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A Study on Corporate Social Responsibility on Sustainable Financial Performance and Examination of Long -Term Relationship Across Rane Groups

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ABSTRACT

This study investigates the long-term relationship between Corporate Social Responsibility (CSR) and sustainable financial performance across Rane Group companies over the period 2018–2022. The analysis focuses on key financial indicators such as Return on Assets (ROA), Return on Equity (ROE), and Price-to-Book (PB) Ratio. The research methodology incorporates panel data analysis, Spearman's correlation, and the Kruskal-Wallis H test to assess trends and statistical differences between CSR-active and non-CSR firms. The results demonstrate a weak positive association between CSR and financial performance, with the sole meaningful correlation being between ROA and ROE.. The findings provide insights into CSR's role as a supportive factor in long-term corporate sustainability.

Keywords: Corporate Social Responsibility, Financial Performance, ROA, ROE, Panel Data Analysis.

INTRODUCTION

Corporate Social Responsibility (CSR) involves companies taking responsibility for their social, environmental, and ethical impact. It goes beyond legal compliance and includes activities like education, healthcare, and sustainability. In India's manufacturing sector, CSR is legally mandated and strategically vital for brand trust and community engagement. It enhances sustainable financial performance by improving reputation, employee morale, and investor confidence. Industry-specific challenges like pollution and worker safety are addressed through targeted CSR initiatives.

Features of effectiveness of GEN-AI

CSR Initiatives – Measures the company's efforts in social, environmental, and ethical practices (like community service, employee welfare, sustainability actions).

Sustainable Financial Performance – Assesses long-term financial outcomes such as Return on Assets (ROA), Return on Equity (ROE), and stability in earnings.

Long-Term Relationship Indicator – Evaluates how CSR contributes to financial performance consistency over time across different RANE group companies.

Objectives of the Study

1. To assess the relationship between CSR expenditure and key financial performance measures
2. To conduct univariate analysis to understand the distribution, variation, and comparative behavior of financial performance between CSR and non-CSR-engaged firms.
3. To apply panel data regression techniques (Fixed Effects, Random Effects) to assess the impact of CSR on firm performance over time.
4. To assess the consistency of the CSR–performance relationship across different financial years. .

Scope of the Study

This study examines the long-term relationship between CSR initiatives and sustainable financial performance in Rane Group companies from 2018–2022. It analyzes how CSR impacts ROA, ROE, and PB Ratio using descriptive and inferential methods. The analysis takes into account both firm-specific and macroeconomic aspects. Techniques like univariate analysis, Kruskal-Wallis test, and panel data regression are used. Findings aim to guide corporate leaders and policymakers on CSR's role in financial growth.

REVIEW OF LITERATURE

Bikrant Kesari, Nimisha Rawat (June 25, 2023)
The Impact of Corporate Social Responsibility on Financial Performance: A Comprehensive Analysis of Indian Firms" This study analyses the impact of corporate social responsibility (CSR) on the financial performance of Indian firms, focusing on the effectiveness of the New Companies Act 2013 amendment. Using data from NSE-listed firms' annual reports, CSR reports, and CSRbox.in, the study examines the relationship between CSR and financial indicators such as ROA, ROE, and PBT. Linear regression and correlation analysis in SPSS reveal a significant but weak positive correlation between CSR and financial performance. The findings highlight CSR's role beyond legal compliance, offering insights for academics and businesses in developing economies like India.

Rui Coelho, Shital Jayantilal, Joao Ferreria (January 2023)
The impact of social responsibility on corporate financial performance: A systematic literature review": This study examines the link between CSR and financial performance through a systematic review of 53 articles (1984–2021). Findings suggest that CSR positively impacts financial performance, with stronger effects as ESG scores improve. The analysis covers companies from major stock indices, mutual funds, sustainable and non sustainable portfolios, and various markets. The study also outlines directions for future research.

