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## INSIGHTS

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“Insights” features the thoughts and views of the top authorities from academia and the profession. This section offers unique perspectives from the leading minds in investment management.

### THE MARKET MAKER IN THE AGE OF THE ECN

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*Electronic trading venues demonstrate an impressive ability to successfully match trades with high accuracy, low cost, and at remarkable speeds. Are they on track to take over the trading process, or will there always be activities better performed by human beings?*



Market makers find themselves under attack from all sides. Bid–offer spreads, the bread and butter of market making, have been reduced by competitive forces and relentless pressure from the Securities and Exchange Commission. Markets once serviced exclusively by market makers, are now challenged by alternate brokerage arrangements and Electronic Communications Networks (ECNs). Investors voice the widespread sentiment that they would prefer to live without market makers.

Not so fast! It is time for investors to step back and consider whether market maker services are worthy of such apparent disdain. Aspects of market making are essential to the smooth functioning of a market, and should be encouraged rather than disparaged.

#### 1 Trading forums

Economists theorize a classical market in terms of a large number of small participants, in rough balance

of buyers and sellers, interacting to find the prices that create the largest possible volume of buyers and sellers. Never does one buyer or seller have dominant influence over the market.

A trading forum is an environment wherein buyers and sellers can fulfill their desire to trade, sometimes with small assistance from the forum operator. A trade represents the successful completion of a negotiation between a willing buyer and seller, meeting in time and place to come to terms on size and price.

1. A trading forum is a focal point—a central location—to which trades go, directly or through an agent, to initiate and hopefully complete desired trades. The location may be geographic, as on the floor of the New York Stock Exchange or on the “upstairs” block-desk, or it may exist in cyberspace, as on NASDAQ, the ECNs, and most non-US exchanges.
2. In addition to meeting in place, the buyer and seller must also meet in time. Even for securities trading thousands of times a day, the chance of

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a buyer and a seller of equal size placing simultaneous market orders is small. The operator of the trading forum bridges the time/size gap, either by (a) encouraging one party to wait for the other; usually through a limit order book; or (b) trading with the first party from his own inventory account, establishing, then reversing, the position when the other side arrives.

3. Published price quotes show potential buyers and sellers the approximate prices of goods they may want to exchange. In many markets, this can take the form of an obligation on the trading forum operator to trade a specified minimum number of shares at the published quotes, thus guaranteeing small but immediate liquidity for those who want it.
4. By advertising trading interest to the world via quotes and sizes available, the trading forum creates market visibility for buyers and sellers.
5. Established rules define for all parties their rights and obligations while participating in negotiations.
6. Investor confidence in the system results from fair dealing and timely and accurate reporting and settling of trades.

From the perspective of an individual investor, the market seems to operate like a vending machine: make your choice, put in your money, and out pops your selection. To all appearances, the process is totally mechanical. In fact, most exchanges have standard procedures whereby low-value, low-information, low-risk orders are processed at minimal operating cost. The market maker operates as a traffic cop, interceding when necessary to provide instant liquidity and move the traffic.

Items 2 (time intermediation) and 3 (affirmative obligation) insert a market maker into the trading forum. Note the eponymous, self-definitional term: the market maker *makes* a market by creating an environment wherein buyers and sellers can fulfill their desires to trade.

Market making is a simple, low-risk business to conduct for retail trading by low-information traders in small amounts. With the exception of time intermediation and affirmative obligation, a computer can easily conduct a trading forum. This is why ECNs have been most successful automating trading for retail orders, and why contemporary institutional traders seek to tap into the flow by slicing their orders into small, retail-sized pieces.

## 2 Information Central

The vending machine analogy does not extend to institutional trades. According to the Plexus Group database of institutional trading, institutional orders are very large compared to normal trading volumes. Over half of the institutional dollars traded come from orders that exceed 100,000 shares. Eighty percent of institutional dollars traded derive from orders exceeding a half day's volume. By size alone these giant orders can easily overwhelm any procedure-oriented trading forum.

