The foreign exchange and over-the-counter derivatives markets in the United Kingdom

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In April this year, the Bank of England conducted its usual three-yearly survey of turnover in the UK foreign exchange and over-the-counter currency and interest rate derivatives markets, which forms part of the latest worldwide survey co-ordinated by the Bank for International Settlements. The results show that the volume of foreign exchange activity in the United Kingdom rose by 80% between April 2004 and April 2007, increasing the UK share of the global market to 34%. Turnover in OTC currency and interest rate derivatives also rose considerably in the same period. This report sets out the results of the UK survey and then goes on to consider developments in these markets over the past three years.

Introduction

In April this year, central banks and monetary authorities in 54 countries, including the United Kingdom, conducted national surveys of turnover in the traditional foreign exchange (FX) markets[1] — consisting of spot, outright forwards and foreign exchange swaps — and in over-the-counter (OTC) currency and interest rate derivatives markets (see the box on pages 556–57 for more details on the types of trades captured in the survey). These surveys have taken place every three years since 1986[2] and measure turnover for the whole of April. They are co-ordinated on a global basis by the Bank for International Settlements (BIS), with the aim of obtaining comprehensive and internationally consistent information on the size and structure of the corresponding global markets.

In pursuing its goals of maintaining monetary and financial stability, the Bank monitors developments in all major UK financial markets. With an average daily turnover of around $1.4 trillion, foreign exchange is currently one of the largest financial markets in London. An in-depth understanding of the factors affecting the foreign exchange market is an important part of the Bank's market monitoring.

This report begins by concentrating on the results of the UK part of the survey, which fed into the BIS global results,[3] and highlights the significant increase in UK foreign exchange turnover since the last survey. The UK survey was conducted by the Bank of England and covers the business of 62 institutions (both UK-owned and foreign-owned) within the United Kingdom. The second part of this report considers the main developments in the UK foreign exchange markets in recent years that may have contributed to the marked increase in turnover, as well as the challenges that have arisen.

All data used in this report are for April 2007 or before, and therefore pre-date the recent period of financial market turbulence. The second section of this report does contain some references to recent events where they provide some insight into the robustness of the foreign exchange markets and the behaviour of their participants.

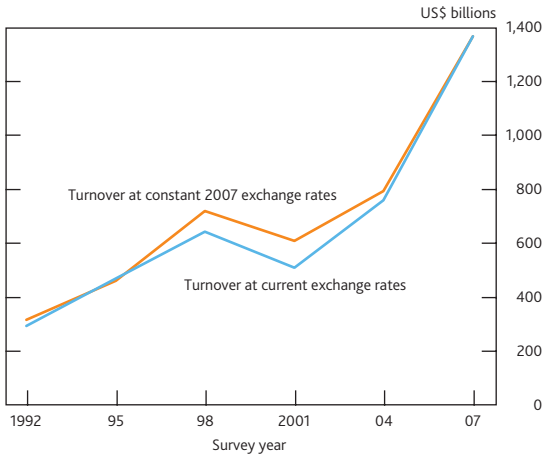
I The results of the UK survey

Foreign exchange turnover in the United Kingdom

Average daily turnover in the UK foreign exchange market during April 2007 was $1,359 billion, 80% higher than in April 2004 measured at current exchange rates and 73% higher at constant April 2007 exchange rates,[4] as shown in **Chart 1**.

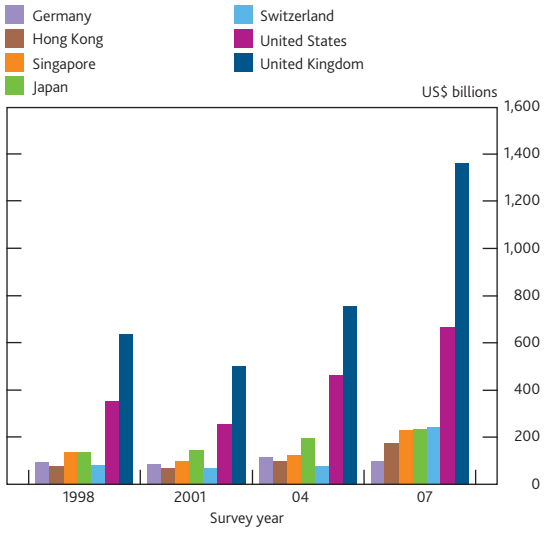
(1) Unless otherwise stated, turnover figures published here are adjusted to remove double counting of trades between UK principals that will have been reported by both parties (so-called 'local double counting').
(2) OTC derivatives were included for the first time in 1995.
(3) The BIS global results can be found on the BIS website: www.bis.org.
(4) For these purposes each leg of a foreign currency transaction, other than the US dollar leg, has been converted into original currency amounts at average exchange rates for April of the relevant year, and then converted back into US dollar amounts at average April 2007 exchange rates.

Chart 1 Average daily foreign exchange turnover in the United Kingdom at constant and current exchange rates



Most global financial centres saw increased activity in the three years to April 2007 (**Chart 2**). The United Kingdom reported the biggest increase in turnover and consolidated its position as the largest centre of foreign exchange activity, accounting for 34.1% of the global market in 2007, up from 31.3% in 2004. The next largest centre was the United States with 16.6% of the global market in 2007, down from 19.2% in 2004. Switzerland was the third largest, with its market share having almost doubled to 6.1% in 2007, in part due to the relocation of some trading desks to Zurich. The majority of turnover in the UK foreign exchange markets was cross-border business(1) — some 68% of total turnover in April 2007 — reflecting London's role as an international financial centre.

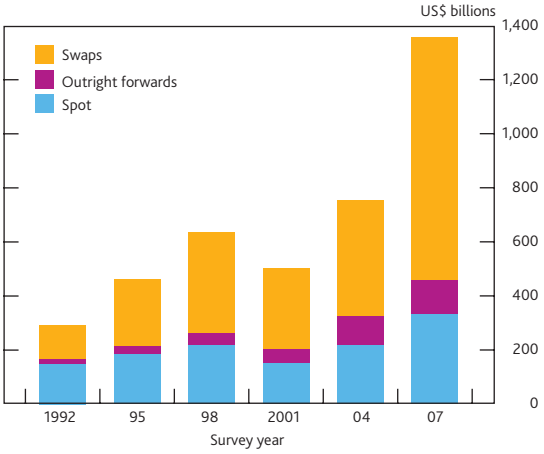
Chart 2 Average daily foreign exchange turnover — United Kingdom and other centres



Source: BIS.

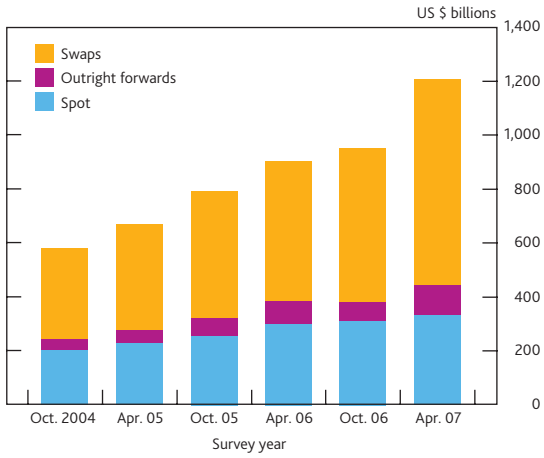
Turnover increased across all foreign exchange instruments, as illustrated in **Chart 3**. Foreign exchange swaps showed the largest increase,(2) with turnover at $899 billion per day, more than double the level in April 2004. Swaps accounted for 66% of total foreign exchange turnover in April 2007, up from 57% in April 2004. The maturity profile of forwards and swaps continued to move towards shorter-term trades. The percentage of forward and swap deals maturing in less than seven days increased to 78% in 2007, compared with 72% in 2004 and 69% in 2001.

Chart 3 Average daily foreign exchange turnover in the United Kingdom — by instrument type



Data from the Foreign Exchange Joint Standing Committee (FXJSC) survey (**Chart 4**), which collects similar information to the BIS survey but on a more frequent basis — twice yearly as opposed to the BIS survey which is every three years — shows foreign exchange turnover increased fairly steadily between the 2004 and 2007 surveys. While the increase in turnover slowed between April and October 2006, it picked up again in April 2007. The box on page 550 provides more information on the FXJSC survey and how it compares with the BIS survey.

