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What drives the growth in FX activity? Interpreting the 2007 triennial survey[1]

The most recent BIS triennial survey shows that turnover in foreign exchange markets increased by more than 70% over the three years to April 2007. Two specific findings stand out. First, the growth in transactions between banks and other financial institutions was particularly strong, consistent with the increasing importance of hedge funds, as well as portfolio diversification by institutional investors with a longer-term horizon, such as pension funds. Second, there has been a marked increase in turnover involving emerging market currencies.

JEL classification: F31, G15, G20.

The 2007 BIS Triennial Central Bank Survey of Foreign Exchange and Derivatives Market Activity shows that turnover in traditional foreign exchange markets increased significantly to $3.2 trillion in April 2007 (Table 1).[2] The growth since April 2004, the previous survey date, was an unprecedented 71% at current exchange rates and 65% at constant exchange rates.[3] Although this growth was broadly based across traditional foreign exchange instruments, the pickup in the growth of foreign exchange swaps was particularly strong, increasing to 82% from 44% over the previous three years. Turnover in foreign exchange derivatives, such as currency swaps and foreign exchange options, increased even more rapidly, albeit from a very small base.

Trends in the growth of turnover by different types of counterparty established in earlier surveys have continued. The increase in trading between reporting dealers, typically commercial and, to a lesser extent, investment banks, and other financial institutions, including hedge funds and pension

[1] The views expressed in this article are those of the authors and do not necessarily reflect those of the BIS. We would like to thank Paola Gallardo and Carlos Mallo, who coordinated and compiled the triennial survey statistics, and Jhuvesh Sobrun for research assistance.

[2] The survey was conducted in April 2007 by 54 central banks and monetary authorities. They collected data on turnover in traditional foreign exchange markets – spot, outright forwards and foreign exchange swaps – as well as over-the-counter currency and interest rate derivatives. All figures presented here are based on preliminary results released in September 2007.

[3] The valuation effects are driven primarily by the depreciation of the dollar and the yen between April 2004 and April 2007.

Global foreign exchange market turnover[1]

Daily averages in April, in billions of US dollars

	1992	1995	1998	2001	2004	2007
Spot transactions	394	494	568	387	621	1,005
Outright forwards	58	97	128	131	208	362
Foreign exchange swaps	324	546	734	656	944	1,714
Estimated gaps in reporting	43	53	61	26	107	128
Total	820	1,190	1,490	1,200	1,880	3,210
Memo: Total at April 2007 exchange rates	*880*	*1,150*	*1,650*	*1,420*	*1,950*	*3,210*

[1] Adjusted for local and cross-border double-counting. Table 1

funds, was particularly notable: the share of this trade in total turnover increased from 33% to 40% (Table 2). The share of trading between reporting dealers and non-financial customers also rose, reaching 17%, recovering to the level it held in 1992–98. Correspondingly, the share of interbank trading continued to fall. In April 2007, trading between reporting dealers captured 43% of the total market, compared to 53% in 2004 and 64% in 1998. This trend is present across instruments.

The survey data also indicate that there have been small but significant changes in the currency composition of foreign exchange turnover. In particular, the presence of emerging market currencies has increased. This potentially points to significant longer-term trends that may have implications for the geographical distribution of foreign exchange sales, given differences in the importance of these currencies for different financial centres.

This special feature looks at some of the trends in traditional foreign exchange turnover in more detail. The first section focuses on the factors underlying the increase in turnover with other financial institutions. In particular, it looks at the contribution made by leveraged investors exploiting short-term profit opportunities through strategies such as the carry trade, by investors with a longer-term horizon diversifying their portfolios and by algorithmic traders. The second section explores the growing importance of emerging market

Foreign exchange market turnover by counterparty[1]

Daily averages in April, in billions of US dollars

	1998		2001		2004		2007	
	Amount	% share	Amount	% share	Amount	% share	Amount	% share
Total[2]	1,429	100	1,174	100	1,773	100	3,083	100
With reporting dealers	908	64	689	59	936	53	1,319	43
With other financial institutions	279	20	329	28	585	33	1,235	40
With non-financial customers	242	17	156	13	252	14	527	17
Local	657	46	499	43	674	38	1,185	38
Cross-border	772	54	674	57	1,099	62	1,896	62

[1] Adjusted for local and cross-border double-counting. [2] Excluding estimated gaps in reporting. Table 2

currencies and the implications this has had for different financial centres. The final section concludes.

