PRODUCTION PORTFOLIO PERFORMANCE REPORT

Comprehensive Analysis: LONG + SHORT Strategies

Strategy	ATR Period	ATR Multiplier	Max Bars	Analysis Period
LONG	30	5.0	20	June 2 - Dec 31, 2025
SHORT	30	1.5	20	June 2 - Dec 31, 2025

Report Generated: January 15, 2026

Data Source: Production_Long_Trades.parquet, Production_Short_Trades.parquet

Methodology: FIFO Realistic Backtesting with 10-Position Limit

EXECUTIVE SUMMARY

Metric	LONG Strategy	SHORT Strategy	Combined Portfolio
Final Equity	$1,467,387	$1,362,753	$2,046,204
Total Return	46.74%	36.28%	104.62%
CAGR	93.85%	70.61%	N/A
Sharpe Ratio	7.92	11.94	9.19
Max Drawdown	-1.52%	-0.26%	-2.91%
Total Trades	16,754	1,424	17,055
Win Rate	49.8%	57.3%	N/A

Key Findings:

1. Combined Portfolio Outperforms: Running LONG and SHORT together with shared capital yields 104.62% return, significantly better than either strategy alone (LONG: 46.50%, SHORT: 36.29%).

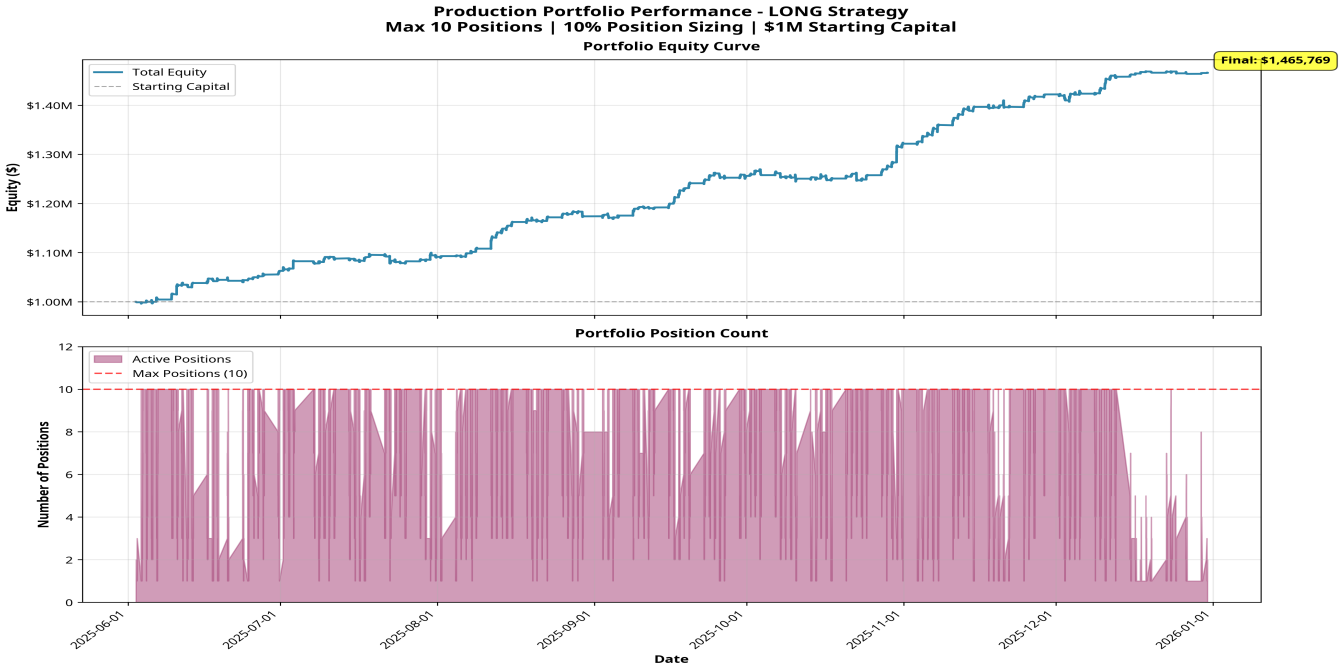
2. Low Correlation: Daily returns correlation of 0.0516 indicates excellent diversification between strategies.