Chart 4 Average daily foreign exchange turnover in the United Kingdom by instrument type — FXJSC survey results(a)



(a) FXJSC survey reporters account for approximately 95% of the BIS survey data.

(1) 'Cross-border business' covers transactions with entities located outside of the United Kingdom.
(2) A foreign exchange swap is a transaction which involves the actual exchange of two currencies on a specific date and a reverse exchange of the same two currencies at a date further in the future, with rates agreed for both legs when the deal is undertaken.

BIS triennial survey and the Foreign Exchange Joint Standing Committee survey

The Foreign Exchange Joint Standing Committee (FXJSC) is a UK market liaison group established by the banks and brokers of the London foreign exchange market and chaired by the Bank of England. Since 2004, it has been publishing foreign exchange turnover data for the United Kingdom every six months. Data are collected for turnover in April and October each year. Further details on the FXJSC can be found at www.bankofengland.co.uk/markets/forex/fxjsc.

The FXJSC survey collects similar information to the foreign exchange section of the BIS triennial survey. There are two important differences in institutional coverage and definition. First, the FXJSC survey has around 30 reporting institutions, a subset of the BIS triennial survey reporters which numbered 62 in 2007 and 93 in 2004. The second difference is the reporting basis: the FXJSC survey is based on the location of the price-setting dealer or trading desk (where transactions are executed), while the BIS triennial survey is based on the location of the sales desk (where transactions are arranged).

Despite these differences the two surveys are still reasonably comparable. **Table 1** shows the data reported on the FXJSC survey and the equivalent BIS triennial data for the same reporting institutions. The numbers are very similar, suggesting the difference in reporting basis did not have a significant effect overall in 2007. **Table 2** shows the FXJSC reporting institutions' percentage share of the BIS triennial survey, which is very high for all instruments. Together, these tables suggest that the FXJSC survey provides a reliable, and more frequent, indication of activity within the foreign exchange market in the United Kingdom.

Similar semi-annual surveys are also conducted for the New York market by the New York Foreign Exchange Committee; for the Singapore market by the Singapore Foreign Exchange Market Committee; and for the Canadian market by the Canadian Foreign Exchange Committee. The Tokyo Foreign Exchange Market Committee also began an annual survey of foreign exchange turnover in April 2006.

Table 1 Comparison of BIS triennial and FXJSC data for FXJSC reporting institutions (April 2007)

Daily average turnover in $ billions[a]

	BIS triennial	FXJSC	Difference
Spot	353	400	-48
Outright forwards	124	119	5
FX swaps	962	926	36
Currency swaps	18	15	2
FX options	117	142	-25
Total	**1,573**	**1,602**	**-30**

(a) To allow this comparison these data are *not* adjusted to remove double counting of trades between UK principals that will have been reported by both parties.

Table 2 FXJSC reporters' contribution to the BIS triennial data (April 2007)[a]

	Total BIS triennial[b]	*Of which*, FXJSC reporting institutions[b]	Per cent
Spot	377	353	94
Outright forwards	132	124	94
FX swaps	1,017	962	95
Currency swaps	20	18	90
FX options	118	117	99
Total	**1,664**	**1,573**	**95**

(a) See footnote (a) in **Table 1**, above.
(b) Daily average turnover in $ billions.

There was marked growth in turnover with non-reporting customers ('non-financial customers' and 'other financial institutions'), with turnover in April 2007 more than triple that in April 2004.(1) This business accounted for over half of total turnover in 2007, but only one third in April 2004, as shown in **Chart 5**. Business with 'other financial institutions', such as hedge funds and mutual funds, averaged $571 billion per day in April 2007. Business with 'non-financial customers', such as corporates and governments, averaged $174 billion per day. US dollar-denominated customer business showed the largest growth, particularly against the euro and sterling. Turnover between reporting dealers increased by 21% compared with April 2004, reaching $614 billion per day in April 2007.

The US dollar continued to be the dominant currency in the UK foreign exchange market, with 89% of all trades having one side denominated in US dollars in 2007 (**Table A**). The euro remained unchanged at 42%, while the proportion of turnover involving sterling fell from 28% to 22%. The market share of 'other currencies' increased to 19%, which may partly be due to growth in 'carry trades'.(2) The survey does not distinguish these trades, but there was an increase in trading in Australian and New Zealand dollars, two currencies commonly used as the investment currency in a carry trade. There was also increased trading in other 'smaller' currencies. The Polish zloty was separately identified in the UK survey for the first time in 2007, recording daily turnover of $15 billion during April. This equalled the turnover of the Hong Kong dollar and South African rand and was almost three times the turnover in the Singapore dollar. These currencies are included within 'other currencies' in **Table A**.

(1) Turnover between survey participants, both in the United Kingdom and overseas, is classified as turnover with reporting dealers. Turnover with all other market participants, who do not complete the survey, is classified as turnover with non-reporting customers.
(2) A foreign exchange carry trade occurs when an investor borrows in the currency of a country with low interest rates (for example, the yen or Swiss franc) and invests in the currency of a country with higher interest rates (for example, sterling or the Australian dollar). For more details see the box 'Carry trades in the foreign exchange market', *Bank of England Quarterly Bulletin*, Winter 2003, page 401.

Chart 5 Average daily foreign exchange turnover in the United Kingdom — by counterparty

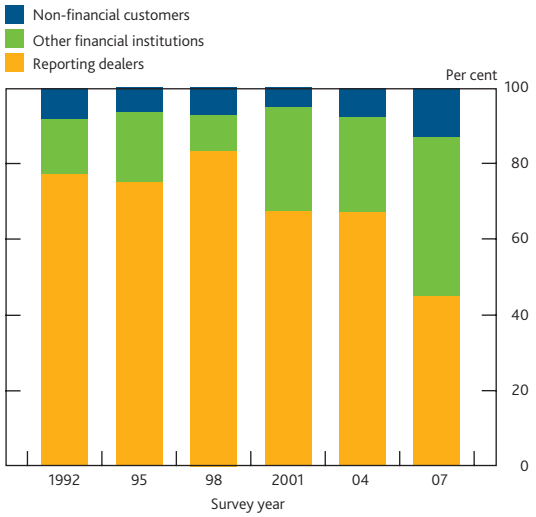


Chart 6 Average daily foreign exchange turnover in the United Kingdom — by nationality of reporting institution

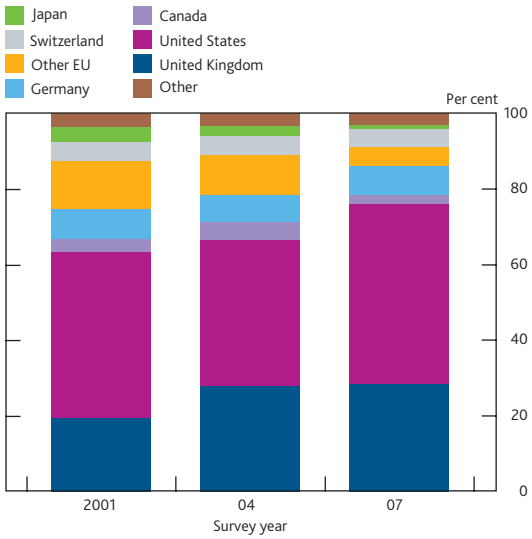


Table A Foreign exchange turnover — currency breakdown

Per cent[a]

	2001	2004	2007
US dollar	92	90	89
Euro	41	42	42
Pound sterling	24	28	22
Japanese yen	17	15	14
Swiss franc	6	6	6
Canadian dollar	4	3	3
Australian dollar	3	4	5
Other currencies	13	12	19

(a) Because two currencies are involved in each transaction, the sum of the percentage shares of individual currencies totals 200% instead of 100%.

Euro/US dollar remained the most traded currency pair, accounting for 33% of total foreign exchange turnover, unchanged from April 2004. The level of trading in sterling/US dollar decreased as a proportion of total turnover, accounting for 18% of the total, in contrast to the increase seen in previous surveys.

