

## State of Information Technology Support for Traders in Fixed-Income Markets

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### ABSTRACT

A fixed-income security is defined as one whose income stream is fixed for the duration of the loan and where the maturity and face value are known. It is estimated that the global fixed-income market is about \$40 trillion with the US having the lion's share of \$19 trillion. There were at least 74 trading platforms in North America and Europe in 2004. However, it is estimated that only about five percent of fixed-income trade is performed through electronic transaction systems. This is very low when compared with use of information systems in support of equity trade. Our research is guided by the following central question: What are the implications of using IT to mediate electronic brokerage relationships that are enacted through the work practices and interactions of actors representing buyers and sellers in financial institutions within the context of fixed income market. This paper, based on interviews with the senior managements and traders of 10 major financial institutions, provides an overview of information system support for traders in fixed-income trade markets.

### Keywords

Information systems evaluation, Information requirements analysis, electronic trading systems, alternative trading, fixed-income trade

### INTRODUCTION

Equities trade on an exchange and are subject to the exchange rules, whereas fixed-income securities trade over the counter. Exchanges are viewed as single-sided auctions compared to the double-auction bargaining process of the traditional over-the-counter markets. The term "over the counter" (also known as "the OTC market") stems from the traditional method of selling securities literally over the counter before the establishment of exchanges. Fixed-income securities did not go via the exchange and continued to be an over-the-counter operation.

Today the OTC market operates in a telephone and computer-based network run by dealers. In this environment, there is no centralized location for the purchase and sale of securities. Instead, bond trading is a very people intensive business, shrouded in secrecy. Investors pick up the phone and speak to their salespersons, who shout across the room to other traders to get bond prices. An important feature of OTC fixed-income trading is the added "bargaining" or "negotiation" reflecting the special needs of the institutional investors. OTC trading is not bound to an organizational structure; in other words, supply and demand are not concentrated on a centralized trading floor. Traditional OTC transactions have several disadvantages. Bilateral negotiations with banks or investment brokers are conducted over the phone, and this leads to higher transaction costs. In contrast to electronic exchanges, investors lose their anonymity and also have to bear contracting risks. Therefore, automating the OTC market is a more challenging task than automating stock exchanges. In addition, the fixed-income market is larger and more fragmented than the equity market. In the US there are about 11,000 individual stocks, as opposed to 4.5 million individual bond issues.

Electronic trading systems are expected to improve the efficiency of OTC derivative trade (Konana, Menon, and Balasubramanian, 2000). In recent years we have witnessed a significant growth of electronic trading systems in support of fixed-income trade. To date, there are at least 74 platforms used internationally (The Bond Market Association, 2004). The growth in online trading in derivatives reflects the rapid growth that has taken place in the use of derivative products in the market and the vital role they play in fixed-income portfolios as well as the trend towards commoditization in some sectors of the derivatives market. It also reflects the efficiencies brought about by electronic execution in a product sector where just a few years ago, conducting trades electronically was a novelty (The Bond Market Association, 2004). Online bond-trading platforms have accelerated the development and implementation of value-added services to enhance the efficiency of electronic trade execution and to reduce users' costs. A recent survey shows that virtually all of the trading platforms offer a

combination of the following services: (a) Pricing data, (b) Confirmation and allocation services (c) Pre-trade analytics (d) Matching services (e) Electronic research delivery (f) Regulatory compliance services (g) Risk monitoring or management services and (h) Identity management services (see Appendix A for details). Nonetheless, unlike equity market, only a small percentage of fixed-income trade is done by means of electronic trading systems. Our research is guided by the following central question: What are the implications of using IT to mediate electronic brokerage relationships that are enacted through the work practices and interactions of actors representing buyers and sellers in financial institutions within the context of fixed income market. To address this question, we adopt a practice perspective, which focuses on people's everyday activities as the unit of analysis, and examine the structural and interpersonal elements that produce and are produced by those activities. We used tape-recorded semi-structured face-to-face interview to collect information from management and traders from 10 financial institutions. Protocol analysis was used to assess the tape-recorded interviews. As the first phase of our research endeavor, in this paper we provide an overview of the state of information technology support for traders in fixed-income environment. To this end, section 2 provides business processes in the context of the Canadian fixed-income market. Alternative trading systems in support of fixed-income trade is described in section 3. Next, advantages and disadvantages of alternative trading systems are presented in section 4. The paper ends with concluding remarks.

