FORUM: P R Tsen: Electronic Markets and the City

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Introduction
Modern information technology and globalization have transformed traditional communication patterns in many fields of science, business and technology. Electronic media have become an integral part of our daily environment shifting the focus from face-to-face interaction to face-to-screen interaction. In this process, the screen and its digital tools have become new actors challenging traditional communication patterns and social practices: via the screen, human beings are not limited to interaction in a physical environment but can also participate electronically.

One of the fastest changing industries in this development is the financial industry which has extensively explored the possibilities of technology. Within the last twenty years, most exchanges have successfully introduced electronic trading systems automating the trading process and connecting market participants worldwide. Electronic order books and market data are globally accessible allowing traders to operate from remote places and in many markets simultaneously. Price discovery, transaction, clearing and settlement no longer require a face-to-face environment but can alternatively take place in an electronic environment. After centuries tied to centralized trading floors of exchanges, information technology does not only provide a new operational system but also a new spatial and temporal experience.

Since the introduction of the first full-electronic exchange in 1971, electronic trading has become more and more efficient in terms of capacity, speed and market structure. This development has attracted many traders to move from floor trading to electronic trading causing a big struggle for many traditional exchanges like, for example, the London International Futures and Options Exchange (LIFFE). In early 1997, LIFFE was the largest futures exchange in Europe successfully operating a trading floor for German Government Bonds but only within a

few months, however, it lost about 80% of its market share to the Deutsche Terminbörse, now Eurex, which competed with the same product but introduced an electronic trading system. Today, a number of physical trading floors still exist, primarily in Chicago and New York, but electronic trading is increasingly taking over worldwide. The Chicago Mercantile Exchange, for example, generated 66% of its trading volume via its electronic platform in the first quarter of 2005 compared with only 15% in 2000. And in Europe, where electronic trading has generally been more popular than in the US, electronic trading systems like XETRA have been even able to generate more than 97% of the total trading volume. In addition, many exchanges such as Archipelago, for example, never had a physical trading floor but only operate electronically.

As these numbers show, floor trading is losing more and more volume to electronic trading; the trend is certainly set raising the question of how this technological change has transformed the financial market. How and where do electronic traders operate today? And what are the implications for cities?

In the following article, I will explore these questions beginning with a brief introduction about early forms of exchanges and their presence in cities. This is followed by a number of examples about typical processes on both physical trading floors and electronic trading rooms. In the final section, I will conclude with a discussion about chances and challenges for cities.

Early Exchanges and their Presence in Cities
Financial exchanges are one of the oldest institutions in cities. Early forms of exchanges presumably date back to transnational trade markets and trade fairs in the Middle Ages where merchants would gather together at regular intervals to trade goods and commodities, exchange economic information, and speculate about future prices, supply and demand. During these fairs and markets, they would also fix currency exchange rates, determine interest rates for loans and sell insurances for prospective goods. These trade and trading activities gradually evolved into its own institution outside the trade markets and trade fairs resulting into institutionalized exchanges. In Europe, the Brugge Exchange and the Antwerp Exchange, founded in 1409 and 1485 respectively, are considered to be the first exchanges operating under the specific name and function of an exchange. Many major cities followed their example and also established exchanges in the centuries thereafter, such as in Lyon (1540), Frankfurt (1585), and Amsterdam (1608).

Traditionally, exchanges were located at strategic sites such as cities with shipping ports, major transportation routes or trade fairs and

trade markets. They highly depended on the density of people and businesses, and consequently, chose prime locations in the city. Similar to cathedrals and city halls, for example, exchange buildings formed a key element of the urban fabric functioning not only as an economic and financial centre but also as a local identity in the city.

Especially during the 19th century, the importance of exchanges in cities and their prominence in the urban landscape increased. Due to industrialization, companies were in great demand of raising capital for new industries, and exchanges were able to address their needs fostering wealth and prosperity in the city. In order to meet the increase of trading activities on the floor, many new exchange buildings were built or existing exchange buildings extended during this particular period. Simultaneously, the architectural expression of exchange buildings also transformed becoming more monumental and prominent in the city. They reflected the new power and self-confidence of the new capitalist middle class which had emancipated itself from the feudal structures and prospered during the industrialization. As a result, exchanges became more prestigious and elaborate gaining equal importance in the city like major public buildings.

