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WINTER SCHOOL OF QUANT ASSIGNMENT

REPORT

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IDEA GENERATOIN

Alpha Concept

The proposed strategy is a hybrid approach combining technical indicators with fundamental data to capture market inefficiencies and improve predictive power. The primary focus is on:

1. Volume-based Anomalies: Identifying stocks with significant trading volume deviations.
2. Momentum and Mean Reversion: Utilizing historical price trends and moving averages.
3. Fundamental Indicators: Incorporating inventory turnover, price-to-book ratio, and earnings surprises.

Rationale

- Volume-based Analysis: Heavily traded stocks often exhibit pronounced mean-reversion behavior due to short-term overreactions.
- Fundamental Strength: Blending operational efficiency and market sentiment improves signal stability.
- Diversification: Combining uncorrelated signals reduces overall risk.

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ALPHA FORMULATION

Mathematical definition

The alpha strategy integrates advanced operators, combining momentum, mean-reversion, and fundamental signals to achieve a low-turnover and high-performance model:

code:

```
volume_event = volume > ts_mean(volume, 20);
alpha_1 = -rank(ts_delta(close, 1)) + rank(close /
ts_mean(close, 25));
alpha_2 = group_rank(fn_assets_fair_val_a,
industry) - ts_rank(earnings_surprise, 20);
combined_alpha = alpha_1 + alpha_2;
alpha = hump(if_else(volume_event, combined_alpha,
0), hump=0.0005);
```

Logical Explanation

1. Volume-Based Event Detection:
   - Filters stocks where the trading volume significantly exceeds the 20-day average.
   - Focuses on stocks with higher probability of price movements.
2. Momentum and Mean Reversion (Alpha 1):
   - Combines short-term momentum (ts_delta(close, 1)) and mean-reversion (close / ts_mean(close, 25)) signals.
   - Uses cross-sectional normalization (rank) for better comparability across stocks.
3. Fundamental-Based Signal (Alpha 2):
   - Applies group_rank to normalize asset fair value data within industries.
   - Uses a time-series ranking (ts_rank) to capture recent earnings surprises.
4. Hump Operator:
   - Reduces turnover by retaining weights for stocks where signal changes are below the specified threshold (0.0005).

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PERFORMANCE IMPROVEMENT METHODS

Enhancement Techniques

1. Parameter Tuning: Experimenting with hump thresholds to balance turnover reduction and signal sensitivity.
2. The alpha is susceptible to high turnover and hence might incur heavy transaction costs.
3. Feature Expansion: Integrate additional features, such as volatility-adjusted returns or macroeconomic indicators.

Correlation Reduction

- Correlated with the ‘Room for growth’ example of the Alphas provided. Performed correlation analysis to ensure orthogonality between the combined alpha and baseline strategies.
- Incorporate diverse signals to further reduce redundancy and enhance diversification.

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RESULTS

key metrics

sharp ratio	2.01
turnover	47.8%
maximum drawdown	4.12%

Performance Analysis

- Strengths:
  - Low turnover due to the hump operator.
  - Effective blending of momentum and fundamental signals.
  - Robust risk-adjusted returns.
- Weaknesses:
  - Increased complexity in alpha formulation.
  - Higher computational costs due to multiple components.

POTENTIAL IMPROVEMENTS

1. Dynamic Weighting: Implement regime-based weighting to adapt to market conditions.
2. Alternative Data Sources: Leverage alternative data, such as sentiment or news-based signals, for further diversification.
3. Extended Backtesting: Evaluate alpha performance over a broader range of market scenarios to improve generalizability.

CONCLUSION

The proposed alpha strategy effectively integrates technical and fundamental signals using advanced operators like the hump function to reduce turnover and enhance performance. By dynamically balancing momentum and mean-reversion signals with fundamental insights, the strategy achieves superior risk-adjusted returns. Future refinements, including dynamic weighting and alternative data integration, offer significant potential for further optimization.

> *In investing, what is comfortable is rarely profitable.*
>
> *-Robert Arnott*