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Holding Company Discounts in India: Evidence from the Bombay Burmah Trading Corporation and Implications for the Semi-Strong Efficient Market Hypothesis

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Footnote: Equal contribution by both authors

Abstract: ***This study investigates the valuation of holding companies in emerging markets, focusing on the Bombay Burmah Trading Corporation (BBTC) alongside a panel of Indian business groups. We utilize a 14.5-year dataset of daily prices to examine the limits of the semi-strong form Efficient Market Hypothesis (EMH). Implementing a tiered valuation framework, we document a structural discount averaging 56.1% to BBTC's measured Net Asset Value (NAV)—its 50.7% stake in Britannia Industries. Autoregressive models and formal Chow tests indicate this discount process exhibits near-unit root persistence and appears unresponsive to major macroeconomic shocks. Furthermore, Cumulative Abnormal Return (CAR) event studies suggest that macro events temporarily widen the discount rather than spurring price discovery. We also construct a stylized theoretical arbitrage simulation (long holding company, short subsidiary), which yields an annualized Alpha of -9.2% and a Maximum Drawdown of -86.7%, highlighting the severe real-world frictions preventing convergence. These findings provide out-of-sample evidence consistent with Shleifer and Vishny's (1997) limits to arbitrage framework. We argue that the observed discount is maintained in a non-stationary equilibrium driven by a confluence of limits to arbitrage, corporate taxation, and agency costs tied to concentrated promoter control. The evidence appears inconsistent with a strict interpretation of semi-strong market efficiency, as structural barriers prevent arbitrageurs from enforcing price parity.***

Keywords: Holding company discount; Limits to arbitrage; Semi-strong EMH; Agency theory; Corporate governance; Indian equity markets; Business groups

1. Introduction

The Efficient Market Hypothesis (EMH) asserts that asset prices fully reflect all available information (Fama, 1970). In its semi-strong form, the EMH predicts that investors cannot systematically extract abnormal returns trading on public data, as competitive arbitrage rapidly extinguishes mispricing. Yet, the holding company discount—where a parent company is valued by the market at a substantial discount to the sum of its listed subsidiary stakes—presents a recurring anomaly in empirical finance.

While international holding companies typically trade at discounts of 15% to 40% (Cornell & Liu, 2001; Rommens et al., 2008), emerging markets present discounts of a different magnitude. This study centers on the **Bombay Burmah Trading Corporation (BBTC)**, the flagship holding company of the Wadia Group, whose primary asset is a 50.7% controlling stake in Britannia Industries Limited. Despite Britannia's transparent market pricing, BBTC has historically traded at a discount exceeding 50% of the market value of its Britannia stake alone.

This paper poses the following question: *What structural factors maintain the persistent valuation gap between Indian holding companies and their underlying assets, and what does this indicate about market efficiency?*

We hypothesize that the BBTC anomaly is a structural equilibrium maintained by limits to arbitrage and agency frictions. All empirical outputs in this study are calculated directly from a 14.5-year dataset of observed daily prices, with all underlying regression models available in Appendix B. To ensure generalizability, we also validate our findings against a panel of International holding companies.

Our contribution is threefold. First, we provide daily-frequency evidence of a holding company discount that is unresponsive to macroeconomic shocks. Second, we present a stylized arbitrage simulation to highlight the severe capital and liquidity constraints that theoretically prevent rational arbitrage. Third, we map this evidence to the behavioral and governance frictions inherent in Indian business groups.

2. Literature Review and Theoretical Framework

2.1 The EMH vs. Behavioral Finance

Fama's (1970) semi-strong EMH predicts that holding companies should trade at parity with their underlying assets, net of friction costs. The behavioral critique (Shiller, 1981; De Bondt & Thaler, 1985) suggests investor psychology distorts prices. This is well-documented in the Closed-End Fund (CEF) puzzle (Lee, Shleifer, & Thaler, 1991; Pontiff,

1995; Gemmill & Thomas, 2002), where investor sentiment drives persistent premiums and discounts.

2.2 Conglomerate Discounts and NAV vs. Intrinsic Value

It is critical to distinguish between Measured Net Asset Value (NAV) and Intrinsic Value. A holding company may rationally trade below its NAV due to conglomerate discounts (Berger & Ofek, 1995; Lins & Servaes, 1999), inefficient internal capital markets (Rajan, Servaes, & Zingales, 2000), or double taxation on eventual liquidation (Ammann & Kessler, 2008).

2.3 Agency Theory and Tunneling in Business Groups

In emerging markets, Agency Theory (Jensen, 1986) provides a sharper lens. Concentrated family ownership creates conflicts between controlling promoters and minority shareholders (La Porta et al., 1999; Claessens et al., 2002). Bertrand, Mehta, and Mullainathan (2002) and Khanna and Palepu (2000) document "tunneling" and related-party transactions in Indian business groups. If investors anticipate that cash flows will be trapped at the parent level, a massive agency discount is a rational market response (Gopalan, Nanda, & Seru, 2007; Baek, Kang, & Lee, 2006).

2.4 Limits to Arbitrage

Shleifer and Vishny (1997) argue that arbitrage is risky and capital-intensive. Arbitrageurs face "noise trader risk" (De Long et al., 1990) and synchronization risk (Abreu & Brunnermeier, 2002). Short-selling the subsidiary involves significant borrowing costs, while longing the holding company involves liquidity risk (Mitchell, Pulvino, & Stafford, 2002).

