



Passive Versus Active Equity Investment in India: A Risk and Return Perspective

Abhilash N G¹, Dr. Karanam Kavitha²

¹Research Scholar, ²Sr. Assistant Professor

Faculty of Management & Commerce, M S Ramaiah University of Applied Sciences, Bengaluru

¹abhilashng135@gmail.com, ²karanamkavitha.ms.mc@msruas.ac.in

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Abstract

Passive index funds and actively managed funds compete for the same allocation to equities of Indian investors, but studies about which provides better return relative to its risk and cost have been inconclusive. In this paper, 19 active large-cap funds have been compared with 16 Nifty 50 index funds (total of 35 schemes) using the secondary data from factsheets for the period 2020-2026. Return analysis (trailing 1, 3 and 5 years and since launch returns and calendar year return in 2021 due to the recovery post-COVID, the 2022 Russia-Ukraine war and the 2024 AI-induced rally), expense ratio, tracking error, beta, Sharpe ratio, Treynor ratio and Jensen's alpha have been analyzed using Welch's t-test, Mann-Whitney U test and within-fund-house pair-wise test. Actively managed funds achieved superior trailing returns in all periods (with mean differences of 3.79, 2.88 and 2.01 percentage points at 1, 3 and 5 years respectively, all $p < 0.001$) and positive mean alpha (1.41% vs -1.52%) while passive funds showed better Sharpe ratios (0.27 vs -0.05). Passive funds outperformed in 2021 and partially in 2022 while active funds performed better in 2024. The actively managed funds were costly by 0.58 percentage points on average (0.72% vs 0.14%). Neither approach predominates across all measures considered. The findings are based on observations, limited in duration and partially inconsistent in the method of calculations for the different fund categories, so they should not be taken to provide causation.

Keywords: Active investing; Passive investing; Mutual equity funds; Risk and return; Sharpe ratio; Jensen's alpha; Expense ratio; Tracking error; India

1. Introduction

Equity mutual funds offer investors the ability to have a diversified portfolio managed professionally. They are broadly classified into two investment styles. Active investment funds aim to outperform a benchmark through security selection and timing while passive funds like index funds and ETFs mimic an index with lower costs. In India, it is now possible to make a choice between both styles of funds in the same category based on the extra expense and risk incurred in the process being compensated by superior performance.

The theoretical background of this question lies in three perspectives. According to Efficient Market Hypothesis, prices incorporate all available information making it difficult to generate consistent excess returns through selection and making market replication appealing [1]. Modern Portfolio Theory emphasizes the risk and return on the portfolio level and not that of the individual securities [2] and Capital Asset Pricing Model relates the expected return to the systematic risk (beta) [3], which forms the basis of Jensen's alpha [4].

The international empirical results have mostly supported the efficiency argument. Jensen [4] noted that average US funds cannot outperform a passive approach after accounting for fees, and Malkiel [5] observed that fund performance was about equal to the level of its fees minus performance against its benchmark, although he warned of a possible survivorship bias affecting the industry's results. Sharpe



[6] explained underperformance after fees as an issue of mathematics, Carhart [7] demonstrated that short-term predictability in fund performance is primarily due to common factors and fees, and Fama and French [8] noted that few funds are skilled enough to cover their fees. However, Cremers and Petajisto [9] noted that highly active funds can provide value, so the term "active" covers a wide array of situations.

The Indian data, on the other hand, are not consistent. Passive ETFs were reported to deliver competitive returns, and risk-adjusted returns from both active and passive large-cap funds were comparable in volatile times, according to Singh and Vats [10]. Also, Shreekanth et al. [12] report that there was no difference between passive and active funds after costs in a sample of 47 schemes. Contrasting this, in a 2017 SSRN study of 40 equity funds, most of the active funds outperformed their benchmarks before costs [13]; moreover, in a study conducted at PES University, active funds had a higher CAGR and were more costly [14]. In a 2020 SSRN working paper, a comparison of information ratio, R^2 and total expense ratio was carried out [15]; a study in 2026 explains index-funds' success by virtue of their lower costs and compounding [16]; and finally a study of two Nifty 50 ETFs has shown that low-cost funds delivered market returns [17]. Some behavioural studies explain passive investing by investor orientation and awareness [18,19].

