PEARSON NEW INTERNATIONAL EDITION

Global Investments

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Sixth Edition

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market structures and trading procedures. Many of these differences are being eliminated, but some historical perspective helps gain a better understanding of the current working of those stock markets.

Historical Differences in Market Organization

Each stock exchange (bourse) has its own unique characteristics and legal organization, but broadly speaking, all exchanges have evolved from one of three market organization types.

Private Bourses Private stock exchange corporations are founded by private individuals and entities for the purpose of securities trading. Several private stock exchanges may compete within the same country, as in the United States, Japan, and Canada. In other countries, one leading exchange has emerged through either attrition or absorption of its competitors. Although these bourses are private, they are not free of public regulation, but the mix of self-regulation and government supervision is oriented more toward self-regulation than in the public bourses. Historically, these private bourses developed in the British sphere of influence.

Public Bourses The public bourse market structure has its origin in the legislative work of Napoleon I, the French emperor. He designed the *bourse* to be a public institution, with brokers appointed by the government and enjoying a monopoly over all transactions. Commissions are fixed by the state. Brokerage firms are private, but their number is fixed and new brokers are proposed to the state for nomination by the brokers' association. The Paris Bourse followed this model until 1990. Stock exchanges organized under the authority of the state were found in the sphere of influence of Napoleon I: Belgium, France, Spain, Italy, Greece, and some Latin American countries. Most have moved toward a private bourse model.

Bankers' Bourses In some countries, banks are the major, or even the only, securities traders. In Germany, the Banking Act granted a brokerage monopoly to banks. Bankers' bourses were found in the German sphere of influence: Austria, Switzerland, Scandinavia, and the Netherlands. Bankers' bourses may be either private or semipublic organizations, but their chief function is to provide a convenient place for banks to meet. Sometimes trading takes place directly between banks without involving the official bourse at all. Government regulation is imposed both on the bourse itself and directly on the banks. Bankers' bourses suffered from potential conflicts of interests, and more trading transparency was required by international investors. Most bankers' bourses moved to a private bourse model in the 1990s to allow foreign financial intermediaries to become brokers.

Historical Differences in Trading Procedures

Apart from legal structure, numerous other historical differences are found in the operation of national stock markets. The most important differences are in the trading procedures.

Cash Versus Forward Markets In most markets, stocks are traded on a cash basis, and transactions must be settled within a few days (typically three business days after the transaction). To allow more leveraged investment, margin trading is available on most cash markets. In *margin trading*, the investor borrows money (or shares) from a broker to finance a transaction. This is still a cash market transaction, and trade settlement takes place in three days; however, a third party steps in to lend money (shares) to the buyer (seller) to honor a cash transaction commitment.

In contrast, some stock markets were organized as a forward market. This was the case for London and Paris, as well as some markets in Latin America and Asia. In Paris, the settlement date was the end of the month for all transactions made during the month (London settled accounts every two weeks). To simplify the clearing operations, all transactions were settled at the end of the month on the settlement day. This is a periodic settlement system. Of course, a deposit is required to guarantee a position, as on most forward markets. Moreover, the transaction price is fixed at the time of the transaction and remains at this value even if the market price has changed substantially by the settlement time. Settling all accounts once a month greatly simplifies the security clearing system, but it also opens the door to short-term speculation and to frequent misconceptions on the part of foreign investors who are unfamiliar with the technique. Although most forward markets (including London and Paris) have moved to a cash market, they usually have institutionalized procedures to allow investors to trade forward, if desired.

Price-Driven Versus Order-Driven Markets U.S. investors are accustomed to a *continuous* market, whereby transactions take place all day and *market makers* (also called *dealers*) ensure market liquidity at virtually any point in time. The market maker quotes both a *bid* price (the price at which the dealer offers to buy the security) and an *ask* price (the price at which the dealer offers to sell the security). The ask price is sometimes called the *offer price*. These quotes are firm commitments by the market maker to transact at those prices for a specified transaction size. The customer will turn to the market maker who provides the best quote. Of course, market makers adjust their quotes continuously to reflect supply and demand for the security as well as their own inventory. This type of market is often referred to as a *dealer market*. It is also known as a *price-driven* market (or *quote-driven* market), because market makers publicly post their bid–ask prices to induce orders. For example, NASDAQ is a dealer market.[1]

[1] The New York Stock Exchange (NYSE) has a unique system in which each stock is allocated to one specialist who acts both as a dealer and as an auctioneer. As a dealer, a specialist posts bid and ask quotes and uses his or her own capital to buy or sell securities (under strict regulations). As an auctioneer, a specialist maintains the order book of all orders that are submitted.