The UK foreign exchange market remained dominated by US-owned institutions, with a 48% share of turnover, up from 39% in April 2004 (**Chart 6**). Turnover attributable to UK-owned institutions accounted for 28% in 2007, unchanged from 2004. Non-UK EU institutions' share fell by 5 percentage points to 13%, largely driven by a fall in the share of French-owned institutions.

The UK foreign exchange market is an open and contestable market. Concentration among financial firms increased in 2007 compared with 2004. The combined market share of the ten institutions with the highest level of total turnover (ie across all three instruments) increased from 61% to 70%, and the share of the top 20 from 80% to 90%. **Table B** shows how concentration varied by instrument. Only two institutions appear in the top five for all three instruments, but seven institutions are in the top ten for all three instruments. The forwards market was the most concentrated, possibly reflecting its smaller size. However, the UK foreign exchange market remained less concentrated than the OTC derivatives market, which is discussed below.

Table B Foreign exchange turnover — market concentration (April 2007)

Per cent

	Spot	Forwards	FX swaps
Top five institutions	45	50	45
Top ten institutions	69	75	72
Top twenty institutions	90	94	92

OTC derivatives turnover in the United Kingdom

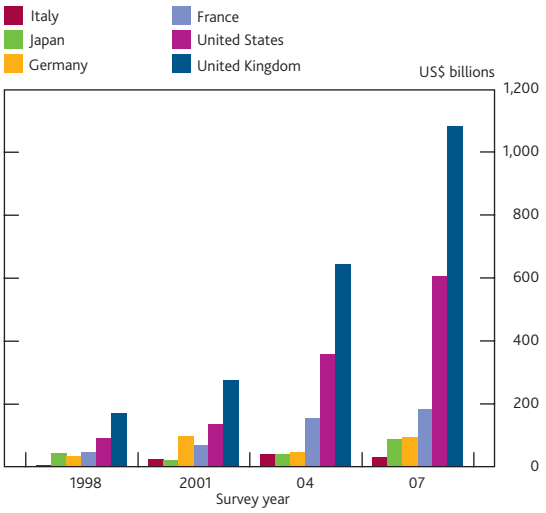
Average daily turnover for OTC currency — consisting of currency swaps and currency options — and interest rate derivatives — consisting of interest rate forward rate agreements (FRAs), swaps and options — in the United Kingdom was $1,081 billion in April 2007, a 68% increase on 2004.(1) Within this, turnover in OTC interest rate derivatives increased from $563 billion to $957 billion per day, while turnover in the OTC currency derivatives rose from $80 billion to $124 billion per day.

Most financial centres reported increased turnover in OTC currency and interest rate derivatives in 2007, as shown in **Chart 7**. The United Kingdom remained the main centre for this business, maintaining its 42.5% share of the global market. Once again, the next largest centre was the United States with 23.8%, followed by France with 7.2%. Cross-border trades comprised around three quarters of the

(1) For a more detailed definition of these instruments see the box on pages 556–57.

United Kingdom's OTC currency and interest rate derivatives turnover, up from two thirds in 2004.

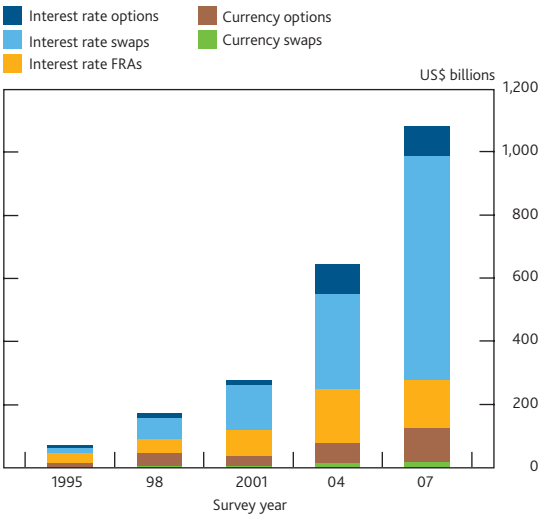
Chart 7 Average daily OTC derivatives turnover — United Kingdom and other centres



Source: BIS.

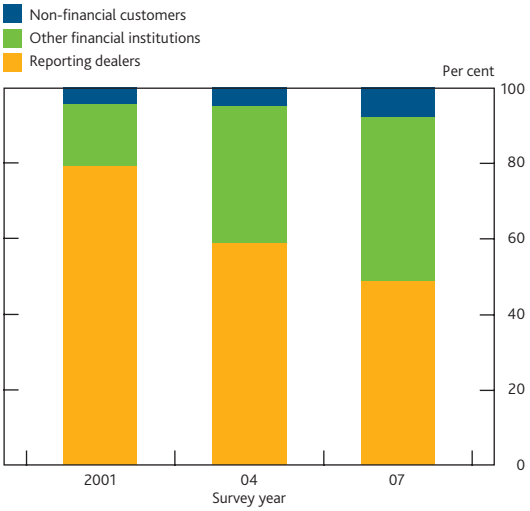
Chart 8 shows OTC derivatives turnover by instrument type and shows that turnover in interest rate swaps had by far the largest increase between 2004 and 2007, up 137%. Interest rate swaps accounted for 66% of the turnover in the OTC derivatives market in April 2007, compared with 47% in 2004. Turnover in currency options also increased significantly, up 66% from $64 billion to $106 billion.

Chart 8 Average daily OTC derivatives turnover in the United Kingdom — by instrument type



As in the foreign exchange market, the proportion of customer business (ie with 'other financial institutions' and 'non-financial customers') increased in 2007, up 10% on 2004, to a 51% share of the market (**Chart 9**). This was driven by a 7% increase in the proportion of business with 'other financial institutions', which accounted for 43% of total turnover. The increase in customer business is likely to be partly due to the continued growth of hedge funds and their involvement in the OTC derivatives markets.

Chart 9 Average daily OTC derivatives turnover in the United Kingdom — by counterparty



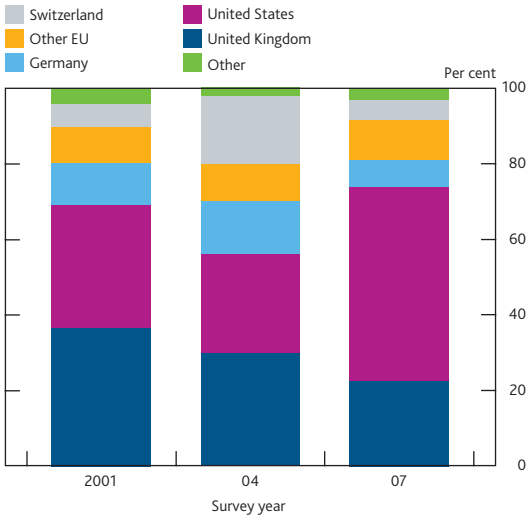
The US dollar remained the most traded currency in the OTC currency derivatives market, with 75% of turnover in 2007, compared to 78% in 2004. The proportion of turnover involving the euro fell to 41%, from 49% in April 2004.

The euro nevertheless remained the dominant currency in the OTC interest rate derivatives market, accounting for 51% of total turnover, down from 58% in 2004. The currency concentration was far higher in the OTC interest rate derivatives market than in currency derivatives. However, turnover in currencies other than the top four — US dollar, euro, sterling and yen — increased from 5% of total turnover in 2004 to 10% in April 2007.

As with the foreign exchange markets, US-owned institutions had a dominant share of the OTC derivatives market in the United Kingdom, accounting for just over half of the total turnover (**Chart 10**). UK-owned institutions' share fell again in 2007, down to 23% of turnover compared with a 30% share in 2004. The share of Swiss-owned institutions fell to 5% in April 2007 from 18% in 2004, while that of German-owned institutions fell from 14% to 7%. This reflects, in part, some non-UK EU institutions having transferred their operations out of London since 2004.

Concentration in the UK OTC derivatives market in April 2007 was similar to that in April 2004 and remained above that in the foreign exchange market. The top ten institutions with the highest total derivatives trading volumes (ie across all five instruments) accounted for 81% of total turnover, compared to 80% in 2004. The top 20 institutions accounted for 96% of total turnover, compared to 94% in 2004. **Table C** shows how

Chart 10 Average daily OTC derivatives turnover in the United Kingdom — by nationality of reporting institution



this concentration varied by instruments. While one institution was ranked within the top five for all the OTC interest rate derivative instruments, no institution was within the top five of all OTC currency and interest rate derivatives.

