

AI-driven option listings by Nasdaq tackle thin trading in options markets

AI and Demand-Based Option Listings

Over 80% of option listings in 2022 had minimal volume (≤ 1)

Challenge: Options are listed well in advance, facing **demand uncertainty**.

→ **Inefficient listings** by exchanges, and **inventory risk** for market makers.

Using difference-in-differences, I show that the AI-based option listings increase volume by listing options that align better with hedging demand.

Increase in Volume

Trading volume spikes on Nasdaq after using AI, compared to CBOE: Deep ITM equity puts have delta close to -1, reflecting shorting demand for equity.

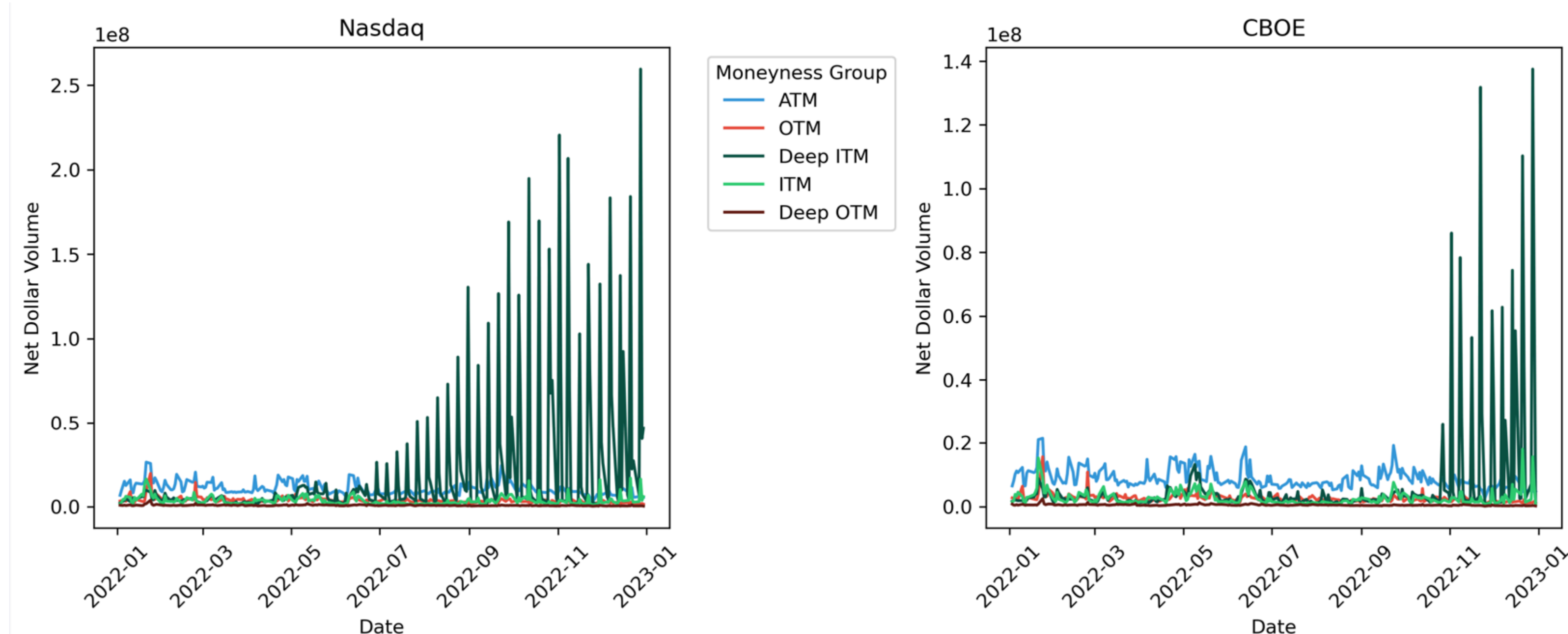


Figure 1: Equity Put Volume(\$\$) by Moneyness (Nasdaq vs CBOE)
Moneyness = Option Strike/Underlying Price. Ranges: Deep ITM (>1.2), ITM ($1.05 - 1.2$), ATM ($0.95 - 1.05$), OTM ($0.8 - 0.95$), Deep OTM (<0.8)

Matching Underlying Stocks

Matching on underlying stocks by market cap and volume for stocks having options on Nasdaq with those not on Nasdaq

