

## Derivatives in emerging markets<sup>1</sup>

*Turnover of derivatives has grown more rapidly in emerging markets than in developed countries. Foreign exchange derivatives are the most commonly traded of all risk categories, with increasingly frequent turnover in emerging market currencies and a growing share of cross-border transactions. As the global reach of the financial centres in emerging Asia has expanded, the offshore trading of many emerging market currency derivatives has risen as well. Growth in derivatives turnover is positively related to trade, financial activity and per capita income.*

*JEL classification: F31, G15, G20, P45.*

This article represents a first attempt to review derivatives markets in emerging market economies (EMEs) on a comprehensive basis. We try to answer some basic questions: How big are the derivatives markets in EMEs? What are their structure and dynamics? Which derivatives are traded in EMEs, and who trades them? How does this all differ from mature markets? In which emerging market countries are derivatives most traded? Which factors might explain differences in the growth of derivatives markets across countries and time?

The picture of derivatives markets in EMEs that one gets from the existing literature is highly fragmented. Most evidence is limited to individual countries, types of derivatives or specific episodes of market development. One reason for this fragmentation is the lack of a unified database; another is the lack of familiarity with existing data sources. This paper aims to start filling this gap. It combines data from the Triennial Central Bank Survey of OTC derivatives market activity with those on derivatives traded on emerging market exchanges. The Triennial survey provides a unique snapshot of OTC derivatives activities in emerging markets, at a level of granularity and multidimensionality that is unmatched.<sup>2</sup> In turn, data on exchange-traded derivatives, compiled by commercial providers and published on a regular basis in the *BIS Quarterly Review*, provide detailed information on standardised derivative contracts listed and traded on emerging market exchanges.

---

<sup>1</sup> We are grateful to Claudio Borio, Stephen Cecchetti, Robert McCauley and Christian Upper for helpful comments and discussions, and to Branimir Gruić, Emese Kuruc and Carlos Mallo for excellent research assistance. The views expressed in this article are those of the authors and do not necessarily reflect those of the BIS.

<sup>2</sup> Detailed results of the FX part of the 2010 Triennial survey are available at [www.bis.org/publ/rpfx10.htm](http://www.bis.org/publ/rpfx10.htm).

Together, these two data sources enable us to start mapping the world of derivatives in emerging markets.

Our main findings are as follows. First, daily turnover in derivatives markets in EMEs has expanded four times over the past decade, to over 6% of emerging market GDP. Second, derivatives in emerging markets are traded in almost equal proportions over the counter and on exchanges. Third, unlike in advanced economies, FX derivatives are still the most traded derivatives in EMEs (50% of total turnover), while interest rate derivatives remain underdeveloped. Fourth, the FX derivatives turnover in emerging markets is becoming increasingly global, with a growing share of transactions being done cross-border, and transactions in emerging market currencies increasingly taking place offshore. Fifth, the largest derivatives markets in EMEs are located in Korea, Brazil and the two Asian financial centres of Hong Kong SAR and Singapore. And sixth, trade, financial activity and per capita GDP are positively related to the growth of derivatives markets in EMEs.

The remainder of this article is organised as follows. The first section looks at the size, structure and growth of derivatives markets at an aggregate emerging market level. The second section focuses on OTC derivatives, comparing the markets in EMEs and advanced economies. The third section further disaggregates the data on derivatives at the regional and country levels. The fourth section attempts to identify factors underpinning the growth in FX derivatives turnover. The final section concludes.

## The size and structure of derivatives markets in EMEs

Derivatives markets in EMEs remain small compared to those in advanced economies. Average daily turnover of derivatives in 33 EMEs for which data are available was \$1.2 trillion in April 2010 (6.2% of those economies' GDP), compared to \$13.8 trillion (36% of GDP) in advanced economies.<sup>3</sup> Though small, derivatives markets in EMEs have expanded rapidly: average daily turnover has increased by 300% since 2001, and by 25% over the past three years, despite the crisis in 2008–09 (Graph 1, left-hand panel). This was higher than the growth of turnover in advanced economies (250% since 2001, and 22% since 2007).

OTC derivatives are relatively more important in emerging markets than in advanced economies. In EMEs, derivatives are traded in almost equal proportions over the counter and on exchanges (Graph 1, centre and right-hand panels). By comparison, in advanced economies almost two thirds of derivatives are traded on exchanges (right-hand panel) and 38% over the counter (centre panel). Furthermore, the relative size of the exchange-traded

Rapid growth of turnover ...

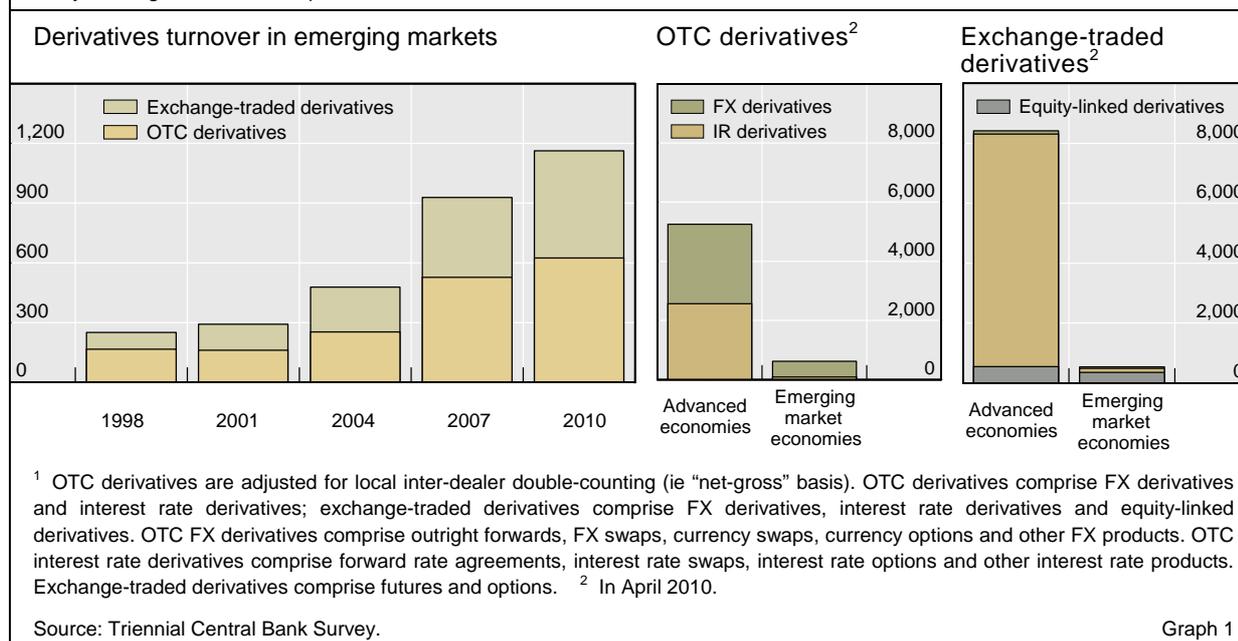
... in both OTC and exchange-traded markets