### OVERVIEW OF THE TRADITIONAL FIXED-INCOME MARKET

Fixed-income securities are issued by the borrower (governments or corporations) and purchased for resale by a dealer or a group of dealers for resale<sup>1</sup>. The dealers are the brokerage houses and the banks known in market parlance as the "sell side". A typical fixed-income transaction involves a considerable sum of capital and is mainly oriented toward institutional investors who constitute more than 80% of the market. Institutional investors are professional money managers who invest for third parties such as insurance companies, mutual funds, pension funds, and deposit-taking institutions. These are referred to as the "buy side". In a typical fixed-income market there are four major players: securities issuers, dealers, inter-dealers brokers and investors.

Dealers are at the center of the market and play a key role in facilitating trade. They are the intermediaries who post bids and offers for fixed-income securities and usually take on one side of the trade, either buying from clients or selling to clients. Dealers are the only body which is allowed to sell to investors. They interact and trade with clients and other dealers, an interaction known as the "secondary market", where previously issued securities trade. The dealer acts either as agent or principal<sup>2</sup>. An agent-dealer executes an order placed by a client for commission, acting simply in an intermediary role between two clients or between a client and a principal agent. The principal dealer performs multiple roles; the dealer maintains the market (i.e. the bid/ask spread), ensures liquidity in the marketplace and "manages" and trades his or her inventory and the firm, fixed-income inventory.

In addition to the dealers and investors, there are private and governmental agencies that oversee the market, such as the Canadian Depository for Securities (CDS) that handles clearing and settlement, and there are also agencies such as the portfolio-accounting and bond-rating systems. The OTC operates with multiple dealers, and the supply of new fixed-income products comes from borrowers known as issuers. This is accomplished through the primary market, where borrowers issue paper (e.g. bonds) to raise funds. Dealers assist issuers with design, marketing and sale of the new securities. Typically issuers consult dealers when planning to issue new securities. Dealers form a "banking syndicate" consisting of a number of dealers and bankers whose job it is to value the new issue, buy it, and sell it to investors. As a rule the greater part of the issue is pre-sold, mostly to the buy side, before a bid is placed to the issuer. The process is known as underwriting. This process involves a great deal of documentation, all of which is available on the web through a system called in Canada CanIssue. Documentation is about 60% of the process; the rest involves face-to-face negotiations and evaluation of the issue, a process that is handled by a banking syndicate staff. Dealers also assist issuers in fulfilling their obligation by retiring the issued debt at maturity, in other words, paying the lenders and obtaining the securities. Most of this is done automatically through the dealers' accounting system.

Actual trading takes place in the secondary market. Secondary markets list and trade primary issues once they are sold. Figure 1 depicts the workflow of a typical fixed-income security traded on the OTC. Market quotes (benchmark prices) to the fixed-income market are provided through information vendors such as Reuters and Bloomberg (step 8) who are connected electronically to dealers' market. The process is fully automated. As a rule, there is no human capital involved in this process; investors (Buy Side) are usually blind to the "real" and "live" market. The prices (quotes) provided to the investors serve as a benchmark and are the first step in a process that may lead to a trade. The "real" or "live" dealers' markets are

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<sup>1</sup> For a profit, the process is known as underwriting.

<sup>2</sup> Some dealers are allowed to be both.

normally given over the phone; they are “tighter” (in term of Bid/Ask spread), involve quantity and represent a binding commitment by the dealer either to buy or sell.

Generally speaking, a customer (Buy Side, Investors) is looking for information (in order to decide whether to sell or buy) or is seeking market quotes after checking those supplied by his or her own quotes vendor such as Bloomberg or Reuters. Step 1 is to telephone the sales office requesting a quote on a particular bond, or on a certain class of bonds of a given maturity. The salesman will normally inquire about the purpose of the trade to match the objectives of the investor with the available securities for sale. Once the item (the security or securities) has been identified the customer starts to negotiate with the sales agent. This is step 2, and it may lead to an order (a trade) being placed on the trading desk that handles that particular bond. This would be step 3.