Table 1 derived from the Plexus Group databases of institutional trading, shows that trading volume mushrooms when large institutional investors commence trading of large positions.

Small orders blend into the daily give and take, but the volume more than doubles the day after a major

**Table 1** Volumes expand to meet trading demand.

Portfolio manager's order size divided by previous day's volume	Ratio of volume gain from day before order to day after order
Over 1.0 day's volume	222%
0.5–1.0 volume	119
0.25–0.5 volume	106
0.1–0.25 volume	100
Less than 0.1 volume	100

institutional trade is begun. The bigger the order, the greater the gain in resulting market volume. We know how the order initiated, but where did the other side of the trade come from? How did it get there? These are the questions of interest to this paper.

The classical market model does not apply when some of the transactors are (a) very large relative to ordinary flow and/or (b) imbalanced toward buying or selling. Simply stated, institutional-sized liquidity is seldom there for the taking. Somebody needs to take actions that draw liquidity to the market. That somebody is a market maker, but not in the sense of normal time intermediation or affirmative action. Sitting athwart the information streams reflecting interest in a stock, a market maker naturally accumulates information about past, current and possible future buying and selling interest: the market maker is “information-central” about trading interest in a stock. The market maker supplies a layer of intelligence on top of the trading forum.

Some readers may be surprised at the trading magnitudes indicated in Table 1. Orders of institutional magnitude are infrequently seen on the streaming transaction tape because they seldom meet another trade of equivalent size. Thus, these orders are often assembled in the market from a large number of smaller pieces, and the information-central trading interacts with the trading forum activity.

Unlike orders in a classical market, these orders dominate not only because of size but also because they represent well-informed opinion. (Think about the effect a Hershey’s or a Nestlé must have on the cocoa futures market.) From the market maker’s perspective, massive trade size combines with informed opinion to make the market making tasks of time intervention and affirmative obligation complicated and hazardous. An expanded market maker’s role as “information-central” is essential to the trading of these orders.

These orders require expanded liquidity to fill the order. The Random House Unabridged Dictionary defines liquidity as “The ability or ease with which assets can be converted into cash.” We prefer a somewhat broader definition: The ability to convert assets into cash, or vice-versa when you want to, at low cost.

There are two ways to expand liquidity, but something has to give. It will be necessary to relax either the “when you want it” clause or the “at low cost” portions of the liquidity definition.

One way to think of the market maker’s task is in terms of liquidity lying in layers. Strata near the surface are easily accessed but thin. Deeper layers can reveal much larger amounts of liquidity, but usually at higher cost. Figure 1 illustrates the relationship between the size of the trade, the cost of trading, and the strata of liquidity required to fill orders of increasing size. The cheapest, easiest to reach liquidity is at the upper left. As we move down the chart, the amount of available liquidity increases. We will show how it arrives and why it comes at a higher price.

The first step for the trader is to dip into the ebb and flow of the everyday liquidity stream. This is

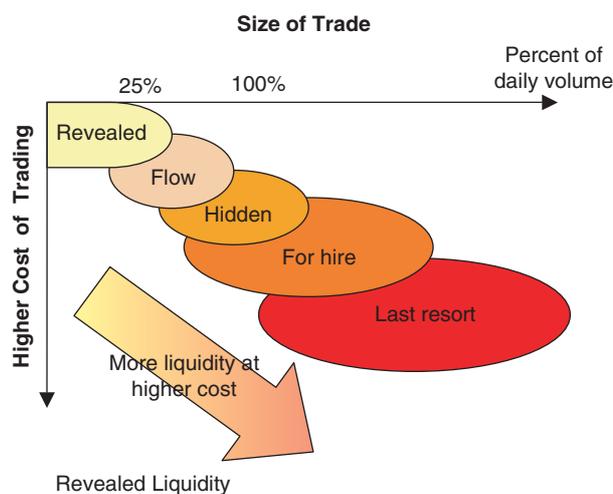


Figure 1 Layers of liquidity.