---

<sup>3</sup> In this paper we focus on derivatives traded in emerging market *countries* rather than derivatives in emerging market *risk* traded worldwide. One exception is OTC foreign exchange derivatives in emerging market currencies (see below). The aggregate figures in this section cover foreign exchange and interest rate derivatives (both OTC and exchange-traded) and exchange-traded equity-linked derivatives. Commodity derivatives and credit default swaps are not considered in this article. For details on the methodology and changes in coverage in the 2010 Triennial Survey, see King and Mallo (this issue)

## Derivatives turnover in advanced and emerging markets<sup>1</sup>

Daily average turnover in April, in billions of US dollars



derivatives market is distorted by two special cases with well developed derivatives exchanges, Brazil and Korea, which together account for nearly 90% of all emerging market turnover of exchange-traded derivatives.

FX derivatives most important in EMEs

Derivatives in EMEs are used mainly to hedge or speculate on exchange rate and, to a lesser extent, equity market risk. FX derivatives account for 50% of total turnover in emerging markets, equity-linked derivatives for 30% and interest rate derivatives for the rest. By contrast, derivatives in advanced economies are used by and large to trade interest rate risk (77% of total turnover), with FX derivatives and in particular equity-linked derivatives being less important. These differences reflect above all the depth and liquidity of bond and money markets in developed countries, and the relatively limited concern with exchange rate risk in advanced compared to emerging market economies.

The sections that follow further disaggregate these data. We first take a look at OTC derivatives at the aggregate emerging market level, and then at derivatives markets in individual emerging market countries.

### OTC derivatives markets

Over-the-counter derivatives represent the most developed segment of the derivatives market in EMEs. The average daily turnover of OTC derivatives in April 2010 was \$625 billion, or roughly 3% of EMEs' (annual) GDP.<sup>4</sup> The OTC market in EMEs is dominated by FX derivatives, which account for nearly 90% of total turnover, versus 50% in advanced economies. Despite these

<sup>4</sup> By comparison, the average daily turnover of OTC derivatives in advanced economies was \$5.3 trillion (13% of their GDP).

differences, trading of OTC derivatives in EMEs has converged towards advanced economy patterns in terms of instruments, counterparties and currencies being traded.

#### *OTC foreign exchange derivatives*

The turnover of OTC foreign exchange derivatives in EMEs – \$535 billion per day in April 2010 (Table 1) – increased 24% between 2007 and 2010. This represents a slowdown compared to the previous three-year period, when turnover almost doubled, but was much faster than the growth in advanced economies (just 5.6%). No doubt the recent financial crisis has taken some of the shine off the use of OTC foreign currency derivatives in advanced economies, particularly FX swap markets, where growth over the entire three-year period was only 0.3%. At the same time, the financial crisis had a relatively small impact on FX derivatives markets in emerging market economies.

Higher turnover of FX derivatives despite the crisis

Geographical distribution of OTC foreign exchange derivatives turnover <sup>1</sup>				
Daily averages in April				
	In billions of US dollars			Percentage share <sup>2</sup>
	2004	2007	2010	2010
<b>Total emerging market economies</b>	<b>222</b>	<b>430</b>	<b>535</b>	<b>100</b>
<i>Total advanced economies</i>	<i>1,546</i>	<i>2,546</i>	<i>2,689</i>	<i>503</i>
<b>Asia</b>	<b>184</b>	<b>354</b>	<b>442</b>	<b>83</b>
Hong Kong SAR	70	143	194	36
Singapore	91	153	175	33
China	...	1	11	2
India	3	24	14	3
Korea	10	18	25	5
Other	9	16	22	4
<b>Latin America</b>	<b>7</b>	<b>14</b>	<b>21</b>	<b>4</b>
Brazil	1	1	5	1
Mexico	5	11	12	2
Other	1	3	4	1
<b>Central and eastern Europe</b>	<b>19</b>	<b>43</b>	<b>50</b>	<b>9</b>
Poland	5	7	6	1
Russia	6	16	19	4
Turkey	2	3	11	2
Other	6	17	13	2
<b>Other emerging market economies</b>	<b>12</b>	<b>19</b>	<b>22</b>	<b>4</b>
South Africa	8	11	10	2
Other	4	8	12	2

<sup>1</sup> Outright forwards, FX swaps, currency swaps, currency options and other FX products. The category "other FX products" covers highly leveraged transactions and/or trades whose notional amount is variable and where a decomposition into individual plain vanilla components was impractical or impossible. Adjusted for local inter-dealer double-counting (ie "net-gross" basis). <sup>2</sup> As a percentage of total emerging market economies.

Source: Triennial Central Bank Survey. Table 1

## Foreign exchange derivatives turnover by instrument, counterparty and location<sup>1</sup>

Daily averages in April, in billions of US dollars and percentages

	Emerging market economies				Advanced economies	
	2004	2007	2010	% share	2010	% share
<b>OTC FX derivatives<sup>2</sup></b>	<b>159</b>	<b>299</b>	<b>380</b>	<b>100</b>	<b>2,110</b>	<b>100</b>
Outright forwards <sup>3</sup>	21	47	73	19	402	19
FX swaps <sup>3</sup>	125	231	277	73	1,488	71
Currency swaps	3	4	7	2	36	2
Currency options and others <sup>4</sup>	10	18	24	6	184	9
With reporting dealers	91	184	221	58	809	38
With other financial institutions	44	70	115	30	1,029	49
With non-financial customers	20	45	44	12	271	13
Local	61	108	127	33	700	33
Cross-border	94	191	254	67	1,410	67
<i>Memo: Spot transactions<sup>3</sup></i>	<i>119</i>	<i>188</i>	<i>203</i>	<i>100</i>	<i>1,287</i>	<i>100</i>
<i>Local</i>	<i>52</i>	<i>84</i>	<i>84</i>	<i>42</i>	<i>484</i>	<i>38</i>
<i>Cross-border</i>	<i>67</i>	<i>104</i>	<i>119</i>	<i>58</i>	<i>803</i>	<i>62</i>
<i>Derivatives/spot ratio<sup>5</sup></i>	<i>1.3</i>	<i>1.6</i>	<i>1.9</i>		<i>1.6</i>	

<sup>1</sup> Adjusted for local and cross-border inter-dealer double-counting (ie "net-net" basis). <sup>2</sup> Due to incomplete reporting, components do not always add up to totals. <sup>3</sup> Previously classified as part of the so-called traditional FX market. <sup>4</sup> The category "other FX products" covers highly leveraged transactions and/or trades whose notional amount is variable and where a decomposition into individual plain vanilla components was impractical or impossible. <sup>5</sup> Ratio of foreign exchange derivatives to spot transactions.

