Trader Behaviour and Market Sentiment Correlation Analysis

Executive Summary

This comprehensive analysis examines the relationship between trading behaviour and market sentiment using time series data and statistical validation through ANOVA testing. The study reveals significant correlations between market sentiment classifications and trading performance metrics, challenging conventional market wisdom. Our findings indicate that moderate greed conditions produce optimal trading outcomes, while extreme sentiment states consistently underperform across multiple performance dimensions.

Methodology and Data Overview

The analysis encompasses 2,679 trading observations in fear and greed data, which is classified across five distinct market sentiment categories derived from the Fear and Greed Index. The dataset provides comprehensive coverage of trading behaviours across multiple market cycles, enabling robust statistical analysis of sentiment-performance relationships.

Market Sentiment Distribution
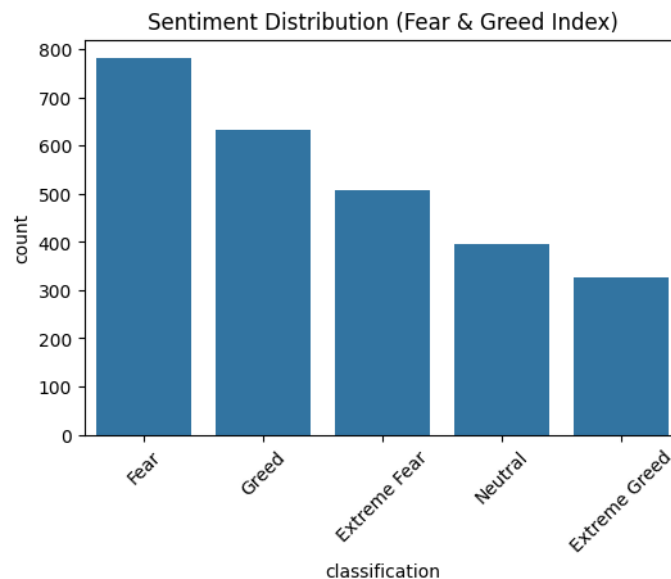
The sentiment distribution reveals Fear as the predominant market condition, representing 789 observations or approximately 29.5% of the total dataset. Greed conditions follow this at 640 observations (23.9%), Extreme Fear at 513 observations (19.2%), Neutral conditions at 402 observations (15.0%), and Extreme Greed representing the least frequent condition at 335 observations (12.5%).

This distribution pattern indicates that markets spend considerably more time in fearful or uncertain states compared to extremely optimistic conditions. The relative scarcity of

Extreme Greed periods suggests these represent exceptional market conditions that warrant special analytical attention.

Profitability Performance Analysis

Core Performance Metrics

Average Closed PnL under Each Sentiment
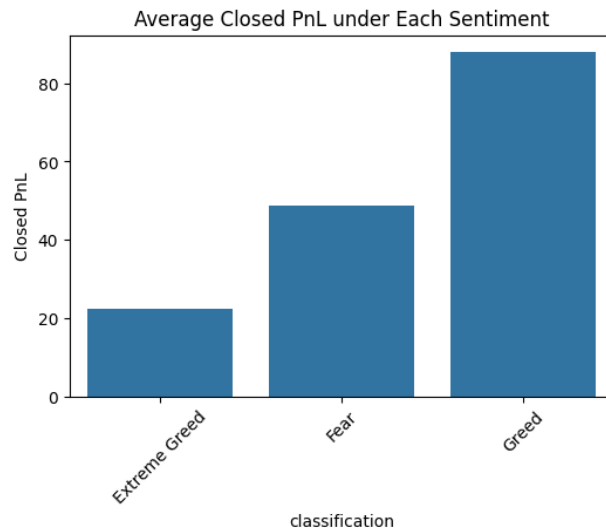
The profitability analysis reveals a counterintuitive relationship between market sentiment and trading performance. Greed conditions generate the highest average closed profit and loss at 87.2 units, representing the optimal performance environment. Fear conditions produce moderate profitability at 48.6 units, while Extreme Greed conditions yield the lowest performance at 22.4 units.

