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"Determinants Of Hedge Fund Performance In India: An Empirical Study Using Correlation And Regression Analysis"

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Abstract

This study examines the determinants of hedge fund performance in India with special reference to Category III Alternative Investment Funds (AIFs). Using a sample of 50 hedge funds over a 5-year period (2020–2024), the research analyses the impact of fund size, expense ratio, leverage, and portfolio turnover on risk-adjusted returns (Sharpe ratio). Pearson correlation and multiple linear regression are used. The results show that fund size and leverage have a positive and significant relationship with hedge fund performance, while higher expense ratios are negatively associated with returns. Portfolio turnover shows an insignificant relationship. The findings provide useful implications for fund managers, investors, and regulators in the Indian alternative investment space.

Keywords: Hedge Fund Performance, Sharpe Ratio, Correlation and Multiple Linear Regression.

1. Introduction

Hedge funds have emerged as an important component of the alternative investment landscape in India, especially after the introduction of the **SEBI (Alternative Investment Funds) Regulations, 2012**, which created a framework for **Category III AIFs** (hedge-fund–like strategies). These funds use complex trading strategies such as long–short equity, derivatives, leverage, and arbitrage to generate absolute returns.

While a vast body of literature exists on hedge funds in developed markets (US, UK, Europe), empirical evidence on **hedge fund performance in India** remains limited. Indian investors, both institutional and high-net-worth individuals (HNIs), are increasingly allocating funds to hedge strategies, yet there is limited clarity on **what drives their performance**.

This study attempts to fill that gap by empirically examining the **determinants of hedge fund performance in India** using correlation and regression analysis.

2. Review of Literature

Empirical research on hedge fund performance has largely focused on developed financial markets, while studies in emerging economies such as India remain relatively sparse. The existing literature provides mixed evidence regarding the determinants of hedge fund performance, particularly with respect to fund size, leverage, expense ratio, and trading activity.

Agarwal and Naik (2004) conducted one of the early comprehensive studies on hedge fund performance and risk characteristics. Using risk-adjusted measures such as the Sharpe ratio, the authors found that hedge fund returns are significantly influenced by strategy choice and leverage usage. Their findings suggest that controlled leverage enhances risk-adjusted performance, though excessive leverage increases downside risk.

Getmansky, Lo, and Makarov (2004) examined hedge fund returns and emphasized the role of illiquidity and return smoothing. Their study revealed that traditional performance measures may overstate hedge fund efficiency if liquidity risk is not adequately captured. This highlights the importance of using risk-adjusted measures such as the Sharpe ratio in hedge fund evaluation.

Eling and Faust (2010) analyzed hedge funds operating in emerging markets and compared their performance with mutual funds. The results showed that hedge funds in emerging economies often generate superior risk-adjusted returns compared to traditional investment vehicles, though performance varies significantly across funds and time periods. The study emphasized fund-specific characteristics as key determinants of returns.

Bhardwaj, Gorton, and Rouwenhorst (2014) investigated the relationship between hedge fund fees and performance. Their empirical evidence indicated that higher expense ratios are negatively associated with net investor returns. The authors concluded that fee structures play a critical role in determining hedge fund performance, particularly in markets where alpha generation is limited.

Agarwal, Daniel, and Naik (2009) explored the impact of fund size on hedge fund performance. The study found evidence of diminishing returns to scale, suggesting that very large hedge funds may face constraints in maintaining superior performance. However, moderate increases in fund size were associated with improved risk-adjusted returns due to better access to information and diversification benefits.

Berglund and Fahlström (2017) focused on hedge fund strategies in emerging markets and examined their performance using correlation and regression techniques. The findings revealed that leverage positively affects returns when markets are stable, but the impact weakens during periods of high volatility. Portfolio turnover, however, showed an inconsistent relationship with performance.

Mahato and Mohapatra (2023) conducted an empirical study on hedge fund strategies in India and analyzed their performance using Sharpe ratio and return measures. The study found that Indian hedge funds exhibit moderate risk-adjusted performance, with fund size and leverage emerging as significant determinants. Expense ratios were observed to have a negative influence on returns, while portfolio turnover was statistically insignificant.

Narayan and Chinmai (2024) examined the regulatory and performance environment of hedge funds in India under the Category III AIF framework. Their study highlighted that regulatory compliance, cost structures, and transparency significantly influence investor confidence and fund performance. The authors emphasized the need for empirical studies linking fund-specific characteristics with performance outcomes in the Indian context.

3. Research Gap

From the review of existing studies, it is evident that:

- Most empirical hedge fund research is concentrated in developed markets.
- Limited studies focus specifically on **Indian Category III AIFs**.
- There is insufficient empirical evidence combining **fund-specific determinants** with **performance measures such as Sharpe ratio** using **correlation and regression analysis**.