Source: Triennial Central Bank Survey.

Table 2

Instruments similar to advanced economies

In terms of FX instruments, the OTC markets in EMEs have already converged to the advanced economies' pattern. In both groups of countries, FX swaps comprise the lion's share of turnover (over 70%), followed by outright forwards (19%), options and currency swaps (Table 2). The relative size of FX spot and derivatives markets has also converged. The ratio of FX derivatives to spot transactions increased in EMEs to 1.9 in 2010 (Table 2), continuing the steady rise evident since 1998. Meanwhile, the ratio of derivatives to spot transactions in advanced economies declined to 1.6 in 2010.<sup>5</sup>

Shift towards trading with financial customers ...

Turning to the question of who is trading derivatives in emerging markets, we see that trades with other financial institutions – such as pension funds and hedge funds – increased the most, to 30% of total turnover in 2010 (Table 2). At the same time, the shares of trade with other reporting dealers (usually commercial and investment banks) and non-financial customers declined to 58% and 12%, respectively. The shift towards trading with financial customers represents the resumption of a trend that started in 1998, when the share of this counterparty type was as low as 15%. The trend is present across all foreign exchange instruments, especially the three largest categories.

<sup>5</sup> The fact that the ratio of FX derivatives to spot transactions in developed countries fell below that in emerging markets probably reflects the degree to which FX swap markets were dislocated in developed countries and became illiquid during the 2007–09 crisis (Baba and Packer (2009), CGFS (2010)). Given that strains in FX swap markets first became apparent in advanced economies, the shift towards spot transactions was more evident there.

Increased dealing with other financial institutions (to nearly 50% of total turnover) can also be seen in developed countries.

Factors underpinning the shift towards trading with financial customers include the increasingly active pursuit of carry trades and other short-term investment strategies. Indeed, many high interest rate currencies commonly identified as carry trade targets, such as the Australian dollar, the Indian rupee and the Korean won, experienced particularly strong growth over the past three years. In addition to these factors, noted already by the analysts of earlier Triennial surveys (Galati and Melvin (2004), Galati and Heath (2007)), high-frequency trading, which is more prevalent in financial centres such as Singapore, also appears to have contributed to the FX turnover growth (King and Rime (2010)).

... possibly driven by carry trades

Convergence towards developed country patterns is also evident in the shift towards cross-border transactions (Table 2). Counterparties to FX derivatives trades are increasingly from different reporting jurisdictions: the share of cross-border transactions grew to 67% in 2010 from 59% in 2004. This is the same as the share of cross-border transactions in advanced economies.

More derivatives traded cross-border

#### OTC interest rate derivatives

The interest rate derivatives markets in EMEs are much smaller than the FX markets, with total daily turnover of \$90 billion in April 2010 (Table 3). In sharp

Interest rate derivatives turnover is smaller ...

OTC interest rate derivatives turnover in emerging markets <sup>1</sup>				
Daily averages in April				
	In billions of US dollars			Percentage share <sup>2</sup>
	2004	2007	2010	2010
<b>Total emerging market economies<sup>3</sup></b>	<b>31</b>	<b>98</b>	<b>90</b>	<b>100</b>
<i>Total advanced economies<sup>3</sup></i>	<i>1,301</i>	<i>2,075</i>	<i>2,564</i>	<i>2,849</i>
<b>Asia<sup>3</sup></b>	<b>23</b>	<b>86</b>	<b>73</b>	<b>81</b>
Hong Kong SAR	11	17	18	21
Singapore	9	57	35	38
Korea	1	5	11	12
Other	2	5	9	10
<b>Latin America<sup>3</sup></b>	<b>2</b>	<b>3</b>	<b>9</b>	<b>10</b>
Brazil	1	0	7	8
Mexico	1	3	1	2
<b>Central and eastern Europe<sup>3</sup></b>	<b>2</b>	<b>4</b>	<b>2</b>	<b>2</b>
Poland	1	3	2	2
<b>Other emerging market economies<sup>3</sup></b>	<b>3</b>	<b>5</b>	<b>6</b>	<b>7</b>
With reporting dealers <sup>4</sup>	12	43	39	61
With other financial institutions	9	20	22	34
With non-financial customers	1	3	3	5

<sup>1</sup> Forward rate agreements, interest rate swaps, interest rate options and other interest rate products. <sup>2</sup> As a percentage of total emerging market economies; percentage share for the breakdown by counterparty is calculated using the total (\$64 billion) adjusted for local and cross-border inter-dealer double-counting (ie "net-net" basis). <sup>3</sup> Adjusted for local inter-dealer double-counting (ie "net-gross" basis). <sup>4</sup> Adjusted for local and cross-border inter-dealer double-counting (ie "net-net" basis).

Source: Triennial Central Bank Survey.

Table 3

contrast to the FX derivatives market, turnover of interest rate derivatives decreased by 8% since 2007. Meanwhile, in advanced economies interest rate derivatives turnover increased by 24%. Note, however, that the decrease in turnover in emerging markets represents one exceptional case rather than a trend – a major dealer, which accounted for 40–50% of interest rate derivatives trading in emerging Asia in 2007, shifted its trading desk out of the region during the crisis. Net of trades by that desk, turnover of interest rate derivatives in emerging markets nearly tripled, which compares with growth in the previous three-year period.

... as local money and bond markets lag behind FX markets

The overall activity in interest rate derivatives in EMEs nevertheless remains extremely low relative to that in advanced economies: emerging market turnover is less than 4% of the global total, versus 15% for FX derivatives turnover. This asymmetry – also noted by Saxena and Villar (2008) – probably reflects the lagging development and liquidity of emerging market bond and money markets relative to those in developed countries.

