

## SELECTED TOPIC: THE ROLE OF FINANCIAL DERIVATIVES IN EMERGING MARKETS

The two previous issues of the *Global Financial Stability Report* contained chapters on local equity and fixed-income markets in emerging market economies, with particular focus on the role of local markets as a substitute for international markets for raising funds. This chapter presents original estimates of the scale of the derivatives trading activity in the major emerging markets and compares developments in these markets with global trends. In addition to providing a brief overview of the local derivatives markets, this chapter focuses on how derivatives facilitated capital flows to emerging market economies and on the role of derivatives in past emerging market crises.

Financial derivatives allow investors to unbundle and redistribute various risks—foreign exchange, interest rate, market, and default risks—and thus, facilitate cross-border capital flows and create more opportunities for portfolio diversification. However, the same instruments allow market participants to avoid prudential safeguards, manipulate accounting rules, and take on excessive leverage by shifting exposures off balance sheets. The latter can occur due to the weaknesses in the companies' internal risk management practices and also due to inadequate financial regulation. In a world of constantly evolving derivatives markets, the establishment of prudential regulations that create incentives for market participants to use derivatives appropriately is one of the major challenges for regulators in both mature and emerging markets.

### Derivatives in Emerging Market Economies

Despite rapid growth over the past several years, emerging market derivatives account for only 1 percent of the total outstanding notionals

in global derivatives markets. Local derivatives markets in emerging market economies differ greatly in their sizes, both in absolute terms and relative to cash markets. Compared to mature markets, the ratio of outstanding notionals in bond and equity derivatives to market capitalization of the underlying asset markets is fairly small in most emerging economies (see Table 4.1). The most common problems that constrain the development of local derivatives markets are (1) relatively underdeveloped markets for underlying instruments; (2) weak/inadequate legal and market infrastructure; and (3) restrictions on the use of derivatives by local and foreign entities.

### Currency Derivatives

Most of the currency derivatives trading around the world takes place through the over-the-counter (OTC) markets, with foreign exchange swaps accounting for more than two-thirds of the turnover. In emerging markets, the most liquid OTC currency derivative markets are in Hong Kong SAR, Singapore, and South Africa, where average daily turnover significantly exceeds the spot market turnover. By contrast, a significant share of the foreign exchange derivative trading in Brazil takes place at the organized exchange—Bolsa de Mercadorias & Futuros of São Paulo, or BM&F (see Box 4.1). According to the Bank for International Settlements (BIS), the global market activity in currency derivatives has been on a declining trend since 1998, with the average daily turnover in the global OTC currency derivatives markets falling to \$853 billion in April 2001 from \$959 billion in April 1998, in parallel with the contraction of the global spot market activity. The latter is generally attributed to the introduction of the euro, expansion of E-broking, and banking sector consolidation. By contrast, the turnover in the

**Table 4.1. Notional Amounts Outstanding of the Over-the-Counter and Exchange-Traded Derivatives**  
(In billions of U.S. dollars; end-June, 2001)

	Equity				Fixed Income				Foreign Exchange		
	Spot	Exchange-traded derivatives	OTC derivatives	Total derivatives in percent of the spot	Spot	Exchange-traded derivatives	OTC derivatives	Total derivatives in percent of the spot	Spot	Exchange-traded derivatives	OTC derivatives
<b>Latin America</b>											
Brazil	194.07	1.00	0.81	0.9	284.80	151.15	12.52	57.5	...	12.61	25.03
Mexico	154.91	0.01	...	—	82.30	4.58	...	5.6	...	0.10	...
Chile	44.31	...	—	—	34.00	...	0.10	0.3	...	...	5.86
<b>Asia</b>											
Singapore	197.62	6.80	0.38	3.6	48.30	459.96	32.00	1018.5	...	...	87.20
Hong Kong SAR	570.56	3.91	0.14	0.7	44.90	25.61	4.15	66.3	...	0.03	21.72
Korea	217.73	12.68	—	5.8	279.00	1.96	19.26	7.6	...	1.33	27.40
Taiwan Province of China	231.05	0.42	...	0.2	...	...	...	...	...	...	...
Malaysia	104.08	0.03	—	—	77.10	2.86	0.94	4.9	...	...	4.32
<b>Europe, Middle East, and Africa</b>											
South Africa	194.93	15.62	8.73	12.5	56.10	0.16	144.79	258.4	...	...	176.66
Hungary	9.34	0.05	—	0.6	17.20	0.06	0.09	0.9	...	0.17	0.28
Poland	25.56	0.04	—	0.2	37.60	...	0.85	2.3	...	0.01	7.36
<b>Total</b>	<b>1,944.16</b>	<b>40.56</b>	<b>10.07</b>	<b>2.6</b>	<b>961.30</b>	<b>646.33</b>	<b>214.69</b>	<b>89.6</b>	<b>...</b>	<b>14.24</b>	<b>355.82</b>
<i>Memo item:</i>											
<b>Global markets</b>	<b>29,843</b>	<b>1,905</b>	<b>2,039</b>	<b>13.2</b>	<b>29,710</b>	<b>17,493</b>	<b>75,813</b>	<b>314.1</b>	<b>...</b>	<b>66</b>	<b>20,435</b>

Sources: BIS; IFC; MSCI; FOW TRADEdata; Exchanges; Bloomberg; and IMF staff estimates.

Notes: The notional amounts outstanding of the OTC traded derivatives are based on the data collected as part of the BIS 2001 Triennial Survey. All positions were reported on a worldwide consolidated basis (i.e., are based on global books of the head offices and all branches and subsidiaries of a given institution), and only to the monetary authority of a country, where the parent institution had its head office. The notional amounts outstanding of the exchange-traded derivatives are estimated using the data from the FOW TRADEdata, Bloomberg, and various local exchanges. Notional amount is calculated as the number of contracts (open interest from FOW TRADEdata) multiplied by the face value of the contract in the U.S. dollar terms. In the case of index derivatives, the face value is the product of the contract's multiplier and the value of the underlying index. In the case of equity derivatives, individual stock futures and options are not included. The breakdown of exchange-traded derivatives by asset class (equity, fixed-income, currency) is based on the FOW TRADEdata classification, which, in some cases, differs from the BIS classification of the OTC derivatives. For example, the exchange-traded fixed income derivatives include a broader range of instruments than the single-currency interest rate swaps. In particular, in the case of Brazil, all cross currency swaps are included in the fixed-income derivatives category. For bond markets, the spot market capitalization is the total value of all outstanding domestic bonds based on the data provided by the BIS. The overall market capitalization of the global bond markets is the total value of all outstanding domestic bonds in all countries followed by the BIS. The overall market capitalization of the global equity markets is an estimated total market capitalization of all countries included in the MSCI All Country World Free Index. The equity market capitalization estimates for individual markets are based on the IFC data.

emerging foreign exchange spot markets increased, with the share of emerging market currencies (including the Hong Kong SAR and Singapore dollars) in global foreign exchange turnover rising from 5.5 percent in April 1998 to 8.6 percent in April 2001. Turnover of currency derivatives in emerging markets remained roughly stable (see Table 4.2).