“natural liquidity,” where the trading counterparty arrives as a result of an independent “exogenously determined” decision process. In other words, trading motivation comes from outside-the-box, representing the external decision process.

This is not as easy as it sounds. The trader must be careful not to trade in a noisy fashion that tips off market participants such as day traders, technical traders, short-term momentum traders, and hedge funds. These traders feed off the flow-information that indicates potential trading interest. They know that institutions have an information edge and that institutional size will dominate the volume until it is satisfied. They hope to go along for the ride.

But where *is* the liquidity? In today’s fractionalized markets, the institutional traders need to search all venues. Traders may try low cost (electronic) venues first, then trading floors. The undone portion of the trade often falls into the hands of a block broker to perform the “information-central” role.

We do not make the usual distinction between brokers, who represent the trade to the market, and dealers, who trade from their own inventory. Both roles are performed at different times by block dealers, block brokers, and specialists. The important distinction is between trading forum and information-central behavior, not the usual broker–dealer breakdown.

### 3 Flow liquidity

Flow liquidity is like revealed liquidity, except that it has not arrived yet. The counterparty will commit to trade at some future point, for informational or cash-generated needs. The problem for the institutional traders is that they cannot anticipate when, or even whether, someone else will independently decide to sell what he wants to purchase. If the order awaiting liquidity has a low information content,

waiting may not be a problem. In contrast, if an information “edge” underlies the order, any delay might be costly if other investors become aware of the information. This leaves the trader with a difficult decision: is the best strategy to wait for liquidity to arrive, or is it more effective to seek quicker—often more expensive—liquidity by other trading techniques? Since information or trading necessity underlies all the largest and most important institutional trades, most institutional traders tilt toward trading faster rather than awaiting natural flow liquidity.

### 4 Hidden liquidity

Hidden liquidity lies one step away from the revealed and flow liquidity. The commitment to trade has been made; the order is live. The order may be known only to the trader holding a large institutional order, or it may be revealed to his block broker (e.g. “participate, do not initiate” orders). In almost all cases hidden liquidity is larger than revealed liquidity.

Quite often the information-central market maker is aware of the liquidity but trusted to keep it secret. If the market maker senses an opportunity to put together a buyer and a seller, the hidden liquidity can be revealed to both parties.

Why is liquidity hidden? Consider what would happen if Sheer Genius Investment Advisors were to announce for all to hear “I’m committed to buy 50 million shares of AMZN immediately.” The announcement would attract imitators, some of whom would think “Gee, if Sheer Genius is buying it must be a good stock.” Those contemplating selling Amazon would be tempted to hold back, waiting to see how high Sheer Genius’s interest might push the stock price. Others, more fleet footed, would think “If I see any liquidity I can scoop it up now and sell it to Sheer Genius a little later at a higher price.” This behavior is called frontrunning.

Sheer Genius would lose the share liquidity it wants to the copycat group. It would ultimately get the liquidity from the committed sellers and the frontrunner group, but at a higher price. In all cases, the reactive traders are free-riding on the information and trading needs of Sheer Genius. Moreover, their actions move prices ahead of Sheer Genius's ability to complete its own trades.

If free-riding and front-running were rare events, we would not be talking about them here. To the contrary, these are all day/every day occurrences. They are, for example, the *raison d'être* of the day traders. They are a major concern to institutional traders.

As a result, large trading interest is seldom shown publicly in order to protect the proprietary value of the order. Information on the desire to trade will not be revealed without a suitable *quid pro quo*: the information will be traded either for an execution or for information—trading or fundamental—of perceived equal value. It will not be intentionally released to untrustworthy parties who can gain from the knowledge at the expense of the order initiator. A primary duty of an institutional trader is to protect the value of this information to the advantage of his employer's clients.

Note that the initiating institution acts from an information edge, particularly with the largest orders. Trading is necessary to capture the information advantage. But the initiator cannot act in the marketplace in size unless someone is willing to trade with him. The order cannot be completely hidden; it must be known to someone who (1) can be trusted to protect the information and (2) is situated to know when a counterparty arrives. If both buyer and seller notify a market maker of potential trading interest, a.k.a. hidden liquidity, the market maker can effect a trade.

