

# Volatility Decay and Arbitrage in Leveraged ETFs: Evidence from the US and Japan

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## **Abstract**

This study examines the role of volatility decay in leveraged exchange-traded funds (ETFs) and its implications for statistical arbitrage strategies. While existing literature predominantly views volatility decay as a structural weakness that erodes long-term ETF performance, we demonstrate that it can be systematically exploited through beta-neutral arbitrage strategies. Using a comprehensive dataset of US and Japanese ETFs, we assess their tracking performance and document cross-market differences arising from distinct leverage replication mechanisms - futures-based (Japan) vs. total return swaps (US). Our empirical findings reveal that shorting paired bull and bear ETFs with equivalent leverage ratios consistently generates risk-adjusted excess returns, confirming that volatility decay is a persistent and exploitable phenomenon.