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## Chapter 21

# New Electronic Trading Systems in Foreign Exchange Markets

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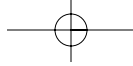
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The foreign exchange market can be divided in two segments: the interbank market and the customer market. Two advances in trading technology, electronic brokers in the interbank market and internet trading for customers, have significantly changed the structure of the foreign exchange market. In this chapter, we explain the functioning of electronic brokers and internet trading and discuss the economic consequences. © 2003, Elsevier Science (USA).

- Bid-ask spread** Difference between the best buy price (ask) and best sell price (bid). The initiator of a trade buys at the ask and sells at the lower bid price. The spread is a measure of transaction costs. The buy price is also called the “offer.”
- Broker** Brokers match dealers in the interbank market without being a party to the transactions themselves and without taking positions (cf. dealer).
- Call market** A market where all traders trade at the same time when called upon.
- Counterparty credit risk** The risk that the market participant on the other side of a transaction will default. Due to the large trade sizes in foreign exchange markets, credit risk is an important issue.
- Dealer** A person employed by a bank whose primary business is entering into transactions on both sides of wholesale financial markets and seeking profits by taking risks in these markets (cf. broker).
- Dealer market** Market where orders for execution pass to an intermediary (dealer) for execution.
- Interbank market** The market where dealers trade exclusively with each other, either bilaterally or through brokers.
- Limit order** Order to buy a specified quantity up to a maximum price or sell subject to a minimum price (cf. market order).
- Liquidity** Characteristic of a market where transactions do not excessively move prices. It is also easy to have a trade effected quickly without a long search for counterparties (“immediacy”). Liquid markets usually have low bid-ask spreads, high volume, and (relatively) low volatility.
- Market maker** Dealer ready to quote buy and sell prices upon request. The market maker provides immediacy (liquidity services) to the market and receives compensation through the spread. There is no formal obligation to quote tight spreads; rather, market making is governed by reciprocity.
- Market order** Order to buy (or sell) a specified quantity at the best prevailing price (cf. limit order).
- Order-driven market** Market where prices are determined by an order execution algorithm from participants sending firm buy and sell orders, which are incorporated into the limit order book (cf. quote-driven or dealer market).
- Order flow** Signed flow of transactions. The transaction is given a positive (negative) sign if the initiator of the transactions is buying (selling).
- Price discovery** Determination of prices in a market. Incorporation of information into prices.



**Quote-driven market** Refers to a market where market makers post bid and ask quotes upon bilateral request. In the interbank market, these prices are on a take-it-or-leave-it basis (cf. order-driven market).

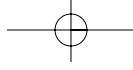
**Transparency** Ability of market participants to observe trade information in a timely fashion.

## I. INTRODUCTION

The 1990s gave us what might prove to be the two biggest changes in foreign exchange market structure since World War II: electronic brokers were introduced into the interbank market in 1992, and in the late 1990s the Internet became available as a trading channel for customers. What are the consequences for the market of these innovations? Is there any reason to believe that these technological developments have influenced the market in any significant way? Do not dealers in the foreign exchange market still fulfill their function as liquidity providers and aggregate information in their price setting? And, do not basic macroeconomic variables still drive exchange rates, irrespective of trading technology?

In an ideal world with perfect information, these changes to the institutions of trading probably would not matter that much at the macroeconomic level. In such a world, exchange rates would be determined by expectations regarding macroeconomic fundamentals like inflation, productivity growth, and interest rates. Exchange rates will be efficient asset prices when all market participants observe these fundamentals and agree on how they influence exchange rates. Furthermore, provision of liquidity would be much less risky than in a situation with imperfect information. However, as empirical evidence has shown all too clearly, models of an ideal world with perfect information do not hold, at least not for horizons shorter than a year or so.

