MIS4321
Computational Finance and
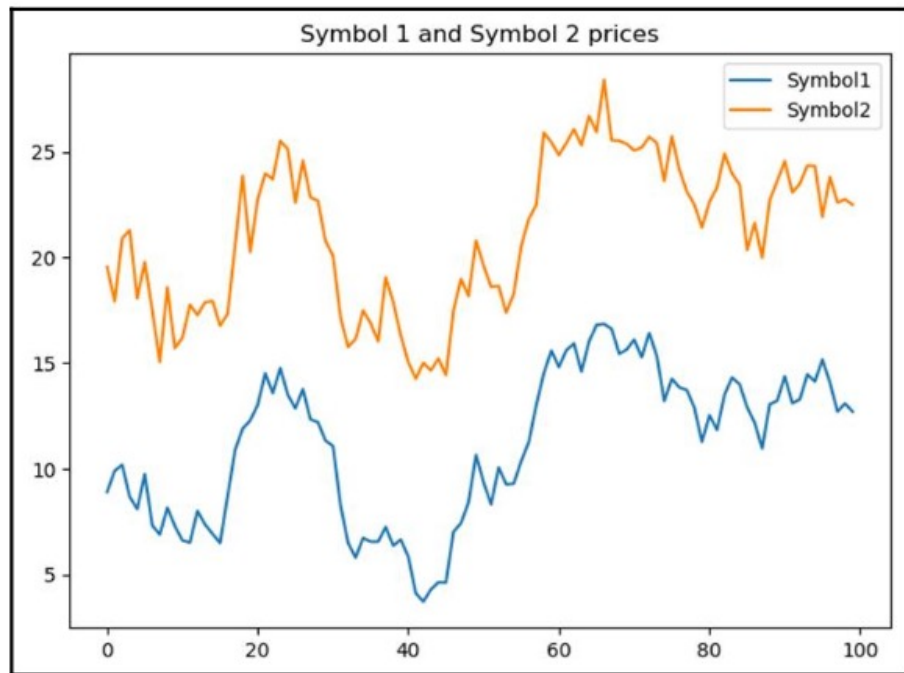# Algorithmic Trading

Fall 2025

Lecture #12

Mean Reversion and Pairs Trading

Mean reversion is the general principle that an asset has **a stable (or mean) price to which it will return after possible periods of volatility** arising from external shocks.

Suppose two assets (symbol-1 and symbol-2) are of **similar types and historical data** show the prices of the two assets to **be correlated**.

Symbol 1 and Symbol 2 prices

Correlated: when two securities move together in the same direction or opposite direction.
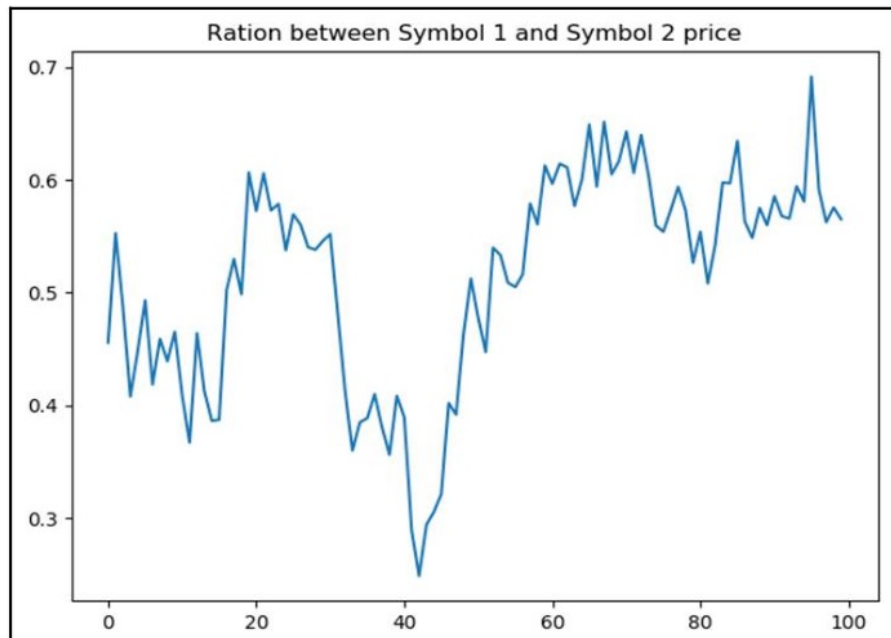
Cointegrated: when the distance between the pair doesn't change drastically over time.