In sum, traditional exchanges and cities enormously profited from each other's presence in the 19th century. Exchanges relied on the density and diversity of the city, while cities gained prestigious and wealthy institutions with the existence of exchanges. How did this mutual benefit shift with the rise of information technology and globalization? A closer look at the communication structure and the spatial configuration of both floor trading and electronic trading shall provide a first approach for this question.

Floor Trading

At physical exchanges, trading is regulated by exact trading hours and limited within the perimeters of the trading floor concentrating all market participants physically and temporally. Traders assemble face-to-face on the trading floor shouting and hand-signaling their bids and offers to each other. Prices and order sizes are the key information for floor traders but in addition to these abstract numbers, they also look for 'ambient' information from visual and acoustic cues such as noise level, crowds and movements on the floor to evaluate the overall market situation. Empirical studies on noise level, for example, have shown that increases in noise level correlate with higher volatility providing important trading signals.

In addition, traders can quickly identify who is placing an order. At some exchanges, traders also wear differently coloured jackets with company names printed on it which make it easy to track the order back

to the company, even when traders do not know each other personally. Knowing where orders come from is important information which can help to anticipate potential price movements. If a large firm like Goldman Sachs, for example, places an order, it is very likely that the order will be relatively large, and, therefore, have great impact on the market price. Traders, therefore, are on the alert and can adjust their positions accordingly. Orders which are placed in the electronic market, however, are anonymous and give no indications which firm is behind the order.

Because products are strongly interconnected and often follow trends, traders also pay attention of how related products are performing. On the floor, trading pits of these products are often in close proximity to each other, and, therefore, easy to watch and overhear. Traders in one pit, therefore, can see and hear what is happening in other pits. This type of information is very valuable for traders to adjust their risk positions.

Furthermore, floor trading generates a group dynamic where a limited number of 'leaders' will drive the actual market price. These key players basically set the benchmark, and the rest of the traders can place their bids and offers within a spectrum of this benchmark. Traders, therefore, closely observe these leaders and use their movements as indicators for the overall market situation.

To sum it up, on the trading floor, knowledge is not only represented in explicit forms such as prices, orders and market data but is also embedded in the physical presence and practices of the market participants. These visual and acoustical cues provide an important context to assess the market, and implicitly signal opportunities and warnings to traders in a market of great uncertainty. Because floor trading bounds traders to a physical place traditional exchanges define with their location where traders operate, and, therefore, keep market participants close to the city centre.

Electronic Trading

Today, however, electronic exchanges allow traders to participate in market activities in real time without the need to be physically present at the same place. Traders have direct access to market data and trading platforms worldwide communicating via face-to-screen interaction. These transformations have made the financial market more efficient in terms of speed and capacity but at the same time, they have simultaneously caused new challenges for traders.

As trading technology and financial products become more complex, trading does not only demand economic and financial understanding but also relies on technical knowledge and skills combined with efficient

hardware and software solutions. Some traders compare the transformation from floor trading to electronic trading with a change from driving a regular car to driving a racing car. Someone who is experienced to drive a regular car is not necessarily able to drive the Formula 1 with a racing car. Technology, speed and course are much more complex and time-sensitive making a change from one to the other extremely difficult.

Similar to Formula 1 drivers, traders are central but not the only actors in electronic trading highly depending on specialists. Traders and engineers need to collaborate with each other constantly exchanging ideas and knowledge. Especially proprietary trading systems are very sensitive, and, therefore, require much higher maintenance than off-the-shelf solutions. Hence, traders often work closely together with IT developers and financial engineers in a face-to-face setting.

The second challenge for electronic traders results from the exponential growth of digital information. Easier market access, lower transaction costs and better technology have generated an abundance of market data making it necessary to filter relevant information electronically. The development of automated trading signals, therefore, has become standard in many fields, demanding a close collaboration between traders, analysts and engineers. Especially in algorithmic trading, where speed and complexity are extremely critical, constant feedback between those who develop the system and those who operate it is very important. In order to communicate and fix complex problems without time delay, traders, analysts and engineers often sit in close physical proximity to each other.

Another challenge for electronic trading is the type of information available on the screen. Unlike on the trading floor where noise level, body language and crowd movements provide ambient information, electronic trading systems only generate information in abstract numbers. Technology can efficiently transfer digital market data but it cannot replicate the complex knowledge communication of the trading floor. Traders, therefore, have to learn to interpret the market without the social interaction of other market participants.