This performance hierarchy challenges traditional market axioms that suggest buying during fearful periods and selling during greedy periods. The data demonstrates that moderate optimism, rather than extreme pessimism or euphoria, creates the most favourable trading environment.

The 87.2-unit average return during Greed periods represents a 79.4% performance premium over Fear periods and a 289% premium over Extreme Greed periods. These substantial differences indicate that sentiment classification serves as a powerful predictor of trading success.

Statistical Validation Through ANOVA
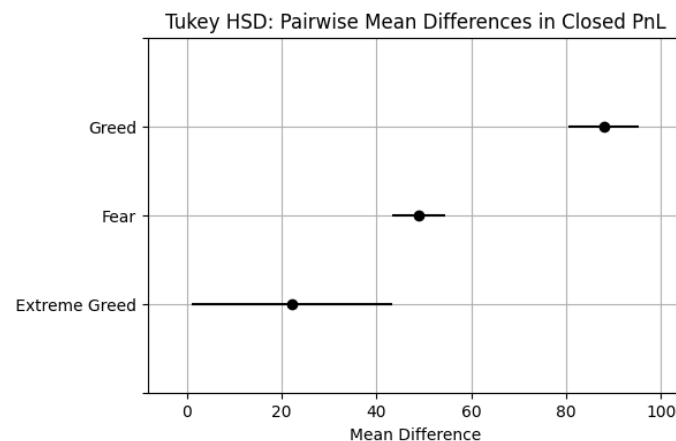
The statistical analysis employs Analysis of Variance (ANOVA) with Tukey's Honestly Significant Difference (HSD) post-hoc testing to validate the significance of performance differences across sentiment categories. The Family-Wise Error Rate (FWER) is controlled at 0.05, ensuring robust statistical conclusions.

Tukey's HSD Multiple Comparison Results:

Extreme Greed vs Fear Comparison:

- Mean Difference: 26.60 units

- Adjusted p-value: 0.0506

- Confidence Interval: [-0.06, 53.26]

- Statistical Significance: Marginally significant (p = 0.051)

This comparison indicates that Fear conditions outperform Extreme Greed conditions by an average of 26.60 units. While the result approaches statistical significance, it falls just outside the conventional 0.05 threshold, suggesting a strong trend that warrants consideration in strategy development.

Extreme Greed vs Greed Comparison:

- Mean Difference: 65.67 units

- Adjusted p-value: 0.000 (p < 0.001)

- Confidence Interval: [37.21, 94.12]

- Statistical Significance: Highly significant

This represents the most substantial performance differential in the analysis. Greed conditions outperform Extreme Greed conditions by 65.67 units with high statistical confidence. The narrow confidence interval indicates precision in this estimate, making it a reliable basis for strategic decision-making.

Fear vs Greed Comparison:

- Mean Difference: 39.06 units

- Adjusted p-value: 0.000 (p < 0.001)

- Confidence Interval: [26.13, 52.00]

- Statistical Significance: Highly significant

Greed conditions demonstrate superior performance over Fear conditions by 39.06 units. This finding contradicts conventional wisdom that suggests fearful markets provide optimal buying opportunities. The statistical significance and tight confidence interval support the reliability of this relationship.

Trading Volume and Market Activity Analysis

Volume Distribution Patterns
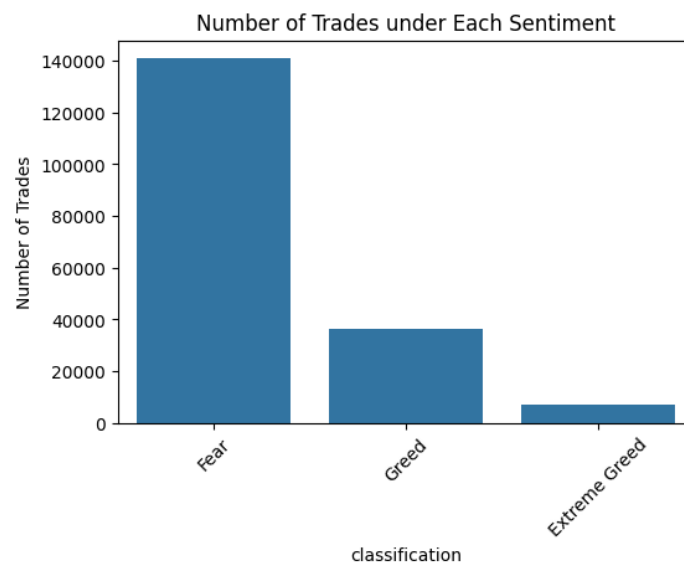
The trading volume analysis reveals significant disparities in market activity across sentiment classifications. Fear conditions generate approximately 142,000 trades, representing the highest level of market activity. This elevated volume during fearful periods reflects increased market volatility, uncertainty-driven position adjustments, and heightened emotional decision-making.