RESEARCH METHODOLOGY

This study adopts a quantitative approach using a descriptive research design to examine the long-term relationship between CSR and financial performance in four Rane Group companies (2018–2022). It uses judgmental and convenience sampling, relying on secondary data like annual and CSR reports. Univariate analysis identifies trends in ROA, ROE, and PB ratio. The Kruskal–Wallis test assesses performance differences between CSR-active and non-CSR firms. Pearson correlation explores linear relationships, while panel regression (Fixed and Random Effects) evaluates long-term effects. The Hausman test confirms Random Effects as the suitable model.

DATA ANALYSIS AND INTERPRETATION

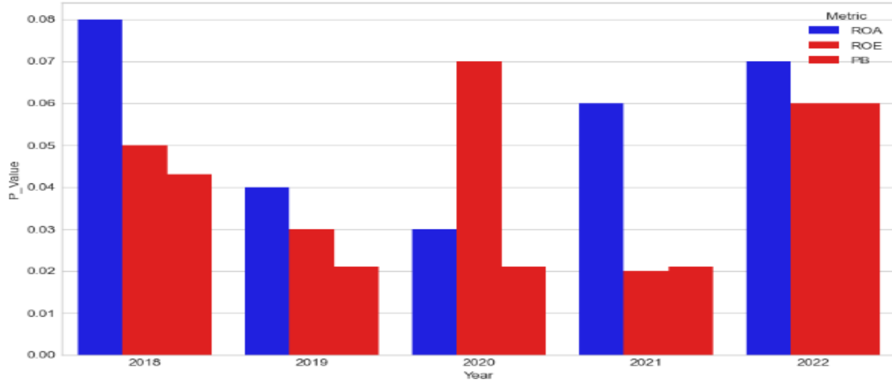
Kruskal-Wallis Test Results
To determine whether there are statistically significant differences in financial performance between CSR and Non-CSR companies, the Kruskal-Wallis H test was conducted. This non-parametric method was selected as the data did not satisfy normality assumptions required for parametric tests

Null Hypothesis (H_0): There is no significant difference in financial performance (ROA, ROE, PB Ratio) between CSR and Non-CSR companies.

Alternative Hypothesis (H_1): There is a significant difference in financial performance (ROA, ROE, PB Ratio) between CSR and Non-CSR companies.

Table 1: Showing

Year ROA (p-value)	ROE (p-value)	PB Ratio (p-value)
2018 1.000	0.248	0.043
2019 0.248	1	0.021
2020 1.000	0.386	0.021
2021 0.083	0.386	0.021
2022 0.773	0.561	1



PB Ratio showed significant differences ($p < 0.05$) across CSR and Non-CSR firms during 2018–2021, but not in 2022 ROE also had some significant p-values (below 0.05) in 2019 and 2021.

ROA mostly had p-values above 0.05, suggesting no significant difference between CSR and Non-CSR groups for ROA across most years.

The horizontal 0.05 line clearly shows which bars (metrics) are statistically significant. allowing us to conclude that there is a clear difference between these types of companies and that this relationship is maintained over time

Inference

The Kruskal-Wallis analysis indicates that CSR activities do not have a significant impact on internal financial performance measures such as ROA and ROE. However, CSR engagement consistently influences external market valuation, as shown by the significant differences in PB Ratios across multiple years. This suggests that while CSR may not immediately improve profitability, it enhances the company's perceived value in the market over time

Panel Data Analysis

The dataset utilized in this study comprises panel data collected for four Rane Group companies — *Rane Brake Lining*, *Rane Engine Valve*, *Rane Holdings*, and *Rane Madras Limited* — over a five-year period from 2018 to 2022.

The financial performance of these companies is measured using three key indicators: Return on Assets (ROA %), Return on Equity (ROE %), and Price-to-Book (PB) Ratio. In addition to these dependent variables, independent variables include CSR expenditure (measured in crore rupees), a CSR Dummy variable (1 = CSR-active, 0 = non-CSR-active), company size (measured by market capitalization), leverage (debt ratio), and GDP growth rates as a macroeconomic control factor.