The major focus of most studies of the same is large-cap funds over short horizons, return, cost and risk-adjusted measures independent of each other or even analysis of performance and behavior independently. The research offers a combination of performance of return measures across horizons and different market conditions along with performance of cost (expense ratio and tracking error) and risk-adjusted measures of active large-cap and Nifty 50 index funds in India. The aims of the research include: (1) identification of fund categories and market conditions compared; (2) comparison of return performance of active and passive funds; (3) evaluation of connection between expense ratio and tracking error and return; and (4) comparison of risk-adjusted performance using beta, Sharpe ratio, Treynor ratio and Jensen's alpha.

2. Materials and Methods

2.1 Research design and sample

The study is quantitative, descriptive and comparative, using secondary data only for the years 2020-2026. The funds have been selected purposively on the basis of category, availability and comparability of data. The sample includes the active large-cap fund along with the corresponding Nifty 50 Index Fund of the same asset management company (AMC). Thus the paired comparison will help us to evaluate the impact of house effect. Out of 19 AMCs which had an active large-cap scheme, 16 had a comparable Nifty 50 Index Fund; Bank of India, Canara Robeco and Mahindra Manulife did not.

Table 1. Composition of the sample

Group	Schemes	Benchmark used by the scheme
Active large-cap funds	19	Nifty 100 TRI (13); BSE 100 TRI (6)
Nifty 50 index funds (passive)	16	Nifty 50 / Nifty 50 TRI
AMCs with a matched active-passive pair	16	—
AMCs without an identifiable index fund ₃ (excluded from passive group)	3	Bank of India, Canara Robeco, Mahindra Manulife
Total schemes analysed	35	—

Source: Author's compilation from fund-house factsheets and AMFI.

2.2 Data and variables

The data were collected in a consistent manner from AMC factsheets, AMFI, and other sources of financial information [20]. The variables used are: (i) 1-, 3-, 5-year and since launch returns (% p.a.); (ii) annual returns under three market regimes, viz., COVID-19 recovery regime in 2021, Russia-Ukraine war regime in 2022, and AI-led rally regime in 2024; (iii) cost factors, viz., expense ratio (applicable to all funds) and tracking



error (applicable only to index funds); and (iv) risk-adjusted performance factors, viz., beta, Sharpe ratio, Treynor ratio, and Jensen's alpha. The formula for Sharpe ratio is $(R_p - R_f)/\sigma_p$ [21], the formula for Treynor ratio is $(R_p - R_f)/\beta_p$ [22], and the formula for Jensen's alpha is $R_p - [R_f + \beta_p(R_m - R_f)]$ [4], where R_p = return on the fund, R_f = risk-free rate of return, R_m = return on the benchmark, and σ_p = standard deviation of fund returns.

2.3 Hypotheses

H1: There exists significant difference in return performance of active and passive equity funds. H2: Expense ratio and tracking error have significant relationship with fund returns. H3: There exists significant difference in risk adjusted performance of active and passive funds. H4: Performance of active and passive funds varies according to market regimes.

2.4 Verification of data and statistical procedures

Index fund expense ratios and regime returns expressed in decimals were transformed to percentage form. Non-numeric data ('-', 'New fund') were coded as missing. Several fields for index funds are almost constant (out of 14 there are 12 three-year return values equal to 8.30%, Sharpe ratios range from 0.26 to 0.29), what indicates that several fields may be presented at the benchmark level or calculated using common scale. It results in low within-group variability and inflated standardized effect sizes, thus effect sizes should be interpreted carefully. Treynor ratio of both groups appears to be on different scales (active -6.5 to 4.8; index -0.04 to 0.28).

According to Shapiro–Wilk tests [23], active-funds' returns followed an approximately normal distribution while index-funds' distributions are heavily concentrated and non-normal. For group comparison, we used Welch's t-test [24] which does not require equal variances and Mann-Whitney U test [25] which does not make any assumptions about normality; effect size was calculated as Cohen's d [26]. In cases where AMC was the same, we used paired t-test and Wilcoxon signed-rank test [27]. Relationships between cost and return will be analyzed using both Pearson and Spearman correlations and linear regression analysis in the form of Ordinary Least Squares, $\text{Return} = \beta_0 + \beta_1(\text{Expense ratio})$

$+ \beta_2(\text{Tracking error}) + \epsilon$, for index funds only since tracking error is not available for other fund types; significance was set to 5%. All analyses were performed in Microsoft Excel and verified independently.