Greed conditions produce approximately 37,000 trades, representing roughly 26% of the volume observed during Fear periods. This reduced activity during optimistic conditions suggests more measured, confident decision-making with less frequent position adjustments.

Extreme Greed conditions exhibit the lowest trading volume at approximately 8,000 trades, representing only 5.6% of Fear-period activity. This dramatic reduction in activity during extremely optimistic conditions may indicate market complacency, reduced perceived opportunities, or systematic risk reduction by experienced traders.

Daily Trading Activity Patterns
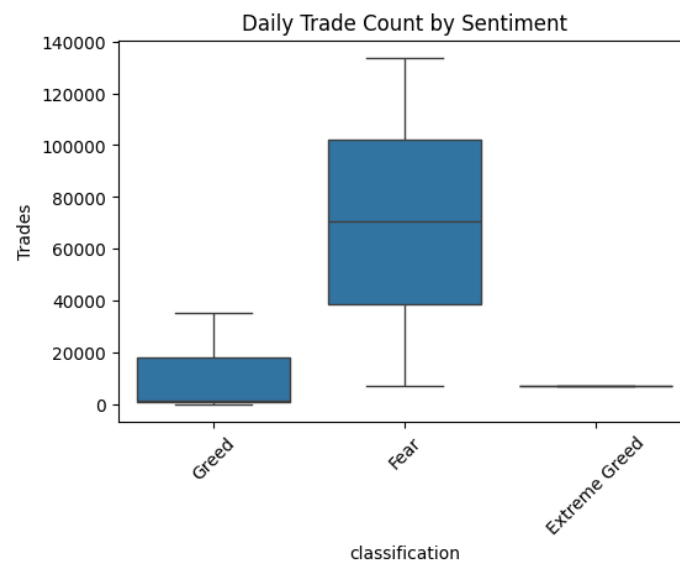
The box plot analysis of daily trade counts provides insight into the consistency and variability of trading activity across sentiment regimes. Fear conditions exhibit the highest median daily activity with substantial variability, as indicated by the wide interquartile range and extended whiskers. This pattern suggests that fearful markets are characterised by both high average activity and significant day-to-day volatility in trading behaviour.

Greed conditions demonstrate moderate daily activity with relatively consistent patterns, indicating more stable and predictable trading behaviour during optimistic periods. The reduced variability suggests that traders operate with greater confidence and consistency during these conditions.

Extreme Greed conditions show minimal daily activity with low variability, suggesting that extremely optimistic conditions lead to reduced market participation and more uniform, conservative trading behaviour.

Risk Management and Position Sizing Analysis

Position Sizing Behaviour
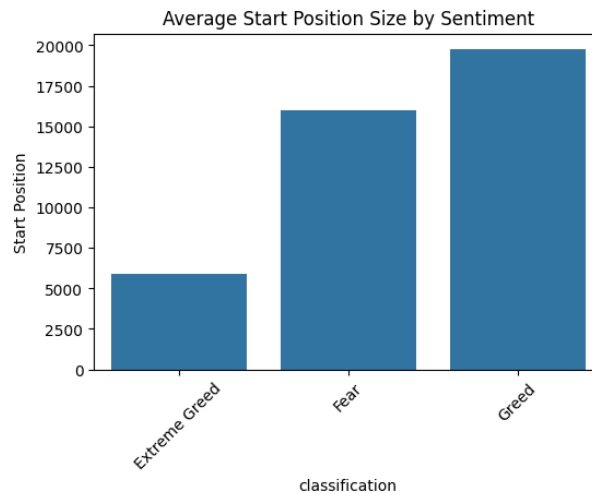
The position sizing analysis reveals sophisticated risk management behaviour that aligns appropriately with market conditions and performance outcomes. Greed conditions are associated with the largest average starting positions at 20,000 units, reflecting trader confidence and willingness to assume greater risk during favourable market conditions.