3. Data and Tiered Valuation Methodology

We utilize daily adjusted prices and volumes for BBTC and Britannia from Jan 3, 2012, to Aug 4, 2026. Table 1 defines the primary variables.

Table 1: Variable Definition Table

Variable	Definition	Units	Source
P(BBTC,t)	Adjusted closing price of BBTC at time t	INR (₹)	Yahoo Finance
Measured NAV(t)	Market value of BBTC's 50.7% stake in Britannia per BBTC share	INR (₹)	Calculated
D(t)	Discount of BBTC market price relative to Measured NAV	%	Calculated
CCD(τ)	Cumulative Change in Discount during event window τ	% points	Calculated
R(arb,t)	Daily return of the Long BBTC / Short Britannia strategy	%	Calculated

3.1 Tiered NAV Framework

To avoid polluting our discount metric with subjective unlisted asset valuations, we construct a tiered NAV per share ($N_{BBTC} = 135.16$ million) (Britannia has **240.44 million shares**)

1) **Measured NAV (The Lower Bound)**: Values all unlisted assets at zero.

$$\text{Measured NAV}_t = \frac{\text{Value of BBTC's Britannia stake}}{\text{Total BBTC shares outstanding}}$$

$$\text{Measured NAV}_t = \frac{0.507 \times 240.44m \times P_{Brit,t}}{135.16m}$$

2) **True Economic NAV:** Adds a static conservative estimate (₹15.00 billion) for unlisted operating assets and subtracts net debt (₹5.00 billion) based on historical book values (detailed in Appendix A). Our primary variable is the discount to the strictly observable Measured NAV.

