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Execution methods in foreign exchange markets[1]

Over the past decade or so, the spread of electronic trading has brought about significant changes in the structure of the interbank foreign exchange markets and the relationship between foreign exchange dealers and their clients. This article looks at the way foreign exchange transactions are executed based on the BIS triennial survey data, and provides some quantitative estimates of the importance of electronic trading across transaction types, counterparties and economies.

JEL classification: F31, G15.

One of the most significant developments in the foreign exchange market over recent decades has been the introduction and growth of new electronic trading technologies. In addition to increasing the efficiency of foreign exchange markets, the diffusion of this technology has allowed new market segments to develop. As a result, the distinction between the interbank and other markets has blurred.

The 2007 BIS Triennial Central Bank Survey of Foreign Exchange and Derivatives Market Activity (BIS (2007))[2] asked participating central banks for information on the way foreign exchange transactions were executed in April 2007. This was the first time these data were published, and provides an opportunity to examine the extent to which electronic trading methods are used across economies. Based on these data, we make three main observations. First, electronic means of execution are more commonly used for spot transactions, which are more homogeneous and therefore more readily automated. Second, although electronic methods are more likely to be used in the interbank market, their prevalence has increased rapidly to similar levels for transactions between foreign exchange dealers, typically banks, and financial customers, such as hedge funds or pension funds. Finally, the take-up of electronic execution methods varies considerably across economies. In

[1] The views expressed in this article are those of the authors and do not necessarily reflect those of the BIS or the Reserve Bank of Australia. We would like to thank Carlos Mallo, Jhuvesh Sobrun and Andrew Zurawski for their help in preparing this article.

[2] The final triennial survey publication is available on the BIS website at www.bis.org/publ/rpfxf07t.htm.

general, industrialised economies have the highest diffusion of electronic methods while smaller financial centres have relatively low shares.

The following section describes the evolution of electronic trading in the foreign exchange market and discusses the implications this has had for its structure. Next, the feature presents the triennial survey data by transaction type, counterparty and location and highlights some stylised facts. The final section summarises the conclusions.

The evolution of electronic execution methods

Traditionally, foreign exchange trades were mainly done directly by phone

Until the late 1980s foreign exchange transactions depended mostly on phone-based technologies. A dealer needing to enter into a foreign exchange transaction would call a counterparty to get both the bid and offer rates for a specific transaction size. The size of the deal would typically influence the prices received. This "two-sided" price quoting was standard practice in foreign exchange markets as it limited market-makers' ability to adjust quoted prices in order to take advantage of information about the counterparty's intentions to buy or sell foreign exchange. At the same time, these phone calls were the only way to get direct bank prices, so frequent calls were required to keep up to date on the latest price developments ("price discovery") (Galati (2001)). Although most transactions took place directly between banks, indirect dealing could also occur through brokers. Dealers would phone a voice broker, who would search for matching interest among their clients to complete a transaction. Voice brokers were beneficial in terms of both saving time on price discovery and the convenience of only needing to show a bid or an offer rate.

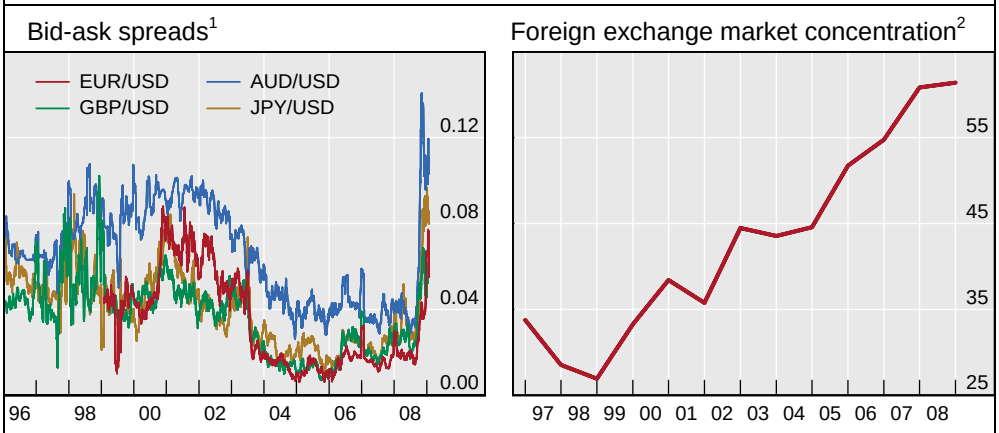
Electronic broking systems evolved in the 1990s