3. Results and Discussion

3.1 Descriptive statistics (Objective 1)

Two fund types can be distinguished here: active large cap funds and passive Nifty 50 index funds; compared under three different market scenarios. Table 2 presents the characteristics of the sample. As expected, the dispersion in all return and risk-adjusted measures is larger for active funds while index funds are highly concentrated.

Table 2. Descriptive statistics, mean (Standard deviation)

Variable	n (A)	Active	n (P)	Passive	Unit
1-year return	19	1.74 (2.52)	16	-2.05 (1.68)	% p.a.
3-year return	17	11.22 (1.44)	14	8.34 (0.13)	% p.a.
5-year return	17	9.82 (1.72)	11	7.82 (0.86)	% p.a.
Since-launch return	19	12.81 (2.79)	15	9.79 (4.65)	% p.a.
2021 return	15	14.49 (5.58)	13	24.62 (1.60)	%
2022 return	15	2.35 (5.37)	13	5.38 (0.08)	%
2024 return	16	15.78 (3.62)	14	9.49 (0.77)	%
Expense ratio	19	0.72 (0.16)	16	0.14 (0.07)	%
Tracking error	–	–	16	0.09 (0.10)	%
Beta	17	0.95 (0.07)	13	0.95 (0.005)	–

A is active; P is passive. Data source: Author's computation..



3.2 Return Performance (Objective 2; H1)

The trailing return of actively managed mutual funds was greater than those of index funds in all horizons (Table 3, Figure 1). This was by 3.79 percentage points in one year, 2.88 in three years and 2.01 in five years, and all differences are statistically significant by both Welch's t-test and the Mann–Whitney U test. Since-inception difference (3.02 points) is also statistically significant, but it depends on the exact launch date of each scheme and is thus not used to draw a general conclusion; 17.24% and –3.31% is reported by one index fund and a relatively newly launched one respectively. Active scheme versus index fund from the same AMC comparison (Table 4) gives an identical result – the active scheme outperformed its index fund from the same AMC in 15 out of 16 one-year pairs, and in all 13 three-year pairs. H1 is validated.

Table 3. Active versus passive returns: group comparisons (active minus passive)

Measure	n (A)	n (P)	Mean diff.	Welch t	p (t)	U	p (U)	Cohen's d
1-year	19	16	3.79	5.31	< .001	283	< .001	1.74
3-year	17	14	2.88	8.21	< .001	237	< .001	2.68
5-year	17	11	2.01	4.09	< .001	156	.004	1.39
Since launch	19	15	3.02	2.22	.037	248	< .001	0.81

Mean differences in percentage points. Source: Author's calculations.

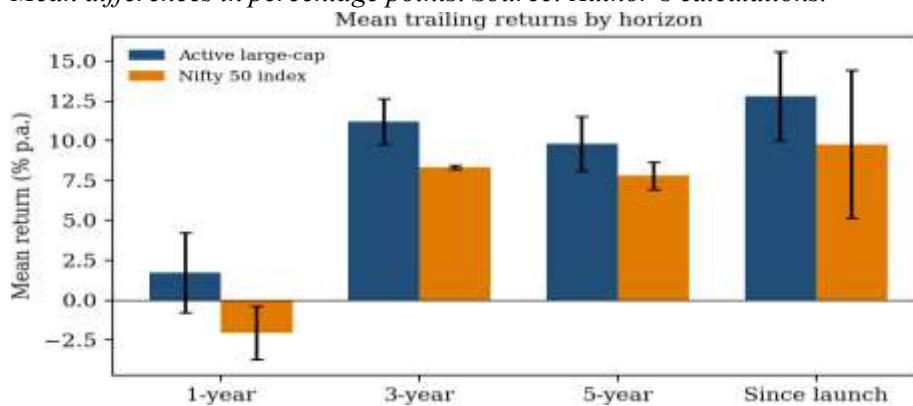


Figure 1. Mean trailing returns of active and passive funds (error bars show one standard deviation).

