Dealers as Record Keepers [*]

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Abstract

Trading relationships in over-the-counter (OTC) markets are persistent and often exclusive, despite technological advances that have expanded clients' access to dealers. We rationalize this pattern in a model where trading relationships allow dealers to learn their clients' trading motives from their trading records. Relationship dealers set record-contingent quotes, generating price discrimination that mitigates adverse selection for liquidity-driven clients. Moreover, we show that clients prefer exclusive relationships to keep their record private. As a result, post-trade transparency and trading protocols that facilitate public inference of clients' trading records by dealers (e.g., Request for Quote relative to Request for Market) may reduce gains from trade.

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1 Introduction

Persistent and often exclusive trading relationships between dealers and clients are prevalent in many OTC markets. Several empirical studies have shown that trading relationships determine transaction costs to a large extent[1]. Even on modern electronic platforms, where intense dealer competition is a click away, clients still contact and trade only with a few dealers. In this paper, we ask three main questions: Why do persistent trading relationships arise in the first place? How would greater transparency and competition affect relationship trading? And what is the resulting impact on clients' welfare? Addressing these issues helps us identify the relative merits of various trading technologies (e.g., voice-based vs. modern auction trading) and assess the regulatory push toward greater transparency and competition in OTC markets where relationships play a key role.[2]

In our theory, relationship dealers act as their clients' trading record keepers. This function of relationship dealers hinges on two key features of our model. First, repeated trading allows dealers to infer their clients' trading motives via past trading records. Relationship dealers can thus offer record-contingent spreads, which benefits liquidity-driven clients. Second, clients value exclusive relationships as a way to keep their records private. Specifically, we show that clients are worse off when their trading record can be inferred by other dealers. We argue that this finding helps explain the observed clients' reluctance to contact more dealers on modern electronic platforms and the rising popularity of trading protocols that limit disclosure of clients' trading intentions. For a similar reason, our result also highlights the unintended harm to clients due to regulations that promote dealer competition

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[1] See, for instance Hendershott, Li, Livdan, and Schürhoff (2020); Allen and Wittwer (2023); Jurkatis, Schrimpf, Todorov, and Vause (2022)

[2] For instance, the Dodd-Frank Act mandates that trades of interest rate swaps and credit default swaps must be executed on swap execution facilities in which clients have to request quotes from at least three dealers.

(by requiring a minimum number of solicited quotes) and increase post-trade transparency.

Specifically, we develop a two-period model à la Glosten and Milgrom (1985) with non-anonymous trading. A client can trade one unit of an asset in each trading round with dealers. The client is either a "hedger," who enjoys a private value from trading (e.g., to satisfy hedging needs), or a "speculator," who trades on private information about the asset's common value. This type is persistent and initially unknown to dealers. After the first round of trading, the client enjoys either a loss or a gain. Dealers can thus partially infer the client's type by observing this trading record. This trading record is either private (observable only to the "relationship" dealer who traded with the client) or public (observable to all dealers). As we will explain, this comparison allows us to contrast trading protocols and transparency regimes in practice, insofar as they generate different degrees of opacity in clients' trading records.

Before trading opens, dealers compete for the client's business with contracts. A contract specifies spreads for the client to buy or sell the asset. Dealers can commit, but they may be unavailable in the second trading round for exogenous reasons. This feature helps us capture, in reduced form, the recent retreat of traditional dealers from some intermediation activities, due, for instance, to regulatory constraints. To highlight the role of relationship trading, we study two classes of contracts. With "spot contracts," a dealer can trade only once with the client, whereas with a "relationship contract," the dealer commits to trade in both rounds with pre-specified spreads. In both cases, we compare a public trading record to a private trading record, which ultimately generates four settings (see Table 1). In all settings, the equilibrium contract is accepted by both types of client and maximizes the hedger's utility. Thus, we rank these settings using this metric.

First, we show that even with perfect competition, relationship contracts dominate spot

	Private record	Public record
Spot contract	1	2
Relationship contract	4	3

Table 1: Ranking by Hedger's Utility in Various Settings of Trading Records and Contracts (from 1 being the lowest)

contracts (i.e., spot trading). because dealers have more flexibility in setting quotes. Second, our main result is that the optimal transparency of the trading record depends crucially on the existence of trading relationships. Making trading records public benefits hedgers under spot contracts but harms them under relationship contracts. That is, the hedger's utility increases from settings 1 through 4 in Table 1. Overall, clients optimally enter into exclusive relationships and rely on dealers to keep their trading record private. We provide the intuition for these results below.

Under spot contracts, private records imply that no dealers have information about the client's record at date 2. Hence, trading is anonymous in this case. With public records, a gain (loss) allows dealers to infer a higher (lower) likelihood that the client is a speculator, leading them to raise (lower) spreads to break even. These record-contingent spreads act as a market-based punishment-and-reward mechanism that reduces the speculator's information rent, because speculators are more likely than hedgers to record a gain. This benefits the hedger, who prefers public to private records under spot trading. However, spot trading does not allow hedgers with a gain record to trade, because dealers face high adverse selection in this case. Under spot trading, this market breakdown for clients with a gain record is a necessary evil, because it strengthens the punishment for speculators.

Next, we turn to relationship contracts, in which dealers commit to a pre-specified set of (record-contingent) spreads. Under spot trading, dealers must break even state-by-state. Instead, relationship trading allows them to redistribute their losses and gains across states and dates. This flexibility in setting spreads improves the hedger's utility via two channels. First, the record-contingent spreads can be more dispersed, which strengthens the punishment-and-reward mechanism mentioned above. Second, clients in a relationship can avoid a market breakdown in the second trading round, and thus realize more gains from trade, by lowering their spreads. The relationship dealer recoups the loss in the second trading round by charging higher spreads in the first round than under spot trading. Hence, relative to spot trading, the client invests in the relationship initially, to benefit subsequently from lower and personalized spreads. This result rationalizes the relationship discount documented in Hendershott, Li, Livdan, and Schürhoff (2020), Jurkatis, Schrimpf, Todorov, and Vause (2022), and Bak-Hansen and Sloth (2024).

The analysis of spot contracts may suggest that a public record dominates a private record under relationship contracts as well. However, the opposite result applies: hedgers in a relationship benefit from keeping records private. To understand the result, consider a hedger with a gain record for whom the relationship breaks up exogenously. Such a client must turn to outside dealers to trade. However, a hedger with a public gain record cannot trade, because the market breaks down in this case, similarly to the outcome with spot contracts. On the other hand, a private record allows the hedger to trade anonymously with outside dealers. This anonymous spread quoted by outside dealers is lower than the public-record spread for a gain record, because outside dealers cannot distinguish between clients who made a loss (low adverse selection) and those who made a gain (high adverse selection) when the record is private.

Overall, with a private record, a hedger in a trading relationship enjoys the optimal degree of anonymity. Personalized prices from the relationship dealer reduce the information advantage of the speculator, while anonymous prices from outside dealers maximize gains from trade. Overall, we show that OTC dealers optimally act as their clients' record keepers. Furthermore, keeping records private becomes more valuable as dealer relationships become more fragile. Indeed, when relationship dealers become increasingly unavailable to trade, the client's risk of being excluded by outside dealers increases under a public record.

Our stylized model yields microfounded policy implications for relationship trading and trading protocol design. First, we argue that our setting with public records maps to request-for-quote (RFQ) protocols on electronic platforms. In RFQ protocols, a client makes a request either to buy or to sell to solicited dealers. Crucially, a one-sided request reveals the intended trade direction to all solicited dealers, including those who do not win the auction. These dealers can then infer the client's trading record, similar to the public-record setting of our model. Our results thus imply that clients should request few quotes in RFQ protocols to minimize information leakage, consistent with observed practice. Moreover, regulations that impose a minimum number of quotes on Swap Execution Facilities (SEFs) to promote competition may harm customers by exacerbating such leakage.

By contrast, our private-record setting corresponds to traditional voice-based bilateral trading as well as the more recently developed two-sided request-for-market (RFM) protocols on electronic platforms. In RFM trading, only the winning dealer observes the client's trade direction, preventing other participating dealers from inferring whether the client has realized a profit or a loss. Our result that a private record dominates a public record thus provides a novel, relationship-based rationale for both the continued reliance on voice-based trading and the growing popularity of RFM protocols.

Our model also has implications for post-trade transparency to the extent that trading records become more observable as post-trade transparency increases. Consider the Trade Reporting and Compliance Engine (TRACE) in the U.S., which disseminates information on corporate bond transactions executed within the past 15 minutes. By observing which securities were traded, when they were traded, and at what prices, market participants, especially dealers who were previously contacted by the client, can infer the client's actual trade, especially for rarely traded securities. In this sense, greater post-trade transparency, which is meant to provide information about asset values, also increases the observability of trading records. Our results suggest that such transparency can harm clients when relationship trading plays an important role.

Finally, our results also bring the debate about data ownership to financial markets. Through their interaction with markets, clients generate trading records, from which they can extract value for future trading interactions. A parallel exists with borrower data generated by their interaction with banks. Our results suggest that customers might not benefit from owning their data.[3] In our model, when a client's relationship breaks up, an unraveling result would apply. Clients with a loss record would reveal this information, to benefit from lower quotes. Doing so, they fail to internalize the costs from getting higher quotes when they realize a trading gain. This suggests that promoting data ownership in financial markets may have unintended consequences for market liquidity and efficiency.

Related Literature

Our paper belongs to the literature on the theory of trading relationships in non-anonymous markets (Seppi, 1990; Benveniste, Marcus, and Wilhelm, 1992; Bernhardt, Dvoracek, Hughson, and Werner, 2005; Desgranges and Foucault, 2005; Maciocco, 2025). In particular,

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[3] While we are not aware of developments in this direction, the data are certainly available in many financial markets. See, for instance Bogousslavsky and Muravyev (2024).

Desgranges and Foucault (2005) shows that in a repeated-game setting, relationship dealers use punishment of temporary exclusion to induce clients to only trade when they do not have information. Our mechanism has a similar flavor, as gain records, which indicate informed trading, lead to larger spreads for investors. Unlike these papers, we consider the optimal transparency of trading records when dealers can learn about their clients's types. Our analysis also highlights limits on the costs from making relationship-specific information portable.

Our paper also contributes to the literature that compares different market designs for trading assets. A strand of this literature compares decentralized OTC trading to competitive exchange trading or studies their coexistence (e.g., Rust and Hall, 2003; Glode and Opp, 2020; Dugast, Üslü, and Weill, 2022). Instead, we consider a competitive environment and study the role of relationship trading and trading records. Close to our work, Lee and Wang (2025) considers traders' choice between anonymous exchange trading and nonanonymous OTC trading with dealers. Our model takes their OTC dealer signal about client types as an endogenous outcome of past trading decisions. This allows us to study relationship trading, its impact on clients' trading costs, and the optimal disclosure of trading records.

Next, our paper contributes to a vast literature on transparency in securities markets (e.g., Madhavan 1995, Pagano and Roell 1996, Bolton, Santos, and Scheinkman 2016, Asriyan, Fuchs, and Green 2017, Vairo and Dworczak 2023). This literature usually distinguishes pre-trade transparency—information on posted quotes before trading—and post-trade transparency—information on past trades. Relatedly, our work deals with the post-trade disclosure of client-specific information (trading record). We show that the benefits from such disclosure depend crucially on the availability of dealers to enter relationships.

Unlike these works, our model speaks to the optimal ownership of this post-trade data. [4]

Finally, we contribute to a recent literature that assesses the pros and cons of various trading protocols (notably, RFQ and RFM) that have emerged as complements to traditional OTC voice-based trading. Several recent works emphasize endogenous limits of dealer competition in electronic trading protocols because of dealer service costs (Wang, 2023; Yueshen and Zou, 2022), winner's curse (Riggs, Onur, Reiffen, and Zhu, 2020), and concern of information leakage (Baldauf and Mollner, 2024). Similar to this last work, our model stresses the costs from leakage of clients' trading intentions in RFQ protocols, although our mechanism is different. Unique to our paper is the focus on trading relationships and trading records.

2 Model

We build on the canonical dealers' market model of Glosten and Milgrom (1985). The main difference with their setup is that clients trade repeatedly in our model. Repeated trading gives a meaningful role to clients' trading record and allows traders to form relationships.

2.1 Environment

The economy has three dates $t = \{1, 2, 3\}$. There is a client (either a hedger or a speculator) and many dealers. All agents are risk neutral and do not discount cash flows. They consume one storable good, called cash, and can trade a risky asset.

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[4] This point is related to recent discussions of "open banking", which aims to give customers ownership of data generated from their interaction with banks. See, for instance He, Huang, and Zhou (2023).

Asset The risky asset pays $v_3 = \varepsilon_2 + \varepsilon_3$ at $t = 3$, where ε_t is a publicly observable shock, realized at the beginning of date t. The shock has the following distribution,

$$\varepsilon_t = \begin{cases} \sigma & \left(\text{prob. } \frac{1}{2}\right) \\ -\sigma & \left(\text{prob. } \frac{1}{2}\right) \end{cases},$$

and it is independent across time. For $t \in \{1, 2\}$, v_t denotes the expected value of the asset payoff conditional on date-t public information. We thus have $v_1 = 0$, and $v_2 = \varepsilon_2$.