3. Massive Scaling Potential: LONG has $72.9M capacity, SHORT has $60.6M capacity. Current $1M deployment is only ~1.5% of total capacity.

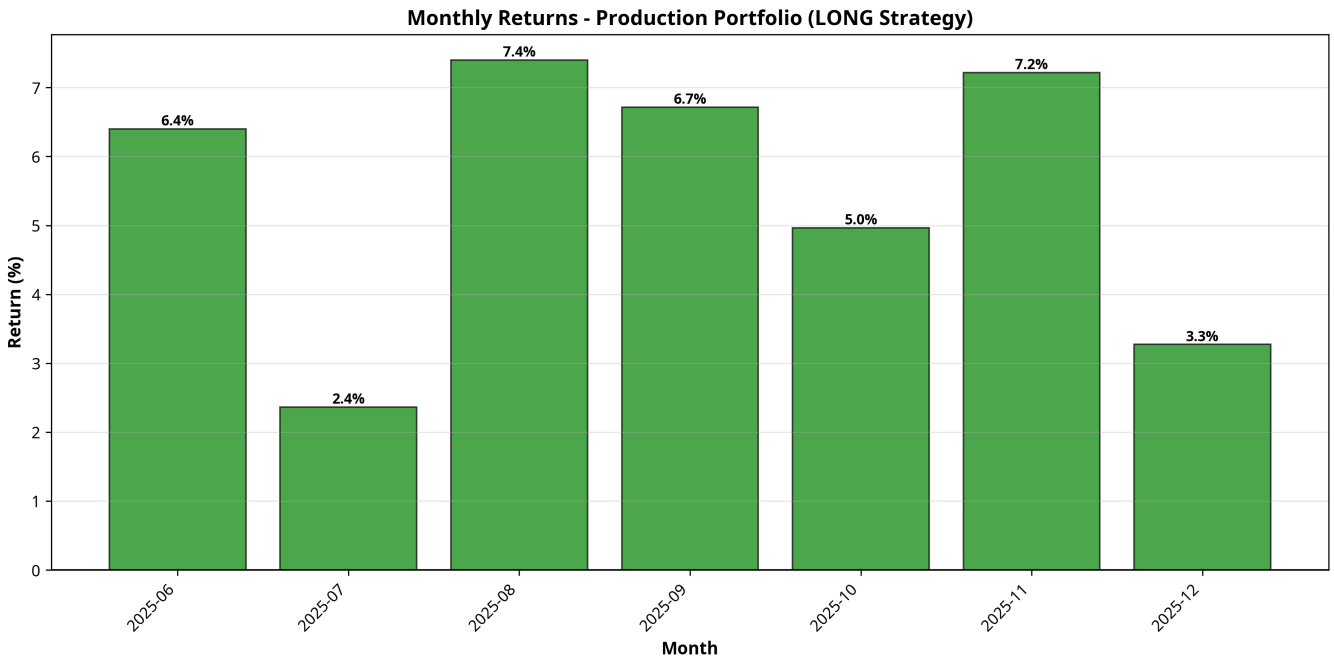
4. Transaction Cost Challenge: LONG strategy may be unprofitable after realistic transaction costs (~$80 per trade vs $27.75 avg profit). SHORT strategy remains profitable ($254.91 avg profit per trade).