Rapid growth in turnover with financial customers[4]

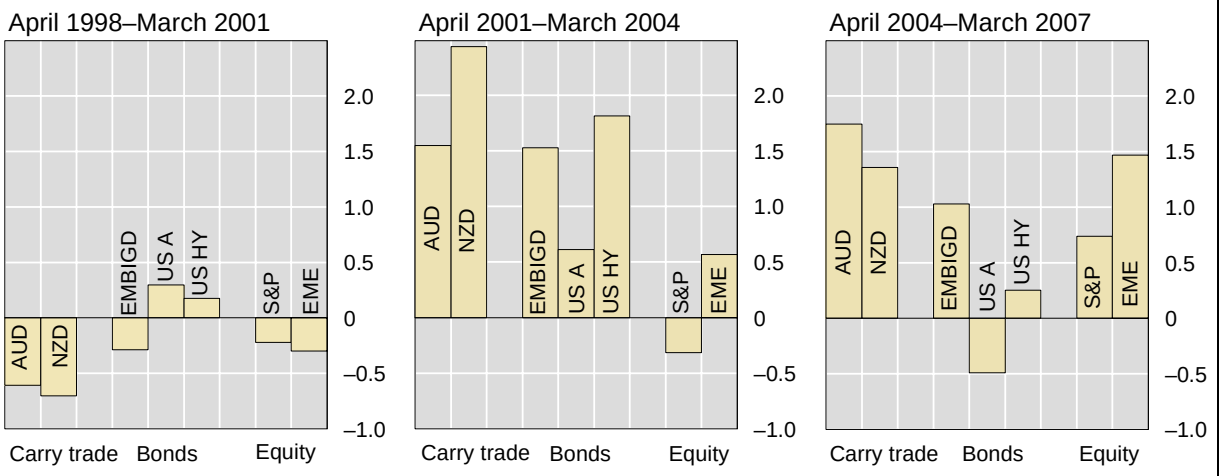
Financial customers were the main driver of turnover growth

Financial customers were the main drivers of the strong rise in global turnover. Growth in this segment has accounted for half of the increase in total turnover over the past three years, compared with 29% for interbank trading and 21% for the non-financial customer segment. This growth can be explained by several factors, many of which were noted in previous surveys and, as such, can be regarded as a continuation of earlier trends (Galati and Melvin (2004)). First, foreign exchange markets have offered leveraged investors with relatively short investment horizons attractive returns. Second, investors with a longer-term investment horizon have been actively diversifying their portfolios, which has created direct and indirect demand for foreign exchange. Finally, an increase in high-frequency algorithmic trading by some investors, mostly investment banks, has also increased turnover, particularly in the spot market.

Leveraged investors, such as hedge funds, played an important role

Market commentary has suggested that leveraged investors such as hedge funds have been primary players in foreign exchange market activity in recent years. In addition, leveraged retail investors also appear to be a growing

Sharpe ratios[1]



AUD = Australian dollar; NZD = New Zealand dollar; EMBIGD = JPMorgan Chase EMBI Global Diversified index; US A = Merrill Lynch US dollar A-rated corporate index; US HY = Merrill Lynch US dollar high-yield corporate index; S&P = S&P 500 equity index; EME = MSCI emerging markets equity index.