The importance of hidden liquidity is emphasized by the Liquidnet and reserve book techniques of

gathering liquidity while revealing it only when it leads to a trade.

Once the supplies of non-hazardous immediate liquidity are exhausted, the institutional trader faces one of two choices: continue to wait for liquidity flow to occur naturally or attempt to draw out the other side.

## 5 For-hire liquidity

We described above trades occurring through the matching of exogenous trading decisions. The interesting question is what happens when no "natural" arrives to balance buying and selling interests. The last two categories of liquidity derive from market participants who respond to calls for liquidity. They will accommodate liquidity demand by buying at a discount or selling at a premium. In other words, they *sell* liquidity to any party anxious enough to pay for it. The information edge these traders work from is endogenously determined, inside-the-box information about the market. The *order* itself is the inside information. In other words, the initiator is not only selling stock, it is selling part of its information edge in order to be able to trade.

From the institution's perspective, liquidity providers can be incented by giving up a portion of the potential alpha in order to coax out the desired liquidity. The trade will be profitable as long as the payment for liquidity does not exceed the potential alpha. By our experience, portfolio managers are more attuned to buying liquidity with alpha than are institutional traders. This leads to the anomalous conclusion that costs can be *too* low if they lead to lower rather than higher portfolio return.

There are many sources of endogenously determined liquidity. (1) A market maker might undertake this role. (2) The block trading desk of a large brokerage firm might use its capital to

accommodate better customers. (3) Large brokers also staff proprietary trading desks. They are stand-alone profit centers; if they sense a profitable trading opportunity, they will seize it. (4) Alternatively, aggressive non-broker traders such as hedge funds may take a short-term position if they believe they can profit. One of the roles of information-central is to alert these potential liquidity sources.

It is not difficult to distinguish between frontrunners and liquidity providers. Suppose the word goes out that Sheer Genius wants to buy stock. Those who sell as a result of this information are liquidity providers; those who buy as a result of this information are frontrunners. Institutional traders develop ulcers when calls for liquidity draw more frontrunners than liquidity providers. They suspect that market makers play a nefarious role. They are particularly concerned about holes in the invisible “Chinese Wall” between the block traders and the proprietary traders.

At first glance, signaling these endogenous liquidity providers appears to breach the confidential nature of the order. While knowledge of the trade is a valuable proprietary asset of the initiator, it is also knowledge that the market makers purvey as their stock in trade.

The market makers aid their customer by transmitting information that attracts liquidity. The distinction is not clear-cut: it is impossible to draw a black and white distinction between seeking liquidity and violating confidentiality. No bright line distinction exists between “trying to find the other side” and “tipping off his pals to frontrunning possibilities.” The market maker cannot accelerate liquidity arrival without revealing trading interest. Nor is the institutional trader able to complete his/her order expeditiously without revealing at least a peek. The trader must balance the costs of revealing information against the cost of failing to find liquidity.

This situation frustrates institutional traders. They must trust but cannot verify. Potential conflicts of interest are rife among the parties they must deal through. Even worse, they have no ability to monitor the market maker’s information dispersal. No paper trail exists, no phone records can be relied on; information could be passed on by a code, a blink, a hesitation, or silence at the pregnant moment.

It gets worse. As information moves down the chain of trading, other parties with no connection or obligation to the customer tune in. A weak market maker may have neither the capital to finance the trading nor the treasured relationship with the institution, and may “daisy chain” the trading by laying off positions to other brokers or hedge funds. This arrangement clearly exposes latent trading demand. No wonder institutional traders would prefer to find the other side without the use of a market maker!

Liquidity providers can be drawn from a myriad of directions. The most innocent way to find potential sellers is to call up those who are known to own the security and those who have been recent sellers. This is clearly part of the information-central role. Another source would be someone who could arbitrage between a sale of, say Sony ADRs, while simultaneously buying Sony shares in Tokyo. An options market maker might find a way to profit from an arbitrage against the options. A hedge fund might sell stock and buy a mathematical hedge of other companies to control the exposure.