The microstructure approach to foreign exchange has made some promising steps toward solving some of these puzzles (see Lyons, 2001a). This approach differs from the traditional macroeconomic approach by allowing for imperfect information and heterogeneous agents and, thereby, leaving a role for trading institutions as such. In such a world, technological changes such as the introduction of electronic brokers and Internet trading may be significant because they change the structure of the market. A different market structure changes the game played between the market participants. This may influence information aggregation capabilities and incentives for liquidity provision and, thereby, different aspects of market quality like *efficiency* (price discovery), *liquidity*, and *transac-*

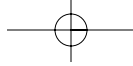


*tion costs.* We are interested in understanding market structure because a well-functioning foreign exchange market is important for the macroeconomy. This chapter considers the impact of technological advances on the foreign exchange market by focusing on these properties of market quality.

The new economy and foreign exchange markets is a vast subject. We limit ourselves to the two major innovations in trading technology because trading institutions are an important part of a financial market's structure. Furthermore, several studies show that trading is important for the determination of exchange rates. There is particular focus on a property of market structure called *transparency*, i.e., how much of the trading process market participants can observe. Because trading is an important determinant of exchange rates, observation of the trading process is important to enable dealers to set the "correct" exchange rates. On a more general level, transparency relates to how efficiently dealers can aggregate information.

There are of course many other uses of information and communication technology (ICT) that have obviously influenced the markets that we do not address here. These include information providers such as Reuters and Bloomberg, computers' calculation capabilities and the importance for option trading, and of course network technologies and computers in general. Two other technological innovations deserving special attention that we do not consider are the newly started settlement service CLS Bank (Continuous Linked Settlement), which went live on September 9, 2002, and the netting technology FXNet. The former links all participating countries' payment systems for real-time settlement. With such a system in place in 1974, the famous Bankhaus Herstatt default would never had happened. FXNet is a technology for netting out gross liabilities. Both are very important for the handling of counterparty credit risk.

Sections II and III provide the background for the introduction of electronic brokers and Internet trading. A brief description and history are given of the structure of the market prior to these innovations, followed by some considerations that dealers take into account in their trading. The trading institutions of the 1980s are referenced to clarify the differences. Section IV discusses electronic brokers, whereas Section V discusses Internet trading. Section VI provides a summary.



## II. THE STRUCTURE OF FOREIGN EXCHANGE MARKETS

Before we discuss electronic brokers and Internet trading, we need an overview of the general structure of the foreign exchange market so as to be able to understand the impact of these new trading institutions. Although electronic brokers were undoubtedly the most significant structural change in the 1990s, the general description given here is valid for the structure both before and after the introduction of electronic brokers. The reason is that brokers were present in the market before electronic brokers were introduced. The introduction of Internet trading, on the other hand, is still very recent, but it may prove to be the most significant structural shift of the first decade of the twenty-first century. This shift has the potential to overthrow the general structure of the market completely, a point that we come back to in Section V.

### A. INFORMATION AND AGENTS

The foreign exchange market is the oldest and largest financial market in the world, with \$1200 billion changing hands every day (April 2001).<sup>1</sup> These trades can be divided into interbank trades and customer trades, representing the two segments of the market. In the interbank market, trading is either direct (bilateral or taking place between dealers) or brokered (interdealer trades). Prior to the advent of the Internet, customers traded only with banks. We could have added customer-to-customer Internet-based trading sites, but we feel it is too early to pay them the same attention as the three methods already mentioned (interbank, both direct and brokered, and customer-bank). In the 1990s, the market was often divided into three groups: customers, dealers, and brokers. However, as brokering becomes more and more electronic and also is open to customers through the Internet, we feel that it is more natural to focus on two main groups of traders: customers and dealers. The customers are the ultimate end-users of currency, and they typically make the largest single trades. Customers may be central banks, governments, importers and exporters of goods, and financial institutions like hedge funds.

Important characteristics of the foreign exchange market are that customers do not have access to the interbank market and that they do not trade with each other (except on the customer-to-customer sites mentioned

<sup>1</sup>This number includes spot, forward, and swap volumes. In the following, we will focus on spot trading because spot is the most fundamental.

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