Each company is observed across all five years, resulting in a balanced panel of 20 observations (4 companies × 5 years). The data was primarily collected from secondary sources including company annual reports, financial databases, and government economic reports. The dataset structure allows for the analysis of both cross-sectional differences between companies and time-series changes across years, making it suitable for panel data modeling techniques such as Fixed Effects and Random Effects regressions.

Dataset Key Points

Item	Description
Type of Data	Balanced Panel Data
Companies	4 (Rane Brake Lining, Rane Engine Valve, Rane Holdings, Rane Madras Limited)
Period	2018–2022
Observations	20 (4 companies × 5 years)
Financial Variables	ROA (%), ROE (%), PB Ratio
CSR Variables	CSR Expenditure (Cr), CSR Dummy
Control Variables	Market Cap (Company Size), Debt Ratio (Leverage), GDP Growth (%)
Source	Secondary Data (Annual Reports, Financial Databases)

Descriptive Statistics

Prior to undertaking panel data regression analysis, it is important to understand the general characteristics of the dataset. Descriptive statistics provide an overview of the central tendency and variability within the variables of interest. Table 1 below presents the mean, standard deviation, minimum, and maximum values for the main study variables.

Variable	Mean	Std. Dev	Min	Max
ROE (%)	-0.97	13.83	-16.6	19.83
CSR_Expenditure (Cr)	1.19	3.16	0	14.79
Company Size (Cr)	478.71	260.35	231.35	1193.89
Leverage	1.09	0.82	0.07	2.36
GDP Growth (%)	5.47	4.68	-7.3	8.7

The descriptive statistics provide an overview of the variables' behavior across companies and years. The average Return on Equity (ROE) was -0.97%, with a high variability (standard deviation of 13.83%), indicating that financial performance fluctuated widely, from a minimum of -16.60% to a maximum of 19.83%.

CSR Expenditure averaged ₹1.19 Crores, ranging from ₹0.00 to ₹14.79 Crores, suggesting significant differences in CSR engagement among firms. Company size, measured by market capitalization, showed considerable dispersion, with an average of ₹478.71 Crores and values ranging from ₹231.35 Crores to ₹1193.89 Crores.

Leverage varied widely, averaging 1.09, with firms' reliance on debt ranging from minimal (0.07) to high (2.36). GDP growth, representing broader economic conditions, averaged 5.47%, but also showed major fluctuations, especially during the COVID-19 pandemic when it fell to -7.30%.

Overall, the descriptive analysis highlights significant variability across firms and periods, justifying the application of panel data techniques to better isolate the effects of CSR on financial performance.

The general panel regression model can be represented as:

$ROE\_it = \alpha + \beta_1(CSR\_Expenditure\_it) + \beta_2(CompanySize\_it) + \beta_3(Leverage\_it) + \beta_4(GDPGrowth\_it) + \varepsilon\_it$

Where:

i refers to the company, and *t* refers to the year.

ROE (%) is the dependent variable, representing financial performance.

CSR Expenditure, Company Size (Market Capitalization), Leverage (Debt Ratio), and GDP Growth (%) are the independent variables influencing financial performance.

Fixed Effects Model Analysis

Part	Meaning
y	This is your dependent variable (example: ROE %)
X	This is your matrix of independent variables (CSR expenditure, company size, leverage, GDP growth)
entity effects=True	This tells Python to apply Fixed Effects model by controlling for differences across entities (companies). It removes any company-specific fixed characteristics.