The relative immaturity of interest rate derivatives markets in EMEs is also apparent in the degree to which trading still takes place with reporting dealers (61% of total turnover; Table 3). By contrast, in advanced economies there has been a long-standing shift of OTC derivatives trading – similar to FX derivatives – away from reporting dealers, which constituted over 60% of turnover in 2001, but only 43% in 2010.

#### *Currency composition of OTC derivatives in emerging markets*

US dollar still the currency of choice for EMEs ...

According to the 2010 Triennial, the US dollar remains the pre-eminent global currency in OTC derivatives markets of EMEs. In the FX derivatives markets, the dollar was one of the currencies in more than 95% of transactions in 2010 (Table 4). This fraction was virtually unchanged from the 2007 survey, thus confirming the dollar's ongoing status as the leading currency for international financial transactions, paralleling its continued leading role in critical areas of international trade and finance (Goldberg (2010)). Even for the currencies of central and eastern European countries, which have strong economic linkages with the euro area, the dollar is the cross-currency for FX derivatives transactions more frequently than the euro.<sup>6</sup> It is also striking that the dominance of the US dollar is much greater in emerging market venues than elsewhere – worldwide, 85% of the transactions are dollar-denominated.

... but EME currencies gain market share in FX derivatives ...

Another interesting development is that emerging market currencies gained share in EMEs' FX derivatives trading. The percentage of transactions in EMEs involving emerging market currencies on one side increased to 60% in 2010 from 55% in 2007 (out of a potential 200%).<sup>7</sup> By contrast, the turnover of

---

<sup>6</sup> According to the 2010 Triennial, OTC turnover in FX derivatives on the Hungarian forint-dollar, Polish zloty-dollar and Czech koruna-dollar currency pairs was higher than that on the forint-euro, zloty-euro and koruna-euro pairs, by about 260%, 150% and 30%, respectively. See BIS (2010a, p 57), for a discussion of the dollar's resilience as a means of exchange during the crisis, with a focus on forward trading of the forint and zloty.

<sup>7</sup> This percentage is smaller for transactions in Hong Kong and Singapore than in other emerging markets, where trading in developed country currency pairs is less common.

OTC foreign exchange derivatives turnover by currency <sup>1</sup>			
Daily averages in April, percentage shares			
	2004	2007	2010
US dollar	95.5	95.2	94.7
Euro	19.3	15.1	15.8
Japanese yen	16.6	14.0	9.7
Australian dollar	7.5	5.7	8.0
Pound sterling	7.9	6.7	4.3
Swiss franc	1.5	2.4	1.2
Hong Kong dollar	12.4	17.3	15.9
Korean won	6.3	6.2	8.3
Singapore dollar	4.9	6.2	6.7
Chinese renminbi	0.4	1.6	4.8
Indian rupee	2.0	4.5	4.4
Russian rouble	1.1	2.0	2.6
Mexican peso	1.9	2.7	1.8
South African rand	3.1	2.2	1.6
Brazilian real	0.7	0.2	1.0
Polish zloty	1.7	1.2	0.9
<b>Emerging market currencies</b>	<b>43.5</b>	<b>55.0</b>	<b>60.4</b>

<sup>1</sup> Outright forwards, FX swaps, currency swaps, currency options and other FX products. Because two currencies are involved in each transaction, the sum of the percentage shares of individual currencies totals 200% instead of 100%. Because not all of the currencies are listed in the table, the total of the listed percentage shares is less than 200%. Adjusted for local and cross-border inter-dealer double-counting (ie "net-net" basis).

Source: Triennial Central Bank Survey. Table 4

global reserve currencies other than the US dollar – such as the euro, yen, pound sterling and Swiss franc – generally declined in relative terms in 2010. In particular, the share of the Swiss franc halved, probably reflecting the unwinding of derivatives positions which had hedged Swiss franc loans made in emerging Europe before the crisis. The Australian dollar was an exception among advanced economy currencies, as its share in total turnover in EMEs increased to around 8%, which is quite similar to its share in advanced economies. This undoubtedly reflected Australia's position as a major supplier of commodity exports to much of emerging Asia.

Within interest rate derivatives turnover, the US dollar also plays an important, though not quite as dominant, role, constituting nearly 20% of all turnover in emerging markets. However, the dollar's share is much higher than that of currencies of other major advanced economies – for instance, the share of euro interest rate derivatives turnover stands at just 8%. Interest rate derivatives in emerging markets are distinguished by the outsized growth of turnover in the Korean won, which in 2010 constituted more than one quarter of all turnover of interest rate derivatives in emerging markets.

... and interest rate derivatives trade

## Where have derivatives markets grown the most?

Four emerging market economies stand out in terms of the size and maturity of their derivatives markets: Korea, Brazil and the two Asian financial centres of Hong Kong and Singapore. Brazil and Korea are exceptional in terms of the size of their exchange-traded derivatives markets, and Hong Kong and Singapore in terms of their OTC derivatives markets (Graph 2, left-hand panel). In addition, no less than 10 EMEs now have total daily derivatives turnover of around \$10 billion or more (right-hand panel).