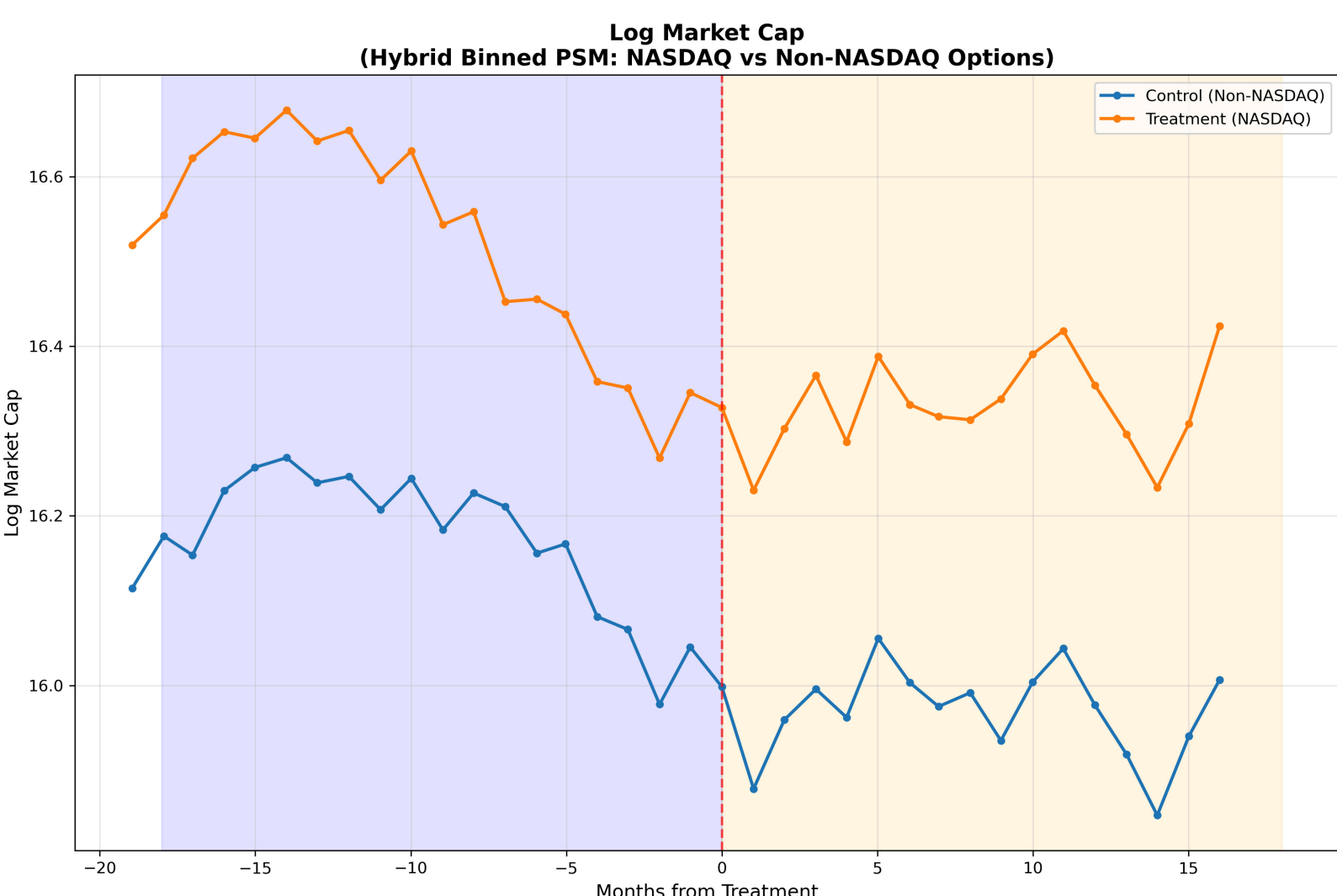


Figure 2: Parallel Trends: Log Market Cap

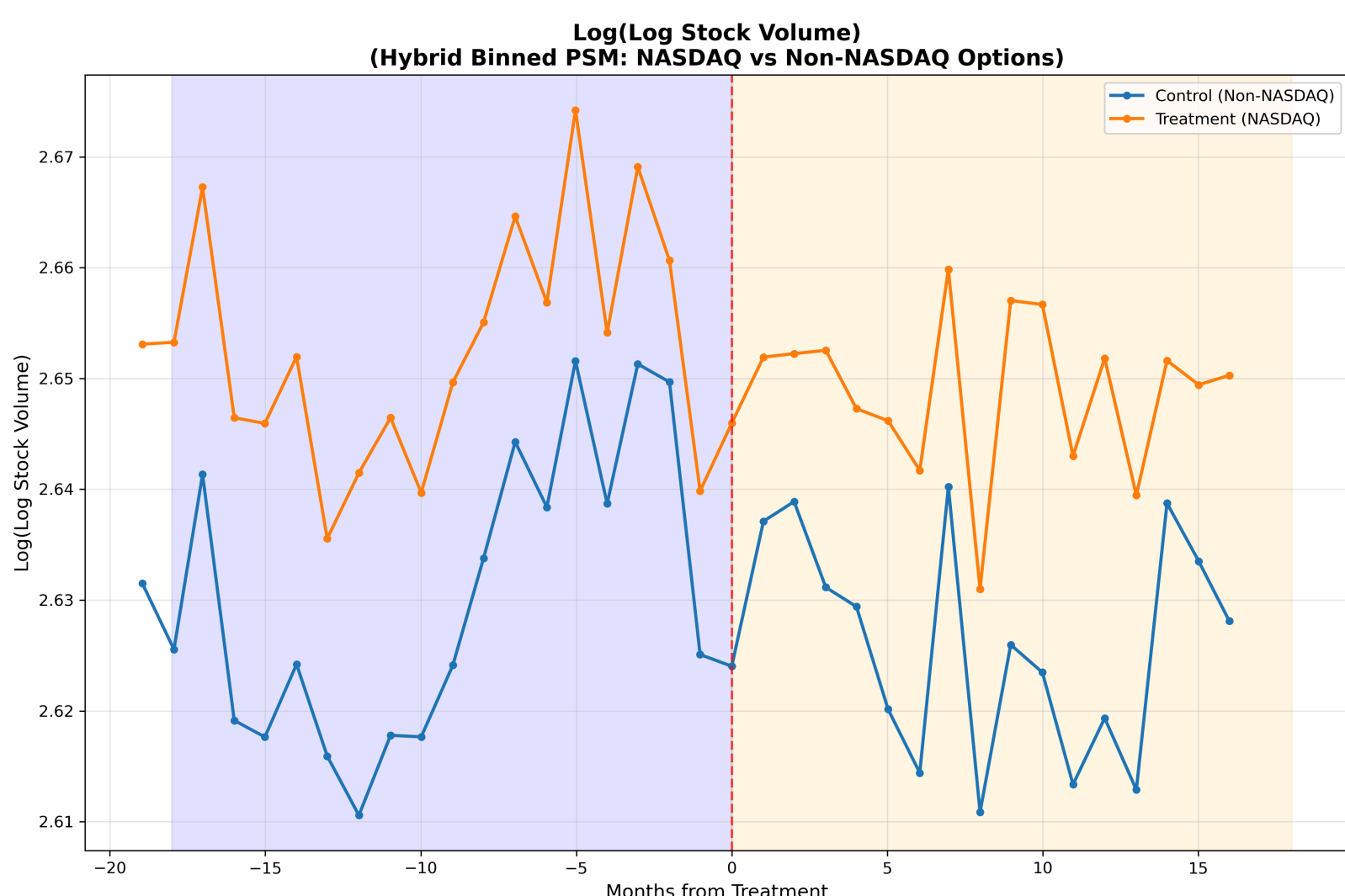