Table 4. Same-AMC paired comparisons (active minus passive)

Measure	Pairs	Mean (A)	Mean (P)	Diff.	A ahead	p (paired t)	p (Wilcoxon)
1-year return	16	1.66	–2.05	3.71	15 of 16	< .001	< .001
3-year return	13	11.22	8.34	2.88	13 of 13	< .001	< .001
5-year return	10	10.15	7.84	2.31	8 of 10	.005	.010
Since launch	15	12.63	9.79	2.84	13 of 15	.008	.004
Sharpe ratio	13	–0.08	0.27	–0.35	0 of 13	< .001	< .001
Jensen's alpha	13	0.89	–1.52	2.41	11 of 13	.002	.002
Expense ratio	16	0.73	0.14	0.59	16 of 16	< .001	< .001

Source: Author's calculations.

3.3 Market conditions (Objective 1; H4)

Relative performance was reversed with market conditions (Table 5, Figure 2). During the 2021 COVID-19 recovery period, index funds gained 10 percentage points more than active funds, and the same-AMC index fund was superior in all 12 pairs of investments. In 2022, index funds had a slightly lower average superiority (3.03 points). This was statistically significant in the group comparison (Welch $p = .046$; Mann–Whitney $p = .001$) but not in the paired



comparison ($p = .104$; Wilcoxon $p = .064$), thus is rather weak evidence. In 2024 during the rally caused by artificial intelligence technologies, the situation was reversed, as active funds performed 6.30 points better than index funds and outperformed their same-AMC index counterpart in 12 of 13 pairs of investments. Thus, H4 is supported, although its direction varies and there is no dominant investment style in all market conditions. Active funds have much higher dispersion (with standard deviations ranging from 3.6 to 5.6 points against 0.1 to 1.6 points for index funds).

Table 5. Calendar-year returns by market condition (active minus passive)

Market condition	n (A)	n (P)	Mean (A)	Mean (P)	Diff.	Welch p	Paired: A ahead; p
2021 COVID-19 recovery	15	13	14.49	24.62	-10.13	< .001	0 of 12; < .001
2022 Russia–Ukraine war	15	13	2.35	5.38	-3.03	.046	2 of 12; .104
2024 AI boom	16	14	15.78	9.49	6.30	< .001	12 of 13; < .001

Returns in %; differences computed from unrounded values. Mann–Whitney p -values are < .001 (2021), .001 (2022) and < .001 (2024). Source: Author's calculations.

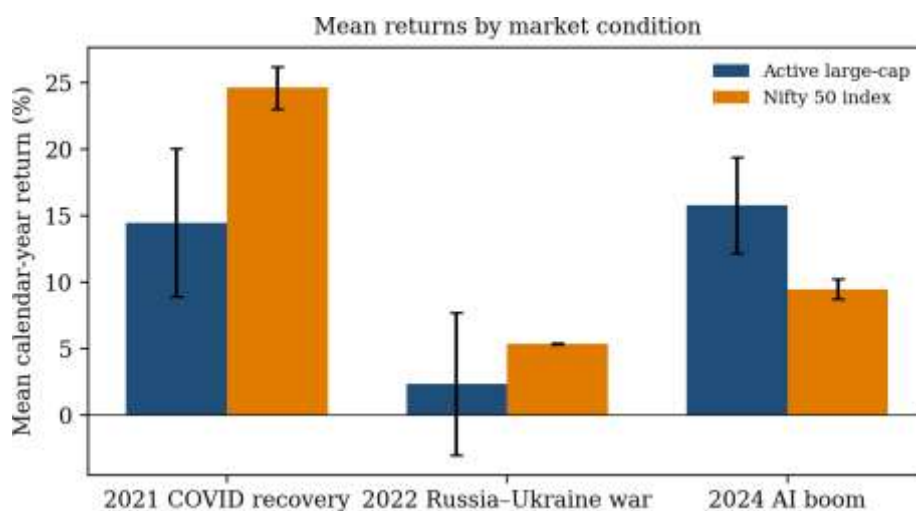


Figure 2. Mean returns of active and passive funds by market condition.

Within each group, no statistically reliable relationship between cost and return was found (Table 6, Figure 3). Among active funds, expense ratio is essentially uncorrelated with 1-, 3- and 5-year returns,

3.4 Expense Ratio and Tracking Error (Objective 3; H2)

The active funds are much more expensive compared to the index funds (mean expense ratio of 0.72% versus 0.14%, difference of 0.58 points; $p < .001$), but each active scheme had higher costs compared to its equivalent index fund from the same AMC. Nevertheless, the superiority of active funds in terms of return, seen in Section 3.2, outweighs the higher cost by many times.