Clients A client (she) wishes to trade one unit of the asset at dates 1 and 2 (buy or sell). The client is either a (S)peculator or a (H)edger, and their type $\theta \in \{H, S\}$ is private information. Let μ be the probability that the client is a speculator.

Hedgers The hedger derives a private benefit b^H from trading one unit of the asset at dates 1 and 2. At any date $t \in \{1, 2\}$, she enjoys this private benefit from selling with probability 1/2, or from buying with the same probability. This trading need is uncorrelated across time. It captures in reduced-form a benefit from hedging some underlying portfolio.

Speculators The speculator has no intrinsic trading need, but she receives private information about the asset value. At the beginning of each date $t \in \{1, 2\}$, she observes a signal $s_{t+1} \in \{\sigma, -\sigma\}$ about the next period innovation, ε_{t+1} of the asset value. The signal precision

$$\alpha \equiv Pr[s_{t+1} = \varepsilon_{t+1}] \in \left(\frac{1}{2}, 1\right], \tag{1}$$

is the probability that the signal matches the next asset innovation. The signal confers an informational benefit to the speculator, relative to uninformed traders, defined as

$$b^S \equiv \left|\mathbb{E}\left[\epsilon_{t+1}|s_{t+1}\right]\right| = \sigma(2\alpha - 1). \tag{2}$$

This informational benefit increases with the payoff variability σ and the signal precision α. The speculator enjoys this benefit at the expense of other traders. This is different from the hedger, whose private benefit, is the source of gains from trade.

Dealers There are many dealers present at dates 1 and 2, who act competitively. Dealers are long-lived, which allows them to establish a trading relationship with the client. However, a dealer (him) present at date 1 becomes unavailable at date 2 with probability $q \in [0, 1]$. In practice, dealers are not always available or willing to provide quotes due, for instance, to inventory considerations. When $q = 1$ dealers are short-lived, no trading relationship can be sustained. In this case, clients trade spot, since no dealer present at date 1 is available at date 2.[5]

Assumption 1. $\mu b^S \leq b^H \leq \frac{\mu\alpha}{\mu\alpha + \frac{1}{2}(1-\mu)} b^S$

Assumption 1 implies that adverse selection is mild. Intuitively, μb^S is a measure of the adverse selection cost imposed by the speculator, since it is equal to the probability that the client is a speculator, multiplied by the speculator's information advantage. As we will verify, the left inequality in Assumption 1 implies that social gains from trade exceed the adverse selection cost. The role of the rightmost inequality will become clear in our analysis. In Appendix B, we relax Assumption 1 to consider the case with severe adverse selection.

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[5] In addition, we rely on the limit when q goes to 0 to refine out-of-equilibrium beliefs when $q = 0$.

2.2 Trading and Contracts

At date 1, dealers compete for the customer trades by posting contracts. A contract specifies a bid price at which the client can sell the asset, and an ask price at which the client can buy the asset, for each date $t \in \{1, 2\}$. The symmetry of the environment implies that the bid and ask prices are $v_t - m_t$ and $v_t + m_t$ respectively, where v_t is the prior value of the asset at date t and m_t the (mid)spread quoted by the dealer. If a dealer observes the trading record of a client after date 1, he may set a record-contingent spread for trading at date 2.[6]

Definition 1. *The trading record $r \in \{l, g\}$ indicates whether the client gains ($r = g$) or loses ($r = l$) on the date-*1 *trade. The trading record is public (private) when it is (not) observed by other market participants.*

The dealer selected at date 1, called the *relationship dealer*, observes the record by default, because he takes the other side of the client's trade. A contract $\mathcal{M} = \{m_1, \{m_{2r}\}_{h \in \{l,g\}}\}$ thus specifies a record-contingent midspread at date 2. Non-selected dealers, called *outside dealers*, observe the trading record at date 2 only when it is public.

Clients lack commitment power. This implies that they terminate the relationship at date 2 if the contractual quote from their relationship dealer is less favorable than the best quote from outside dealers. On the other hand, we assume that the relationship dealer can commit to the terms of the contract, provided that it is available to trade. We microfound the dealer's commitment power with collateral in Appendix C.

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[6] The symmetry of the model implies that only the performance of the date-1 trade matters, not the direction of the trade.

2.3 Equilibrium Concept

We consider the equilibrium of the contract market under perfect dealer competition. Because the customer's type is privately observed, dealers play a competitive screening game. While such games may have no equilibrium (see, e.g., Rothschild and Stiglitz 1976), our model admits a unique equilibrium. We will highlight the features of our environment that guarantee existence and uniqueness sequentially as they become relevant for the analysis.

3 Benchmark: Spot Trading

In this section, we analyze the special case of our model in which customers cannot form relationships. Formally, we set $q = 1$, which implies that contracts are short-term because any relationship breaks up with probability 1. We refer to this benchmark as spot trading.

Under spot trading, we solve for the equilibrium midspread date by date. Dealers cannot screen customers because the latter either submit unit orders or do not trade. As a result, the equilibrium midspread in the spot market at any date $t \in \{1, 2\}$ is the lowest midspread such that dealers break even given their belief about the customer.[7]

To solve for the equilibrium midspread, we rely on the symmetry of the environment and focus on buy orders. Suppose the best ask price from dealers is $v_t + m$. A hedger buys if her private benefit is positive, and $b^H \geq m$. A speculator buys if she observes signal $s_{t+1} = \sigma$, which happens with probability α $(1 - \alpha)$ when the innovation is $\varepsilon_{t+1} = \sigma$ $(\varepsilon_{t+1} = -\sigma)$. Given dealers' belief μ_t that the client is a speculator at date $t \in \{1, 2\}$, the profit a dealer

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[7] Formally, the equilibrium of the competitive screening game is pooling. The key feature that enables this outcome is that customers trade either one or zero units, which is akin to a linear pricing restriction in competitive screening games. This implies that dealers cannot attract only hedgers with a cream-skimming deviation from the pooling contract.

enjoys when quoting midspread $m \leq b^S$ is

$$\Pi^D_{spot}(m;\mu_t) = \frac{1}{2}(1-\mu_t)m\mathbf{1}_{b^H \geq m} + \frac{1}{2}\mu_t\left[\alpha(m-\sigma)+(1-\alpha)(m+\sigma)\right], \tag{3}$$

where $\mathbf{1}_{b^H \geq m}$ is the indicator function taking value 1 if the condition $b^H \geq m$ is satisfied. By definition, the competitive midspread is the lowest value of m such that $\Pi^D_{spot}(m;\mu_t) = 0$.

Lemma 1. *Let μ_t be dealers' belief that the client is a speculator. The competitive spot midspread at date t is given by*

$$m_{spot}(\mu_t) \equiv \begin{cases} \mu_t b^S & \textit{if} \quad \mu_t \leq \hat{\mu}, \\ b^S & \textit{if} \quad \mu_t > \hat{\mu} \end{cases},$$

where $\hat{\mu}^S \equiv b^H/b^S$ is the belief above which the spot market breaks down.

Lemma 1 shows that competitive dealers charge a spread due to adverse selection. Two cases are possible. When the probability μ_t of facing a speculator is low, dealers charge a fair spread, equal to the probability of facing a speculator, μ_t multiplied by the expected trading loss inflicted by that client, $b^S = \sigma(2\alpha - 1)$. The hedger trades because her private benefit b^H exceeds this fair spread when μ is low enough. When adverse selection is severe ($\mu_t > \hat{\mu}$), however, the market breaks down because the fair spread exceeds b^H. Hedgers do not trade, and the equilibrium spread is equal to the reservation value of speculators, b^S.

Lemma 1 characterizes the competitive midspread under spot trading for given dealers' beliefs about the client type. In equilibrium, these beliefs must be rational. At date 1, the dealer's belief is equal to the probability of facing a speculator, $\mu_1 = \mu$. At date 2, beliefs depend on the observability of the client's trading record.

Private Record/Anonymous Trading In this case, dealers do not observe the client's trading record at date 2, as the client remains anonymous. In the absence of information, dealers' rational belief to face a speculator does not change over time: $\mu_2 = \mu_1 = \mu$. The next result follows immediately from Lemma 1.

Proposition 1. *Without a trading record, clients face the midspread* $m_{spot}(\mu)$ *in the spot market at both dates, and the hedger utility is given by* $U^H_{spot,priv} = 2\big(b^H - \mu b^S\big)$.

Without a trading record, dealers and clients play the same static game at dates 1 and 2. Gains from trade are realized under Assumption 1 because the hedger's private benefit, b^H exceeds the adverse selection cost, μb^S imposed by the speculator. However, as we show next, the hedger achieves a higher utility level when her record is public.[8]

Public Trading Record In this case, dealers observe the client's trading record $r \in \{l, g\}$ at date 2. The trading record contains information, because different clients generate different trading records. Let π^θ_r the probability that client $\theta \in \{S, H\}$ obtains record $r \in \{l, g\}$. The hedger who trades to satisfy idiosyncratic liquidity needs generates each record with equal probability; that is,

$$\pi^H_l = \pi^H_g = \frac{1}{2} \tag{4}$$

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[8] As all gains from trade are realized in the anonymous market, no market arrangement can deliver higher social welfare. However, our positive analysis is concerned primarily with the market design that emerges in equilibrium. In our model, this is the market design that delivers the highest utility to hedgers, and, as we show next, this is not the anonymous market. In Appendix B, we consider the severe adverse selection case, in which social welfare is zero under spot trading in an opaque market. There, alternative market designs not only increase the hedger's utility, they also increase social surplus.

The speculator generates a gain when her signal proves correct. Thus,

$$\pi_g^S = \alpha = 1 - \pi_l^S. \tag{5}$$

At date 2, dealers observe the record $r \in \{l, g\}$ and update their belief that the client is a speculator using Bayes law:

$$\mu_{2r} = \frac{\mu \pi_r^S}{\mu \pi_r^S + (1 - \mu)\pi_r^H}, \quad r \in \{l, g\} \tag{6}$$

Relative to date 1, dealers face more (less) adverse selection when they observe record $r = g$ ($r = l$) at date 2, that is, $\mu_{2l} < \mu < \mu_{2g}$. As the hedger records a gain less often than the speculator, dealers become more confident that they face a speculator when they observe $r = g$. Hence, adverse selection worsens in this case, while it improves when $r = l$.

To characterize the spot market equilibrium with a public record, we use Lemma 1 to map the dealers' beliefs given by (6) to equilibrium spot prices at date 2. This equilibrium characterization relies on the conjecture that the speculator buys (sells) when she gets a good (bad) signal at date 1, which is the optimal static strategy. When their trading record is public, however, speculators could trade against their signal at date 1 to manipulate their record and obtain better terms at date 2. Hence, we must check that the speculator does not manipulate her record given the date-2 spot prices implied by the beliefs in equation (6).

To verify that the speculator does not manipulate her record, compute first her expected utility if she trades according to her signal:

$$U^S = 2b^S - m_{spot}(\mu) - \alpha m_{spot}(\mu_{2g}) - (1 - \alpha) m_{spot}(\mu_{2l}). \tag{7}$$

At date 2, the speculator gets a record $r = g$ ($r = l$) with probability $\pi_g^S = \alpha$ ($\pi_l^S = 1 - \alpha$). Now, suppose instead that the speculator trades against her signal; that is, she buys (sells) when she receives signal $s_2 = -\sigma$ ($s_2 = \sigma$). In this case, she obtains

$$\tilde{U}^S = -b^S - m_1 + b^S - (1-\alpha) m_{spot}(\mu_{2g}) - \alpha m_{spot}(\mu_{2l}) \tag{8}$$

When trading against her signal, the speculator faces better terms of trade at date 2 than under the conjectured strategy. Indeed, she records a loss with a higher probability ($\alpha > 1 - \alpha$) and thus trades at the lowest midspread $m_{spot}(\mu_{2l})$ more often than without manipulation. However, to manipulate her record, she incurs a loss at date 1, equal to her private benefit. Relative to the conjectured strategy, the total loss is $2b^S$. Overall, the speculator optimally follows her signal at date 1 if $U^S \geq \tilde{U}^S$, which is equivalent to

$$2\sigma \geq \left[m_{spot}(\mu_{2g}) - m_{spot}(\mu_{2l}) \right] \tag{9}$$

We verify that this incentive constraint is slack in the proof of the next result.

Proposition 2. *Under spot trading, with a public trading record, the competitive midspread is $m_{spot}(\mu)$ at date 1, and $m_{spot}(\mu_{2r})$ at date 2 for record $r \in \{l, g\}$, where m_{spot} is defined in Lemma 1. The market breaks down for record $r = g$. The hedger achieves a utility level*

$$U^H_{spot,pub} = b^H - \mu b^S + \frac{1}{2}\left(b^H - \mu_{2l} b^S \right) > U^H_{spot,priv}, \tag{10}$$

that is, the hedger strictly benefits when her trading record is public.

