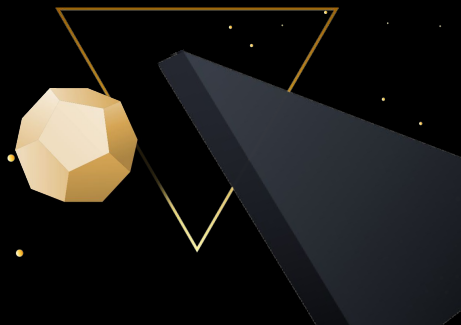
PAIRS TRADING & COINTEGRATION STRATEGY

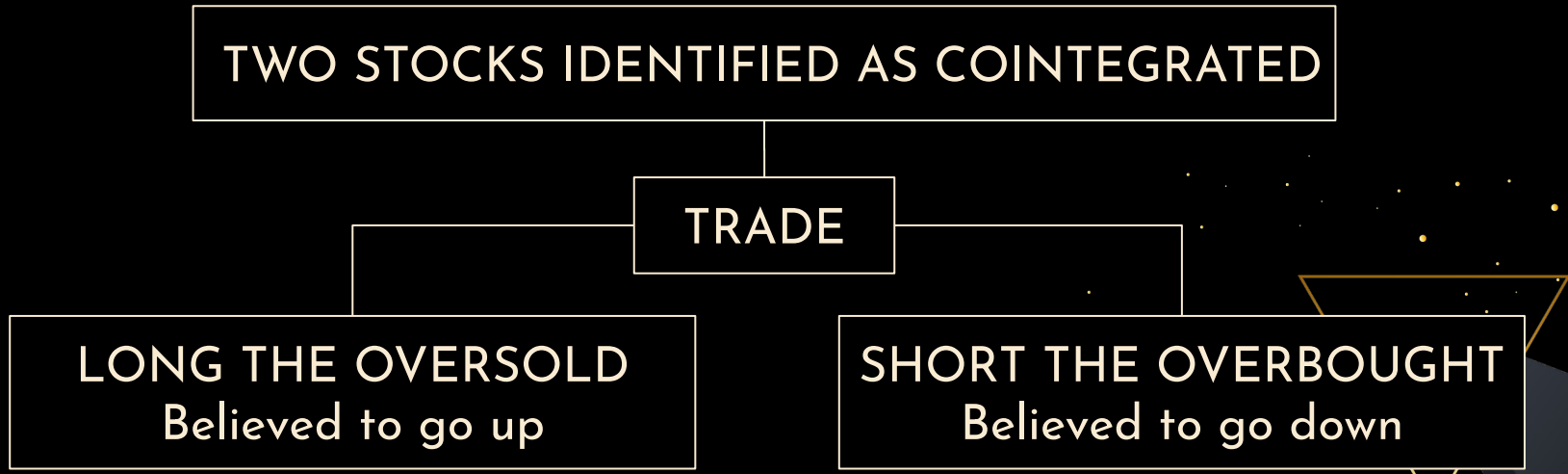
INTRODUCTION

- Devising a trading strategy based on cointegration, aimed at profiting from relative price movements.
- Pairs trading uses mean reversion in related assets for market-neutral profit, presenting opportunities for profit when short-term deviations occur.
- Pair of stocks will be selected by judging their p-values.
- Entry and Exit points will be determined using the Z-scores of the spread.



PAIRS TRADING

- Pairs trading involves pairing related assets that usually move together.
- Pairs of stocks selected must have a historical correlation.
- Traders profit when they briefly diverge by buying one and selling the other.



COINTEGRATION AND Z SCORE

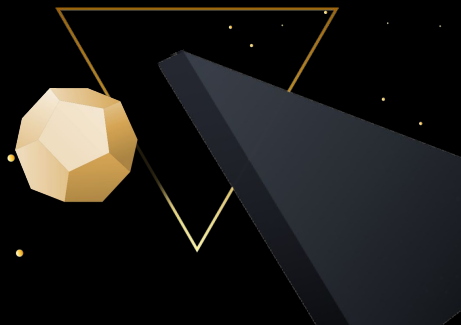
- Cointegration is a statistical property of two or more time-series variables which indicates if a linear combination of the variables is stationary.
- Linear combination of these variables can be a linear equation defining the spread.
- The z-score is calculated so that the new distribution is a normal distribution with a mean of 0 and a standard deviation of 1. Such a Distribution is very helpful for creating threshold levels.