Instead, they focus on close collaboration within their own company. For assessing the market, they develop new trading strategies as a team, contextualize news and numbers, and constantly share comments and alerts with each other. In this process, the trading room transforms into a new type of knowledge space where traders and their teams use both electronic and physical communication sources. They monitor the market via the screen, and simultaneously assess their individual observations face-to-face with their co-workers. For this, they collaborate both

organizationally and spatially.

Trading rooms are typically organized in open plan offices where trading desks are arranged with maximum density allowing them to see and hear as many co-workers as possible. Seating positions and configurations are often carefully orchestrated fostering close collaboration within teams, and additionally, between teams with interdependent products. In general, good sightlines and acoustics are considered to be one of the most important features of trading room design.

For the filtering and interpretation process of market data, trading rooms seek for people from different disciplines and experiences. These highly skilled people need to make their own decisions independently but integrate themselves easily into teams at the same time. Communication has to be fast and transparent leading to flat hierarchies and organizational diversity.

To summarize, electronic trading can technically be operated from any location worldwide but this does not mean that traders can work isolated without any personal interaction. The increase in information technology has created complex trading mechanisms which require close collaboration between traders and many specialists. For cities, this implies both chances and challenges.

Chances and Challenges for Cities

Most researchers agree today that information technology has made financial markets not less but rather more concentrated in the urban environment. The development of cities such as New York, London and Tokyo suggests that technology itself may have made processes more flexible but at the same time, also more dependent on human capital and specialized services. The access to highly skilled people and innovative businesses requires the creative environment of the city where universities, major financial institutions but also competitors are concentrated. Many talented people are attracted by the diversity of the city, and, therefore, trading firms need to be located close by to reach these high potentials.

Cities have the advantage of extensive transportation infrastructure connecting many people conveniently. These are not only significant for those who commute daily but also for those who are globally engaged and require regular face-to-face meetings in different locations worldwide. Airports, train stations and local transportation hubs are strategic sites, especially for trading rooms which need to physically concentrate a large group of people and hardly engage in telework.

In addition, firms which trade for clients such as brokerage houses and investment banks need to be in close proximity to the city. Business

relationships cannot be fostered by electronic communication only but must highly invest in personal interaction and commitment. Social events such as lunches, parties and conferences, for example, provide important opportunities to exchange market information informally and intensify business networks. Beyond pure orders and abstract numbers, brokers and clients interact personally with each other, and the city centre with its variety of social places such as restaurants, clubs and public venues is a strategic location for informal communication. Therefore, many trading firms which provide services for clients will continue to depend on prime locations in the city centre because of its dense social infrastructure.

And finally, the trend of quantitative finance and algorithmic trading in particular has made trading extremely time-critical. Unlike on the physical trading floor where social networks dominate the trading activities and can distort fair competition, electronic trading operates solely on the principle "first come, first serve". Traders, therefore, rigorously compete for their own orders to reach the exchange servers first for fastest execution. Efficient hardware and software can support the speed but the actual physical distance to the telecommunication hub of the exchange still plays a major role for some trading strategies. Due to modern technology, orders can be executed in milliseconds but the prevailing matching mechanisms technically provide a slight advantage to firms which are located closer to the host of the exchange. Their orders need to travel a shorter distance from the company server to the exchange host, and, therefore, their orders will arrive there milliseconds before those of their competitors. This may be only a minimal time delay but for those firms, which have time-critical trading strategies and automate trading signals and order execution, this difference matters enormously, and, therefore, the location of the servers is very important. Locations close to exchanges, therefore, are not only chosen for business relationships but also for technical reasons. For many trading firms which engage in time-critical trading strategies, the city center and its close proximity to the exchange is still the preferred location for trading effectively. Against this background, some exchanges are even currently considering to offer spaces inside the exchange building for locating servers of their members.

All these above cases, however, reflect only part of the truth. For cities, electronic trading means also a challenge, and a number of trading firms will not necessarily need the density of the city centre.

