023; Bolton &Kacperczyk, 2024). Climate-related risks and opportunities have garnered greater attention by investors and regulators and are now a key part of their consideration when evaluating dividend sustainability, cash flow stability and long-term value creation (Choudhury & Das, 2025; Al-Shboul et al., 2025). In emerging markets, such as India, where the climate risk exposure is high and regulatory shifts are rapid, and investor interest in climate performance is rising, it is imperative to understand the impact of climate performance on dividend decisions

(Singh & Kumar, 2024; Centre for Science and Environment, 2024).

Empirical studies have recently demonstrated strong evidence that climate risks limit dividend payments. According to the global studies, companies in climate riskier countries cut their cash dividends, while the firms in less risky countries increasingly start to repurchase shares to boost payout flexibility, with a one-standard-deviation higher climate risk associated with a 4.4% drop in cash dividends and a 2.4% rise in share repurchases (Javadi & Masum, 2023; Javadi et al., 2021). Several studies on carbon risk and dividend policy reveal that companies with greater carbon intensity or operating in polluting industries tend to exhibit lower dividend payout ratios, especially following carbon-related regulatory events such as the Kyoto Protocol (Balachandran & Nguyen, 2018; Zhu & Hou, 2022).

There are emerging but limited evidence from India. Climate transition risks are found to have negative impact on market value creation (Tobin's Q) which in turn has adverse impact on dividend capacity (Singh & Kumar, 2024; Verma & Patel, 2025). Emerging markets are also grappling with high cost of capital, as they are deemed to be high-risk markets, and the top three concerns for the financing of clean energy projects in the country are the risk of off-taker payment, variability of resources, and construction risk (Centre for Science and Environment, 2024).

Although this progress has been made, there are still a number of gaps. Firstly, much of the evidence is from developed markets (e.g., US, Europe) or certain emerging markets (e.g., China, South Africa) but not so much for Indian listed firms (Javadi & Masum, 2023; Bolton &Kacperczyk, 2024). Second, the differential effects of physical climate risk, climate initiatives, carbon intensity, and transition risk on dividend payout ratio are not well understood in the Indian context (Singh & Kumar, 2024; Al-Shboul et al., 2025). Third, very few studies combine risk-based theory, signaling theory, and agency theory and explore the mechanisms through which climate performance impacts dividend decisions in emerging markets (Chen & Yue, 2023; Javadi & Masum, 2023).

This paper makes a contribution to the literature by providing a structured empirical analysis, exploiting panel data of Indian listed firms, which captures real-life situations that are consistent with the recent global/EM studies. The aim is to estimate the correlation between physical climate risk exposure and dividend payout ratio, and to explore the effect of climate change efforts on dividend payout ratio, the relation between carbon emission intensity and dividend payout ratio, and the implications for dividend payout ratio for managers, investors and policy makers in India.

2. Literature Review and Theoretical Framework:

2.1 Climate risk and dividend policy: Global evidence

The relationship between dividend policy and climate risk is explored in a stream of literature. Using a large sample of firms across 45 countries, Javadi and Masum (2023) and Javadi et al. (2021) examine how firms adjust cash dividend payments when climate risk increases, and discover that firms in countries with high climate risk are less likely to increase cash dividend

payments but more likely to use share repurchases to increase payout flexibility. From their findings, they find that for every one standard deviation increase in the climate risk index, the firm's dividends are reduced by 4.4%, total payouts are increased by 1.2%, and repurchases are increased by 2.4%, indicating that the company is likely to replace dividends with repurchases to increase financial flexibility.

In the context of the dividend payment flexibility of firms, it is identified that two channels through which the risk of climate change impacts firms' dividend payment flexibility include operating volatility and financial constraints (Javadi & Masum, 2023; Dang et al., 2024). This substitution effect is the need for increased financial flexibility to address the cash flow shock associated with uncertain climate-related shocks (Javadi & Masum, 2023; Nguyen et al., 2024).

Dang et al. (2024) and Nguyen et al. (2024) report that the firm-level climate risk is negatively related to dividend smoothing, particularly for firms that invest in environmental assets. The results suggest that companies with increased climate risk are more inclined to invest in the environment than in dividend stability, especially when they are not able to raise funds internally (Dang et al., 2024; Nguyen et al., 2024).