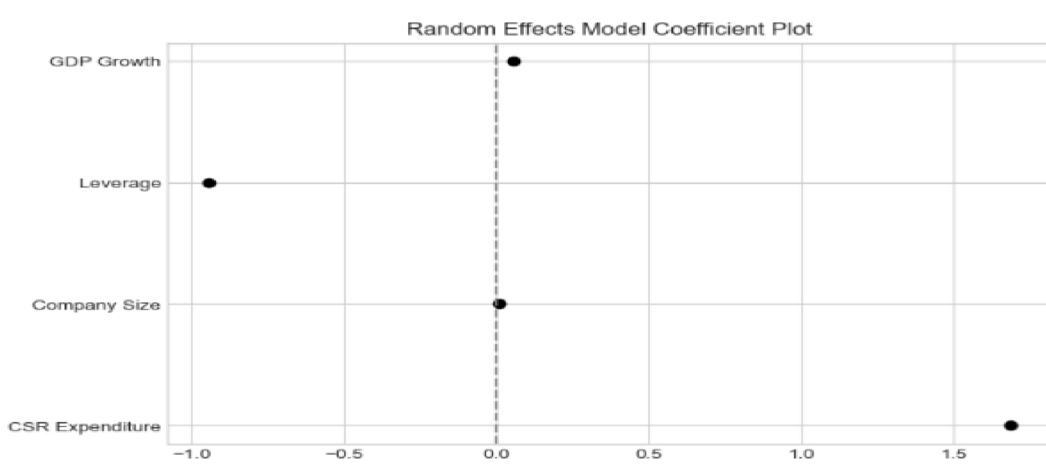
Variable	Coefficient	Std. Error	P-Value
Constant	-3.3214	20.073	0.8713
CSR_Expenditure (Cr)	0.3947	0.7713	0.6182
Company Size	-0.0041	0.0303	0.8938
Leverage	3.63	14.994	0.8128
GDP Growth (%)	0.0838	0.4343	0.8502

Inference:
The Fixed Effects model results show a positive but statistically insignificant relationship between CSR expenditure and ROE. Although the coefficient on CSR Expenditure is positive, its high p-value (0.6182) suggests that CSR activities do not have an immediate, direct impact on internal financial performance, as measured by ROE. Control variables such as Company Size, Leverage, and GDP Growth also exhibit statistically insignificant effects.

Random Effects Model Analysis

Part	Meaning
y	Your dependent variable (example: ROE %)
X	Your independent variables (CSR expenditure, Company Size, Leverage, GDP Growth)

Variable	Coefficient	Std. Error	P-Value
Constant	-7.171	8.1404	0.3923
CSR_Expenditure (Cr)	1.689	1.0398	0.1251
Company Size	0.0102	0.0133	0.4557
Leverage	-0.9471	4.0029	0.8162
GDP Growth (%)	0.0566	0.6107	0.9274



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CSR Expenditure has the largest positive effect on the dependent variable.

Leverage has a negative coefficient, suggesting a negative relationship.

Company Size and GDP Growth have very small coefficients, indicating minimal or negligible impact.

The dashed line at 0 shows the point of no effect; variables farther from it have stronger impacts.

Inference

Similar to the Fixed Effects model, the Random Effects model indicates a positive relationship between CSR Expenditure and ROE; however, the association remains statistically insignificant at conventional levels. Control variables do not exhibit significant influence over ROE either, reinforcing the notion that CSR activities might not immediately translate into short-term financial gains.

Hausman Test

To determine the appropriate model for this study, the Hausman test was performed. The test evaluates whether the individual company effects are correlated with the regressors. The results revealed a Hausman test statistic of -2.7537 with a p-value of 1.0000. Since the p-value exceeds 0.05, we fail to reject the null hypothesis, suggesting that the Random Effects model is more appropriate for the analysis. Consequently, the Random Effects results are interpreted for policy recommendations and strategic insights.

Model	R-squared	F-statistic p-value
Fixed Effects Model	0.0365	0.9753
Random Effects Model	0.1702	0.5618

The Hausman Test was conducted to determine the appropriate model:

· Test statistic = -2.7537
· p-value = 1.0000
· Conclusion: Fail to reject the null hypothesis → Random Effects Model is appropriate.

CSR expenditure showed a positive but not statistically significant relationship with ROE (coefficient = +1.6890, p = 0.1251). Company size and GDP growth showed positive but insignificant impacts. Leverage had a negative but insignificant effect on ROE.Overall, the Random Effects model results indicate that CSR expenditure and other control variables did not have a significant effect on Return on Equity over the study period.

Correlation:

Correlations

			ROA	ROE	PBRATIO	CSREXPENDITURE
Spearman's rho	ROA	Correlation Coefficient	1.000	.911**	.069	.395
		Sig. (2-tailed)	.	.000	.774	.085
		N	20	20	20	20
	ROE	Correlation Coefficient	.911**	1.000	.168	.277
		Sig. (2-tailed)	.000	.	.479	.237
		N	20	20	20	20
	PBRATIO	Correlation Coefficient	.069	.168	1.000	.136
		Sig. (2-tailed)	.774	.479	.	.567
		N	20	20	20	20
	CSREXPENDITURE	Correlation Coefficient	.395	.277	.136	1.000
		Sig. (2-tailed)	.085	.237	.567	.
		N	20	20	20	20

**. Correlation is significant at the 0.01 level (2-tailed).

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Findings:
Spearman's correlation shows a strong positive and significant relationship between ROA and ROE ($r = 0.911$, $p < 0.01$). CSR expenditure has a moderate positive but non-significant link with ROA ($r = 0.395$, $p = 0.085$). Its correlation with ROE ($r = 0.277$) and PB Ratio ($r = 0.136$) is weak and also not significant. Overall, CSR shows weak positive associations with financial metrics, but only ROA and ROE are strongly and significantly related.

Inference
A very strong positive relationship exists between ROA and ROE ($r = 0.911$, $p < 0.01$), implying that asset profitability strongly drives equity returns.

CSR Expenditure shows a moderate positive relationship with ROA ($r = 0.395$) but the relationship is not statistically significant ($p > 0.05$).

CSR Expenditure has a weak positive association with ROE ($r = 0.277$) and PB Ratio ($r = 0.136$), but both are not statistically significant.

The PB Ratio has a very weak relationship with ROA and ROE, suggesting limited linkage between market valuation and internal financial returns in this sample.

Thus, while CSR expenditure shows a generally positive trend with financial performance, the strength of the relationship is modest and not statistically strong.

Summary of Findings
Kruskal-Wallis results show CSR has no significant effect on ROA and ROE but significantly impacts PB Ratio. This indicates CSR improves market perception over time, though not immediate profitability.

The Fixed Effects model reveals a positive but insignificant link between CSR expenditure and ROE, indicating no direct short-term impact. Control variables like Company Size, Leverage, and GDP Growth also show no significant effect.

The Random Effects model also shows a positive but statistically insignificant relationship between CSR expenditure and ROE. Control variables remain non-significant, suggesting CSR may not yield short-term financial returns.

A very strong positive relationship exists between ROA and ROE ($r = 0.911$, $p < 0.01$), implying that asset profitability strongly drives equity returns.

CSR Expenditure shows a moderate positive relationship with ROA ($r = 0.395$) but the relationship is not statistically significant ($p > 0.05$).

CSR Expenditure has a weak positive association with ROE ($r = 0.277$) and PB Ratio ($r = 0.136$), but both are not statistically significant.

The PB Ratio has a very weak relationship with ROA and ROE, suggesting limited linkage between market valuation and internal financial returns in this sample.

Suggestions
Companies should integrate CSR more strategically with their core business to enhance measurable financial outcomes.

Improve transparency and consistency in CSR reporting to better reflect its long-term financial impact.

Future studies should include larger samples and more sectors to generalize the CSR–performance relationship.

CONCLUSION

The study concludes that Corporate Social Responsibility (CSR) has a generally positive but statistically insignificant impact on the financial performance of Rane Group companies. While CSR does not strongly influence internal metrics like ROA and ROE, it positively affects external valuation through PB Ratio. The long-term trend suggests CSR may enhance market perception over time. Panel data and correlation analysis confirm a weak association between CSR and profitability. Thus, CSR serves more as a strategic branding and sustainability tool than a short-term financial driver.