Given advances in technology and the relatively simple structure of some foreign exchange deals, it was only a matter of time before electronic technologies were implemented in foreign exchange markets. In 1989 Reuters began offering participants in the interbank market a so-called electronic broking service, whereby trading is carried out through a network of computer terminals linked among participating users, and new orders are matched with outstanding orders already in the system. In the early 1990s a consortium of banks launched EBS to provide a similar service.[3] Electronic broking systems allow banks to make a "one-way" price quote and, in addition to the best bid and offer prices, display information about the closest bids and offers in the system. The resulting transparency of prices obviates the need to spend resources on price discovery activities, as interbank price quotes are now available at all times to participating interbank dealers. Another important feature of these systems is that a large order can be matched with several small ones, which allows banks to make a one-way price quote for smaller amounts. Access to these systems therefore enabled smaller institutions to deal at more favourable spreads that had previously been available only to large institutions. Reuters Matching and EBS continue to dominate in the inter-dealer market, although they cover somewhat different currencies: while

[3] EBS has subsequently been bought by ICAP to complement its other broking services.

Bid-ask spreads and foreign exchange market concentration

In per cent



[1] Twenty-two-day moving average of daily bid-ask spreads (business day close) of US dollar per counterparty currency. [2] Top five dealers' market share.

Sources: Reserve Bank of Australia; Bloomberg; Euromoney. Graph 1

Reuters Matching specialises in major Commonwealth currencies, EBS has much more trading in the US dollar, euro, yen and Swiss franc.

Electronic broking has increased the efficiency of interbank markets …

As a result of the increased penetration of electronic broking systems, the efficiency of interbank foreign exchange markets has improved significantly. This can be observed in the decrease in the bid-ask spreads quoted in the interbank market over the 1990s and early 2000s (Barker (2007); see also Graph 1, left-hand panel). One consequence of the associated sharp fall in margins has been a shift by market participants towards a business model that focuses on high volumes of low-margin transactions (Barker (2007)). The high fixed costs of making the investment required to put in place and maintain the systems that can handle high volumes of transactions have been one of the factors behind the increased concentration of liquidity provision and market-making in the interbank market (ECB (2003); see also Graph 1, right-hand panel).

… although the downward trend in bid-ask spreads has recently reversed …

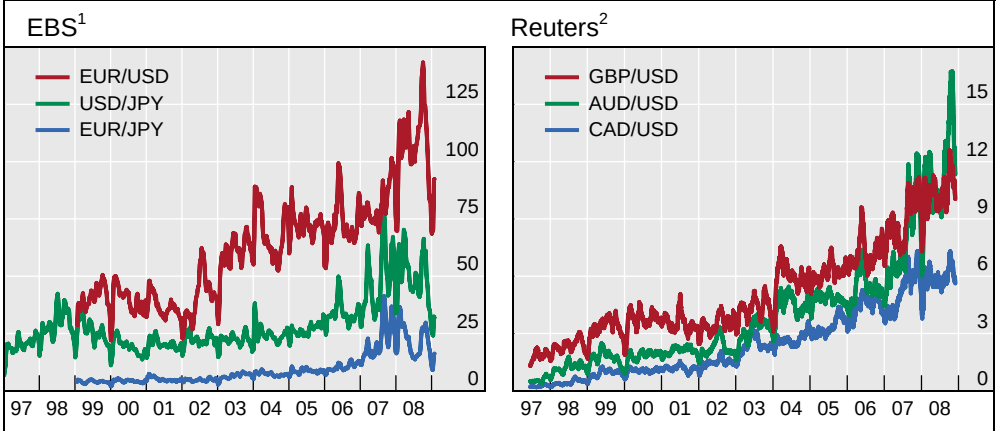
The downward trend in bid-ask spreads had levelled off by the mid-2000s but increased significantly following the failure of Lehman Brothers in September 2008. As volatility in foreign exchange markets spiked to nearly three times normal levels (Reserve Bank of Australia (2009)), bid-ask spreads for many major currency pairs more than doubled between September and December (Graph 1, left-hand panel).

… as has the uptrend in turnover

Turnover on EBS and Reuters, which grew rapidly over most of the past decade, also reversed course in late 2008 (Graph 2). Though activity in interbank markets in many currency pairs levelled off in mid-2007, growth resumed in some major currency pairs, such as the euro/US dollar, in 2008. But in late 2008, activity levels dropped sharply across the board: turnover for the three most traded currency pairs in EBS roughly halved between the end of September and the end of the year.