2.2 Carbon risk and dividend policy: Global evidence

Other research gives further insights into carbon risk and dividend policy. Balachandran and Nguyen (2018) use a quasi-natural experiment in the imputation tax environment in Australia to investigate the effect of carbon risk on dividend policy. After the ratification of the Kyoto Protocol, they discover that polluter companies have lower probability of paying dividends and dividend payout ratio as compared to non-polluters (Balachandran & Nguyen, 2018; Zhu & Hou, 2022). The post-Kyoto decline in polluters' dividend payments appears to be caused by the increase in polluters' earnings uncertainty, suggesting that carbon risk impacts firm dividend policy (Balachandran & Nguyen, 2018).

Zhu and Hou (2022) study carbon risk and dividend policy in China and conclude that the carbon risk is negatively associated with dividend policy, implying that any increase in carbon risk causes a decrease in firm dividend payouts (Zhu & Hou, 2022; Balachandran & Nguyen, 2018). This indicates that carbon risks limit dividend capacity by increasing the uncertainty of their operations and financing difficulty (Zhu & Hou, 2022).

At the carbon emissions level, Al-Hiyari et al. (2025) and Pham et al. (2024) reveal that companies with lower emissions pay more to shareholders, indicating that management prioritizes balancing the interests of shareholders and financial returns in dividend decisions. The Paris Agreement of 2015 has encouraged companies to cut their dividends, which may be due to increasing climate change pledges and reinvestment requirements (Al-Hiyari et al., 2025; Ellili, 2022).

2.3 Climate initiatives, sustainability strategies, and dividend policy

Research on climate policy and sustainable business practices reveals that these variables create a significant impact on dividend policy, which is dependent on the level of a country's economic development, with the impact of climate policy being present or lagged (Khan et al., 2025; Ellili,

2022). Khan et al. (2025) investigate an unbalanced panel of 117,410 firm-year observations in 71 countries and conclude that climate change programs have a positive impact on firm performance, including dividend-related measures. Their findings indicate that proactive climate measures generate value through risk mitigation, efficiency gains, and signaling long-term thinking to investors (Khan et al., 2025).

The results of the study of ESG performance and dividend policy in emerging countries reveal that the higher the ESG performance, the higher the dividend payment, and that dividend payment can be boosted by the earnings and risk components of the ESG performance (Al-Hiyari et al., 2023; Ellili, 2022). The overall impact of ESG can be decomposed into its three components, and the results indicate that there are stronger, and sometimes more expensive, relationships between the payout outcome and governance, with weaker relationships in environmental and performance dimensions, particularly among smaller firms (Al-Hiyari et al., 2023; Saeed et al., 2024).

2.4 Climate risk and dividend policy: Indian and emerging-market context

The context is provided by the data from India and emerging markets. Singh and Kumar (2024) examine the relationship between climate transition risk and financial performance and market value of the Indian-listed companies, and they found that the climate transition risk adversely influences the market value creation (Tobin's Q) of the companies, which in turn negatively impacts their dividend capacity (Verma & Patel, 2025).

The cost of capital in India for clean energy investments is high because of the risk associated with investment in emerging markets and developing economies (Centre for Science and Environment, 2024) and dividend capacity is limited by the risk of off-taker payment, resource variability, and construction risk for financiers. This indicates that in India, structural and institutional risks exacerbate climate risks, thereby increasing financing costs and limiting dividend payments (Centre for Science and Environment, 2024).

Climate risk in South Africa is reflected in the cost of debt and cost of equity capital, where the higher the climate risk exposure, the higher the financing costs, and the lower the debt-equity ratio, leading to lower dividend capacity, indirectly (African Economic Association, 2025). This suggests that climate risk not only influences the price of corporate investment but also the nature of the investment and dividend policy of corporate investors in emerging markets (African Economic Association, 2025).

2.5 Theoretical foundations

Three complementary theoretical perspectives underpin the expected climate–dividend link:

- **Risk-based perspective:** Climate change introduces physical risks (e.g., extreme weather, supply chain disruptions) and transition risks (e.g., policy changes, technology shifts) that can increase costs, reduce revenues, and elevate uncertainty, thereby constraining dividend capacity (Bolton &Kacperczyk, 2024; Choudhury & Das, 2025).
- **Signaling theory:** Strong climate performance (e.g., low emissions, robust climate initiatives) signals superior management quality, lower risk, and long-term orientation,

which can support higher and more stable dividend payouts by improving investor confidence (Khan et al., 2025; Al-Hiyari et al., 2023).

- **Agency theory:** Climate risk and transition exposure can exacerbate agency conflicts, leading managers to prioritize financial flexibility (e.g., share repurchases over dividends) and environmental investments over dividend stability (Javadi & Masum, 2023; Dang et al., 2024).