If these are such effective methods of raising liquidity, why did the Sheer Genius traders not try them themselves? They will not want to call other investors because they would just as soon the others did not know what they were doing. As the old saying goes, “Does Macy’s tell Gimbels?” The trader has neither the time, the resources nor, particularly, the contacts.

Ah, but the market makers *do* have the contacts. It is the heart of their business. Maintaining this network of contacts is time consuming and expensive. Only someone with an on-going, every day mission to be privy to everything knowable about a stock's supply and demand can profit enough to cover the high network maintenance cost.

We have one more category of liquidity to tend to; then, we will return to the issues involved in finding for-hire liquidity.

## 6 Last-resort liquidity

Suppose a company unexpectedly restates earnings, leading to a panic of intensely motivated sellers. Everyone, including the for-hire liquidity providers, hangs back until price reaches a bottom. In this situation, there are no buyers at the current price, and stock for sale will overhang the market until the price reaches a level where last-resort liquidity comes into play.

Who are these buyers of last resort? The junkmen; the deep contrarians, who compare price to asset value and are motivated to trade by a deep, deep discount. Donald Keim<sup>1</sup> has documented how one fund manager, Dimensional Fund Advisors (DFA), systematically adds value by standing as buyer of

last resort. The lower line in Figure 2, taken from [www.dfafunds.com](http://www.dfafunds.com), shows that stock prices decline on average 10% over 20 days prior to DFA block purchases, then bounce back and stabilize. This is the price pattern we would expect to see from a buyer of last resort.

Value investors are constantly on the prowl for these situations and will likely uncover them without market maker assistance. They will step in when the price falls farther than the fundamentals. Still, these are risky trades that demand big price concessions to offset the risks of buying too soon or buying fatally damaged goods.

Table 2 summarizes the above discussion of the levels of liquidity.



Figure 2 “Last resort” liquidity pattern.

Table 2 Levels of liquidity.

Level of transaction	Nature of liquidity provider	Type of liquidity	Role of market maker
Revealed	Publicly pre-committed	Natural	Traffic cop
Flow	Will decide to trade in a short timeframe	Natural	Traffic cop
Hidden	Privately pre-committed	Natural	Information-central secret keeper
For-hire	Stand-by commitment at a price	Situational (liquidity seller)	Information-central bush beater
Last-resort	Value investor	Natural (contrarian)	Traffic cop

## 7 How information moves stock prices

Sometimes liquidity is plentiful, sometimes it is scarce. It becomes plentiful when there are reasons to trade; i.e. news. News causes the price to move about as different players react. Some will feel the news portends higher prices and want to buy; others chime in with sell orders as they feel the price becomes over-extended. As the price moves, it trips the triggers—both price and volume—of other traders who were waiting to buy or sell.

Traders say liquidity begets liquidity. All this activity will generate volume leaders, financial news coverage, Maria Bartiromo headshots, and other levels of excitement. Once news-based traders create liquidity, momentum traders, hedge funds, and others step in to try to capture a profit from temporary supply/demand imbalances and over/understated prices. Technical traders study trading patterns for telltale footprints and jump in based on perceived supply/demand balance. The liquidity generated by this activity may be twice to ten or more times normal volume.

Figure 3 from bigcharts.com is typical; it could have been selected at random. During the last week of July, 2001 Cooper Industries traded a couple hundred shares per day. A merger announcement on August 1 caused the price and volume spike. Note how the volume spikes correspond to larger

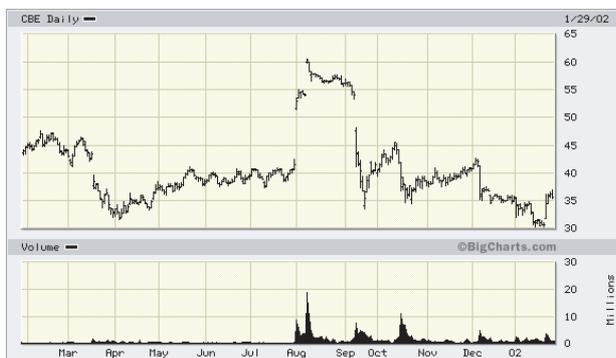


Figure 3 Volume jumps when price jumps.

changes in price, and note how rapidly the activity dies down in between.