$$\text{Spread} = \log(a) - n\log(b)$$

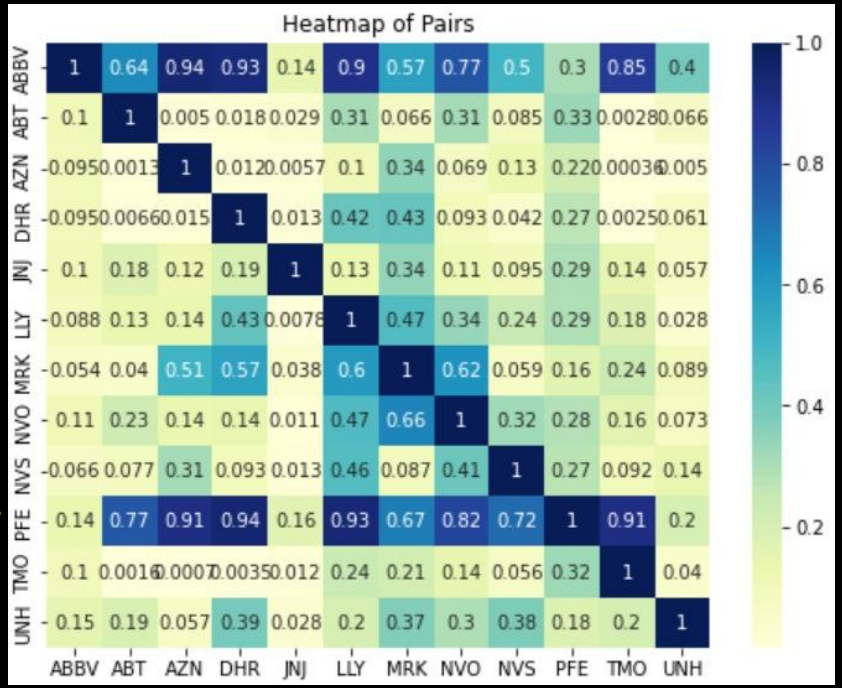
where a and b are the stock price, n is the number of stocks of B sold for every stock of A

$$z\text{-score} = (x-\mu)/\sigma$$

x=raw data point
μ=mean
σ=standard deviation



P VALUE



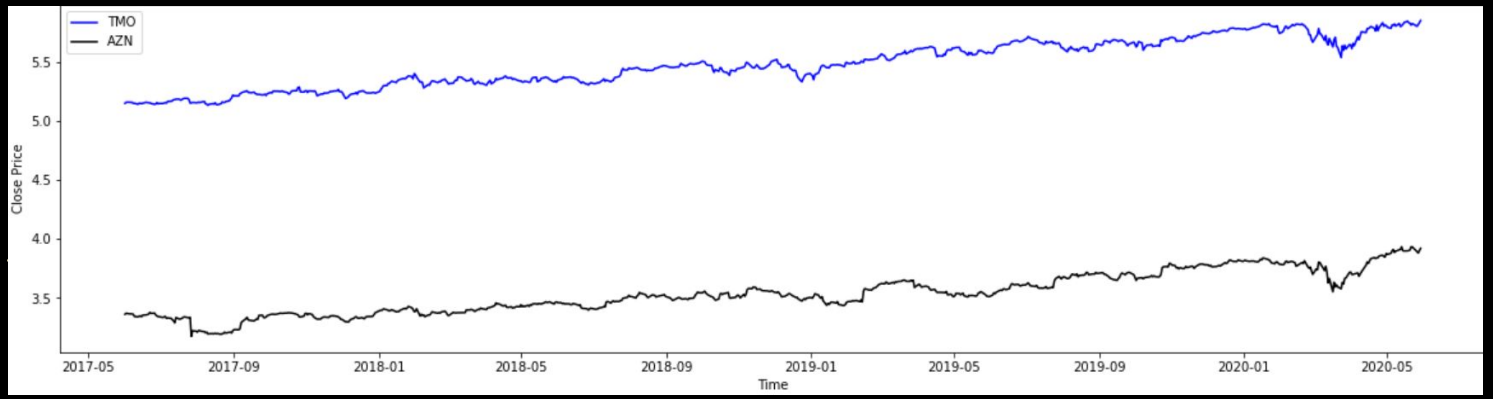
- The pairs of stock having a cointegration are those with a p-value less than 0.05.
- p-value can be considered as a measure of the strength of cointegration between the two series.
- A lower p-value indicates a stronger cointegration.

