Sustaining Trading Relationships with Lemons

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Abstract

This paper endogenizes the value and persistence of trading relationships in non-anonymous over-the-counter (OTC) markets. In the model, a liquidity-driven client initially chooses to trade with a number of dealers. She would like to commit to trading with these dealers again in the future in exchange for better pricing or services today. When non-anonymity allows dealers to infer the client's trading motives (i.e., whether driven by liquidity needs or private information) from past trading, the client can credibly commit to these valuable relationships by trading *information-sensitive* assets, because deviating to trade with alternative dealers would incur an adverse selection discount. This mechanism yields several unconventional results: liquidity-driven, uninformed clients could benefit from trading 1) risky assets that are subject to adverse selection, 2) with a costly technology, 3) in an opaque environment. These results help rationalize why investors trade risky, complex, and illiquid assets. The paper also derives novel testable predictions about how the number of relationships depends on client and asset characteristics.

1 Introduction

Recent empirical studies have documented that trading relationships between clients and their dealers in bilateral OTC markets are highly persistent. For instance, Hendershott et al. (2020) show that insurers in the U.S. corporate bond market trade with a persistent set of dealers, with 30% of insurers trading with only one dealer. Similar persistent trading relationships have been observed in interest rate swaps (Hau et al., 2021), FX forwards (Collin-Dufresne et al., 2019), corporate bonds beyond insurers (Jurkatis et al., 2022), and Canadian Treasuries (Allen and Wittwer, 2023). Importantly, while some studies argue that these trading relationships benefit the clients and/or the dealers, others have suggested that dealers have used their market power to extract rent from clients who seem to be reluctant or unable to switch dealers.[1] Given that relationship trading by definition can only arise in non-anonymous OTC markets, studying how and when trading relationships create or destroy value to different parties is instrumental to understanding the fundamental functions of OTC markets.

Despite its potential importance and broad policy implications, relationship trading is relatively under-explored in the OTC trading literature. A potential reason is that the canonical random search model paradigm in OTC markets, pioneered by Duffie et al. (2005), does not allow for trading relationships, and few papers have endogenized relationship trading and explored their broad implications.[2] This paper aims to help close this gap.

This paper develops a two-period model of client-to-dealer relationships and argues that the combination of information asymmetry and non-anonymity in OTC markets sustains

[1] Hendershott et al. (2015) and Allen and Wittwer (2023) structurally estimated substantial positive relationship or loyalty benefits to the clients. Meanwhile, Hau et al. (2021) empirically find that dealers price discriminate against less sophisticated clients.

[2] A notable exception is Maciocco (2025), which will be discussed in detail.

trading relationships that facilitate intertemporal risk-sharing between uninformed clients and dealers. Information asymmetry arises in the second period following Glosten and Milgrom (1985), where an informed speculator may trade. Meanwhile, non-anonymity gives relationship dealers informational advantages over other dealers regarding the trading motives of their previous clients—specifically, whether they trade for hedging needs or private information.

In the model, clients prefer to purchase as many assets upfront as possible but are limited by their initial endowment. If they could commit to repay, they could borrow against all their future endowments from dealers to buy more assets today. Such additional upfront purchase is the risk sharing and the gains from trade in the model. If clients can commit, neither information asymmetry nor non-anonymity matters, and trading relationships are unnecessary because all the feasible gains from trade are realized.

In the more realistic environment where clients cannot commit, valuable trading relationships emerge and, importantly, thrive under information asymmetry. Due to non-anonymity, relationship dealers have superior information over other dealers regarding the client's trading motives and thus extract informational rent from the client. Anticipating this rent, dealers ex ante compete aggressively for the client's business by offering discounts, in turn allowing the client to buy more asset upfront. Hence, the greater the information asymmetry in the asset, the larger the discount dealers can offer to the client.

The mechanism drives three main results of the paper. First, uninformed clients achieve higher utility in economies with *asymmetric information* than in symmetric-information economies. The intuition is that if information is symmetric, clients can always trade with any dealer at the asset's fair value. Relationship dealers thus cannot enjoy information rent in the future and hence offer no discount today. Effectively, information asymmetry acts as a *relationship glue* and helps sustain valuable trading relationships. This result contrasts with the conventional wisdom drawn from anonymous trading, whereby information asymmetry is synonymous with illiquidity and harm uninformed investors (DeMarzo and Duffie, 1999; Dang et al., 2020).

The benefit of information asymmetry discussed above is limited by the presence of the speculator, who can mimic the client and enjoy the initial discount offered by the dealer without trading subsequently. Therefore, from the client's perspective, the optimal level of information asymmetry is an intermediate one: as high as possible without triggering the mimicry by the speculator. Trading assets with information asymmetry higher than this level makes clients strictly worse off because they incur losses either to the dealer (who does not fully rebate all future rent) or to the speculator. This is the second main result.

The third result is that trading costs or costs of matching with dealers could benefit the client. While such costs impose a direct loss on the client, they also reduce the speculator's profit from mimicking. Higher trading costs thus allow the relationship dealer to offer a larger initial discount to the client, increasing overall utility.

After establishing the main mechanism of relationship trading in OTC markets, I turn to the client's initial trading network formation problem. At the initial date, the client freely chooses how many dealers to trade with. These dealers become relationship dealers in the second period, unless they experience an exogenous shock and become unavailable to trade. The probability of this shock proxies for the stability of a trading relationship—an important determinant of the client's optimal trading network size.

In choosing trading network size, the client faces two countervailing forces. By choosing a smaller network, the client softens competition among relationship dealers and preserves their rent in the future. Hence, they benefit from the larger expected discount offered today.

On the other hand, she faces a higher likelihood of all relationship dealers being shocked and is thus forced to trade with other dealers. As these dealers cannot distinguish her from the speculator, the client is charged an adverse selection discount.

