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Trading mechanisms

Bachelor Thesis Finance

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Introduction

The interest in market microstructure and trading is not new, but Madhavan (2000) claims that the recent literature is characterized by theoretical accuracy and extensive empirical confirmation using new databases. It is becoming easier to trade financial assets because of the enormous growth of electronic markets. Furthermore, the different trading mechanisms with their specific trading rules have a lot of impact on the price of the financial asset, which is also relevant for the liquidity.

Market microstructure is the study of the process and outcomes of exchanging financial assets, such as stocks and bonds, under specific rules. It focuses on how specific trading mechanisms affect the price, and thus indirectly the attractiveness of the market. In this paper we will take a look at four trading mechanisms. The four types of markets are auction markets, limit order markets, dealer markets, and over-the-counter markets.
Stoll (2003) gives an explanation of his statement that immediacy is the financial intermediation service that a market offers. If an investor wants to immediately act then he places a market order to trade at the best possible price, he is a demander of immediacy. The different prices and the different needs of the sellers and buyers lead us to the next subject. Behavior of prices depends on the extent to which trading mechanism can match the needs of buyers and sellers. This matching principle provides the provision of market liquidity. So, the main research question in this paper is to determine the features of each trading mechanism, and which trading mechanism gives the best possible outcome for different type of traders.

As mentioned above, different trading mechanisms will be discussed. Each trading mechanism will be explained in a different chapter, where we also elaborate the features of the markets. These features, e.g. trading price of the assets, the anonymity of the trader, etcetera, provides the liquidity in the markets. In the next chapter we will elaborate on different combinations of markets. In some previous studies two types of markets has been used to determine the difference between those markets within the same environment, and we will outline some of these findings. Based on the analysis of the previous five chapters, we now can compare the markets and identify which trading mechanism is the optimum in different situations.

Auction market

Types of auction markets

There are several types of auction markets, but the overall objective of an auction market is to offer an uniform price, be fair to all participants, and risk sharing by trading shares. An auction market is a centralized facility where traders who want to buy or sell can execute the trades in an open and competitive bidding process such as a ground floor or electronically. All the needed information, such the bid and ask price, is collected in one location which is accessible to all potential buyers and sellers, for example a computer network. Traders are not allowed to deviate from the centralized facility, so private exchanges between individual buyers and sellers will not be made outside of the centralized facility.

Auction markets differ in several ways with each other. One of the main differences is the timeframe when bid and ask prices can be placed. According to this criterion we have two types of auction markets, namely a call auction market and a continuous auction market. In a call market the bid and ask prices are all posted at one time. A seller or a buyer places an order, in which the price and the quantity is included, which are traded at a specific time. In continuous markets the bid and ask prices can be posted at any time the market is open and that is why exchanges take place on continual basis.

Due to the accumulation of information during the overnight non-trading period, a lot of markets make use of an opening of the trading day. Because of this non-trading period information asymmetry is greatest at the start of each trading day and price discovery is more important at the opening than at the rest of the day.
Madhavan (1992) reports that call auctions are effective at handling information asymmetry problems. Given that information asymmetry is related to market value and trading activity it is expected that call auctions will be more valuable in small and less active assets. That is why an call auction often is used in the opening of a trading day. Sometimes call auctions are also gladly seen by traders since it can absorb the market impact of liquidity shocks (Barclay et al 2008).

Before the opening, there is a floor of orders to buy or to sell a specified quantity of the stock at a limit price or at the market price. Trading is performed at a price which clears the market, called the single market clearing price. This price is determined by the bid and ask process of buyers and sellers interested in trading the financial asset. The market clearing price applies to all orders executed at the opening. Because of that, the call auction mechanism is similar to the clearing house model of trade. In the call auction there is no difference between the buying and selling prices, what is called uniform pricing. In other words, the prices do not fluctuate between the bid and the ask, as is the case during the day with the continuous trading mechanism.