Table C OTC currency and interest rate derivative turnover — market concentration (April 2007)

Per cent

	Currency swaps	Currency options	Interest rate FRAs	Interest rate swaps	Interest rate options
Top five institutions	60	51	54	64	78
Top ten institutions	84	82	78	85	95
Top twenty institutions	98	99	97	97	100

Summary

There was strong growth in turnover in the UK foreign exchange market, increasing by 80% between April 2004 and April 2007. This led to an increase in the United Kingdom's share of the global market to 34%: double the next closest, the United States, with 17%. The increase was predominately driven by business with customers and was focused in foreign exchange swaps. There was also strong growth in OTC derivatives turnover, increasing by 68% between April 2004 and April 2007. The United Kingdom's global market share remained unchanged at 43%. Again, the increase in turnover was driven by customer business, predominately in interest rate swaps.

II Main developments in the foreign exchange market

As the UK survey shows, the average daily turnover in the UK foreign exchange market has increased markedly. Foreign exchange is one of the largest financial markets in London by turnover and in turn, London is currently the largest centre of foreign exchange activity worldwide. The Bank's many contacts with foreign exchange market participants afford it an insight into the underlying factors affecting the foreign exchange market.

Market contacts have noted three key drivers behind the strong turnover growth: the proliferation of electronic trading, the increasing number of new market participants, and the greater use of foreign exchange as a distinct asset class. This section discusses these three factors in more detail.

Electronic trading

The foreign exchange market landscape has changed notably over the past three years, largely due to the introduction and development of new trading technologies. Market contacts suggest that a growing share of total foreign exchange trading is now being executed electronically. To better document this trend, the BIS began to collect data in 2007 on the execution methods of foreign exchange transactions, as part of the triennial survey. In April 2007, around 30% of total UK foreign exchange turnover was executed through electronic broking and electronic trading systems.(1)

However, the overall figure for electronic trading may be higher as some of the interbank and customer direct trading(2) reported by the UK survey respondents is also likely to be executed electronically.

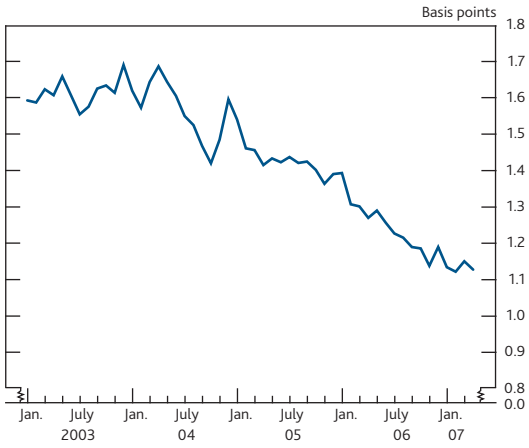
Electronic trading has allowed 'traditional' foreign exchange market participants to adopt new trading strategies, streamlining their existing processes, lowering their costs and increasing their efficiency. Moreover, by allowing a growing number of new market participants to access the market directly, these developments have led to increased market liquidity, price transparency and narrower bid-offer spreads (**Chart 11**).

The reduction in trade execution times, together with increased market liquidity and more powerful computational engines, compared with previous survey periods, have also made possible the use of automated high-volume strategies (often referred to generically as algorithmic trading) by some of the larger market participants and hedge funds.

Moreover, the introduction of Continuous Linked Settlement (CLS) in 2002, has significantly reduced foreign exchange settlement risk(3) and hence, according to market contacts, supported the increase in total foreign exchange turnover.

(1) Electronic broking systems are defined as automated order matching systems for foreign exchange dealers. Electronic trading systems include single-bank proprietary platforms and multi-bank dealing systems.
(2) These are trades executed either between two BIS survey reporting dealers ('interbank') or between a reporting dealer and a customer or non-reporting dealer ('customer') using direct telephone communication or direct electronic dealing systems such as Reuters Conversational Dealing.
(3) The risk that one party to a transaction will pay the currency it sold but not receive the currency it bought. CLS eliminates foreign exchange settlement risk using a 'payment versus payment' (PvP) system, whereby both sides' payments for a foreign exchange transaction are settled simultaneously.

Chart 11 Bid-offer spread proxy for major foreign exchange currency pairs[a]



Source: Lehman Brothers.

(a) Spreads are weighted averages across several active foreign exchange currency pairs during core London trading hours in the interdealer market. The weights used are in approximate proportion to the volume traded — they are intended only to be reasonable proxies for typical market spreads.

A brief history of electronic trading

Electronic trading platforms began to emerge in the late 1980s and by the early 1990s dealing systems developed by EBS and Reuters had become established for the interbank market. EBS and Reuters both offered 'matching' systems in which participants were able to put in bids and offers that others could choose to trade at. The market for end-users remained mainly telephone based.

However, advances in technology, and especially the increasing capabilities of the internet, led to the appearance of web-based electronic platforms that were easily accessible by a broader range of market participants.

First, large banks, which already had access to the electronic interbank foreign exchange markets, began to build proprietary trading platforms which allowed their customers to trade electronically with them. Prices were usually based on those on interbank systems. These platforms made transaction processing more efficient and cost effective, and reduced the risk of human error. Straight-through processing (STP) from trading through to settlement was facilitated by going electronic, as was the ability to interface easily with other systems, such as those for real-time risk management. Some banks also sold the technology underlying their proprietary platforms to other market participants that were unable or unwilling to make the necessary technical investment (a process known as 'white labelling').[1] Typically, the supplier bank would also offer pricing in at least some of the currency pairs through these platforms.

In addition to these proprietary platforms, bank consortia and other independent technology suppliers developed multi-bank platforms, where prices are offered by a number of different providers. These platforms were further diversified depending on their features; tailored to specific client groups (such as corporates), providing anonymous trading, or end-to-end user matching for example.

More recently, price aggregator platforms have also emerged; these systems aggregate multiple sources of liquidity into a single access point allowing traders to see prices simultaneously from a number of different trading platforms. Price aggregators tend to be used by market professionals, including some banks. There has been much debate that the foreign exchange market will one day migrate to a true exchange model (with a central counterparty) and some of the most recently established platforms are pursuing such a strategy.

Main challenges for the foreign exchange market arising from electronic trading

One of the main operational issues preoccupying foreign exchange market participants in recent years has been the 'latency' of the trade cycle: the time it takes to deliver an executable price to a client plus the time it takes for the trade record to return to the price maker. Latency increases in importance when the time horizon for trading shortens, because of its impact on the certainty of filling a trade and the possibility of so-called price slippage. For price-takers, any time delay will expose them to market risk until confirmation that the order has been completed. For price-makers, delays can leave their offered prices in the market at a time when the market is moving. The length of latency periods typically depends on the physical architecture of the trading venue and the links market participants have to it. For a time, latency arbitrageurs (usually small funds) used high-frequency models to exploit time inefficiencies between prices offered by as many providers as they could access. It was reported that some would even locate servers in close physical proximity to a foreign exchange trading platform's data centre to minimise latency.

Another issue with electronic trading has been the 'liquidity mirage': the distribution of an interbank offer price for a specific size trade to multiple trading platforms, making it appear that liquidity is greater than it really is and possibly resulting in mispricing. Once a single price offer is taken (or 'hit') it may disappear simultaneously from many systems. If not, then the bank making the price could be 'hit' on several platforms and find itself committed to a larger-than-expected market risk. One solution trading platforms have adopted to combat this problem is no longer to rely exclusively on external price feeds, but to factor in the bank's current position and market view to create a more robust 'house price'.

Perhaps the most live area of development currently in foreign exchange markets is how market participants manage their trading positions arising from electronic trading. In managing

(1) See *Bank of England Quarterly Bulletin*, Summer 2003, page 237, for a more detailed discussion.

very high frequency risk effectively, some banks now employ sophisticated hedging tools to offset risk automatically and to adjust prices with almost no manual intervention. This ability to manage incoming trade flow ensures that the price-maker can continue to offer robust pricing consistently, including through volatile periods.