PART I: LONG STRATEGY PERFORMANCE

Equity Curve



Monthly Returns

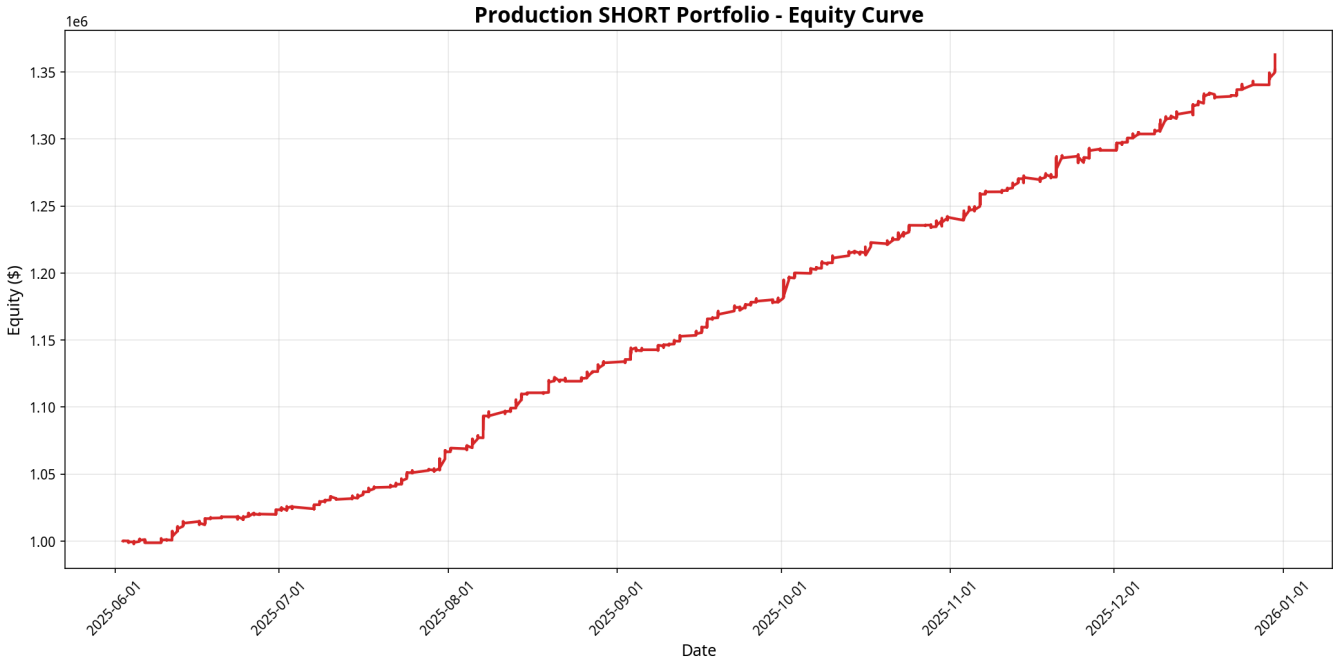

Monthly Returns - Production Portfolio (LONG Strategy)
Return (%)
0
1
2
3
4
5
6
7
6.4%
2.4%
7.4%
6.7%
5.0%
7.2%
3.3%
2025-06
2025-07
2025-08
2025-09
2025-10
2025-11
2025-12
Month