An auction market is a market in which investors trade directly with each other, and there will be no intervention of dealers. To make the term 'dealers' more valuable, the background will be explained shortly to make clear the difference between the two most important forms of market makers, namely a broker and a dealer. A broker is defined as an individual or firm that charges a fee or commission for executing buy and sell orders submitted by an investor, while a dealer is defined as an individual or firm willing to buy or sell securities for their own account. Technically, a broker is only an agent who executes orders on behalf of clients, whereas a dealer acts as a principal and trades for his or her own account. A well-known definition related to this is the principal-agent relationship. It is an agreement in which someone legally appoints another to act on its behalf so they should not have a conflict in carrying out the act. Continuous auction markets typically involve the participation of a dealer who enters bids and offers to maintain liquidity and continuous trading. He has the function as a gatekeeper for incoming orders to buy and sell. Essentially, the specialist process the orders and he match the buying and selling orders as they come in. This means that a specialist in an auction market does not perform functions such as researching the market trend or providing sales support to investors.

Features of an auction market

In an auction market traders operate in a centralized market. An advantage of such a mechanism is that it is easier for traders to detect the presence of traders with special information as compared to an OTC market for example where the dealers are dispersed. Huang and Stoll (1996) argue that the execution costs are an advantage of an auction market. They are relatively low due to the fact that auction markets allow traders to directly trade with each other as opposed to a dealer market where the dealers make profits.

The models of Kyle (1985) and Glosten-Milgrom (1985) are important models in the literature about adverse selection. The basis of these models is derived from the work of Bagehot (1971). He concluded in his study that trades move prices because there is a possibility that the trader is better informed than the market in general.
The Kyle model (1985) is a model of a batch auction market in which the market makers see only the imbalance of the buy and sell orders at each auction date. They compete with each other to fill this imbalance, and trying to match orders at the market clearing price. Because orders are batched, there is uniform pricing. Kyle focuses on the depth or the liquidity of the market. To derive the equilibrium depth, Kyle solves for the equilibrium strategy of a single trader with a monopoly on information. He shows that in equilibrium the trader will only trade gradually to exploit his monopoly power over time, instead of operating at the maximum size possible, so that his information is incorporated into prices at a slow, almost linear rate. This results in maximizing his profits before the information becomes common knowledge. The second conclusion of his work is that when auctions are held continuously, the depth of the market is constant over time. Later on in this paper, the findings of adverse selection in dealer markets will be explained by using the Glosten-Milgrom model (1985).

Limit order markets

Description of a limit order market

A limit order market is most frequently used in the exchange of financial assets. In a limit order market traders can submit two types of orders, namely a market order and a limit order. An order remains in force until the moment that the order is accepted or canceled. A market order is a request to trade immediately at the most attractive price that is available at that moment in the market. So, a market order fills immediately.
A limit order is an order to buy a specified quantity of a security at a specified price. If the trader places an order to sell, it will be an order to sell a specific quantity at a specified price. This specified price is called the limit price.

This specified price is not a guarantee that the order will be filled. All limit orders enter the limit order book. Market orders do not enter this book because a market order is a request to trade immediately at the most attractive price at that moment, so it fills immediately. Limit orders are executed when it can be sold in the market because of an attractive limit price. When they are not executed, they stay in the limit order book until they are cancelled or filled. In some limit order markets, all limit orders in the limit order book will be cancelled at the end of a trading day.

According to Parlour and Seppi (2008), there are two different types of limit order books, an open book and a closed book. In a closed book, the traders cannot see the book, and that is why it is called a "Dark Pool". In contrast of a Dark Pool, all limit orders are observable to all investors in an open book. This is a good example of a regulation regarding information transparency.
Buti, Rindi and Werner (2011) model a dynamic financial market where traders can place an order in a limit order book or to a dark pool. Their model shows that dark pools increase liquidity, but only when a dark pool is added to a dealer market where traders cannot compete with each other for the provision of liquidity by submitting limit orders. When a dark pool is added to a limit order book, orders migrate away from the limit order book to the dark pool. So, the model demonstrates that the dark pool produces order migration rather than order creation as in Degryse, Van Achter and Wuyts (2009).

In their paper, which is the closest to the paper of Buti, Rindi and Werner, they investigate the interaction of a crossing network and a dealer market.

In terms of market quality, Buti, Rindi and Werner find that depth and volume get worse on the limit order book, while the total volume increases, when a dark pool is introduced.