Mean Reversion and Pairs Trading

For some reason, **this correlation** may **temporarily weaken.**

As a result, the **prices of the two assets diverge** more than what is predicted from historical data.

Suppose the price of symbol-1 goes up and the price of symbol-2 goes down. This suggests the following trading strategy. Short sell symbol-1 and go long on symbol-2.

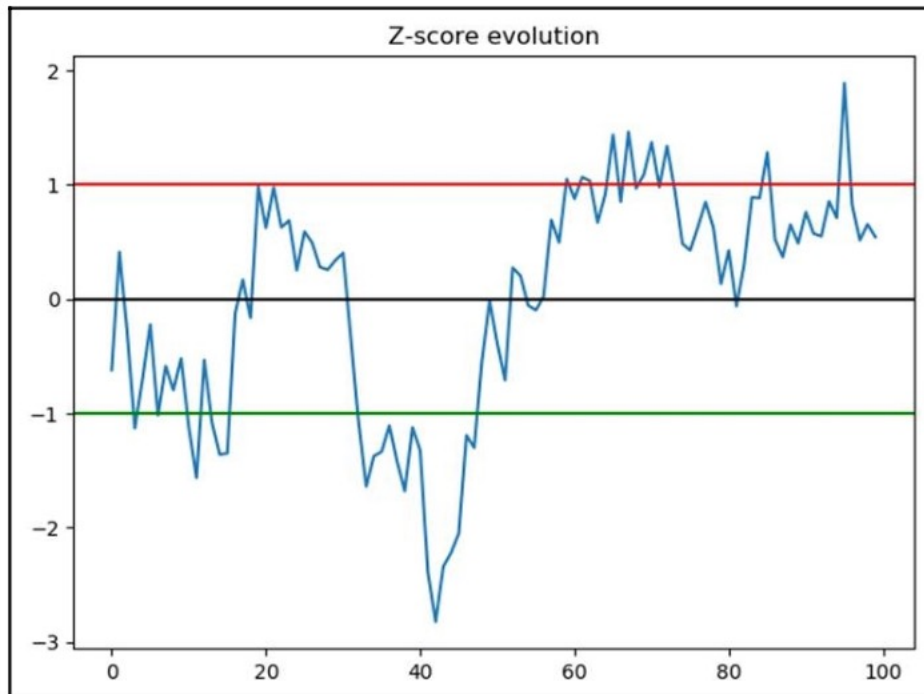Ration between Symbol 1 and Symbol 2 price

The mean reversion assumption implies that **after a certain amount of time, the prices of symbol-1 and symbol-2 will converge**, i.e. the price of symbol-1 will come down and the price of symbol-2 will go up.