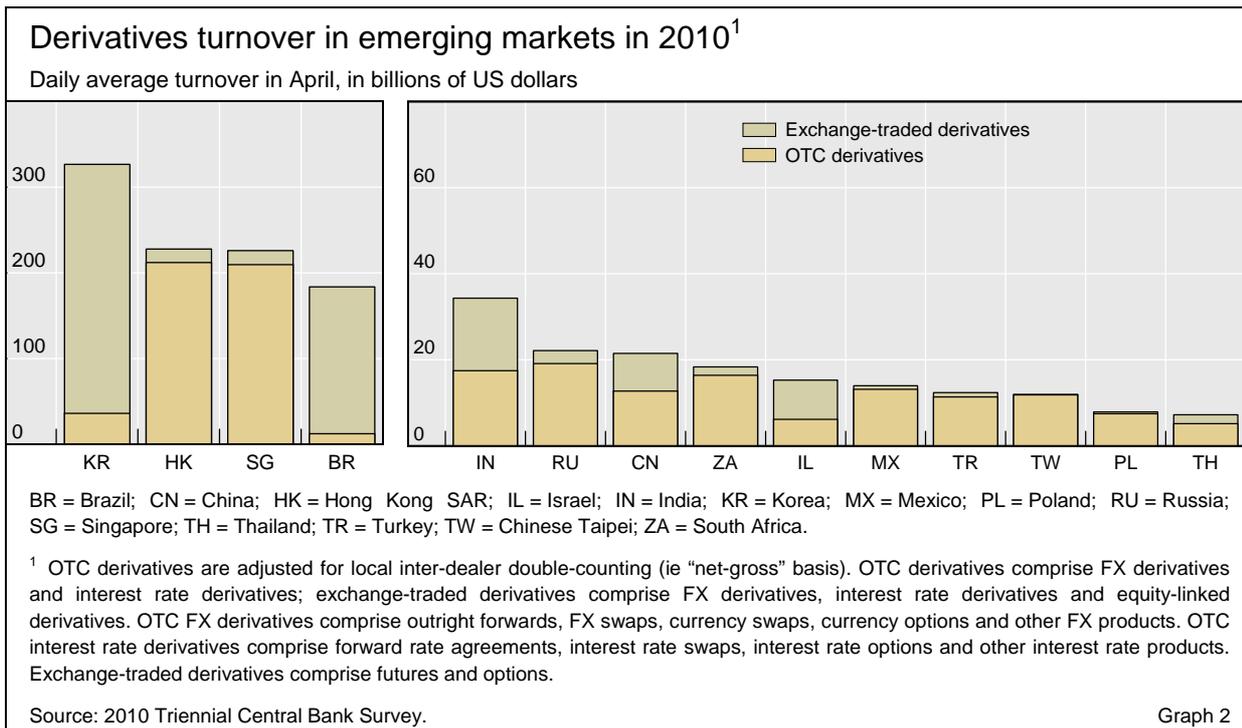
High turnover of interest rate derivatives in Brazil ...

Brazil is outstanding in terms of the turnover of interest rate and FX derivatives traded on its exchanges. The former doubled between 2007 and 2010, and the latter increased by 45%. Market in exchange-traded derivatives in Brazil dwarfs that of OTC derivatives: average daily turnover of exchange-traded FX derivatives in April 2010 was \$31 billion, versus \$5 billion in OTC markets, and that of interest rate derivatives as much as \$126 billion, versus \$7 billion in OTC instruments.

The other major centre for exchange-traded derivatives is Korea, with \$2 billion daily turnover in FX and \$8 billion in interest rate derivatives in April 2010. Elsewhere, the FX derivatives turnover on exchanges in Mexico and Russia has doubled since 2007, while in India turnover of FX derivatives surged to \$4 billion per day in April 2010, within just a year or so of their launching on the local exchange.

... and of equity-linked derivatives in Korea

Several EMEs, above all Korea, also have very large turnover of equity-linked derivatives. With \$270 billion daily turnover of these derivatives in April 2010, the Korea Exchange was second globally only to the United States' CME Group – and trailing closely behind it. Significant trading of equity-linked derivatives also takes place on exchanges in Brazil, Hong Kong, India and Singapore (\$12–16 billion daily in April 2010), as well as in China, Israel and



Russia (\$3–9 billion daily). Although still increasing, growth in turnover of equity-linked derivatives has slowed considerably since 2007, reflecting the general decline in stock market activity after the crisis. In particular, income losses due to the crisis seem to have affected previously widespread margin trading by households on several Asian exchanges.

Trading of OTC derivatives is highly concentrated in Hong Kong and Singapore. The two financial centres together accounted for 69% of all OTC foreign exchange and 59% of all interest rate OTC derivatives turnover in EMEs in April 2010. Hong Kong increased its share in FX turnover between 2007 and 2010 (to 36% of the EME total), while Singapore's share decreased (to 33%). In trading of interest rate derivatives, Singapore maintained its dominant position (39% of the EME total).

OTC derivatives traded most in Hong Kong and Singapore

Outside those two financial centres, trading of OTC derivatives has made notable strides in several countries. China, Brazil and Turkey have seen remarkable growth in FX derivatives – in China, turnover has risen by a factor of 10 since 2007, albeit from a very low base (Table 1). Trading in OTC interest rate derivatives has also surged in Brazil and Korea – in Brazil, from \$100 million per day in April 2007 to \$7 billion per day in April 2010 (Table 3). Compared with the mid-2000s, when only a few countries had average daily turnover of OTC derivatives around \$1 billion, in 2010 every emerging market region had at least one country with more than \$10 billion in daily turnover. In Asia, these were China, Chinese Taipei, India and Korea; in Latin America, Mexico; and elsewhere, Russia, Turkey and South Africa. Strong growth of international trade over the past decade, the rapid spread of financial globalisation and regulatory reforms in individual emerging market countries have all contributed to these developments.

Other EMEs expand derivatives trade ...

The recent crisis has dented the growth of OTC derivatives markets mainly in central and eastern Europe, which was seriously affected by the contraction of cross-border financing during the crisis. The Baltic states, Hungary and Poland experienced decreases in FX derivatives turnover ranging from 15 to 30% between 2007 and 2010. As demand for major currencies in both onshore cash markets and short-term credit markets surged in October 2008, banks in these countries had major difficulties exchanging euros and Swiss francs for domestic currency in foreign currency swap markets. This prompted several central banks to step in as counterparties in swap transactions and to lend euros to local banks. Since mid-2009, local FX swap markets have gradually recovered. That said, with the exception of Poland they are not likely to return to pre-crisis levels of activity in the near term, given the ongoing contraction of foreign currency lending.<sup>8</sup>

... except in central and eastern Europe

Regarding the amounts outstanding of OTC derivatives, emerging Asia was clearly ahead of other regions in terms of FX derivatives, but not in terms