Together, these perspectives suggest that climate risks constrain dividend capacity, whereas proactive climate strategies can support dividend sustainability, with the net effect depending on firm characteristics, industry context, and the quality of climate performance (Khan et al., 2025; Singh & Kumar, 2024).

3. Hypotheses:

Based on the literature and theory, we formulate the following hypotheses:

- **H1:** Higher physical climate risk exposure is negatively associated with dividend payout ratio in Indian listed companies (Javadi & Masum, 2023; Al-Shboul et al., 2026).
- **H2:** Stronger climate change initiatives are positively associated with dividend payout ratio (Khan et al., 2025; Al-Hiyari et al., 2023).
- **H3:** Higher carbon emission intensity is negatively associated with dividend payout ratio (Balachandran & Nguyen, 2018; Zhu & Hou, 2022).
- **H4:** Climate transition risk is negatively associated with dividend payout ratio, though the effect may be weaker than that of physical climate risk (Singh & Kumar, 2024; Javadi & Masum, 2023).
- **H5:** The adverse effects of climate risk and carbon intensity on dividend payout ratio are attenuated in firms with stronger climate initiatives and larger firm size (Khan et al., 2025; Al-Hiyari et al., 2023).

4. Data and Methodology:

4.1 Sample selection

We construct a **panel dataset** of **100 Indian listed firms** (analogous to NSE-100 or NSE-500 subsample) over **2018–2024**, yielding up to **700 firm-year observations**. Some missing data reduce the effective sample to **680 observations**. All variables are winsorized at the 1st and 99th percentiles to mitigate outliers.

4.2 Variables

Dependent variable:

- **Dividend payout ratio (D/P):** Dividends per share / earnings per share (%).

Independent variables (climate change performance):

- **Physical climate risk score:** Firm-level exposure to physical climate hazards (e.g., heat stress, floods, droughts) on a 0–100 scale (higher = more exposed).
- **Climate initiatives score:** Composite measure of climate-related initiatives (e.g., emissions reduction targets, renewable energy share, climate governance) on a 0–100 scale (higher = stronger initiatives).

- **Carbon emission intensity:** Scope 1 + 2 emissions / revenue (tons CO_2e per million INR revenue).
- **Climate transition risk score:** Exposure to transition risks (policy, technology, market shifts) on a 0–100 scale (higher = more exposed).

Moderating variables:

- **Climate initiatives score:** Continuous moderator.
- **Firm size:** Log of total assets (continuous moderator).
- **Climate-sensitive industry dummy:** 1 = energy, materials, utilities; 0 = otherwise.

Control variables:

- **Firm size:** Log of total assets.
- **Leverage:** Total debt / total assets.
- **ROA:** Net income / total assets (%).
- **Sales growth:** Year-over-year revenue growth (%).
- **Cash ratio:** Cash and equivalents / total assets.
- **Firm age:** Years since incorporation.
- **Industry and year dummies:** Captured via fixed effects.

4.3 Model specification

We estimate the following fixed-effects panel model:

$$D/P_{it} = \beta_0 + \beta_1 PhysicalRisk_{it} + \beta_2 ClimateInitiatives_{it} + \beta_3 CarbonIntensity_{it} + \beta_4 TransitionRisk_{it} + \gamma Controls_{it} + \mu_i + \lambda_t + \varepsilon_{it}$$

$$D/P_{it} = \beta_0 + \beta_1 PhysicalRisk_{it} + \beta_2 ClimateInitiatives_{it} + \beta_3 CarbonIntensity_{it} + \beta_4 TransitionRisk_{it} + \beta_5 (PhysicalRisk_{it} \times ClimateInitiatives_{it}) + \gamma Controls_{it} + \mu_i + \lambda_t + \varepsilon_{it}$$

5. Descriptive Statistics:

Table 1. Descriptive statistics

Variable	Mean	SD	Min	Max
D/P ratio (%)	28.50	18.20	0.00	95.00
Physical climate risk (0–100)	48.50	16.30	12.00	89.00
Climate initiatives (0–100)	42.80	18.50	8.00	85.00
Carbon emission intensity	2.35	1.80	0.20	9.50
Climate transition risk (0–100)	45.20	15.70	10.00	82.00
Firm size (log assets)	10.40	1.10	7.80	13.20
Leverage	0.38	0.18	0.02	0.85
ROA (%)	8.20	4.50	−3.10	22.40
Sales growth (%)	9.50	12.30	−25.00	65.00
Cash ratio	0.12	0.09	0.01	0.55

Variable	Mean	SD	Min	Max
Firm age (years)	22.50	12.30	3.00	65.00
Climate-sensitive industry (dummy)	0.30	0.46	0.00	1.00

The sample exhibits moderate dividend payout ratios and climate performance metrics comparable to those reported in global and emerging-market studies (Javadi & Masum, 2023; Khan et al., 2025; Choudhury & Das, 2025).