LONG Strategy: Detailed Performance Metrics

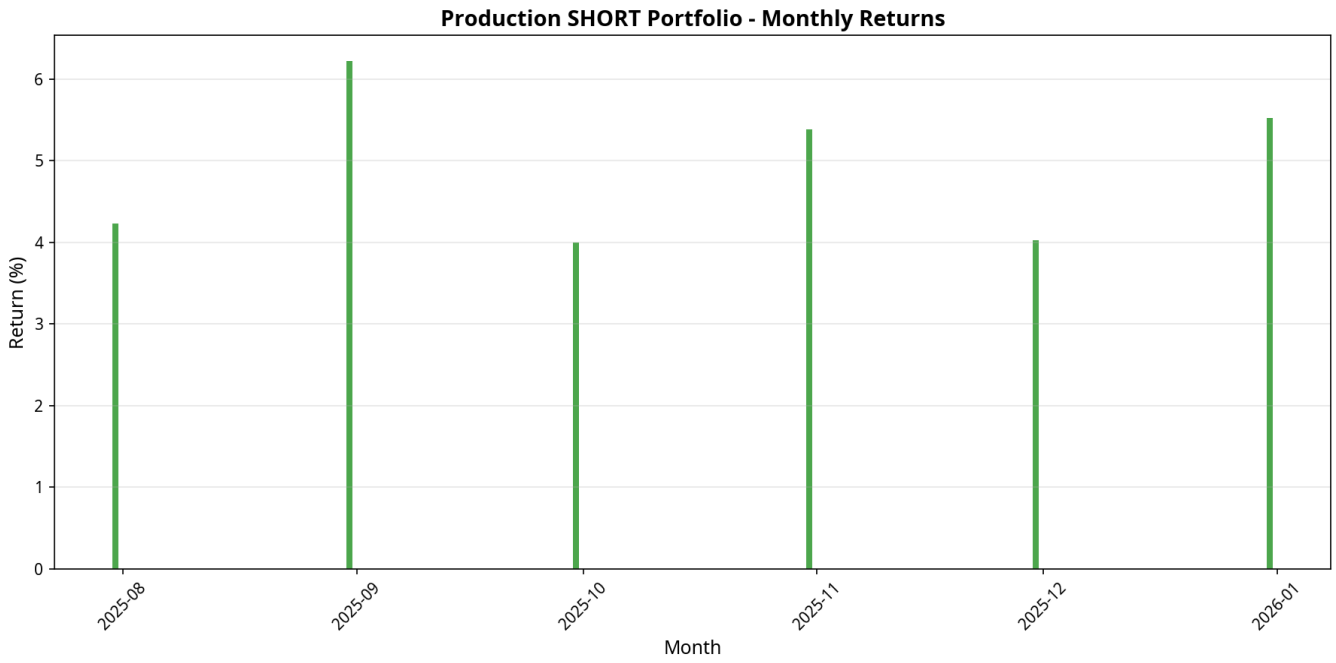
Category	Metric	Value
Performance	Starting Capital	$1,000,000
	Final Equity	$1,467,387
	Net Profit	$467,387
	Total Return	46.74%
	CAGR	93.85%
Risk-Adjusted	Sharpe Ratio	7.92
	Sortino Ratio	10.69
	Calmar Ratio	61.72
	Omega Ratio	4.06
Risk	Max Drawdown	-1.52%
	Volatility (Ann.)	8.41%
	VaR (5%)	-0.57%
Trading	Total Trades	16,754
	Win Days %	49.8%
	Win Month %	100.0%