The direct impact of the recent financial market turbulence provided an opportunity for market participants to examine the resilience of their systems. Overall the market sentiment has been that the foreign exchange market infrastructure, from trading to settlement, met the test satisfactorily, especially during certain high-volume days in August. The biggest impact was on the foreign exchange swap market, where market-making was restricted because of liquidity and pricing problems in the underlying money markets.(1) Looking forward, the knowledge gained regarding the infrastructure's performance under stress and capacity constraints will inform future system enhancements and stress-testing scenarios.

New market participants

Looking more closely at the trading counterparties involved in foreign exchange transactions, there has been a marked growth in the involvement of 'other financial institutions', a category that includes institutions such as hedge funds and pension funds, and 'non-financial customers', such as corporates and governments (**Chart 5**).

Electronic trading has improved access to the foreign exchange market for new participants, who were either unwilling or unable to do so before. Lower costs, increased speed and price transparency have all been significant factors in attracting a wide range of new participants, from hedge funds to retail investors, to the foreign exchange market.

Market contacts suggest that both hedge funds and commodity trading advisors (CTAs)(2) have significantly increased their foreign exchange trading flows in recent years, benefiting from electronic trading and prime brokerage services(3) offered by a number of banks. Indeed, over the past few years an increased number of large hedge fund management and private equity firms have been established in the United Kingdom, with twelve of the world's largest 50 hedge funds currently located in London, as against only three in 2002.(4) Hedge funds typically employ large-volume foreign exchange trading strategies, and may therefore account for a sizable share of the growth in UK foreign exchange turnover.

In a global context, retail currency trading(5) has also risen significantly; a report by Greenwich Associates found that total global retail currency trading rose by 54% in 2006 (and by 80% in Europe specifically).(6) Indeed, according to some market estimates, the average daily retail foreign exchange volume globally is around $50 billion. Again, electronic trading technology, with low barriers to entry and narrow bid/ask spreads, has been a key catalyst to broadening the appeal of foreign exchange to end-users. A range of electronic platforms now allow retail investors to invest in foreign exchange in a variety of ways; from margin trading(7) to more exotic structured products that recreate any desired pay-off profile.

Perhaps the most notable expansion in retail trading has been in Japan. Japanese retail investors engaging in foreign exchange-related trading have been cited by a number of market commentators as a key influence on yen spot prices over the past two years. According to one estimate, online retail traders in Japan account for around $15 billion of deals(8) each day.

Possible challenges from new participants

The foreign exchange market landscape has changed significantly over the past few years. Electronic trading has reduced barriers to entry, narrowed spreads and eroded margins. Today a wide range of different market participants can access the foreign exchange market at prices close to traditional foreign exchange traders and on multiple trading platforms. As a consequence, traditional buy and sell-side participant definitions have been blurred and trading volumes have increased rapidly. Infrastructure capacity and banks' ability to monitor and analyse their clients' positions have had to be expanded, and this trend looks set to continue.

Another area of interest among market commentators has been how the new entrants would react in the event of turbulence in the foreign exchange market. A possible concern may be that, having joined the market during a period of exceptionally low levels of volatility, non-financial investors might not have fully taken into account potential market risks. If, in a time of stress, they seek or are forced through margin requirements to unwind their positions quickly, this might have a disruptive effect on markets. Market contacts have suggested that this may have contributed to the sharp movement in the dollar/yen bilateral rate on 16 August, for example, which moved by around 2% in just a few minutes.

Foreign exchange as an asset class

During the past few years market contacts have reported a shift in the way many market participants perceive foreign exchange. Traditionally, foreign exchange tended to be seen

(1) See *Bank of England Quarterly Bulletin*, 2007 Q3, page 349, for a more detailed discussion.
(2) A CTA is an individual or firm which advises others about buying and selling futures and/or options on futures, and manages associated trades for its clients or on its own behalf.
(3) Foreign exchange prime brokerage allows a client to source liquidity from a variety of dealers by utilising a credit relationship, placing collateral, and settling with a single entity — the prime broker.
(4) See Gieve (2007).
(5) Retail foreign exchange in general refers to currency trading not done by large corporations, investment banks/asset managers/fund companies, or large retail banks.
(6) 'Electronic trading systems capture one half of global FX volume', Greenwich Associates (2007).
(7) Margin trading allows an investor to take a position (long/short) on a currency by depositing a portion of the purchase price.
(8) See *The Times* (2007).

Definitional issues

Participants

In April 2007, 62 institutions, mainly commercial and investment banks, participated in the UK part of the global survey. This was fewer than in previous surveys (for example, there were 93 participants in 2004), as only firms that participate in the interdealer market and/or have an active business with large customers were asked to complete the 2007 survey. The 62 reporting institutions for the 2007 survey accounted for 99% of turnover in the 2004 survey. Others active in the UK market were not directly involved in the survey, but their transactions with participating principals will have been recorded by those institutions.

The questionnaire

Survey participants completed a questionnaire prepared by the Bank of England, based on a standard format agreed with other central banks and produced by the Bank for International Settlements (BIS). Participants were asked to provide details of their gross turnover for the 19 business days in April 2007. Gross turnover (measured in nominal values) was defined as the absolute total value of all deals contracted; there was no netting of purchases against sales. Data were requested in terms of US dollar equivalents, rounded to the nearest million. The basis of reporting was the location of the sales desk of the trade, as in the 2004 survey. The questionnaire asked for turnover to be broken down by currency, instrument and type of counterparty.

The survey distinguished the following types of transaction:

Foreign exchange

- *Spot transaction*: Single outright transaction involving the exchange of two currencies at a rate agreed on the date of the contract for value or delivery (cash settlement) within two business days. The spot legs of swaps and swaps that were for settlement within two days (ie 'tomorrow/next day' swap transactions) were excluded from this category.

- *Outright forward*: Transaction involving the exchange of two currencies at a rate agreed on the date of the contract for value or delivery (cash settlement) at some time in the future (more than two business days later). Also included in this category were forward foreign exchange agreement transactions (FXA), non-deliverable forwards, and other forward contracts for differences.

- *Foreign exchange swap*: Transaction which involves the actual exchange of two currencies (principal amount only) on a specific date at a rate agreed at the time of the conclusion of the contract (the short leg), and a reverse exchange of the same two currencies at a date further in the future at a rate (generally different from the rate applied to the short leg) agreed at the time the contract is agreed (the long leg). Short-term swaps carried out as 'tomorrow/next day' transactions are included in this category.

OTC currency derivatives

- *Currency swap*: Contract which commits two counterparties to exchange streams of interest payments in different currencies for an agreed period of time and to exchange principal amounts in different currencies at a pre-agreed exchange rate at maturity.

- *Currency option*: Option contract that gives the right to buy or sell a currency with another currency at a specified exchange rate during a specified period. This category also includes currency swaptions, currency warrants and exotic foreign exchange options such as average rate options and barrier options.

Single-currency OTC interest rate derivatives

- *Forward rate agreement (FRA)*: Interest rate forward contract in which the rate to be paid or received on a specific obligation for a set period of time, beginning at some time in the future, is determined at contract initiation.

- *Interest rate swap*: Agreement to exchange periodic payments related to interest rates on a single currency. Can be fixed for floating, or floating for floating based on different indices. This category includes those swaps whose notional principal is amortised according to a fixed schedule independent of interest rates.

- *Interest rate option*: Option contract that gives the right to pay or receive a specific interest rate on a predetermined principal for a set period of time. Included in this category are interest rate caps, floors, collars, corridors, swaptions and warrants.

Reporting institutions were asked to distinguish between transactions with:

- *Reporting dealers*: Financial institutions that are participating in the globally co-ordinated survey. These firms actively participate in local and global foreign exchange and derivatives markets.

- *Other financial institutions*: Financial institutions that are not classified as reporting dealers. Thus, it will mainly cover smaller commercial banks, investment banks and securities houses, and in addition 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.

- *Non-financial customers*: Covers any counterparty other than those described above, ie mainly non-financial end-users, such as corporates and governments.