In some organizations, real estate factors will simply drive the decision for or against cities. As mentioned before, sightlines and acoustics are of great importance for better communication in trading

rooms and firms require large, preferably column-free, open plan offices where they can fit as many traders and engineers as possible on one floor. Often these large office spaces are not available in the dense city centre, and, therefore, they decide to move into the suburbs where more opportunities exist to build custom-designed trading rooms which exactly fit their needs. Trading rooms such as UBS in Stamford (Connecticut), for example, fit about 2.000 trading positions onto one floor (equals about two soccer fields) which can simply not be realized in the density of New York City. For these firms, physical concentration is extremely important - but less within the macrostructure of the city but more within the microstructure in the firm.

Also, firms which focus less on time-critical trading strategies may choose to locate outside the city. For them, being closer to the telecommunication hubs of exchanges is not critical, and, therefore, there is no necessity to be located in the city where rents are higher and commuting more time-intensive. For them, locations in the suburbs with a good transportation connection for occasional visits into the city provide a good alternative. Especially those firms which do not trade for clients but with their own capital and additionally have access to in-house specialists can be more independent from locations in the city.

Often privacy factors are also reasons why firms prefer the remoteness of the suburbs, as with many Hedge Funds. The density of the city means better access and better communication sources but this may also include those to and from competitors. Certain trading firms may not prefer this degree of transparency and consequently move outside the city centre to protect their privacy.

To conclude, information technology and globalization have significantly changed trading processes in the financial industry. This has produced a number of new actors in the field and a variety of new possibilities of trading strategies. Are cities still important places for electronic markets? Yes. They continue to be important strategic sites in the global financial market centralizing technology, infrastructure and human capital. As we have seen, many firms still highly depend on this density and diversity, and, therefore, concentrate their trading rooms in the city. Although the traditional marketplace has vanished, it has not resulted in the end of urbanization but has rather redefined key parameters of the city such as physical distance, social infrastructure and creative collaboration. However, we must differentiate more clearly between different types of trading firms, their trading concepts and related organizational and spatial needs to better understand the complex fabric of electronic markets. We will find that in addition to the large number of firms which are directly located in the city centre,

there are also several firms which do not need prime locations in the city. This, however, does not mean that they do not need cities at all. Cities will continue to be central to electronic markets, and the microstructure of trading rooms will drive the decision for the specific location.

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Recommended Literature:

Baker, Wayne E., The Social Structure of a National Securities Market, in: American Journal of Sociology 89 (1984), 4, S. 775-811

Beunza, Daniel; Stark, David, How to Recognize Opportunities: Heterarchical Search in a Trading Room, in: Knorr Cetina, Karin; Preda, Alex (Hgg.), The Sociology of Financial Markets, Oxford 2005

Castells, Manuel, The Rise of the Network Society, Oxford 2000

Coval, Joshua; Shumway, Tyler, Is Sound just Noise?, in: Journal of Finance 56 (2001), S. 1887-1910

Davidsen, Judith, Trading Desks, Interior Design February 1990

Goldinger, Heiner, Rituale und Symbole der Börse, Münster 2002

Knorr Cetina, Karin and Bruegger, Urs, Global Microstructures: The Virtual Societies of Financial Markets, in: American Journal of Sociology 107 (2002), 4, S. 905-950

Meseure, Sonja A., Die Architektur der Antwerpener Börse und der europäische Börsenbau im 19. Jahrhundert, München 1998

Buck, James E., The New York Stock Exchange: The First 200 Years. Lyme/Conn. 1992

Phillips, James G.; Strauss, Frederic M., Trading Up, Contract Design July 1994

Sassen, Saskia, The Global City: New York, London, Tokyo, Princeton 2001

Stäheli, Urs, Der Takt der Börse: Inklusionseffekte von Verbreitungsmedien am Beispiel des Börsen-Tickers, in: Zeitschrift für Soziologie 33 (2004), 3, S. 245-263

Tamarkin, Bob, The Merc: the Emergence of a Global Financial Powerhouse, New York 1993

Tsen, Pe-Ru, Globale Wissensräume des Finanzmarktes, Tagungsband zum 52. Kongress der Gesellschaft für Arbeitswissenschaft ‚Innovationen für Arbeit und Organisation', Stuttgart 2006

Zaloom, Caitlin, Ambiguous Numbers: Trading Technologies and Interpretation in Financial Markets, in: American Ethnologist 30 (2003), 2, S. 258-272