Reducing Opaqueness in Over-the-Counter Markets

Zhuo Zhong
Cornell University

October 24, 2012
Opaqueness in OTC Markets

- Trades in OTC markets are conducted through bilateral negotiations. Bilateral trading impedes the public disclosure of information, which makes OTC markets opaque.

- Based on empirical findings in the corporate bond market, opaqueness reduces liquidity in the OTC market.

- Opaqueness exacerbates the recent financial meltdown. Opaqueness $\Rightarrow$ Loose risk control from regulators $\Rightarrow$ Excessive risk-taking in OTC markets.
Opaqueness in OTC Markets

Trades in OTC markets are conducted through bilateral negotiations. Bilateral trading impedes the public disclosure of information, which makes OTC markets opaque.
Trades in OTC markets are conducted through bilateral negotiations. Bilateral trading impedes the public disclosure of information, which makes OTC markets opaque.

Based on empirical findings in the corporate bond market, opaqueness reduces liquidity in the OTC market.
Opaqueness in OTC Markets

- Trades in OTC markets are conducted through bilateral negotiations. Bilateral trading impedes the public disclosure of information, which makes OTC markets opaque.

![Diagram showing bilateral trades between buyers and dealers.]

- Based on empirical findings in the corporate bond market, opaqueness reduces liquidity in the OTC market.

- Opaqueness exacerbates the recent financial meltdown. Opaqueness $\Rightarrow$ Loose risk control from regulators $\Rightarrow$ Excessive risk-taking in OTC markets
Calls from Regulators

“We pledged to work in a coordinated manner to accelerate the implementation of over-the-counter (OTC) derivatives regulation and supervision and to increase transparency and standardization.”

– G20 Toronto Summit Declaration
Policy Reforms on Reducing Opaqueness in OTC Markets

▶ Calls from Regulators

“We pledged to work in a coordinated manner to accelerate the implementation of over-the-counter (OTC) derivatives regulation and supervision and to increase transparency and standardization.”

– G20 Toronto Summit Declaration

▶ The Dodd-Frank Act and the MiFiD II

1. **Exchange Trading [Centralized Trading]**
2. Central Clearing
3. Standardization
4. Wider Trades Reports
Questions Regarding to the Introduction of a Centralized Market

- As dealers can benefit from opaqueness (Madhavan (1995) and Yin (2005)), will the centralized market incentivize OTC market dealers to reduce opaqueness?

- With the competitive centralized market, competition between the centralized market and the OTC market forces OTC dealers to reduce opaqueness.

- With the noncompetitive centralized market, opportunities for collusion incentivize OTC dealers to increase opaqueness.

- Can the centralized market survive in the equilibrium?

- Answer: Opaqueness in the OTC market enhances the centralized market’s viability.

- Will the centralized market replace the OTC market?

- Answer: It depends on the transaction cost in the centralized market and the transaction cost in the OTC market.
Questions Regarding to the Introduction of a Centralized Market

- As dealers can benefit from opaqueness (Madhavan (1995) and Yin (2005)), will the centralized market incentivize OTC market dealers to reduce opaqueness?
- Answer:
  - With the **competitive centralized market**, competition between the centralized market and the OTC market forces OTC dealers to **reduce opaqueness**.
  - With the **noncompetitive centralized market**, opportunities for collusion incentivize OTC dealers to **increase opaqueness**.
Questions Regarding to the Introduction of a Centralized Market

- As dealers can benefit from opaqueness (Madhavan (1995) and Yin (2005)), will the centralized market incentivize OTC market dealers to reduce opaqueness?
- Answer:
  - With the **competitive centralized market**, competition between the centralized market and the OTC market forces OTC dealers to **reduce opaqueness**.
  - With the **noncompetitive centralized market**, opportunities for collusion incentivize OTC dealers to **increase opaqueness**.
- Can the centralized market survive in the equilibrium?
Questions Regarding to the Introduction of a Centralized Market