They show that the market share of dark pools is higher when the limit order book depth is high, when the limit order book spread is narrow, and when the tick size is large because that reduces the profitability of liquidity provision and hence the use of a dark pool. When large visible limit orders cause price pressure in the limit order book, traders also resort to dark pools to reduce price impact. Another finding is that asymmetric information is responsible for moving liquidity from the limit order book to the dark pool. When traders know that other traders are informed, they anticipate that the informed traders will use the dark pool more intensively and that this will increase the execution probability of dark pool orders.

Features of a limit order market

In all cases a limit order has a better price than a market order, but there are also costs associated to submit a limit order. One of the biggest tradeoffs is that there is a risk that the limit order may fail to fill. Related to this, there is a chance that the limit order fills. This chance is called the execution probability.

A limit order may take time to fill. It takes longer for a limit order is filled in contrast to a market order. If the trader is not monitoring the limit order, then there is a possibility that the limit order could fill when there is a change in value. The expected loss from such fill is called the picking of risk. Hollifield, Miller and Sandås (2004) provide a theoretical model for the tradeoff between supplying liquidity by issuing a limit order and consuming liquidity by issuing a market order. In that model, the submissions of the limit orders placed by traders depend on their valuations of the assets and the trade-offs in execution probabilities, picking-off risks, and prices of market orders.

Related to these subjects, the market makers faces an adverse selection problem since a customer agreeing to trade at the market maker's ask or bid price. He may be trading because he has information that the market maker does not have. In effect, the market maker must recover the losses suffered in trades with the well informed by gains in trades with liquidity traders. These gains are achieved by setting a spread. These spreads are larger when adverse selection is more severe. So, this spread compensates the market maker for the risk of doing business with traders who have superior information. (Bagehot 1971; Copeland and Galai, 1983; Glosten and Milgrom, 1985;, Kyle, 1985; Easley and O'Hara, 1987)

Copeland and Galai (1983) suggest that limit orders or market makers' quotes are exposed to the risk of being "picked off" when the market valuation is changing, which results in an unprofitable execution. In Copeland and Galai (1983), the asymmetry in the timing of the moves is at the origin of the adverse selection. This adverse selection problem is a different one than studied by Kyle (1985) and Glosten and Milgrom (1985). Kyle (1985) and Glosten and Milgrom (1985) underline the asymmetric information about the value of the asset, such that adverse selection would arise even if the market makers and informed traders move simultaneously.

The studies mentioned above demonstrate that the possibility of information-based trading can induce a spread between bid and ask prices. Easley and O'Hara (1987) show that the possibility of information-based trading need not always result in a bid-ask spread. Depending on market conditions, such as width or depth, informed traders may choose to trade only large quantities, leaving the price for small trades unaffected. Easley and O'Hara (1987) demonstrate that prices and spreads will differ across quantities.

According to Glosten (1994), discretionary uninformed traders who act as liquidity providers are more likely to choose limit orders than market orders. As long as limit order traders have an informational disadvantage relative to informed traders, the adverse selection problem is likely to be more serious around the market open and close, and around the beginning and the end of the week. This is due to concentrated informed trading around these periods (Foster and Viswanathan, 1993). Thus, limit order traders are likely to maintain wider spreads and lower depths in order to avoid losses from trading with the informed traders. So, the marginal cost of supplying liquidity is increasing because of adverse selection (Glosten, 1994).

There is also another tradeoff called the winner's curse. Limit orders are potentially executed at better prices than market orders, but they run the risk of non-execution and are exposed to a winner's curse problem. This means that you are adversely picked off if the security's value moves past the limit price before the limit order can be cancelled. Foucault (1999) created a model in which limit orders face the winner's curse because they cannot be cancelled once submitted and thus may become stale once new information hits the market. Traders differ in the speed with which they can react to the arrival of new information, but in the model of Foucault there are identical traders.
Hoffmann (2011) decided to extend the original model of Foucault by allowing for heterogeneity in the opportunity for traders to revise the limit orders after the arrival of new information. There are two different kind of traders, namely the fast High Frequency Trader and the slow human market participant. He found two opposing effects. The first one is that the speed advantage of the fast traders allows them to adjust their quotes to new public information which allows to achieve higher profits. The second one is that fast traders obtain higher expected profits from posting limit orders than slow traders since they have a reduced risk of being picked off. If the winner's curse is high enough, the first effect dominates and trading volume, which is related to welfare, is above the level in the case with identical traders studied by Foucault (1999).