Once the news effect passes, activity settles down. With no market, industry, or company reason to trade, the market sees only liquidity traders. It becomes difficult to trade large volumes without sparking substantial price effects.

We describe below the process through which fundamental information moves market prices, and how news affects stock price, played through the scrambling necessary as buyers and sellers seek the liquidity to optimize their strategies.

1. Low-volume liquidity trading prevails until information arrives. This is the classical market of no-news situations; only liquidity traders active, low volume and wandering, trendless price.
2. Outside-the-box information sparks trading interest among naturals, leading to trading interest and price moves.
3. Their activity leaves readable footprints that attract inside-the-box copycats who accelerate price movement. Volume increases.
4. Price movement and signs of liquidity imbalance draw out for-hire accommodators. Volume explodes with the rapid buying and selling of the liquidity providers.
5. Ultimately, price moves to the point where information-driven naturals drop out, copycats bail, and liquidity accommodators flatten positions in a game of musical chairs.
6. The situation returns to low volume liquidity trading as the last resort traders come in and mop up what is left.
7. All the while, the market maker coordinates this frenzied *pas de troupe*.

This is a new domain in economics called market process theory, which focuses not on the efficiency

of the market mechanism but the actions which take place in the market arena. The information and communication behavior of the participants is crucial in this analysis. The market is seen to be a discovery/learning process which rewards the best informed participants with the greatest knowledge profits.<sup>2</sup>

The market for individual stocks stays in the no-news liquidity condition most of the time, yet most market activity occurs in intense news-adjustment periods. In these periods, the market maker plays the key information-central role.

## 8 Nash equilibrium

In “A Beautiful Mind,” Sylvia Nasar<sup>3</sup> describes cooperative games as conflicts in which players have the opportunity to communicate and collaborate and are able “to discuss the situation and agree on a rational joint plan of action, an agreement that is assumed to be enforceable.” In cooperative games, players form coalitions and reach agreements. The key assumption is that there is an umpire around to enforce the agreement.

The umpire, the market maker, is indispensable to finding this Nash equilibrium. The market maker knows what has happened, who has shown interest, who might be willing to trade—and who might be standing by to provide for-hire liquidity and draw them into the market.

It is common to speak of the stock market as a two-person, zero-sum game, one in which one person’s gains are the other person’s losses. However, as Nasar points out, two-person, zero-sum games occur in board games, but are extremely rare in the world of politics and economics: “Pure conflict, in which the interests of two antagonists are completely opposed, is a special case; it would arise in a war of compete extermination, otherwise not even in war.” This is

hardly a description of the day-to-day operation of securities markets.

While every securities transaction occurs between a single buyer and a single seller, their interests are not in direct conflict. Rather, each has agreed to the terms because each defines their objective in terms of their needs, their utility. While neither achieves their pure, unfettered maximization of their or their investors’ utility, each feels that the transaction is the best that could be done under the circumstances.

The investors who have done the research realize that the advantage of trading a zero-sum manner will be limited in its economic advantage by the paucity of “flow liquidity.” In order to further exploit the information advantage, they must forego a portion of that research advantage to traders who will trade only if they can piggyback on that research advantage.

This is an everyday, all-the-time occurrence. Liquidity is not a free good. Rather, it is a cost of being able to implement good investment ideas in institutional size. Those who satisfy the liquidity demand receive compensation for extending the privilege.

So this is a Nash equilibrium. No player is zero-sum oriented toward winning at all costs. Rather, the manifest solution is to encourage players willing to provide liquidity for trading profits so that those who develop the research insights can secure at least part of the profit.