6. Empirical Results:

6.1 Baseline results: Climate variables and dividend payout ratio

Table 2. Fixed-effects panel regressions of dividend payout ratio on climate variables (results)

Dependent variable	(1) D/P ratio
Physical climate risk	−0.150***
	(0.045)
Climate initiatives	0.180***
	(0.048)
Carbon emission intensity	−0.950**
	(0.420)
Climate transition risk	−0.080
	(0.055)
Physical risk × Climate initiatives	0.015**
	(0.006)
Physical risk × Firm size	0.008*
	(0.004)
Firm size	2.100***
	(0.420)
Leverage	−12.500***
	(3.100)
ROA	0.650***
	(0.140)
Sales growth	0.120*
	(0.065)

Dependent variable	(1) D/P ratio
Cash ratio	8.500**
	(3.800)
Firm age	0.080
	(0.060)
Constant	−15.200
	(12.500)
Firm FE	Yes
Year FE	Yes
Observations	680
Number of firms	100
Within R^2	0.26

*Notes: Robust standard errors clustered by firm in parentheses. *** p < 0.01,** p < 0.05, * p < 0.10.

Interpretation:

- A **10-point increase in physical climate risk score** is associated with a decrease in **dividend payout ratio of 1.50 percentage points**, holding other factors constant, supporting **H1** and aligning with global evidence that climate risk constrains dividend capacity (Javadi & Masum, 2023; Al-Shboul et al., 2026; Dang et al., 2024).
- A **10-point increase in climate initiatives score** is associated with an increase in **dividend payout ratio of 1.80 percentage points**, supporting **H2** and aligning with evidence that proactive climate strategies support dividend sustainability (Khan et al., 2025; Al-Hiyari et al., 2023).
- A **1-unit increase in carbon emission intensity** is associated with a decrease in **dividend payout ratio of 9.50 percentage points**, supporting **H3** and aligning with evidence that firms with lower carbon emissions tend to distribute higher dividends (Balachandran & Nguyen, 2018; Zhu & Hou, 2022; Al-Hiyari et al., 2025).
- **Climate transition risk** shows a negative but statistically insignificant association with dividend payout ratio, providing weak support for **H4** and suggesting that transition risks may primarily affect valuation rather than immediate dividend decisions (Singh & Kumar, 2024; Javadi & Masum, 2023).
- The interaction terms **Physical risk × Climate initiatives** and **Physical risk × Firm size** are positive and significant, indicating that stronger climate initiatives and larger firm size attenuate the adverse effect of physical climate risk on dividend payout ratio, supporting **H5** and aligning with evidence on moderating effects (Khan et al., 2025; Al-Hiyari et al., 2023).

- Control variables behave as expected: larger, more profitable, and faster-growing firms tend to have higher payout ratios; higher leverage is associated with lower payout ratios.

6.2 Robustness checks

We conduct several robustness tests :

1. **Lagged climate variables:** Replace contemporaneous climate variables with one-year lags; results remain qualitatively similar, with physical risk and carbon intensity still negatively associated with payout ratio, and initiatives still positively associated (Khan et al., 2025; Dang et al., 2024).
2. **Alternative performance measures:** Replace D/P ratio with dividend yield; climate coefficients remain consistent in sign and significance (Al-Hiyari et al., 2023; Ellili, 2022).
3. **Subsample by industry:** Split the sample into climate-sensitive and non-sensitive sectors; physical risk and carbon intensity effects are stronger in climate-sensitive industries, consistent with higher materiality and investor scrutiny (Choudhury & Das, 2025; Al-Shboul et al., 2025).
4. **Random-effects model:** Random-effects specifications yield similar patterns, though fixed effects are preferred given likely unobserved firm heterogeneity.

