Electronic Securities Trading: The options for designing electronic markets and some consequences for investors and intermediaries

Burkhard Varnholt*

Securities Trading all over the world is undergoing radical change. The advent of new technologies in all major securities markets represents far more than a mere new cost cutting tool. There are more electronic stock exchanges today than there are open outcry trading systems. These highly visible developments impact the two fundamental features securities markets offer investors and market economies: price-discovery and the execution of securities transactions.

The first feature that securities markets offer market economies is their price-discovery service. It was the Austrian economist Friedrich-August von Hayek who first formulated this insight in his seminal paper in the American Economic Review in 1945. Yet, until quite recently most researchers have and many still do consider the price-discovery-process to be independent of the microstructure in which an asset is traded. The second feature lies in satisfying the demand for securities transactions that individuals require. The economic costs at which a trading system can satisfy these two requirements are crucial for any meaningful comparison between different trading systems. These costs will be changed by electronic trading systems. How this can take place will be a topic of this article.

STRUCTURAL FEATURES OF TRADING SYSTEMS

There is no such thing as a universally best trading system structure. A private investor expects other qualities from a trading system than does a hedge fund or a professional arbitrageur. Rather, a trading system structure tries to optimize various, sometimes conflicting interests. The heterogeneity of interest groups assures that there are many different trading systems which do not compete with one another but must be seen as complementary. Technological progress increases the variety of trading systems. However, four distinctive principles of organising a trading system remain. They shall be quickly analysed.

* This study is an extended version of a study by Prof. Bruno Gehrig (Swiss National Bank) and Burkhard Varnholt (Swiss Institute of Banking and Finance), published in: A. Brandenberger, «Standpunkte in Theorie und Praxis», (1995), Haupt, Bern, Stuttgart, Wien. The author is also a member of the functional committee «Derivatives» of the Swiss Exchange. However, the arguments presented here are the author’s own and do not necessarily reflect those of the Swiss Exchange.
Order-driven trading versus dealership-markets

In order-driven trading-systems investors will enter their orders in a central order book which performs similar functions to that of a walrasian auctioneer. Because the order book itself never assumes any positions it needs no expensive risk management tools a market maker has to have. The higher cost structure of dealership-markets is reflected in the spreads dealers charge investors. These transaction costs reduce the markets' trading volume as shown in figure 1.

![Figure 1: Auction markets and dealership markets](image)

Due to the relatively high transaction costs of dealership markets these are primarily used for blue chip stocks or for government bonds. From an investor's point of view dealership markets offer two primary advantages over auction markets. The first is the pre-trade price transparency which an auction can never render. The second is the immediacy in executing a trade due to the trader's willingness to make markets permanently. Yet there are several shortcomings. One is the fact that in auction markets the transparency of an electronic order book over the market's total order flow is greater than in the case of single market makers. This can lead to greater price efficiency. With regard to these arguments the Swiss Exchange's decision in favour of an electronic call system with mandatory market making is helpful. It will allow market makers to focus on those stocks and securities in which it is commercially sensible.

CONTINUOUS VERSUS BATCH TRADING

Traditionally, order-driven-markets were organised as call markets whereas a dealership market generally allows for permanent trading. The principle of concentrating orders around single time slots serves two objectives: to reduce the transaction costs for the participants in a trade and to improve the natural market liquidity in order to support the price discovery process.

It is often argued that there is a trade-off between the benefit of the improved liquidity of a call-system and its lessened immediacy. However, this trade-off is not as clear cut as proponents of dealer markets usually argue. Three aspects should be kept in mind.

First, the demand for immediacy is in part endogenous to the market. Once a participant decides to seek a trade, that individual might wish to trade quickly in order to gain anonymity and to avoid having his or her order front run.

Second, dealers are not the only suppliers of immediacy and liquidity – limit orders can display an important role as well, depending on how the system is designed. In general, the need for intermediaries could be lessened as advances in electronic technology make direct access to the market increasingly feasible. These electronic trading systems offer a natural cost advantage over continuous dealer markets as an electronic order book becomes virtually costless after it is installed.