Asia and South Africa top in amounts outstanding

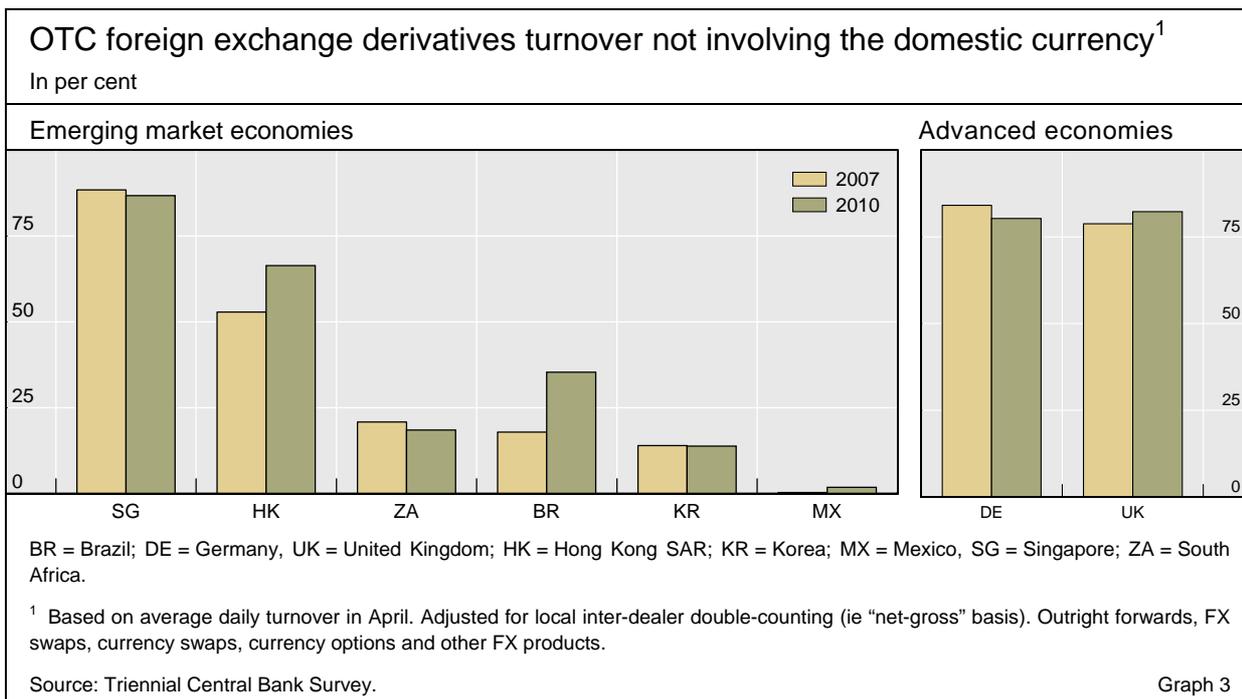
---

<sup>8</sup> India was the only emerging market outside of central and eastern Europe to experience a decrease in OTC turnover over the past three years (of 40%); however, this development reflects the shift in FX derivatives trading to an organised exchange rather than any crisis-related developments.

of interest rate derivatives.<sup>9</sup> The total notional amount outstanding of OTC foreign exchange derivatives by banks headquartered in Asia at the end of June 2010 was \$1.7 trillion, compared to \$150–280 billion by banks from other regions. At the same time, the total notional amount outstanding of OTC interest rate derivatives in emerging Asia was \$1.8 trillion, and in all other EMEs as much as \$1.7 trillion. The latter is largely due to South African banks, reflecting the country’s well developed and mature financial system. The amounts outstanding of interest rate derivative contracts at end-June 2010 in Latin America (\$120 billion) and central and eastern Europe (\$70 billion) were a fraction of these figures. This might reflect the importance of major international banks operating subsidiaries in these two regions, which report their derivatives positions in the country of their headquarters.

*Trends in the global hubs and offshore trading*

As noted earlier, emerging markets include global financial centres where other currencies are commonly traded. While the role of the Singapore and Hong Kong dollars is significant in Asian markets, much more noticeable is the degree to which the two centres serve as a trading platform for other currencies.<sup>10</sup>



<sup>9</sup> In the Triennial, data on amounts outstanding are collected on a consolidated basis, whereas turnover data are locational. This means that the amounts outstanding refer to the global positions of banks headquartered in EMEs, irrespective of where they are booked. Conversely, the data do not include positions by EME affiliates of banking groups headquartered in advanced economies.

<sup>10</sup> For instance, 69% of all turnover in FX derivatives markets in EMEs took place in Singapore or Hong Kong as of April 2010 (Table 1). At the same time, the Singapore or Hong Kong dollar was one of the currencies in FX derivatives transactions in only 16% and 7%, respectively, of all transactions in EMEs in 2010 (Table 4).

OTC foreign exchange derivatives turnover by currency offshore ratio <sup>1</sup>					
Daily averages in April 2010, in per cent					
	Total <sup>2,3</sup>	Outright forwards	FX swaps	Currency swaps	Currency options
<b>Asia</b>					
Chinese renminbi	71.0	90.8	8.3	...	...
Indian rupee	59.7*	76.0	16.4	55.6	79.1
Indonesian rupiah	81.3*	94.7	29.3	22.5	99.5
Korean won	56.8*	90.7	11.2	53.5	98.6
Malaysian ringgit	69.4*	91.1	29.7	17.9	84.9
Philippine peso	55.8*	90.0	14.3	1.8	23.2
Thai baht	34.5	23.4	39.6	6.1	6.4
<b>Latin America</b>					
Brazilian real	90.8	90.8	81.1	13.0	99.0
Chilean peso	58.9*	65.2	12.8	86.1	95.2
Mexican peso	96.0*	95.6	96.2	76.6	98.1
<b>Central and eastern Europe</b>					
Hungarian forint	91.8*	88.0	91.5	...	99.3
Polish zloty	94.7*	92.0	94.9	98.7	97.1
Russian rouble	62.6*	93.5	54.4	...	99.7
Turkish lira	94.8*	87.3	98.3	95.7	88.8
<b>Other emerging market economies</b>					
Israeli new shekel	78.0*	83.0	80.7	64.6	59.1
South African rand	86.5	86.7	86.4	98.1	86.0
<b>Total emerging market currencies<sup>3</sup></b>	<b>77.2*</b>	<b>86.7*</b>	<b>71.1</b>	<b>76.7*</b>	<b>91.5*</b>
<i>Total emerging market currencies in April 2007<sup>3</sup></i>	<i>75.5</i>	<i>83.3</i>	<i>72.0</i>	<i>63.2</i>	<i>87.0</i>
An asterisk indicates higher observations compared to 2007. Comparison was made only for the total figures.					
<sup>1</sup> This ratio defines turnover in any given currency outside the home market as a percentage of the total turnover in the same currency. Adjusted for local and cross-border inter-dealer double-counting (ie "net-net" basis). <sup>2</sup> Total of the listed instruments. <sup>3</sup> Since the turnover data for the home market are not available in some economies for some segments, percentages for the total currency offshore ratio for those economies are an upper-bound estimate, since the calculation assumes that the total turnover for that segment is traded outside the home economy.					
Source: 2010 Triennial Central Bank Survey.					Table 5

Graph 3 illustrates the degree to which trading in currencies other than the home currency occurs in a few financial centres, and how that has changed since the last survey. As expected, Hong Kong and Singapore score highly, with 66% and 87% of FX derivatives turnover in those jurisdictions occurring in currency pairs that do not include the Hong Kong dollar or the Singapore dollar, respectively. The elevated numbers are comparable to those of the United Kingdom and Germany. In Hong Kong, trading in currencies other than the Hong Kong dollar has increased by 14 percentage points over the last three years.