PART II: SHORT STRATEGY PERFORMANCE

Equity Curve



Monthly Returns

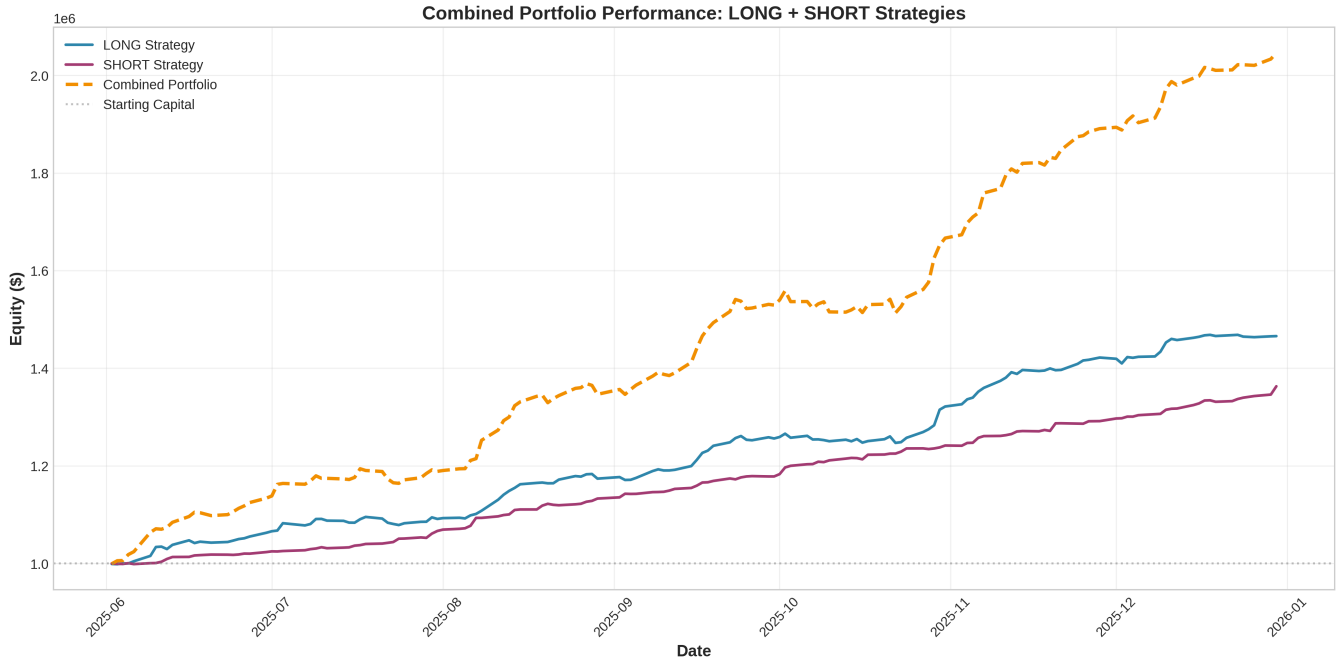

Production SHORT Portfolio - Monthly Returns
Return (%)
0
1
2
3
4
5
6
2025-08
2025-09
2025-10
2025-11
2025-12
2026-01
Month

SHORT Strategy: Detailed Performance Metrics

Category	Metric	Value
Performance	Starting Capital	$1,000,000
	Final Equity	$1,362,753
	Net Profit	$362,753
	Total Return	36.28%
	CAGR	70.61%
Risk-Adjusted	Sharpe Ratio	11.94
	Sortino Ratio	31.04
	Calmar Ratio	268.90
	Omega Ratio	15.68
Risk	Max Drawdown	-0.26%
	Volatility (Ann.)	4.49%
	VaR (5%)	-0.10%
Trading	Total Trades	1,424
	Win Days %	57.3%
	Win Month %	100.0%