▶ As dealers can benefit from opaqueness (Madhavan (1995) and Yin (2005)), will the centralized market incentivize OTC market dealers to reduce opaqueness?
▶ Answer:
  ▶ With the **competitive centralized market**, competition between the centralized market and the OTC market forces OTC dealers to **reduce opaqueness**.
  ▶ With the **noncompetitive centralized market**, opportunities for collusion incentivize OTC dealers to **increase opaqueness**.
▶ Can the centralized market survive in the equilibrium?
▶ Answer:
  ▶ Opaqueness in the OTC market enhances the centralized market’s viability.
Questions Regarding to the Introduction of a Centralized Market

- As dealers can benefit from opaqueness (Madhavan (1995) and Yin (2005)), will the centralized market incentivize OTC market dealers to reduce opaqueness?

  Answer:
  - With the *competitive centralized market*, competition between the centralized market and the OTC market forces OTC dealers to *reduce opaqueness*.
  - With the *noncompetitive centralized market*, opportunities for collusion incentivize OTC dealers to *increase opaqueness*.

- Can the centralized market survive in the equilibrium?

  Answer:
  - Opaqueness in the OTC market enhances the centralized market’s viability.

- Will the centralized market replace the OTC market?
Questions Regarding to the Introduction of a Centralized Market

- As dealers can benefit from opaqueness (Madhavan (1995) and Yin (2005)), will the centralized market incentivize OTC market dealers to reduce opaqueness?
  - Answer:
    - With the **competitive centralized market**, competition between the centralized market and the OTC market forces OTC dealers to **reduce opaqueness**.
    - With the **noncompetitive centralized market**, opportunities for collusion incentivize OTC dealers to **increase opaqueness**.

- Can the centralized market survive in the equilibrium?
  - Answer:
    - Opaqueness in the OTC market enhances the centralized market’s viability.

- Will the centralized market replace the OTC market?
  - Answer:
    - It depends on the transaction cost in the centralized market and the transaction cost in the OTC market.
A Brief View of the Model

Search Model + Knightian Uncertainty

- The search model follows Spulber (1996), Rust and Hall (2003). In the search model, the buyer and the seller search through dealers for prices to trade, one dealer per round.

\[ P_B(\epsilon) = \{(1 - \epsilon)P_a + \epsilon\mu : \mu \in M\} \] (1)

\[ P_S(\epsilon) = \{(1 - \epsilon)P_b + \epsilon\mu : \mu \in M\} \] (2)

In above equations,

- \( P_a \) is the equilibrium distribution of the ask price,
- \( P_b \) is the equilibrium distribution of the bid price,
- \( \epsilon \) measures the degree of opaqueness.

\[^1\] \( M \) represents the space of all probability measures.
Search Model + Knightian Uncertainty

▶ The search model follows Spulber(1996), Rust and Hall(2003). In the search model, the buyer and the seller search through dealers for prices to trade, one dealer per round.

▶ Knightian uncertainty represents opaqueness.
  ▶ The Buyer’s Set of Priors:

\[
P^B(\epsilon) = \{(1 - \epsilon)P_a + \epsilon \mu : \mu \in M\}^1
\]

▶ The Seller’s Set of Priors:

\[
P^S(\epsilon) = \{(1 - \epsilon)P_b + \epsilon \mu : \mu \in M\}
\]

In above equations,

▶ \(P_a\) is the equilibrium distribution of the ask price,
▶ \(P_b\) is the equilibrium distribution of the bid price,
▶ \(\epsilon\) measures the degree of opaqueness.