A very different set of issues is raised by the trading of emerging market currency derivatives "offshore", or outside the jurisdiction of the monetary authority. Such trade is often the result of foreign exchange or capital controls

Derivatives turnover in EME hubs increasingly global

Offshore trading of EME currencies widespread ...

in the home jurisdiction.<sup>11</sup> In fact, a very large share of trading in EME currency derivatives takes place at such locations. (Offshore locations for trading in emerging market currencies tend to be the global financial centres identified above). Table 5 documents the degree to which trading in the FX derivatives of certain emerging market currencies takes place offshore. For instance, more than 90% of trading in the Brazilian real, the Mexican peso, the Hungarian forint, the Polish zloty and the Turkish lira takes place outside the home market. Offshore trading is particularly pronounced in FX options and outright forward contracts, where around 90% of all trading takes place abroad.

... and growing in importance

Offshore trading of emerging market currencies appears to have increased in both absolute and relative terms since the 2007 Triennial. For instance, the share of all FX derivatives transactions in emerging markets in which neither side of the currency pair is within the jurisdiction of the monetary authority has risen to 77%. In each of the categories of outright forwards, currency swaps and FX options, the share of FX derivatives transactions in emerging markets taking place offshore has grown by 3–5 percentage points. Currencies for which the offshore ratio has increased by more than 20% over the past three years include the Indian rupee, the Chilean peso, the Colombian peso and the Russian rouble.

## Explaining FX derivatives turnover

Which factors drive growth of FX derivatives ...

As noted above, OTC FX derivatives represent the most important derivatives market in EMEs, so it is natural to ask which factors help explain differences in turnover in this market across countries and time. This section reports the results of a preliminary statistical analysis of this question. We look at simple bivariate correlations of FX derivatives turnover with some structural economic factors that are generally associated with the growth of derivatives markets.<sup>12</sup> The aim is to identify potential drivers of turnover as a first step in a more rigorous econometric analysis. One tentative finding is that variables such as trade, financial openness and the growth of bond and equity markets seem more promising in explaining FX derivatives turnover than the volatility of exchange rates or the level of interest rates. In addition, there might be a threshold level of per capita GDP above which the development of FX derivatives markets takes off.

... in a panel dataset of EMEs?

The panel dataset we use covers 30 EMEs over six Triennial surveys conducted since 1995. Hong Kong and Singapore are excluded as outliers. The dependent variable is daily turnover of OTC FX derivatives (outright forwards, FX swaps, currency swaps, options and other FX derivatives) measured in US dollars, in country  $i$  ( $i = 1, \dots, 30$ ) at Triennial survey year  $t$  ( $t = 1995, \dots, 2010$ ).

---

<sup>11</sup> For a further discussion of the impact of foreign exchange controls on derivatives turnover, see Tsuyuguchi and Wooldridge (2008).

<sup>12</sup> For stylised facts on the development of OTC derivatives markets, see Schinasi et al (2000), and for emerging markets, Saxena and Villar (2008). Potential drivers of FX turnover are discussed by, among others, Galati and Heath (2007) and King and Rime (2010).

Reflecting the demand for foreign currency to settle cross-border trade transactions, as well as the traditional role of derivatives as a hedge against exchange rate risk, the first variable that suggests itself intuitively when we think about explaining the turnover of FX derivatives is gross trade flows. There is indeed a strong positive relationship between the two variables in our sample: 10% higher gross trade flows are associated with 8.8% higher daily turnover of FX derivatives (Graph 4, left-hand panel).<sup>13</sup> An even stronger relationship holds in terms of growth rates: a 10% growth of gross trade flows is associated with a 14% growth of FX derivatives turnover.

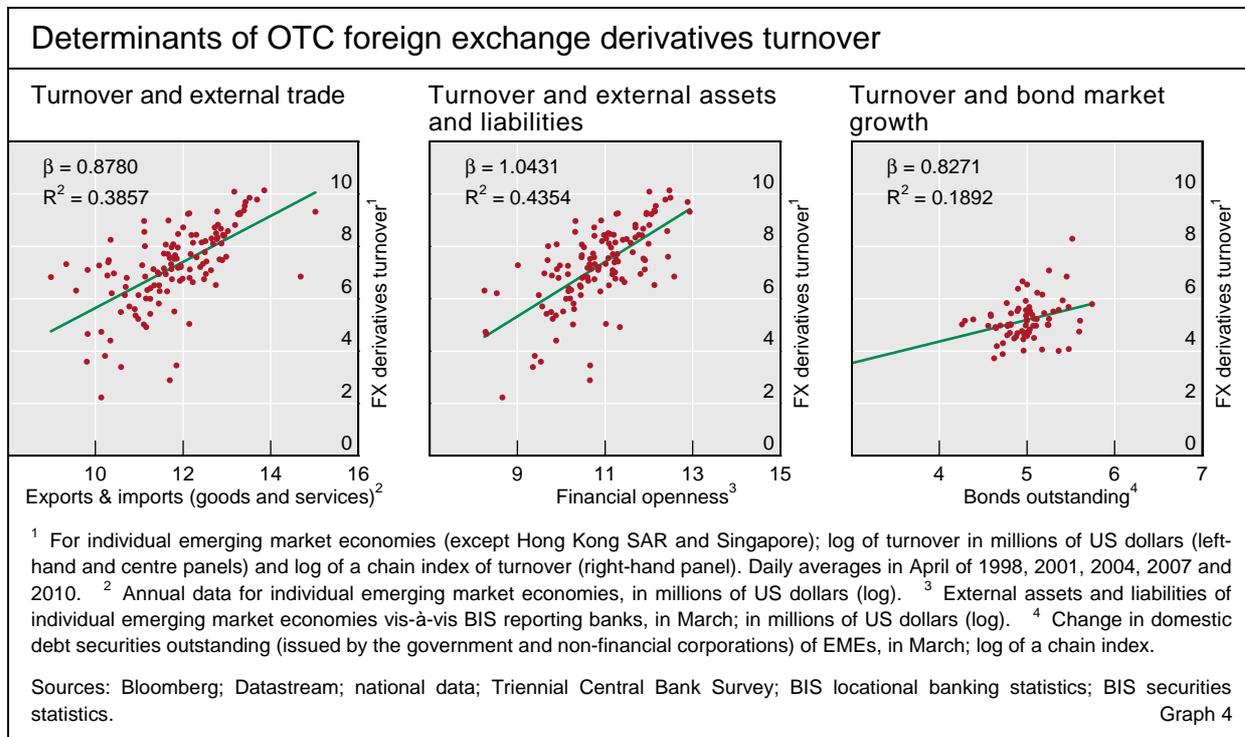
Growth of trade is an important factor ...