SELECTED COMPANIES

Thermo Fisher Scientific Inc.

&

AstraZeneca PLC

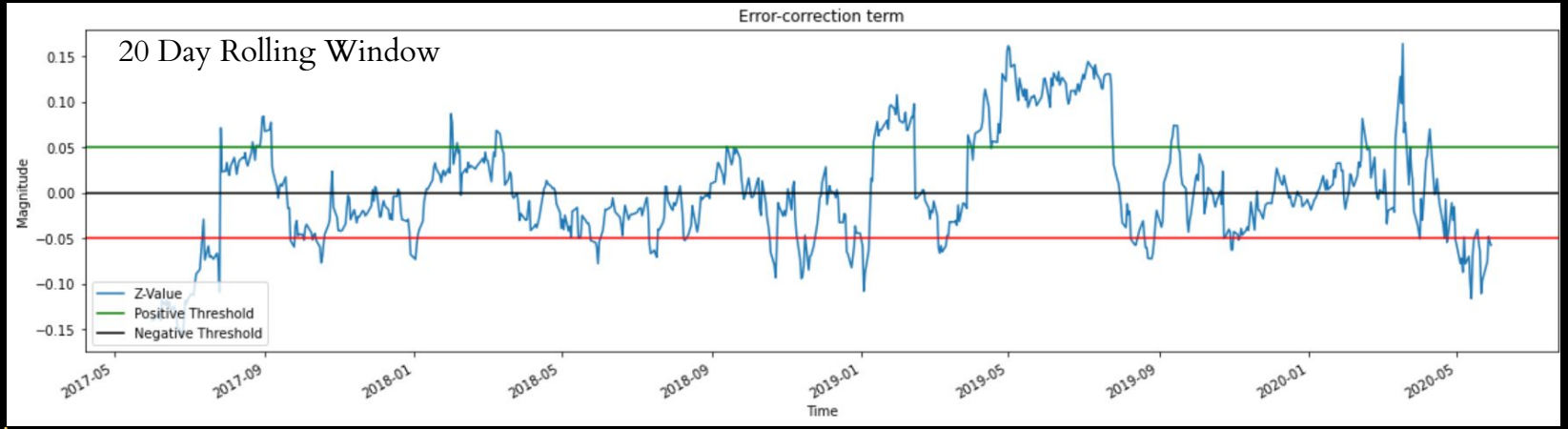


Z SCORE

Z-score of the spread of the two selected stocks has been plotted using the formula:

$$z=(x-\text{mean})/\text{standard deviation}$$

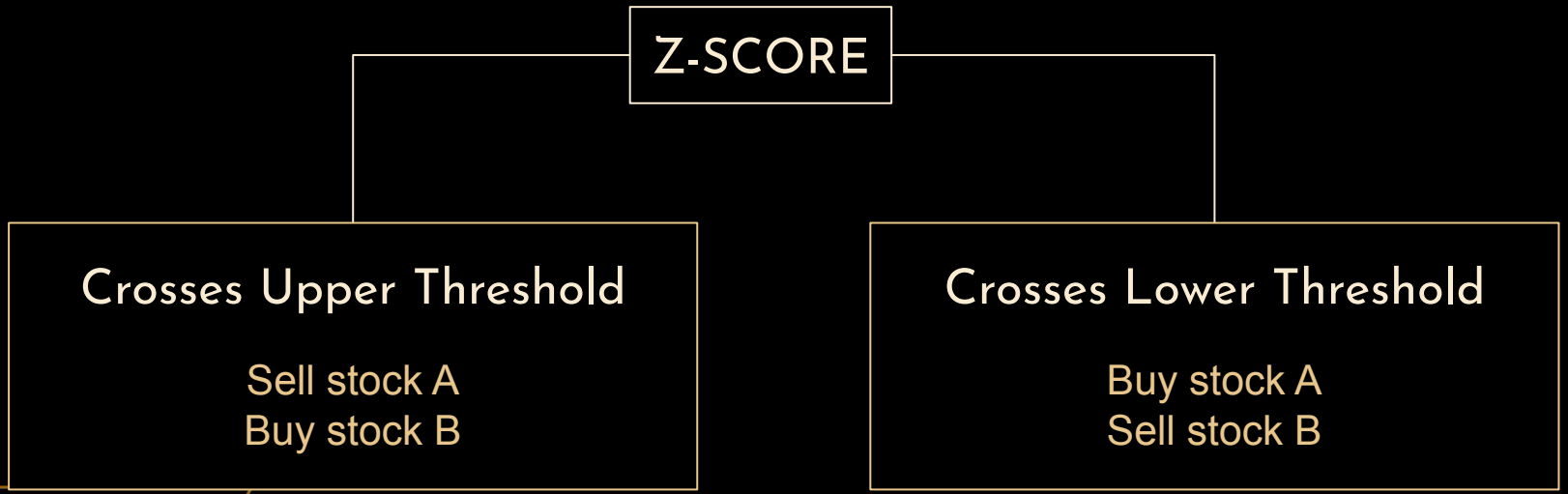
(where x are the raw data values)