Among the emerging markets of Asia, Singapore has the largest foreign exchange derivatives market. A notable pickup in cross-currency swaps occurred after 1998, when the government allowed foreign entities to issue Singapore dollar bonds and to swap the proceeds into foreign currency for use outside the

country. In Korea, the development of the onshore currency derivatives market was constrained by a legal requirement that any forward transaction had to be certified as a hedge against future current account flows (the so-called “real demand principle”), which also spurred the development of a liquid offshore “nondeliverable” forward (NDF) market in the Korean won. In 1999, this restriction was lifted and a lot of activity moved onshore, leading to the convergence of the offshore and onshore prices.

Generally, the NDF contracts are the principal instruments in the offshore derivatives markets for emerging market currencies and are often preferred by foreign investors who have restricted

#### Box 4.1. The Bolsa de Mercadorias & Futuros of São Paulo

The Bolsa de Mercadorias & Futuros (BM&F) of São Paulo, Brazil, which started operations in January 1986, ranks among the largest exchange-traded derivatives markets in the world in terms of the number of contracts transacted annually. In 2001, almost 98 million contracts were traded with a total open interest of 74 million contracts. These figures would likely be surpassed in 2002: by the end of August 2002 the cumulative number of contracts traded was up to 74 million, with a total open interest of 58 million contracts. According to International Financial Services, London, the BM&F ranked ninth in terms of the number of contracts traded by the end of 2001, being surpassed among emerging markets only by the Korean Stock Exchange.

Trading at the BM&F takes place through the auction market system, which comprises both the exchange floor and the electronic trading system. Most contracts are traded in the auction market system, which accounted for 94 percent of all contracts traded and 97 percent of financial volume in 2001, while the over-the-counter (OTC) system accounted for the remaining transactions. The performance of all contracts traded through the auction system is guaranteed by the BM&F Derivatives Clearinghouse, which uses a safeguard structure based on intraday risk limits, market concentration limits, and collateral requirements imposed on clearing members, brokerage houses, and customers. The safeguard structure is complemented with three clearinghouse funds that provide additional levels of protection against counterparty risk. Currently, the BM&F is exploring the possibility of using international insurance policies as an additional line of defense. Other transactions in the OTC market system must be registered either with the BM&F or the Central of Custody and Financial Settlement (CETIP) if at least one of the counterparties is a financial institution. The settlement of OTC contracts registered with the BM&F can be guaranteed by the exchange upon request of the contractual parties provided the contract is written according to the BM&F specifications, which ensures a certain level of

standardization. In practice, most of the OTC contracts are guaranteed by the BM&F.

The BM&F offers end-users of the exchange a substantial number of contracts allowing them to hedge risks or acquire market exposure. Futures contracts are available on a number of commodities, including gold, on the São Paulo Exchange Stock Index (Ibovespa); on foreign currencies, including the U.S. dollar and the euro; and on interest rates, including short and long interbank deposit rates, and the local U.S. dollar interest rate (Cupom Cambial). Option contracts are available on gold, interbank deposit rates, the Ibovespa, and the U.S. dollar. However, liquidity in the BM&F is heavily concentrated in a few contracts, including the one-day inter-bank deposit futures contracts or DI Futures, U.S. Dollar Futures, especially for those with maturities of one year or less, Ibovespa Index Futures, and Cupom Cambial Futures. Some of these contracts are described next.

*DI Futures.* This contract allows end users to hedge or take positions on local interest rate risk. The contract size is 1 million *reais* (the Brazilian currency), and the underlying asset is the capitalized daily interbank deposit rate, as measured by the Certificate of Deposit rate, verified on the period between the trading day and the business day preceding the expiration date of the contract, which is the first business day of the contract month. All contracts are settled on a cash basis. Contract months include the first four months subsequent to the month during which a trade is made, and months that initiate a quarter (January, April, July, and October). DI Futures with maturities less than two years enjoy good liquidity, with an average daily turnover in the range of \$5–10 billion.

*Foreign exchange derivatives.* The two- and three-month U.S. Dollar Futures, with contract sizes of \$50,000, are the most traded and liquid contracts, with an average daily trading volume of around \$3 billion. Contract months include every month of the year and should be settled on a cash basis the next business day following the last business day of the previous month. Hedging and speculation in the foreign

exchange market can also be accomplished via U.S. Dollar European and American Options in the auction and OTC market systems, respectively. The average daily trading volume in this market is only around \$250 million, a fraction of the volume traded in the futures market. In terms of open interest, though, U.S. Dollar Options accounted for 30 percent of total exchange-traded foreign currency instruments by the end of July 2002.

*Ibovespa Index Futures.* Local investors can engage in index arbitrage and hedge positions on the main Brazilian stock market index, Ibovespa, through Ibovespa Index Futures. The contract size in Brazilian *reais* is equal to three times the level of the index. These contracts mature every two months and are settled on a cash basis on the next business day following the Wednesday closest to the 15th calendar day, which is the last trading day. Trading in the Ibovespa index futures comprises 86 percent of total trading in stock index instruments, as measured by number of traded contracts.

*Cupom Cambial Futures.* The Cupom Cambial for a given maturity is the spread between the local interest rate, as measured by the interest

rate on interbank deposits, and the exchange rate variation during the life of the contract. From this definition, it is clear that the Cupom Cambial is equivalent to the onshore U.S. dollar interest rate and, hence, its level is affected by corporate demand for foreign currency hedging. The Cupom Cambial Futures allow local market participants—mostly nonfinancial companies, banks, and mutual funds—to position themselves in the local U.S. dollar interest rate market. Contract size is \$50,000 and contract months and expiration dates are established by the BM&F. Contracts are settled in cash.