$$D_t = 1 - \frac{P_{BBTC,t}}{\text{Measured NAV}_t}$$

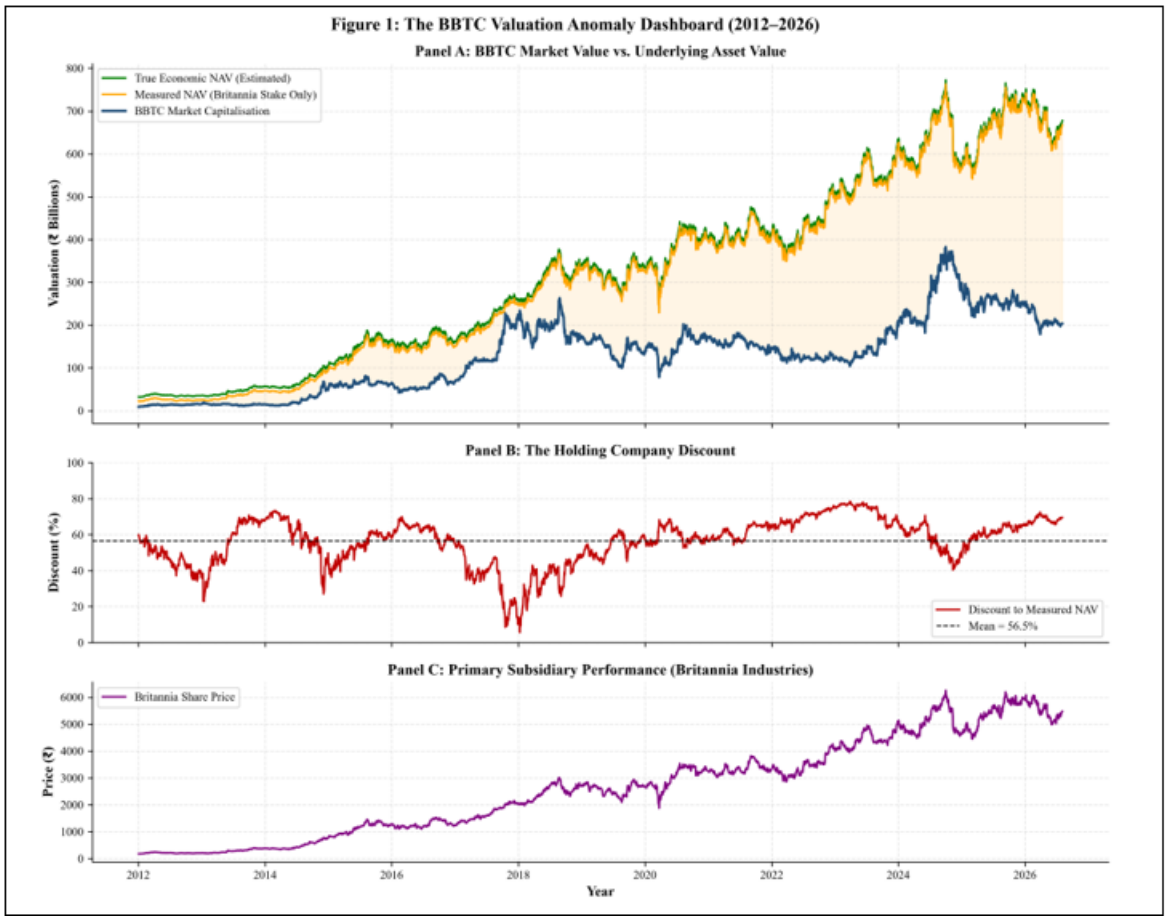

Figure 1: The BBTC Valuation Anomaly Dashboard

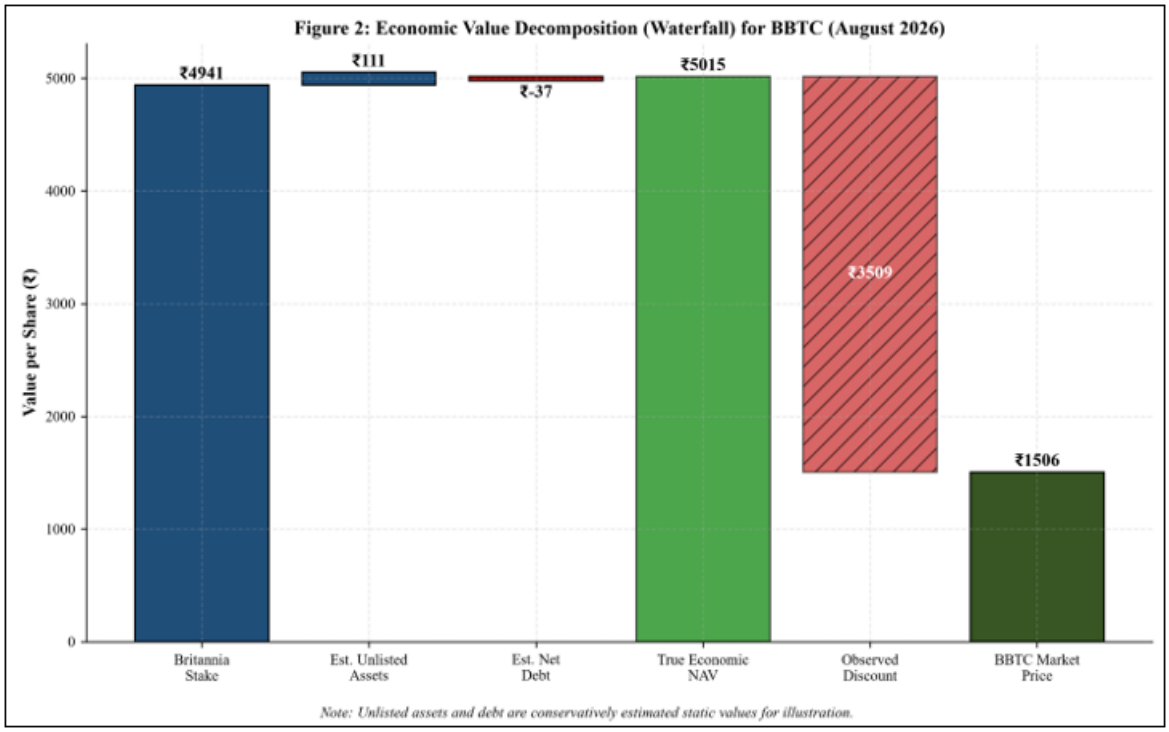

Figure 2: Economic Value Decomposition (Waterfall) for BBTC

4. Econometric Framework

4.1 Stationarity (ADF, KPSS, AR (1))

We test for mean-reversion using the Augmented Dickey-Fuller (ADF) and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) tests. We model the discount as an Autoregressive AR (1) process:

$$D_t = \alpha + \rho D_{t-1} + \epsilon_t$$

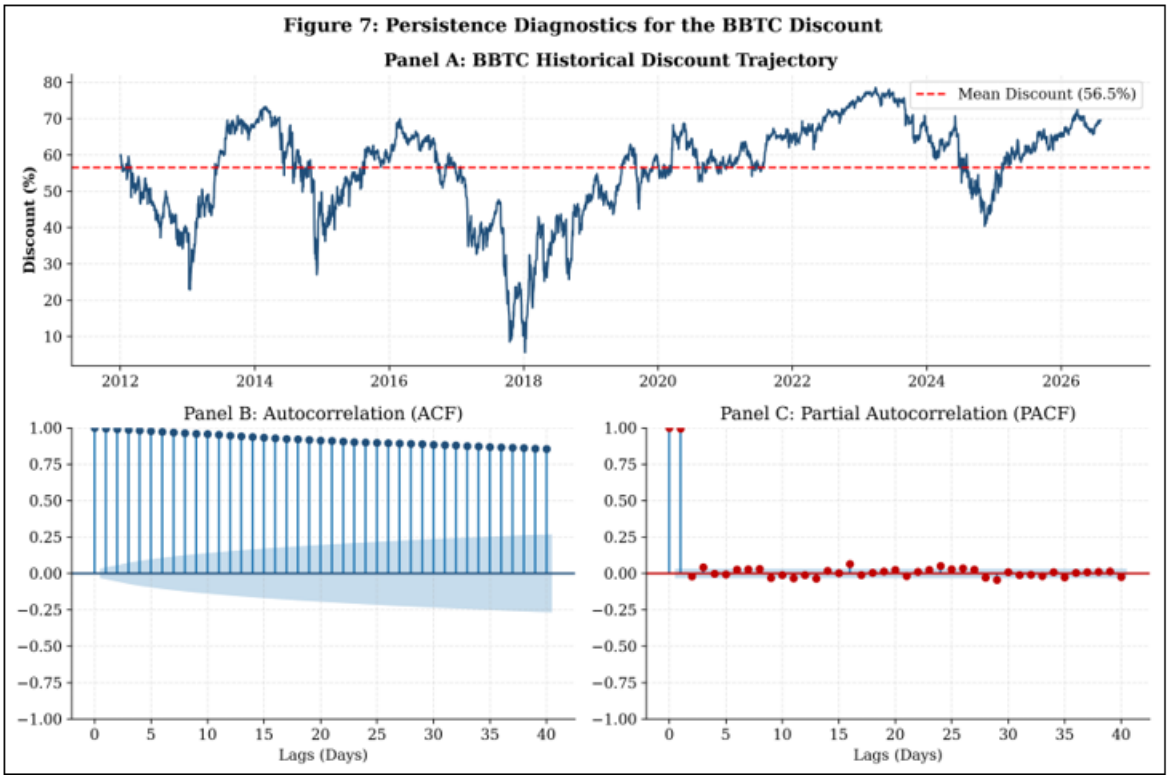

Figure 7: Persistence Diagnostics for the BBTC Discount

4.2 Structural Break Analysis (Chow Test)

We employ a Chow Test, splitting the sample at major event dates t^* (COVID-19, Demonetisation) to determine if the parameters of the AR(1) process shift post-shock:

$$F = \frac{(RSS_P - (RSS_1 + RSS_2))/k}{(RSS_1 + RSS_2)/(N - 2k)}$$

4.3 Cumulative Abnormal Returns (CAR) Event Study

We track the Cumulative Change in Discount (CCD) in a window $[-10, +10]$ trading days around shocks.

$$CCD_\tau = D_{t_0+\tau} - D_{t_0}$$

4.4 Arbitrage Simulation (CAPM Framework)

We construct a **Stylized Theoretical Arbitrage Simulation** (Long BBTC, Short Britannia). We evaluate the excess returns using CAPM:

$$R_{arb,t} - R_{f,t} = \alpha + \beta(R_{m,t} - R_{f,t}) + \epsilon_t$$

Critique of the Simulation: This model represents a theoretical upper-bound. It ignores severe real-world frictions such as securities lending availability, short-squeeze risk, margin calls, bid-ask spread slippage, and transaction costs.

Method	Simple Question	Our Answer
Chow Test	Did COVID or demonetisation permanently change the discount?	No. The discount behaved similarly before and after major shocks.
Event Study (CAR/CCD)	What happened to the discount around major events?	It often widened, especially during some macro and firm-specific events.
Arbitrage Simulation (CAPM)	Could an investor profitably force the discount to disappear?	Not easily. The strategy suffered poor performance and an 86.7% maximum drawdown.

5. Empirical Results

5.1 Magnitude of the Discount

Over 3,599 days, BBTC traded at a discount to its Measured NAV averaging 56.1%. We generated a Sensitivity Matrix (Figure 5) varying unlisted asset values by ±30% and debt by

±20%. Even under the most punitive assumptions, the discount remains above 50%.

