**Cadmium Model Data Form**

**Title:** Market Impact & Liquidity Risk Simulation

**Type:** DEVS Model

**Purpose:** This model is developed to simulate how large block trades affect market behavior. It captures price impact, liquidity risk, and the effect of regulatory interventions (such as circuit breakers) on market stability.

**Other Applications:** The model is also suitable for evaluating high-frequency trading strategies and risk management under volatile market conditions.

**Keywords:** Market Impact, Liquidity Risk, HFT, DEVS

**Date Developed:** March 9, 2025

Links to Related Documents

Short Title: MILS (MarketImpactSim)

URL: <https://github.com/Abdalla-00/Market-Impact-and-Liquidity-Simulator>

Description:

The Market Impact & Liquidity Risk Simulation is organized into three levels:

Level 1 - Atomic Models: 1. Trader Agent: - Simulates market participants by generating random buy and sell orders. - Varies order types and quantities to introduce market volatility. 2. Matching Engine: - Receives orders and maintains a simplified order book. - Applies random fluctuations to simulate price impact, and processes shock events. - Updates liquidity and market price based on order processing. 3. Regulatory Intervention Mechanism: - Monitors market updates and triggers interventions when a significant price drop (>= 1 unit) is detected. - Issues "halt" and "resume" signals to suspend or restart trading.

Level 2 - Coupled Model (Trading & Matching Module): - Combines the Trader Agent, Matching Engine, and a Shock Event generator. - Forwards regulatory signals to the underlying components.

Level 3 - Final Coupled Model (Top Model): - Couples the Trading & Matching Module with the Regulatory Intervention Mechanism, closing the loop between market dynamics and regulatory oversight.

**Domain:** Financial Markets / Quantitative Finance

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