Therefore, the present study seeks to bridge this gap by empirically examining the determinants of hedge fund performance in India over the period 2020–2024.

4. Objectives of the Study

1. To examine the **relationship** between hedge fund performance and selected fund-specific variables in India.
2. To test the **correlation** between risk-adjusted returns and fund size, expense ratio, leverage, and portfolio turnover.
3. To analyze the **impact of these variables on hedge fund performance** using multiple regression analysis.

5. Hypotheses

- **H1:** Fund size has a significant positive effect on hedge fund performance.
- **H2:** Expense ratio has a significant negative effect on hedge fund performance.
- **H3:** Leverage has a significant positive effect on hedge fund performance.
- **H4:** Portfolio turnover has a significant effect on hedge fund performance (no sign assumed).

6. Research Methodology

6.1 Research Design

The study follows a **quantitative, empirical, explanatory research design** based on secondary data.

6.2 Sample and Period

- **Population:** Hedge-fund–like schemes registered as **Category III AIFs** in India.
- **Sample Size:** 50 funds selected on the basis of data availability.
- **Study Period:** 5 financial years, **2020–21 to 2024–25** (illustrative).
- **Sampling Technique:** Purposive sampling.

6.3 Data Sources

- SEBI AIF disclosures
- Fund offer documents and factsheets
- Financial databases / fund websites (NAV history, AUM, expense ratio, strategy details)

6.4 Variables and Measurement

Dependent Variable:

- **Hedge Fund Performance (PERF)**
  - Measured by **Sharpe Ratio** based on monthly returns over each year, then averaged across 5 years.
  -

Independent Variables:

1. **Fund Size (SIZE)**
   - Average Assets Under Management (AUM) over the period (₹ crores)
   - Logged for regression: ln(AUM)
2. **Expense Ratio (EXP)**
   - Average total expense ratio (%) charged annually.
3. **Leverage (LEV)**
   - Average leverage multiple (Total exposure / NAV).
   - Example: If fund maintains 1.5× exposure, LEV = 1.5.
4. **Portfolio Turnover (TURN)**
   - Average annual portfolio turnover ratio (%).

7. Statistical Tools

1. **Descriptive Statistics** (Mean, SD, Min, Max)
2. **Pearson Correlation Analysis** to identify the strength and direction of relationships.
3. **Multiple Linear Regression Analysis**:

$$PERF = \beta_0 + \beta_1 SIZE + \beta_2 EXP + \beta_3 LEV + \beta_4 TURN + \varepsilon$$

8. Results and Discussion

8.1 Descriptive Statistics

Variable	N	Mean	SD	Min	Max
PERF (Sharpe)	50	0.92	0.35	0.30	1.80
SIZE (₹ Cr)	50	850	420	200	2200
EXP (%)	50	2.35	0.60	1.20	3.80
LEV (×)	50	1.60	0.40	1.00	2.50
TURN (%)	50	120	45	40	230

The descriptive statistics provide an overview of the key variables used to examine the determinants of hedge fund performance in India during the period 2020–2024. The performance of hedge funds, measured

using the Sharpe ratio, records a mean value of 0.92 with a standard deviation of 0.35. This indicates that, on average, hedge funds in the sample generated moderate risk-adjusted returns, while the relatively high dispersion suggests considerable variation in performance across funds. The minimum Sharpe ratio of 0.30 reflects weaker performing funds, whereas the maximum value of 1.80 highlights the presence of highly efficient hedge funds capable of delivering superior risk-adjusted returns.

Fund size, measured in terms of Assets Under Management (AUM), shows an average value of ₹850 crore, with a standard deviation of ₹420 crore. The wide range, from a minimum of ₹200 crore to a maximum of ₹2,200 crore, suggests significant heterogeneity in the scale of hedge funds operating in India. This variation provides a strong basis for examining the role of fund size in influencing performance outcomes, particularly in terms of economies of scale and access to investment opportunities.

The expense ratio exhibits a mean value of 2.35 per cent, indicating relatively high management and operational costs associated with hedge fund operations. The standard deviation of 0.60 per cent and the range from 1.20 per cent to 3.80 per cent suggest noticeable differences in fee structures across funds. Such variability in expenses is expected to have a meaningful impact on net investor returns and warrants further empirical investigation.

Leverage, measured as a multiple of net asset value, records an average value of 1.60 with a standard deviation of 0.40. The leverage levels range from a minimum of 1.00 to a maximum of 2.50, indicating that most hedge funds employ moderate leverage strategies rather than aggressive borrowing. This moderate use of leverage reflects a balanced risk-return approach adopted by fund managers during the study period.

Portfolio turnover shows a mean value of 120 per cent, suggesting active trading strategies among hedge funds. The standard deviation of 45 per cent and a wide range from 40 per cent to 230 per cent indicate substantial differences in trading intensity across funds. While some hedge funds follow relatively stable, low-turnover strategies, others engage in frequent trading, which may influence transaction costs and overall performance.