Figure 3: Parallel Trends: Log Volume

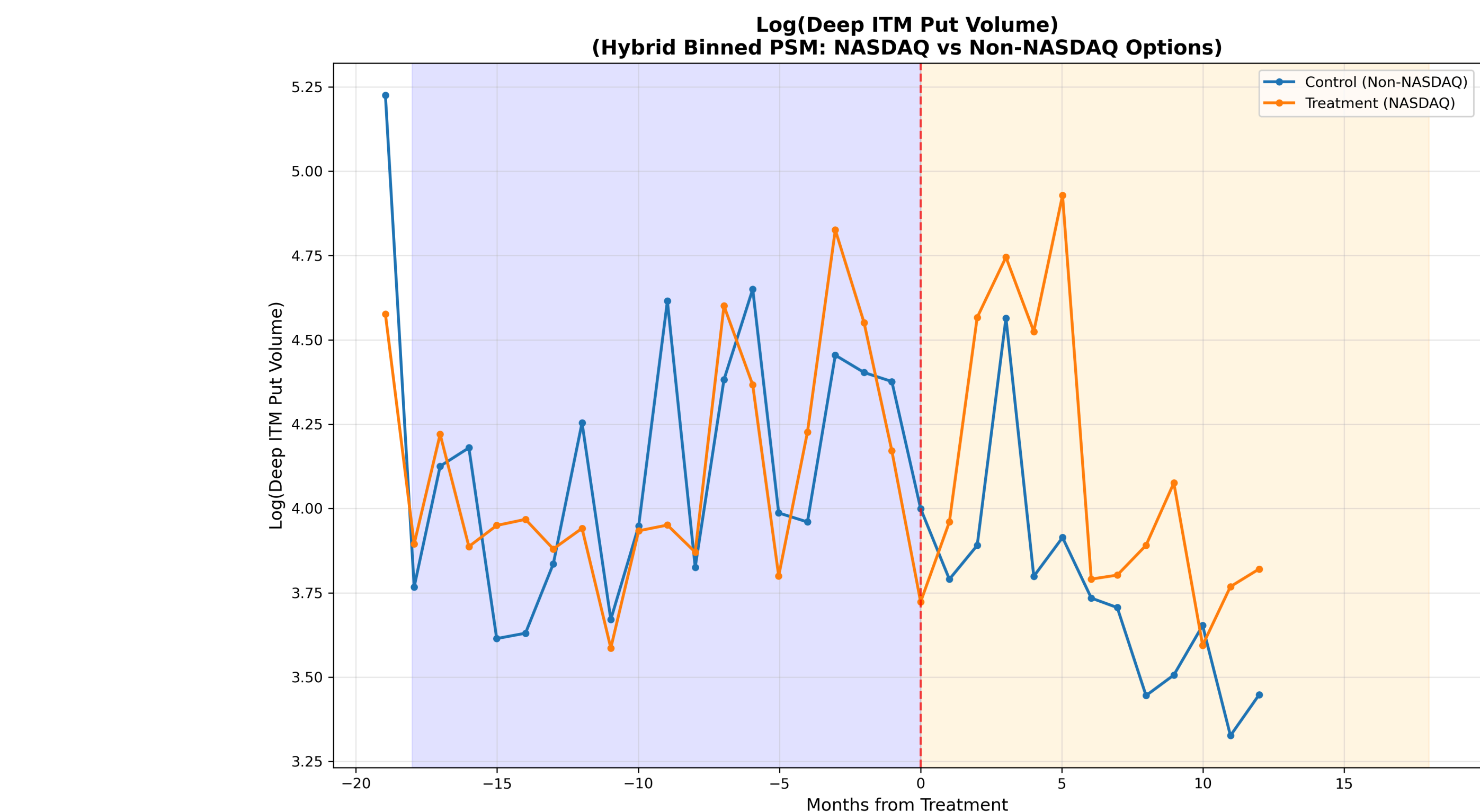


Figure 4: Deep ITM Put Volume (Matched Sample)

Nasdaq began using AI to choose option strikes in 2022/08.

AI Solution: Predict demand and adjust listings dynamically.

→ Listings **contingent on realized uncertainty** in demand.