As mentioned above, a limit order has a better price than a market order. In limit order markets there is price priority in limit order markets what means that limit sells trade at lower prices and limit buys trade at higher prices. This results in better terms of trade.
There is also a time priority in limit order markets. This means that an older limit order are executed before a more recent limit order, also known as the "first-in first-out" principle. This principle rewards the investors who take the risk to move first with providing liquidity at a given price.
Because of recent theoretical developments the theoretical literature focuses more and more on the features that are unique to the limit order market. Not only the price discovery, but also the demand of immediacy plays a major role. Foucault, Kadan and Kandel (2005) consider a dynamic model of price formation in a limit order market. They assume away the information asymmetry, and instead of that the traders differ in terms of impatience. Now the order submission decision of the traders is driven by a trade-off between the cost of immediacy and the cost of delayed execution.

This assumption was as first suggested by Demsetz (1968). Foucault, Kadan and Kandel found that traders submit more aggressive limit orders when the number of patient traders increases or when the arrival rate decreases, and these aggressive orders reduces the expected execution time. Price priority determines the effect of the submitted price on the expected execution time. This expected execution time affects subsequently the choice of order strategy.

Dealer markets

Description of a dealer market

A dealer market is a market in which a large number of market makers are active. Each individual market maker is trading on the 'temporary fluctuations' of supply and demand. The market maker is a price-setter, in the sense that he controls the price-probability functions for the demand and supply. The dealers post bids and offers at which public investors can trade. The investor must buy at the dealers ask and sell at the dealers bid, so they cannot trade directly with each other. To give an idea, bond markets and currency markets are often dealer markets. Dealer markets differ a lot from the other markets. The traders focus on particular assets engage in buying and selling activity using their own accounts rather than being represented by a third party. Generally, dealers have to meet stringent requirements in order to participate in a dealer market, including compliance with regulations that govern their continued participation in the dealer market.

As mentioned in the beginning of this paper, Kyle (1985) and Glosten-Milgrom (1985) in which they study the adverse selection problem. Both models use the finding of Bagehot (1971), but while Kyle (1985) uses an auction market, Glosten-Milgrom (1985) uses a dealer market. In the Glosten-Milgrom model, orders arrive and are execute by market makers individually. In this model, there are bid and ask quote which are determined by the probability that a particular order is informed. Informed traders are assumed to trade once. In other words, when trade is profitable, they trade as much as possible. Glosten and Milgrom (1985) focus on the behavior of transactions prices. They show that if market makers are risk neutral and competitive, the prices in the long term will reflect the information of better informed traders. Glosten and Milgrom make the assumption that he bid and ask prices at each trade are set to yield zero profits to the specialist. Adverse selection can account for the existence of a spread between the ask and bid prices, and the average magnitude of the spread depends on many parameters. Furthermore, the transaction prices are informative, and hence spreads tend to decline with trade.

There is a trading system in the market named inter-dealer quotation system or inter-dealer trading system. This system allows dealers to post their 'quotes', in fact the prices, to the market place and let the traders negotiate on the trades. The dealers often receive buy and sell orders that match. They prefer such orders because then they execute the trade 'internally' instead of the trading system. With an order internally traded they receive commissions on both sides, the buy and the sell-side, of the trade.

There is even another feature in which the markets may be different. This is the extent to which a crowd is present in the market. The "crowd" is a group of exchange members with a function within a specific area and they tend to work around a trading post pending execution of orders. On the market there are two sides. On the first side there are investors who intent to sell. These investors trade at the bid price established by earlier buy orders, or they trade at prices in the crowd. On the other side, there are investors who intent to buy. They trade at the asking price established by earlier sell orders, or they trade at prices in the crowd too.

Features of a dealer market

Due the fact that a dealer market is centralized, dealers are able to move quickly to process orders to buy and sell and they operate freely when it comes to key functions such as doing research. In other words, the ability to move quickly in buying and selling securities means a greater opportunity to earn a higher return or minimize loss on any given investment.