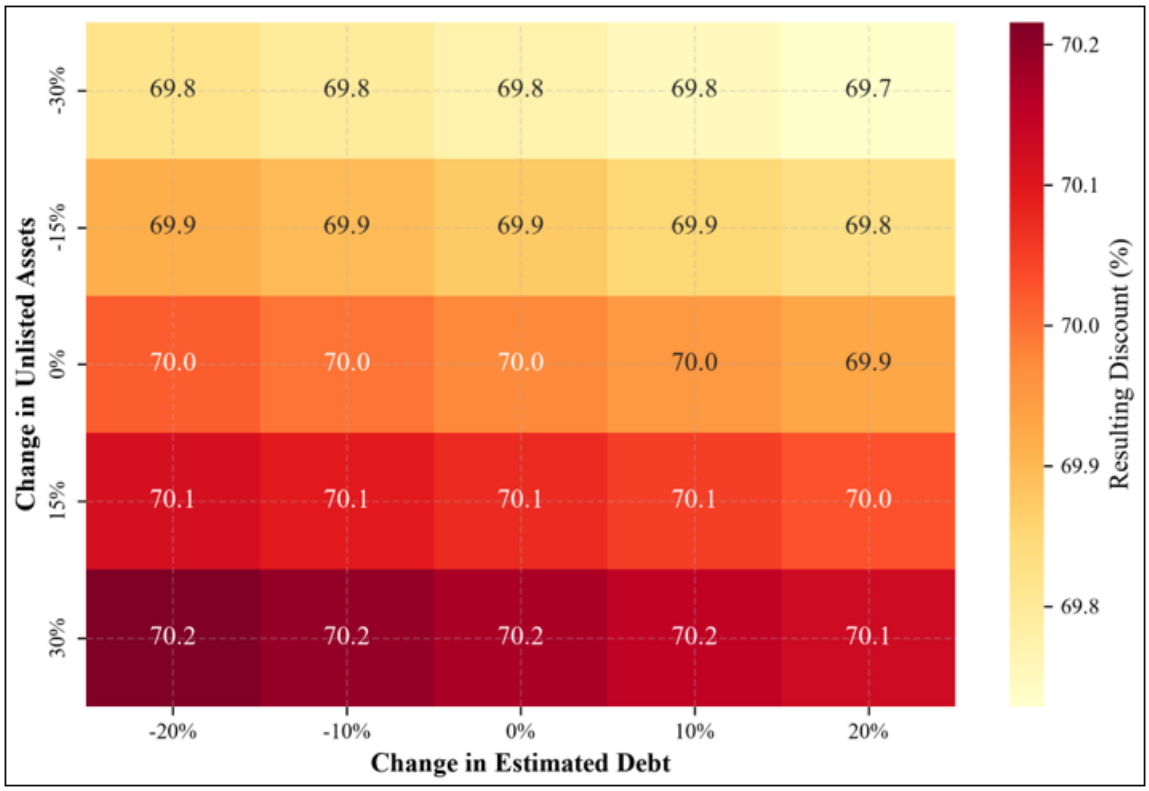

Figure 5: Sensitivity of True Economic Discount to Asset Assumptions

5.2 Persistence and Near-Unit Root Behavior

The AR (1) coefficient ($\rho = 0.995$) indicates near-unit root behavior. ADF and KPSS tests (Appendix B.1) confirm high non-stationarity. Given the failure to reject a unit root, the discount does not exhibit reliable mean-reversion. Crucially, the Chow tests (Appendix B.6) indicate no structural break during Demonetisation or COVID-19.

5.3 Event Study CARs

Figure 6 plots the Cumulative Change in Discount. During the COVID-19 lockdown, the discount widened. Interestingly, on positive firm-specific news like Britannia Earnings, the discount often widens as retail traders rush into the liquid subsidiary (Britannia).