Intellectual capital is substantial here; dealers through the sales force provide research, analysis, advice and execution. Furthermore, dealers supply in-house research and analysis, product and product mix through marketing campaigns. Although trades for the most part are conducted over the phone, parts of the process are automated and are handled by an alternative trading system (ATS), a *request-for-quotes* system, by which requests for quotes are submitted to a number of dealers. Only about 5% of total bond trading is conducted electronically.

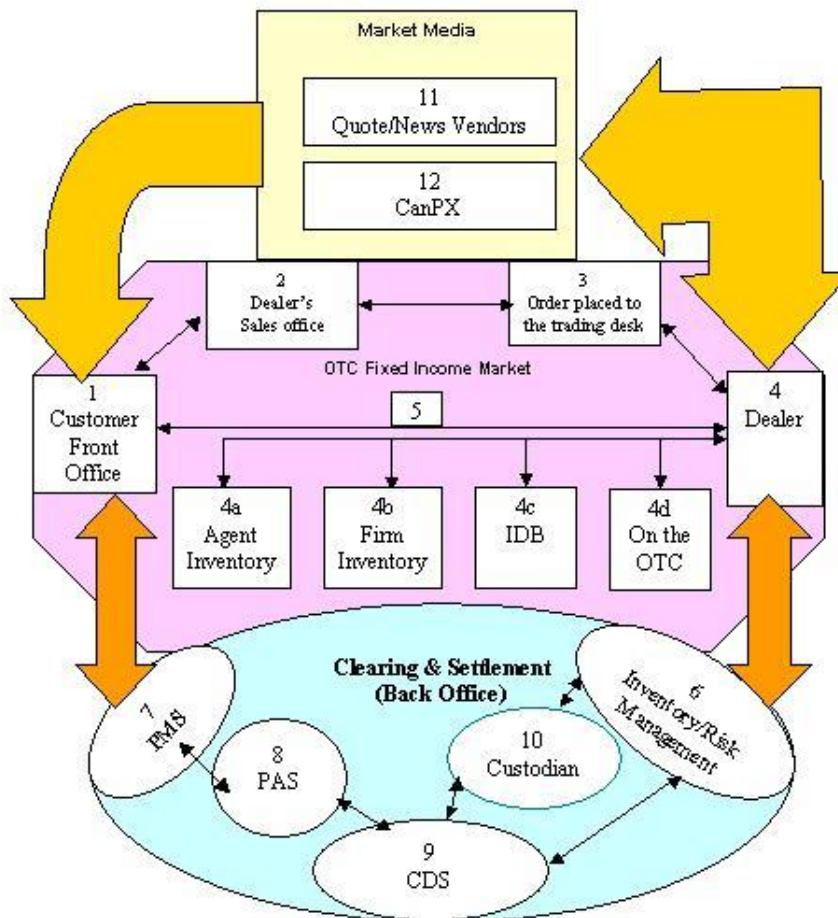


Figure 1. Steps in a Typical OTC Security Transaction

Once an order is placed with the dealer, he or she has several alternatives. This is step 4. The order can either be accepted (I will take the trade, price and quantity) and a report then conveyed to the customer: “you’re done”. Alternatively, the order can be sent back to the customer with changes (“I will take ½ at this price and the rest at another price”). A series of “real”