The optimal trading network size balances these two forces. The following predictions emerge. First, when the trading relationship is stable enough, the optimal network size is one, rationalizing the existence of exclusive trading relationships. Second, when the client values the initial trading discount more highly, she chooses a smaller trading network. Third, if she is relatively more concerned about gains from trade in the future, she prefers a larger trading network. Fourth, when trading costs are reduced and the speculator has stronger incentives to mimic, the client responds by enlarging the trading network to limit relationship dealers' rent and hence the initial discount. These predictions about the client's endogenous choice of network size are, to the best of my knowledge, novel in the literature.

This paper's results have direct and often novel implications for policy debates regarding OTC markets. It offers a more nuanced perspective on transparency: while transparency reduces dealers' rent, the reduction in dealers' future rent can benefit or harm the client. The analysis also warns that recent regulatory efforts to lower dealer-matching costs (e.g., electronic trading) could be detrimental to valuable trading relationships. Finally, observed patterns of exclusive trading relationships and dealer rent do not necessarily imply distortions from dealers' market power; they could reflect the client's optimal choice, especially when she benefits from the initial discount and services provided by relationship dealers.

1.1 Related literature

This paper contributes to the recent literature on client-to-dealer relationship trading and its benefits. Hendershott et al. (2015) and Allen and Wittwer (2023) assume reduced-form relationship benefits in their structural models and estimate substantial benefits to clients. This paper complements these findings by endogenizing relationship trading and provides microfoundations for client benefits, linking them to various client and asset characteristics.

This paper belongs to the theoretical literature on relationship trading (Seppi, 1990; Benveniste et al., 1992; Bernhardt et al., 2005; Desgranges and Foucault, 2005). These papers, particularly Desgranges and Foucault (2005), use repeated-game arguments to sustain equilibria in which clients trade with dealers only when uninformed. If a client deviates and trades on private information, the dealer can punish her through trading exclusion. However, once detected, this punishment is costly for both parties and thus not renegotiation-proof—a desirable property in private bilateral trading environments. The mechanism in this paper is renegotiation-proof and makes a distinct argument: information asymmetry itself sustains trading relationships.

This paper also relates to the vast search-and-matching literature on OTC markets, initiated by the seminal work of Duffie et al. (2005). Most papers in this literature employ anonymous random matching and thus do not feature trading relationships. A notable exception is the recent work by Maciocco (2025), which studies how exclusive trading relationships mitigate hold-up problems arising from search frictions. The mechanism in my paper differs fundamentally: it uses information asymmetry to sustain future information rents, which induces dealers to offer better pricing and services today. Additionally, this paper endogenizes the client's optimal number of trading relationships.[3]

This paper directly relates to the empirical literature on persistent trading relationships

[3] To a lesser extent, this paper also relates to recent literature on limits to dealer competition in OTC markets (Yueshen and Zou, 2022; Wang, 2023; Riggs et al., 2020; Baldauf and Mollner, 2024). These studies do not analyze persistent trading relationships and instead emphasize various costs of contacting multiple dealers, such as dealer service costs and front-running risks. This paper abstracts from such costs and instead emphasizes the intertemporal, relationship-based aspects of OTC markets.

in various OTC markets (Hendershott et al., 2015; Hau et al., 2021; Allen and Wittwer, 2023; Jurkatis et al., 2022; Comerton-Forde et al., 2025). Interestingly, while some studies document relationship discounts, others find relationship premiums charged by dealers. A key implication of this paper is that investigating client benefits from relationship trading requires looking beyond discounts and premiums to also consider dealers' provision of services and liquidity.

2 A Model of Relationship Trading

2.1 Setup

The model features three dates $t \in \{1, 2, 3\}$, universal risk neutrality, zero discounting, and a risk-free rate $r = 0$. The market includes a divisible risky asset that pays a random dividend $\tilde{v} \in \{v + \sigma, v - \sigma\}$ at $t = 3$ with equal probability. The parameter σ represents both the asset's volatility and the degree of information asymmetry: the dividend $\tilde{v}$ is realized at $t = 2$ and is privately observed by some agents, so σ captures the extent of adverse selection in the asset market at $t = 2$.

Trading can occur at both $t = 1$ and $t = 2$. At $t = 1$, trading matters for relationship building and is, for simplicity, free from adverse selection. Trading at $t = 2$ is subject to adverse selection following Glosten and Milgrom (1985). The trading protocol follows a request-for-quote (RFQ) format with first-price sealed bids.

The trading environment reflects three key features of OTC markets:

- **Opaque**: No public disclosure of past trades or trader identities.

- **Non-anonymous**: Dealers retain private information about clients' trading histories and recognize repeat clients.

- **Costly**: Trading incurs a per-unit cost c, representing various OTC frictions (search, matching, delays) not explicitly modeled.

2.2 Agents

The economy is populated by an investor and many dealers. The investor is born at $t = 1$ and can be either a hedger with probability $(1-\mu)$ or a speculator with probability $\mu \in (0, 1)$. Both the investor and dealers survive through $t = 3$, allowing long-term trading relationships to form. Since I focus on relationships between hedgers and dealers, I henceforth call the hedger "the client."

Client The client is endowed with cash e_1 at $t = 1$ and receives e_2 at $t = 2$. She is uninformed about the asset payoff $\tilde{v}$ and derives private non-monetary flow benefits b_t, with $b_1 > 0$ and $b_2 > 0$ per unit of asset held at $t = 1$ and $t = 2$, respectively. She thus has an incentive to buy the asset on both dates and, ceteris paribus, would prefer to borrow against her future endowment to purchase assets at $t = 1$. However, she cannot do so because her future endowment is non-verifiable; she faces the possibility of strategic default, as in Bolton and Scharfstein (1990).

Denote by x_1 and x_2 the quantities of the asset purchased by the client at $t = 1$ and $t = 2$, and let p_1 and p_2 denote the corresponding prices. The client's utility is given by:

$$U = x_1(b_1 + b_2 - c) + x_2(b_2 - c) + x_1\mathbb{E}(\tilde{v} - p_1) + x_2\mathbb{E}(\tilde{v} - p_2) \tag{1}$$

The first two terms represent the client's total private benefits net of trading costs from asset purchases at $t = 1$ and $t = 2$. The third and fourth terms represent the expected monetary gains from these purchases.