Although aggregate turnover could be expected to fall in extremely volatile conditions, there are several reasons why recent market volatility may have disproportionately affected electronic trading turnover. First, the general

Interbank spot foreign exchange market activity



[1] Four-week moving average of daily average turnover; in billions of US dollars. [2] Twenty-two-day moving average of daily number of trades; in thousands.

Sources: Reserve Bank of Australia; ICAP; SIRCA (Reuters). Graph 2

reduction in risk appetite may have had a larger adverse effect on the activities of market participants that are more active users of electronic methods, such as proprietary and prime brokerage accounts. Second, market-makers may have been less willing to quote on electronic platforms to avoid being caught by adverse price movements, thereby driving activity through phone transactions. In addition, some forms of trading activity, such as automated trading, which rely on electronic execution methods and are based on rules designed to work in normal conditions, may be abandoned at times of unusually high volatility.

Electronic trading between banks and their clients evolved later …

Some time after the development of electronic broking systems became established in the interbank market, some foreign exchange providers developed electronic trading systems that allowed them to transact electronically with their customers. This opened electronic execution methods to counterparties that had not had access to electronic broking systems (Christodoulou and O'Connor (2007)). Initially, some large foreign exchange trading banks provided electronic execution to their customers through "single-bank" platforms. These largely internet-based systems allow a client to deal directly with their bank and, generally, to automate trading processes. Banks were motivated to develop these proprietary platforms both to create new opportunities as the profitability of the interbank market decreased and to meet demand for foreign exchange services from a range of clients, from smaller corporate customers to sophisticated financial institutions, such as hedge funds (ECB (2003)). Subsequently, demand from clients for prices from several sources led to the development of multibank electronic trading systems, such as Currenex, FX Connect and FXall, established between 1999 and 2002. These systems allow different market-makers to quote prices in competition with one another. In contrast to electronic broking systems in the interbank market, there are a large number of electronic trading systems that allow clients to execute foreign exchange transactions with banks. A dominant business model has yet to emerge. For example, some multibank electronic trading systems provide prices in response to requests for quotes, while others stream quotes with a limit order book (Celent (2007)).

… allowing new market segments to emerge

The developments described above have significantly changed the relationship between banks and their customers. In particular, as larger banks have invested in technology to handle large volumes of transactions executed electronically with their clients, a number of new market segments have emerged, such as white labelling, prime brokerage, algorithmic trading and retail margin trading.[4]

A snapshot of execution methods used in April 2007

The 2007 triennial survey is the first dataset that contains information on execution methods used in foreign exchange markets across economies. The survey asked banks to provide information on whether foreign exchange transactions were executed directly with another bank that deals in foreign exchange, directly with a customer, indirectly through a voice broker or indirectly through electronic means, categorised as electronic broking systems, multibank trading systems or single-bank trading systems. The survey also collected data by execution method broken down by transaction type and counterparty. The transactions distinguished were: spot transactions, outright forwards, foreign exchange swaps and options. The counterparty categories reported comprised: reporting dealers, which are typically banks; other financial institutions, which include hedge funds, pension funds and smaller banks; and non-financial customers.

Incidence of electronic methods is highest for spot market transactions …

In total, around one third of all foreign exchange transactions are executed electronically.[5] Disaggregating the triennial survey by transaction type shows that electronic execution methods are most prevalent in the spot market, accounting for over half of turnover on a global basis (Table 1). Electronic broking systems, such as Reuters Matching or EBS, account for around 32% of all spot market transactions, while single- and multibank electronic trading platforms represent 17% and 8%, respectively. Among non-electronic methods, the most important way of executing spot transactions is directly between banks and their customers ("customer direct").

… and lower for more complex instruments

Electronic execution methods are used less frequently for more complex instruments. Around 30% of outright forward transactions take place electronically, predominantly through electronic trading systems. In contrast to

[4] White labelling is an arrangement whereby a smaller bank outsources the provision of foreign exchange services for its clients to a larger bank (Barker (2007)). Prime brokerage allows large banks to provide sophisticated clients, such as hedge funds, with the ability to trade foreign exchange in the bank's name using the bank's credit rating (Foreign Exchange Committee (2005)). Algorithmic trading strategies fully automate the process of entering data, applying decision rules and executing the chosen trades (Pelham (2006)). Margin trading for retail customers has become increasingly important in recent years, particularly in Japan (Terada et al (2008)). This has contributed to the blurring of the distinction between wholesale and retail customers.