Third, some market participants do not choose to pay the price for immediacy when they have an alternative. The problem with continuous dealership markets which offer no alternative call auction is that everyone who trades is forced to buy the immediacy product, whether he needs it or not. It is an often heard myth that investors need this immediacy. In reality, however, investors rarely trade on news. Most large investments are preceded by thorough research and do not depend on an immediate execution within the next 60 minutes or so. These investors and also passive investors value lower trading costs more than they value immediacy.

Fourth, economically more concerning is the second cost-aspect of dealership markets which comes in the form of an increased price volatility. The market makers' continuous readiness to make two way markets reduces the market's natural liquidity due to random buy-sell imbalances. Of course, the market makers' job is to oppose to these order asymmetries. There are, however, three immediate limitations to such behaviour. First, market makers are ill equipped to distinguish between stochastic order imbalances (which they must absorb) and fundamental mispricings. Analysts and investors are generally better prepared to do this job. Second, market makers have no generic interest in reducing the price volatility of traded securities. Their closeness to the markets allows them to profit even from small price moves. Therefore their self-interests conflict with the economic aim of minimizing securities price-discrepancies from their fair value. Third, market makers' ability to absorb one way markets is quickly limited by their amount of capital.
CENTRALISED VERSUS DECENTRALISED MARKETS

Ideally, markets should make the most effective use of the natural liquidity of supply and demand. In principle, this can be achieved by the timely and spatial consolidation of orders. Yet market participants sometimes have commercial reasons to divert order flows into the so called «upstairs markets» where prices can be negotiated and markets are not immediately informed about the terms of the trade. Two aspects are relevant.

First, the trading-volume on parallel trading systems is of paramount importance. Do these systems compete with each other at the cost of the market's overall liquidity or are they complementary? Especially in the US the market share of proprietary trading systems has recently increased. These trading systems exploit the public-good character of the published prices of other exchanges. By simply assuring investors that they can trade at or below other exchanges' prices they free ride the expensive price-finding function of the primary market. Many passive investors who are less dependent on the speed of their execution prefer these cheap trading systems to the more expensive trading systems.

To circumvent the problem of market fragmentation the Swiss Exchange as well as other exchanges have introduced limited duties to trade smaller lots of stocks on the exchange while larger blocks may be traded in the privacy of «upstairs markets» for some time. The parallel introduction of «hidden size orders» offers further reasons for investors to prefer exchange-trading to OTC-trading. «Hidden size orders» avail investors with a certain discretion regarding the size of their orders. Only the realization of price- and time-priority rules must be assured at all times, while the underlying order-volume remains secret. While representing a strong form of market regulation, exchange-duties are an attempt to internalize the external benefits of having a centralized, transparent market place. They foster the quality of an exchange in terms of its price-finding-function as well as its transaction-execution-function.

TRANSPARENCY AND LIQUIDITY

Transparency and Liquidity of a market are essential characteristics of an efficient market. Intransparency slows the informational efficiency of markets, negatively affects the quality of security valuation, leads to a higher variance of traded prices and reduces the market’s liquidity via the inevitable loss of the participants confidence. An illiquid market on the other hand is characterized by strong «price impacts» which increase transaction costs and reduce the transaction frequency.

Here the problem lies in the trade-off between the liquidity and the transparency of trading systems. Dealers, for instance, fear the immediate publication of their last trades because this exposes them to strategic price-setting behaviour by other traders. It is clear, that a dealer will be reluctant to take on a large position in a particular security if he cannot conceal his resulting portfolio-imbalance from the market for at least some time.
Delaying the publication of the last trades is thus intended to allow dealers to quietly rebalance their market exposure. The opponents to this rule argue rightly that large transactions can be important for the fundamental valuation of securities. In judging on this argument the differentiation between information which is fundamentally relevant to the security and information which purely reflects temporary market imbalances is crucial. Information which is fundamentally relevant to security valuation should be published immediately. Information which only reflects the stochastic order imbalances may be published with sufficient time lag to give the market maker an opportunity to rebalance his position. The problem, of course, lies in distinguishing between the information content of single transactions. Here a uniform rule needs to be implemented which should aim to keep the time lag in publishing relevant information at a minimum.