Speculator The speculator has unlimited cash endowment. At $t = 2$, the speculator observes the asset payoff $\tilde{v}$ with certainty and trades purely for profit, deriving no private benefits from asset ownership. In equilibrium, the speculator can only earn a profit by mimicking the client's trading behavior. Otherwise, dealers identify the speculator and learn his private information.

Dealers There are infinitely many dealers who are ex ante identical, unconstrained, uninformed, and competitive. Crucially, to capture non-anonymous trading in OTC markets, I assume dealers can distinguish between clients and speculators at $t = 2$ *if they have traded with the investor at* $t = 1$. I note that clients can create new identities to erase their trading history, allowing them to trade anonymously with any dealer at $t = 2$. Thus, anonymous trading and relationship termination are always available to the client as choices.

Going forward, I call dealers who traded with the client at $t = 1$ "inside dealers" and those who did not "outside dealers." In addition to voluntary termination, a relationship is also exogenously terminated when an inside dealer receives a shock at $t = 2$ with probability $q \in (0, 1)$, rendering the dealer unable to trade. The shock is i.i.d. across dealers and represents occasional margin calls, binding regulatory constraints, and internal risk limits faced by dealers in practice.

2.3 Frictions

The model incorporates two key frictions in the economy:

1. **Lack of commitment**: The client cannot commit to future actions (e.g., trading with specific dealers or repaying loans). In addition, the client and dealers can always renegotiate ex post, so they cannot commit to arrangements that are ex post Pareto-suboptimal.

2. **Asymmetric information**: At $t = 2$, only the speculator observes the realized dividend $\tilde{v}$.

As we will see, the client leverages Friction 2 (combined with non-anonymity) to mitigate Friction 1.

2.4 Assumptions

Assumption 1. $c \in (0, \min\{b_1, b_2\})$. *This ensures gains from trade net of trading costs for both the client and the speculator.*

Assumption 2. $\sigma \in (0, b_2)$. *The client's private benefits are larger than the adverse selection cost at* $t = 2$. *This assumption rules out complete market breakdown at* $t = 2$.

Assumption 3. *At* $t = 2$*, there are at least two unshocked outside dealers. This ensures that outside dealers' bids are pinned down by their zero-profit condition.*

Assumption 4. $q \in (0, \bar{q})$ *where* $\bar{q} \in (0, 1)$ *satisfies* $\frac{\log(1/\bar{q})-1}{\bar{q}} = \frac{2v}{\mu(v+\sigma)}$. *This restricts attention to the case where that trading relationships are stable enough.*

3 Analysis

I begin the analysis of the baseline model by presenting three benchmarks to illustrate the role of each friction. Then, I characterize the equilibrium when all frictions are present.

3.1 First-best Benchmark: Client has commitment

First, consider a benchmark economy in which the client has commitment about future actions. Specifically, she can commit to repay at $t = 1$ and thus can borrow against future income e_2 from unconstrained dealers. The client's optimal strategy is to borrow the maximum amount e_2 at $t = 1$ and use all available funds $(e_1 + e_2)$ to purchase the asset. As competitive dealers quote $p_1 = \mathbb{E}[\tilde{v}] = v$, she can purchase $x_1 = \frac{e_1+e_2}{v}$ units of the asset.

The client's utility in this benchmark is:

$$U^{FB} = \frac{e_1 + e_2}{v}(b_1 + b_2 - c) \tag{2}$$

This first-best outcome shows that information asymmetry (captured by σ) is irrelevant.

3.2 Symmetric-information benchmark

The second relevant benchmark is the symmetric information economy in which the client lacks commitment but information about the asset dividend is symmetric. In this benchmark, the asset always trades at the expected price v. Because the client cannot borrow against future income and prefers to purchase assets early, she spends all available cash: e_1 at $t = 1$ to purchase $\frac{e_1}{v}$ units, and e_2 at $t = 2$ to purchase $\frac{e_2}{v}$ units. The client's utility in this symmetric-information benchmark is:

$$U^{SI} = \frac{e_1}{v}(b_1 + b_2 - c) + \frac{e_2}{v}(b_2 - c) = U^{FB} - \frac{e_2}{v}b_1 \tag{3}$$

Relative to the first-best benchmark, the client loses utility of $\frac{e_2}{v}b_1$ because she cannot use income from $t = 2$ to purchase the asset at $t = 1$, forgoing the flow benefit b_1 at $t = 1$. Importantly, if information sensitivity is sufficiently low ($\sigma < c$), the informed speculator does not trade at $t = 2$, so the economy effectively exhibits symmetric information. Therefore, throughout the rest of the paper, we implicitly maintain the assumption $\sigma > c$ whenever information asymmetry is relevant.

3.3 Anonymous benchmark

The third benchmark is the anonymous economy under asymmetric information. For buy orders, the equilibrium price p_2^{anon} is

$$p_2^{anon} = \begin{cases} \min\left\{v + \dfrac{\sigma\mu}{2-\mu}, v + \sigma - c\right\} & \text{for } \sigma \in (c, b_2) \\ \min\left\{v + \dfrac{\sigma\mu}{2-\mu}, v + b_2 - c\right\} & \text{for } \sigma \in (b_2, \frac{2-\mu}{\mu}(b_2 - c)) \\ v + \sigma & \text{for } \sigma > \frac{2-\mu}{\mu}(b_2 - c) \end{cases}$$

Note that the second case may not exist, and the third case features market breakdown, where the client does not trade. A key observation is that p_2^{anon} increases in σ. This implies that when information asymmetry worsens, purchasing the asset becomes more expensive for the client.