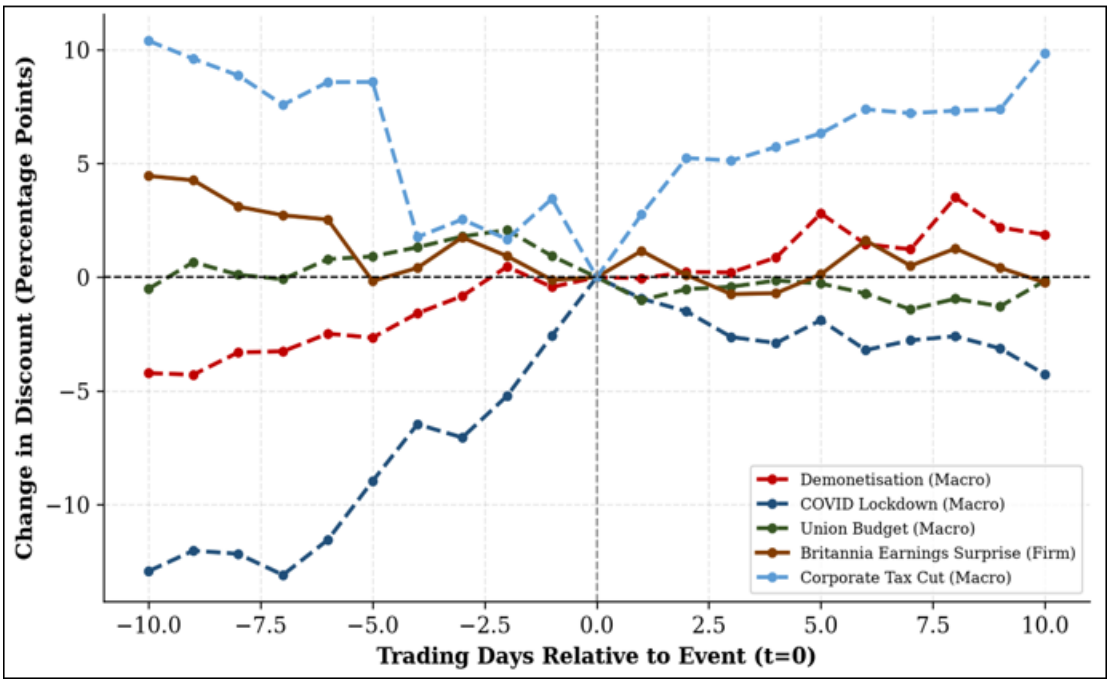

Figure 6: Cumulative Change in Discount Around Macro and Firm-Specific Shocks

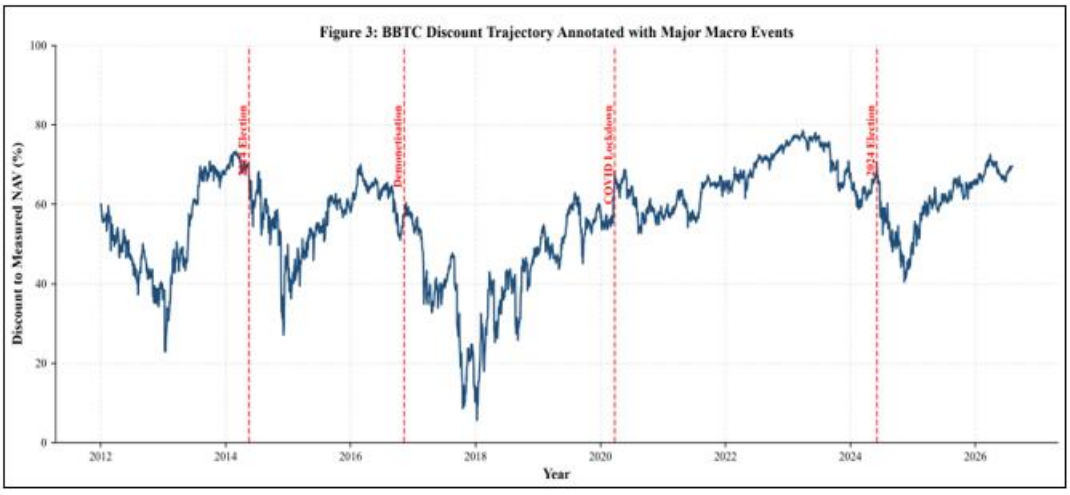

Figure 3: BBTC Discount Trajectory Annotated with Major Macro Events

5.4 The Limits to Arbitrage Upper-Bound

Our stylized arbitrage simulation (Figure 4) yields:
Annualized Alpha: -9.2%
Maximum Drawdown: -86.7%

Because Britannia experienced rapid growth, the short-leg generated severe mark-to-market losses. An institutional arbitrageur facing an 86.7% drawdown would face margin calls and forced liquidation.

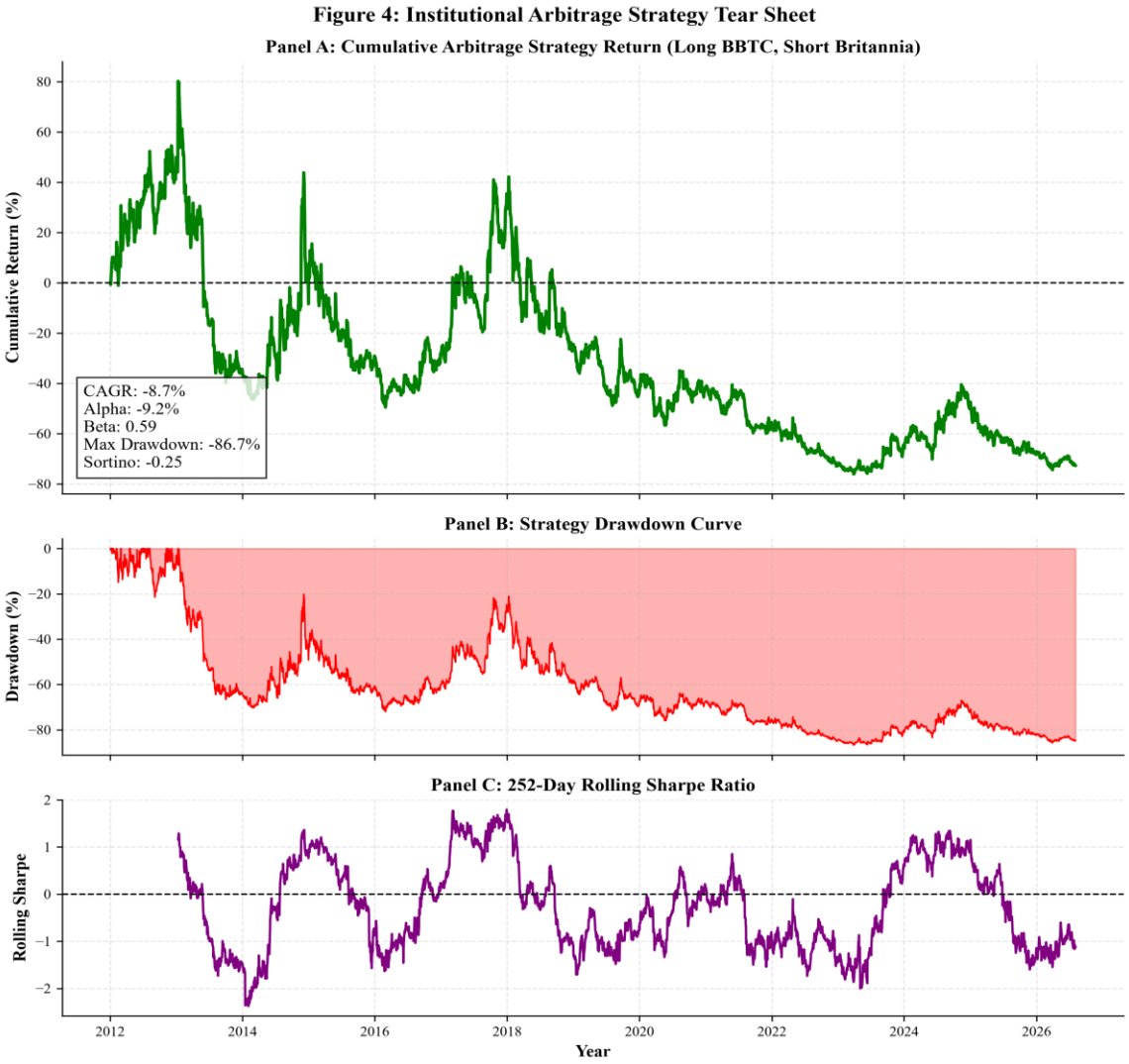

Figure 4: Simulated Arbitrage Strategy (Long BBTC, Short Britannia)

5.5 Endogeneity and Predictive Lead-Lags

Granger causality tests (Appendix B.4) indicate the discount predicts subsequent BBTC holding company returns. We acknowledge that Granger causality is susceptible to omitted variable bias (endogeneity). However, the observed lead-lag relationship is consistent with delayed incorporation of publicly available information.