[1] Calculated as the ratio of annualised excess returns to the annualised standard deviation of returns. The one-month US dollar Libor rate is taken as the risk-free rate. Carry trade returns are calculated as the returns on a US dollar collateral account from a strategy of borrowing in yen with a leverage ratio of 10, to buy an Australian or New Zealand dollar deposit for one month, allowing for profits and losses to be cumulated. All bond and equity indices are in US dollars.

Sources: Bloomberg; Datastream; Global Financial Data; JPMorgan Chase; Merrill Lynch; BIS calculations. Graph 1

[4] The term "financial customers" as used here is equivalent to the term "other financial institutions" in the triennial survey. This term covers all non-reporting financial institutions, such as smaller commercial banks, investment banks and securities houses, as well as mutual funds, pension funds, hedge funds, currency funds, money market funds, building societies, leasing companies, insurance companies, other financial subsidiaries of corporate firms and central banks.

presence in foreign exchange markets, although the impact of these investors on global turnover is still relatively small and the degree of leverage is not likely to be large (Galati et al (2007)). One of the factors driving this trend is that retail investors have had significantly more access to margin accounts through online trading services targeted at retail traders, such as Deutsche Bank's dbFX.

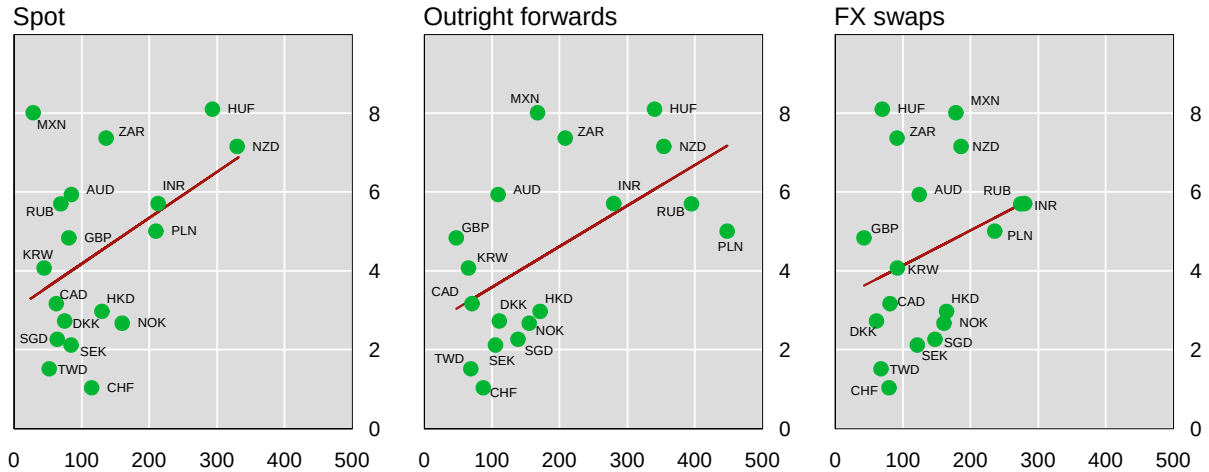
Carry trades have been a popular investment strategy

Indeed, strategies such as the carry trade, which use leverage to exploit interest rate differentials and exchange rate trends in an environment of low financial market volatility, have been profitable over the past three years (Galati et al (2007), Graph 1). The triennial survey statistics show that several currencies identified as carry trade targets, such as the Australian and New Zealand dollars, experienced particularly strong growth in turnover between April 2004 and April 2007 (Table 3).[5] More broadly, there is a positive correlation between growth in turnover and the level of domestic interest rates across instruments (Graph 2).