The second candidate for explaining turnover of FX derivatives is the size of external assets and liabilities. Again, the two variables are strongly correlated: 10% higher holdings of external assets and liabilities by EMEs in our sample are associated with 10.4% higher turnover of FX derivatives (Graph 4, centre panel). As with gross trade flows, the correlation holds for both levels and growth rates: a 10% growth of external assets and liabilities is associated with a 10% increase in FX derivatives turnover.

... as are holdings of external assets and liabilities ...

The third group of factors potentially explaining turnover of FX derivatives is activity in emerging bond and equity markets. Investors in emerging market assets – especially institutional investors such as pension funds – frequently hedge their positions in bonds and, to a lesser extent, equities. We would therefore expect turnover in EMEs’ derivatives markets to be positively correlated with turnover in their bond and equity markets. This turns out to be the case: a 10% growth in bonds outstanding of the government and non-financial corporate sectors is associated with an 8.3% increase in daily FX

... and activity in local bond and equity markets



<sup>13</sup> Standard econometric tests suggest that virtually all variables used in regressions reported in this section are stationary.

derivatives turnover (Graph 4, right-hand panel).<sup>14</sup> Similarly, a 10% increase in equity market turnover is associated with a 3% increase in FX derivatives turnover.

Exchange rates and interest rates are less important

The statistical relationship of FX derivatives turnover with other potential determinants identified in the literature is much weaker in our sample. For instance, the correlation between exchange rate volatility (measured by the standard deviation of monthly changes in the nominal effective exchange rate of individual EMEs) and FX derivatives turnover is positive but statistically insignificant. In particular, greater volatility of emerging market exchange rates in the latest crisis period has not been associated with increased turnover of FX derivatives. There is also a positive but weak relationship between growth of FX derivatives turnover and the level of domestic interest rates across the main FX instruments – outright forwards and FX swaps.<sup>15</sup>

Derivatives markets take off at higher income levels

On a more structural level, turnover of FX derivatives is statistically highly correlated with per capita income. While even lower-income countries such as India have started to develop dynamic derivatives markets, it is only at a fairly high level of per capita income that such markets begin to take off. In a sample covering both advanced and emerging market economies, the vast majority of countries with daily turnover of FX derivatives of \$10 billion or more have per capita income above \$30,000 (measured at PPP exchange rates). In the emerging markets, this level of per capita income is found, for instance, in Israel and Korea, which have, unsurprisingly, some of the most developed derivatives markets among EMEs. These results are tentative and should be interpreted with caution; nonetheless, they are indicative of some of the structural reasons for the observed gap in the development of derivatives markets between advanced economies and EMEs.

## Conclusion

The growth of derivatives turnover in emerging markets remains more rapid than in advanced economies. The largest emerging market derivatives markets are now located in Korea, Brazil and the two Asian financial centres of Hong Kong and Singapore. About half of the derivatives turnover in emerging markets occurs over the counter, compared to one third in advanced economies. FX derivatives are by far the most commonly traded. Growth of FX derivatives turnover appears to be positively related to trade, financial activity and per capita GDP.

Derivatives turnover in emerging markets is becoming more and more global. Not only is an increasing share of emerging market transactions cross-border as opposed to domestic, but the two large financial centres of emerging

---

<sup>14</sup> We use growth of amounts outstanding because turnover data are generally not available for bond markets. Note that there can be some reverse causality between FX derivatives turnover and financial market activity, especially foreign non-financial corporate issuance in local bond markets in EMEs.

<sup>15</sup> The level of interest rates is a potential determinant of FX derivatives turnover because carry trades and other leveraged investment strategies exploit interest rate differentials and exchange rate trends in emerging vis-à-vis advanced market economies.

Asia continue to grow in importance as home to an increasingly large share of OTC derivatives trades not involving the local currency.

## References

Baba, N and F Packer (2009): "From turmoil to crisis: dislocations in the FX swap market before and after the failure of Lehman Brothers", *BIS Working Papers*, no 285, July.

Bank for International Settlements (2010a): *80th Annual Report*, June.

——— (2010b): *Triennial Central Bank Survey of Foreign Exchange and Derivatives Market Activity in April 2010 – preliminary results*, September.

——— (2010c): *Triennial Central Bank Survey: report on global foreign exchange market activity in 2010*, December, pp 71–83.

Committee on the Global Financial System (2010): "The functioning and resilience of cross-border funding markets", *CGFS Publications*, no 37, March.

Galati, G and A Heath (2007): "What drives the growth in FX activity? Interpreting the 2007 triennial survey", *BIS Quarterly Review*, December.

Galati, G and M Melvin (2004): "Explaining the surge in FX turnover", *BIS Quarterly Review*, December.

Goldberg, L (2010): "Is the international role of the dollar changing?", *Current Issues in Economics and Finance*, January.

King, M and C Mallo (2010): "A user's guide to the Triennial Central Bank Survey of foreign exchange market activity", *BIS Quarterly Review*, this issue.

King, M and C Rime (2010): "The \$4 trillion question: what explains FX growth since the 2007 survey?", *BIS Quarterly Review*, this issue.

Saxena, S and A Villar (2008): "Hedging instruments in emerging market economies", *BIS Papers*, no 44.

Schinasi, G, S Craig, B Drees and C Kramer (2000): "Modern banking and OTC derivatives markets", *IMF Occasional Papers*, no 203.

Tsuyuguchi, Y and P Wooldridge (2008): "The evolution of trading activity in Asian foreign exchange markets", *BIS Working Papers*, no 252, May.