The client's utility in the anonymous economy is:

$$U^{anon} = \begin{cases} \frac{e_1}{v}(b_1 + b_2 - c) + \frac{e_2}{p_2^{anon}}(b_2 - c) & \text{for } \sigma < \max\{b_2, \frac{2-\mu}{\mu}(b_2 - c)\} \\ \frac{e_1}{v}(b_1 + b_2 - c) & \text{otherwise} \end{cases} \tag{4}$$

For $\sigma > c$, we have $U^{anon} - U^{SI} < 0$ since $p_2^{anon} > v$ and increases in σ. Greater information asymmetry reduces client welfare in anonymous markets. Because the market breakdown case does not provide additional insights and only complicates the analysis, Assumption 2 restricts the discussion to scenarios where the client always trades at $t = 2$.

3.4 Economy with Asymmetric Information and Non-anonymity

With all frictions present, the client lacks commitment and trading at $t = 2$ is subject to information asymmetry. I solve the model by backward induction.

3.4.1 Equilibrium at $t = 2$

At $t = 1$, the client has purchased x_1 units of the asset from $n \geq 1$ dealers. At $t = 2$, the number of inside dealers n is observable. The client requests quotes from all dealers, spending all her endowment e_2 to purchase the asset at the lowest available quote. Similarly, the speculator, knowing the dividend is $v + \sigma$, makes the same request, since any deviation would reveal her identity as a speculator in equilibrium.

As inside dealers know the client's type, they are not concerned about trading with an informed speculator and thus outbid outside dealers who face this concern. Hence, if an outside dealer wins the quote competition, it must be trading with either a speculator who knows the dividend is $v + \sigma$ or a client whose inside dealers are all shocked. As there are at least two unshocked outside dealers (Assumption 3), they compete via Bertrand competition and offer a breakeven quote p_2^o.

The outside dealer's breakeven quote depends on the trading behavior of the client and the speculator (who knows the dividend is $v + \sigma$). The client buys with probability 1 if $p_2^o < v + b_2 - c$, and the speculator buys with probability 1 if $p_2^o < v + \sigma - c$. Given Assumption 2, the upper bound of p_2^o in equilibrium is $v + \sigma - c$, where the client always buys, and the speculator buys with some probability $m^* \in (0,1)$.[4] Then, in equilibrium, the outside dealer's breakeven price p_2^o is

$$p_2^o = \min\left\{v + \sigma\frac{\mu}{\mu + 2(1-\mu)q^n}, v + \sigma - c\right\}.$$

Note that p_2^o (weakly) increases with n and decreases with q. The intuition is that the outside dealer's concern for adverse selection is more severe if the client has more inside dealers and/or relationships are more stable (lower q).

Next, I consider the inside dealers. An unshocked inside dealer knows that the client's best outside offer is p_2^o but does not know how many of the $(n-1)$ other inside dealers are shocked. I solve for a symmetric mixed-strategy equilibrium.[5] Each inside dealer offers a quote p drawn from a distribution $H(p)$ with support $[\underline{p}, p_2^o]$, where $\underline{p}$ is an endogenous lower bound to be determined.

Denote the expected profit of an unshocked insider as π_{UI}. By the properties of mixed-strategy equilibrium, π_{UI} is constant across all p in the support:

$$\pi_{UI} = \Pr[p \text{ outbids all } n-1 \text{ quotes}](p - v)e_2/p \tag{5}$$

$$= [q + (1-q)(1-H(p))]^{n-1} e_2 \left(1 - \frac{v}{p}\right) \tag{6}$$

At $p = p_2^o$, we have $\pi_{UI} = q^{n-1} e_2 \left(1 - \frac{v}{p_2^o}\right)$. This gives:

$$H(p) = \frac{1}{1-q} - \frac{q}{1-q}\left[\frac{1 - v/p_2^o}{1 - v/p}\right]^{\frac{1}{n-1}} \tag{7}$$

[4]The speculator's trading probability m^* is such that at the outside dealers' breakeven quote, the speculator is indifferent between trading and not trading. Formally, $v + \sigma\frac{m^*\mu}{m^*\mu + 2(1-\mu)q^n} = v + \sigma - c$.

[5]It is well-established that auctions with uncertain bidders do not admit pure-strategy equilibria.

The lower bound $\underline{p}$ is implicitly defined by $H(\underline{p}) = 0$. Each inside dealer's expected profit at $t = 1$ is given by

$$\pi_I(n) = (1-q)q^{n-1}e_2\left(1 - \frac{v}{p_2^o}\right). \tag{8}$$

Note that $\pi_I(n) > 0$ since $p_2^o > v$.

Properties of Dealers' Profit Since inside dealers' expected profit plays a key role in the subsequent analysis, the following lemma states its important properties.

Lemma 1. *[Properties of Dealers' Profit]*

1. *$\pi_I(n)$ increases in σ*
2. *$\pi_I(n)$ decreases in n*
3. *$n\pi_I(n)$ is increasing in n for $n < \underline{n}$ and is decreasing otherwise, where $\underline{n} \geq 1$.*

First, an inside dealer's profit $\pi_I(n)$ (weakly) increases in the asset's information sensitivity σ. This is because higher σ worsens outside dealers' bids due to adverse selection concerns, strengthening inside dealers' informational advantage.

Second, more competition among inside dealers erodes individual profits. Third, total inside dealer profit is non-monotonic in n. Beyond the erosion of individual profits due to competition, having more inside dealers reduces the probability that all are shocked, meaning profits accrue to outside dealers in fewer scenarios. The profit-erosion effect dominates as n grows (when $n \geq \underline{n}$), and this effect is stronger when relationships are more stable (lower q). In particular, the profit-erosion effect dominates the beneficial effect of reduced shock probability across all n (i.e., $\underline{n} = 1$) when $q < \bar{q}$ (Assumption 4).

Importantly, unlike canonical market-making in anonymous markets, the profits that inside dealers earn from the uninformed client at $t = 2$ do not serve as compensation for losses to the informed speculator. In this model, inside dealers effectively trade solely with the client, whom they can identify from their $t = 1$ interaction. This information rent induces them to compete aggressively for the client's patronage at $t = 1$. Eventually, all information rents are rebated to the client in the form of an upfront discount. I now turn to the client's problem at $t = 1$.