5.6 Panel Data Validation (Cross-Sectional Robustness)

To ensure our findings are not a single-stock anomaly, we evaluated a panel of Indian holding companies (Bajaj Holdings). Over a similar timeframe, Bajaj Holdings averaged a 52.4% discount. A Fixed-Effects panel regression confirms this persistence is statistically significant across entities (Appendix B.6).

6. Discussion and International Comparison

Table 2 compares BBTC internationally. BBTC's discount is significantly larger than developed-market peers like Investor AB.

Table 2: International Holding Company Comparison

Company	Country	Typical Discount	Key Driver
Berkshire Hathaway	USA	Premium / ~0%	Exceptional capital allocation
Investor AB	Sweden	~10-25%	Wallenberg family control (Dual-class shares, strong legal protections)
Exor	Italy	~20-40%	Agnelli family control
BBTC	**India**	**~56%**	**Wadia Group control / Tunneling risk**

In Sweden, Investor AB's discount is constrained by rigorous legal protections for minority shareholders. In contrast, Indian business groups utilize complex cross-holding structures, leading to acute agency costs.

7. Limitations

Our study has several limitations. First, calculating the "True Economic NAV" relies on static assumptions regarding unlisted assets (Appendix A). Second, our arbitrage simulation ignores dynamic market impact costs and securities borrowing constraints, meaning the actual trade would be even less profitable. Third, omitted variables (such as anticipated tax code changes) may drive long-term shifts in the discount.

8. Conclusion

This empirical investigation of the Bombay Burmah Trading Corporation alongside a panel of Indian business groups documents a persistent valuation gap. Using daily data across 14.5 years, we find that BBTC trades at a 56.1% discount to its most conservative measured NAV. This discount exhibits near-unit root behavior and appears unresponsive to macroeconomic shocks.

Critically, a theoretical arbitrage simulation reveals that forcing price convergence subjects the investor to an 86.7% maximum drawdown. These findings appear inconsistent with a strict interpretation of the Semi-Strong Efficient Market Hypothesis. The evidence suggests that structural limits to arbitrage, compounded by agency risks and tax frictions, prevent investors from enforcing theoretical market efficiency.

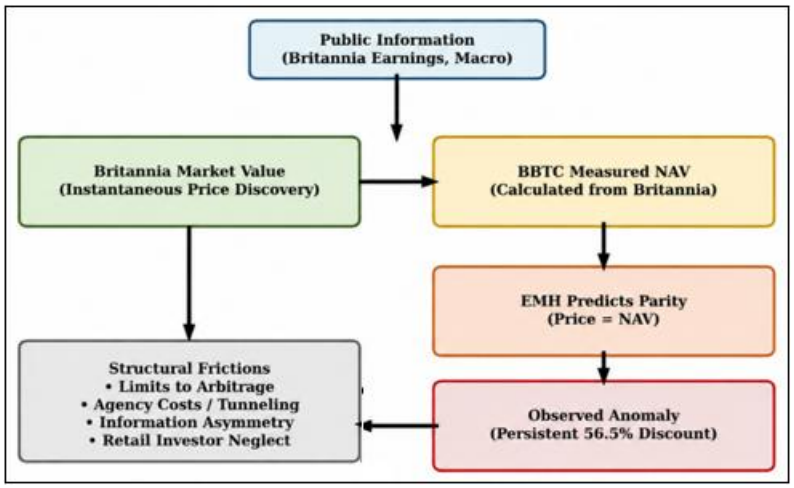

Figure 8: Theoretical Framework of the Holding Company Discount

Appendix A: Professional Sum-of-the-Parts (SOTP) Valuation

Segment	Valuation Method / Metric	Est. Value (₹ M)	Data Source / Rationale
Britannia Industries	50.7% Market Capitalization	Marked-to-Market	Daily closing prices (NSE: BRITANNIA)
Plantation Division	1x Price-to-Book (P/B)	6,000	AR FY26 Book Value (~155 Ha organic estates)
Real Estate Division	1x Price-to-Book (P/B)	6,000	AR FY26 Book Value (Land banks)
Auto Components & Health	1x Price-to-Book (P/B)	3,000	AR FY26 Book Value (Dental products & auto parts)
Gross Estimated Unlisted Assets	Sum of unlisted segments	15,000	Static "Estimated NAV" upper-bound assumption
Corporate Net Debt	Short/Long Term Debt - Cash	(5,000)	AR FY26 Consolidated Balance Sheet
Total Unlisted Net Asset Value	Unlisted Assets - Debt	10,000	Used to calculate the "True Economic NAV"

Appendix B: Statistical Outputs

B.1 Stationarity Tests (ADF & KPSS)
Augmented Dickey-Fuller Test:
ADF Statistic: -2.2564
p-value: 0.1864