In each case reporting institutions were asked to separate local and cross-border transactions (determined according to the location, rather than the nationality of the counterparty) to permit adjustment for double counting.

Market conditions

Participants were asked whether they regarded the level of turnover in April 2007 as normal. The responses are summarised in **Table 1**, and suggest that the survey results can be regarded as representative.

The aggregate responses (adjusted for double counting) for the main sections of the questionnaire are shown in **Tables D**, **E** and **F** (at the end of this article). The BIS intends to publish an analysis of the global survey results in December 2007. A survey of global outstanding positions in the derivative markets (measured at the end of June 2007) has been undertaken and global results for this survey were released by the BIS on 21 November 2007.

Table 1 Survey participants' estimates of foreign exchange turnover levels

In April 2007

	Number of banks	Percentage of turnover
Below normal	16	14
Normal	40	60
Above normal	6	26

In preceding six months

	Number of banks	Percentage of turnover
Decreasing	7	1
Steady	31	29
Increasing	24	70

more as a residual consideration for traders managing portfolios of other instruments such as equities or bonds. However, with nominal returns under pressure in these more traditional asset classes, investors have searched for alternatives. Attention turned towards hedge funds, structured credit, commodities, property and foreign exchange among others, as possible vehicles to generate extra returns and diversification. Market contacts suggest that institutional clients, such as pension funds, have begun to invest more in foreign exchange products as part of their portfolios, attracted by the deep market liquidity and increased transparency.

Central banks and other official reserve managers also appear to have become more active in foreign exchange markets recently. A number of factors have probably been influential. First, many developed and developing country reserve managers seem to have adjusted the currency composition of their assets in order to benefit from a more diversified portfolio. Over the past couple of years for example, a number of central banks have publicly announced changes to the currency exposure in their reserves.

Second, reserve managers may have started to manage their assets more actively in search of higher yields. Holdings of sterling assets for example have increased significantly, as a percentage of total reserves, according to the IMF's COFER survey: from 2.38% of total reserves in 2004 Q4 to 2.98% in 2007 Q2.(1) With total world foreign exchange reserves exceeding $5.7 trillion, the impact that reserves management can have on total foreign exchange turnover can be considerable.

Perhaps the most prominent foreign exchange trading strategy over the past few years has been the 'carry trade' (see footnote 2 on page 550). In theory, market arbitrage should ensure that carry trades are not profitable — high interest rate currencies should be expected to depreciate so that the potential gain from interest rate differentials (the basis of the carry trade) is exactly offset by a fall in the relative value of the high interest currency. However, the low levels of implied and realised foreign exchange volatility during 2006 and early 2007 made these type of strategies particularly popular with investors with a sufficiently short-term investment horizon, in search of higher returns.

Since the reason behind particular foreign exchange trades is not recorded, there is no single recognised measure of carry-trade activity. Market estimates for the size of carry-trade activity range from around $34 billion to $1 trillion but there is little certainty behind these figures. What is clear, however, is that the impact of these types of trading strategies on total foreign exchange turnover has been significant at particular moments in time.

Conclusion

UK foreign exchange turnover increased markedly over the past three years; the average daily turnover rose by 80% from $753 billion in April 2004 to $1,359 billion in April 2007. Compared with other contributors to the global BIS triennial survey, the United Kingdom reported the biggest increase in turnover and consolidated its position as the largest centre of foreign exchange activity, accounting for 34% of the global market in 2007. Indeed the UK foreign exchange landscape has changed significantly over the past three years. The proliferation of electronic trading, the increasing number of new market participants and the greater use of foreign exchange as a separate asset class have all contributed to the strong growth in market turnover. Foreign exchange markets continue to develop and evolve, extending the boundaries and posing new challenges to market participants.

(1) *Currency Composition of Official Foreign Exchange Reserves*, IMF (2007).

Table D Average daily net-gross foreign exchange turnover (April 2007)[a]

US$ millions (rounded to the nearest million)

	US dollar against:							Sterling against:							
	Euro	¥	SwFr	Can$	Aus$	Skr	Other	US$	Euro	¥	SwFr	Can$	Aus$	Skr	Other
Spot															
Reporting dealers	**45,260**	**20,208**	**7,253**	**4,921**	**5,931**	**626**	**11,264**	**24,878**	**8,533**	**2,000**	**371**	**105**	**81**	**68**	**268**
Local	11,461	5,025	1,633	1,188	1,459	50	2,736	7,634	2,797	475	127	22	27	30	70
Cross-border	33,799	15,183	5,620	3,733	4,472	576	8,528	17,243	5,736	1,525	243	83	54	37	197
Other financial institutions	**40,069**	**16,835**	**5,383**	**5,243**	**4,203**	**2,933**	**10,839**	**18,570**	**5,761**	**2,313**	**571**	**125**	**153**	**99**	**396**
Local	10,305	4,462	1,482	1,972	1,140	82	2,548	5,606	2,050	451	218	49	76	75	247
Cross-border	29,764	12,373	3,901	3,271	3,063	2,851	8,291	12,964	3,711	1,861	353	76	77	25	149
Non-financial institutions	**12,642**	**4,773**	**1,472**	**1,352**	**1,275**	**250**	**4,285**	**7,606**	**1,788**	**787**	**168**	**56**	**58**	**41**	**121**
Local	3,251	1,280	413	367	364	79	1,480	2,719	725	117	74	34	34	27	76
Cross-border	9,391	3,493	1,058	985	911	171	2,805	4,888	1,063	670	94	22	24	14	45
Subtotal	**97,971**	**41,816**	**14,108**	**11,516**	**11,409**	**3,809**	**26,388**	**51,054**	**16,082**	**5,099**	**1,110**	**286**	**292**	**208**	**785**
Outright forward															
Reporting dealers	**11,896**	**3,361**	**1,509**	**840**	**928**	**522**	**7,879**	**4,740**	**1,303**	**285**	**133**	**15**	**158**	**8**	**48**
Local	2,014	689	176	150	210	59	1,861	1,547	346	85	51	8	21	4	23
Cross-border	9,882	2,672	1,333	690	718	463	6,018	3,194	957	200	83	7	137	4	24
Other financial institutions	**19,184**	**5,432**	**2,225**	**1,330**	**1,500**	**644**	**10,114**	**7,400**	**3,294**	**924**	**545**	**83**	**291**	**151**	**267**
Local	7,597	1,148	514	410	498	125	2,419	2,605	1,740	425	259	54	163	118	211
Cross-border	11,587	4,284	1,711	920	1,002	519	7,696	4,795	1,554	499	286	29	127	33	56
Non-financial institutions	**8,251**	**2,277**	**792**	**882**	**534**	**389**	**4,072**	**3,784**	**1,467**	**292**	**98**	**48**	**60**	**58**	**104**
Local	2,228	519	187	170	88	77	1,459	1,582	856	193	67	44	44	40	91
Cross-border	6,022	1,759	605	712	446	312	2,613	2,202	611	99	31	4	16	18	13
Subtotal	**39,330**	**11,070**	**4,525**	**3,052**	**2,962**	**1,555**	**22,066**	**15,924**	**6,065**	**1,501**	**776**	**146**	**508**	**217**	**418**
Foreign exchange swaps															
Reporting dealers	**131,201**	**53,674**	**18,929**	**12,460**	**23,452**	**12,164**	**67,442**	**85,091**	**4,358**	**801**	**248**	**237**	**289**	**95**	**781**
Local	36,550	8,168	3,134	2,266	4,884	2,226	15,078	40,901	1,095	345	83	157	42	14	112
Cross-border	94,651	45,506	15,796	10,195	18,568	9,938	52,364	44,190	3,262	456	165	80	247	81	669
Other financial institutions	**134,434**	**39,975**	**12,162**	**7,348**	**15,995**	**8,270**	**58,797**	**72,151**	**7,949**	**675**	**208**	**106**	**175**	**214**	**500**
Local	57,505	7,781	5,392	1,921	6,557	2,319	26,550	39,358	3,577	431	108	81	97	89	380
Cross-border	76,929	32,193	6,771	5,427	9,438	5,952	32,246	32,793	4,372	244	101	26	77	126	120
Non-financial institutions	**40,667**	**7,037**	**5,253**	**1,758**	**2,065**	**5,347**	**15,393**	**16,080**	**4,934**	**704**	**223**	**286**	**114**	**182**	**418**
Local	8,361	1,993	1,475	578	812	501	3,193	7,718	2,436	265	185	211	83	63	258
Cross-border	32,305	5,044	3,778	1,180	1,253	4,847	12,200	8,362	2,498	438	38	75	31	120	159
Subtotal	**306,301**	**100,686**	**36,345**	**21,565**	**41,512**	**25,781**	**141,631**	**173,323**	**17,241**	**2,179**	**680**	**629**	**577**	**492**	**1,699**
Total foreign exchange turnover	**443,602**	**153,572**	**54,978**	**36,134**	**55,883**	**31,146**	**190,086**	**240,301**	**39,388**	**8,780**	**2,566**	**1,062**	**1,378**	**916**	**2,902**
Maturity of forwards; per cent[b]															
Seven days or less	79	84	83	82	79	80	81	79	53	61	49	68	49	41	71%
Over seven days	21	15	16	17	20	20	17	20	44	38	51	29	50	58	25%
Over one year	0	1	0	1	0	1	2	1	3	1	0	2	0	1	4%