Funds managed by leveraged investors have increased

The contribution of these investment strategies to overall turnover has been amplified by the increase in the funds managed by leveraged investors. Although it is difficult to obtain precise numbers, it is clear that hedge fund activity, measured by either estimates of assets under management or the number of funds, has increased significantly over the past six years (Graph 3, left-hand and centre panels). The growth in hedge fund activity has been concentrated in the United States and London. In addition to access to relatively cheap funding and benign conditions in financial markets, hedge fund

Turnover and interest rates



The horizontal axis indicates the percentage change between 2004 and 2007 of foreign exchange turnover, and the vertical axis indicates the average between April 2004 and April 2007 of the three-month interest rate. Both axes show figures in per cent. The line is obtained from an OLS regression, with adjusted R^2 of 0.14, 0.29 and 0.02 for the left-hand, centre and right-hand panels, respectively.

Sources: Datastream; national data; BIS calculations. Graph 2

[5] This is true even after taking into account valuation effects arising from exchange rate changes and an increase in the share of Australian dollar turnover due to refinements in the data collection process. For an analysis of the role of the carry trade in Asia, see Gyntelberg and Remolona (in this issue).

Foreign exchange turnover by currency[1]

Daily averages in April, percentage shares

	2001	2004	2007
US dollar	90.4	88.7	86.3
Euro	37.7	37.2	37.0
Japanese yen	22.7	20.3	16.5
Pound sterling	13.3	16.9	15.0
Swiss franc	6.1	6.1	6.8
Australian dollar	4.2	5.5	6.7
Canadian dollar	4.5	4.2	4.2
Swedish krona	2.1	2.3	2.8
Hong Kong dollar	2.2	1.9	2.8
Norwegian krone	1.1	1.5	2.2
New Zealand dollar	0.2	1.0	1.9
Mexican peso	0.8	1.1	1.3
Singapore dollar	0.9	1.0	1.2
Korean won	0.7	1.2	1.1
South African rand	1.0	0.8	0.9
Danish krone	1.0	0.9	0.9
Russian rouble	0.4	0.7	0.8
Polish zloty	0.5	0.4	0.8
Indian rupee	0.2	0.3	0.7
Chinese renminbi	0.0	0.1	0.5
New Taiwan dollar	0.3	0.4	0.4
Brazilian real	0.4	0.2	0.4
All currencies	200	200	200
Emerging market currencies[2]	16.9	15.6	19.8
Asia[3]	4.7	5.3	7.2
Latin America[4]	1.5	1.6	1.8
Central and eastern Europe[5]	1.1	1.5	2.2

[1] Because two currencies are involved in each transaction, the sum of the percentage shares of individual currencies totals 200% instead of 100%. The figures are adjusted for local and cross-border double-counting. [2] Defined as the residual after accounting for the top eight currencies, the Norwegian krone, the New Zealand dollar and the Danish krone. See also footnote 10 on page ●. [3] Includes the listed currencies of emerging Asian economies as well as the Indonesian rupiah, the Malaysian ringgit, the Philippine peso and the Thai baht. [4] Includes the listed Latin American currencies as well as the Chilean and Colombian pesos. [5] Includes the Czech koruna, the Hungarian forint, the Russian rouble, the Polish zloty and the Slovak koruna. Table 3

growth in foreign exchange markets has benefited from the development of prime brokerage services.[6]

Institutional investors, such as pension funds and investment trust managers with a longer-term investment horizon, have also been more active in their cross-currency investment activities. This reflects a number of driving forces. First, similarly to investors with a shorter-term horizon, these investors