The BM&F follows state-of-the-art risk management procedures to deal with market risk, liquidity risk, and counterparty risk. These procedures have helped the BM&F to withstand several episodes of market turbulence, including the January 1999 crisis, the Argentina crisis at the end of 2001, and the current volatility associated to the recent presidential elections. Despite this impressive track record, the BM&F remains highly exposed to sovereign risk, as close to 90 percent of the exchange's collateral is composed of Federal Government Bonds.

access to the onshore market and want to avoid potential costs of delivering local currencies or to reduce their counterparty credit risk exposure. In most cases, NDF markets trade at a premium to local markets because offshore financial institutions have limited access to local funding. In Taiwan Province of China, for example, the average implied one-year NDF yields were around 150 basis points higher than onshore rates during 2001–02. In some cases, however, offshore markets perform functions that are not performed by onshore markets. For example, while both onshore and offshore forward markets in Korea are most liquid in maturities of up to one year, the NDFs and swaps can be structured in tenors of up to 10 years in the offshore market.

In Latin America, the most active foreign exchange derivatives markets are in Brazil and

Mexico (see Table 4.2). The recent expansion of currency derivatives in Brazil was stimulated by the flotation of the *real* in early 1999 and regulatory authorization for OTC derivatives on foreign exchange, interest rates, and price indexes. The change in the exchange rate regime coincided with sharply higher volatility in both the *real*-dollar rate and Brazilian interest rates, contributing to the creation of a “hedge culture.” At present, trading in currency derivatives is much higher than that in the cash market: daily currency derivatives turnover is more than \$5 billion compared with a little over \$1 billion in the spot market. Most of the derivatives contracts are “nondeliverable” because, historically, the BM&F did not want local derivatives markets to be limited either by less than free convertibility of the *real* or by the size of the cash market, with the

**Table 4.2. Average Daily Turnover in the Over-the-Counter Derivatives Markets**  
(In billions of U.S. dollars)

	Total		Foreign Exchange		Interest Rate	
	April 1998	April 2001	April 1998	April 2001	April 1998	April 2001
Brazil	...	2.1	...	1.9	...	0.3
Chile	0.5	0.6	0.5	0.6	—	—
China	...	—	...	—	...	—
Czech Republic	3	1.4	3	1.2	—	0.2
Hong Kong SAR	51.4	52.0	48.9	49.4	2.4	2.6
Hungary	0.5	0.2	0.5	0.2	—	—
India	1.3	2	1.3	1.8	—	0.1
Indonesia	1	0.5	1	0.5	—	—
Korea	1.1	4	1	3.9	—	0.1
Malaysia	0.8	0.9	0.8	0.9	—	—
Mexico	2.6	4.6	2.4	4.2	0.2	0.4
Philippines	0.4	0.6	0.4	0.6	—	—
Poland	0.5	3.8	0.5	3.3	...	0.5
Russia	0.9	0.2	0.9	0.2	—	—
Singapore	90.7	72.5	85.4	69.3	5.3	3.2
South Africa	6	8.4	5.2	7.9	0.8	0.6
Taiwan Province of China	1.6	1.8	1.5	1.7	0.1	0.1
Thailand	2.2	1.3	2.2	1.3	—	—
Turkey	...	0.7	...	0.7	...	—
<b>Total</b>	<b>164.5</b>	<b>157.6</b>	<b>155.5</b>	<b>149.6</b>	<b>8.8</b>	<b>8.1</b>

Source: Bank for International Settlements, *Triennial Central Bank Survey 2001*.

Note: Turnover is defined as the absolute gross value of all new deals entered into during the month of April. No distinction is made between sales and purchases. The basis for reporting is the location of the office where any given deal was struck, so transactions concluded abroad were not reported by the country of location of the head office.

latter also being susceptible to short squeezes. In contrast with many other derivatives markets, a significant part of the trading in currency derivatives in Brazil takes place at the BM&F. Besides certain features of the country's legal framework that had hampered the development of the OTC market, the BM&F itself was actively trying to absorb part of the OTC business (see Box 4.1). In contrast to the rapid growth of derivatives markets in Brazil, the development of exchanges in Mexico has been slower, primarily because the exchanges in Chicago (which are in the same time zone) have launched numerous derivative products based on Mexican underlying assets.

In emerging Europe, Middle East, and Africa (EMEA), the most liquid OTC forward foreign exchange market is in South Africa, where daily turnover significantly exceeds turnover in the spot market (see Table 4.2). By contrast, the liquidity of the Central European derivatives markets remains limited. Hungary has seen a strong pickup in currency derivatives trading since the move to greater exchange rate flexibility and removal of capital controls, but, compared to

Poland, liquidity is still low (see Tables 4.1 and 4.2). The relatively limited development of onshore derivatives in the Central and Eastern European (CEE) countries is due to some extent to restrictions on derivatives trading, including regulatory constraints on the use of hedging instruments by local corporates and pension funds. Many of the derivatives linked to the Central European currencies are reportedly traded offshore, mainly out of London.

### Fixed-Income Derivatives

In contrast to recent trends in markets for currency derivatives, global fixed-income derivatives activity surged over the past few years, with daily average turnover in the global OTC interest rate derivatives market rising from \$265 billion in April 1998 to \$489 billion in April 2001, according to the BIS. Interest rate swaps constitute the largest (around 70 percent of total turnover) and the fastest growing segment of the market. The rapid expansion of the interest rate swaps was triggered by the liquidity crunch

**Table 4.3. Exchange-Traded Options and Futures Contract Trading Volume, 2001**

	Stock	Equity Index	Government Debt	Interest Rate	Foreign Exchange
<b>Latin America</b>					
Brazil	69,065,436	6,713,344	3,012	88,626,322	24,869,397
Mexico	...	34,478	958,908	16,813,830	205,068
<b>Asia</b>					
Singapore	6,575	9,349,788	624,435	21,008,786	...
Hong Kong SAR	4,010,411	5,889,934	1,175	643,806	4,226
Korea	...	855,257,564	9,323,430	1,410	1,681,677
Taiwan Province of China	...	4,351,390	...	...	...
Malaysia	...	288,092	...	54,914	...
<b>Europe, Middle East, and Africa</b>					
South Africa	6,517,235	28,798,060	14,072	...	...
Hungary	879,049	1,245,481	1,800	7,585	2,750,373
Poland	60,557	...	...	...	14,325

Sources: International Federation of Stock Exchanges (FIBV); and FOW TRADEdata.

in the cash and exchange-traded derivatives markets during the Russia/Long-Term Capital Management crisis and the reduction in the U.S. government bond market liquidity due to the planned debt repayments, which forced market participants to look for alternative hedging and benchmark instruments and encouraged the shift into the OTC swaps market (see Schinasi and others, 2001). As in the case of currency derivatives, the OTC segment of the global fixed-income derivatives market is significantly larger (when measured in terms of the outstanding notionals) than the exchange-traded derivatives segment, although the average daily turnover in the latter is higher, possibly due to the shorter maturity of the exchange-traded instruments.