An important factor in a dealer market is the reputation of a dealer. There is a large literature that shows that reputation affects price evolutions. As compared to auction markets and limit order markets, trading in a dealer is not anonymous. With asymmetric information, dealers post wider quotes to protect themselves against losses. In these markets, Desgranges and Foucault (2002) show that it is even more valuable to establish a relationship with a dealer to obtain price improvements. The value of the relationship, in other words the value of the future order flow, depends on whether a dealer is informed or not.

Massa and Simonov (2003) studied the impact of reputation on dealers' behavior. They conclude that "salient traders", who are either known to be smart or scared, have a significant effect on prices and on volatility in the market. Their reputation affects the price formation process in the market and they cooperate with each other to provide liquidity.

The price-setting competition of multiple market makers is a typical feature of a dealer market. In other equity exchange markets orders are traded in central locations and liquidity arises because of the actions of a specialist. In contrast with those markets, dealer markets depend on the multiplicity of the market makers who post prices at which they want to buy or sell.

The interaction between the quotes of these dealers and the orders provides liquidity to traders and firms. It also provides the determination of the price. In dealer markets entry is rather easy and dealer markets allow for the entry and for the exit of dealers. That is in stark contrast with the most auction markets. Basically, the price-setting structure of a dealer market is closely related to the competitive price formation process of the standard economic theory (Ellis, Michaely & O'Hara, 2002).

Over-the-counter markets

Description of an Over-the-counter market

The over-the-counter market, also called OTC market, provides an alternative to be listed on a traditional stock exchange. In general, a reasonable explanation could be that they do not want to be listed on the stock exchange because that is too expensive. However, a more common reason is that the company cannot meet the relevant listing requirements because of the size of the company. The assets are traded in an OTC market are traded by broker-dealers who negotiate directly with another trader by computer or telephone.

The OTC market structure is very similar to the other markets. The five parties included in an OTC market are the companies, investors, broker-dealers, and the regulators. The companies sell securities in the market often to raise their capital. Companies that provide disclosure experience significantly greater levels of liquidity and they improve price discovery. The investors in an OTC market vary a lot, but their objectives are all the same, namely to generate returns from their investment. Broker-dealers may participate in the OTC market by executing client orders and principal orders. Broker-dealers make a profit out of the orders, the bid-ask spread, and investing the firm's capital in an investment, also called principal trading. Regulators keep an eye on the activities of an OTC market and the activities of broker-dealers.
OTC trading responds to the supply and demand in the market place for certain securities. The investors and the broker-dealers desire to buy and sell securities at certain prices. The number of orders, the volume, the timing of the buy and sell orders, and the availability of information determines how prices will move for a particular security.

Investors select a broker-dealer, or multiple broker-dealers, to execute trades. Then the investor makes an investment decision. This is the most difficult decision is which should be based on research on the company and security. After that, the investor defines the order they wish the broker-dealer to execute. When a broker-dealer receives an order, they often go through a couple steps. First, the broker-dealers usually will determine if it is possible to execute the trade internally and if so, he is willing to.. If the

broker-dealer cannot or do not want to trade internally, they must attempt to execute the trade with another broker-dealer. If the order is not marketable, the broker-dealer may create or edit its existing quote on an Inter-dealer quotation system to reflect a new price or size. Once broker-dealers have created or updated their quote, they continue to monitor the market. If prices change they may send a trade message to another broker-dealer.
When the broker-dealers accept an offer to trade they must report, clear, and settle the trade. Part of this process is the confirmation of the trade with the investor. However, the trade will not be complete until the delivery of the financial assets.

The features of an OTC market

Because of the dispersed dealers in an OTC market, the market is not centralized. Therefore, the broker-dealers must communicate and trade directly with other broker-dealers. Trading is conducted by computer or telephone. According to Duffie, Gârleanu, and Pedersen (2005), there are a couple of tradeoffs in an OTC market. The most important one is the liquidity on an OTC market. Liquidity is the ability to buy or sell a security without causing a significant movement in the price of the security. In an OTC market there is not much liquidity due the low number of clients and participants. In contrast to the OTC market, in an exchange traded market there will be buyers and sellers in almost all counters.