TRADING STRATEGY AND SIGNAL GENERATION

Upper and Lower threshold are defined as per BACKTESTING results.

Trading signals are generated on the basis of deviation of z-score as follows:



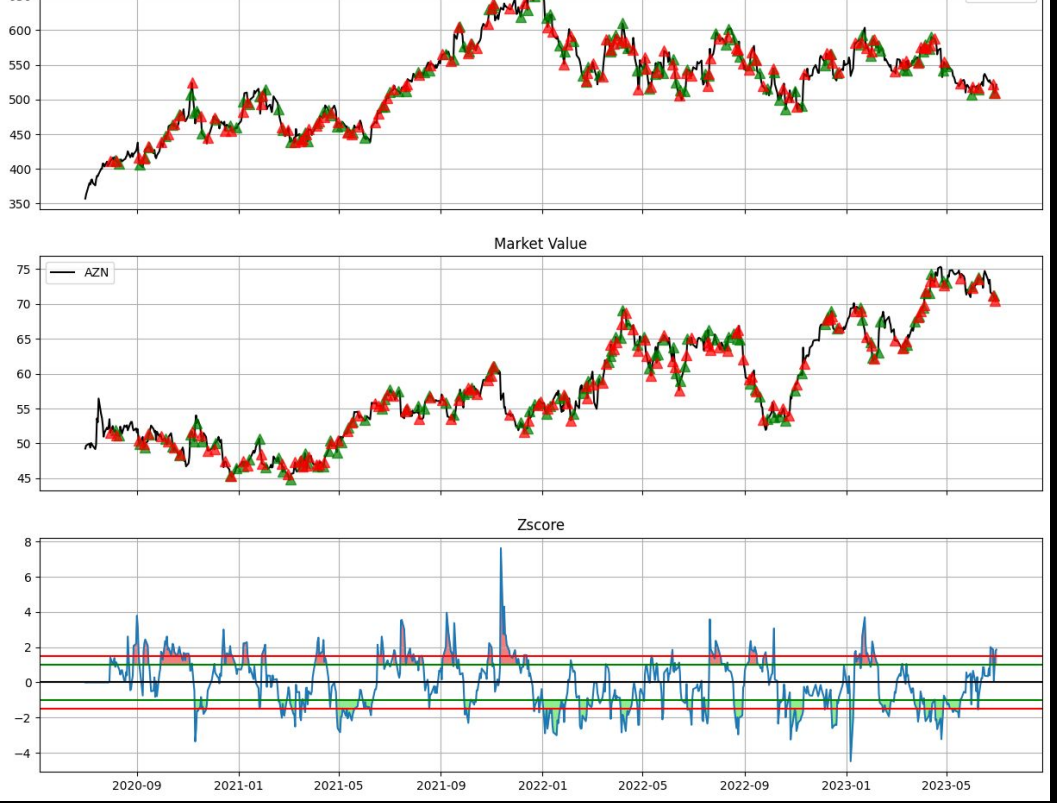
RISK MANAGEMENT MEASURES

STOP LOSS

Stop loss is defined for scenarios when the expected outcome does not occur. By placing a stop-loss, we manage risk by exiting a position if the price for their security starts moving in the direction opposite to the position that they've taken.
Stop loss marked at z =1.5