(a) Adjusted for local double counting.
(b) Gross maturities data cannot be adjusted accurately for local double counting. Figures in this table are unadjusted, given as a percentage of gross outright forward and foreign exchange swap turnover.

			Euro against:				
¥	SwFr	Can$	Aus$	Skr	Other	Residual	Total, all currencies
7,389	**6,401**	**227**	**226**	**2,599**	**5,771**	**3,720**	**158,098**
1,805	1,873	21	34	595	1,324	837	41,224
5,583	4,528	205	192	2,005	4,447	2,882	116,874
5,654	**6,766**	**368**	**291**	**1,669**	**3,812**	**2,601**	**134,654**
1,123	1,787	120	46	304	942	643	35,728
4,531	4,979	248	245	1,364	2,870	1,958	98,926
1,475	**1,895**	**85**	**125**	**532**	**1,132**	**770**	**42,688**
414	761	18	30	204	392	159	13,019
1,061	1,134	67	95	328	739	611	29,669
14,518	**15,062**	**680**	**641**	**4,799**	**10,714**	**7,091**	**335,440**
712	**746**	**40**	**78**	**235**	**882**	**669**	**36,988**
167	167	10	27	61	205	145	8,024
545	579	30	51	175	678	524	28,964
2,230	**1,291**	**373**	**428**	**794**	**1,691**	**1,401**	**61,592**
274	279	151	145	214	392	488	20,229
1,956	1,012	222	283	580	1,299	914	41,362
333	**516**	**65**	**159**	**352**	**754**	**337**	**25,623**
137	145	15	41	101	248	104	8,437
195	371	50	118	251	506	233	17,186
3,275	**2,553**	**477**	**664**	**1,382**	**3,328**	**2,408**	**124,203**
1,525	**857**	**446**	**377**	**121**	**2,337**	**2,521**	**419,406**
212	183	220	92	12	883	659	117,314
1,313	674	225	286	109	1,454	1,862	302,091
3,245	**5,546**	**1,124**	**410**	**835**	**3,511**	**1,122**	**374,752**
396	2,057	48	101	114	359	307	155,527
2,849	3,489	1,076	309	721	3,152	815	219,225
932	**927**	**299**	**237**	**559**	**1,270**	**618**	**105,303**
301	211	77	64	136	395	76	29,394
631	717	221	173	423	875	542	75,909
5,702	**7,330**	**1,868**	**1,024**	**1,515**	**7,118**	**4,261**	**899,460**
23,494	**24,945**	**3,025**	**2,330**	**7,696**	**21,160**	**13,760**	**1,359,103**
43	63	53	40	46	49	65	78
56	35	45	58	51	48	33	21
2	2	2	2	2	3	1	1

Table E Average daily net-gross OTC currency derivatives turnover (April 2007)[a]

US$ millions (rounded to the nearest million)

	US dollar against:							Sterling against:							
	Euro	¥	SwFr	Can$	Aus$	Skr	Other	US$	Euro	¥	SwFr	Can$	Aus$	Skr	Other
Currency swaps															
Reporting dealers	**2,072**	**758**	**795**	**622**	**173**	**162**	**1,254**	**2,373**	**501**	**27**	**2**	**0**	**0**	**0**	**21**
Local	715	108	97	0	37	20	312	244	169	0	2	0	0	0	0
Cross-border	1,357	650	698	622	137	142	943	2,129	332	27	0	0	0	0	21
Other financial institutions	**2,515**	**1,034**	**110**	**40**	**78**	**105**	**992**	**579**	**426**	**0**	**1**	**0**	**0**	**0**	**11**
Local	362	49	22	0	2	16	300	202	172	0	0	0	0	0	6
Cross-border	2,154	985	87	40	76	89	692	377	254	0	1	0	0	0	5
Non-financial institutions	**644**	**195**	**60**	**71**	**106**	**0**	**428**	**569**	**115**	**3**	**0**	**0**	**0**	**29**	**3**
Local	28	2	0	0	0	0	5	281	99	3	0	0	0	0	0
Cross-border	616	193	60	71	106	0	422	288	16	0	0	0	0	29	3
Subtotal	**5,231**	**1,987**	**964**	**734**	**357**	**267**	**2,674**	**3,521**	**1,042**	**29**	**3**	**0**	**0**	**29**	**35**
OTC options sold															
Reporting dealers	**4,465**	**3,567**	**405**	**473**	**820**	**16**	**1,768**	**2,139**	**467**	**324**	**168**	**8**	**22**	**1**	**30**
Local	1,278	1,197	147	116	258	3	733	747	120	71	45	0	12	1	12
Cross-border	3,187	2,370	259	356	561	13	1,035	1,392	346	253	123	8	9	0	18
Other financial institutions	**4,859**	**4,801**	**491**	**646**	**503**	**23**	**4,608**	**1,607**	**550**	**692**	**168**	**41**	**17**	**6**	**27**
Local	1,272	1,263	118	95	147	4	754	453	157	472	88	1	5	0	21
Cross-border	3,587	3,538	373	551	356	19	3,853	1,155	393	219	80	40	12	6	6
Non-financial institutions	**2,612**	**1,548**	**299**	**290**	**402**	**32**	**1,931**	**1,007**	**196**	**142**	**131**	**25**	**6**	**7**	**50**
Local	809	931	140	109	118	29	662	415	110	113	83	0	2	3	37
Cross-border	1,803	617	160	181	284	3	1,269	592	86	29	48	25	4	4	13
Subtotal	**11,935**	**9,915**	**1,195**	**1,409**	**1,725**	**72**	**8,307**	**4,753**	**1,212**	**1,157**	**467**	**73**	**45**	**14**	**107**
OTC options bought															
Reporting dealers	**4,510**	**3,829**	**540**	**492**	**900**	**16**	**2,269**	**2,370**	**485**	**590**	**188**	**14**	**12**	**22**	**49**
Local	1,239	1,304	117	144	281	9	851	743	119	100	45	1	11	8	17
Cross-border	3,271	2,526	422	348	619	7	1,419	1,627	366	490	143	12	1	15	32
Other financial institutions	**4,595**	**3,583**	**510**	**576**	**619**	**56**	**2,811**	**1,621**	**574**	**767**	**157**	**10**	**26**	**0**	**35**
Local	1,111	687	149	104	128	26	607	433	107	505	58	0	6	0	23
Cross-border	3,485	2,896	361	472	491	31	2,204	1,187	466	262	100	10	20	0	12
Non-financial institutions	**2,486**	**1,795**	**296**	**291**	**353**	**14**	**2,635**	**961**	**221**	**181**	**94**	**22**	**16**	**5**	**39**
Local	755	973	152	87	102	7	690	555	111	106	56	0	13	0	31
Cross-border	1,732	822	144	204	250	7	1,945	406	110	75	38	21	3	5	7
Subtotal	**11,591**	**9,208**	**1,345**	**1,359**	**1,872**	**87**	**7,715**	**4,952**	**1,280**	**1,537**	**440**	**46**	**55**	**28**	**123**
Total options	**23,527**	**19,123**	**2,541**	**2,768**	**3,596**	**158**	**16,022**	**9,705**	**2,492**	**2,695**	**906**	**119**	**100**	**42**	**230**
Total OTC currency derivatives	**28,758**	**21,110**	**3,505**	**3,502**	**3,953**	**425**	**18,696**	**13,226**	**3,534**	**2,724**	**909**	**119**	**100**	**72**	**265**

(a) Adjusted for local double counting.

