BACKTESTING REPORT

Statistical Arbitrage

03/04/2024

1 Objective and Constraint

Capital Size	10B
Return Objective	Medium
Liquidity needs	Low
Time Horizon	Medium
Other Specific Constraint	N/A

2 Trading Algorithm

Algorithm Name	Statistical Arbitrage
Target Market	Future and Stock
Decision-making schedule	Daily

3 Backtesting Assumption

Liquidity	Full
Price slippage	N/A
Market impact	N/A
Simulated fill price	N/A
Transaction fee and taxes	.23 point/ .23%
Sales proceeds advance	Yes

4 Backtesting Performance Evaluation

Time Period	**In-Sample** <CHANGEME: INSERT PERIOD HERE>		**Out-of-Sample** <CHANGEME: INSERT PERIOD HERE>
	Initial Parameters	**Optimal Parameters**	**Optimal Parameters**

In-Sample — Initial Parameters

```python
# Input
estimation_window = 60
min_trading_days = int(0.5 * estimation_window)
max_clusters = 10
top_stocks = 6
correlation_threshold = 0.6
residual_threshold = 0.3
tier = 1
first_allocation = 0.4
adding_allocation = 0.4
```

YEAR	2021	2022	2023
YEARLY	4.2%	-25.11%	-0.12%
JAN	n.a%	-1.27%	0.23%
FEB	n.a%	-1.02%	-2.53%
MAR	n.a%	-3.31%	2.90%
APR	n.a%	-6.48%	-0.11%
MAY	n.a%	-6.66%	2.89%
JUN	n.a%	-0.57%	-0.0%
JUL	n.a%	0.77%	-0.07%
AUG	0.00%	-0.00%	0.00%
SEP	0.36%	-4.47%	-4.55%
OCT	1.28%	-5.13%	-5.32%
NOV	1.55%	0.00%	5.42%
DEC	-0.96%	0.00%	1.54%

In-Sample — Optimal Parameters

```python
# Input
estimation_window = 40
min_trading_days = int(0.8 * estimation_window)
max_clusters = 10
top_stocks = 6
tier = 1
first_allocation = 0.4
adding_allocation = 0.2
correlation_threshold = 0.6
```

YEAR	2021	2022	2023
YEARLY	-2.77%	-16.63%	11.10%
JAN	n.a%	0.51%	4.69%
FEB	n.a%	-2.67%	-1.91%
MAR	n.a%	0.15%	7.1%
APR	n.a%	-6.06%	0.55%
MAY	n.a%	-3.43%	-1.00%
JUN	n.a%	3.82%	0.56%
JUL	n.a%	-0.44%	5.57%
AUG	-0.54%	0.00%	0.3%
SEP	-0.59%	-8.18%	-0.82%
OCT	1.34%	-3.41%	-3.56%
NOV	-1.43%	1.55%	-1.99%
DEC	-1.55%	0.76%	1.66%

Out-of-Sample — Optimal Parameters

```python
# Input
estimation_window = 40
min_trading_days = int(0.8 * estimation_window)
max_clusters = 10
top_stocks = 6
tier = 1
first_allocation = 0.4
adding_allocation = 0.2
correlation_threshold = 0.6
```

YEAR	2023	2024
YEARLY	0.00%	-1.77%
JAN	0.00%	1.41%
FEB	0.00%	0.37%
MAR	0.00%	1.36%
APR	0.00%	-0.52%
MAY	0.00%	0.00%
JUN	0.00%	-1.12%
JUL	0.00%	0.14%
AUG	0.00%	2.55%
SEP	0.00%	-0.91%
OCT	0.00%	-2.29%
NOV	0.00%	-2.05%
DEC	0.00%	-0.59%

Time Period	**In-Sample** < 08/2022-12/2023>			**Out-of-Sample** <01/2024-12/2024>	
	Initial Parameters		**Optimal Parameters**	**Optimal Parameters**	
	Portfolio	VNINDEX	Portfolio	Portfolio	VNINDEX
HPR	-22.05%	-20.80%	-9.95%	-1.77%	18.83%
Excess HPR	-1.25%	n/a	10.79%	-20.60%	n/a
Annual Return	-10.15%	-4.24%	2.88%	-1.78%	18.9%
Annual Excess Return	-0.62%	n/a	4.93%	-20.68%	n/a
Maximum Drawdown	30.27%	42.46%	28.98%	6.09%	8.38%
Longest Drawdown	468	472	530	95	71
Turnover Ratio	6.35%	n/a	8.95%	8.95%	n/a
Sharpe Ratio	-1.53	-0.65	-0.78	-0.93	0.97
Sortino Ratio	-0.9	-0.54	-0.39	-0.25	1.67
Information Ratio	-0.03	n/a	0.31	-1.76	n/a
No. stocks in periods					
No. held stocks in periods					
Excess returns in periods					