How AI Improves Listing

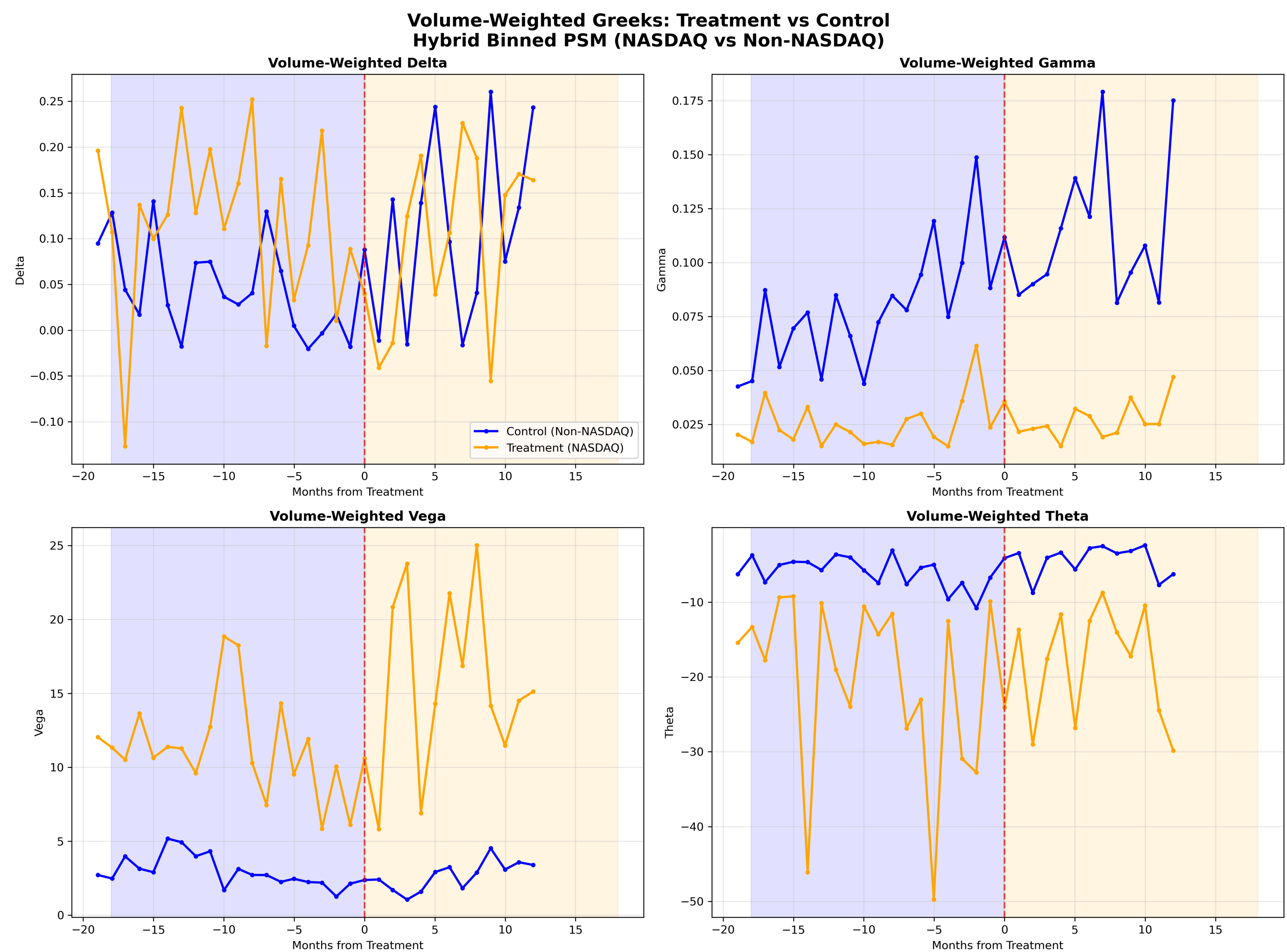


Figure 5: Volume-weighted Option Greeks (Treatment vs Control)
 δ : $\partial V / \partial S$, γ : $\partial^2 V / \partial S^2$, ν : $\partial V / \partial \sigma$, θ : $\partial V / \partial t$

Optimal listings provide investors with efficient hedging opportunities to hedge endowment risk.

Example: Consider an economy with time-varying volatility - if we can list only one option, an ATM option (strike price = stock price) provides optimal volatility risk hedging.

Model: Characteristics-Based Listings

Exchange: Chooses product listings J based on option characteristics z (exposure to diffusion, volatility risk, jump risk, etc.) to maximize expected total trading volume before investor's hedging demand is realized.

AI Innovation: As exchange predicts demand better, listings align more with investor's demand.

Conclusion

- AI improves the efficiency of options listings by predicting demand, extending to other markets with uncertain demand.
- However, the objective of profit maximization leads to mixed welfare implications for investors, particularly given the recent surge in retail options trading.



Scan for paper & additional materials