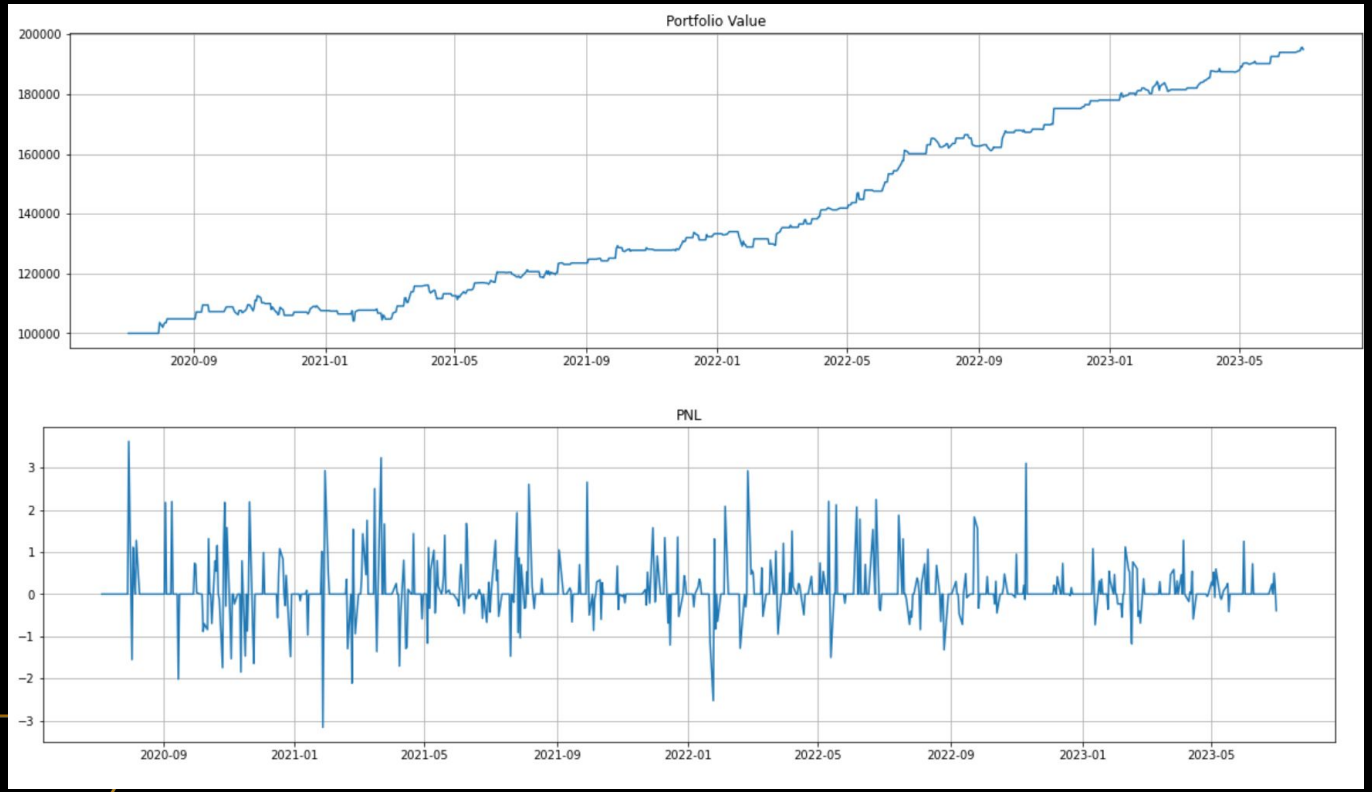
TAKE PROFIT

Take profit scenario are defined as when the mean crosses zero for the first time after reverting from the threshold levels.


Market Value
AZN
Zscore
2020-09
2021-01
2021-05
2021-09
2022-01
2022-05
2022-09
2023-01
2023-05

PORTFOLIO VALUE AND PNL

CAGR : 24.95%



PERFORMANCE METRICS

94.95 %

PROFIT

ANNUALISED SHARPE RATIO

2.02

7.49

MAXIMUM DRAWDOWN

TOTAL TRADES PLACED

249

THANK YOU

The Team
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Manas Jhawar
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Himanshu