[5] Data were collected on a "gross-gross" basis, meaning that there is double-counting of local and cross-border inter-dealer transactions. Data on the size of this effect for each transaction type and counterparty appear in Table E.1 of the triennial survey. The turnover data used in Tables 1 and 2 are scaled by this adjustment, and are therefore net of local and cross-border double-counting.

Foreign exchange market turnover by execution method[1]

Daily averages in April 2007, percentage share by transaction type

	Inter-dealer direct	Voice broker	Customer direct	Electronic methods			
				Broking systems	Multibank trading systems	Single-bank trading systems	Total
Spot transactions	13	2	28	32	8	17	57
Outright forwards	17	8	45	7	11	12	30
FX swaps	22	27	25	13	6	6	25
OTC FX options	26	16	51	4	2	2	8
Total	19	17	30	17	7	10	34

[1] Adjusted for local and cross-border inter-dealer double-counting, "net-net".

Source: BIS Triennial Survey. Table 1

spot transactions, most outright forwards are conducted directly between banks and their customers. Electronic execution is used for around one quarter of all foreign exchange swap transactions. Unlike outright forwards, electronic broking systems are employed relatively frequently in foreign exchange swap transactions, which, in comparison with other transactions, also appear to use voice brokers more frequently. A relatively small percentage of foreign exchange options is traded electronically, which is compatible with their more complex and less homogeneous nature.

Electronic execution is common for all counterparties

Electronic execution methods are extensively used across all counterparties. Around 35% of interbank transactions are executed electronically, with almost two thirds of this accounted for by electronic broking systems (Table 2). Almost half of all interbank transactions occur directly between dealers (the category "inter-dealer direct"), and voice brokers execute the remainder. A similar share of transactions between banks and other financial institutions is done electronically, although electronic broking systems are less important. More than 30% of transactions between banks and their

Foreign exchange market turnover by counterparty[1]

Daily averages in April 2007, percentage share by counterparty

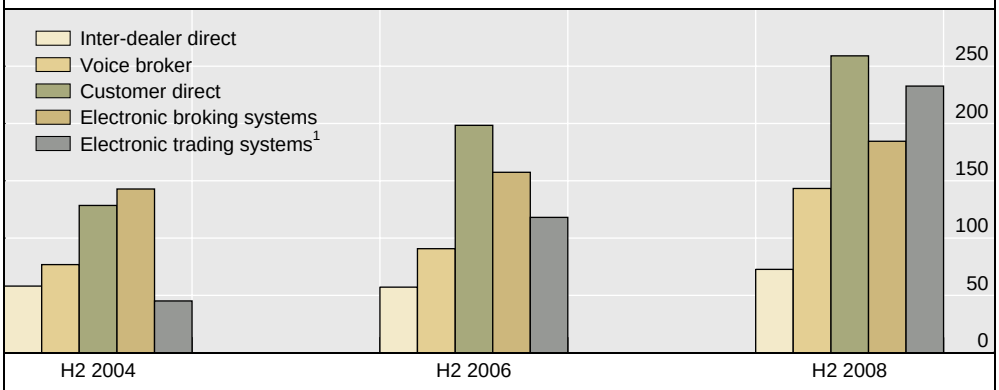
	Inter-dealer direct	Voice broker	Customer direct	Electronic methods			
				Broking systems	Multibank trading systems	Single-bank trading systems	Total
Reporting dealers (interbank)	45	20	–	23	5	7	35
Other financial institutions (non-bank)	–	18	48	15	8	11	34
Non-financial customers	–	7	62	9	8	14	31
Total	19	17	30	17	7	10	34

[1] Adjusted for local and cross-border inter-dealer double-counting, "net-net".

Source: BIS Triennial Survey. Table 2

FX turnover in the United States by execution method

Daily averages, in billions of US dollars



[1] Includes both single- and multibank trading systems.

Source: Foreign Exchange Committee. Graph 3

non-financial customers take place electronically (with around half of this share accounted for by single-bank trading systems), while almost two thirds occur directly between the reporting bank and the customer.

Given the relatively rapid growth in turnover between banks and other financial institutions as well as non-financial customers (BIS (2007)), and the importance of multibank and single-bank trading systems for these counterparty categories, these data suggest that turnover through these trading systems has increased significantly faster than that executed on electronic broking systems. Data from the Foreign Exchange Committee on foreign exchange turnover in the United States, which show that turnover through electronic trading systems (both multibank and single-bank) has grown at an exceptionally rapid pace, support this conjecture (Graph 3).