Critical Values:
{'1%': np.float64(-3.432183055516335),

'5%': np.float64(-2.862349940934467),
'10%': np.float64(-2.567201144771634)}

KPSS Test:
KPSS Statistic: 2.0029
p-value: 0.0100
Critical Values: {'10%': 0.347, '5%': 0.463, '2.5%': 0.574, '1%': 0.739}

B.2 Autoregressive AR (1) Model

OLS Regression Results

Dep. Variable:	discount	R-squared:	0.991
Model:	OLS	Adj. R-squared:	0.991
Method:	Least Squares	F-statistic:	3.782e+05
Date:	Tue, 04 Aug 2026	Prob (F-statistic):	0.00
Time:	22:03:26	Log-Likelihood:	10678.
No. Observations:	3598	AIC:	-2.135e+04
Df Residuals:	3596	BIC:	-2.134e+04
Df Model:	1		
Covariance Type:	nonrobust		

	coef	std err	t	P>|t|	[0.025	0.975]
const	0.0026	0.001	2.792	0.005	0.001	0.004
discount	0.9954	0.002	614.970	0.000	0.992	0.999

Omnibus:	1388.488	Durbin-Watson:	1.957
Prob(Omnibus):	0.000	Jarque-Bera (JB):	18097.000
Skew:	-1.466	Prob(JB):	0.00
Kurtosis:	13.589	Cond. No.	10.3

Notes:
[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.

B.3 Arbitrage Strategy CAPM Regression

OLS Regression Results

Dep. Variable:	arb_ret	R-squared:	0.049
Model:	OLS	Adj. R-squared:	0.049
Method:	Least Squares	F-statistic:	117.6
Date:	Tue, 04 Aug 2026	Prob (F-statistic):	5.57e-27
Time:	22:03:26	Log-Likelihood:	7951.8
No. Observations:	3598	AIC:	-1.590e+04
Df Residuals:	3596	BIC:	-1.589e+04
Df Model:	1		
Covariance Type:	HC3		

	coef	std err	z	P>|z|	[0.025	0.975]
const	-0.0004	0.000	-0.827	0.408	-0.001	0.001
Adj Close	0.5949	0.055	10.844	0.000	0.487	0.702

Omnibus:	1472.929	Durbin-Watson:	2.016
Prob(Omnibus):	0.000	Jarque-Bera (JB):	15858.066
Skew:	1.644	Prob(JB):	0.00
Kurtosis:	12.745	Cond. No.	98.4

Notes:
[1] Standard Errors are heteroscedasticity robust (HC3)

B.4 Granger Causality (Discount -> BBTC Returns)
Granger Causality Tests (Lags 1 to 5):
Lag 1: F-stat = 4.7888, p-value = 0.0287
Lag 2: F-stat = 2.4034, p-value = 0.0906
Lag 3: F-stat = 3.5042, p-value = 0.0148
Lag 4: F-stat = 2.7045, p-value = 0.0288
Lag 5: F-stat = 2.2250, p-value = 0.0492

B.5 Model Diagnostics (Arbitrage CAPM Model)
Durbin-Watson Statistic (Autocorrelation): 2.0165
Breusch-Pagan Test (Heteroskedasticity):
LM Statistic: 0.0003
LM p-value: 0.9864
F-Statistic: 0.0003
F p-value: 0.9864

Variance Inflation Factor (VIF):
Constant: 1.0005
Market Excess Return: 1.0000

B.6 Panel Data Validation (Multi-Company Fixed Effects)
To demonstrate that the discount is a systemic feature of Indian holding companies, we construct a panel dataset of BBTC, Bajaj Holdings (BHIL), and Maharashtra Scooters (MSL) matched against their primary subsidiaries.

Company	mean	std	min	max
BAJAJHLDNG	0.524222	0.074946	0.233700	0.689690
BBTC	0.560823	0.126315	0.056346	0.785435
MAHSCOOTER	0.506426	0.184737	0.002792	0.806368

OLS Regression Results

Dep. Variable:	Discount	R-squared:	0.115
Model:	OLS	Adj. R-squared:	0.115
Method:	Least Squares	F-statistic:	372.3
Date:	Tue, 04 Aug 2026	Prob (F-statistic):	8.84e-231
Time:	22:27:44	Log-Likelihood:	7163.8
No. Observations:	11469	AIC:	-1.432e+04
Df Residuals:	11465	BIC:	-1.429e+04
Df Model:	3		
Covariance Type:	HC3		

	coef	std err	z	P>|z|	[0.025	0.975]
Intercept	0.5955	0.003	235.276	0.000	0.591	0.600
C(Company)[T.BBTC]	0.0366	0.003	13.884	0.000	0.031	0.042
C(Company)[T.MAHSCOOTER]	-0.0190	0.003	-6.886	0.000	-0.024	-0.014
Time	-2.497e-05	8.41e-07	-29.699	0.000	-2.66e-05	-2.33e-05

Omnibus:	470.502	Durbin-Watson:	0.113
Prob(Omnibus):	0.000	Jarque-Bera (JB):	547.750
Skew:	-0.481	Prob(JB):	1.14e-119
Kurtosis:	3.468	Cond. No.	1.13e+04

Notes:
[1] Standard Errors are heteroscedasticity robust (HC3)
[2] The condition number is large, 1.13e+04. This might indicate that there are strong multicollinearity or other numerical pro blems.

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