In many other markets and countries, however, active market makers do not exist, and the supply and demand for securities are matched directly in an *auction market*. Because the quantities demanded and supplied are a function of the transaction price, a price will exist that equilibrates demand and supply. In a traditional auction market, liquidity requires that an asset be traded only once or a few times per day. This is known as a *call auction* or *fixing* procedure, whereby orders are batched together in an order book until the auction when they are executed at a single price that equilibrates demand and supply. This auction price maximizes trade volume. In the past, many stock markets used an open *criée* (outcry) system in which brokers would negotiate loudly until a price was found that would equilibrate buy and sell orders (quietness is restored). All these stock markets have moved to computerized trading systems in which buy-and-sell orders are entered on the computer trading system, which matches them directly. An auction market is also known as an *order-driven market* because all traders publicly post their orders, and the transaction price is the result of the equilibrium of supply and demand. Although a single call auction provides excellent liquidity at one point in time, it makes trading at other times difficult. Hence, the market- making function is being developed on all call auction markets (e.g., Paris, Tokyo, or Frankfurt) to allow the possibility of trading throughout the day.

Automation on the Major Stock Exchanges

Trading on a floor where participants noisily meet is increasingly being replaced by computerized trading. Automation allows more efficient handling of orders, especially a large number of small orders. Competition across national stock exchanges and the increased volume of trading hastened the adoption of computerized systems, including price quotation, order routing, and automatic order matching. The design of the automated systems reflects the historical and cultural heritage of the national market. Automated trading systems have followed two different paths, depending on whether the traditional market organization was dominated by dealers making the market or by brokers acting as agents in an auction system.

Price-Driven and Order-Driven Systems The U.S. NASDAQ is a typical *price-driven* system. The automated system posts firm quotes by market makers. There is no centralized book of *limit orders*. When posting a quote, the market maker does not know what trades it will generate. In a price-driven system, a market maker is placing the equivalent of limit orders: a buy limit order representing his bid and a sell limit order representing his ask.

At the other extreme, auction markets, such as Paris, Frankfurt, or Tokyo (and most other markets), have put in place electronic order-driven systems. The computer stores all orders, which become public knowledge. All limit orders that have not been executed are stored in a central order book. A new order is immediately matched with the book of orders previously submitted (see Example 1). The central limit order book is the hub of these automated systems. Viewing all standing orders, a trader knows

EXAMPLE 1 *ORDER-DRIVEN MARKET*

LVMH (Moët Hennesy Louis Vuitton) is a French firm listed on the Paris Bourse. You can access the central limit order book directly on the Internet and find the following information (the limit prices for sell orders are ask prices and those for buy orders are bid prices):

Sell Orders		Buy Orders	
Quantity	**Limit**	**Limit**	**Quantity**
1,000	58	49	2,000
3,000	54	48	500
1,000	52	47	1,000
1,000	51	46	2,000
500	50	44	10,000

You wish to buy 1,000 shares and enter a market order to buy those shares. A market order will be executed against the best matching order. At what price will you buy the shares?

SOLUTION

Unless a new sell order is entered at a price below 51 before your order is executed, you will buy 500 shares at 50 and 500 shares at 51.

exactly what trades will be executed if she enters a new order. Market makers provide liquidity by entering limit buy-and-sell orders in the order book. The highest limit bid and the lowest limit offer act as the bid and ask prices in a price-driven market.

To improve liquidity, most order-driven markets have retained periodic call auctions. There is a fixing at the opening of the market, where all orders that arrived before opening are stored and the opening price is set through a call auction.[2] In Frankfurt, call auctions take place periodically throughout the day, at prespecified times other than opening and closing. At the time of the call auction, the continuous trading of the stock on XETRA is interrupted. (XETRA is a trading platform that includes all stocks on the Deutsche Boerse.) In a *pretrading* phase, traders can submit limit and market orders, which are accumulated in the order book. At auction time, orders are automatically crossed (matched) at a price that maximizes the volume of trading. In Tokyo, a call auction system, called *itayose*, is used to establish prices at the start of the morning and afternoon sessions (the market closes for lunch). During the sessions, a continuous auction is used for new orders. This auction system, called *zaraba*, is an order-matching method and does not require the intervention of a market maker.

The NYSE has developed a hybrid market that integrates traditional floor trading with electronic auction trading. The electronic system allows the order to find the best transaction price on the NYSE or elsewhere.

[2] On the NYSE, the opening price is determined through a call auction.