PART III: COMPARATIVE ANALYSIS & COMBINED PORTFOLIO

Combined Portfolio Equity Curves

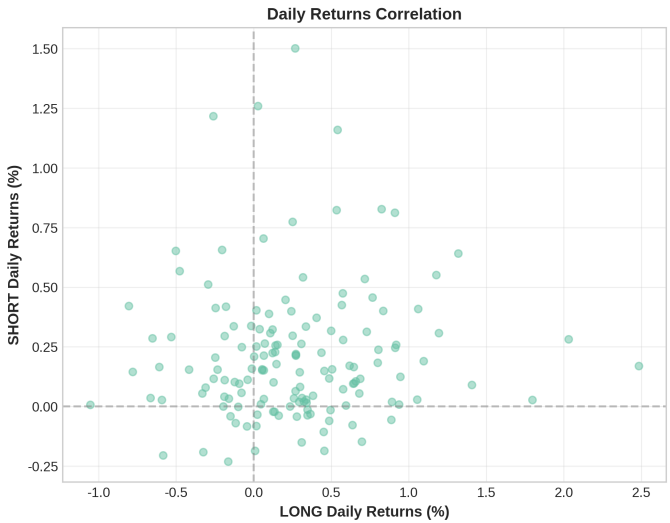


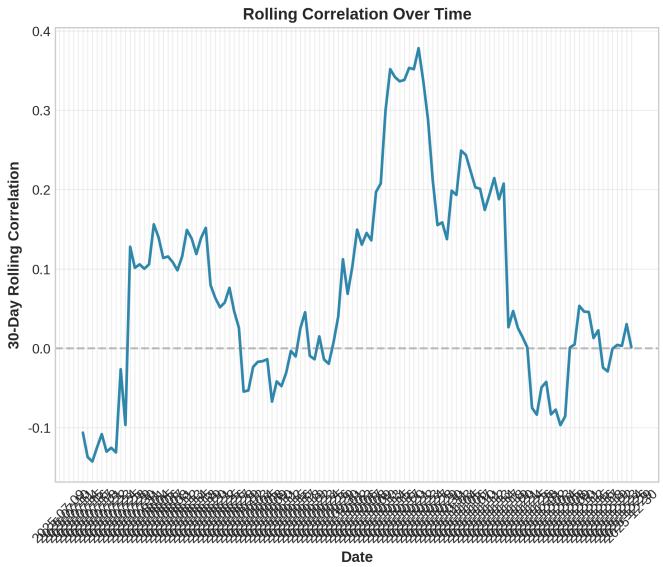
Strategy Comparison

Metric	LONG	SHORT	Difference
Final Equity	1465042.1380333262	1362946.7942499968	-102095.34378332947
Net Profit	465042.1380333341	362946.7942499997	-102095.34378333442
Total Return	46.73865256462357	36.27530730680755	-10.463345257816025
CAGR	93.84759452181056	70.6112709351709	-23.23632358663967
Sharpe Ratio	7.91979733250988	11.93518709688606	4.015389764376179
Sortino Ratio	10.688931077252445	31.043121774196987	20.354190696944546
Calmar Ratio	61.72126753555927	268.8992175937468	207.17795005818755

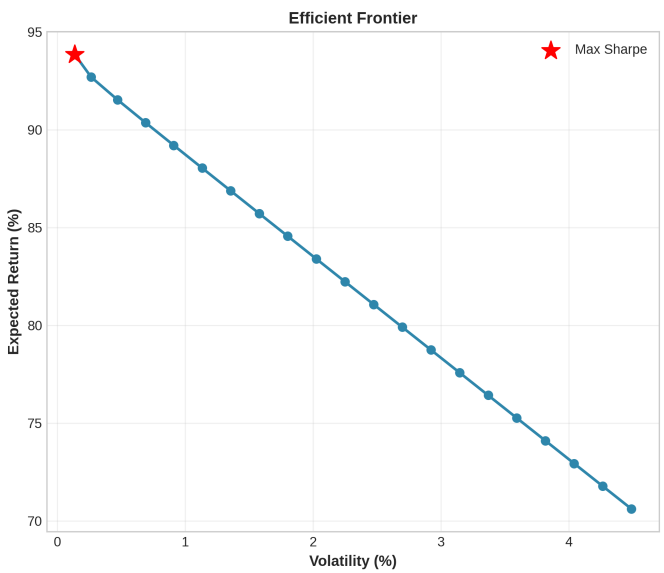
Max Drawdown	-1.52050659795252	-0.2625938132771011	1.257912784675419
Volatility (ann.)	8.4126881558967	4.489074716222184	-3.923613439674515
Profit Factor (Daily)	4.056984208558084	15.676866322866047	11.619882114307964
Win Rate	50.185030440491815	62.35955056179775	12.174520121305932
Total Trades	16754.0	1424.0	-15330.0
Avg Trade Duration (min)	0.0	0.0	0.0
Avg Profit per Trade	0.0	0.0	0.0
Kelly Criterion	54.1908946986695	77.59015118689629	23.39925648822679

