

To find the price at which the dealers are indifferent between trading and not trading, we'll approach the problem step-by-step, considering that each dealer has a CRRA (Constant Relative Risk Aversion) utility function.

## Step 1: Utility Function for the Dealers

The CRRA utility function is given by:

$$U(W) = \frac{W^{1-\gamma}}{1-\gamma}$$

where:

- $W$  is the wealth of the dealer after trading.
- $\gamma$  is the coefficient of relative risk aversion.

## Step 2: Wealth After Trading

Each dealer starts with an initial wealth  $W_0$  and a random inventory position  $I_i$ . The value of the risky asset is  $v \sim 1 + z$ , where  $z \sim N(0, \sigma^2)$ . The dealer's wealth after trading (assuming they are the ones to serve the order  $Q$ ) is:

$$W_i = W_0 + I_i v + Q(p_i - v)$$

where:

- $p_i$  is the price the dealer sets.
- $Q$  is the quantity traded.

If the dealer doesn't trade, their wealth remains:

$$W_i^{\text{no trade}} = W_0 + I_i v$$

## Step 3: Indifference Condition

The dealer is indifferent between trading and not trading when the expected utility from trading equals the expected utility from not trading:

$$\mathbb{E}[U(W_i)] = \mathbb{E}[U(W_i^{\text{no trade}})]$$

Substituting the expressions for  $W_i$  and  $W_i^{\text{no trade}}$  into the utility functions: