Potential Policy Questions We Can Explore

### What We’ve done

A simulation model like the one we’ve built, which combines a realistic limit order book with different types of trading agents (noise, informed, and a reinforcement learning-based market maker), is a powerful tool for exploring a wide range of policy questions in financial markets

# Market Stability and Liquidity

**Impact of High-Frequency Trading (HFT):**

The market maker, especially if it's trained to act very quickly, can be seen as a proxy for an HFT firm. You could explore questions like.

* Does the presence of a sophisticated, fast market maker *increase* or *decrease* overall market stability?
* How does the market maker behave during moments of high volatility (e.g., when the informed trader makes a large move)? Does it provide liquidity when it's most needed, or does it withdraw from the market, exacerbating the price swing?

**Market Liquidity Under Stress:**

You can simulate market stress by increasing the activity of the informed trader or by introducing large, sudden shocks to the mid-price. This allows us to ask:

* How does the market's depth (the volume of orders at different price levels) change during a crisis?
* What strategies can a market maker learn to remain profitable without taking on excessive risk during these periods?

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# Regulatory and Policy Interventions

### Transaction Taxes:

Could introduce a small cost for every trade or order placement to simulate a financial transaction tax. This would allow us to investigate:

* How does a transaction tax affect the behaviour of the market maker? Does it lead to wider bid-ask spreads (making trading more expensive for everyone)?
* Does it reduce the volume of "unnecessary" high-frequency trading, and if so, what is the overall impact on market quality?

### Circuit Breakers:

You could implement rules that halt trading if the price moves by a certain percentage within a short period of time. This would let us explore:

* + Are circuit breakers effective at curbing panic selling or buying?
  + How does the market behave when trading resumes after a halt? Does the market maker's strategy need to be significantly adapted?

# Minimum Resting Times for Orders:

Some have proposed that orders must remain on the book for a minimum amount of time (e.g., a few milliseconds) to prevent certain HFT strategies. You could add this constraint to the model and ask:

* + How does this rule change the profitability and strategy of Wer RL market maker?
  + Does it improve market conditions for the slower, "noise" traders?

# Market Microstructure and Agent Behaviour

**The "Ecology" of the Market:** Your model has different types of traders. You can change the mix of these traders to see how the market dynamics change. For example:

* What happens if the market is dominated by noise traders versus informed traders?
* How does the market maker's optimal strategy change depending on the types of other participants in the market?

# **Adversarial Strategies:**

We could train another RL agent to act as a "predator" that tries to exploit the market maker. This would allow us to explore:

* What are the vulnerabilities of a typical market-making strategy?
* Can a market maker learn to defend itself against such predatory trading?