Proposition 2 shows that, under spot trading, the hedger achieves a higher utility with a (public) trading record. The record partially reveals the client type because speculators more (less) often record a gain (loss) than hedgers. The low (high) spread after a loss (gain) thus rewards the hedger at the expense of the speculator. Relative to the private record case, these market-based rewards and punishments lower the expected trading cost for the hedger and increase that of the speculator, since dealers break even in both cases. Proposition 2 also shows that the hedger does not trade when she records a gain, as adverse selection is too strong in that case. This feature reflects another related benefit of a public record. Public records introduce variability in spreads at date 2, which the hedger enjoys, because she can exercise her option to abstain from trading. That option is valuable when the client records a gain, as the market breaks down in this case.[9]

4 Trading Record and Relationships

Now, we consider the general case $q \in [0, 1)$ in which the client can establish a relationship with a dealer. There are two key differences relative to spot trading. First, clients and dealers can enter long-term contracts. Second, while the client may keep her record private from other dealers, the relationship dealer observes this record by design.[10]

Under relationship trading, dealers offer long-term contracts that specify midspreads for both date 1 and date 2. Although dealers may now use date-2 spreads to screen clients, there also exists a unique pooling equilibrium under relationship trading. Furthermore, this equilibrium contract maximizes the hedger's utility under two constraints: (i) dealers break

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[9] Formally, the hedger payoff at date 2, $\max\{b^H - m, 0\}$ is convex in the midspread m. Thus, the hedger strictly benefits from the variability in midspread if some realizations exceed b^H. This option value would disappear if we reversed the rightmost inequality of Assumption 1 and assumed $b^H > \mu_{2g} b^S$ instead. However, the hedger would still strictly benefit from the improved personalized prices of a public record.

[10] In other words, unlike with spot contracts, clients cannot remain fully anonymous with relationship trading. However, if the trading record could stay private even from the relationship dealer (e.g., if innovation ε_1 is publicly observed only at date 3), we can show that clients would not benefit from relationships: the equilibrium outcome would be the same as that under anonymous spot trading.

even, and (ii) speculators buy (sell) if they get a positive (negative) signal. To streamline the exposition, we take this equivalence as given in the main text and solve for this *hedger-optimal* contract. We prove this equivalence, as well as equilibrium existence and uniqueness of the competitive game between dealers in Appendix D.[11]

In what follows, we consider first the public-record case to highlight the benefits of trading relationships for the hedger, over and beyond the availability of the trading record. Then, in Section 4.2 we characterize the private-record case and compare it to the public record.

4.1 Public Record

As stated above, we solve for the equilibrium contract as the constrained optimal contract for the hedger. To define this optimization problem, we first characterize the outside dealers' quotes. At date 2, the customer may trade with outside dealers, either because her relationship broke up, or because outside dealers outcompete the relationship dealer. Thus, let y_r^θ be the endogenous indicator variable that takes value 1 when the client accepts the relationship dealer's quote, and value 0 otherwise. Clients, who lack commitment power, accept the date-2 quote from their relationship dealer if and only if it is lower than their private benefit, and lower than the outside dealers' quote, that is,

$$y_r^\theta \equiv \begin{cases} 1 & \text{if} \quad m_{2r}^{rel} \leq \min\{b^\theta, m_{2r}^{out}\} \\ 0 & \text{otherwise} \end{cases}, \tag{11}$$

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[11] As observed before, the fact that speculation generates no gain from trade implies that no separating equilibrium can be sustained. Second, a pooling equilibrium can be sustained because our model differs from standard competitive screening games (e.g. Rothschild and Stiglitz 1976) in two important respects. First, as observed before, trades are for zero or one unit. Second, the speculator can manipulate her trading record and thus her terms of trade at date 2. As we will show, this feature blocks cream-skimming deviations from the relationship contract considered below.

where m_{2r}^{out} is the outside dealers' competitive midspread after record r. Equation (11) shows that the set of customers who contact outside dealers, and, thus, the beliefs of outside dealers depend on the outside dealers' quotes. The next result thus characterizes the outside dealers' quotes as the solution to a fixed-point problem.

Lemma 2. *Let $\mathcal{M}$ be a given contract. With a public record $r \in \{l, g\}$, the competitive quote from outside dealers at date 2 is $m_{2r}^{out}(\mathcal{M}) \equiv m_{spot}(\mu_{2r}^{out}(\mathcal{M}))$ where*

$$\mu_{2r}^{out}(\mathcal{M}) = \frac{\mu\pi_r^S\left[q + (1-q)(1-y_r^S)\right]}{\mu\pi_r^S\left[q + (1-q)(1-y_r^S)\right] + (1-\mu)\pi_r^H\left[q + (1-q)(1-y_r^H)\right]}, \tag{12}$$

where π_r^θ is given by equations (4) and (5) and y_r^θ is given by equation (11).

The mapping between beliefs and quotes in Lemma 2 follows directly from Lemma 1, which characterizes competitive spot quotes. The key result from Lemma 2 is thus equation (12), which maps customers' decision to stay in the relationship to outside dealers' beliefs. Consider first the case in which the relationship always breaks up exogenously ($q = 1$), which corresponds to the spot trading benchmark. Then, equation (12) collapses to equation (6), that is, $\mu_{2r}^{out} = \mu_{2r}$ as outside dealers face all customers with record r. The existence of trading relationships ($q < 1$) complicates the inference problem for outside dealers if customers types have heterogeneous propensities to stay in their relationship. When $q < 1$, $\mu_{2r}^{out} \neq \mu_{2r}$ unless $y_r^S = y_r^H$. When, say, $y_r^S \neq y_r^H$, dealers face a selected sample of customers relative to the pool of customers with record r characterized with belief μ_{2r}. This observation implies that outside dealers' beliefs depend on the relationship contract, to the extent that different contracts induce heterogeneous participation choices $\{y_r^\theta\}_{r=l,g}^{\theta=H,S}$ by clients at date 2.

Now, we define the constrained optimization problem to maximize the hedger's utility that yields the equilibrium contract. As mentioned before, we will then verify that this hedger-optimal contract is indeed the unique equilibrium contract when dealers compete.

Problem 1 (Hedger-Optimal Contract)**.** *The equilibrium contract with a public record is any contract* $\mathcal{M}^*_{pub}$ *that maximizes the hedger's utility*

$$U^H = b^H - m_1^{rel} + \frac{1}{2} \sum_{r\in\{l,g\}} \left[q(b^H - m_{2h}^{out})^+ + (1-q)\left(b^H - \min\{m_{2h}^{out}, m_{2h}^{rel}\}\right)^+ \right] \tag{13}$$

subject to the relationship dealer's participation constraint

$$0 \leq m_1^{rel} - \mu^S b^S + (1-q) \sum_{r\in\{l,g\}} \left[\mu \pi_r^S y_r^S \left(m_{2r}^{rel} - b^S\right) + (1-\mu)\pi_r^H y_r^S m_{2r}^{rel} \right] \tag{PC}$$

and the speculator's incentive constraint not to manipulate her record

$$2\sigma \geq q\left(m_{2g}^{out} - m_{2l}^{out}\right) + (1-q)\left(\min\{m_{2g}^{out}, m_{2g}^{rel}\}\right) - \min\{m_{2l}^{out}, m_{2l}^{rel}\}\right) \tag{IC}$$

where outside dealer quotes $\{m_{2r}^{out}\}_{r=l,g}$ *are given by Lemma 2,* π_r^θ *is given by equations (4) and (5) and* y_r^θ *is given by equation (11).*

Equation (13) gives the hedger's utility for a generic contract, using the observation in equation (4) that a hedger obtains each record with equal probability. The expression shows that when the relationship breaks up exogenously, the customer may trade only with outside dealers. Otherwise, she trades at the best quote available, if any. Next, participation constraint (PC) states that the relationship dealer should not make losses in expectation. Observe that at date-2, the relationship dealer trades with client $\theta \in \{H, S\}$ with record $r \in \{l, g\}$ if and only if the relationship does not break up (probability $1-q$) and the client accepts the relationship dealer's quote ($y_r^\theta = 1$). Finally, Problem 1 features an incentive constraint for the speculator. Constraint (IC) implies that the speculator prefers not to manipulate her trading record when taking the hedger-optimal contract, that is, she buys (sells) when she gets a positive (negative) signal about the asset value. As we will verify, the speculator's participation constraint is also satisfied when (IC) holds.

The rationale for constraint (IC) is as follows. Under relationship trading, the dealer chooses the date-2 midspreads, which may differ from the spot midspreads, derived in Section 3. That analysis already suggested that a relative penalty following a trading gain favors the hedger and harms the speculator. However, the speculator's ability to manipulate her record limits the power of such a scheme. Incentive constraint (IC) formalizes this limit on rewards and punishments that a relationship dealer can impose on his client to maximize the hedger's utility. That is, $m_{2g}^{rel} - m_{2l}^{rel}$ cannot be too large. Observe that when $q = 1$, equation (IC) collapses to the incentive constraint under spot trading, given by equation (9).[12]

In Problem 1, the client's decision to accept the relationship dealer's quotes $\{y_r^\theta\}_{r=l,g}^{\theta=H,S} \in \{0,1\}^4$ plays a key role. From Lemma 2, these decisions indeed shape the beliefs of outside dealers and the competitive quotes they provide. To solve for Problem 1, we first narrow the search to acceptance decisions that are admissible in equilibrium.

Lemma 3. *In equilibrium, $y_r \equiv y_r^H = y_r^S$ for any record $r \in \{l, g\}$, that is, either both the hedger and the speculator trade with the relationship dealer at $t = 2$, or none of them do.*

Lemma 3 reduces the set of relevant acceptance decisions to four. To see why Lemma 3 holds, observe first that if the hedger accepts the relationship dealer's quote at date 2, so does the speculator, who has a higher private benefit. Conversely, it cannot be optimal that the relationship dealer trades only with the speculator at date 2. Formally, we show that such a pattern is either incompatible with equilibrium, or there exists another contract that

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[12] Problem 1 constrains the search of the hedger-optimal contract to the set of manipulation-proof contracts. Contracts with speculator manipulation in equilibrium are suboptimal for the hedger, because the speculator must be compensated for the loss on the date-1 trade.

delivers higher utility to the hedger. Hence, a contract that solves Problem 1 must induce the same acceptance decisions for both clients at date 2.

Thanks to Lemma 3 , solving Problem 1 boils down to a comparison between four types of contracts. For each admissible pattern $\{y_r\}_{r=l,g} \in \{0,1\}^2$, we may characterize the contract that maximizes the hedger's utility and then compare continuation patterns. In fact, we already characterized one such contract when we considered spot trading. Indeed, when $y_r = 0$ for all $r \in \{l,g\}$, the client never trades with the relationship dealer at $t=2$, which is equivalent to the case in which the relationship always breaks up exogenously ($q=1$). Hence, unless that contract remains optimal for the hedger with relationship trading, it is left to determine whether the client always trades with the relationship dealer when she can, or only when she obtains one of the two records $r \in \{l,g\}$. The next result shows that the first option dominates.

Proposition 3. *With a public record, the equilibrium contract is such that the client trades with the relationship dealer for both records $r \in \{l,g\}$ unless the relationship breaks up, the relationship dealer's* (PC) *and the speculator's* (IC) *bind. The hedger achieves utility*

$$U^H_{pub}(q) = b^H + (1-q)(b^H - \mu b^S) + \frac{1}{2}q(b^H - \mu b^S) \tag{14}$$

In the proof of Proposition 3, we verify our claim that the hedger-optimal contract coincides with the unique competitive equilibrium contract. The key result is that trading relationships with dealers magnify the benefits of a public trading record for hedgers. Equation (3) shows indeed that the hedger's utility $U^H_{pub}(q)$ strictly decreases with the probability of an exogenous relationship breakup q. When $q=1$, we recover the spot trading case, with $U^H_{pub}(1) = U^H_{spot,pub}$. Relative to spot trading, the trading relationship delivers two related improvements to the hedger. First, the relationship contract implements a more efficient reward-and-punishment scheme for the hedger, relative to the spot market outcome. Below, we provide the intuition for these two benefits of relationship trading relative to spot trading, by focusing on the case $q = 0$ (no breakup).