\(^1\)\(M\) represents the space of all probability measures.
The Literature Review

- Studies on Market Fragmentations

- Studies on Ambiguity or Knightian Uncertainty in Exchange Trading
  - Easley and O’Hara (2009, 2010a, 2010b)

- Modeling the OTC Market
The Benchmark Model

The Environment

- $\nu_B$ is the buyer’s internal valuation, $\nu_B \sim \text{Uniform}[0, 1]$.
- $\nu_S$ is the seller’s internal valuation, $\nu_S \sim \text{Uniform}[0, 1]$.
- $k$ is the dealer’s transaction cost, $k \sim \text{Uniform}[k, 1]$.
- $k$ is the lower bound of the dealer’s transaction cost.
- All trades go through dealers.
- Traders (Buyers or Sellers) search across dealers for the ask and bid price.
- Traders and dealers have the same discount factor $\beta$. 
In the equilibrium:

- Traders, conjecturing equilibrium prices with Knightian uncertainty, adopt the optimal stopping rule strategy to solve the search problem.
- Dealers, conjecturing traders’ strategies, set ask and bid prices, which maximize expected profits and clear inventory.
- Ask prices and bid prices set by dealers coincide with equilibrium prices conjectured by traders.

Equilibrium outcomes are distributions of the ask price and the bid price.
The Benchmark Model
Analyzing the Equilibrium: Traders’ Reservation Values
The Benchmark Model
Analyzing the Equilibrium: Welfare Analysis

![Graph showing Traders Surplus and Dealers Total Profits as functions of the level of opacity (ε).]
The Extended Model
The Centralized Market

The centralized market is a trading venue.
There are $m$ market makers on the trading venue.
The $m$ market makers are associated with transaction costs $K_1, K_2, ..., K_m$.
The $m$ market makers post *publicly available ask and bid* prices on the trading venue.
The Extended Model
The Competitiveness of the Centralized Market

WOLG, I assume $K_1 < K_2 < \ldots < K_m$.

- From the assumption, market maker $K_1$ will become the natural monopolist in the centralized market.
- The Bertrand competition implies that $K_1$'s bid-ask spread shall be smaller than $K_2$ in order to deter $K_2$ from entering. That is,
  \[ a_c - b_c \leq K_2. \]  
  (3)

- When $a_c - b_c = K_2$, the centralized market is **competitive**.
- When $a_c - b_c < K_2$, the centralized market is **noncompetitive**.
The Extended Model
The Competitive Centralized Market v.s. the Noncompetitive Centralized Market

Competitive

Noncompetitive
The Extended Model
The Competitive Centralized Market v.s. the Noncompetitive Centralized Market

The Spread w/ Competitive

The Spread w/ Noncompetitive
The Extended Model

The Equilibrium Selection: Corner EQ = Competitive; Interior EQ = Noncompetitive
Conclusion

Findings

Main Findings:

- The competitive centralized market incentivizes OTC dealers to reduce opaqueness in the OTC market.
- The noncompetitive centralized market does the opposite.

Other Findings:

- Greater opaqueness in the OTC market can help the centralized market to survive in the equilibrium.
- Whether the centralized market can replace the OTC market depends on the comparison between their transaction costs.
- If the centralized market is noncompetitive, then the viability of the OTC market also depends on its opaqueness.
Conclusion

Findings

- **Main Findings:**
  - The competitive centralized market incentivizes OTC dealers to reduce opaqueness in the OTC market.
  - The noncompetitive centralized market does the opposite.

- **Other Findings:**
  - Greater opaqueness in the OTC market can help the centralized market to survive in the equilibrium.
  - Whether the centralized market can replace the OTC market depends on the comparison between their transaction costs.
  - If the centralized market is noncompetitive, then the viability of the OTC market also depends on its opaqueness.
Empirical predictions:

- With the OTC market along, opaqueness $\uparrow \Rightarrow$ the bid-ask spread $\uparrow$.
- If the **competitive** centralized market coexists with the OTC market,
  opaqueness $\uparrow \Rightarrow$ the bid-ask spread in OTC $\downarrow$, the bid-ask spread in the centralized market is constant.
- If the **noncompetitive** centralized market coexists with the OTC market,
  opaqueness $\uparrow \Rightarrow$ the bid-ask spread in OTC $\uparrow$, the bid-ask spread in the centralized market $\uparrow$. 
Thank you!