negotiations starts through the salesperson (on behalf of the client) until an agreement is reached and the trade is done. These negotiations, if accepted, are binding on both parties. The market provided (in terms of prices) to institutions is always “better” than that provided to the retail market in the sense that there is a better spread. Or we may come to an impasse and the trade is not executed: “you’re dead”. If an agreement is reached, the dealer has several ways to fill the order. It can be filled from his or her own inventory (step 4a), from the firm’s inventory or from a combination of both inventories (step 4b). In some cases investors (who own the bond) are contacted and asked if they would be willing to sell at this price. These clients may be willing to sell but at a slightly higher price, and thus starts another round of negotiations. Alternatively the order can be filled from the inter-dealer brokers’ market (step 4c) or by means of a combination of some or all of the above. The inter-dealer brokers (IDB) enhance liquidity in the market by facilitating trading between dealers. This is a “live” market where dealers post bids and offers on individual securities on inter-dealers’ screen, the IDB’s charge commissions for execution. Some of the IDB firm include Shorcan, Cantor and Freedom. Trades occur on the screen and all other dealers (members of IDB) can view them. In the inter-dealer brokers’ market the trading dealers remain anonymous. The market is exclusive to dealers, although inter-dealers are trying to gain access to investors. It is surprising that only about 5% of the trades (in a \$500 billion market) are done electronically. Little intellectual capital is needed here since both parties are professional and know what they are trading. The electronic platform used in this market is CBID, an inventory-based system where dealers (called liquidity providers) place securities for sale to other dealers. These markets are live and the current price and quantity are provided. Little intellectual capital is exchanged in this market; the IDBs have the most to lose from an electronic system. Yet another avenue would be to contact another dealer from another firm (step 4d), but this would be a last resort, as dealers do not like to go to other dealers and give business to competitors.

An alternative method is for the client to request direct contact with the trader. This is step 5. This was the traditional approach, but today it is used less frequently and is granted only to preferred customers with large orders. Clearing and Settlement (step 6 to 9) is effected electronically through Clearing and Settlement Corporation (Canadian Depository Securities – CDS). All parties involved must generate reports confirming trades to third-party accounting systems. The Buy Side (investors) reports electronically first, to their Portfolio Management System – PMS and next to their Portfolio Accounting System – PAS, which in turn reports to the CDS. The Sell Side (dealer) reports to CDS through the dealer’s Inventory/Risk Management Office. An Independent custodian holds the inventory and verifies ownership with the dealer’s system and the CDS.

CanPX (step 12) has access to the dealer market and reports to the market. Only quotes are provided and not the “live” market. Quotes are indications only, whereas markets offer “live” tradable prices with quantity and are honored by the dealer who gives them: “my word is my bond”. These are offered over the phone and are good only for the duration of the phone conversation. A market is given to a “known” source and not to the public because it normally involves large quantity. CanPx is a venture of the member firms and Investment Dealers’ Association of Canada and four inter-dealer brokers operating in Canada. It provides investors with a benchmark to determine whether dealer-quoted prices are representative of fair market prices. Quote vendors have access to the dealer quotes and report it to the market (step 11).

### **ALTERNATIVE TRADING SYSTEM**

Exchanges are viewed as single-sided auctions compared to the bargaining process of the traditional OTC markets. Double auctions admit multiple buyers and multiple sellers at the same time, while continuous double auction (CDA) matches bids in the order received. When a new bid is processed, the auction checks to see if the price offered matches the lowest existing selling price (offer) and vice versa. If there is a match, the auction clears at the price of the existing offer and generates a new price quote. CDA is a common mechanism for organized exchanges. An important feature of OTC fixed-income trading is the added “bargaining” or “negotiation” that arise from the special needs of the institutional investors. OTC trading is not bound to an organizational structure in that supply and demand are not concentrated on a centralized trading floor. Participants lose several degrees of freedom during negotiations. Prices are determined by auction and by bargaining. Bargaining is needed because investors have special preferences based on their market expectations and their portfolios. They negotiate with financial intermediaries on attributes, such as the type of the security, the unit of trade, price basis, varying maturity, inflation linkage, and delivery term. Credit derivatives also trade on the OTC and need a high level of negotiation.

Rapid advances in technology have permitted innovative participants in the financial markets to offer traditional services in new and more efficient ways, like electronic order-matching and trade execution outside the confines of the physical trading floor. ATS is an electronically interconnected, computer-based securities trading network, providing a variety and combination of services, including dissemination of information such as the last traded price, volume, bid and offer quotation, order routing, automatic order matching, trade execution, and clearance and settlement services. Participants can trade anonymously from a computer terminal and inquire into the latest market information.