In emerging markets, the most deep and liquid fixed-income derivatives markets are in Singapore, Brazil, and South Africa (see Tables 4.1, 4.2, and 4.3). In terms of the outstanding notional of the exchange-traded fixed income derivatives, the Singapore Exchange (SGX) is far ahead of all other emerging markets, with most traded contracts including Euroyen LIBOR, Euroyen TIBOR, and Eurodollar futures and options.

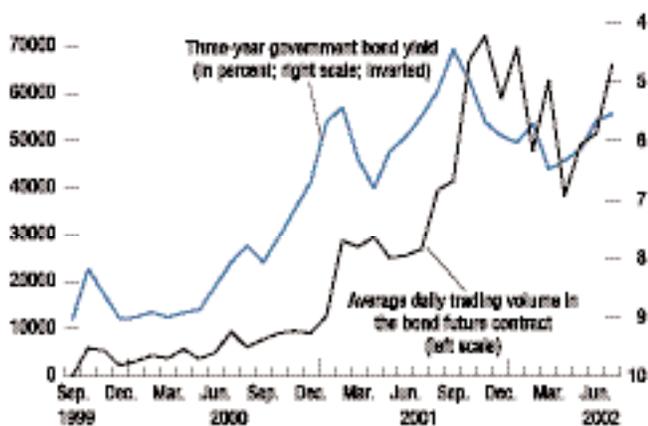
Over the past two years, falling interest rates and increased local bond issuance in emerging Asia spurred the expansion of the interest rate

swaps market, which significantly outpaced the growth in cross-currency swaps.<sup>1</sup> The onshore derivatives markets in Singapore and Korea, which were deregulated more extensively than other regional markets, experienced the fastest growth. As equity prices remained volatile and interest rates continued to decline throughout Asia, many investors shifted from stocks to bonds, turning to the bond futures and interest rate swaps markets either in search of yield or to hedge their bond exposures. For example, in Korea, the increase in the fixed-income derivatives trading volume clearly mirrored the performance of the underlying cash market (see Figure 4.1).

Abundant local liquidity and an increasingly sophisticated institutional investor base also contributed to the rapid pickup of the fixed-income derivatives activity in Asia. One of the key drivers behind the growth of the interest rate swaps market in Korea was the entry of the investment trust companies that were allowed to hedge up to 5 percent of total assets using local derivatives. In Singapore, insurance companies, which form the core of the local institutional investor base, increased their participation in the longer-dated bond futures market as well. Similarly, in Taiwan Province of China, pension and insurance companies have become more active users of debt-related derivatives, following their shift toward

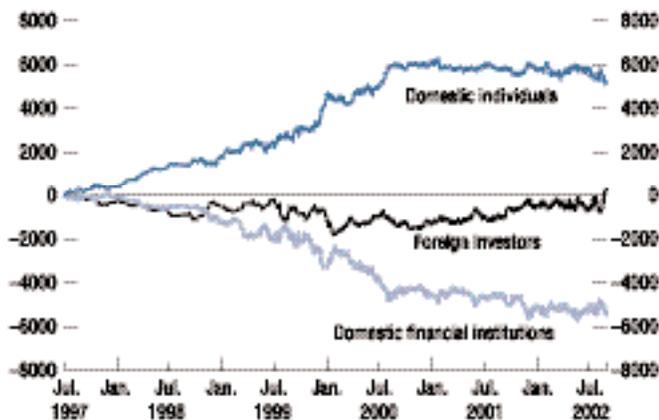
<sup>1</sup>See Chapter IV, "Emerging Local Bond Markets," in the September 2002 issue of the *Global Financial Stability Report*.

**Figure 4.1. Korea: Three-Year Government Bond and Bond Futures**



Sources: Bloomberg L.P. and FOM TFRADData.

**Figure 4.2. KospI 200 Index Futures: Cumulative Net Purchases (in millions of U.S. dollars)**



Source: Bloomberg L.P.

fixed-income investments and away from equity and real estate.

The recent efforts by several Asian governments to extend the government bond yield curve played an important role in lengthening maturities of the interest rate swap contracts. However, the improvement in liquidity of longer-tenor bond futures has been uneven. For example, the daily volume on the three-year government bond future contract traded on the Korean Futures Exchange (Kofex) grew from 27,000 contracts in July 2001 to 66,000 contracts in July 2002. By contrast, the liquidity of the future contract on the five-year Singapore government bond launched in July 2001 declined markedly, with the average daily volume falling from 878 contracts in July 2001 to 351 contracts in July 2002, partly due to weak activity in the underlying cash market.

In some emerging market economies, most notably in Brazil and Hong Kong SAR, the interest rate swap market is more liquid than the underlying cash market and as a result performs functions that are typically provided by cash markets, such as price discovery and provision of benchmarks. For example, in Brazil, the local swap curve is the benchmark yield curve for maturities beyond one year. In Hong Kong SAR, because the small size of Exchange Fund bonds limits the liquidity of the secondary market, the swap market is more liquid and, therefore, drives the pricing of local bonds.

### Equity-Linked Derivatives

Compared with global currency and fixed-income derivatives, the equity-based derivative products represent a much smaller part of the global market, with most of the activity concentrated at the organized exchanges. This reflects in part the diminishing role of local equity markets as a source of funding for local entities. As of June 2001, the outstanding notional of equity-based options and futures was only 3 percent of the global outstanding notional of all types of derivatives (see Table 4.1). While the increased volatility in global equity markets over the past

years led more participants to use equity derivatives, the volume of exchange-traded equity futures and options in most mature markets nonetheless rose fairly modestly.