Sharpe ratio and alpha. For index funds, there is no significant correlation between expense ratio, tracking error and 1-, 3- or 5-year returns, and a regression of one-year return on both is not statistically significant ($R^2 = 0.11$; F-test $p = .463$; β for expense ratio = -1.60 , $p = .836$; β for tracking error = -5.04 , $p = .358$; $n = 16$). Tracking error is significantly related to the since-launch return ($p = .003$ in the regression), but this result is due to only one recently launched fund (Bajaj Finserv: since-launch return -3.31% ; tracking error 0.43%) and different inception dates, hence not considered. With a sample size of 11 to 19, the test has low statistical power, hence the right conclusion is that no effect was detected and not that there is no effect.



H2 is not supported.

Table 6. Correlation of cost variables with returns (Pearson r, p-value)

Pair	1-year	3-year	5-year	n (1/3/5-year)
Active: expense ratio	0.13 (.593)	0.09 (.735)	-0.00 (.992)	19 / 17 / 17
Index: expense ratio	-0.22 (.406)	-0.23 (.422)	0.34 (.307)	16 / 14 / 11
Index: tracking error	-0.33 (.212)	-0.19 (.513)	0.49 (.130)	16 / 14 / 11

Source: Author's calculations. Spearman rank correlations lead to the same conclusion except for isolated, small-sample cases that are not robust (e.g. index tracking error with 1-year return, $\rho = -0.56$, $p = .023$, and 5-year return, $\rho = 0.64$, $p = .034$, with opposite signs).

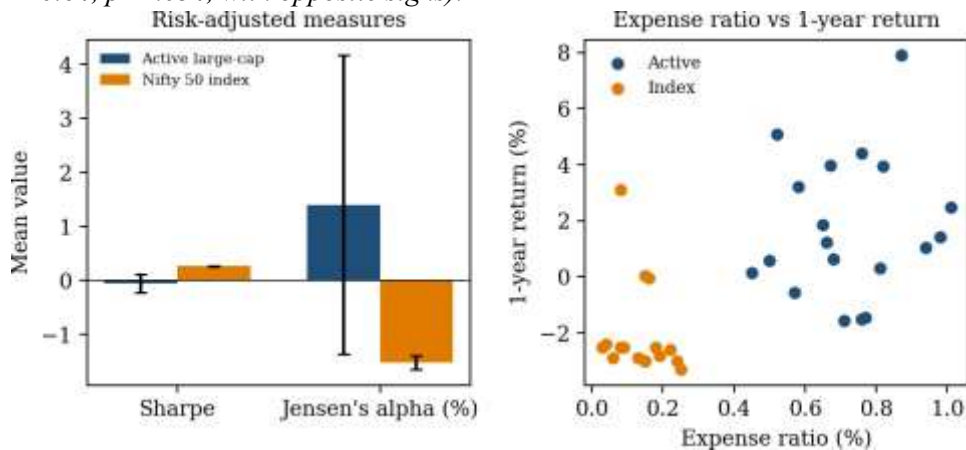


Figure 3. Left: mean Sharpe ratio and Jensen's alpha. Right: expense ratio against one-year return.

3.5 Risk adjusted performance (Objective 4; H3)

The systematic risk was practically the same between both samples (beta 0.95 for both; $p = .702$), as expected from actively-managed large-cap funds that carry similar risks to the market portfolio. Differences do arise in the risk-adjusted metrics, but move in opposing directions (Table 7). Passive funds exhibit significantly higher Sharpe ratios (0.27 versus -0.05; all 13 pairs of AMCs favoring each other have index funds with higher Sharpe), while actively managed funds exhibit higher Jensen's alpha (1.41% versus -1.52%; out of 19 active funds, 13 exhibit positive alpha, while all 13 index funds with data exhibit negative alphas, as expected).