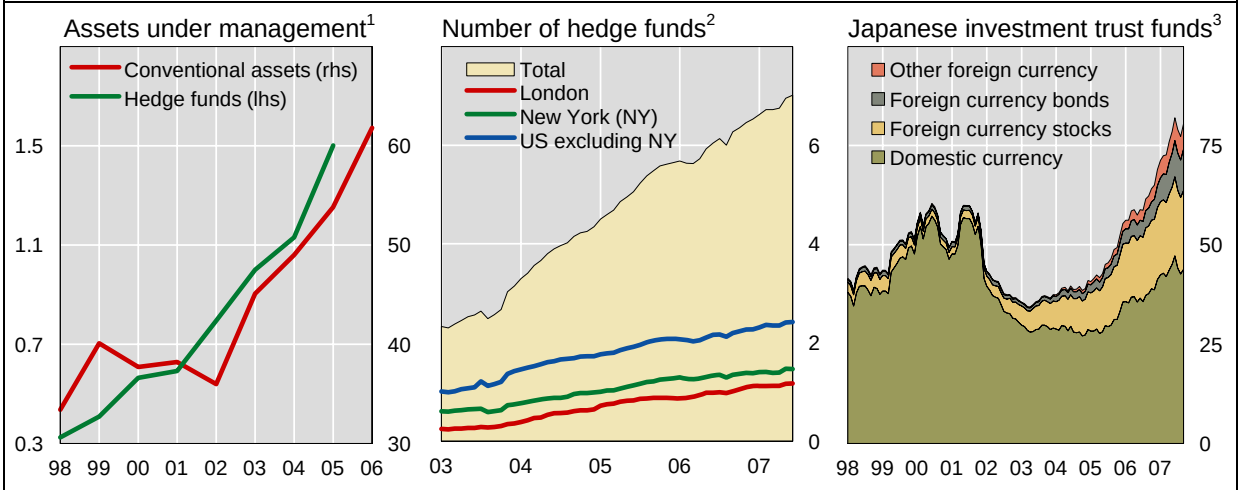
[6] With prime brokerage, a customer, for example a hedge fund, can obtain liquidity from a variety of sources while at the same time maintaining a credit relationship, placing collateral and settling transactions with a single bank – the prime broker (Foreign Exchange Committee (2005)).

have increasingly viewed foreign exchange as a distinct asset class and have taken a more active approach to the management of currency exposure with a view to improving returns on international investments.[7] Second, the portfolios these institutions manage have become increasingly diversified internationally (CGFS (2007)), encouraged by developments in financial markets, the greater availability of instruments that allow foreign exchange risk to be hedged and regulatory changes. A third driving force is that the value of funds managed by these investors has grown significantly. Data on Japanese investment trusts provide a specific example of the latter two factors at work (Graph 3, right-hand panel).

Algorithmic trading has boosted turnover

Another factor likely to have been important for the increase in turnover between reporting dealers and other financial institutions, particularly hedge funds and investment banks, is the growing role of algorithmic trading (*The Economist* (2007), Pengelly (2007)). This style of trading is designed to exploit high-frequency movements in exchange rate quotes that are available electronically, based on a set of predetermined rules. For example, algorithmic traders have tried to exploit changes in carry trade profitability at very high frequencies. Algorithmic trading generates high turnover relative to the underlying size of the positions. The growth in this market segment owes much to advances in technology in electronic trading systems, particularly in the spot market (Kos (2006)).[8] There is also anecdotal evidence that algorithmic traders have contributed to a significant rise in futures market activity.[9]

Managed funds



[1] In trillions of US dollars. [2] Number of funds reporting to the HFR database; in thousands. [3] In trillions of yen.

Sources: Hedge Fund Research (HFR); IFSL; Investment Trust Association Japan. Graph 3

[7] One aspect of this approach is the increasing use of currency overlay, a process by which investors manage their foreign exchange positions more actively and manage their currency exposures separately (Galati and Melvin (2004)).

[8] *The Banker* (2007) reported that the continuing rise in algorithmic trading has boosted the business of electronic brokers in the interbank segment.

[9] In early 2007, Reuters and the Chicago Mercantile Exchange announced plans to create a joint platform that would support the use of algorithmic trading.