## 9 What ECNs do well

An ECN’s first advantage is the computerization of manual efforts. Expensive labor is replaced by dirt-cheap computing power coupled to extensive electronic connectivity. Response time shrinks and error rates tumble. These features guarantee the success of electronic trading in the retail market. This

is not pleasing to those whose skill, experience, and wealth are tied to floor trading.

Automated price discovery can be another advantage of an ECN. One of the market maker's traditional functions is to find the price point that satisfies the greatest trading interest. This function is performed simply in a crossing network and more elaborately in the defunct Optimark and AZX systems. Even here, trading occurs in the light cast by the prices in the primary market. Without the ballast of central market quotes, ECN prices quickly lose touch with reality.

Traders love the ability of an ECN to maintain anonymity while performing some of the information-central role. Institutional traders prefer anonymous trading because they fear copy cats and frontrunners who observe their actions very carefully. Because of this suspicion, alternative trading mechanisms such as third market brokers, Instinet, Optimark, and Liquidnet generate initial enthusiasm and in some cases significant market share by offering to take the market maker out of the process.

Some ECNs have tried to exclude less desirable trading partners. For example, Instinet, an abbreviation of Institutional Network, was designed exclusively for institution to institution trading. Instinet failed to generate a profit as long as it self-limited its clientele to institutions. It gained popularity and profitability only when brokers were allowed to interact. The advantage of "cutting out the middleman" failed to overcome the added search costs imposed by an inability to find trading partners outside the exclusive club.

The newer Liquidnet system has a similar institutions-only restriction, but so far appears to be avoiding the frustrations Instinet experienced in its early years.

## 10 What ECNs cannot do well

ECNs are effective at reducing search costs and accessing natural liquidity. They do not seem as proficient at setting prices, operating information-central, or assessing risk.

### 10.1 Setting prices

Directly or indirectly, ECNs set prices by piggy-backing off the centralized market. There is much more to finding a price than simply observing the limit order book or recent order flow. Through experience and a network of contacts, the market maker develops a sense of what might lie around the corner. It is beyond our current technology to create a computer algorithm that receives, processes, and weighs this intense yet nuanced stream of information.

Yet, *somebody* has to set the price: this would seem to intimate that the market maker knows the price, but on closer inspection this turns out to be untrue. The market makers set a plausible price, keep their exposure low, and make prompt corrections if they turn out to be wrong. This fine tuning keeps the market maker's exposure under control. A market maker makes money as a highly informed and very agile facilitator, not as an investor.

In today's markets the stream of trade prices and quotes is broadly available at low cost. A battle is brewing over whether the exchange can claim property rights on the creation and maintenance of the price discovery process. Price discovery is a major product of an exchange, although we seldom price its economic value. ECNs and secondary exchanges that free-ride on the dominant market's price discovery process can offer transaction services of similar quality without having to bear the costs of price setting. The question of who owns property rights on price discovery would seem to raise public policy questions worthy of considerable debate.

### 10.2 *Information-central*

As information-central, the market maker is adept at accessing the lower strata of liquidity. Despite the advance of automated markets, the direct liquidity seeking price inquiry process remains where it has been always—in the hands of the market maker.

In no-news conditions, the information-central role is unimportant and ECNs perform well. Things become a lot more interesting when supply and demand are out of balance. The institutional traders who cannot afford to wait need to draw out a liquidity when there is no buyer on the ECN for the stock they want to sell. The ECN can do nothing with non-matching orders other than sit on them or reject them back to the originator. We suppose that an ECN could be programmed to send messages to recent trading interest; but, without human discretion in the process, it would quickly deteriorate into a deluge of spam.

### 10.3 *Risk assessment*

Selling a security transfers the risk of owning to the buyer. When stock is sold to a for-hire liquidity provider it remains actively for sale until he can reverse the position. Unlike the other strata of liquidity, for-hire traders, like market makers, are not investors.

A buyer operating a temporary way station on the route to the ultimate buyer bears risks proportional to the exposure in dollars and holding time.