3.4.2 The client's problem at $t = 1$

At $t = 1$, the client solicits quotes from n dealers, spending her entire endowment e_1 to purchase the asset. Because dealers are homogeneous and competitive, in equilibrium all quote the same price p_1, and the client splits her purchase equally among the n dealers.

The client's problem at $t = 1$ thus becomes:

$$\max_{n \in \mathbb{N}^+} \quad U(n) = \frac{e_1}{p_1}\mathbb{E}[(\tilde{v} - p_1)] + \mathbb{E}\left[\frac{e_2}{p_2}(\tilde{v} - p_2)\right] + \frac{e_1}{p_1}(b_1 + b_2 - c) + \mathbb{E}\left[\frac{e_2}{p_2}\right](b_2 - c) \tag{9}$$

$$\text{subject to} \quad \frac{e_1}{p_1}\mathbb{E}[(\tilde{v} - p_1)] + \mathbb{E}\left[\frac{e_2}{p_2}(\tilde{v} - p_2)\right] \leq 0 \tag{10}$$

$$p_1 \geq v - c \tag{11}$$

Equation (9) represents the client's utility function. Equation (10) is the break-even condition for the n dealers. Equation (11) ensures the speculator does not mimic the client to purchase at $t = 1$ at price p_1.

The client's choice of n dealers affects utility through endogenous prices p_2 and p_1. Consider an increase in n. The analysis at $t = 2$ shows that higher n makes inside dealers more competitive, reducing their expected profit at $t = 2$. The reduced future profit means that at $t = 1$, dealers must charge a higher p_1 to break even across periods. The client thus cannot purchase as many units at $t = 1$, so she enjoys fewer private benefits b_1.

The following lemma formalizes this intuition by expressing the client's utility directly in terms of inside dealers' expected profit $\pi_I(n)$.

Lemma 2. *Using the dealers' break-even condition* (10)*, the client's problem simplifies to:*

$$\max_{n \geq \hat{n}} \quad U(n) = U^{SI} + \frac{1}{v}\left[n\pi_I(n)b_1 - \frac{q}{1-q}\pi_I(n)(v + b_2 - c)\right] \tag{12}$$

$$\textit{where} \quad \hat{n} := \min\{n \in \mathbb{N}^+ : n\pi_I(n) \leq \frac{c}{v-c}e_1\} \tag{13}$$

Proof: See Appendix.

The terms in brackets highlight the key trade-off in the client's problem. The first term (positive) represents the combined profit of inside dealers rebated to the client due to competition, enabling her to purchase more units and enjoy the private benefit b_1. The second term represents the loss when all inside dealers are shocked. In that case, the client incurs a monetary loss trading with outside dealers, which reduces expected gains from trade at $t = 2$.

The condition $n\pi_I(n) \leq \frac{c}{v-c}e_1$ in (13) replaces the speculator's no-mimicking condition in (11). Intuitively, dealers compete to offer lower p_1 at $t = 1$ when they expect higher profit at $t = 2$. Therefore, a lower bound on p_1 is equivalent to an upper bound on aggregate dealer profit $n\pi_I(n)$. Since $n\pi_I(n)$ decreases in n (under Assumption 4), this upper bound is equivalent to a lower bound $\hat{n}$ on the number of dealers, which appears as a constraint in the client's maximization problem.

The reformulation of the client's problem substantially simplifies the analysis and highlights the instrumental role of dealers' expected future profit. We now discuss the first key result in the following proposition. Let $n^* := \arg\max_{n \geq \hat{n}} U(n)$ denote the optimal number of dealers.

Proposition 1. *At the optimal number of relationships n^*, the client's utility is strictly higher in equilibrium with asymmetric information than in the symmetric-information benchmark. Formally, $U(n^*) > U^{SI}$.*

Proof. First, note that $U(n) \to U^{SI}$ as $n \to +\infty$. At this limit, the bracketed terms in (12) tend to zero since both $n\pi_I(n)$ and $\pi_I(n)$ are decreasing in n and non-negative.

Next, for a finite n, $\pi_I(n) > 0$. The bracketed expression is strictly positive for all $n \geq n_1$ where $n_1 := \min\{n \in \mathbb{N}^+ : n > \frac{q}{1-q} \frac{v+b_2-c}{b_1}\}$. Since the bracketed expression in $U(n)$ is well-defined and strictly positive for $n \geq n_1$, the optimal n^* exists and satisfies $U(n^*) > U^{SI}$. $\square$

Proposition 1 establishes the first unconventional result: the uninformed client derives higher utility in the economy with information asymmetry than in the symmetric-information economy. The intuition stems from the value of relationships and the role of information asymmetry as a relationship glue. The information asymmetry the client faces at $t = 2$ binds her to inside dealers. Anticipating this, inside dealers can extract information rent and thus provide valuable discounts to the client at $t = 1$. Without information asymmetry, there is no information rent, and dealers offer no discount.

The above discussion suggests that information asymmetry increases the value of trading relationships and thus the client's utility. Since increasing n and decreasing σ reduce the information asymmetry the client faces, it follows that she benefits from fewer trading relationships and assets with greater information sensitivity. The next two propositions formalize these observations.

Proposition 2. *If* $\hat{n} = 1$ *and trading relationships are sufficiently stable (i.e.,* q *is sufficiently small), then* $n^* = 1$.

Proof. We prove this by continuity in q. Consider the limit as $q \to 0^+$. In this limit, $U(n) = U^{SI} + n\pi_I(n)b_1$. Substituting $\pi_I(n) = (1-q)q^{n-1}e_2\left(1 - \frac{v}{p_2^o}\right)$, we see that $\pi_I(1) > 0$ while $\pi_I(n) = 0$ for all $n \geq 2$ as $q \to 0^+$. Thus, in the limit $q \to 0^+$, we have $n^* = 1$.