The rising importance of emerging market currencies

Fast growth in emerging market currency turnover

The results of the latest triennial survey also show that turnover involving emerging market currencies grew significantly faster than aggregate turnover. As a result, emerging market currencies are estimated to be on at least one side of almost 20% of all transactions, compared to less than 15% in April 2004 and less than 17% in April 2001 (Table 3).[10] The largest growth rates in turnover for emerging market currencies were in transactions between banks and non-financial customers (157%), a segment generally identified more closely with economic growth and trade, and financial customers (144%). Over the past three years, emerging market financial assets have offered very attractive risk-adjusted returns (Graph 1). This partly reflects the strong growth in many of these economies and the ongoing trend towards deepening financial markets in the Asian region (Ho et al (2005)).

A marked rise in activity in Hong Kong dollars

The rise in turnover was particularly pronounced for the Hong Kong dollar, and occurred across all three traditional foreign exchange instruments. This increase is likely to reflect Hong Kong SAR's ties with China and, in particular, the recent wave of equity flows, most of which are related to initial public offerings (IPOs) by Chinese companies in Hong Kong. The volume of IPOs on the Hong Kong stock exchange has been very high in recent years, averaging $2 billion per month (BIS (2007)). In April 2007, Chinese nationals raised $9 billion on equity markets, an unusually large amount, mostly in Hong Kong. For example, China Citic Bank is quoted in market commentary as having raised about $3.7 billion in Hong Kong in April 2007.[11] These activities generate sizeable money market activity, as buyers seek funding, which then spills over into the foreign exchange market, especially the derivatives segment, as banks swap US dollars for Hong Kong dollars. A wide range of other currencies also made significant contributions to overall growth in turnover, including the Indian rupee, the Mexican peso, the Polish zloty, the Singapore dollar and the South African rand.

Offshore trading of emerging market currencies has increased

Another interesting development for emerging market currencies is that, in many cases, the share of currency trade between non-resident counterparties has increased significantly. Some emerging market currencies, including the Brazilian real, the Indonesian rupiah, the Malaysian ringgit, the Mexican peso, the Polish zloty and the Turkish lira, experienced very large increases in the share of offshore trade. However, the share of trading with non-resident counterparties in emerging markets is still generally lower compared to currencies of industrial economies, and is particularly low for most Asian emerging market currencies, partly because a number of these economies place some restrictions on offshore trading activity.

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[10] These estimates assume that unidentified currencies are emerging market currencies, and so provide an upper bound. The degree of overestimation in the 2007 survey is likely to be less than one percentage point, but is probably larger in earlier surveys. As such, the estimate of 15.6% in Table 3 should be treated as a generous upper bound. This issue will be discussed in more detail in the final report on the triennial survey, due to be released in December 2007.

[11] www.iht.com/articles/2007/04/20/news/citic.php.

Foreign exchange turnover by country and currency[1]

April 2007, in billions of US dollars

	Emerging market currencies				Aggregate turnover
	Reporting dealer	Other financial institution	Non-financial customer	Total (% aggregate)	
United Kingdom	68.6	72.2	17.8	158.5 (12)	1,359.1
United States	70.0	62.5	41.6	174.1 (26)	663.6
Switzerland	8.7	2.0	1.9	12.6 (5)	241.7
Japan	10.6	1.9	1.2	13.6 (6)	238.4
Hong Kong SAR	85.9	16.9	6.2	109.1 (62)	174.6
Australia	5.2	3.0	0.8	9.0 (5)	169.5

[1] Net of local inter-dealer double-counting. Table 4

Largest offshore centres are the United Kingdom and the United States

Offshore trading in emerging market currencies is distributed unevenly across financial centres (Table 4). The United Kingdom and the United States have the largest volume of emerging market currency trading. In both cases, the share of this turnover accounted for by transactions with non-reporting financial institutions is relatively high, owing to the large presence of these institutions in these centres (Graph 3, centre panel). For the United Kingdom, cross-border transactions are more important than local ones, and two thirds of the turnover is accounted for by foreign exchange swaps. The most important emerging market currencies are the Hong Kong dollar, the Polish zloty and the South African rand. For the United States, spot transactions account for almost half of the turnover and, although a broad spectrum of emerging market currencies is traded, turnover is dominated by Latin American currencies, in particular the Mexican peso and the Brazilian real.