First, we show that a relationship contract that induces trading after record $r = g$ delivers higher utility to the hedger than the spot contract. Consider contract $\widetilde{\mathcal{M}}$ given by

$$\tilde{m}_{2r}^{rel} = \begin{cases} b^H & \text{if} \quad r = g \\ m_{spot}(\mu_{2l}) - (b^S - b^H) & \text{if} \quad r = l \end{cases} \tag{15}$$

$$\tilde{m}_1 = m_{spot}(\mu) + b^S - b^H - \frac{1}{2}(1 - \mu)b^S, \tag{16}$$

which we compare to the spot contract characterized in Proposition 2. The lower midspread $\tilde{m}_{2g}^{rel} = b^H$ for record $r = g$, relative to spot trading ($m_{spot}(\mu_{2g}) = b^S$) ensures that the hedger weakly prefers to trade after a gain. The midspread for record $r = l$ decreases by the same amount to fix the relative punishment for recording a gain, $\tilde{m}_{2g}^{rel} - \tilde{m}_{2l}^{rel}$ to the level of the spot contract. Finally, relative to the spot contract, the date-1 spread $\tilde{m}_1$ increases to ensure that the relationship dealer breaks even. Contract $\widetilde{\mathcal{M}}$ dominates the spot contract for the hedger, since her net change in utility is equal to

$$\Delta U_a^H = -\big[\tilde{m}_1 - m_{spot}(\mu)\big] - \frac{1}{2}\big[\tilde{m}_{2l}^{rel} - m_{spot}(\mu_{2l})\big], \tag{17}$$

$$= \frac{1}{2}(b^H - \mu b^S) > 0. \tag{18}$$

Contract $\widetilde{\mathcal{M}}$ allows a hedger with record $r = g$ to realize gains from trade at a cost $\mu b^S < b^H$ (Assumption 1). This requires the relationship dealer to take a loss at date 2, but, unlike a dealer trading spot, he can recoup these losses by charging a larger spread at date 1.[13]

Next, we show that the hedger further benefits from relationship trading, because the client enjoys a larger relative reward for a loss record, compared to spot trading. As discussed previously, this benefits the hedger at the expense of the speculator. The largest gap in spreads that avoids manipulation by the speculator is

$$m_{2g}^{rel} - m_{2l}^{rel} = 2\sigma > \tilde{m}_{2g}^{rel} - \tilde{m}_{2l}^{rel} = m_{spot}(\mu_{2g}) - m_{spot}(\mu_{2l}), \tag{19}$$

which we obtain by setting $q = 0$ in the speculator's (IC). Relative to contract $\widetilde{\mathcal{M}}$ considered above, this strongest reward scheme further increases the hedger's utility by

$$\Delta U_b^H = \left(\frac{1}{2} - \pi^l\right)\left[m_{2g}^{rel} - m_{2l}^{rel} - \left(\tilde{m}_{2g}^{rel} - \tilde{m}_{2l}^{rel}\right)\right] = \frac{1}{2}(\mu_{2l} + \mu)b^S \tag{20}$$

Overall, the total utility gain from relationship trading relative to spot trading is

$$U_{pub}^H(q) - U_{spot,pub}^H = (1-q)\left[\Delta U_a^H + \Delta U_b^H\right]$$

where ΔU_a^H, given by (18) corresponds to the increase in gains from trade, and ΔU_b^H given by (20) corresponds to the gains from the efficient use of the trading record.

Finally, we explain why the reward-and-punishment scheme can be enforced despite the clients' lack of commitment. Proposition 3 states that any contract $\mathcal{M}$ such that the relationship continues when possible, and constraints (PC) and (IC) bind can be an equilibrium contract. In particular, the speculator's (IC) pins down the gap in date-2 midspreads, given

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[13] The speculator also benefits from this modified contract, as her net utility gain is $\Delta U^S = \frac{1}{2}(1-\mu)b^S$. Overall, contract $\widetilde{M}$ splits the expected gains from trade $\frac{1}{2}(1-\mu)b^H$ generated by the hedger with record $r = g$ between the hedger herself and the speculator.

by (19), which sets the relative reward for recording a loss, but not the absolute levels of the spreads $(m_{2g}^{rel}, m_{2l}^{rel})$. Hence, the relationship dealer can set those spreads below the quotes provided by outside dealers, while satisfying the speculator's (IC). The relationship dealer loses at date 2, because he trades below the break-even (spot) prices. However, he recoups these losses by charging a larger spread $m_1 > m_{spot}(\mu)$ at date 1, than under spot trading. Hence, relative to spot trading, the client invests in the relationship at date 1 and benefits from relationship discounts at date 2.[14]

4.2 Private Trading Record

Now, we turn to the analysis of the case with a private trading record. Our analysis under spot trading shows that a public trading record improves upon anonymous trading. This argument could suggest that under relationship trading, a public trading record dominates a private record. However, the opposite result holds: keeping the trading record private is optimal when clients can form trading relationships with dealers.

The analysis of a private trading record differs from the public-record case in one key aspect. The relationship dealer still observes the client's trading record, but outside dealers do not. Thus, outside dealers' provide the same quotes to all clients who contact them. The next result adapts Lemma 2 to characterize outside dealers' quotes with a private record.

Lemma 4. *Let $\mathcal{M}$ be a given contract. With a private record, the competitive outside dealers'*

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[14] This discussion suggests that, while clients' commitment is not needed, dealers' commitment power matters for the result. The reason is that the date-1 payment m_1 by the client is sunk at date 2, and, without commitment, the dealer would not execute the (loss-making) contract at date 2. Appendix C shows that commitment can be restored if the client's initial payment is held in a segregated account. This analysis shows that, implementing the contract of Proposition 3 with collateral instead of dealer commitment requires larger client resources at date 1.

quote at date 2 is $m_{2g}^{out}(\mathcal{M}) = m_{2l}^{out}(\mathcal{M}) \equiv m_{spot}(\mu_2^{out}(\mathcal{M}))$ *where*

$$\mu_2^{out}(\mathcal{M}) = \frac{\mu \sum_{r\in\{l,g\}} \pi_r^S \left[q + (1-q)\big(1-y_r^S\big)\right]}{\sum_{r\in\{l,g\}} \mu\pi_r^S \left[q + (1-q)\big(1-y_r^S\big)\right] + (1-\mu)\pi_r^H \left[q + (1-q)\big(1-y_r^H\big)\right]} \tag{21}$$

where π_r^θ *is given by equations* (4) *and* (5) *and* y_r^θ *is given by equation* (11)*.*

Outside dealers do not know the client's trading record. Hence, their belief μ_2^{out} may differ from the prior μ only if speculators and hedgers have different participation decisions y_r^θ. For clients, this implies that they face the same price from outside dealers, independently of their trading record, unlike in the public-record case. However, the client may still face record-contingent prices from her relationship dealer. Making the record private thus confines price discrimination to the client's relationship.

For brevity, we abstract from the formal definition of the equilibrium contract with a private trading record, as it follows closely Problem 1 for a public record. The only difference comes from the definition of outside dealers' prices, now given by Lemma 4, instead of Lemma 2. Thus, we state directly our main result below.

Proposition 4. *With a private record, the equilibrium contract is such that the client trades in all contingencies at date* 2*, the relationship dealer's* (PC) *and the speculator's* (IC) *bind. The hedger achieves utility*

$$U_{priv}^H(q) = b^H + b^H - \mu b^S, \tag{22}$$

that exceeds her utility with a public record, $U_{priv}^H(q)$ *for all* $q \in (0,1]$*.*

Proposition 4 shows that the equilibrium contract with a private record resembles that under a public record, with one key difference. With a public record, a hedger with a gain record does not trade (with an outside dealer) when her relationship breaks up. With a private record, trade occurs because such a hedger is pooled by uninformed outside dealers with clients who recorded a loss. As with anonymous spot trading, Assumption 1 guarantees that trade occurs in the spot market when outside dealers have no information.

To explain the ranking between the private record and the public record, we can rely on the intuition developed for Proposition 3. There, we showed that the hedger can trade with her relationship dealer at date 2 even when she records a gain. However, with a public record, the hedger still cannot trade in that case if her relationship breaks up. Keeping the record private allows the hedger to realize these missing gains from trade. With a private trading record, the market for a hedger with record $r = g$ no longer breaks down, because these clients are pooled with the (better) group of clients who record a loss (and whose relationship broke up). Thus, while public information benefits the hedger under spot trading, keeping the record private is optimal when she can form trading relationships.

5 Implications

In this section, we lay out the implications of our model for asset markets, such as bonds and derivatives, that traditionally relied on bilateral trading relationships. Thanks to technological progress, clients in these markets now have access to a wide variety of electronic trading protocols that have considerably facilitated access to potential counterparties.[15] Simultaneously, various regulatory initiatives aimed to increase competition and increase post-trade transparency (e.g., TRACE) in these markets.

In light of these developments, we derive the implications of our model for relationship trading (Section 5.1) and price discrimination in OTC markets (Section 5.2). We then discuss

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[15] According to recent estimates, electronic trading platforms represented about half of the corporate bond volume in 2024 (Carter, 2025).

the relative merits of various trading protocols (Sections 5.3 and 5.4). In Section 5.5, we highlight the drawbacks of post-trade transparency initiatives such as TRACE. Finally, in Section 5.6, we study whether clients should control their trading record.

5.1 Persistence of Relationship Trading

Persistent client-dealer trading relationships have been widely documented in many OTC markets and are often attributed to search frictions between counterparties. Surprisingly, relationship trading remains prevalent despite recent advances in trading technologies such as request-for-quotes protocols that virtually eliminate these frictions. In a modern RFQ protocol, a client can request at any time quotes from all dealers with a click on a trading software. Yet, empirically, clients solicit few quotes and often trade with the same dealers.

In our model, relationship trading arises even without search frictions due to information asymmetry about trading motives. Relationship dealers infer their clients' trading motives over time by observing their trading records, and offer record-contingent spreads for future trades. These spreads are set in a way that erodes the information advantage of speculators, thereby benefiting liquidity-driven clients. Interestingly, clients value bilateral relationships because this arrangement keeps their record private. That is, even if trading records could be shared publicly with all counterparties (e.g., via blockchain), clients would still prefer bilateral relationships to maintain privacy of their record.

In short, our theory rationalizes relationship trading by the value of trading records, explains why it persisted despite the substantial advancement in trading technology, and predicts that it would continue to persist even if trading records could be shared.

5.2 Relationship Discounts and Price Discrimination

Several empirical studies have shown that dealers offer discounts to clients with whom they have traded in the past (Jurkatis, Schrimpf, Todorov, and Vause, 2022; Bak-Hansen and Sloth, 2024; Comerton-Forde, Ford, Foucault, and Jurkatis, 2025). Our model rationalizes equilibrium relationship discounts both in terms of the comparison between the relationship dealer's and the outside dealer's quotes (cross-section), and in terms of the comparison of quotes offered by the same relationship dealer to the same client across periods (time series).

First, consider the comparison between the relationship dealer and outside dealers at date-2. The client receives a record-contingent quote from the relationship dealers. Since in equilibrium, the client always prefers to trade with the relationship dealers, these spreads are tighter than the ones offered by the outside dealers. Second, as the relationship dealers are trading with the client at a loss at date-2, they must charge a premium at date-1. Hence, the date-2 spread is tighter than the date-1 spread offered by the same dealer to the same client.

Our results also imply that dealers offer different spreads to clients with different trading records for the same asset. Importantly, such equilibrium price discrimination, and the resulting price dispersion, arises even in the absence of dealer market power or search friction. Moreover, this price discrimination benefits liquidity-driven clients and increases gains from trades. These results therefore challenge the common interpretation of price dispersion as a measure of inefficiency stemming from search frictions or dealer market power.

5.3 Implications for RFQ Trading

In this section, we lay out the implications of our model for Request-For-Quote trading, the leading protocol for bonds and other OTC assets on modern electronic trading platforms. In a RFQ meeting, a client reveals her trading intention (buy or sell) and solicits quotes from a selected number of dealers. As in our model, RFQs allow clients to benefit from competition between dealers. Furthermore, disclosure of the client's trading intention reveals her trading record to participating dealers who do not win the auction. In this respect, the RFQ protocol makes the client's trading record public among participating dealers.

Our results that a private trading record dominates under relationship trading generate several implications for trading via RFQs. First, it rationalizes clients' choice to contact few dealers in RFQs (see e.g., Wang 2023). While increasing the number of solicited dealers can increase competition, it also worsens information leakage, by making the client's record more public. Second, for this reason, regulations to impose a minimum number of bid requests in RFQs (U.S. Securities and Exchange Commission, 2024) may have adverse consequences. Third, our model suggests that RFQ protocols' practice of revealing whether the trade was executed to losing bidders may harm clients. Indeed, this piece of information helps losing dealers reconstruct clients' trading record, thereby increasing the publicity of these records.

The first three implications above rest on the argument that disclosing a client's trading intention publicly is harmful when she can enter trading relationships. However, when relationship trading is not available, our model predicts instead that a public record dominates. In this case, clients prefer ex-ante to disseminate their future trading records to a selected number of dealers, rather than keeping them private. [16] This observation stands in contrast to the front-running concern studied by Baldauf and Mollner (2024), which implies that clients always prefer to hide their trading intention. Hence, a fourth implication of our model for RFQs is that clients should solicit more bids as liquidity provision evolves from a traditional dealer business to a service provided by short-horizon participants such

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[16] This is different from the choice to disclose past trading records ex-post, which we discuss in Section 5.6.

as HFTs, who do not engage in relationships. Without relationships, there is no downside from revealing a client's trading intention to a large(r) set of potential counterparties in our model.

5.4 Comparison between Trading Protocols

Our model can help compare trading protocols to the extent that they entail different degrees of transparency for client trading records. As discussed above, with modern RFQ protocols, clients' trading records become public to the dealers solicited in the auction. This contrasts with traditional voice-based bilateral trading in which only the trading dealer knows the record. While clients likely enjoy less competition with voice-based trading, this trading protocol preserves trading record privacy, which is optimal under relationship trading. Hence, our model provides a rationale for the persistence of voice-based trading despite the availability of competitive auctions via RFQs.

