Pre-Class Discovery Handout: Algorithmic Trading Business Models

Activity 1: Business Model Canvas Detective

Scenario: Pick ONE algorithmic-trading firm you have heard of — Citadel Securities, Virtu, Jane Street, Two Sigma, or Optiver. Fill in the Business Model Canvas below by investigating how the firm actually earns its margin. Focus on who the customer is, what asset (technology, data, talent, or capital) underpins the edge, and how the firm is paid for that edge.

Canvas Element	Your Analysis
Value Proposition *What edge does the firm sell, and to whom?*	
Customer Segments *Itself? Brokers? Buy-side clients? Other firms?*	
Channels *How does the firm reach its customer — venue connection, sales coverage, API?*	
Revenue Streams *Type of income (P&L, commission, subscription, rebate)?*	
Key Resources *What does the firm need that a generic trading desk does not have?*	

Q1: What is the single most important friction this firm removes from the trading process for its customer?

Q2: How does the firm reach its customer without relying on a traditional sell-side broker network?

Q3: If this firm disappeared tomorrow, what would its customers lose that an established bank cannot easily replace?

Activity 2: Unbundling Map

Scenario: Traditional broker-dealers historically bundled research, capital, execution, and post-trade services. Algorithmic firms attack individual links of that bundle. Match each firm in the slate to the link of the broker-dealer bundle it primarily attacks, then answer the questions below.

Algorithmic Firm		Broker-Dealer Link Attacked
Citadel Securities	____	Wholesale market making for retail flow
Virtu	____	Principal liquidity provision plus client execution
Jane Street	____	ETF authorised-participant creation/redemption
Two Sigma	____	Quantitative research and signal generation
Optiver	____	Continuous options quoting on lit venues

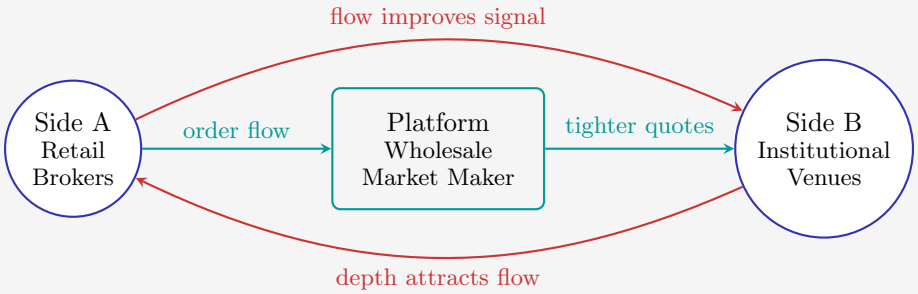
Q1: For each pair, describe in one sentence what friction the firm removes for its specific customer.

Q2: Which of these firms has started adding adjacent services on top of its original wedge? What did it add?

Q3: Why might a firm that starts narrow eventually rebundle adjacent services rather than staying pure?

Activity 3: The Platform Puzzle

Scenario: A wholesale market maker connects two sides of the order-flow market — retail brokers (who route customer orders for execution quality) and institutional venues (which need predictable liquidity to keep spreads tight). Neither side finds the platform useful without the other.



Q1: Why does a wholesale market maker with more retail-broker flow attract more institutional counterparties (and vice versa)?

Q2: The chicken-and-egg problem: which side should the platform attract first, and why?

Q3: Once the platform reaches critical mass, why is it hard for a new entrant to attract either side?

Solutions

Activity 1: Business Model Canvas Detective

A1: Model answer for Citadel Securities: The most important friction removed is the cost and uncertainty of executing retail orders against fragmented institutional venues. Citadel Securities provides predictable price improvement to brokers and standardised, well-understood flow to institutional venues, so each side gets a more usable counterparty than it would assemble on its own.

A2: Citadel Securities reaches its customers through routing relationships with retail brokers (built around guaranteed price improvement and operational reliability) and through direct connectivity to lit venues. There is no traditional sell-side branch network; the platform is a set of order-routing pipes and venue interfaces, governed by a small institutional sales and relationship-coverage team.

A3: Customers would lose a centralised counterparty whose continuous quoting and risk-warehousing reliability cannot be quickly replicated. Established banks could in principle assemble a similar capability, but only by hiring an entirely different staff profile (low-latency engineers, quant researchers, operations specialists in market microstructure) and committing to a different cost structure.

Canvas elements (Citadel Securities):

- **Value Proposition:** Reliable wholesale liquidity with predictable price improvement on retail flow.
- **Customer Segments:** Primary — retail brokers routing customer orders; secondary — institutional venues seeking depth and tight spreads.
- **Channels:** Direct broker-routing relationships, exchange and ATS connectivity, dedicated institutional coverage.
- **Revenue Streams:** Principal trading P&L on the spread between bid and offer, plus rebate and fee economics tied to venue tier and order type.
- **Key Resources:** Low-latency stack, risk-warehousing capital, market-microstructure research talent, broker-routing relationships, regulatory standing as a registered market maker.

Activity 2: Unbundling Map

A1: Citadel Securities → Wholesale market making for retail flow (removes the cost and reliability gap of routing each retail order across many fragmented venues). Virtu → Principal liquidity provision plus client execution (removes the burden on the buy-side of building its own algo desk). Jane Street → ETF authorised-participant creation/redemption (removes the friction between primary basket issuance and secondary ETF quoting). Two Sigma → Quantitative research and signal generation (removes the dependency on traditional fundamental research for systematic strategies). Optiver → Continuous options quoting on lit venues (removes the reliance on relationship-based voice quoting for liquid contracts).

A2: Virtu is the clearest case: the firm started as a pure principal market maker and rebundled algorithm-as-a-service execution, transaction-cost analytics, and an order-management workflow on top of the same low-latency infrastructure. Jane Street has also expanded across asset classes from its ETF-creation wedge into adjacent fixed-income and digital-asset market making, illustrating a parallel rebundling arc.

A3: Customer-acquisition cost is concentrated up front. Once a counterparty trusts the firm's execution reliability and risk warehousing, the marginal cost of selling adjacent services on the same connectivity is low and the marginal revenue is high. Rebundling lifts the lifetime value per relationship and creates switching costs through workflow integration, which makes the relationship harder to displace.

Activity 3: The Platform Puzzle

A1: This is a **cross-side network effect** on a wholesale-liquidity platform: more retail-broker flow makes the institutional side's view of the platform more attractive because flow becomes more predictable and the firm can quote more confidently to institutions. Reciprocally, more institutional connectivity gives the platform more opportunities to internalise or hedge, which improves the price improvement returned to retail brokers. Each side's growth reinforces the other.

A2: Most successful wholesale market makers attract the **retail-broker flow side** first, often by guaranteeing price improvement and absorbing operational integration cost. The logic mirrors the cold-start problem for any platform: if the firm can already point to predictable retail flow, institutional venues have a concrete reason to connect. Trying to attract institutional venues first is much harder because the platform has no flow to bring to the table.

A3: Once critical mass is reached, the platform enjoys a self-reinforcing loop that creates a **structural moat**. A new entrant would need to attract both sides simultaneously, each of which has little reason to join an empty platform whose pricing edge has not yet been demonstrated. The incumbent's quoting quality improves with every additional participant, and the gap widens. Competitors must either find a niche the incumbent under-serves (a specific asset class, a specific geography) or offer dramatically better economics to pry one side away.