The real-time dissemination of quote information provides transparency. This transparency leads to a more efficient investment or trading process. The dissemination of price information and company financial data to the investment community, leads to the development of new prices via trading decisions. This continuous flow of information between participants defines the OTC market, so there is a high level of price transparency.

Another tradeoff is discovering the best price. In an exchange traded system there are a lot of traders and they all trade at a single and centralized system. This differs from the OTC market in which there are a low number of dealers, or market makers, who trade in a particular security. As a result there will be more chances of manipulation by operators in OTC markets.

In an OTC market also a counterparty risk applies, which can be seen as another tradeoff. In an exchange traded market the exchange becomes the counterpart to every transaction and delivery of securities/funds is guaranteed. In an OTC market this is not the case and counter party risk exists.

Furthermore there is also an increased risk for an arbitrage opportunity. Arbitrage is the trading strategy that takes advantage of the price differential between two or more markets for the same underlying asset. Investors and traders profit from the price differential by buying at the cheaper price and selling at the higher price.

Combinations

Madhavan (1992) analyzes and contrasts the process of price formation under two trading mechanisms, namely a continuous quote-driven system where dealers post prices before order submission and an order-driven system where traders submit their orders before prices are determined. A trading mechanism transforms the demands of investors into realized transactions. The key to this transformation is the process of finding the market clearing prices, called price discovery. Madhavan showed that a continuous dealer system provides a greater price efficiency than a continuous auction system. Although, the dealer market is less robust to asymmetric information problems than an auction market. So, there is a tradeoff between price efficiency and stability. Madhavan find also that in the limit the equilibria of the two mechanisms coincide when the dealer market has a large number of dealers. Madhavan (1992) demonstrates also that a periodic trading mechanism can overcome the problems of information asymmetry that cause failure in a continuous trading mechanism where trading takes place sequentially. This occurs by pooling orders for simultaneous execution. So, a periodic system offers greater price efficiency but requires traders to sacrifice continuity.

Auction market versus Dealer market

Despite the long debate over the relative benefits of auction and dealer markets, a couple of studies directly compare these two systems. Huang and Stoll (1995) decided to compare the execution costs for NASDAQ stocks with the execution costs for comparable NYSE stocks. The NYSE is based on an auction market, while the NASDAQ is based on a dealer market. Huang and Stoll define execution cost as the cost to a trader of selling or buying stocks. They have decided to compare execution costs, in addition to the quoted spread, on the basis of the effective spread, the realized spread, the Roll (1984) implied spread, and the perfect foresight spread. The research gave interesting answers, and found eleven categories where the two markets differ from each other. In summary, individuals have less negotiating power and face substantially higher execution costs on dealer markets than on auction markets.

Limit order market versus Dealer market

In the recent years, an interesting regularity is found towards limit order markets and dealer markets. In general, smaller orders are executed in limit order markets, while large orders are executed in dealer markets. Viswanathan and Wang (2002) analyzed the customer's choice among a limit order market, a dealer market, and a hybrid market structure that combines the two. They present a general approach to solving for equilibria in dealer markets and in limit order markets when the risk-averse dealers compete for the customer order. They found that a risk-neutral customer prefers to trade in a limit order market, while a risk-averse customer prefers to trade in a dealership market over a limit-order book market when the number of market makers is large and when the average order size is large. For risk-averse customers, the hybrid market structure dominates both the dealership market and the limit-order book.

Investors can choose to post limit orders and then they are "makers" or to hit limit orders and then they are "takers". In the dealer market they must trade at dealers' quotes. In the limit order market, investors pay a trading fee to the "matchmaker" of this market. Every time a maker is matched with a taker he earns a fee, and makers and takers are often charged different fees. Colliard and Foucault (2011) provide a theoretical model that shows that it is important to distinguish between changes in the make/take breakdown and changes in the total exchange fee. The main finding of the model is that an increase in the trading fee on a limit order market has a non-monotonic effect on limit order fill rates. The reason is that the increase reduces the surplus to be split between makers and takers in each transaction. Thus, for a fixed division of this surplus, it makes the option of takers to trade outside more attractive, such as an immediate trade in a dealer market. The consequence is that the makers' market power reduce, which forces them to make offers with a higher execution probability or they will apply more attractive prices to attract matches for their limit orders. For this reason, a decrease in trading fees, for example due competition, does not always result in a higher market share for the limit order market or higher expected gains from trade, because unfilled limit orders will result in a welfare loss. The make/take breakdown should thus have no impact on trader behavior or on providing of liquidity, as long as the difference between the taker fee and the maker rebate, in other words the total exchange fee, remains the same.