Table 7. Risk-adjusted performance (active minus passive)

Measure	Active (SD)	meanPassive (SD)	meanDiff.	Welch t	p (t)	p (U)
Beta	0.95 (0.07)	0.95 (0.005)	0.01	0.39	.702	.796
Sharpe ratio	-0.05 (0.17)	0.27 (0.01)	-0.32	-8.54	< .001	< .001
Jensen's alpha (%)	1.41 (2.76)	-1.52 (0.12)	2.93	4.61	< .001	.001
Treynor ratio*	-2.10 (2.91)	0.01 (0.09)	-2.10	-3.15	.006	.027

*Descriptive only; scales are not comparable across groups. n (A/P): beta 17/13; Sharpe and alpha 19/13; Treynor 19/12. Source: Author's calculations.

The contrast between Sharpe ratio and alpha calls for careful consideration. Active funds generate higher returns and alpha than index funds, but have a lower Sharpe ratio, which can only be positive when the return exceeds the risk-free rate, and as the one-year average active fund return is not high, different time periods for measuring, risk-free rates or different benchmarks in the two areas are a better explanation. The almost constant levels of index funds pointed out in Section 2.4 provide further support to this view. Thus, H3 is valid in that the two groups show significant



differences, but depending on what measure we use. This risk-adjusted comparison is still tentative until Sharpe ratios are calculated from daily net asset value series with equal time periods.

3.6 Summary of hypothesis decisions

Table 8. Summary of hypothesis testing

	Construct	Key evidence	Decision
H1	Return performance	Active higher at 1, 3, 5 years ($p < .001$)	Supported
H2	Expense ratio and tracking error vs returns	No significant within-group correlation or regression effect	Not supported
H3	Risk-adjusted performance	Sharpe favours passive; alpha favours active; beta equal	Supported, direction mixed
H4	Market conditions	Passive led 2021 (and weakly 2022); active led 2024	Supported

Source: Author's analysis.

3.7 Discussion

The higher active returns align with research that showed outperformance of active funds relative to benchmarks [13] and higher CAGR for active funds [14], but are different from studies where passive funds were equal to active funds when costs were considered [10–12]. The risk-adjusted results showing an advantage for passive funds according to Sharpe ratio and an advantage for active funds in terms of alphas are in harmony with findings from literature where the dependence on measure and period was noted. The period dependency can be seen even within this study where index funds performed better during 2021 recovery and active funds outperformed during 2024 rally. This is consistent with the point that cost is not the only factor driving the difference in performance [4–9] and the dispersion among active funds is large. Potential factors explaining the results like differences in holdings of active funds versus the Nifty 50 or using Nifty 100 or BSE 100 as a benchmark for active funds have not been tested here.

4. Conclusion

Based on data from 19 active large-cap and 16 Nifty 50 index funds over 2020 to 2026, it was found that active funds had better trailing returns in one, three and five years along with positive mean alpha, while index funds outperformed in the recovery in 2021, in 2022 to a lesser degree, and active funds performed better in 2024; the Sharpe ratio was higher for index funds while expenses were much lower. There was no significant relationship between expense ratio or tracking error and returns in both types of funds. Thus, it does not seem possible to conclude in favor of one type of funds universally.

There are limitations to the research. The study focuses on selected large cap and Nifty 50 mutual funds on a limited and event-specific time window, and the results might not be generalized to other kinds of mid cap, small cap or thematic mutual funds or market environments. Fields for index funds are nearly fixed and risk-adjusted measures might not be computed on a consistent basis; some samples for statistical tests are small and option for fund selection (Direct or Regular), taxation, transaction costs and exit loads have not been considered. Significant differences do not imply causation but simply reflect detectable differences in data set. Further research needs to compute Sharpe Ratio, Treynor ratio and alpha using a common time window for NAV series, and other passive funds like Nifty Next 50, mid-cap indices etc. can also be studied along with new measures such as Sortino Ratio and Maximum Drawdown.

5. Acknowledgements

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6. Conflict of Interest

The authors declare that they have no conflict of interest with respect to the publication of this research paper.

7. Ethical Consideration

This study has been conducted on publicly available fund level data, without any human subject, animals or personal data and interviews. Therefore, ethical approval and consent is not needed for this research.

8. Availability of Data

The datasets have been gathered from publicly available mutual fund factsheets, AMFI and other published financial sources for 2020-2026. The fund level data used in the study is attached in the form of an appendix to the related dissertation.

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