As q increases from zero, the term $\pi_I(1) - \frac{q}{1-q}\pi_I(1)(v + b_2 - c)$ decreases, while $2\pi_I(2) - \frac{q}{1-q}\pi_I(2)(v + b_2 - c)$ increases. Before the latter surpasses the former, $n^* = 1$ for all q in some neighborhood $(0, q_1)$. □

Proposition 2 shows that if relationships are sufficiently stable (low q) and the speculator's no-mimicking constraint binds at $\hat{n} = 1$, then an exclusive relationship ($n^* = 1$) is optimal. Intuitively, the only downside of maintaining few inside dealers is the loss of trading opportunities at $t = 2$ when they become unavailable. As this risk becomes less significant, the optimal strategy is to concentrate on very few dealers, or even just one.

This result explains the observed prevalence of exclusive relationships in corporate bond markets, as documented in Hendershott et al. (2020).

Proposition 3. *Consider an* $n^* \geq 1$ *that solves the client's problem in* (12). *At this* n^*, *there exists an increment* $\Delta_\sigma \geq 0$ *such that increasing* σ *to* $\sigma + \Delta_\sigma$ *strictly increases the client's utility.*

Proof. At n^*, the client's utility is $U(n^*) = U^{SI} + \pi_I(n^*)\left(n^*b_1 - \frac{q}{1-q}(v + b_2 - c)\right)$. The optimality of n^* implies both $\pi_I(n^*) > 0$ and $n^*b_1 - \frac{q}{1-q}(v + b_2 - c) > 0$. Since $\frac{d\pi_I(n^*)}{d\sigma} > 0$, we have $\frac{dU(n^*)}{d\sigma} > 0$. A feasible increase $\Delta_\sigma > 0$ exists unless the speculator's no-mimicking condition is binding, i.e., $n^*\pi_I(n^*) = \dfrac{c}{v-c}e_1$. □

This result starkly contrasts with the anonymous-trading benchmark and the conventional wisdom that information-insensitive assets best facilitate liquidity for uninformed investors (Dang et al., 2020). Instead, this novel result suggests that in non-anonymous markets where trading relationships can form, information sensitivity enhances relationship value.

Next, I examine how client characteristics influence the optimal number of trading relationships.

Proposition 4. *n^* decreases in b_1 and increases in b_2.*

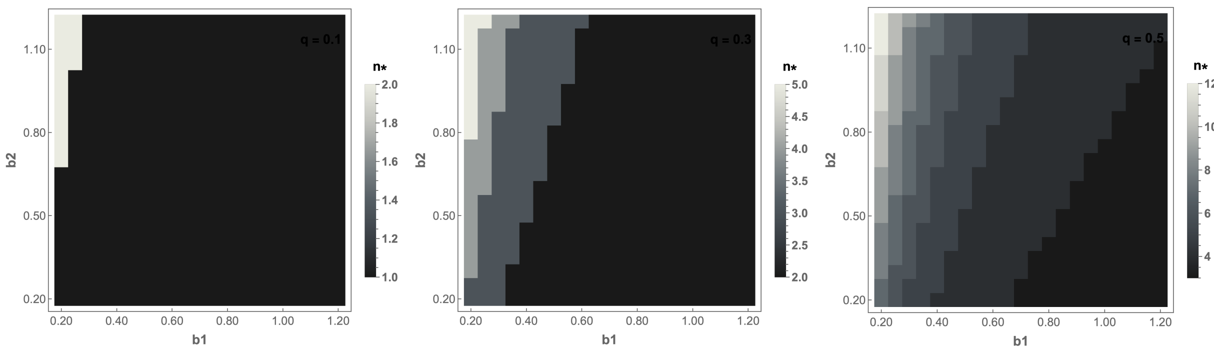
Proof. These results follow from monotone comparative statics (Topkis, 2011). Monotone comparative statics (MCS) states that $n^*(\theta)$ strictly increases in θ if the single-crossing condition $\frac{\partial^2 U}{\partial n\,\partial\theta} > 0$ holds. We can verify that

$$\frac{\partial^2 U}{\partial n\,\partial(-b_1)} = -\frac{1}{v}\frac{\partial(n\pi_I(n))}{\partial n} > 0 \qquad \text{and} \qquad \frac{\partial^2 U}{\partial n\,\partial b_2} = -\frac{1}{v}\frac{q}{1-q}\frac{\partial \pi_I(n)}{\partial n} > 0.$$

□

Proposition 4 shows that clients with stronger private benefits at $t = 1$ prefer fewer trading relationships, while those with stronger benefits at $t = 2$ prefer more. When increasing the number of relationships, the client faces two countervailing forces. First, dealers offer smaller discounts at $t = 1$ because their expected future profit declines. Second, the client is less likely to rely on outside dealers at $t = 2$, increasing her expected gains from trade. Thus, clients who derive greater private benefits from early (late) trading prefer fewer (more) relationship dealers.

Figure 1 provides a graphical illustration of how the optimal number of trading relationships depends on the client's private benefits of trading at $t = 1$ (b_1) and $t = 2$ (b_2), at various



(a) $q = 0.1$ **(b)** $q = 0.3$ **(c)** $q = 0.5$

Figure 1. Optimal number of trading relationships n^* and client's private benefits of trading at $t = 1$ (b_1)and $t = 2$ (b_2), at various probability of exogenous relationship terminations q. Other parameter values are fixed at $c = 0.1$, $v = 1$, $e_1 = 1.1$, $e_2 = 1$, $\mu = 0.4$, and $\sigma = 0.2$.

probabilities of exogenous relationship termination q, from low probability (a) to high (c). First, notice that in all panels, the optimal number of relationships n^* tends to be higher as b_1 decreases and b_2 increases, consistent with Proposition 4. Second, as the probability of exogenous relationship termination q increases, n^* also tends to increase. At low q, it can be optimal to have an exclusive relationship, whereas at high q, n^* ranges from 4 to 12. In these parameter settings, the speculator's no-mimicking condition is always satisfied, and hence does not constrain the choice of n (i.e., $\hat{n} \geq 1$). The implications of this condition will be discussed in the next section.