			Euro against:				
¥	SwFr	Can$	Aus$	Skr	Other	Residual	Total, all currencies
102	**27**	**20**	**0**	**4**	**100**	**58**	**9,072**
39	1	0	0	0	13	38	1,794
64	26	20	0	4	87	19	7,277
202	**61**	**0**	**0**	**81**	**88**	**56**	**6,378**
67	1	0	0	2	4	0	1,204
135	60	0	0	80	84	56	5,174
8	**0**	**14**	**0**	**72**	**44**	**11**	**2,373**
0	0	0	0	0	0	0	418
8	0	14	0	72	44	11	1,955
312	**88**	**34**	**0**	**157**	**232**	**125**	**17,823**
1,093	**925**	**26**	**90**	**178**	**693**	**1,281**	**18,956**
295	309	8	25	58	257	229	5,922
798	616	18	65	120	436	1,051	13,034
1,341	**1,235**	**55**	**73**	**207**	**1,021**	**1,056**	**24,026**
607	214	38	25	33	385	271	6,423
734	1,022	17	47	173	636	785	17,603
1,752	**350**	**10**	**13**	**59**	**350**	**306**	**11,518**
201	203	0	7	17	164	146	4,299
1,552	147	10	6	42	186	160	7,219
4,186	**2,510**	**91**	**176**	**443**	**2,064**	**2,642**	**54,499**
1,098	**972**	**12**	**72**	**223**	**790**	**753**	**20,207**
340	332	1	30	79	219	251	6,242
758	640	12	42	144	571	502	13,965
1,073	**1,228**	**21**	**54**	**172**	**891**	**959**	**20,339**
204	221	0	16	18	169	205	4,777
868	1,008	21	38	153	722	754	15,563
585	**471**	**12**	**12**	**74**	**378**	**297**	**11,238**
256	288	5	7	20	135	186	4,537
329	184	7	5	54	242	110	6,702
2,756	**2,672**	**45**	**138**	**468**	**2,059**	**2,008**	**51,785**
6,941	**5,182**	**136**	**314**	**912**	**4,124**	**4,651**	**106,284**
7,254	**5,270**	**170**	**314**	**1,069**	**4,356**	**4,776**	**124,107**

Table F Average daily net-gross OTC interest rate derivatives turnover (April 2007)[a]

US$ millions (rounded to the nearest million)

	£	US$	€	¥	SwFr	Can$	Aus$	Dkr	HK$	Skr	Other	Total
FRAs												
Reporting dealers	**27,232**	**35,510**	**24,274**	**756**	**1,611**	**40**	**234**	**105**	**0**	**5,302**	**4,940**	**100,005**
Local	16,240	8,212	6,982	531	357	0	28	57	0	650	663	33,721
Cross-border	10,992	27,298	17,292	225	1,253	40	206	48	0	4,652	4,277	66,285
Other financial institutions	**9,694**	**6,292**	**12,827**	**273**	**351**	**140**	**195**	**155**	**1**	**3,789**	**2,749**	**36,466**
Local	3,371	1,440	4,541	13	66	0	48	57	0	566	428	10,531
Cross-border	6,323	4,852	8,286	260	285	140	147	98	1	3,223	2,320	25,936
Non-financial institutions	**7,035**	**1,267**	**3,156**	**45**	**24**	**0**	**201**	**0**	**0**	**4,128**	**2,166**	**18,023**
Local	720	58	51	0	0	0	0	0	0	0	3	832
Cross-border	6,316	1,209	3,105	45	24	0	201	0	0	4,128	2,163	17,192
Subtotal	**43,962**	**43,070**	**40,257**	**1,074**	**1,986**	**180**	**630**	**261**	**1**	**13,219**	**9,855**	**154,495**
Swaps												
Reporting dealers	**70,199**	**36,941**	**169,452**	**22,428**	**2,034**	**189**	**1,404**	**40**	**652**	**3,798**	**21,404**	**328,539**
Local	39,622	10,332	43,124	7,942	600	36	386	21	158	2,221	1,115	105,557
Cross-border	30,577	26,609	126,328	14,486	1,434	153	1,018	18	493	1,577	20,288	222,982
Other financial institutions	**44,050**	**29,988**	**215,053**	**35,990**	**1,913**	**212**	**772**	**73**	**601**	**7,311**	**11,530**	**347,494**
Local	17,194	6,903	30,783	7,800	584	7	122	14	60	828	742	65,037
Cross-border	26,856	23,084	184,271	28,190	1,329	205	650	60	541	6,483	10,788	282,456
Non-financial institutions	**4,931**	**8,619**	**6,218**	**3,492**	**57**	**30**	**259**	**9**	**55**	**943**	**9,433**	**34,045**
Local	1,043	1,337	281	543	0	14	2	0	2	1	10	3,233
Cross-border	3,888	7,282	5,938	2,949	57	16	256	9	52	942	9,422	30,812
Subtotal	**119,180**	**75,547**	**390,723**	**61,910**	**4,003**	**431**	**2,435**	**122**	**1,307**	**12,052**	**42,366**	**710,078**
OTC options sold												
Reporting dealers	**1,411**	**6,652**	**16,429**	**366**	**70**	**0**	**12**	**7**	**8**	**63**	**902**	**25,921**
Local	583	1,326	3,222	127	34	0	9	0	3	14	47	5,365
Cross-border	828	5,326	13,208	239	36	0	3	7	5	49	855	20,556
Other financial institutions	**1,282**	**3,519**	**11,964**	**857**	**143**	**0**	**37**	**1**	**23**	**23**	**190**	**18,039**
Local	558	719	2,888	205	13	0	22	0	5	0	5	4,415
Cross-border	724	2,800	9,076	652	130	0	15	1	19	23	185	13,624
Non-financial institutions	**518**	**1,996**	**1,442**	**121**	**10**	**0**	**5**	**0**	**1**	**4**	**12**	**4,109**
Local	311	612	39	3	0	0	0	0	0	0	0	965
Cross-border	207	1,384	1,403	118	10	0	5	0	1	4	12	3,144
Subtotal	**3,211**	**12,167**	**29,836**	**1,345**	**223**	**0**	**54**	**8**	**32**	**90**	**1,104**	**48,069**
OTC options bought												
Reporting dealers	**1,457**	**8,952**	**14,683**	**466**	**96**	**0**	**14**	**0**	**23**	**79**	**557**	**26,328**
Local	518	2,007	3,584	116	7	0	13	0	6	8	90	6,348
Cross-border	939	6,946	11,099	351	89	0	1	0	17	71	467	19,980
Other financial institutions	**947**	**2,522**	**10,748**	**830**	**16**	**0**	**30**	**4**	**13**	**7**	**106**	**15,223**
Local	332	692	3,629	107	4	0	10	0	4	6	41	4,826
Cross-border	615	1,830	7,119	723	12	0	21	4	9	2	64	10,397
Non-financial institutions	**483**	**1,443**	**817**	**132**	**0**	**0**	**3**	**0**	**0**	**8**	**14**	**2,900**
Local	336	695	52	11	0	0	0	0	0	0	0	1,094
Cross-border	147	748	765	121	0	0	3	0	0	8	14	1,806
Subtotal	**2,886**	**12,918**	**26,248**	**1,428**	**112**	**0**	**48**	**4**	**36**	**94**	**677**	**44,451**
Total options	**6,097**	**25,085**	**56,083**	**2,773**	**335**	**0**	**102**	**12**	**68**	**184**	**1,781**	**92,520**
Total OTC interest rate derivatives	**169,239**	**143,702**	**487,064**	**65,757**	**6,325**	**611**	**3,167**	**394**	**1,376**	**25,455**	**54,002**	**957,093**

(a) Adjusted for local double counting.

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