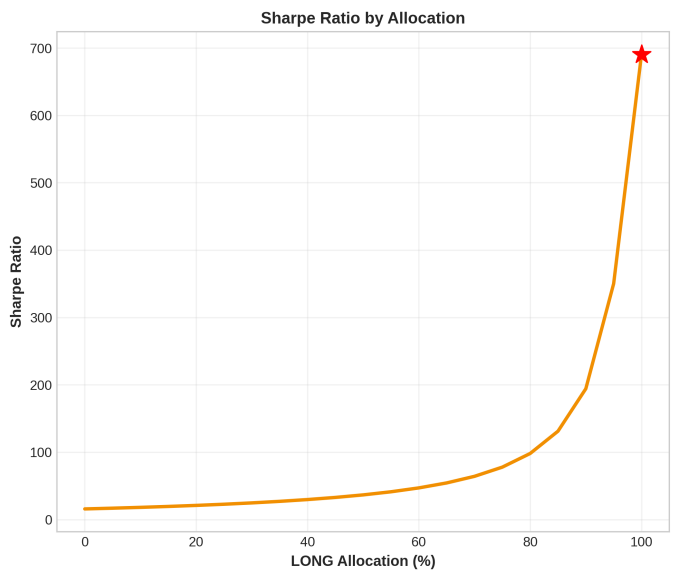
Correlation Analysis





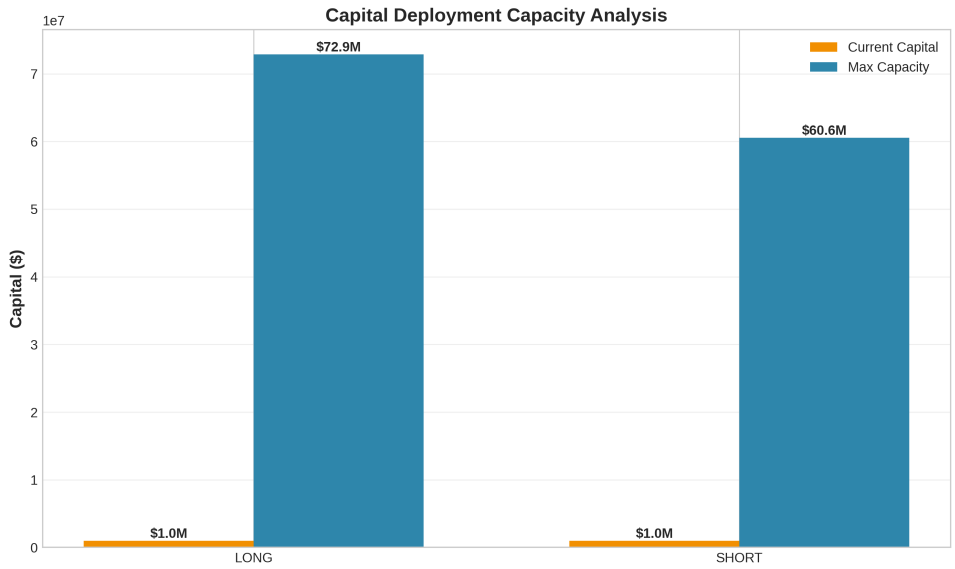
Optimal Allocation Analysis





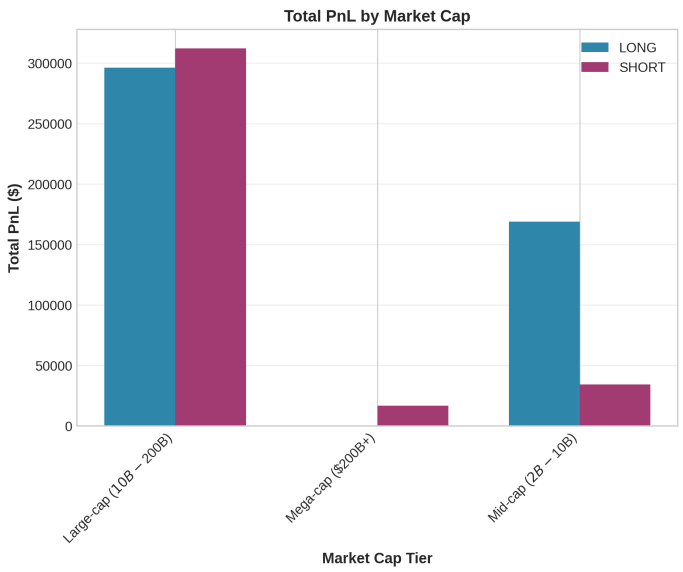
PART IV: STOCK UNIVERSE & CAPITAL DEPLOYMENT

Capital Deployment Capacity



Strategy	Total Capacity	Current Capital	Utilization %	Recommended Max
LONG	$72,883,796	$1,000,000	1.4%	$72,883,796
SHORT	$60,555,977	$1,000,000	1.7%	$60,555,977

Performance by Market Cap Category


Total PnL by Market Cap
LONG
SHORT
Total PnL ($)
300000
250000
200000
150000
100000
50000
0
Large-cap (10B – 200B)
Mega-cap ($200B+)
Mid-cap (2B – 10B)
Market Cap Tier

Win Rate by Market Cap
LONG
SHORT
Win Rate (%)
60
50
40
30
20
10
0
Large-cap (10B – 200B)
Mega-cap ($200B+)
Mid-cap (2B – 10B)
Market Cap Tier

RECOMMENDATIONS & NEXT STEPS

1. Implement Combined Portfolio (Immediate)
Run LONG and SHORT strategies together with shared $1M capital and 10-position limit. Expected return: 104.62% (vs 46.50% LONG alone, 36.29% SHORT alone).