Singapore and Hong Kong are very important for Asian currencies

Singapore and Hong Kong are important offshore financial centres for currencies of emerging market economies in Asia. In addition to trade in each other's currencies, there is significant turnover in the Chinese renminbi, the Korean won, the Indian rupee and the New Taiwan dollar. The importance of non-deliverable forward contracts in these currencies is reflected in the relatively high share of forward contracts in aggregate turnover. In contrast, other financial centres, such as Australia, Japan and Switzerland, have relatively small volumes of emerging market currency trading.

Conclusions

The latest triennial survey revealed an exceptional increase in global foreign exchange market turnover between April 2004 and April 2007. This special feature examined two noteworthy results: the growing importance of

transactions between reporting dealers and other financial institutions and the increase in the turnover of emerging market currencies.

Some trends are likely to continue to affect turnover ...

Some of the drivers of these results seem to reflect structural changes and are therefore likely to continue affecting developments in foreign exchange turnover. For example, the increase in portfolio diversification by longer-term fund managers appears to be the result of a fundamental shift in approach. To the extent that some home bias in investment behaviour remains, there is potential for further diversification to boost turnover between reporting dealers and financial customers going forward. The expansion of activity by leveraged retail traders could also add momentum to this trend. In contrast, the potential role for investors with a shorter-term horizon, such as those following carry trade strategies, is more dependent on factors such as financial market volatility that affect the attractiveness of foreign exchange as an asset class.

Further above average growth in turnover in emerging market currencies is also likely going forward, although this is dependent on emerging market economies continuing to experience robust growth, as well as a further deepening and opening of their domestic financial markets. Should the share of emerging market currencies in total turnover continue to increase, this could have significant implications for the geographical distribution of foreign exchange activity given that some financial centres, such as Hong Kong and Singapore, have a stronger focus on these currencies.

... while some earlier trends appear to have run their course

Other structural trends noted in previous analyses of triennial surveys appear not to have had a significant impact. The concentration of the banking sector and the increased efficiency driven by the spread of electronic broking platforms, which were put forward as explanations for the falling share of the interbank market in previous surveys, do not appear to have been as important over the past three years. Indeed, the growth in interbank transactions has been roughly steady over the past six years, and the fall in the share of this segment can largely be explained by the more rapid growth of the other segments.

Several other developments will also be important

Several other developments in foreign exchange markets are also having a profound impact, although the effect on aggregate turnover is not clear. First, the distinction between banks that are market-makers in the interbank market and other financial institutions continues to become less apparent as these other financial institutions increasingly provide market liquidity. This trend is underpinned by the consolidation in the banking industry, the growth of banking organisations that play a number of different roles in foreign exchange markets, the strong growth in prime brokerage and the granting of access to electronic brokers in the interbank market to hedge funds (Jung (2007)). While the impact of this trend on aggregate turnover is difficult to assess, it does suggest that the ability to characterise the behaviour of different counterparty types may become more difficult over time.

Another significant development is the expansion of multibank electronic trading platforms that cater to customer markets. While transactions between banks and their customers are still generally executed through direct

dealing,[12] business transacted on electronic trading platforms has increased steadily. In the early 1990s, banks started to offer the advantages of these services to their customer business in the form of single-dealer trading platforms. Partly as a result of pressure from customers seeking simultaneous access to several pricing sources, dealing banks have tended to become associated with one or several of the multibank trading platforms that have become operational since the early 2000s. These systems allow customers to access prices and to trade with any of the participating dealers with whom they have an established credit relationship. The expansion of the role of multibank electronic platforms is likely to increase turnover by facilitating investors' access to market-makers. Indeed, the electronic trading platforms have already increased turnover by providing access to retail margin traders and tools for algorithmic trading.

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[12] An exception to this are banks in Switzerland, which are more likely to transact with their financial customers through electronic trading systems.