There are more than 50 ATS in North America and 24 in Europe. An example of a fixed-income ATS is TradeWeb established in the US in 1998. TradeWeb is the leading online fixed-income trading network with over 6 million trades executed and total volume surpassing \$65 trillion since its inception in 1998. TradeWeb's multi-dealer auction model links the trading desks of 32 of the world's leading fixed-income dealers with more than 1,800 buy-side institutions in North America and Europe. TradeWeb screen displays top, live prices and indicates which dealers are willing buy or sell. The investor fills out a ticket on the computer indicating how many Treasuries are required, and within seconds the dealers respond with their offers and the investor can then either pick the dealer with the best level and execute the trade over the computer or alternatively do nothing.

The TradeWeb trading model is the “Dealer-to-client Request-for Quote” (D2C RFQ) model, one closely resembling the familiar telephone transaction sequence but offering added market transparency and liquidity. Figure 2 depicts the price discovery mechanism provided by TradeWeb (Schmerken, 2003).

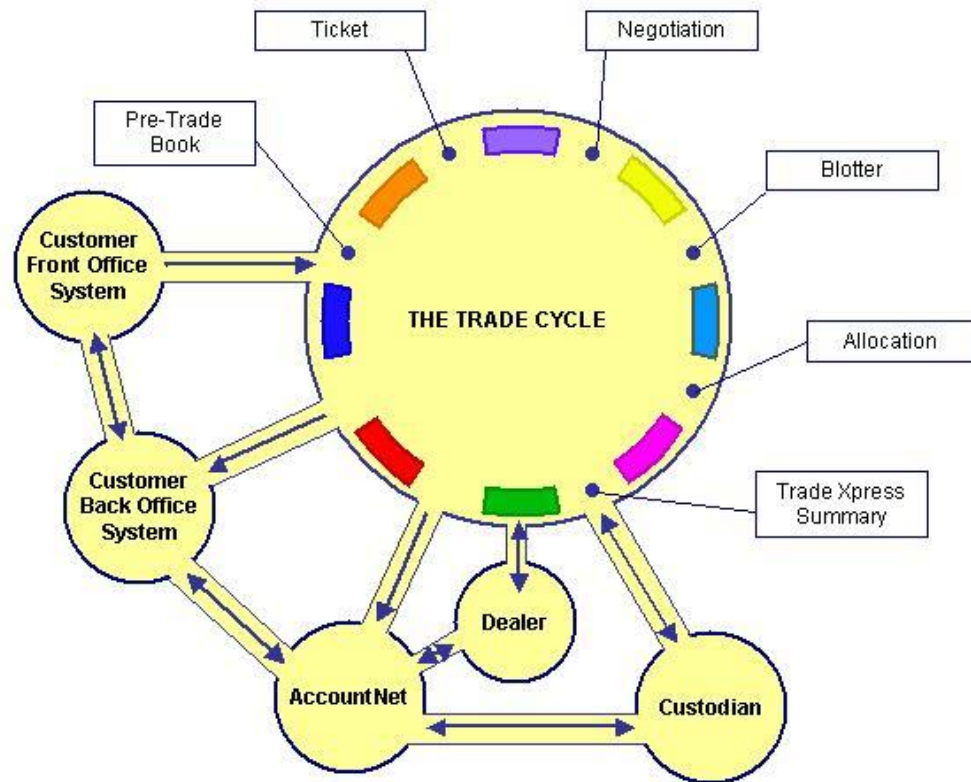


Figure 2. An Overview of TradeWeb Structure

For example, TradeWeb in support of U.S. Treasuries provides the following:

**Execution**

- Institutional investor access:
- Combined liquidity of 17 of the leading primary dealers
- Trade of every Treasury bill, note, bond and strip with their premier dealers

- Trading on announcement of "when-issued" securities
- Treasury Inflation-Protected Securities (TISP) are priced and traded
- Live "Hits" and "Takes" are shown for transactions

**With the click of your mouse, one can:**

- Hold a live auction by sending inquiries electronically to multiple dealers simultaneously
- Receive live, executable quotes back from each dealer
- Execute trades in under 8 seconds