Importance of electronic execution varies by location

The importance of electronic execution in foreign exchange markets across different economies varies widely (Table 3).[6] In a number of cases, the share of electronic methods is consistently high (or low) across all instruments and counterparties. For example, it is consistently high across all market segments for Switzerland and Germany, but consistently low for Denmark, Latin America and smaller financial centres in Asia. In other instances, the aggregate numbers reflect differences in the composition of turnover and in the predominance of electronic methods. For example, both Australia and Hong Kong SAR have relatively low incidence of electronic methods in their interbank markets. However, the interbank market makes up a much more significant share of total turnover in Hong Kong, resulting in a lower incidence of electronic methods in aggregate.

[6] Data by economy can only be adjusted for local dealer double-counting. In Table 3, the level of turnover is scaled by estimates of local dealer double-counting, which are available in Tables E.9 to E.11 and Table E.28 of the triennial survey. This adjustment typically has only small effects on the reported shares because the share of turnover between local reporting dealers is generally small, particularly in the larger financial centres.

Global foreign exchange market turnover by execution method[1]

Daily averages in April 2007, percentage share by location

	Inter-dealer direct	Voice	Customer direct	Electronic methods	Economy share[2]
United Kingdom	22.9	18.8	27.9	30.4	34.1
United States	12.2	15.7	31.9	40.2	16.6
Switzerland	8.9	22.4	14.5	54.2	6.1
Japan	31.5	18.8	17.4	32.3	6.0
Singapore	34.4	17.5	12.4	35.6	5.8
Hong Kong SAR	45.5	19.5	9.9	25.0	4.4
Australia	33.0	20.2	15.2	31.6	4.3
France	16.6	33.3	16.7	33.4	3.0
Germany	22.6	2.2	12.4	63.7	2.5
Denmark	67.2	1.4	17.2	14.1	2.2
Canada	29.2	11.3	26.7	32.8	1.5
Russia	28.1	9.5	27.6	34.8	1.3
Other industrialised[3, 4]	35.0	8.4	22.2	34.4	6.7
Other Asia[3, 5]	29.8	17.2	26.2	26.8	2.4
Latin America[3, 6]	24.3	14.3	36.7	24.7	0.6
Central and eastern Europe[3, 7]	40.7	6.9	25.0	27.5	0.8
Other[3, 8]	32.1	5.4	18.6	43.8	0.5
Average[3]	32.8	11.5	23.8	31.8	–
Aggregate	19.1	16.7	30.2	34.0	–

[1] Adjusted for local double-counting, "net-gross". [2] Total country turnover as a share of global turnover. [3] Average of component shares. [4] Austria, Belgium, Finland, Greece, Ireland, Italy, Luxembourg, the Netherlands, New Zealand, Norway, Portugal, Spain and Sweden. [5] Chinese Taipei, India, Indonesia, Korea, Malaysia, the Philippines and Thailand. [6] Brazil, Chile, Colombia, Mexico and Peru. [7] Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovenia and Turkey. [8] Bahrain, Saudi Arabia and South Africa.

Source: BIS Triennial Survey. Table 3

Conclusion

The development of electronic broking and trading systems represents one of the most significant catalysts of structural change in foreign exchange markets over the past decade or so. Although there has been substantial commentary about the increased penetration of electronic execution methods for foreign exchange and the changes in business models and strategies it has enabled, little has been produced in the way of comprehensive data that allow the importance of the trend to be quantified.

Data from the triennial survey provide an opportunity to look at the importance of electronic execution methods across economies for different foreign exchange transactions and counterparties. The survey confirms that the prevalence of electronic execution methods declines as the complexity of the instrument increases. More than half of foreign exchange spot turnover worldwide is executed electronically, whereas less than one tenth of foreign exchange options are. The results presented by counterparty show that although the development of execution methods started with electronic broking systems in the interbank market, the use of electronic methods to execute

transactions between banks and financial customers, such as hedge funds or pension funds, has expanded rapidly and has captured a similar market share. The survey results also indicate that the use of electronic execution methods varies widely across economies. Some economies, notably Germany and Switzerland, have a consistently high share of electronic execution methods across market segments, while in other economies, particularly smaller financial centres, electronic execution methods are less important.

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