

STRATEGY CHEATSHEET

QUANT TRADING

ARBITRAGE | HFT | VOLATILITY

HIGH FREQUENCY TRADING

Market Making

$$\text{P\&L} = (P_{ask} - P_{bid}) \times V - |I| \times \Delta P$$

Objective

Maximize Spread Capture

Providers of liquidity quote simultaneous buy and sell prices. Profits stem from the bid-ask spread. Losses stem from toxic order flow (adverse selection) and inventory holding risk.

Exec: Placing limit orders at both sides of the book; adjusting quotes based on inventory skew (I).

MEAN REVERSION

Pairs Trading

$$S_t = \ln(P_A) - \beta \ln(P_B)$$

Signal

$$z_t = \frac{S_t - \mu}{\sigma}$$

Exploits temporary pricing anomalies between co-integrated assets. It relies on the spread (S_t) being stationary. If $z_t > 2$, short the spread; if $z_t < -2$, long the spread.

***Exec: Identifying co-integrated pairs via Engle-Granger test;
Entering when spread diverges from historical mean.***

DIRECTIONAL STRATEGY

Trend Following

$$\text{Signal}_t = \text{sgn}(\text{EMA}_S - \text{EMA}_L)$$

Time Series Momentum

$$R_{t,t+h} = \alpha + \beta R_{t-k,t} + \epsilon$$

Assumes asset prices exhibit serial correlation. Commodity Trading Advisors (CTAs) buy assets with positive past returns and short those with negative past returns. It is structurally long volatility.

Exec: Scaling position size inversely to volatility to target constant risk exposure across trends.

DERIVATIVES

Delta Neutral / Long Vol

$$\Pi = V_{option} - \Delta S$$

PnL Driver

$$\frac{1}{2}S^2\Gamma(\sigma_{realized}^2 - \sigma_{implied}^2)dt$$

Isolates volatility exposure by hedging directional risk (Delta). If realized volatility exceeds the implied volatility paid at entry, the Gamma gains outweigh Theta decay.

Exec: Buying straddles before earnings if implied move < expected move; continuously re-hedging Delta.

BASIS TRADING

Cash-and-Carry

$$F_t = S_t e^{(r-q)(T-t)}$$

Basis

$$B_t = F_{market} - F_{theoretical}$$

Exploits mispricing between the spot index (S_t) and the futures contract (F_t). If $F_{market} > F_{theoretical}$, buy the basket of stocks and short the futures.

Exec: Program trading baskets to instantly buy 500+ stocks while selling the S&P 500 E-mini future.

RELATIVE VALUE

Capital Structure Arb

Long CB + Short Stock

Components

Bond Floor + Call Option

Purchasing a convertible bond and shorting the underlying stock to hedge the equity sensitivity (Delta). The strategy isolates underpriced Volatility or Credit spreads.

Exec: Monetizing the cheap optionality embedded in the bond while collecting the coupon.

EVENT DRIVEN

Risk Arbitrage

$$\text{Spread} = P_{deal} - P_{current}$$

Prob(Success)

$$\pi = \frac{P_{current} - P_{fail}}{P_{deal} - P_{fail}}$$

Betting on the completion of an announced M&A deal. The trader captures the spread between the current market price and the acquisition price. Risk is deal failure (regulatory blocks).

Exec: Long the target company; Short the acquirer (if stock-for-stock deal) to hedge market risk.

SYSTEMATIC EQUITY

Smart Beta

$$R_i = \alpha + \beta_1 \text{MKT} + \beta_2 \text{HML} + \beta_3 \text{SMB}$$

Fama-French Factors

Value | Size | Mom

Constructing portfolios exposed to specific risk premia that historically outperform the market. Factors include Value (Book-to-Market), Momentum, and Quality.

Exec: Long/Short multi-factor portfolios to neutralize market beta (β_1) and isolate factor alpha.

HIGH FREQUENCY

Order Flow Imbalance

$$OFI_t = \sum_{i=1}^N q_i \cdot \text{sgn}(p_i - p_{mid})$$

Volume Weighted

$$VWAP = \frac{\sum P_j Q_j}{\sum Q_j}$$

Predicting short-term price moves (seconds/milliseconds) based on the pressure in the Limit Order Book. Heavy aggressive buying indicates upward pressure.

Exec: Front-running large institutional execution algorithms detected via Iceberg order patterns.

VOLATILITY

Correlation Trading

$$\sigma_{index} \approx \sum w_i \sigma_i \rho_{ij}$$

Trade Structure

Short Index Vol vs Long Single Vol

Selling options on an index (S&P 500) and buying options on the constituents. Profit arises if correlation (ρ) between stocks is lower than implied by index pricing.

Exec: Betting that stocks will move independently (earnings idiosyncratic) rather than together (macro).