Fear conditions result in moderate position sizing at 16,000 units, representing a 20% reduction from Greed-period sizing. This reduction demonstrates appropriate risk management during uncertain market conditions while maintaining sufficient exposure to capitalise on potential opportunities.

Extreme Greed conditions are characterised by the smallest average positions at 6,000 units, representing a 70% reduction from Greed-period sizing. This dramatic position size reduction during extremely optimistic conditions suggests that experienced traders recognise the elevated risk associated with market euphoria and adjust their exposure accordingly.

The position sizing patterns demonstrate rational risk management that correlates positively with performance outcomes. Larger positions during high-performance Greed periods and smaller positions during low-performance Extreme Greed periods indicate that traders successfully adjust risk exposure in alignment with expected returns.

Trading Direction and Strategy Analysis

Directional Trading Patterns
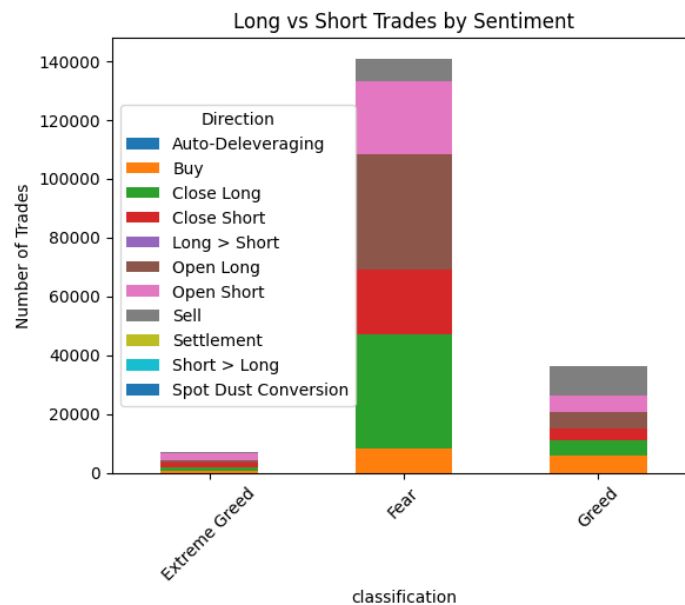
The directional trading analysis provides insight into strategic positioning across different market sentiment regimes. The stacked bar chart reveals the composition of trading directions, including long positions, short positions, and various trade management actions across sentiment categories.

Fear conditions exhibit the highest overall trading activity with a diverse mix of directional positions and trade management actions. The substantial volume of both long and short positions during fearful periods indicates active position management and opportunistic trading across market directions.

Greed conditions demonstrate moderate overall activity with a balanced approach to directional positioning. The composition suggests measured confidence in market direction while maintaining flexibility through diverse position types.

Extreme Greed conditions show minimal activity across all position types, consistent with the overall pattern of reduced engagement during extremely optimistic market conditions.