In contrast, the Korean Stock Exchange experienced exceptionally strong growth in equity options and futures trading on the back of increased participation by individual investors (see Figure 4.2), with the average daily volume of KOSPI200 options and futures reaching 3.5 million contracts in June 2002 compared to only about 400,000 contracts in June 2000. As a result, the Korean equity index derivatives market has become the second most active in the world after that of the United States. The Hong Kong Exchanges and Clearing Company (HKE) has also been very active in introducing new equity-linked derivative products, such as equity-linked notes and small-sized equity index option contracts, aimed at attracting retail investors. The Taiwan Futures Exchange (Taifex) launched similar instruments to increase retail investor participation. The average daily volume of index futures and options traded at Taifex rose from 2,000 contracts in July 2000 to almost 6,000 in July 2002, with around 90 percent of futures markets reportedly being represented by retail investors.<sup>2</sup>

In Latin America, the trading volume of stock options at the Brazilian Bovespa is the highest in the region. In EMEA, South Africa has a fairly well developed equity index futures and options market, with the outstanding notional exceeding that of the Korean market in June 2001 (see

Table 4.1). By contrast with index options and futures, the activity in derivatives based on individual emerging market stocks is much lower.

### Credit Derivatives

Although the global credit derivatives market is still a very small part of the global derivatives markets, it remains one of its fastest-growing segments despite several major credit events that shook the market over the past few years (for example, defaults by Russia and Argentina, and the collapse of Enron). The data collected as part of the BIS Triennial Survey showed that positions in the global credit derivatives market rose to \$693 billion at the end of June 2001 from \$118 billion at the end of June 1998.<sup>3</sup>

The market for credit derivatives in emerging markets mainly consists of credit protection instruments on external sovereign bonds that are traded offshore. Size estimates of this market range from \$40 billion for the outstanding notional as of mid-2001, according to *Risk* survey, to \$200–300 billion suggested by Deutsche Bank.<sup>4</sup> The most commonly used credit derivatives in emerging markets are credit default swaps (CDSs), credit-linked notes (CLNs), and collateralized debt obligations (CDOs).<sup>5</sup> The sovereign CDSs are the most liquid instruments in emerging market credit derivatives, accounting for around 85 percent of the total outstanding notional. The most actively traded contracts reference the external sovereign bonds issued by

<sup>2</sup>The contract volumes are based on the information provided by the FOW TRADE data.

<sup>3</sup>There is currently no single aggregate data source for credit derivatives markets and there are substantial differences in coverage and methodology between various data providers. For example, *Risk* surveys large dealers that make two-way market in OTC credit derivatives and does not eliminate double-counting, while the BIS surveys banks and dealers in around 50 countries and eliminates double-counting at the holding company level. A more detailed comparison of various data sources on credit derivatives can be found in the BIS *Quarterly Review* (2002).

<sup>4</sup>Both estimates exclude emerging markets in Asia. Deutsche Bank is believed to be the largest broker-dealer in emerging market credit derivatives, with an estimated market share of 50 percent (see Ranciere, 2002).

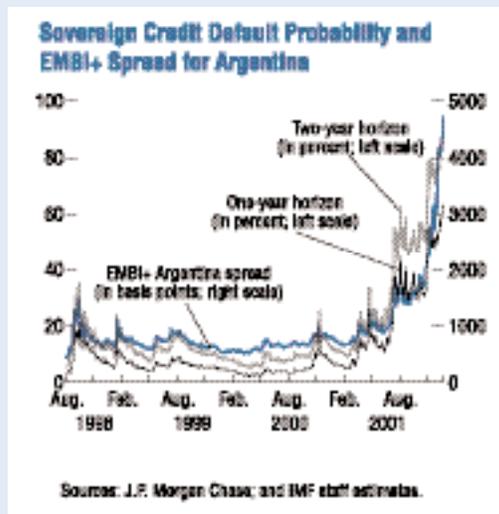
<sup>5</sup>A *credit default swap* is a financial contract under which the protection buyer pays a periodic fee (expressed in basis points per notional) in return for a payment by the protection seller contingent on the occurrence of a credit event. A *credit linked note* is a security with principal and/or coupon payments linked to the occurrence of a credit event with respect to reference entity (i.e., it is a structured note with an embedded default swap). In a synthetic *collateralized debt obligation* (CDO), the issuer of notes (protection buyer) is typically either a special purpose vehicle or a bank and the payments are usually linked to a portfolio (which may be actively managed) of default swaps referencing a variety of credit risks. The proceeds from issuance of CDOs are reinvested in a collateral consisting of highly rated government securities, which is used to pay interest and principal on the notes.

### Box 4.2. Credit Default Swap Spreads in Emerging Markets

The credit default swap curve, a plot of credit default swap spreads for different maturities, conveys useful information about market views on a sovereign's ability to honor its external debt, as well as the recovery value bond investors can obtain in case of debt default. The credit default swap curve is normally upward sloping because credit deterioration is more likely in the medium and long term than in the short term. If the sovereign is able to meet its debt repayments in the short term, changes in market perception about debt sustainability would likely result into parallel or steepening movements of the credit default swap curve. In contrast, problems associated to short-term financing needs would lead to a flattening of the credit default swap curve, as short-term spreads widen to compensate protection sellers for the increase in short-term risk. During periods of market stress, the credit default swap curve can become inverted, as in the case of Argentina during the second half of 2001, and more recently, of Brazil since June 2002.

Further information on default probabilities for a sovereign for different time horizons can be extracted using standard credit default swap valuation models. The figure shows the evolution of one-year and two-year default probabilities for Argentina between January 1990 and December 2001.<sup>1</sup> The approval of an IMF package for Argentina at the end of 2000 contributed to soothe investors' sentiment and reversed a sharp spike in default probabilities experienced in November 2000. However, increased concerns about the ability of Argentina to meet its debt payments amid continued deterioration of the country's fiscal position, together with an uncertain political climate, caused default probabilities to creep upwards during 2001. By the end of the second half of 2001, default probabilities reached levels not observed ever before. As it became clear that no further external aid was forthcoming

<sup>1</sup>Default probabilities were estimated using the credit derivatives pricing model described in Duffie (1999) and assuming a 25 percent recovery rate in case of default.



and that the government would refrain from implementing significant fiscal measures, default probabilities increased significantly at the end of the third quarter of 2001. By mid-December 2001, trading on Argentina default swaps stopped completely as no participant was willing to take a long position on Argentina credit risk, a position validated by Argentina's default in December 2001.

