On the Structure of Securities Exchanges— Auction Markets and Dealer Markets

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1. Introduction

Due to the deregulation of securities exchanges and reduction in trade commissions, many individual investors have started participating in the market through Internet trading. As a result, a number of previously inconceivable trading phenomena have started to appear.[1]

An exchange is defined as a permanent marketplace established to trade large volumes of marketable securities or speculative commodities, operated by a corporate entity comprised of specific members, with the function of adjusting supply and demand and producing fair market prices.[2] In other words, exchanges not only have a brokering function to facilitate trading, but a price disclosing function of informing the world regarding fair prices. Thus pricing mechanisms are a critical feature of exchanges. In addition, in the event of a global stock market crisis such as Black Monday, pricing mechanisms can greatly affect how markets perform after the crisis.

This paper examines the trading systems (pricing mechanisms) used in securities exchanges, and discusses their characteristics, current problems and future direction with respect to market liquidity.

2. Auction Market and Dealer Market

Generally speaking, securities exchanges operate as a continuous market, with trades occurring whenever market participants exist who want to trade. In a continuous market, the trading system can take the form of an auction market or dealer (market maker) market.

The auction market is widely used by exchanges including the Tokyo Stock Exchange. In general, market participants place buy and sell orders, which are matched according to price

[1] For example, when individual investors placed a large volume of orders for Prime Systems Corp. (4830 H) listed on the HERCULES market, the Osaka Stock Exchange took the special measure of matching buy and sell orders only twice a day due to systems problems.
[2] In recent years, the organization of exchanges has increasingly shifted from mutual companies to stock companies.

priority and time priority. For example, in a continuous session on the TSE, a list of limit orders is displayed (called a "limit order book"), and market orders are matched to limit orders with the best price.[3] Figure 1 shows an example of trades being executed at two prices. Since limit orders play a decisive role in pricing and trade execution, the auction market is described as an order-driven trading system.

Figure 1 Auction Market Example

Limit sell order	Limit price	Limit buy order
1,000 shares	11,000	
2,000 shares	10,050	
	10,000	1,500 shares
	9,000	2,500 shares
	8,750	1,000 shares

When a market order is placed to sell 2,500 shares, trades are executed for 1,500 shares at ¥10,000 and 1,000 shares at ¥9,000.

When a market order is placed to buy 2,500 shares, trades are executed for 2,000 shares at ¥10,050 and 1,000 shares at ¥11,000.

On the other hand, in a dealer market, market makers display firm ask and bid prices for specific stocks, and stand ready to buy for and sell from their own accounts on a regular and continuing basis. For any given security, there may be one or more market makers. The fact that market makers must always trade the securities for which they make a market ensures that trades are executed immediately. Since the quotes displayed by market makers play a decisive role in pricing and trade execution, the dealer market is described as a quote-driven trading system.

The New York Stock exchange has a hybrid system known as the specialist market. While small trades are executed automatically according to the limit order book, large trades that can cause a market imbalance are cleared by specialists, who make adjustments by buying and selling as necessary out of their own account.

3. Comparison of Market Liquidity

Generally, it is desirable for market liquidity to be as high as possible. Market liquidity is characterized by three factors:

(1) market depth: the maximum size of trade orders that can be executed without causing price volatility;

(2) trade immediacy: whether trades are executed as soon as orders are placed;

[3] On the TSE, such matching occurs except at the opening and closing of sessions.

(3) price resiliency: how quickly the market price returns to equilibrium after deviations.

Below we compare the liquidity of auction and dealer markets from the perspective of investors as well as suppliers of liquidity— market makers and market participants who place limit orders.

We start with the investor's perspective. In an auction market, trades are executed when limit orders are matched to market orders. In other words, market liquidity is guaranteed by the depth of limit orders. Since trades cannot be executed without limit orders, the auction market is bests suited for exchanges with a large number of market participants. Even so, however, the market can still break down under volatile conditions that create price chaos, since participants will stop placing limit orders. Thus the main characteristic of the auction market is that it works well and ensures high liquidity as long as the market is stable, but tends to break down under adverse conditions such as Black Monday.

By comparison, the dealer market guarantees that trades are executed immediately even when prices become volatile, because market makers will always clear trades. However, since market makers also quote the price of each security, there is a risk that trades will be executed at unfair prices.[4] For example, in a well known case, specialists on the NYSE were sued for arbitrarily manipulating trades for their own accounts before clearing their customers' orders, and forced to pay substantial fines.

We next turn to the perspective of the suppliers of market liquidity—market makers and participants who place limit orders. In return for displaying prices and standing ready to make trades instantaneously, market makers are allowed to earn profit through the bid-ask spread. Moreover, when there is only one market maker as in the case of specialists on the NYSE, they not only learn the specific characteristics of their securities, but develop information networks to stay one step ahead of the market. Market makers thus generate profits by quoting prices based on their information edge.

By comparison, while limit orders specify the price and size of trades, their execution is not certain. Also, an adverse selection risk arises because other participants will have newer, better information than those who place limit orders. Theoretically, limit orders would not exist if all trades were based on symmetric information. However, the existence of limit orders can be explained by inventory cost or the existence of irrational investors and investment strategies that defy theory. In particular, limit orders can be an effective strategy in a market where investors have different trading attitudes and risk tolerances.

[4] On Black Monday, however, since Nasdaq does not require participating securities firms to make a market, prices were not quoted and trading was far from immediate.

4. Trading System of Major Securities Exchanges

Finally, we look at the trading systems adopted by the major stock exchanges (Figure 2).[5] Generally, larger and more established exchanges are structured as auction markets, while newer exchanges tend to be dealer's markets. This is because established exchanges like the TSE have a large number of participants who can regularly place limit orders, ensuring the market's liquidity. On the other hand, newer markets and OTC markets cannot count on this level of participation, and must rely on market makers to ensure the market's liquidity and efficiency.

Looking at the exchanges with the largest trading volume in each country, we find that almost all use a pure auction method and do not rely on specialists for pricing. The intention is to encourage competitive price quotes from market participants having diverse risk tolerances and trading attitudes, and to avoid unfair pricing by noncompetitive market makers. Another aim is to eliminate asymmetric information by posting limit orders for the entire market to view so that the best price is always obtained.

Figure 2　Structure of Major Exchanges

Auction market	Dealer market	Other
Tokyo Stock Exchange	NASDAQ	NYSE
Euronext	London Stock Exchange	JASDAQ
Asian stock exchanges	Foreign exchange (direct dealing)	

5. Conclusion

The trading system of a securities exchange can a critical concern for institutional investors trying to optimize the execution of large trades.

When executing large trades, an optimal execution strategy must not only consider the trade price, but commissions and execution costs. The market impact of executing a large trade all at once must be weighed against the time cost and price movement risk of executing many smaller trades. The problem has grown more complicated recently due to financial market deregulation and advances in financial techniques, which have given rise to many alternatives including basket trades, block trades, and VWAP trades.[6]

As we have seen, securities exchanges use a variety of mechanisms and systems. Depending on their characteristics, the formation and movement of prices can differ significantly,

[5] On JASDAQ, the structure varies depending on the particular issue.
[6] In a basket trade, many stocks are traded at once. A block trade is where the securities firm executes a large trade by seeking out recently active investors rather than through the exchange. In a VWAP trade, a large trade is broken into

generating important implications for the optimal trading strategy of institutional investors. For example, according to one study, the trade execution cost of the Employees' Pension Fund can comprise 2-3% of the transaction amount.[7]

The new research field of market microstructure addresses these market structure and pricing mechanism issues. Currently, however, there are almost no practical applications of theoretical models. In the future, we hope theoretical models will be developed that can be applied to the real world.[8]

several transactions using the volume weighted average price of a given security on a given day.

[7] See *Mizuho nenkin repoto*, 2003, no. 51, page 5.

[8] Two leading models are Kyle (1985) and Glosten and Milgrom (1985). However, these models make the unrealistic assumption that securities prices have binomial or normal distributions, and thus are not suited to practical application.