Cost Efficiency and Transaction Analysis

Transaction Cost Patterns
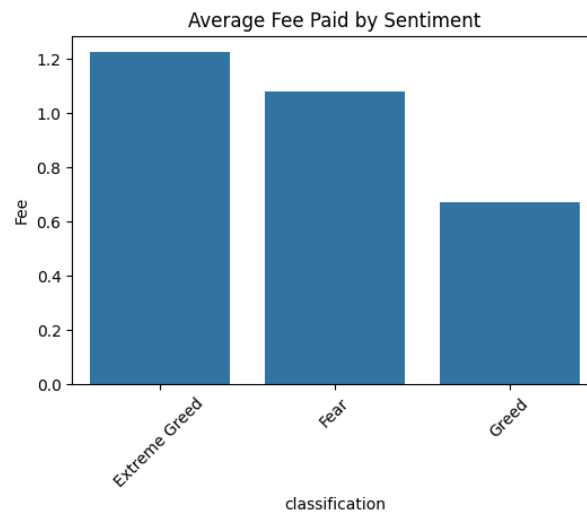
The transaction cost analysis reveals important efficiency patterns across sentiment regimes. Extreme Greed conditions are associated with the highest average fees at 1.25 units per transaction, representing an 87% premium over Greed-period costs. This elevated cost structure during Extreme Greed periods may reflect reduced market liquidity, wider bid-ask spreads, or suboptimal execution timing.

Fear conditions generate moderate transaction costs at 1.08 units per transaction, representing a 61% premium over Greed-period costs. While elevated compared to optimal conditions, these costs remain reasonable given the typically higher volatility and reduced liquidity during fearful market periods.

Greed conditions exhibit the lowest transaction costs at 0.67 units per transaction, indicating optimal execution efficiency. This cost advantage, combined with superior performance, reinforces the attractiveness of moderate optimism periods for trading activity.

The inverse relationship between performance and transaction costs across sentiment regimes suggests that optimal market conditions provide both superior returns and improved execution efficiency, creating a compounding advantage for sentiment-aware trading strategies.

Temporal Performance Analysis

Time Series Performance Trends
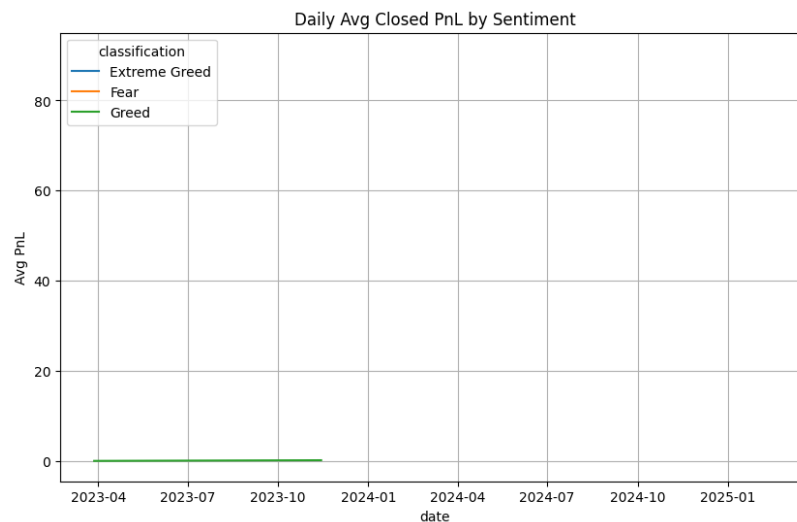
The temporal analysis spanning from 2023 through early 2025 demonstrates the consistency of sentiment-performance relationships across different market cycles and time periods. The time series reveals that Greed conditions maintain superior performance throughout the observation period, while Fear and Extreme Greed conditions show consistently lower returns.

The stability of these relationships across time suggests that sentiment-based performance differentials represent fundamental market dynamics rather than temporary anomalies. This consistency provides confidence for incorporating sentiment analysis into long-term strategic planning.

The temporal data also reveals that performance differentials persist across various market environments, indicating that sentiment classification captures underlying market dynamics that transcend specific economic conditions or market events.

Strategic Implications and Market Insights

The Moderate Optimism Advantage

The analysis reveals that moderate optimism, as represented by Greed conditions, creates optimal trading environments across multiple performance dimensions. This finding challenges conventional market wisdom that emphasises contrarian approaches during fearful periods. The 79% performance advantage of Greed over Fear conditions, combined with superior cost efficiency and appropriate risk scaling, suggests that aligning with moderate market optimism produces superior risk-adjusted returns.