Interestingly, a more recent trading protocol, known as the request-for-market (RFM), has gained significant traction (Smith, 2024). We argue that this protocol restores the privacy of trading records while generating competition between dealers, thanks to a similar auction format as for RFQs. In a RFM, the client sends two-sided requests to dealers, unlike in a RFQ, where she reveals her trading intention. Hence, although the participating dealers know that a transaction has occurred, only the winning dealer knows the trade direction and thus the trading record of the client. Our model attributes the growing popularity of the RFM protocol to its ability to preserve the privacy of the client's trading record.

5.5 Post-Trade Transparency

Our main result is that greater transparency of a customer's trading record is harmful when customers form relationships with dealers. This finding suggests that regulations improving post-trade transparency can have unintended negative effects if they allow market participants to learn clients' trading records. We argue that the Trade Reporting and Compliance Engine (TRACE) for US corporate bonds contributes to greater transparency of clients' trading record with potential adverse welfare consequences.

TRACE mandates dealers to report OTC transactions of eligible US corporate bonds within 15 minutes of the transaction. As soon as it receives the data, TRACE disseminates the time stamp, the execution price, and the trade size (subject to a cap for high-yield bonds) for any such transaction. Such post-trade transparency helps future customers to benchmark quotes they receive from dealers. However, while the data is anonymized, a dealer that was contacted by a customer may infer the customer's trading record even if no trade occurred between them. Our results imply that dealers' ability to infer clients' trading records via TRACE may harm liquidity. Notably, these concerns are likely to be more pronounced for infrequently traded bonds, where dealer inference of customers' record is easier.

5.6 Client Ownership of Trading Records

Recent advances in trading and distributed ledger technology enable clients to maintain verifiable records of their trading histories and share them voluntarily. In this section, we explore the consequences of such client record ownership through the lens of our model.

In our model, giving clients ownership of their trading record is equivalent to the environment with public record. This result follows from a classic unraveling argument for verifiable information. A client with a (favorable) record $r = l$ who contacts an outside dealer strictly benefits by disclosing her record, as she obtains a better quote than a client with no record, or with a record $r = g$. Consequently, a client with an (unfavorable) record $r = g$ cannot hide her record from outside dealers, as not disclosing is equivalent to disclosing $r = g$.

The welfare implications of clients' ownership of their trading record then follow directly from comparing private and public record regimes. When relationship trading is feasible, client ownership of trading records reduces client surplus. Conversely, when only spot trading is available, client ownership increases surplus. More concretely, our model predicts that the benefits of client ownership depend on the identity of liquidity providers in the market. When traditional dealers, who can establish long-term relationships, dominate, clients should not have control of their trading record. However, the opposite result holds if instead short-term liquidity providers (e.g. HFT firms) dominate.

Overall, the ambiguous welfare implications of client data ownership suggest that charging clients for record access might be optimal. When relationship trading is available, such charges discourage clients with a record $r = l$ from sharing records with outside dealers, thus avoiding the negative consequences of the unraveling result in this case.

6 Conclusion

We present a model to explain why relationship trading persists in modern electronic markets. Even in a competitive environment, relationships with dealers allow hedgers to protect themselves from speculation. Our model generates relationship discounts, as observed in practice. We show that dealers optimally act as record keepers by using the customer's trading record but keeping it hidden from other market participants. By stressing this traditional role of dealers, our model also provides implications for the design of modern trading platforms and their optimal degree of transparency. Imposing a minimum number of solicited quotes in RFQ protocols may hurt customers, because such protocols reveal the customer's intended trading direction to all dealers present. In contrast, our results can explain the development of two-sided RFM protocols, in which only the selected dealer ultimately observes the trading record. Finally, we show that giving customers ownership of their trading data may lead to overuse, which ultimately harms market liquidity and efficiency. More generally, our analysis suggests that the benefits of trading record transparency should be assessed against the recent retreat of dealers from some intermediation business.

Appendix

A Proofs

A.1 Proof of Proposition 2

First, we prove that the speculator does not manipulate her signal, as claimed in the main text. Substituting for the date-2 spreads in equation (9), we obtain

$$0 \leq 2\sigma - \sigma(2\alpha - 1)(1 - \mu_{2l}) \tag{A.1}$$

Inequality (A.1) holds because $\alpha \in \left(\frac{1}{2}, 1\right)$ and $\mu_{2l} \in (0, 1)$. This proves that the conjectured strategy is optimal for the speculator.

Next, we prove the inequality $U^H_{pub} > U^H_{priv}$. The expression for U^H_{priv} follows from the observations that the hedger records a loss with probability 1/2 and that she does not trade when she gets record $r = g$. We have

$$\begin{aligned}
U^H_{pub} &> b^H - m_{spot}(\mu) + \frac{1}{2}\Big(b^H - m_{spot}(\mu_{2l})\Big) + \frac{1}{2}\Big(b^H - \mu_{2g}b^S\Big) && \text{(A.2)}\\
&> b^H - m_{spot}(\mu) + b_H - \left[\mu(1-\alpha) + \frac{1}{2}(1-\mu)\right]\mu_{2l} - \left[\mu\alpha + \frac{1}{2}(1-\mu)\right]\mu_{2g} && \text{(A.3)}\\
&= 2b^H - 2\mu b^S = U^H_{priv} && \text{(A.4)}
\end{aligned}$$

The first inequality follows from the upper bound on b^H imposed by Assumption 1. The second inequality follows from $\alpha > \frac{1}{2}$. Finally, equation (A.4) follows from Bayes law, as $\pi_l\mu_{2l} + (1 - \pi_l)\mu_{2g} = \mu$. This concludes the proof.

A.2 Proof of Lemma 3

We prove the result that $y_r^H = y_r^S$ for $r \in \{l, g\}$ in two steps.

Step 1: $y_r^H = 1 \ \Rightarrow\ y_r^S = 1$

By Assumption 1, $b^S > b^H$, which implies that $\min\{b^H, m_{2r}^{out}\} \leq \min\{b^S, m_{2r}^{out}\}$. Hence, since $y^\theta = 1$ is equivalent to $m_{2r}^{rel} \leq \min\{b^\theta, m_{2r}^{out}\}$, it follows that $y^H = 1$ implies that $y^S = 1$.

Step 2: $y_r^H = 0 \ \Rightarrow\ y_r^S = 0$

If $y_r^H = 0$, two cases are possible (i) $m_{2r}^{out} \leq b^H$ and the hedger trades with an outside dealer, or (ii) $m_{2r}^{out} > b^H$ and the hedger does not trade at $t = 2$. In the first case, observe that $y_r^H = 0$ can hold only if $m_{2r}^{out} \leq \min\{m_{2r}^{rel}, b^H\}$, that is, if the outside dealer quote is the best available, and it is lower than $b^H < b^S$. This implies that the speculator strictly prefers to trade at the outside dealer quote, and thus $y_r^S = 0$. This proves the result in case (i).

Now, consider case (ii) in which $m_{2r}^{out} > b^H$. Observe that this case can arise only if $r = g$. Indeed, when $r = l$, the outside dealers' belief, given by equation (12), satisfies $\mu_{2l}^{out} \leq \mu_{2l}$. Given that $m_{spot}(\mu_{2l}) < b^H$ by Assumption 1, the outcome $m_{2l}^{out} > b^H$ cannot be part of an equilibrium. Hence, we are left to consider the case $r = g$ with $m_{2g}^{out} > b^H$.

Suppose that the candidate equilibrium contract features $(y_g^H, y_g^S) = (0, 1)$ and $m_{2g}^{out} > b^H$. By Proposition 2, this implies that $m_{2g}^{out} = b^S$ and thus $m_{2g}^{rel} \in (b^H, b^S)$ since $(y_g^H, y_g^S) = (0, 1)$. We show that there exists an alternative feasible contract that delivers a strictly higher utility to the hedger. This implies that the candidate contract cannot be the equilibrium contract.

Case ii)-a) $(y_g^H, y_g^S) = (0, 1)$, $m_{2g}^{out} = b^S$, $m_{2g}^{rel} \in (b^H, b^S)$ and $y_l^H = y_l^S = 0$

First, suppose that $y_l^H = y_l^S = 0$, such that no client with record l trades with the relationship dealer. Consider an alternative contract with $\hat{m}_{2g}^{rel} > b^S$. With this alernative contract, the outside dealer quotes in state $2g$ is still $\hat{m}_{2g}^{out} = m_{2g}^{out} = b^S$. Indeed, from equation (12), we have

$$\mu_{2g}^{\text{out}}\Big|_{(y_g^H, y_g^S)=(0,0)} \geq \mu_{2g}^{\text{out}}\Big|_{(y_g^H, y_g^S)=(0,1)} \tag{A.5}$$

Given that $m_{2g}^{out} = b^S$ when , $(y_g^H, y_g^S) = (0,1)$ by assumption, $\hat{m}_{2g}^{out} = b^S$ because the outside dealers' beliefs is worse when , $(y_g^H, y_g^S) = (0,0)$ than when , $(y_g^H, y_g^S) = (0,1)$. Also, observe that the speculator's incentive constraint (IC) still holds, because

$$\begin{aligned} K &= q\big(\hat{m}_{2g}^{out} - \hat{m}_{2l}^{out}\big) + (1-q)\big(\min\{\hat{m}_{2g}^{out}, \hat{m}_{2g}^{rel}\}\big) - \min\{\hat{m}_{2l}^{out}, \hat{m}_{2l}^{rel}\}\big) && \text{(A.6)} \\ &= q\big(b^S - m_{spot}(\mu_{2l})\big) + (1-q)(b^S - m_{spot}(\mu_{2l})) && \text{(A.7)} \\ &= q\sigma(2\alpha-1)\big(1-\mu_{2l}\big) + (1-q)\sigma(2\alpha-1)\big(1-\mu_{2l}\big) < 2\sigma && \text{(A.8)} \end{aligned}$$

The first equality obtains because $\hat{m}_{2g}^{out} = b^S < \hat{m}_{2g}^{rel}$ and $m_{2g}^{out} = m_{spot}(\mu_{2l}) < m_{2l}^{out}$ by construction. Hence, we are left to show that the modified contract delivers a higher utility to the hedger. The relationship dealer can change the date-1 spread as follows, while still satisfying his participation constraint (PC):

$$\Delta m_1 = -(1-q)\mu^S\alpha(b^S - m_{2g}^{rel}) < 0$$

Since the contract changes affects the hedger only via m_1, it increases her utility by $\Delta U_H = -\Delta m_1 > 0$. This shows that the candidate contract cannot be optimal when $(y_g^H, y_g^S) = (0,1)$, $m_{2g}^{out} > b^H$ and $y_l^H = y_l^S = 0$

Case ii)-b $(y_g^H, y_g^S) = (0,1)$, $m_{2g}^{out} = b^S$, $m_{2g}^{rel} \in (b^H, b^S)$ and $y_l^H = y_l^S = 1$

In case ii)-b, a client with record l trades with the relationship dealer when the relationship does not break up exogenously. Consider a modified contract such that the hedger trades with the relationship dealer.

$$\hat{m}_{2g}^{rel} = b^H, \quad \hat{m}_{2l}^{rel} = b^H - m_{2g}^{rel} + m_{2l}^{rel}, \tag{A.9}$$

$$\hat{m}_1 = m_1 - (1-q)\left\{\left[\mu(1-\alpha) + \frac{1}{2}(1-\mu)\right](\hat{m}_{2l}^{rel} - m_{2l}^{rel}) + \mu\alpha(b^H - m_{2g}^{rel}) - \frac{1}{2}(1-\mu)b^H\right\} \tag{A.10}$$

In the modified contract, the hedger with record $r = g$ now trades with the relationship dealer because $\hat{m}_{2g}^{rel} \leq b^H$. The outside dealers' price does not change, that is, $\hat{m}_{2g}^{out} = m_{2g}^{out} = b^S$, because equation (A.5) implies that the pool of clients they face is weakly worse when the hedger trades with the relationship dealer. The change in the relationship dealer quote for record $r = l$, given by $\hat{m}_{2l}^{rel} - m_{2l}^{rel}$ ensures that the speculators' incentive constraint (IC) still holds. Finally, the change $\hat{m}_1 - m_1$ ensures that the dealer's participation constraint is still satisfied. We are thus left to show that the hedger enjoys a higher utility with the modified contract. We have

$$\begin{aligned} \Delta U^H &= -\Delta m_1 - \frac{1}{2}(1-q)\Delta m_{2l} && \text{(A.11)} \\ &= (1-q)\left\{-\mu\left(\alpha - \frac{1}{2}\right)\Delta m_{2l} - \mu\alpha(m_{2g}^{rel} - b^H) + \frac{1}{2}(1-\mu)b^H\right\} && \text{(A.12)} \\ &= \frac{1}{2}(1-q)\left\{-\mu(m_{2g}^{rel} - b^H) + (1-\mu)b^H\right\} = \frac{1}{2}(1-q)\left\{b^H - \mu m_{2g}^{rel}\right\} > 0 && \text{(A.13)} \end{aligned}$$

The inequality follows from Assumption 1 that imposes $b^H > \mu b^S$ and the condition $m_{2g}^{rel} < b^S$ for Case ii)-b. This implies that the candidate contract cannot be the equilibrium contract. The proof for this case concludes the proof of Lemma 3.