Credit default swaps are not the only financial instruments that contain useful information about sovereign risk, as sovereign bond spreads are also useful indicators of sovereign debt solvency. Indeed, the figure shows the high correlation between the default probabilities implied by credit default swaps and the EMBI+ spread for Argentina.<sup>2</sup> However, liquidity in the cash market is more likely to dry out during periods of stress than in the credit default swap markets. In fact, there is anecdotal evidence that following the serious disruptions in the cash market clearing mechanisms in the aftermath of the events of September 11, 2001, price discovery migrated from the cash market to the credit derivatives market.

<sup>2</sup>A detailed analysis of different sovereign risk measures for emerging markets, including implied default probabilities from credit default swaps and sovereign bond yields, is provided in Chan-Lau and Sy (forthcoming).

Brazil, Russia, Mexico, Turkey, and Venezuela. A relatively few top tier corporate credits (in Latin America, these include mainly Mexican names, such as Telmex and Cemex) are also traded in the CDS market, but these instruments are considerably less liquid and account for less than 5 percent of the emerging CDS market, excluding Asia. Market participants use credit default swaps as a tool for hedging against (or gaining exposure to) changes in credit spreads and default risk. Compared with cash instruments, the CDSs have several advantages: (1) they allow positions in maturities for which the cash instruments are illiquid or unavailable; (2) they require no collateral or upfront cash payment, subject to the counterparty's decision; and (3) they provide investors with an opportunity to take a short position vis-à-vis a particular credit for a longer term than in the repo market, in which positions typically have to be rolled over every one-to-three months.<sup>6</sup> Thus, emerging market credit default swaps are often used to take exposure to sovereigns for maturities shorter than those corresponding to outstanding bonds and to express views on sovereign default risk and on cross-country relative values (see Box 4.2).

Compared with other regions, credit default swaps activity in emerging Asia has been limited by the relatively small size of external sovereign bond market. However, the CDSs are rapidly gaining popularity, as they often provide higher market liquidity, higher returns, and longer yield curves than the U.S. dollar-denominated sovereign bonds. In some cases, the CDS market is more liquid than the underlying bond market. According to market sources, the average daily trading volume in the Asian CDS market rose to \$200 million in 2002 from \$100–150 million in 2001. In Korea, the onshore investors with excess cash reserves have reportedly been very active in the CDS market this year, buying credit protection in anticipation of widening spreads

on Korean bonds on the back of increased new issuance.

Some emerging markets, most notably Brazil and South Africa, have recently experienced a pickup in local credit derivatives activity. In Brazil, the government has made the first steps toward developing the onshore credit derivatives markets by allowing local banks to trade credit risk. In South Africa, trading in credit derivatives grew rapidly in 2001 on the back of a strong local demand for higher-yielding paper, amid a general shortage of government bonds and with bond yields hovering at all-time lows. However, in both countries, the local bond markets are fairly small and illiquid, limiting the CDS growth.<sup>7</sup> As a result, local banks tend to structure CLNs, which reference corporate bonds and promissory notes that are unlisted but traded over-the-counter. Nevertheless, many market analysts are optimistic and foresee the local credit derivatives market providing price discovery for the cash market and, thus, encouraging securitization in the medium term.

### Local Derivatives Markets and Capital Flows to Emerging Market Economies

There is a broad consensus that the rapid expansion of derivatives products during the past 10 to 15 years was an important factor that facilitated the growth of global cross-border capital flows (see, for example, Garber, 1998; and Dodd, 2001). Various traditional cross-border investment vehicles, such as loans, bonds, equities, and foreign direct investment (FDI) can potentially expose both lenders and borrowers to foreign exchange, interest rate, market, credit, and refinancing (liquidity) risks. By allowing investors to unbundle and redistribute these risks to those who are in a better position to manage them, derivatives make cross-border investments more attractive, thereby increasing

<sup>6</sup>Of course, an obvious disadvantage is that like in any insurance contract, no payout occurs if protection expires before the credit event.

<sup>7</sup>The type of reference obligations most commonly included in a CDS contract is “bonds,” and less often “bonds and loans” or “specified obligations.” In addition, the CDS counterparties use the underlying bond market to hedge their swap positions.

net flows and creating more opportunities for portfolio diversification. There are many ways in which the use of derivatives by local and foreign market participants can facilitate cross-border capital flows. Here are a few examples.

Currency derivatives can be used to change the currency of denomination of asset holdings and, therefore, to hedge investments against unexpected changes in exchange rates by both foreign and local investors. Foreign investors typically use currency derivatives to hedge their long local currency exposure in emerging markets, while local entities often use the same instruments to manage foreign exchange risk associated with external financing, typically in the three major currencies (U.S. dollar, euro, and yen). Thus, the level of external fundraising by local entities may, in part, be determined by the availability of the currency hedging instruments.

Another example is the basic single-currency interest-rate swap, which can allow the borrower with a floating interest rate loan/bond to hedge the interest rate risk by swapping floating rate payments for fixed-rate payments. Because interest rate swaps give borrowers an opportunity to exploit their comparative advantages for borrowing at fixed versus floating rates in different markets, they may encourage corporates or banks to seek external financing at more favorable terms instead of borrowing locally. Thus, the use of single-currency swaps can generate gross cross-border flows. In some emerging markets, most notably in Brazil, where local corporate treasurers use a floating local currency interest rate as a benchmark, interest-rate swaps have become central to the ability of local entities to manage the risks associated with foreign borrowing, given that funds raised internationally are typically at a fixed U.S. dollar rate.

Finally, credit derivatives add to the list of instruments that can potentially increase net flows into emerging markets. An attractive feature of credit derivatives is that they allow investors/lenders to manage the default/bankruptcy risks without having to buy or sell the underlying securities. For example, a foreign bank can reduce its credit exposure to a particu-

lar client without physically removing assets from its balance sheet and thus, effectively separate relationship management from risk management. Some market analysts argue that if international banks could use onshore credit derivatives in emerging markets, they would be more willing to maintain or increase their exposure to local corporate clients.