**Straight-through processing**

- Reduce processing costs with the TradeXpress STP Network. TradeXpress offers complete paperless electronic processing:
- Allocate and confirm all fixed-income trades, including phone trades, accurately and more efficiently
- Reduce failed trades

**ADVANTAGES AND DISADVANTAGES OFATS**

The traditional OTC Bond market, compared to ATS, is inefficient. Bids/offers in the OTC market do not have to be reported and the trades do not have to be publicly reported. Investors are not aware of the premiums embedded in the dealers' bid/ask spreads, and this raises questions of whether they are getting a good (fair) price. Furthermore, deals may be affected by trading and personal relationship between participants. Without transparency and public information, prices may change from client to client. Because of wide bid/ask spreads trading errors (ticker/ticket errors) are more costly than any other product. ATSS can be more efficient than the OTC approach because technology can relieve some of the problems that have long plagued the OTC market. ATS can lower a number of barriers to entry by having more transparent markets and providing decision-makers with access to market microstructure information (e.g., depth and liquidity). Furthermore, the efficiency of ATS can lower transaction costs, significantly reduce ticker errors and foster real-time competition with multiple dealers offering bids on securities. Investors can receive real-time prices within a tighter market and tighter bid-ask spreads without having to shop around. This implies lower bid/ask transaction costs. ATS can free up traders' and salespeople's time, enabling them to concentrate on value-added transactions. It can also make it possible to sell securities (public offering) directly over the Internet. Ford was the first to do this by selling commercial paper directly to institutional investors. Nevertheless, ATS can have its disadvantages where dealers are concerned. The current distribution system may collapse, squeezing out the middlemen and that will result in a smaller sales force and fewer dedicated product traders will be needed. Dealers could be forced to post more competitive prices because of the transparency squeezing dealer profits.

Electronic systems may have disadvantages not only for traders but also for investors. Investors may have to divulge their identity and details of their order to dealers. Some fixed-income products have complex structure or credit stories and investors prefer talking to a salesman who can answer questions. There are different types of fixed-income systems to deal with the complexity of fixed-income products (See Appendix B for details). Nonetheless, the complexity of selecting "right products" makes it difficult for investors to rely solely on information received through ATS. As a result, major transactions are performed over the phone.

**CONCLUDING REMARKS**

Trading in OTC is not bound to an organizational structure in that supply and demand are concentrated on a centralized trading floor: Bilateral negotiations with banks or investment brokers are conducted over the phone, and this leads to high transaction costs. Prices are not determined by auction but by bargaining. Investors have special preferences based on their market expectations and on their portfolio and they negotiate with financial intermediaries on attributes such as the type of underlining security, the unit of trading, price basis, and contract maturity and delivery terms (Bichler, 2000). Nonetheless, our interviews with senior traders and managers of major financial firms indicate that the present ATS systems do not support their requirements for information where large, fixed-income trades are concerned. This is evident by the small percentage of fixed-income trades completed through ATS (5%). The reason is that, whilst the information provided by ATS may reflect the market's best available information on the value of a trade, current ATS provides very little information to the dealer wishing to determine the transaction cost of a given trade. Lacking the necessary information for effective price negotiation, market-makers would have to cross-subsidize some traders (Clemons and Weber, 1997). In this regard, Clemons and Weber contend that:

“As technology-enabled competition among trading venues increases, and as market makers become less able to recover their loss by overcharging for safe intermediation, they will need to be able to negotiate fair and accurate prices for each individual provision of their services. Thus, screen-based markets that do not support pretrade price negotiation place intermediaries at extreme risk. (page 1697)”