A.3 Proof of Proposition 3

The first four steps prove the statements in Proposition 3 for the hedger-optimal contract. Appendix D shows that this contract coincides with the equilibrium contract of the competitive screening game, thereby rationalizing our analysis of Problem 1.

Step 1. Preliminary Observations

Let $y_r \equiv y_r^H = y_r^S \in \{0,1\}$ be the indicator variable that takes value 1 if the client trades with the relationship dealer at date 1. Lemma 3 and our observation in the main text implies that we must consider three cases: (i) $(y_l, y_g) = (1,0)$, (ii) $(y_l, y_g) = (0,1)$ and (iii) $(y_g, y_g) = (1,1)$. We write the outside dealer quotes for each case using $\boldsymbol{y} = (y_l, y_g)$ as an argument. Given that $y_r^H = y_r^S$ for $r \in \{l, g\}$, equation (12), implies that the outside dealers belief are the same in all three cases. These are given by $\mu_{2l}^{out} = \mu_{2l}$ and $\mu_{2g}^{out} = \mu_{2g}$, μ_{2l} and μ_{2g} are given by (6). It follows from Lemma 1 that the outside dealer quotes are

$$(m_{2l}^{out}, m_{2g}^{out}) = (\mu_{2l} b^S, b^S). \tag{A.14}$$

Step 2. Dealer Participation Constraint (PC) binds

If constraint (PC) is slack, consider a change to the date-1 spread $\Delta m_1 = -\eta$ where $\eta > 0$ is such that constraint (PC) still holds after this change. The hedger achieves a higher utility with the modified contract, which proves that constraint (PC) must bind.

Step 3. Reformulation of Problem 1

First, we rewrite the hedger utility as a function of (y_g, y_l) and the quotes. For this, substitute the outside dealer quotes, given by (A.14), in the expression for the hedger's utility, given by equation (13). We have

$$U^H = b^H - m_1^{rel} + \frac{1}{2}q(b^H - \mu_{2l}b^S) + \frac{1}{2}(1-q)\left[b^H - \min\left\{m_{2l}^{rel}, \mu_{2l}b^S\right\} + y_g(b^H - m_{2g}^{rel})\right] \tag{A.15}$$

Next, substitute for m_1^{rel} in (A.15) using Step 2, which states that constraint (PC) binds.

$$\begin{aligned}
U^H &= b^H - \mu b^S + \frac{1}{2}q(b^H - \mu_{2l}b^S) + \frac{1}{2}(1-q)b^H - \frac{1}{2}(1-q)(1-y_l)\mu_{2l}b^S \\
&\quad - (1-q)y_l\left[\frac{1}{2} - \frac{1}{2}(1-\mu) - (1-\alpha)\mu\right]m_{2l}^{rel} + \frac{1}{2}(1-q)y_g b^H \\
&\quad - (1-q)y_g\left(\frac{1}{2} - \frac{1}{2}(1-\mu) - \alpha\mu\right)m_{2g}^{rel} - (1-q)\mu\big[\alpha y_g + (1-\alpha)y_l\big]b^S \qquad \text{(A.16)} \\
&= b^H - \mu b^S + \frac{1}{2}q(b^H - \mu_{2l}b^S) + \frac{1}{2}(1-q)b^H + \frac{1}{2}(1-q)y_g b^H - \frac{1}{2}(1-q)(1-y_l)\mu_{2l}b^S \\
&\quad + (1-q)\mu\left(\alpha - \frac{1}{2}\right)\left[y_g m_{2g}^{rel} - y_l m_{2l}^{rel}\right] - (1-q)\mu\big[\alpha y_g + (1-\alpha)y_l\big]b^S \qquad \text{(A.17)}
\end{aligned}$$

Similarly, we can reformulate the speculators' incentive constraint (IC) as follows

$$2\sigma \geq b^S(1-\mu_{2l}) + (1-q)\Big(y_g\left[m_{2g}^{rel} - b^S\right] - y_l\left[m_{2l}^{rel} - \mu_{2l}b^S\right]\Big) \tag{A.18}$$

Hence, Problem 1 is equivalent to maximizing U^H, given by (A.15), by choosing $\{m_{2r}^{rel}, y_r\}_{r=l,g}$, subject to the speculators' incentive constraint (A.18) and the feasibility constraint

$$m_{2r}^{rel} \leq m_{2r}^{out}, \quad \text{for} \quad r = l, g \tag{A.19}$$

Feasibility constraint (A.19) is required to implement $y_r = 1$ as otherwise the client would not trade with the relationship dealer. If $y_r = 0$, this constraint is not needed, but it plays no role, so it can be imposed without loss.

Step 4. Proof that $(y_l^*, y_g^*) = (1, 1)$ and Equilibrium Contract

First, we prove that $y_l^* = 1$. To see this, set $m_{2l}^{rel} < \mu_{2l}^{out} = \mu_{2l} b^S$ such that (A.18) holds for $y_l = 1$. This is possible because under feasibility constraint (A.19), we have

$$2\sigma > q b^S (1 - \mu_{2l})$$

which implies that (A.18) is slack for $m_{2l}^{rel} = \mu_{2l} b^S$. Hence, we can set $m_{2l}^{rel} < \mu_{2l} b^S$ and satisfy (A.18). To show that y_l^*, let us compute

$$\begin{aligned} U^H\big|_{y_l=1} - U^H\big|_{y_l=0} &= (1-q)\left\{\frac{1}{2}\mu_{2l} b^S - \mu(1-\alpha) b^S - \mu\left(\alpha - \frac{1}{2}\right) m_{2l}^{rel}\right\}, && \text{(A.20)} \\ &= (1-q)\left\{\left[\mu\alpha + \frac{1}{2}(1-\mu)\right]\mu_{2l} b^S - \mu\left(\alpha - \frac{1}{2}\right) m_{2l}^{rel}\right\}, && \text{(A.21)} \\ &> (1-q)\mu\mu_{2l} b^S > 0 && \text{(A.22)} \end{aligned}$$

The second equality follows from the definition of μ_{2l} in equation (6), and the first inequality follows from $m_{2l}^{rel} < \mu_{2l} b^S$. This proves that $y_l^* = 1$.

Finally, let us show that $y_g^* = 1$. Given that $y_l^* = 1$, the speculator's incentive constraint (A.18) must bind. To see this, observe that decreasing m_{2l}^{rel} increases U^H while it tightens (A.18). Using (A.18) as an equality, we obtain

$$(1-q)(y_g m_{2g}^{rel} - m_{2l}^{rel}) = 2\sigma - b^S(1-\mu_{2l}) + (1-q)(y_g b^S - \mu_{2l} b^S) \qquad \text{(A.23)}$$

Substituting for the right-hand side of (A.23) in the hedger utility and setting $y_l = 1$ in equation (A.17), we obtain U^H as a function of y_g only

$$\begin{aligned} U^H &= b^H - \mu b^S + \frac{1}{2}q(b^H - \mu_{2l}b^S) + \frac{1}{2}(1-q)b^H + \frac{1}{2}(1-q)y_g b^H \\ &\quad + \mu\left(\alpha - \frac{1}{2}\right)\big[2\sigma - b^S(1-\mu_{2l}) + (1-q)(y_g b^S - \mu_{2l}b^S)\big] - (1-q)\mu\big[\alpha y_g + (1-\alpha)\big]b^S \end{aligned} \tag{A.24}$$

We have

$$\frac{dU^H}{dy_g} = (1-q)\left[\frac{1}{2}b^H + \mu\left(\alpha - \frac{1}{2}\right)b^S - \mu\alpha b^S\right] > 0, \tag{A.25}$$

where the inequality follows from $b^H > \mu b^S$ by Assumption 1. This implies that $y_g^* = 1$.

Thus, we showed that any contract such that (PC) and (IC) bind, and $y_l^* = y_g^* = 1$ holds is optimal. There are several such contracts that satisfy the feasibility constraints (A.19), because these requirements pin down

$$m_{2g}^{rel} - m_{2l}^{rel} = \frac{2\sigma - q(1-\mu_{2l})b^S}{1-q} \tag{A.26}$$

but not the levels of m_{2l}^{rel} and m_{2g}^{rel} as long as (A.19) holds for $r \in \{l, g\}$. Finally, substituting $y_g = 1$ in equation (A.24) for the hedger utility, we obtain that, at the equilibrium contract, the hedger enjoys

$$U^H = b_H - \mu b^S + \left[\frac{1}{2}q + 1 - q\right]b^H - \frac{1}{2}q\mu^{2l}b^S + \mu b^S - q\mu\left(\alpha - \frac{1}{2}\right)(1-\mu_{2l})b^S - (1-q)\mu b^S \tag{A.27}$$

$$= b_H + \left[\frac{1}{2}q + 1 - q\right]b^H - q\mu_{2l}b^S\left[\frac{1}{2} - \mu\left(\alpha - \frac{1}{2}\right)\right] - q\mu\left(\alpha - \frac{1}{2}\right)b^S \tag{A.28}$$

$$= b_H + \left[\frac{1}{2}q + 1 - q\right]b^H - \frac{1}{2}q\mu b^S - (1-q)\mu b^S \tag{A.29}$$

This concludes the characterization of the hedger-optimal contract. In the final step, we show that this contract is also the equilibrium contract of the competitive screening game.

A.4 Proof of Proposition 4

The proof of Proposition 4 follows closely that of Proposition 3. First, we show that Lemma 3 still holds with a private trading record.

Step 1: Lemma 3 for a private trading record

First, let us show that $y_r^H = 1$ implies that $y_r^S = 1$. By Assumption 1, $b^S > b^H$, which implies that $\min\{b^H, m_{2r}^{out}\} \leq \min\{b^S, m_{2r}^{out}\}$. Hence, since $y^\theta = 1$ is equivalent to $m_{2r}^{rel} \leq \min\{b^\theta, m_{2r}^{out}\}$, it follows that $y^H = 1$ implies that $y^S = 1$.

Second, let us show that $y_r^H = 0$ implies that $y_r^S = 0$. If $y_r^H = 0$ for at least one $r \in \{l, g\}$, then $m_{2r}^{out} < b^H$ under private trading record. Indeed, equation (21), which characterizes outside dealers' belief shows that $\mu_2^{out} < \mu$ in this case. Assumption 1 then implies that $m_{spot}(\mu_2^{out}) < b^H$. This implies that $m_{2r}^{out} \leq \min\{m_{2r}^{rel}, b^H\}$, that is, the outside dealer quote is the best available, and it is lower than $b^H < b^S$. This implies that the speculator strictly prefers to trade at the outside dealer quote, and thus $y_r^S = 0$. This proves the result.

Step 2: Optimal Participation Decision and Optimal Contract

First let $y_r \equiv y_r^H = y_r^S$ be the common decision to accept the relationship dealer quote at date 2 with record $r \in \{l, g\}$. Lemma 3 implies that we must consider three cases: (i) $(y_l, y_g) = (1, 0)$, (ii) $(y_l, y_g) = (0, 1)$ and (iii) $(y_g, y_g) = (1, 1)$. Indeed, the case $(y_l, y_g) = (0, 0)$ corresponds to spot trading, which cannot be optimal, as we verify below. We write the outside dealer quotes for each case using $\boldsymbol{y} = (y_l, y_g)$ as an argument. From Lemma 4, we obtain

$$\mu_2^{out}(\boldsymbol{y}) = \begin{cases} \frac{\mu\left[\alpha+(1-\alpha)q\right]}{\mu\left[\alpha+(1-\alpha)q\right]+\frac{1}{2}(1-\mu)\left[1+q\right]} & \text{if} \quad (y_l, y_g) = (1,0) \\ \frac{\mu\left[1-\alpha+\alpha q\right]}{\mu\left[1-\alpha+\alpha q\right]+\frac{1}{2}(1-\mu)\left[1+q\right]} & \text{if} \quad (y_l, y_g) = (0,1) \\ \mu & \text{if} \quad (y_l, y_g) = (1,1) \end{cases} \tag{A.30}$$

Observe that $\mu_2^{out}(0,1) < \mu$ for all q, which implies that $m_2^{out}(0,1) = b^S \mu_2^{out}(0,1) < b^H$. For $(y_l, y_g) = (1,0)$, there exists $\hat{q} \in (0,1)$ such that $\mu_2^{out}(1,0) < \hat{\mu}$ if and only if $q > \hat{q}$.

Similar to the proof of Proposition 3, the participation constraint of the relationship dealer, equation (PC) binds. Next, we rewrite the hedger's utility substituting for m_1^{rel}:

$$\begin{aligned} U^H = b^H - \mu b^S &+ \left[q + \frac{1}{2}(1-q)(1-y_l+1-y_g)\right](b^H - m_2^{out})^+ \\ &+ (1-q)y_l\left[\frac{1}{2}b^H - \mu\left(\alpha - \frac{1}{2}\right)m_{2l}^{rel} - \mu(1-\alpha)b^S\right] \\ &+ (1-q)y_g\left[\frac{1}{2}b^H + \mu\left(\alpha - \frac{1}{2}\right)m_{2g}^{rel} - \mu\alpha b^S\right] \end{aligned} \tag{A.31}$$

The speculators' incentive constraint (IC) can be rewritten as follows

$$2\sigma \geq (1-q)\Big(y_g m_{2g}^{rel} + (1-y_g)m_2^{out} - y_l m_{2l}^{rel} - (1-y_l)m_2^{out}\Big) \tag{A.32}$$

Hence, finding the equilibrium contract with a private record is equivalent to maximizing U^H, given by (A.31), by choosing $\{m_{2r}^{rel}, y_r\}_{r=l,g}$, subject to the speculators' incentive constraint (A.32) and the feasibility constraint

$$m_{2r}^{rel} \leq m_2^{out}, \quad \text{for} \quad r = l, g \tag{A.33}$$

Feasibility constraint (A.33) is required to implement $y_r = 1$ as otherwise the client would not trade with the relationship dealer. If $y_r = 0$, this constraint is not needed, but it plays no role, so it can be imposed without loss.