Mean Reversion and Pairs Trading

Z-Scores is used to define the **entry and exit points** of pair trading

Z Score (Value) = (Value — Mean) / Standard Deviation

A pair trade is set up when the ratio (and the density curve) has deviated convincingly enough from the mean value.
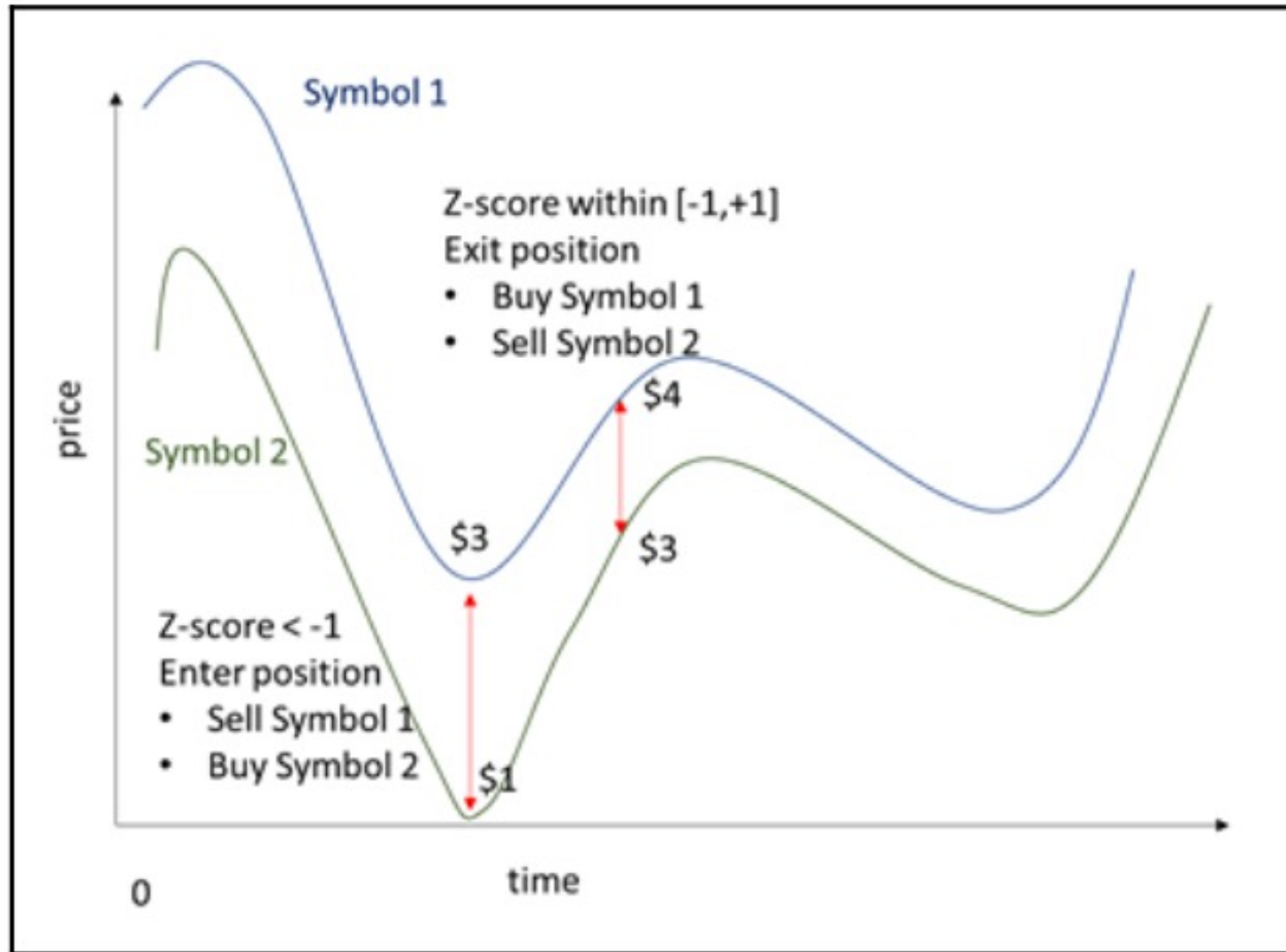

Z-score evolution

When the Z-score reaches -1 or +1, we will use this event as a trading signal.

Usually, **Entry** should be taken when Z-Score is less than -1 or greater than 1.

Exit should be around 0, between -0.5 to 0.5.

4

Mean Reversion and Pairs Trading

Symbol 1

Symbol 2

price

Z-score within [-1,+1]
Exit position
- Buy Symbol 1
- Sell Symbol 2

Z-score < -1
Enter position
- Sell Symbol 1
- Buy Symbol 2

$3

$4

$3

$1

0

time

Next week

- Event Driven Signals

Thank you for your participation ☺