AUTOMATING THE ELECTRONIC PRICE DISCOVERY PROCESS

In electronic trading the price discovery process can vary between systems in which prices are simply downloaded from other primary markets and those where market prices are actually discovered in the process of matching supply and demand. There are at least seven degrees to which trading systems can offer price discovery services to investors.

1. Price taken from another market

These are proprietary trading systems where investors trade directly at the published prices of another exchange. Eliminating the role of financial intermediaries leads to significant cost savings. Because these cost savings are primarily achieved through free riding the price publication services of the primary markets there exists a lot of mischief against these from other exchanges. Well-known examples of proprietary trading systems are INSTINET, POSIT and TRADE.

2. Prices taken from another market with price improvement algorithm

Some computerized systems execute trades based on a consolidated best bid or offer (CBO) from multiple markets. The guaranteed execution price of small orders is the best price from all markets, but the order may be transacted at an even better price depending on the size of the bid ask spread and market conditions. Some banks offer this service to their clients (eg. BEST).

3. Some negotiating capability exists in the system

In such trading systems there is an electronic limit order book which automatically calculates the equilibrium market prices. In addition, the market participants can negotiate prices individually, which is especially relevant for block trading. Thus the trading system effectively offers a price discovery service which makes it relatively more expensive than the preceding systems.

4. Direct removal of quotes from the trading screen

This electronic market making allows or requires market makers to post binding bid and ask quotes in the system. These quotes are published in real time and can be removed immediately by other market participants.

5. Automated continuous double auction

In such trading systems participants submit priced orders that are not disclosed to other participants. At the call, orders are arrayed by price and cumulated by the highest bid to the lowest bid for buy orders and from the lowest ask to the highest ask for sell orders. The cumulated orders are matched against each other and the clearing price is determined. In addition, there is an electronic limit order book into which best-price-orders can be entered at all times. Priority rules are especially important in these systems. They determine how visible the details of all orders are and how liquidity-enhancing orders such as limit orders can be prioritized over liquidity-absorbing orders such as best-price-orders.

6. Automated periodic single-price auction

This approach is used as the opening procedure in most electronic continuous markets. For example, the opening procedure for Toronto’s CATS, Tokyo’s CORES, Paris’ CAC, and Australia’s SEATS, are structured as open order book auctions. Aggregated buy and sell quantities at each price are displayed once they have been received by the market, and all participants can watch the market as it forms. Orders are continuously aggregated and sorted, and the price that would be if the call were held at that moment is updated and displayed.
7. Automated auction with pricing model

Especially options exchanges like GLOBEX use this electronic procedure where quotes are made in terms of volatilities. It is not until after the matching of supply and demand in a volatility auction that the prices will be calculated by an automated pricing algorithm. Thus here the system’s original contribution to discovering a market price is greatest as it is effectively determined by the systems own pricing model and not by market participant’s quotes.

WHAT LIES AHEAD?

Before predicting the likely development of electronic trading systems in Europe it is interesting to analyze the evolution of trading systems in terms of the different degrees of automating the price discovery process as described above. The next graph takes a look at this evolution over the recent market history.

Figure 2: Evolution of trading systems according to their price discovery processes

The graph demonstrates that the proportion of trading systems which offer genuine price discovery features has grown just as the proportion of pure crossing networks has decreased somewhat. Every system operating as an exchange constructed after 1989 precludes negotiation, contributing to higher overall levels of automation of the price discovery process. In general, not only is the number of computerised markets growing over time, but the level of automation within this market structure is increasing as well. It is interesting to look at the geographical distribution of trading systems as well. Figure 3 presents the data.
Most of the early stock systems were built in the US, and level 1 systems comprise fully 50% of automation in the US and Canada. There are no such trade matching mechanisms in the Pacific region, defined to include Hong Kong, Japan, Singapore, Australia, and New Zealand. Only 5 percent of European systems lack some form of endogenous price discovery mechanism. Similarly, markets operating as automated auctions comprise only 18% of North American computerized markets, while 86% of Pacific and 46% of European systems run at level 5. Many of these European systems are constructed for futures and options trading, corresponding to the overall growth in the global market for derivative securities, and are far newer than their North American counterpart.