A change in an organization’s technology entails adjusting the tools, devices, knowledge, or techniques involved in the decision processes (Burkhardt and Brass, 1990; Irani et al, 2000; Tushman and Anderson, 1986). Based on our research findings reported in this paper, it seems that the present ATSs are designed mainly to support efficient transactions among the parties involved. They can be considered as competence-destroying, because they can disrupt industry structure (Mensch, 1979). But traders in fixed-income markets are knowledge workers in need of knowledge-based support systems. That is why, in spite of access to ATSs, they still rely on voice communication by telephone and in face-to-face conversations for the exchange of information and trade. A key role of financial markets is the provision of liquidity to investors who want to exchange financial assets for cash or vice versa, without possessing superior information (Mendelson and Tunca, 2004). The choice problem faced by such liquidity traders and its effects on market performance are overlooked in present ATS in regard to dynamic models of asymmetric information on financial markets. Information asymmetry means that, in any relationship, someone possesses private information, which other parties do not. The acquisition of some private information by the informed trader increases liquidity traders’ welfare, but the informed trader may acquire more information than needed to maximize liquidity traders’ welfare (Mendelson and Tunca, 2003). In essence, the informed trader plays the role of an insurer, with the liquidity traders paying him for risk reduction. Thus, to assist traders, we need to provide them with competence-enhancing tools, which build on existing expertise within the organization. This requires an integration of present transaction-based systems with additional knowledge-based information systems in support of tacit knowledge of the actors. In this endeavor, we need to take into consideration the dynamic environment in which buyers, sellers, and intermediaries work in concert to create a mutually beneficial environment.

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**APPENDIX A****Services offered by Electronic Trading Systems****(Adopted from The Bond Market Association, 2004)**

**Pricing data** —Users can access a database of all trades executed on the system and, in some cases, trades executed on other platforms or by voice.

**Confirmation and allocation services** —Users can obtain electronic trade confirmations and/or use the platform to allocate trades among several accounts.

**Order management system** —Users can view and manage orders and positions on a real-time basis, in some cases across all traders within a firm or group.

**Pre-trade analytics**—Users can access research, data and analytical functions to develop or test trade ideas before actual execution.

**Matching services** — Users can compare trades against a counterparty's records to enhance the clearance and settlement process.

**Electronic research delivery** — Users can obtain research products produced by dealers or third-party providers.

**Regulatory compliance services** — Assists users in complying with certain regulatory requirements such as record-keeping or due diligence in price discovery.

**Risk monitoring or management services** — Allows users to apply risk assessment functions or models to portfolio holdings or monitor and control portfolio risk for individual traders or across a group or firm.

**Identity management services** — Advanced login features that allow users to monitor or control access to certain functions or services.

**APPENDIX B****Types of Systems supported by the Electronic Trading Systems****(Adopted from The Bond Market Association, 2004).****Auction Systems**

Auction systems enable participants to conduct electronic auctions of securities offerings. Some auction systems are tailored to new issues in the primary market. Others focus on auctions of secondary market offerings by investors or others. In either case, a seller or issuer typically posts the details of a security on offer and the specific terms of the auction, i.e., whether the auction is single-price or multiple-price, the time the auction is open, whether partial orders will be filled, etc. Buyers are able to submit bids for the securities on offer, and the offering is awarded to the bidder that offers the highest price or lowest yield. In some cases the identities of the bidders and the amounts of the bids are kept anonymous. In others, identities or bid amounts are viewable by all participants.

**Cross-Matching Systems**

Cross-matching systems generally bring both dealers and institutional investors together in electronic trading networks that provide real-time or periodic cross-matching sessions. Customers are able to enter anonymous buy and sell orders with multiple counterparties that are automatically executed when contra side orders are entered at the same price or when the posted prices are "hit" or "lifted." In some cases, customers are able to initiate negotiation sessions to establish the terms of trades.

**Interdealer Systems**

Interdealer systems allow dealers to execute transactions electronically with other dealers through the fully anonymous services of interdealer brokers.

**Multi-Dealer Systems**

Multi-dealer systems provide customers with consolidated orders from two or more dealers and allow customers to execute from among multiple quotes. Often, multi-dealer systems display to customers the best bid or ask price for a given security among all the prices posted by participating dealers. These systems also generally allow investors to request quotes for a particular security or type of security from one or more dealers. Participating dealers generally act as principals in transactions. A variety of security types are offered through these systems.

**Single-Dealer Systems**

Single-dealer systems allow investors to execute transactions directly with a specific dealer of their choice, with the dealer acting as principal in each transaction. Dealers offer access through a combination of third-party providers, proprietary networks and the Internet.