In contrast to the anonymity of screen trading, floor trading is conducted face-to-face and, therefore, not in an anonymous manner. Experienced floor traders lament the lack of contextual information in anonymous screen markets. When orders have no discernable background, insight into the market's reaction is hardly possible. Nor is there any loyalty

or social sanction possible to discipline wrongdoers. Thus, opacity adds risk for all participants, especially market makers.

The risk is ever-present in market making and the supply of for-hire liquidity. In the author's opinion, this risk is intuitive and emotional; something felt in the pit of your stomach rather than calculated with mathematical precision. Risk assessment is essential to the workings of a market. Without consequences, we face a situation of moral hazard. Like the dead man throttle on a locomotive, the human perception of risk is a necessary governor to prevent a runaway train.

Madoff Securities is an example in point; the computer makes markets until pre-specified volume bounds are reached; e.g. our inventory of AMZN stock is too large; we need to lay off the risk. Even though the routine processing is done by computer, the boundaries are set by humans, and the actions taken to control the risk require human attention.

Indeed, it is under extreme market conditions that electronic markets show the most strain. They are designed for foreseeable situations; when the unforeseeable happens they have no intuition or experience to fall back on.

Except in science fiction, it is impossible to inflict financial or emotional pain on an unfeeling computer. We do not know how to teach a computer to react in the same manner that a human being would. There is a good chance we never will.

## 11 Conclusion

Schumpeter spoke of innovation as *creative destruction*, and it abounds in the securities markets. Innovation and technology are changing the market and will continue to do so. The competition between new and traditional market places is healthy, forcing

all to hone their unique advantages. Technology decreases the importance of traditional high cost structures and challenges the franchise power of brokers and exchanges. Automation increases the transaction speed, creating new opportunities for managers with hair triggers. Reducing costs make more investment ideas actionable, which increases liquidity. Increased liquidity leads to the ability to manage larger pools of assets. At the bottom line, this enhances investor power.

We come to the conclusion that the computer will not soon obsolete the traditional functions of the human market maker. The information-central role is too essential to the process, and requires knowledge, skill, continuing relationships, and risk assessments that are now impossible to program into a computer.

Yes, there *is* an indirect cost: in order to find the needed liquidity, large institutional traders must give away an informational advantage to intermediaries. Fairness and integrity require that the information is not used to the harm of the originator. For powerful institutions, the integrity of the system leans on a continuing relationship with important monetary implications at stake. Monitoring and feedback play a critical role.

In 1989 the author attended a conference on the state of the market where the head of a major sellside desk warned: If brokers were not adequately compensated for services offered, they would become less a partner to the buy-side and more of an adversary. Prophetic? The old salts in the trader community believe this has already happened. They fear that the institutions' slipping influence over market maker loyalty as investors such as hedge funds whose high turnover and higher commissions crowd out the interests of institutional investors.

As Picot *et al.* conclude, "Complete replacement of human intermediaries will not take place. But it is likely that there will be an unbundling of the activities of intermediaries so that *consultative* [emphasis mine] and pure order handling activities are separated. Standard transactions will become more and more automated, even their price discovery, as long as the orders are atomistic and one order has no significant impact on the price. Intricate transactions will still need human intermediaries but may be conducted with electronic support."

We are still searching for the new Nash Equilibrium. The future promises to be interesting; you will want to stay tuned.

### Acknowledgments

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### Notes

- <sup>1</sup> Keim, Donald (1999). "An Analysis Of Mutual Fund Design. The Case For Investing In Small-Cap Stocks." *Journal of Financial Economics* 51.
- <sup>2</sup> Picot, Arnold, Christine Bortenlaenger, and Heiner Roehrl. The Automation of Capital Markets. Link to [www.ascusc.org/jcmc/vol1/issue3/picot.html](http://www.ascusc.org/jcmc/vol1/issue3/picot.html). This one-of-a-kind paper is an undiscovered jewel for anyone who wants to think straight about market structure.
- <sup>3</sup> Nasar, Sylvia (1998). *A Beautiful Mind: The Life of Mathematical Genius and Nobel Laureate John Nash*. New York: Touchston Books.

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