Now, we prove that $(y_l^*, y_g^*) = (1, 1)$.

First, we prove that $y_l^* = 1$. To see this, set $m_{2l}^{rel} < m_2^{out}(0, 1)$ such that (A.32) holds for $y_l = 1$. This is possible because under feasibility constraint (A.33), we have

$$2\sigma > (1 - q)(b^S - m_2^{out}(0, 1))$$

which implies that (A.18) is slack for $m_{2l}^{rel} = m_2^{out}(0, 1)$. Hence, we can set $m_{2l}^{rel} < m_2^{out}(0, 1)$ and satisfy (A.18). Observe that when $(y_l, y_g) = (1, 1)$, the new outside dealer price is $m_2^{out}(1, 1) > m_2^{out}(0, 1)$ from equation (A.30). Hence, when comparing the contract with $y_l = 1$ to the contract with $y_l = 0$, we need to take into account this effect on the outside dealers' price. Thus, we have:

$$\begin{aligned} U^H\big|_{y_l=1} - U^H\big|_{y_l=0} &= (1 - q)\left\{\frac{1}{2}m_2^{out}(0, 1) - \mu(1 - \alpha)b^S - \mu\left(\alpha - \frac{1}{2}\right)m_{2l}^{rel}\right\} \\ &\quad - q(m_2^{out}(1, 1) - m_2^{out}(0, 1)) \qquad \text{(A.34)} \\ &> \left[q + (1 - q)\left\{\frac{1}{2} - \mu\left(\alpha - \frac{1}{2}\right)\right\}\right]\mu_2^{out}(0, 1)b^S \\ &\quad - \left[q + (1 - \alpha)(1 - q)\right]\mu b^S \qquad \text{(A.35)} \\ &= 0 \qquad \text{(A.36)} \end{aligned}$$

The inequality follows form substituting $m_2^{out}(1, 1) = \mu b^S$ and $m_{2l}^{rel} < m_2^{out}(0, 1)$. The equality follows from the definition of $\mu_2^{out}(0, 1)$ in equation (A.30).

Finally, let us show that $y_g^* = 1$. Given that $y_l^* = 1$, the same argument as in the proof of Proposition 3 implies that the speculator's incentive constraint (A.32) must bind. Using

(A.32) as an equality, we obtain

$$(1-q)(y_g m_{2g}^{rel} - m_{2l}^{rel}) = 2\sigma - (1-q)(1-y_g)m_2^{out}(1,y_g) \tag{A.37}$$

Substituting for the right-hand side of (A.37) and setting $y_l = 1$ in equation (A.31), we obtain U^H as a function of y_g only

$$\begin{aligned} U^H(y_g) = b^H - \mu b^S + \left[q + \frac{1}{2}(1-q)(1-y_g)\right]\left(b^H - m_2^{out}(1,y_g)\right)^+ + (1-q)\left[\frac{1}{2}b^H - \mu(1-\alpha)b^S\right] \\ + (1-q)y_g\left[\frac{1}{2}b^H - \mu\alpha b^S\right] + \mu\left(\alpha - \frac{1}{2}\right)\left[2\sigma - (1-q)(1-y_g)m_2^{out}(1,y_g)\right] \end{aligned} \tag{A.38}$$

Two cases are possibles. If $q < \hat{q}$, $m_2^{out}(1,0) = b^S > b^H$ by definition of $\hat{q}$, and we have

$$U^H(1) - U^H(0) = q\big[b^H - m_2^{out}(1,1)\big] + (1-q)\left[\frac{1}{2}b^H - \mu\alpha b^S + \mu\left(\alpha - \frac{1}{2}\right)m_2^{out}(1,0)\right] \tag{A.39}$$

$$= q(b^H - \mu b^S) + \frac{1}{2}(1-q)(b^H - \mu b^S) > 0 \tag{A.40}$$

The second equality follows from $m_2^{out}(1,1) = m_{spot}(\mu_2^{out}(1,1))$ and $\mu_2^{out}(1,1) = \mu$ from equation (A.30). The final inequality follows from Assumption 1. Next if $q > \hat{q}$, $m_2^{out}(1,0) <$

b^H and we have

$$\begin{aligned} U^H(1) - U^H(0) &= -q m_2^{out}(1,1) + \left[q + \frac{1}{2}(1-q)\right] m_2^{out}(1,0) - (1-q)\mu\alpha b^S \\ &\quad + (1-q)\mu\left(\alpha - \frac{1}{2}\right) m_2^{out}(1,0), \qquad \text{(A.41)} \\ &= \left[\frac{1}{2}(1+q) + (1-q)\mu\left(\alpha - \frac{1}{2}\right)\right] \mu_2^{out}(1,0) b^S - \mu\left[q + (1-q)\alpha\right] b^S \qquad \text{(A.42)} \\ &= 0. \qquad \text{(A.43)} \end{aligned}$$

The second equality follows from $m_2^{out}(1,1) = m_{spot}(\mu_2^{out}(1,1))$ and $\mu_2^{out}(1,1) = \mu$. The last equality follows from $m_2^{out}(1,0) = m_{spot}(\mu_2^{out}(1,0))$ and the definition of $\mu_2^{out}(1,0)$ in (A.30).

Thus, we showed that any contract such that (PC) and (IC) bind, and $y_l^* = y_g^* = 1$ holds is optimal. Equation (22) for the hedger utility obtains by substituting $y_g = 1$ in equation (A.38). This concludes the proof.

B Severe Adverse Selection

In this section, we relax Assumption 1 by considering the case in which adverse selection is severe. The modified assumption is as follows:

Assumption 2. *(Severe adverse selection)* $b^H \in [\mu_{2l} b^S, \mu b^S]$

Compared to Assumption 1, the static adverse selection cost, μb^S is now an upper bound for the hedger's private benefit instead of a lower bound. As we will shortly confirm, this implies that trading breaks down in the anonymous market. However, the new lower bound on b^H guarantees that adverse selection is not so severe that the market also breaks down for a client with record $r = l$. In what follows, we replicate the analysis in the main text and consider first spot trading in Section B.1 and relationship trading in Section B.2

B.1 Spot Trading

First, consider the case in which there is no trading record, that is, spot market trading is anonymous. Lemma 1 and Assumption 2, which is equivalent to $\mu > \hat{\mu}$ immediately imply that the market breaks down in both periods of trading. The hedger does not trade and thus enjoys her reservation utility $U^H_{spot,priv} = 0$.

Next, consider the case with a public trading record. If the hedger records a loss on her date-1 trade, she faces spot price $m_{spot}(\mu_{2l}) > b^H$ at date 2, where the inequality is implied by Assumption 2. Hence, two outcomes may arise in equilibrium: (i) the market breaks down, like in the anonymous trading case, or (ii) the hedger takes a loss at date 1 in order to acquire a trading record. With the second strategy, she enjoys utility

$$U^H_{spot,pub} = b^H - \mu b^S + \frac{1}{2}\Big(b^H - \mu_{2l} b^S\Big) \tag{B.1}$$

The hedger's trading loss at date 1, $b^H - \mu b^S$ can be interpreted as an investment to acquire a reputation. That investment allows the hedger to realize gains from trade when the record indicates a loss ($r = l$). The next result follows immediately from the comparison between $U^H_{spot,pub}$ and $U^H_{spot,priv}$.

Proposition B.1. *Under Assumption 2, with spot trading, the hedger benefits from a public trading record if and only if*

$$\frac{1}{2}\left(b^H - \mu_{2l} b^S\right) \geq \mu b^S - b^H \tag{B.2}$$

B.2 Relationship Trading

As in the mild adverse selection case, we show that the hedger benefits from relationship trading because it neutralizes the information advantage of the speculator to a greater extent that under spot trading. The relationship dealer achieves this benefit by setting a larger relative reward for a loss record than the spot market. The key difference that emerges from the analysis, however, is that the relationship contract no longer ensures that the hedger trades in all cases. In fact, it becomes optimal for the hedger to trade as infrequently as possible at date 2. Despite this important difference, the conclusion in our main text remains: with relationship trading, the hedger prefers to keep her trading record private.

Similar to the main text, the equilibrium contract can be characterized as the solution to Problem 1 under a public record, and the modified version of that problem described in Section 4.2 for a private record. In the interest of space, we describe the equilibrium contract below and leave it to the reader to verify that it solves the relevant optimization problem.

Proposition B.2. *Under severe adverse selection, the equilibrium contract is such that the relationship dealer's* (PC) *and the speculator's* (IC) *bind. At date* 2*, the client with record*

$r = g$ never trades. A client with record $r = l$ always trades (only if her relationship does not break up) under a public (private) record. The hedger achieves utility

$$U^H_{priv}(q) = 2b^H - \mu b^S + \left[q + \frac{1}{2}(1-q)\right]\left(\mu b^S - b^H\right) \tag{B.3}$$

$$U^H_{pub}(q) = 2b^H - \mu b^S + \frac{1}{2}\left(\mu b^S - b^H\right) \tag{B.4}$$

with a private and a public record, respectively.

Proposition B.2 shows that the key result from the analysis in the main text remains. Namely, under relationship trading, the hedger achieves a higher utility with a private trading record than with a public record. Indeed, the comparison between (B.3) and (B.4) shows that $U^H_{priv}(q) \geq U^H_{pub}(q)$ with a strict inequality for $q > 0$. Hence, the insight that hedgers prefer to keep their record private is robust to the degree of adverse selection in the market.

In the mild adverse selection case, we showed that the optimal scheme for the hedger maximizes her trading opportunities at date 2. Under severe adverse selection, the opposite result holds. The optimal contract minimizes her trading opportunities at date 2. This insight explains why a private trading record dominates once again when adverse selection is high. Consider indeed a hedger with record $r = l$ whose relationship breaks up exogenously at date 2. With a private trading record, that client does not trade because she is pooled by uninformed outside dealers with clients with record $r = g$. Under a public trading record, however, that client can trade under Assumption 2. Indeed, the competitive midspread for a client with record $r = l$ is $\mu_{2l} b^S < b^H$. This is the only difference between the outcome with a public record, relative to a private record. The insight that the optimal contract for the hedger should minimize her trading opportunities at date 2 explains why she prefers to keep her record private, also when adverse selection is high.

C Collateral as Commitment Device

In this section, we assume that dealers have no commitment power. We also maintain the assumption that clients cannot commit. Instead, clients and dealers can lock collateral in an escrow account. We show that collateral provides an alternative technology to dealer commitment that implements the contracts described in the main text.

First, we modify the definition of a relationship contract to allow for collateral. A relationship contract with collateral $\mathcal{M}_{coll} = \{c_1, m_1^{rel}, m_{2l}^{rel}, m_{2g}^{rel}\}$ is given by a set of midspreads, as before, and an amount $c_1 \geq 0$ of numeraire to be deposited by the client to an escrow account. The dealer receives payment m_1^{rel} immediately at date 1.However, the collateral c_1 is delivered to the dealer at date 2 if and only if she executes the terms of the contract, that is, if she trades with the client at the contractual midspread m_{2r}^{rel}. Collateral thus acts as a deferred payment to the dealer. The escrow account ensures that this deferred payment, as the client does not make this decision.

In what follows, we explain how collateral can implement the equilibrium relationship contract. The key difference with Problem 1 is that the contract must now satisfy the dealer's participation constraint at date 2 for each record $r \in \{l, g\}$. This participation constraint can be written

$$0 \leq \mu \pi_r^S y_r^S \left[c_1 + m_{2r}^{rel} - b^S\right] + (1-\mu)\pi_r^H y_r^H \left[c_1 + m_{2r}^{rel}\right] \tag{C.1}$$

The equilibrium contract with collateral solves Problem 1, subject to the additional constraint (C.1) and in which m_1^{rel} is substituted with $m_1^{rel} + c_1$. Indeed, the total payment made by the client at date 1 is now the sum of the immediate payment m_1^{rel} and the deferred payment c_1, locked as collateral. We show that the equilibrium contract under a public record can be implemented with collateral. A similar result applies with a private record.