### Local Participation

Local entities with foreign exchange exposures are among the most active participants in the local derivatives markets. The relative importance of derivatives for local entities' fundraising in international markets varies across emerging market economies, depending on their net external borrowing needs as well as on the relative maturity of the local derivatives markets. In the emerging markets in Europe and Asia, the link between fundraising in international markets and derivatives activity is not as strong as in Latin America. Following the Asian crisis, many emerging market countries in Asia began to rely more on local currency financing. In addition, many of these countries are running significant current account surpluses, and thus do not have positive net external financing requirements. In emerging Europe, local entities have gained access to the international capital markets only a few years ago and are still facing regulatory restrictions on the use of derivatives.

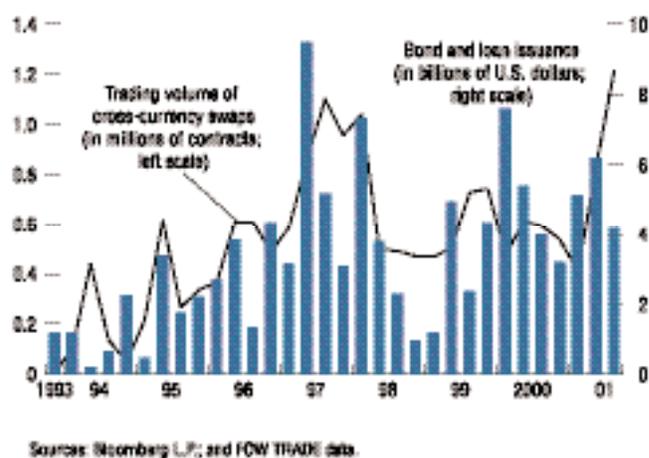
By contrast, in Brazil, the link between fundraising in international markets and derivatives activity has been particularly strong (see Figure 4.3). Virtually all local companies that have access to international financial markets raise U.S. dollar-denominated funds and then turn to the local derivatives market to swap the external financing obligations into *reais* with an interest rate indexed to the overnight (CDI) rate. Historically, the cost of U.S. dollar hedges in Brazil was fairly high due to the shortage of hedge provision, as most domestic institutional investors did not have foreign currency positions (in sharp contrast to the Chilean pension funds) and many exporters with U.S. dollar receivables nonetheless typically had overall net short U.S.

dollar positions. As a result, Brazilian corporates tended to invest part of their cash reserves in U.S. dollar-denominated securities in order to provide at least partial protection against an adverse exchange rate move. In 1999, the Brazilian central bank stepped in as the main provider of the currency hedge to the market through the issuance of U.S. dollar-linked securities. Furthermore, in March 2002, the Brazilian central bank decided to split the exchange rate linked instruments into *real*-denominated bonds and foreign-exchange swaps in order to lower its debt rollover costs and also to reduce the cost of currency hedging for local entities.<sup>8</sup>

Local market participants can also play a key role in the development of a local credit derivatives market, which can facilitate a more accurate pricing of corporate credit risk and help attract capital flows going forward. Many analysts believe that since local players are more familiar with local credit risk and less concerned about market liquidity than foreign investors, they are natural sellers of credit protection on emerging market corporate risk. On the other hand, local financial institutions that have exposure to local corporate credit risk (in the form of bonds, loans, receivables) are in a good position to structure products that match local investors' preferences for credit risk exposure. Currently, the market for corporate credit risk protection remains very illiquid in most emerging market economies, mainly due to the lack of a well developed local corporate bond market. However, local institutional investors, particularly pension funds and insurance companies in Latin America, have become more active users of credit derivatives over the past year. In emerging Asia, banks and insurance companies were

<sup>8</sup>This move was intended to result in a more efficient pricing of both instruments and a reduction of the transaction costs for end users of these instruments, with mutual funds being the main users of the *real*-denominated bonds, and with local corporates being the main users of currency hedges. Before March 2002, Brazilian corporates had to pay a premium to the financial intermediaries for transferring the U.S. dollar hedge component of the U.S. dollar-linked bond to them through currency swap arrangements.

**Figure 4.3. Brazil: International Bond and Loan Issuance and Derivatives Trading Volume**



also reported to have been actively buying CDSs and CLNs to boost yields in a low interest rate environment.

### Foreign Participation

Foreign investors in emerging markets generally include banks, corporates, “real money” accounts (both dedicated and crossover investment funds), and speculative money accounts (hedge funds and proprietary trading desks of investment and commercial banks). Compared with local entities, foreign investors’ participation in the local derivatives exchanges is fairly limited. Mexico, Hungary, Poland, and the Czech Republic have recently seen a considerable demand by international investors for long-term interest rate and local currency exposures that has been driven in part by the so-called “convergence trades,” with exposures established both in cash and derivatives markets.<sup>9</sup> As far as the OTC markets are concerned, the extent of foreign investor participation (both as final users of the derivative products as well as intermediaries) varies. In some countries, such as Singapore, Hong Kong SAR, and South Africa, foreign dealers account for the bulk of the turnover in the OTC markets, while in other countries, most of the trading goes through domestic dealers.

Both anecdotal evidence and industry surveys suggest that “real money” funds hedge relatively little of their risk exposures in emerging markets, either because of internal restrictions on leveraged positions or because these risk exposures are desirable. A survey of derivatives usage by U.S. institutional investors conducted in 1998 by the Stern School of Business at New York University (Hayt and Levich, 1999) showed that only 46 percent of respondents were permitted to use derivatives by their investment mandate,

and only 27 percent of respondents had open derivative positions at the time of the survey. Because many emerging market countries maintain various restrictions on foreign participation in local derivatives markets, one would expect that the percentage of the dedicated emerging market funds using local derivatives to hedge various risk exposures is even lower. Separately, our analysis of foreign institutional investors’ purchases of stocks in Brazil, Korea, Taiwan Province of China, and South Africa and the trading volumes in these economies’ currency and equity derivatives markets suggests that there is no statistically significant relationship between foreign purchases of cash instruments and the level of activity in local derivatives markets.<sup>10</sup> It should be noted, however, that in some emerging markets, local equities are a “natural hedge” against the foreign exchange risk (e.g., in South Africa, the share prices of companies with significant dollar receivables are often referred to as “rand hedges”). Also, in some emerging markets, foreign investors prefer to hedge their local bond market exposure via the repo market rather than by using currency derivatives.

