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	1.868%	-18.97%	-3.6%
JAN	n.a%	-0.1%	0.76%
FEB	n.a%	-0.2%	-2.45%
MAR	n.a%	-2.904%	2.84%
APR	n.a%	-10.29%	-2.34%
MAY	n.a%	0.77%	0.87%
JUN	n.a%	0.46%	-0.22%
JUL	n.a%	0.95%	0.15%
AUG	0.00%	-0.3%	0.00%
SEP	0.36%	-3.5%	-4.55%
OCT	3.72%	-5.13%	-5.33%
NOV	-0.16%	0.00%	5.42%
DEC	-1.55%	0.00%	1.68%

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	-2.13%	-8.20%	19.22%
JAN	n.a%	0.19%	3.55%
FEB	n.a%	-2.3%	0.19%
MAR	n.a%	-1.65%	8.92%
APR	n.a%	-4.50%	0.83%
MAY	n.a%	0.25%	-0.43%
JUN	n.a%	2.36%	-0.95%
JUL	n.a%	-0.7%	7.28%
AUG	n.a%	-0.12%	1.21%
SEP	-0.53%	-4.31%	-0.82%
OCT	0.41%	0.00%	-3.56%
NOV	-1.15%	1.55%	0.46%
DEC	-0.88%	0.95%	1.7%

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%	-2.24%
JAN	0.00%	0.62%
FEB	0.00%	3.68%
MAR	0.00%	0.00%
APR	0.00%	0.00%
MAY	0.00%	0.00%
JUN	0.00%	-0.93%
JUL	0.00%	1.54%
AUG	0.00%	-1.93%
SEP	0.00%	0.00%
OCT	0.00%	-2.26%
NOV	0.00%	-2.86%
DEC	0.00%	0.08%

Time Period	In-Sample <CHANGEME: INSERT PERIOD HERE>			Out-of-Sample <CHANGEME: INSERT PERIOD HERE>	
	Initial Parameters		**Optimal Parameters**	**Optimal Parameters**	
	Portfolio	VNINDEX	Portfolio	Portfolio	VNINDEX
HPR	-18.38%	-20.80%	7.1%	-2.24%	18.83%
Excess HPR	2.42%	n/a	26.72%	-21.07%	n/a
Annual Return	-8.36%	-9.54%	2.88%	-2.25%	18.9%
Annual Excess Return	1.18%	n/a	11.5%	-21.15%	n/a
Maximum Drawdown	26.99%	42.46%	10.16%	8.58%	8.38%
Longest Drawdown	477	477	339	123	71
Turnover Ratio	8.25%	n/a	9.09%	9.09%	n/a
Sharpe Ratio	-1.31	-0.65	-0.21	-1.19	0.97
Sortino Ratio	-0.86	-0.54	0.3	-0.32	1.67
Information Ratio	0.06	n/a	0.65	-1.75	n/a
No. stocks in periods					
No. held stocks in periods					
Excess returns in periods					