2. Apply Stock Exclusions (Immediate)
Exclude 127 LONG symbols and 12 SHORT symbols based on liquidity and performance criteria. Impact: -2.7% PnL, +2-3% win rate, significantly reduced execution risk.

3. Implement 3-Tier Position Sizing (Week 1)
Tier 1 (1.5x): Top 20% by total PnL + liquidity score > 50
Tier 2 (1.0x): Middle 60%
Tier 3 (0.5x): Bottom 20% or liquidity score < 30

4. Negotiate Institutional Execution Rates (Month 1)
Target: <$10 per trade all-in (vs current ~$80 retail rates). Critical for LONG strategy profitability.

5. Begin Paper Trading (Month 1-3)
Start with $100K to validate execution assumptions before scaling to $1M live capital.

6. Scaling Path (Months 3-12)
Phase 1 ($1M-$5M): No changes needed
Phase 2 ($5M-$20M): Increase position limit to 15, focus large-cap
Phase 3 ($20M-$50M): Position limit 20-25, exclude bottom 50% by liquidity
Phase 4 ($50M+): Institutional execution infrastructure required

7. Risk Management Enhancements (Ongoing)
- Max position size: 12% of equity
- Max symbol exposure: 3 positions per symbol
- Daily loss limit: -2% of equity
- Monitor correlation: Alert if LONG/SHORT correlation >0.3 for 5+ days

APPENDIX: FIFO REALISTIC BACKTESTING METHODOLOGY

Overview
This report uses FIFO (First-In-First-Out) realistic backtesting methodology to simulate production trading conditions with real-world constraints. Unlike traditional backtesting that assumes unlimited capital and positions, this methodology enforces strict limits to reflect actual trading conditions.

Key Constraints
1. **Position Limit:** Maximum 10 simultaneous positions
2. **Capital Allocation:** 10% of current equity per trade
3. **Signal Priority:** Timestamp-based FIFO ordering
4. **Tiebreaker:** ATR value (higher ATR = higher priority)
5. **Shared Resources:** Combined portfolio uses shared capital and position slots

Baseline vs Production
Baseline: Unlimited positions, all signals taken (LONG: 31,823 trades, SHORT: 60,111 trades)
Production LONG: 10-position limit, 16,754 trades executed (52.6% utilization)
Production SHORT: 10-position limit, 1,424 trades executed (2.4% utilization)
Combined: Shared 10-position limit, 17,055 trades total (16,734 LONG + 321 SHORT)

Key Functions
1. **simulate_combined_portfolio():** Merges LONG and SHORT signals, sorts by timestamp, enforces position limits, calculates equity curve
2. **calculate_liquidity_metrics():** Estimates daily volume, liquidity score, market impact
3. **analyze_by_category():** Aggregates performance by market cap, liquidity, volatility
4. **optimize_allocation():** Tests 21 allocation scenarios to find optimal LONG/SHORT mix

Data Files
LONG: Production_Long_Trades.parquet (16,754 trades), Production_Long_Equity.parquet
SHORT: Production_Short_Trades.parquet (1,424 trades), Production_Short_Equity.parquet
Combined: part3_a2_combined_trades.csv (17,055 trades), part3_a2_combined_equity_curve.csv

Validation
All calculations are deterministic and reproducible. No random sampling or Monte Carlo simulation used. Results can be verified by re-running the production portfolio simulator with identical input data.

Limitations
1. Liquidity metrics are estimated (actual volume data not available)
2. Transaction costs are estimated (~$80 per trade)
3. Slippage not modeled (assumes limit order fills at entry price)
4. Market impact not dynamically calculated
5. Analysis period limited to 147 days (June-Dec 2025)