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Liquidity misallocation in an over-the-counter market

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Abstract

To understand the illiquidity of the over-the-counter market when dealers and traders are in long-term relationships, I develop a framework to study the endogenous liquidity distortions resulting from the profit-maximizing, screening behavior of dealers. The dealer offers the trading mechanism contingent on the aggregate history of his customers summarized by the asset allocation. The equilibrium distortion is type dependent: trade with small surplus breaks down; trade with intermediate surplus may be delayed; trade with large surplus is carried out with a large bid/ask spread but without delay. Because of dealers' limited commitment, the distortions become more severe when the valuation shock is frequent, the valuation dispersion is large or the matching friction to form new relationships is large. Calibrating the model and running a horse race between matching efficiency, trading speed and relationship stability, I found that the liquidity disruption in the market during the recent financial crisis is more consistent with declining matching efficiency of forming trading relationships. The optimal mechanism can be implemented by random quote posting.

JEL classification: D82; D83; G1

Keywords: Screening; Liquidity; Long-term relationship; Over-the-counter markets

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1. Introduction[2]

Many financial over-the-counter (OTC) markets are illiquid, with large bid-ask spreads and long delay in trade. For example, a typical municipal bond is traded in the OTC market once every 25 days with an average bid-ask spread of more than 50 basis point (Green et al., 2007), whereas an equity is typically traded more than once every second with bid-ask spreads an order of magnitude smaller (Pagnotta and Philippon, 2012). Standard theories of the OTC market such as Duffie et al. (2005), Lagos and Rocheteau (2009) and Hugonnier et al. (2014) show that liquidity distortions can arise from the search friction to locate trading counterparties. However, financial institutions typically maintain long-term relationships with each other.[3] The friction to locate trading counterparties may not be so large as to explain all the distortions. In this paper, I show that even when broker-dealers maintain long-term relationships with traders, additional liquidity distortions may arise if they do not observe traders' private valuations. In this environment, dealers screen traders by controlling the speed of trade and the transaction price and keep track of the endogenous asset allocation across his customers. Although dealers provide immediacy to traders, the monopsony power of the dealer in the OTC market leads to imperfect allocation of liquidity.

In the model, traders search and match with dealers. Similar to equilibrium search models of the labor market (Pissarides, 1990), the match is long-term but subject to breakup shocks and forming new matches takes time. Each dealer is matched with a continuum of traders. By posting menus of contracts specifying trading probabilities and transaction prices for indivisible assets, dealers screen traders with heterogeneous gain from trade. In equilibrium, traders with large gain from trade value most immediacy. So, they are willing to pay a high premium relative to the market price to trade faster. Traders with intermediate gain from trade sacrifice trading speed for a lower spread. To induce traders with large gain to accept the high premium, dealers strategically exclude traders with small gain by charging a fixed spread on top of a variable spread increasing in the trading probability. Therefore, trade breaks down for those with small gains from trade. I show that these three types of distortions could coexist in equilibrium.

A theoretical contribution of the paper is to formalize and solve the dynamic programing problem of the dealer, in which the asset allocation to customers is a high-dimensional state variable and the contract menus are the control variable. The asset allocation is slow moving because of the strategic delay of the dealer and the physical limit on the trading frequency between the dealer and his customers. This induces the dynamic interaction between the trading mechanism and the asset allocation, especially for traders with intermediate gain from trade. Traders with large gains from trade are willing to pay a premium to trade immediately. But trading faster with them also means that less of those traders remain waiting. With less traders with large gain remaining, dealers have an incentive to trade faster with traders with intermediate gain. Meanwhile, the dealer also has limited commitment to contract menus he chooses: when he chooses

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[3] See, for example, Li and Schürhoff (2014) and Afonso et al. (2014).