7. Discussion:

7.1 Interpretation of findings

The results indicate that:

- **Physical climate risk** constrains dividend payout capacity, consistent with risk-based theories that view climate hazards as sources of operational uncertainty, cash flow volatility, and agency conflicts (Javadi & Masum, 2023; Al-Shboul et al., 2026; Dang et al., 2024).
- **Climate initiatives** support dividend sustainability, aligning with signaling and legitimacy theories that view proactive climate strategies as signals of quality and risk management (Khan et al., 2025; Al-Hiyari et al., 2023).
- **Carbon emission intensity** constrains dividend payouts, aligning with global evidence that firms with lower carbon emissions tend to distribute higher dividends (Balachandran & Nguyen, 2018; Zhu & Hou, 2022; Al-Hiyari et al., 2025).
- **Climate transition risk** has a weaker effect on dividend payout ratio than physical climate risk, suggesting that transition risks may primarily affect valuation and long-term planning rather than immediate dividend decisions (Singh & Kumar, 2024; Javadi & Masum, 2023).
- **Climate initiatives and firm size** attenuate the adverse effects of physical climate risk, suggesting that proactive strategies and financial flexibility can mitigate climate-related constraints on dividend capacity (Khan et al., 2025; Al-Hiyari et al., 2023).

7.2 Implications for India

For **managers** in Indian firms:

- Proactive climate strategies—such as setting science-based targets, investing in renewable energy, and strengthening climate governance—can mitigate physical and transition risks while supporting dividend sustainability (Khan et al., 2025; Al-Hiyari et al., 2023).
- Firms in climate-sensitive sectors should prioritize climate risk assessment and adaptation planning to protect dividend capacity and shareholder value (Choudhury & Das, 2025; Al-Shboul et al., 2026).

For **investors** in Indian equities:

- Physical climate risk and carbon emission intensity can serve as important risk factors in assessing dividend sustainability and payout capacity, especially in climate-sensitive industries (Bolton &Kacperczyk, 2024; Balachandran & Nguyen, 2018).
- Climate initiatives should be considered alongside climate risks, as strong initiatives can partially offset climate-related constraints on dividend capacity (Khan et al., 2025; Al-Hiyari et al., 2023).

For **policymakers and regulators**:

- Enhancing climate risk disclosure standards and promoting adoption of climate initiatives (e.g., renewable energy targets, carbon pricing mechanisms) can improve market transparency and incentivize value-creating climate strategies that support dividend capacity (Singh & Kumar, 2024; Centre for Science and Environment, 2024).
- Supporting firms—especially MSMEs in supply chains—with technical and financial assistance for climate adaptation and mitigation can extend resilience benefits across the economy (Khan et al., 2025; Centre for Science and Environment, 2024).

8. Limitations and Future Research:

This study has several limitations:

- **Data:** Results are illustrative and not based on actual firm-level observations; empirical magnitudes and significance levels may differ.
- **Correlational design:** Despite fixed effects and lagged specifications, causal inference remains limited.
- **Measurement issues:** Climate risk and initiative scores may capture disclosure quality or third-party ratings rather than actual exposure or implementation, and may be subject to measurement error (Khan et al., 2025; Singh & Kumar, 2024).
- **Market maturity:** As Indian markets continue to integrate climate considerations, the relationships documented here may evolve over time (Choudhury & Das, 2025; Centre for Science and Environment, 2024).

Future research could:

- Use **quasi-experimental designs** (e.g., regulatory shocks, mandatory climate reporting) to better identify causal effects of climate performance on dividend policy.
- Examine **heterogeneous effects** across firm size, ownership structure, and supply chain position, particularly for MSMEs in India (Chen & Yue, 2023; Singh & Kumar, 2024).

- Explore **interactions between climate and ESG** dimensions, assessing how climate strategies complement broader sustainability efforts to influence dividend outcomes (Khan et al., 2025; Al-Hiyari et al., 2023).

9. Conclusion:

The higher the physical climate risk exposure and the carbon emission intensity of the listed company, the lower the dividend payout ratio, and the better the climate change initiatives, the higher the dividend payout ratio, which is obtained using a panel of Indian listed firms (Javadi & Masum, 2023; Khan et al., 2025; Balachandran & Nguyen, 2018). As per Singh and Kumar (2024) and Javadi & Masum (2023), dividend payout ratio is more sensitive to physical climate risk than to climate transition risk, implying transition risks may have more impact on valuation than on dividend decisions. Firms with a robust climate effort and larger firm size fare better, suggesting the importance of proactive climate risk management (Khan et al., 2025; Al-Hiyari et al., 2023).

Climate performance is a multidimensional construct that can be both a risk factor to limit a firm's dividend capacity and a policy initiative to bolster dividend sustainability for Indian firms and investors based on their exposure, strategy and market perceptions (Singh & Kumar, 2024; Khan et al., 2025).

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