1 Order_book_depth.py — Visible vs Hidden Liquidity

Purpose

Visualises the order book with both visible and hidden liquidity, showing how market depth is distributed around the best bid and ask.

Learning focus

- Tight spreads can give a false sense of liquidity if the depth at the best prices is shallow.
- Hidden liquidity (icebergs, dark pools) may provide additional fills, but is not guaranteed.
- Market impact depends not only on spread but on depth across multiple price levels.

Key intuition

Traders placing large market orders will "walk the book", executing at progressively worse prices if visible liquidity is low. Even in a narrow-spread market, execution costs can be significant.

Experiment

Use the simulate_market_impact() function to test different order sizes. You will see average execution price rise (for buys) or fall (for sells) as the order consumes depth further away from mid.

2 Liquidity_dimension_radar.py — Multi-dimensional liquidity measure

Purpose

Compares liquidity profiles of asset classes (Equities, Credit, Crypto) across four dimensions: Tightness, Depth, Immediacy, and Resilience.

Learning focus

- **Tightness**: Small bid–ask spreads mean lower immediate transaction costs.
- **Depth**: Ability to absorb large orders without large price moves.
- **Immediacy**: Speed of order execution.
- **Resilience**: How quickly prices revert after a shock.

Key intuition

Liquidity is multi-dimensional — a market may have tight spreads but low depth (crypto) or good depth but poor immediacy (credit). Understanding these dimensions is crucial for trade sizing and execution strategy.

Experiment

Adjust the scores for each asset class to reflect different market conditions (e.g., stressed credit markets) and compare shapes.

3 Market_impact_vs_trade_size.py — Market Impact and Liquidity-adjusted VaR

Purpose

Models how trade size affects price impact under different liquidity scenarios and incorporates this into **Liquidity-adjusted VaR (L-VaR)**.

Learning focus

- Price impact increases convexly with trade size — doubling trade size more than doubles the cost.
- Low-liquidity markets amplify impact.
- L-VaR adjusts standard VaR to account for these execution costs, often showing much higher risk for large positions.

Key intuition

Standard VaR can understate risk for large trades because it ignores the cost of liquidating the position. L-VaR adds this market impact cost, producing a more realistic measure of risk for big positions or illiquid assets.

Experiment

Use l_var_adjustment() for different market_depth values. See how thin liquidity dramatically increases the gap between Standard VaR and L-VaR.