Advantages and Risks of Each System Automation brings many improvements in the speed and costs of trading. An order-driven system requires little human intervention and is therefore less costly to run. Cost considerations have pushed all markets in this direction. Only some U.S. stock markets have retained a price-driven model. Markets with lesser transaction volumes have found it more efficient to adopt order-driven electronic trading systems. For example, London had a price-driven market with competitive market makers. Cost-efficiency considerations caused it to move to an automated order-driven system called SETS (Stock Exchange Electronic Trading Service) at the end of the twentieth century.[3] Market makers enter their bid-and-ask quotes directly in the order book in the form of limit orders. Most emerging stock markets have adopted an order-driven electronic trading system.

The cost of running the trading system, however, is only one component of the transaction cost borne by investors. Investors try to get the best execution price for each trade. This raises the question: Which market structure provides the best liquidity and lowest execution costs? Theoretical and experimental research suggests that the market design affects trader behavior, transaction prices, and market efficiency. In real life, the answer depends on the market environment, and there is no clear-cut conclusion. An electronic auction market is cheaper to operate, but that could be at the expense of liquidity—hence, trading could be more costly because of overall execution costs, including price impact.[4] Domowitz (2001) suggests that the public dissemination of the electronic order book in order-driven markets allows traders to monitor liquidity and provide liquidity at a lower cost than in price-driven markets.

A drawback of electronic order-driven systems is their inability to execute large trades. In the absence of active market makers, trading a *block* (a large transaction) on an automated order-driven system is difficult. Because of the lack of depth in the market, it may take a long time before the block is traded. This will leave the trader who discloses the block on the system fully exposed to the risk that new information might hurt him unless he continuously updates the limit on the block order. This is the risk of being "picked off"—that is, having an order accepted at a price no longer desired by the trader at the time of the transaction. Blocks are generally traded away from the automated system. This is often called *upstairs trading*. Order-driven systems have developed in part because they are much cheaper to operate than traditional dealers' markets. However, market makers are still needed for trading large blocks.

Another drawback of a continuous order-driven system, in the absence of developed market making, is the danger in placing *market orders* (i.e., orders with no price limits). In the absence of competitive market makers providing liquidity, a sell market order will be immediately crossed with the highest buy limit order, which could be very far from the lowest sell limit order. The Tokyo Stock Exchange

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[3] Smaller and many foreign companies, however, are traded on an automated price-driven system called SEAQ (Stock Exchange Automated Quotation System).

[4] Conrad, Johnson, and Wahal (2004) find some evidence that realized execution costs are lower on electronic trading systems for U.S. stocks. Using data up to 2000, Huang (2002) finds that electronic communication network quoted spreads are smaller than dealer spreads for NASDAQ stocks. However, the period of study was prior to the U.S. adoption of decimal quotations, which reduced spreads markedly.

has a special procedure to limit this risk. Other markets are trying to implement rules protecting market orders. This is typically true for less active stocks, in which market making would help provide liquidity.

Any automated trading system exposes one party to transparency risk. It forces one side of the transaction to expose itself first and, therefore, run the risk of being picked off. In all cases, a limit order gives a free trading option to other market participants. In an order-driven market, the trader who submits the order implicitly gives the free option to the rest of the market. In a price-driven market, it is the dealer posting a firm quote who gives this free option, as shown in Example 2. Of course, the option holder depends on the dealer to deliver in a non-automated system, and "backing away" (reneging) can be a problem.

EXAMPLE 2 *EXPOSITION RISK IN TWO TYPES OF MARKETS*

LVMH is traded on the Paris Bourse, and the last transaction was at 50 euros per share. An investor entered on the French electronic trading system NSC (Nouveau Système Cotation) a limit order to sell LVMH shares at 51 euros while the market price was 50.

LVMH is also traded as an ADR on NASDAQ. One ADR represents one-fifth of an LVMH French share (so 5 ADRs equal 1 LVMH share). The exchange rate is one dollar per euro, and the ADR price is quoted by a market maker at 10–10.20. Assume that the exchange rate remains constant over time.

Suppose that favorable information suddenly arrives that justifies a higher price for LVMH—say, 55 euros. Who are the parties exposed to losses on the Paris Bourse and on NASDAQ if they do not react immediately?

SOLUTION

- On the Paris Bourse, informed market participants have an option worth four euros per share, and the investor who has a standing order in the electronic order book gets picked off (the informed participant can buy at 51 euros a share now worth 55 euros).
- On NASDAQ, the market maker posts a firm bid–ask quote for LVMH of 10–10.20 for the dollar ADR, which is equivalent for the French share of LVMH quoted in euros to a quote of 50–51. Under the same scenario, informed market participants suddenly get a free option worth 0.8 dollar per ADR or four euros per French share (they can buy at 10.2 dollars from the market maker a share now worth 11 dollars). In a price-driven market, dealers run the risk of being picked off.

The danger of automation is that market liquidity may be reduced because dealers (in a price-driven system) or public investors (in an order-driven system) may be less willing to publicly place limit orders.