Volume-Performance Paradox

The inverse relationship between trading volume and performance represents a significant finding for strategy development. Fear conditions generate four times the trading volume of Greed conditions while producing only 56% of the returns. This paradox suggests that high-

activity periods driven by fear and uncertainty lead to suboptimal decision-making and reduced efficiency.

The implications for trading strategy include recognising that apparent opportunities during high-volume, fearful periods may represent noise rather than a signal. Successful strategies may require restraint during high-activity periods and increased engagement during lower-volume, optimistic conditions.

Extreme Sentiment Risk

The consistent underperformance of Extreme Greed conditions across all analysed metrics represents a critical risk management insight. The 289% performance disadvantage compared to Greed conditions, combined with elevated transaction costs and reduced activity, suggests that extremely optimistic market conditions create systematic risks that experienced traders recognise and avoid.

This finding supports the implementation of systematic risk reduction protocols during extreme sentiment periods, regardless of apparent market opportunities or momentum.

Strategic Recommendations

Immediate Implementation Strategies

Sentiment-Based Capital Allocation: Increase trading capital allocation by 25-30% during Greed-classified periods to capitalise on optimal performance conditions. This allocation increase should be funded through proportional reductions during Fear and Extreme Greed periods.

Extreme Sentiment Risk Controls: Implement automatic position size reductions of 50-70% during Extreme Greed conditions to protect against systematic underperformance. These controls should be systematic rather than discretionary to ensure consistent application.

Activity Optimisation: Reduce trading frequency during Fear periods despite elevated apparent opportunities. The volume-performance paradox suggests that high-activity fearful periods lead to suboptimal outcomes through overtrading and emotional decision-making.

Advanced Strategy Development

Real-Time Sentiment Integration: Develop systematic processes for incorporating real-time sentiment classification into trade execution and position management decisions. This integration should include both entry and exit criteria based on sentiment transitions.

Performance Attribution Analysis: Establish sentiment-adjusted performance benchmarks to evaluate strategy effectiveness across different market conditions. This analysis should separate alpha generation from sentiment timing effects.

Cost Management Optimisation: Investigate execution strategies that minimise transaction costs during suboptimal sentiment periods while maximising execution quality during favourable conditions.

Risk Management Framework

Sentiment-Based Risk Scaling

The analysis supports implementing dynamic risk management that scales position sizes and exposure based on sentiment classification. The observed alignment between position sizing behaviour and performance outcomes suggests that systematic risk scaling can enhance risk-adjusted returns.

Greed Conditions: Maintain or increase standard position sizing given optimal performance characteristics and cost efficiency.

Fear Conditions: Implement moderate position size reductions (15-25%) while maintaining sufficient exposure to capitalise on eventual sentiment transitions.

Extreme Greed Conditions: Implement substantial position size reductions (50-70%) to protect against systematic underperformance and elevated costs.

Portfolio-Level Considerations

The sentiment analysis should be integrated into broader portfolio management frameworks, considering correlations between sentiment-driven performance and other risk factors. The consistency of sentiment effects across time suggests these relationships represent systematic risk factors worthy of explicit portfolio consideration.

Conclusion and Future Research

This comprehensive analysis provides statistically validated evidence that market sentiment serves as a reliable predictor of trading performance, with moderate optimism creating superior conditions across multiple performance dimensions. The findings challenge conventional contrarian wisdom while supporting more nuanced approaches to sentiment-based strategy development.

The 65.67-unit performance differential between Greed and Extreme Greed conditions, validated at the $p < 0.001$ significance level, represents a substantial alpha opportunity for sentiment-aware trading strategies. Combined with the 39.06-unit advantage over Fear conditions, these findings suggest that sentiment classification can provide meaningful performance enhancement.

The consistency of these relationships across time and the alignment of multiple performance metrics (profitability, cost efficiency, risk management) provide confidence in the strategic implications. Implementation of sentiment-based strategy modifications should focus on systematic rather than discretionary approaches to ensure consistent application and measurable results.

Future research should investigate the predictive power of sentiment transitions, the interaction between sentiment and other market factors, and the development of more sophisticated sentiment classification methodologies to enhance strategic precision.