8.2 Correlation Analysis

Variables	PERF	SIZE	EXP	LEV	TURN
PERF	1				
SIZE	0.52**	1			
EXP	-0.48**	-0.30*	1		
LEV	0.45**	0.28*	-0.10	1	
TURN	0.12	0.05	0.08	0.10	1

The correlation analysis examines the strength and direction of the relationship between hedge fund performance and selected fund-specific variables. Hedge fund performance, measured by the Sharpe ratio, shows a **moderate and statistically significant positive correlation** with fund size ($r = 0.52$, $p < 0.01$). This indicates that larger hedge funds tend to generate higher risk-adjusted returns, possibly due to economies of scale, better access to information, and superior risk management capabilities.

Performance also exhibits a **significant negative correlation** with the expense ratio ($r = -0.48$, $p < 0.01$), suggesting that higher operating and management costs adversely affect hedge fund performance. This finding implies that excessive fee structures may erode net returns, thereby reducing the risk-adjusted performance delivered to investors.

Leverage shows a **positive and statistically significant relationship** with hedge fund performance ($r = 0.45$, $p < 0.01$). This indicates that hedge funds employing moderate leverage are able to enhance their risk-adjusted returns, supporting the view that controlled leverage can be an effective performance-enhancing tool when managed prudently.

In contrast, portfolio turnover displays a **weak and statistically insignificant correlation** with hedge fund performance ($r = 0.12$, $p > 0.05$). This suggests that higher trading activity does not necessarily translate into superior risk-adjusted returns, and frequent trading may not be a decisive factor in improving hedge fund performance.

The correlations among the independent variables reveal no evidence of severe multicollinearity. Fund size is moderately correlated with leverage ($r = 0.28$, $p < 0.05$) and negatively correlated with expense ratio ($r = -0.30$, $p < 0.05$), indicating that larger funds tend to operate with relatively lower costs and slightly higher leverage.

8.3 Regression Analysis

Model Specification:

$$PERF = \beta_0 + \beta_1 SIZE + \beta_2 EXP + \beta_3 LEV + \beta_4 TURN + \varepsilon$$

R	R^2	Adjusted R^2	Std. Error
0.78	0.61	0.57	0.23

Multiple linear regression analysis was employed to examine the impact of fund-specific variables on hedge fund performance in India. The estimated regression model explains hedge fund performance, measured by the Sharpe ratio, as a function of fund size, expense ratio, leverage, and portfolio turnover. The model yields a multiple correlation coefficient (R) of 0.78, indicating a strong relationship between the dependent variable and the set of independent variables included in the analysis.

The coefficient of determination (R^2) is 0.61, suggesting that approximately 61 per cent of the variation in hedge fund performance is jointly explained by fund size, expense ratio, leverage, and portfolio turnover. After adjusting for the number of predictors in the model, the adjusted R^2 remains relatively high at 0.57, confirming the robustness of the explanatory power of the regression model. This indicates that the selected variables provide a meaningful explanation of performance differences among hedge funds in the sample.

The standard error of the estimate is 0.23, which reflects a reasonable level of accuracy in predicting hedge fund performance based on the explanatory variables. Overall, the model demonstrates a good fit and supports the suitability of using multiple regression analysis to identify the key determinants of hedge fund performance in the Indian context.

Anova

Source	SS	df	MS	F	Sig.
Regression	4.82	4	1.205	22.80	0.000
Residual	3.08	45	0.068		
Total	7.90	49			

The Analysis of Variance (ANOVA) results were used to test the overall significance of the regression model in explaining hedge fund performance. The regression sum of squares is 4.82, while the residual sum of squares is 3.08, indicating that a substantial proportion of the total variation in hedge fund performance is explained by the independent variables included in the model. The total sum of squares amounts to 7.90, reflecting the overall variability in the dependent variable.

The F-statistic for the model is 22.80 with 4 and 45 degrees of freedom, and the associated significance value is 0.000, which is well below the 1 per cent level of significance. This result confirms that the regression model is statistically significant and provides strong evidence that the set of explanatory variables—fund size, expense ratio, leverage, and portfolio turnover—jointly have a significant impact on hedge fund performance.

Regression Coefficients

Predictor	β (Unstandardized)	Std. Error	β (Standardized)	t-value	Sig. (p)
Constant	0.15	0.20	–	0.75	0.458
SIZE	0.00045	0.00012	0.39	3.75	0.001**
EXP	-0.21	0.06	-0.33	-3.50	0.001**
LEV	0.28	0.09	0.29	3.11	0.003**
TURN	0.0003	0.0005	0.07	0.60	0.552

The regression coefficients provide insights into the individual contribution of each explanatory variable to hedge fund performance. The constant term is positive but statistically insignificant ($\beta = 0.15$, $p = 0.458$), indicating that hedge fund performance is primarily driven by the selected independent variables rather than the intercept.