3.5 Speculator's Mimicry and The Benefits of Trading Costs

The analysis up till now has ignored the speculator's no-mimicking constraint (13). Recall that the constraint ensures that the discount offered at $t = 1$ is not too attractive for the speculator to mimic and form trading relationships like the client does. As the expected discount is inversely related to dealers' total expected profit, it is essentially an upper bound on the profit. Specifically, the condition is $n\pi_I(n) \leq \frac{c}{v-c}e_1$.

This gives rises to novel predictions about the importance of the client's initial endowment e_1 and exogenous transaction cost c. Specifically, as both e_1 and c increases, the constraint is relaxed, allowing the client to choose a smaller number of trading relationships. The following proposition summarizes this.

Proposition 5. *n^* (weakly) decreases in e_1 and c. In addition, the client's utility is non-monotonic in c.*

Proof. First note that at the optimal n^*, $n^*\pi_I(n^*)$ is strictly decreasing. Then, both higher e_1 and c relaxes the constraint (13). This allows the client to choose an n smaller than n^*, which weakly increases the client's utility. □

The novel, unconventional implication of Proposition 5 is that the client might be better off in an environment with higher trading costs. While the client suffers from a higher cost, she benefits indirectly by choosing a smaller number of relationship dealers and thus receiving offer a larger discount at $t = 1$. This becomes feasible because the trading cost also deters the mimicry by speculators.

More generally, these economic forces suggest that relatively exclusive and valuable trading relationships are more difficult to sustain when the speculator's entry cost is reduced. This gives a new testable empirical predictions that a client's dealer networks become larger when trading cost goes down. Furthermore, it also suggests relationship benefits and the associated benefits could be harmed by the reduction of trading costs.

4 Discussions

4.1 Assets with More Price Discovery Provide Less Liquidity

The mechanism of this paper relies on future information asymmetry to sustain trading relationships that are valuable today. A direct implication is that assets with greater price discovery are less subject to information asymmetry and thus less conducive to valuable trading relationships.

To be more concrete, consider the following extension. Suppose there are public signals such as asset prices or news at the beginning of $t = 2$ that perfectly reveal the asset payoff with some probability $\eta \in [0, 1]$. Assets with higher η have more price discovery. From the client's perspective at $t = 2$, price discovery is beneficial as it reduces adverse selection costs. However, from the perspective of relationship trading and liquidity provision, price discovery is harmful because dealers' expected future profits decline to $(1 - \eta)\pi_I$, reducing their willingness to provide liquidity to the client at $t = 1$.

What assets tend to have more price discovery? Standardized assets such as equities and futures, which trade across many venues with numerous participants, typically exhibit more price discovery. In contrast, debt securities with multiple dimensions of heterogeneity (e.g., maturity, covenants, coupon rates) exhibit less price discovery. This paper explains why non-standardized assets are more conducive to relationship trading.

4.2 The Benefits of Trading Complex Contracts

It is somewhat puzzling why clients enter into very complex contracts written on assets in which they lack expertise. A prominent example is the Landesbanken in Germany, which purchased significant amounts of mortgage-backed securities (MBS) and collateralized debt obligations (CDOs) backed by U.S. assets before the Global Financial Crisis. These clients are sophisticated financial institutions and should have been aware of severe adverse selection problems they faced.

This paper proposes a different rationale: by trading a complex contract, the client becomes more captured by the relationship dealer because it is very difficult to unwind the position with other counterparties ex post. In turn, dealers can extract more rent ex post and thus provide more liquidity to the client ex ante.

4.3 Transparency Can Harm Relationship Trading

Regulators around the world have raised concerns regarding the opaque nature of OTC markets. After the Global Financial Crisis, several regulatory reforms have been implemented to increase transparency in OTC markets. Transparency can take multiple forms, including pre-trade transparency (allowing clients to view dealer quotes) and post-trade transparency (disclosure of past transactions). Extensive research has examined the effects of increased transparency, but few studies have examined relationship trading. According to this model, transparency may harm relationship trading by undermining the informational advantage of relationship dealers.

Suppose outside dealers can infer a client's type with probability τ, either by observing past trading records (post-trade transparency) or monitoring relationship dealers' quotes (pre-trade transparency). Greater transparency means higher τ. In a more transparent environment, relationship dealers extract less rent and thus provide less liquidity to clients ex ante.

4.4 Client's Liquidity Provision and the Optimality of Debt

Dealers may also face liquidity problems due to regulatory constraints. Jurkatis et al. (2022) argue that clients provide liquidity to dealers, who in exchange give them discounts.

This model can be modified to incorporate this mechanism. Suppose all dealers' marginal utility for profit at $t = 2$, denoted by α_ω, is state-contingent where $\omega \in \{U, D\}$ and $\alpha_U < 1 < \alpha_D$. This implies that dealers value profit more in state D than in state U. Then, for a fixed average information sensitivity $\mathbb{E}[\tilde{\sigma}]$, assets with higher information sensitivity in state D (and lower in state U) would allow more gains from trade. Effectively, clients are more captured by dealers in state D, meaning they can credibly offer better terms to dealers in that state.

If state D represents a bad fundamental state, fixed-income securities fit these characteristics as they become informationally sensitive in bad states (Dang et al., 2020).

5 Conclusion

This paper develops a model of client-to-dealer relationship trading in OTC markets where information asymmetry and non-anonymity act as a "relationship glue." Dealers expect to extract information rents from clients in the future, inducing them to compete aggressively and offer valuable discounts today. This mechanism explains why uninformed clients paradoxically benefit from information asymmetry in non-anonymous markets, contrasting sharply with conventional wisdom from anonymous trading.

The model yields several novel predictions. Exclusive relationships are optimal when relationships are stable. Clients with stronger preferences for early liquidity choose fewer dealers, while those prioritizing later liquidity prefer more. Counterintuitively, higher transaction costs can benefit clients by deterring speculator mimicry. The framework also explains empirical patterns: why non-standardized assets are more conducive to relationship trading, why clients enter complex contracts, and why transparency can harm relationship-based liquidity provision.