Comparison between the markets

Transparency

O'Hara(1995) defined market transparency as the ability of market participants to observe information about the trading process. The information can refer to knowledge about prices, quotes, or volumes, the sources of order flow, and the identities of market participants. There are two dimensions of transparency, namely pre- and post-trade transparency.

Pre-trade transparency refers to orders and quotes. It covers a wide range including the current bid and ask quotations, depths, and possibly also information about limit orders away from the best prices, as well as other pertinent trade related information such as the existence of large order imbalances.

Post-trade transparency is all about transactions. It refers to the public and timely transmission of information on past trades, including execution time, volume, price, and possibly information about buyer and seller identifications.

Transparency is a complicated subject, but recent research gives us some explanations.

With a lot of information available about orders and quotes you would say that it will equalize information across market participants. Related to this, transparency reduces the size of adverse selection problems. Since these problems reduce the gains from trade (Glosten & Harris, 1988), transparency can be seen as a factor to increase welfare. Indeed, within the context of an adverse selection, Pagano and Roell (1996) show in their theoretical research that transparency reduces the transaction costs made by uninformed investors. Consistent with that analysis, Flood, Huisman, Koedjick and Mahieu (1999) find that pre-trade transparency reduce the size of the spreads in experimental financial markets.

One could argue that trade disclosure can make it harder to supply liquidity to large traders. After large trades the market maker can be in a difficult bargaining position to unwind his inventory. Naik, Neuberger, and Viswanathan (1999) offer an interesting counterargument. After the risk-averse dealer has bought an asset from a potentially informed trader, he seeks to unload his position. Yet to relieve his price impact, he reduces the size of his trade. With that decision he reduces his ability to share risk. This does not arise with trade disclosure. In that case, since the market has already taken into

account the information content of the trade, the dealer can unwind his inventory with little incremental price impact. Consequently, trade disclosure increases risk sharing.

The empirical evidence in Gemmill (1996) is consistent with the view that transparency at least does not reduce liquidity. Gemmill (1996) analyzes liquidity in the London Stock Exchange under three publication regimes. He finds that there is no gain in liquidity as the spreads and the speed of price adjustment are not affected by the disclosure regime. Yet, in a dynamic trading environment, transparency can have ambiguous consequences, as shown by the experimental and theoretical analyses of Bloomfield and O'Hara (1999 and 2000). They find, by using a two-period model, that opening spreads are larger, but later spreads smaller, when ex-post transparency is increased.

In summary, there are some findings on transparency. First, there is broad agreement that transparency does matter. It affects the informativeness of the order flow and related to that, the process of price discovery. Greater transparency is generally associated with more informative prices. Second, complete transparency is not always beneficial to the operation of the market. A couple of studies demonstrate that too much transparency can actually reduce liquidity because traders are unwilling to reveal their intentions to trade. Third, there is also general agreement that some disclosure of information can improve liquidity and reduce trading costs. Finally, changes in transparency will probably lead to benefits of one group of traders at the expense of others. The literature almost uniformly agrees that traders who trade on private information will prefer anonymous trading systems while liquidity traders prefer greater disclosure.

Liquidity

From a trading perspective, liquidity is the ability of a security to be bought or sold without causing a significant movement in the price of the security. When there is information asymmetry, the market makers have a limited risk-bearing ability or when order handling costs are large, trades have a strong impact on prices, which can be interpreted as a form of illiquidity. Therefore, the finding of Bagehot(1971), Kyle(1985) and Glosten and Milgrom(1985) are very import due the fact that information asymmetry reduces social welfare because they reduce the gains from trades which can be achieved in the market.

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