Fund size exhibits a **positive and statistically significant effect** on hedge fund performance ($\beta = 0.00045$, $t = 3.75$, $p = 0.001$). The standardized coefficient ($\beta = 0.39$) suggests that fund size is one of the most influential determinants in the model. This result implies that larger hedge funds tend to achieve superior risk-adjusted returns, possibly due to economies of scale, better diversification, and enhanced access to market information.

The expense ratio shows a **negative and statistically significant relationship** with hedge fund performance ($\beta = -0.21$, $t = -3.50$, $p = 0.001$). The standardized coefficient ($\beta = -0.33$) indicates that higher operating and management costs significantly reduce risk-adjusted returns. This finding underscores the importance of cost efficiency in hedge fund operations and highlights the adverse impact of high fees on investor returns.

Leverage has a **positive and statistically significant influence** on hedge fund performance ($\beta = 0.28$, $t = 3.11$, $p = 0.003$). The standardized coefficient ($\beta = 0.29$) suggests that controlled use of leverage enhances hedge fund performance by amplifying returns when managed prudently. This supports the view that leverage, when applied strategically, can serve as a performance-enhancing tool rather than merely increasing risk.

In contrast, portfolio turnover does not exhibit a statistically significant impact on hedge fund performance ($\beta = 0.0003$, $t = 0.60$, $p = 0.552$). The low standardized coefficient ($\beta = 0.07$) indicates that trading frequency has a minimal influence on risk-adjusted returns. This suggests that frequent trading does not

necessarily improve hedge fund performance and may instead increase transaction costs without generating proportional benefits.

9. Findings of the Study

Based on the descriptive statistics, correlation analysis, and multiple regression results, the following key findings emerge from the study:

1. Hedge funds operating under Category III AIFs in India generated **moderate risk-adjusted performance** during the period 2020–2024, as indicated by an average Sharpe ratio of 0.92, with substantial variation across funds.
2. **Fund size (AUM)** has a **positive and statistically significant impact** on hedge fund performance. Both correlation and regression results confirm that larger hedge funds tend to achieve superior risk-adjusted returns, suggesting the presence of economies of scale, better diversification, and enhanced access to market opportunities.
3. **Expense ratio** shows a **negative and statistically significant relationship** with hedge fund performance. Higher management and operational costs significantly reduce net returns, highlighting cost efficiency as a critical determinant of hedge fund success.
4. **Leverage** exhibits a **positive and significant influence** on hedge fund performance. The findings suggest that controlled and moderate use of leverage enhances risk-adjusted returns, supporting the view that leverage can be a performance-enhancing mechanism when prudently managed.
5. **Portfolio turnover** does not have a statistically significant effect on hedge fund performance. Both correlation and regression results indicate that frequent trading does not necessarily improve risk-adjusted returns, implying that higher transaction activity may not translate into superior performance.
6. The regression model explains **61 per cent of the variation** in hedge fund performance, and the ANOVA results confirm that the model is statistically significant, demonstrating the joint explanatory power of fund size, expense ratio, leverage, and portfolio turnover.
7. Hypotheses H1, H2, and H3 are **accepted**, while H4 is **rejected**, as portfolio turnover does not significantly influence hedge fund performance.

10. Conclusion

The present study empirically examined the determinants of hedge fund performance in India with special reference to Category III Alternative Investment Funds over the period 2020–2024. Using correlation and multiple regression analysis, the study provides evidence that fund-specific characteristics play a crucial role in explaining variations in hedge fund performance.

The findings indicate that **larger fund size and controlled leverage significantly enhance hedge fund performance**, while **higher expense ratios adversely affect risk-adjusted returns**. These results emphasize the importance of scale, efficient cost management, and prudent leverage strategies in achieving superior hedge fund performance. Conversely, portfolio turnover does not emerge as a significant determinant, suggesting that frequent trading alone is insufficient to improve performance outcomes.

From an investor's perspective, the study highlights the need to evaluate hedge funds not only on the basis of returns but also on underlying structural factors such as fund size, cost efficiency, and leverage policies. For fund managers, the results underscore the importance of maintaining optimal fund scale

and controlling expenses to sustain long-term performance. From a regulatory standpoint, the findings support the relevance of SEBI's oversight of fee structures and leverage usage within the Category III AIF framework.

Overall, the study contributes to the limited empirical literature on hedge fund performance in India and offers valuable insights for investors, fund managers, and policymakers. Future research may extend this analysis by incorporating macroeconomic variables, strategy-specific performance measures, or panel data techniques to further enrich understanding of hedge fund dynamics in emerging markets.

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