Our findings carry important policy implications. Regulatory efforts to reduce trading costs or increase transparency, while reducing adverse selection on individual trades, may undermine the mechanisms through which dealers provide liquidity ex ante. Observed exclusive relationships should not be interpreted solely as evidence of dealer market power. Understanding these trade-offs is essential for designing effective financial market regulation and appreciating the fundamental role of relationship-based trading in OTC markets.

References

Allen, Jason, and Milena Wittwer, 2023, Centralizing over-the-counter markets?, *Journal of Political Economy* 131, 3310–3351.

Baldauf, Markus, and Joshua Mollner, 2024, Competition and Information Leakage, *Journal of Political Economy* 132, 1603–1641, Publisher: The University of Chicago Press.

Benveniste, Lawrence M., Alan J. Marcus, and William J. Wilhelm, 1992, What's special about the specialist?, *Journal of Financial Economics* 32, 61–86.

Bernhardt, Dan, Vladimir Dvoracek, Eric Hughson, and Ingrid M. Werner, 2005, Why Do Larger Orders Receive Discounts on the London Stock Exchange?, *Review of Financial Studies* 18, 1343–1368.

Bolton, Patrick, and David S Scharfstein, 1990, A theory of predation based on agency problems in financial contracting, *The American economic review* 93–106.

Collin-Dufresne, Pierre, Peter Hoffmann, and Sebastian Vogel, 2019, Informed traders and dealers in the fx forward market, *working paper* .

Comerton-Forde, Carole, Billy Ford, Thierry Foucault, and Simon Jurkatis, 2025, Investors as a liquidity backstop in corporate bond markets, *Bank of England Staff Working Paper Series* .

Dang, Tri Vi, Gary Gorton, and Bengt Holmström, 2020, The information view of financial crises, *Annual Review of Financial Economics* 12, 39–65.

DeMarzo, Peter, and Darrell Duffie, 1999, A liquidity-based model of security design, *Econometrica* 67, 65–99.

Desgranges, Gabriel, and Thierry Foucault, 2005, Reputation-based pricing and price improvements, *Journal of Economics and Business* 57, 493–527.

Duffie, Darrell, Nicolae Gârleanu, and Lasse Heje Pedersen, 2005, Over-the-counter markets, *Econometrica* 73, 1815–1847.

Glosten, L.R., and P.R. Milgrom, 1985, Bid, ask and transaction prices in a specialist market with heterogeneously informed traders, *Journal of Financial Economics* 14, 71–100.

Hau, Harald, Peter Hoffmann, Sam Langfield, and Yannick Timmer, 2021, Discriminatory Pricing of Over-the-Counter Derivatives, *Management Science* 67, 6660–6677, Publisher: INFORMS.

Hendershott, Terrence, Dan Li, Dmitry Livdan, and Norman Schürhoff, 2020, Relationship trading in over-the-counter markets, *The Journal of Finance* 75, 683–734.

Hendershott, Terrence, Dmitry Livdan, and Norman Schürhoff, 2015, Are institutions informed about news?, *Journal of Financial Economics* 117, 249–287.

Jurkatis, Simon, Andreas Schrimpf, Karamfil Todorov, and Nicholas Vause, 2022, Relationship discounts in corporate bond trading, *Available at SSRN 4301416* .

Maciocco, Alex, 2025, Trading Relationships in Over-the-Counter Markets, *Available at SSRN 5469246* .

Riggs, Lynn, Esen Onur, David Reiffen, and Haoxiang Zhu, 2020, Swap trading after Dodd-Frank: Evidence from index CDS, *Journal of Financial Economics* 137, 857–886.

Seppi, Duane J, 1990, Equilibrium block trading and asymmetric information, *the Journal of Finance* 45, 73–94.

Topkis, Donald M, 2011, *Supermodularity and complementarity* (Princeton university press).

Wang, Chaojun, 2023, The limits of multi-dealer platforms, *Journal of Financial Economics* 149, 434–450.

Yueshen, Bart Zhou, and Junyuan Zou, 2022, Less is more, *Available at SSRN 4274063* .

Appendix

A Proofs

A.1 Proof of Lemma 2

Proof. Start from the client's utility in Equation (9). Note here p_2 is a random variable. Denote A as the event in which at least one insider is available. Then write

$$\begin{aligned}\mathbb{E}[\frac{e_2}{p_2}(v-p_2)] &= q^n\left(\frac{v}{p_2^o}-1\right)e_2 + (1-q^n)\underbrace{\mathbb{E}[\frac{e_2}{p_2}(v-p_2)|A]}_{-\text{conditional expected profit for an unshocked dealer}*n} \\ &= q^n\left(\frac{v}{p_2^o}-1\right)e_2 + (1-q^n)\frac{1-q}{1-q^n}nq^{n-1}\left(\frac{v}{p_2^o}-1\right) \\ &= \left(\frac{v}{p_2^o}-1\right)e_2(q^n+(1-q)nq^{n-1})\end{aligned}$$

From the above,

$$\mathbb{E}[e_2/p_2] = \frac{e_2}{v}\left[1+\left(\frac{v}{p_2^o}-1\right)(q^n+(1-q)nq^{n-1})\right]$$

To express x_1 in terms of e_2 and p_2, use an insider's breakeven condition

$$\frac{x_1}{n}(p_1-v)+(1-q)q^{n-1}(1-\frac{v}{p_2})e_2 = 0$$

This gives $x_1 = \dfrac{e_1+(1-q)q^{n-1}ne_2}{v} - (1-q)q^{n-1}n\dfrac{e_2}{p_2}$.

The client's expected trading loss can be simplified as

$$
\begin{aligned}
&\mathbb{E}\left[e_1(\frac{v}{p_1}-1)+e_2(\frac{v}{p_2}-1)\right] \\
&=(1-q)q^{n-1}(1-\frac{v}{p_2})ne_2+(\frac{v}{p_2}-1)e_2\left[q^n+(1-q)nq^{n-1}\right] \\
&=-(1-\frac{v}{p_2})e_2q^n
\end{aligned}
$$

The last step uses the insider dealer's expected profit π_I in Equation (8) to get Equations (12) and (13). □