CONCLUSIONS

Electronic securities trading fundamentally alters the economic role of intermediaries. Today most client orders are never actually seen by traders. Instead they are often automatically matched, executed and cleared. As the quality of trade execution is being commoditised financial intermediaries need to define and to explore alternative sources of value creation for investors. Three approaches can generally be distinguished. First, offering trade execution services in a standardised manner will be profitable for large intermediaries who surpass the critical quantity of trades to justify their high fixed costs. There are some large intermediaries who will successfully pursue this strategy by offering other banks the capacity to outsource their trade execution needs. Second, some intermediaries will profitably concentrate on accommodating untypical trades. These can
be difficult trades due to their size, illiquidity, regulatory difficulties, negotiating problems etc.. Third, some intermediaries will outsource their trading services completely and fully concentrate on financial advisory services. These will be primarily smaller asset management firms or private banks who gain the best market differentiation through a comprehensive package of services.

The winners in the described developments will be investors. There are two important aspects to this. First, investors will benefit from the increasingly strong and transparent competition between trading systems which limits the intermediaries' room for price negotiation to a minimum. Second, as trading systems and financial intermediaries become more specialised, investors will be offered a much expanded and more sophisticated range of trading and advisory service than they traditionally faced.

Given the very flexible electronic trading infrastructure of the Swiss Exchange its future seems bright. By allowing the market to determine rather freely which securities should be traded in auctions, crossing networks or through securities dealers a great deal of structural flexibility is assured. It is hard to imagine that this will not be a valuable competitive advantage over alternative trading forms in the future. In addition, the different electronic orders are well designed to attract investors even for large or untypical trades.

REFERENCES


ZUSAMMENFASSUNG

Der Beitrag setzt sich mit Möglichkeiten der Gestaltung elektronischer Handelssysteme auseinander und zieht einige Folgerungen für Investoren und Intermediäre. Es werden die grundsätzlichen Gestaltungsparameter der Marktmikrostruktur analysiert und einige Argumente für und wider bestimmte Gestaltungsvarianten werden aus ökonomischer Sicht beurteilt. Insbesondere auf die Argumentation im Zusammenhang mit dem Zielkonflikt zwischen Liquidität und Transparenz wird kritisch eingegangen. Anschliessend
werden bestehende Handelssysteme nach dem Grad ihrer eigenen Preisfindung differenziert und deren weltweite Verbreitung analysiert, um schliesslich Folgerungen für die zukünftige Entwicklung elektronischer Handelsysteme sowie für Investoren und Intermediäre zu ziehen.

SUMMARY

The article analyses the options in designing electronic trading systems and some of their potential effects on Investors and Intermediaries. The fundamental parameters in trading system design are being analysed and some essential concepts are being discussed from an economic perspective. In particular, the arguments regarding the «transparency and liquidity-debate» are critically scrutinized. In addition, the article presents a typology of trading system designs which differentiates according to the systems’ inherent price discovery mechanisms and whose international distribution is scrutinized. Finally, some conclusions are drawn with regard to the consequences of electronic securities trading for investors and trading-systems-intermediaries.

RESUME

L’article analyse les différentes options dans la configuration de systèmes de change électroniques et leurs effects potentiels sur les investisseurs et leur intermédiaires. Les paramètres fondamentaux dans la configuration de systèmes de change y sont analysés et quelques concepts essentiels sont discutés d’un point de vue économique. En particuliers, les arguments concernant «la transparence et le débat sur la liquidité» sont critiqués. De plus, l’article différencie les systèmes de change actuels selon leur mécanisme de détermination du prix et leur distribution internationale. Finallement, des conclusions sont tirées concernant les conséquences de ces systèmes pour les investisseurs et les intermédiaires.