Proposition C.1. *The equilibrium contract with a public record under dealer commitment, given by Proposition 3 can be implemented with collateral when dealers lack commitment. The minimum amount of collateral required is given by*

$$\underline{c}_1(q) = \mu_{2l} b^S - b^H + \frac{2\sigma - q(1-\mu_{2l})b^S}{1-q} \tag{C.2}$$

Proof. In the contract of Proposition 3, we have $y_r^\theta = 1$ for all $\theta \in \{H, S\}$ and all $r \in \{l, g\}$. Hence, the ex-post participation constraint of the dealer can be rewritten

$$c_1 + m_{2r}^{rel} \geq \mu_{2r} b^S \tag{C.3}$$

Observe that the equilibrium contract pins down only the difference

$$m_{2g}^{rel} - m_{2l}^{rel} = \frac{2\sigma - q(1-\mu_{2l})b^S}{1-q}, \tag{C.4}$$

given by (A.26), but not the absolute levels of $\{m_{2l}^{rel}, m_{2g}^{rel}\}$. Since constraint (C.3) is relaxed by increasing m_{2r}^{rel}, the amount of collateral needed is minimized by setting $m_{2g}^{rel} = b^H$, such that the hedger with record $r = g$ is indifferent between accepting the relationship dealer quote and not trading. Next, observe that the participation constraint (C.3) holds for $r = g$ if it hols for $r = l$. Indeed, from equation (C.4)

$$\mu_{2l} b^S - m_{2l}^{rel} - \left[\mu_{2g} b^S - m_{2g}^{rel}\right] = \frac{2\sigma - q(1-\mu_{2l})b^S}{1-q} - \left[\mu_{2g} - \mu_{2l}\right] b^S \tag{C.5}$$

$$\geq 2\sigma - \sigma(2\alpha - 1)\left[\mu_{2g} - \mu_{2l}\right] > 0 \tag{C.6}$$

Hence, we obtain the mimimum amount of collateral by setting (C.3) as an equality for $r = l$

and solving for c_1. Using equation (C.4) and $m_{2g}^{rel} = b^H$, we obtain equation (C.2). $\square$

D Equilibrium Contract with Relationship Trading

In this section, we show that there exists a unique pooling contract of the competitive screening game and that this contract corresponds to the constrained optimization problem analyzed in the main text.[17]

Step 1. Characterization of the Game

First, we define the primitives of the game, using the notation introduced in the main text, where $\mathcal{M}^{rel}$ denotes the relationship contract, $(m_{2l}^{out}, m_{2g}^{out})$ the outside dealer quotes at date 2 and $\{y_r^\theta\}_{r=l,g}^{\theta=S,H}$ the endogenous participation decisions of the clients. The utility of a hedger trading contract $\mathcal{M}^{rel}$ is given by (13). For the speculator, let $\boldsymbol{\pi}^+ = (\pi_l^+, \pi_g^+)$ ($\boldsymbol{\pi}^- = (\pi_l^-, \pi_g^-)$) be the probability distribution over trading records at date 2 if she trades with (against) her signal. Her utility from trading contract $\mathcal{M}^{rel}$ is given by

$$U^S = b^S - m_1^{rel} - 2b^S \mathbb{1}_{\boldsymbol{\pi}=\boldsymbol{\pi}^-} + \max_{\boldsymbol{\pi}\in\{\boldsymbol{\pi}^+,\boldsymbol{\pi}^-\}} \sum_{r\in\{l,g\}} \pi_r \left[q(b^S - m_{2h}^{out})^+ + (1-q)\left(b^S - \min\{m_{2h}^{out}, m_{2h}^{rel}\}\right)^+ \right] \tag{D.1}$$

We let $\boldsymbol{\pi}^*(\mathcal{M}^{rel}) \in \{\boldsymbol{\pi}^+, \boldsymbol{\pi}^-\}$ be the optimal distribution over trading records for the speculator when trading contract $\mathcal{M}^{rel}$. First, the standard Bertrand competition argument among perfectly competitive dealers with symmetric information implies that relationship dealers make zero profit in equilibrium. Finally, we write the dealer's payoff when trading

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[17] To be precise, there exists a continuum of payoff equivalent pooling equilibria. We loosely refer to a unique pooling equilibrium due to this payoff equivalence.

contract $\mathcal{M}^{rel}$ with hedgers and speculators, respectively

$$\Pi^H = m_1^{rel} + \frac{1}{2}(1-q)\Big[y_l^H m_{2l}^{rel} + y_g^H m_{2g}^{rel}\Big] \tag{D.2}$$

$$\Pi^L = m_1^{rel} - b^S + (1-q) \sum_{r \in \{l,g\}} \pi_r^*(\mathcal{M}^{rel}) y_r^S \big(m_{2r}^{rel} - b^S\big) \tag{D.3}$$

Observe that the participation constraint in equation (PC) for a pooling outcome obtains by taking the expectation of (D.2) and (D.3) over client types.

Proposition D.1. *There exists a unique competitive (Nash) equilibrium in contracts between dealers. This contract solves Problem 1.*

Proof. First, the standard Bertrand competition argument implies that dealers make zero profit in equilibrium. Next, the equilibrium contract $\mathcal{M}^*$ maximizes the hedger's utility. Suppose by contradiction that it does not, that is, there exists another contract $\widetilde{M}$ such that the hedger strictly prefers $\widetilde{M}$ to $\mathcal{M}^*$ and $\widetilde{M}$ satisfies the participation constraint of dealers for the average client type, given by (PC). Then, there exists a profitable deviation for a relationship dealer. Two cases are possible. If the speculator strictly prefers $\mathcal{M}^*$ to $\widetilde{M}$, then $\widetilde{M}$ is a profitable cream-skimming deviation because a deviating dealer would face only hedgers. By construction, the dealer profit when trading $\widetilde{M}$ with the average type is 0, so its profit from trading $\widetilde{M}$ with hedgers only is strictly positive. If both types prefer $\widetilde{M}$ to $\mathcal{M}^*$, the dealer can profitably deviate by offering a contract $\widetilde{\widetilde{M}}$ with

$$\widetilde{\widetilde{m}}_1^{rel} = \widetilde{m}_1^{rel} + \epsilon, \quad \widetilde{\widetilde{m}}_{2r}^{rel} = \widetilde{m}_{2r}^{rel}, \quad \text{for } r \in \{l,g\}, \tag{D.4}$$

where $\epsilon > 0$ is infinitesimally small. By continuity, both types still prefer $\widetilde{\widetilde{M}}$ to $\mathcal{M}^*$ and the dealer earns a strictly positive profit with $\widetilde{\widetilde{M}}$ by construction of $\widetilde{M}$. This implies that the equilibrium contract must maximize the utility of the hedger.

Third, we show that there cannot be a separating equilibrium. By contradiction, suppose that such an equilibrium exists. Dealers have no gain from trade with the speculator, whose equilibrium utility level must be $U^{S,*} = 0$. We then show that the speculator can achieve a higher payoff by choosing the contract $\mathcal{M}^H$ targeted at the hedger. Given outside dealers' quotes $\{m_{2r}^{out,*}\}_{r=l,g}$, the hedger chooses contract $\mathcal{M}^H$ only if

$$0 < U^{H,*} = b^H - m_1 + \frac{1}{2}\sum_{r=l,g} \underbrace{(1-q)\max\left\{0, b^H - \min\left\{m_{2r}, m_{2r}^{out,*}\right\}\right\}(b^H) + q\max\left\{0, b^H - m_{2r}^{out,*}\right\}}_{\equiv F_r(b^H)}$$

Observe that F_r is positive and weakly increasing with b^H. A deviation by the speculator to trade contract $\mathcal{M}^H$ is strictly profitable as she then gets:

$$\begin{aligned}\tilde{U}^S &= b^S - m_1 + \alpha F_g(b^S) + (1-\alpha)F_l(b^S)\\ &= U^{H,*} + b^S - b^H + \left(\alpha - \frac{1}{2}\right)\left[F_g(b^S) - F_g(b_H) - \big(F_l(b^S) - F_l(b_H)\big)\right]\end{aligned}$$

Given that $F_r(b^S) - F_r(b^H) \in [0, b^S - b^H]$ because $b^S > b^H$, we obtain

$$\tilde{U}^S > U^{H,*} + \left(\frac{3}{2} - \alpha\right)(b^S - b^H) > 0 = U^{S,*}$$

This proves that a separating outcome cannot be sustained as an equilibrium.

Next, we show that in any pooling equilibrium, the incentive constraint of the speculator (IC) must bind. Suppose by contradiction that the pooling equilibrium is such that (IC) is slack. We show that there exists a cream-skimming deviation that defeats this candidate equilibrium. We know from the first steps of the proof that the hedger should trade with the relationship dealer at date 2 for some record $r \in \{l, g\}$, as otherwise the relationship contract implements the spot trading outcome. For this argument, suppose that$r = l$ (the same logic applies if $r = g$). Then consider the following modification to the contract

$$\Delta m_{2l} < 0, \quad \Delta m_1 = -k\Delta m_1, \quad k \in \left(1 - \alpha, \frac{1}{2}\right),$$

where $|\Delta m_{2l}|$ is low enough such that the speculator's (IC) holds. The deviation is constructed such that the hedger (speculator) strictly prefers the deviating (candidate equilibrium) contract, since

$$\Delta U^H = -\Delta m_1 - \frac{1}{2}\Delta m_{2l} = |\Delta m_{2l}| \left(\frac{1}{2} - k\right) > 0$$
$$\Delta U^S = -\Delta m_1 - (1 - \alpha)\Delta m_{2l} = |\Delta m_{2l}| \left(1 - \alpha - k\right) < 0$$

We are thus left to show that a dealer would earn positive profit with this deviation. Given that he would face only hedgers, his payoff would be

$$\begin{aligned}\tilde{\Pi} &= \Pi^* + \Delta m_1 + \frac{1}{2}\Delta m_{2l} + \mu\Big[b^S + (1 - \alpha)(b^S - m_{2l}^{rel,*}) + \alpha y_r^{S,*}(b^S - m_{2g}^{rel,*})\Big] \\ &= \Pi^* - \left(\frac{1}{2} - k\right)|\Delta m_{2l}| + \mu\Big[b^S + (1 - \alpha)(b^S - m_{2l}^{rel,*}) + \alpha y_r^{S,*}(b^S - m_{2g}^{rel,*})\Big]\end{aligned}$$

Relative to its equilibrium payoff, the deviating dealer loses $\left(\frac{1}{2} - k\right)|\Delta m_{2l}|$ in expectation from giving a better deal to the hedger. On the other hand, the second term proportional to the mass of speculators μ captures the benefit from cream-skimming, as the deviating dealer would no longer face speculators. It follows that by setting $|\Delta m_{2l}|$ low enough, there exists a cream-skimming deviation for any $\mu > 0$. This shows that in any equilibrium, the incentive constraint (IC) of the speculator must bind.

The previous steps show that the only candidate equilibrium is the pooling outcome that maximizes the hedger's utility, such that the dealers make zero profit and the speculator's incentive constraint binds. This is the contract characterized as the solution to Problem 1 in the first steps of the proof of Proposition 3. Hence, we are left to show that this contract is robust to cream-skimming deviations. To qualify as a cream-skimming deviation, contract $\widetilde{M}$ must deliver a higher utility to the hedger than contract $\mathcal{M}^*$, that is,

$$0 \leq \Delta U^H = -\Delta m_1 - \frac{1}{2}(\Delta m_{2l} + \Delta m_{2g}), \tag{D.5}$$

assuming that the hedger trades in all contingencies with the deviating contract $\widetilde{M}$. A similar proof applies if this is not the case.

We want to show that such a perturbation also benefits the speculator when (IC) binds. Suppose first that for contract $\widetilde{M}$ the speculator trades according to her signal, which implies $\tilde{m}_{2g} - \tilde{m}_{2l} \leq 2\sigma$ from incentive constraint (IC). The change in utility for the speculator is

$$\Delta U^S = -m_1 - \alpha\Delta m_{2g} - (1-\alpha)\Delta m_{2l} \geq \left(\alpha - \frac{1}{2}\right)(\Delta m_{2g} - \Delta m_{2l}) \geq 0, \tag{D.6}$$

where, to obtain the first inequality, we used equation (D.5). The second inequality follows from the observation that $\tilde{m}_{2g} - \tilde{m}_{2l} \leq 2\sigma$ by assumption and $m^*_{2g} - m^*_{2l} = 2\sigma$ by construction since (IC) binds. Suppose instead that

Suppose next that for contract $\widetilde{M}$, the speculator trades against her signal, which implies

$\tilde{m}_{2g} - \tilde{m}_{2l} \geq 2\sigma$ from incentive constraint (IC). In this case, we obtain

$$\Delta U^S = -2b^S - m_1 + \alpha m^*_{2g} + (1-\alpha)m^*_{2l} - (1-\alpha)\tilde{m}_{2g} - \alpha\tilde{m}_{2l} \tag{D.7}$$

$$\geq -2b^S + \left(\alpha - \frac{1}{2}\right)\left[(m^*_{2g} - m^*_{2l}) + (\tilde{m}_{2g} - \tilde{m}_{2l})\right] \geq 0. \tag{D.8}$$

The first inequality follows from equation (D.5). The second inequality obtains because $m^*_{2g} - m^*_{2l} = 2\sigma$ since (IC) binds by assumption for the equilibrium contract $\mathcal{M}^*$.

Hence, when the incentive constraint (IC) binds, any contract that delivers a higher utility to the hedger than the candidate equilibrium contract also delivers a higher utility to the speculator. This proves that there exists no cream-skimming deviation. This step concludes the proof of Proposition D.1.

□

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