In contrast with the “real money” accounts, speculative investors can use derivatives freely either for hedging risks associated with their cash market positions or for gaining leveraged returns or for exploiting relative value opportunities between the cash and derivatives markets. However, according to the Credit Suisse First Boston/Tremont, the leading provider of the hedge fund indices, emerging market hedge funds often employ a long-only strategy because “many emerging markets do not allow short selling, nor offer viable futures or other derivative products with which to hedge.”<sup>11</sup>

Both leveraged investors and dedicated emerging market debt funds are active participants in the credit derivatives markets for emerg-

<sup>9</sup>The term “convergence trade” refers to a bet that local inflation rate (and thus long-term interest rates) in an emerging market will converge to a particular developed market rate (in the United States or in the European Union) within a certain period of time or as economic integration progresses.

<sup>10</sup>This exercise uses monthly time series data of foreign purchases of local shares (from Bloomberg) and trading volumes in local equity and foreign exchange derivatives markets (from the FOW TRADEdata).

<sup>11</sup>See the notes on the index methodology on <http://www.tremont.com>.

ing market U.S. dollar-denominated bonds. The main protection sellers in credit derivatives markets are the major internationally active banks. Hedge funds have been the most active users of emerging market credit derivatives over the past year, mainly focusing on trading the basis between default swaps and bonds amid increased volatility in emerging debt markets.<sup>12</sup> The “convertible arbitrage” funds have also been among the active buyers of credit protection, using the CDSs to strip the credit component from the equity option of convertible bonds. The main features of credit derivatives that make them particularly attractive for hedge funds are: they provide an efficient way to short a credit with a relatively low risk of a short squeeze, and they are better instruments for structuring any relative value trading strategies than cash bonds because they allow better alignment between maturities of different credit exposures. However, for “real money” accounts, CLNs represent a more viable investment alternative than CDSs, since these funds are typically allowed to invest only in cash instruments.<sup>13</sup> Since the ability of foreign investors to manage the emerging market corporate default risk remains limited (due to the relatively underdeveloped state of the corporate credit default market), many emerging market borrowers are forced to issue bonds with various credit enhancements, particularly when the perceived credit risk rises (see Chapter V, in the March issue of the *Global Financial Stability Report*; IMF, 2002a).

## The Role of Derivatives in Emerging Market Crises

While derivatives do play a positive role by reallocating risks and facilitating growth of capital flows to emerging markets, they can also allow

market participants to take on excessive leverage, avoid prudential regulations, and manipulate accounting rules when financial supervision and internal risk management systems are weak or inadequate. In particular, the use (or rather misuse) of derivatives can potentially allow financial institutions to move certain exposures off balance sheets, thereby magnifying their balance sheet mismatches in ways that may not be easily detected by prudential supervisors and, as a result, may lead to a gradual buildup of financial system fragilities. Also, due to their very nature (i.e., the fact that they allow market participants to establish leveraged positions), derivative instruments tend to amplify volatility in asset markets. Thus, a negative shock to a country with already weak economic fundamentals, which typically triggers a sell-off in local asset markets, can also lead to an unpredictable and rapid unwinding of derivatives positions that can in turn accelerate capital outflows and deepen the crisis.

This section will discuss the role of derivatives in several emerging market crises, focusing mainly on two issues: (1) the types of financial derivatives used by market participants before the onset of a crisis and how the use of these instruments affected the stability of the domestic financial system; and (2) the impact of the unwinding of derivatives positions on the crisis dynamics after the onset of a crisis. While the Mexican and Asian crises highlighted the role of structured notes and swaps in magnifying balance sheet mismatches and the associated volatility in foreign exchange markets, the Russian and Argentine crises demonstrated the importance of counterparty risk and spillovers through credit markets. It should be pointed out that deteriorating fundamentals—mostly fiscal, but also financial in the case of Asia—were the main causes of the recent emerging market crises, but derivatives amplified the impact of these crises

<sup>12</sup>“Basis” is the difference between bond spread (over LIBOR) and the CDS premium for the same credit/same maturity.

<sup>13</sup>An important feature of CLNs is that they can be issued in Euroclearable form and listed on international exchanges. In contrast to CDSs, which do not pay the protection buyer until a credit event occurs, the credit-linked notes allow the protection buyer to receive cash payment at the time of the issuance of the notes, and thus eliminate the counterparty credit risk inherent in the CDSs.

on financial systems of emerging market economies. It should also be noted that the analysis of the role of derivatives in emerging market crises is seriously hampered by data availability, since the OTC derivatives transactions are not reported systematically. Thus, in many cases, anecdotal evidence and reported (ex post) losses on derivatives positions by major investment banks of the industrial countries are the main sources of information.

### The Mexican Crisis, 1994

In the early 1990s, the recently privatized Mexican banks engaged in an aggressive building up of their on- and off-balance sheet positions, which led to an increase of their credit and market risk exposures well beyond prudential limits. In particular, they used various derivatives in order to achieve leveraged returns. One of the popular instruments that allowed local banks to leverage their holdings of the exchange rate linked treasury bills (the Tesobonos) was a tesobono swap (Garber, 1998). In a tesobono swap, a Mexican bank received the tesobono yield and paid U.S. dollar LIBOR plus  $X$  basis points to an offshore counterparty, which in turn hedged its swap position by purchasing tesobonos in the spot market. The only transactions that were recorded in the balance of payments were: (1) an outflow of bank deposits related to the payment of collateral by the Mexican bank, and (2) a U.S. dollar inflow related to the purchase of tesobonos by the foreign investor. Thus, traditional balance of payments accounting provided a misguided representation of capital flows and associated risks—that is, although it appeared that the foreign investor had a long position in government bonds, it was in fact the local bank that bore the tesobono risk, while the foreign investor was effectively providing a short-term dollar loan. Tesobono swaps were not the only instruments that allowed local banks to establish leveraged

positions financed by short-term U.S. dollar loans from their offshore counterparties; other instruments included various structured notes and equity swaps.<sup>14</sup>

At the onset of the crisis and in the face of rising political uncertainty and weakening fundamentals that ultimately forced the authorities to float the peso, the tesobono yields jumped from 8 percent to 24 percent. As a result, the U.S. dollar value of the collateral fell, triggering margin calls on Mexican banks. Quoting market sources, Garber (1998) suggested that the total of margin calls on tesobono and total return swaps was about \$4 billion, adding to the pressure on the Mexican peso foreign exchange market.<sup>15</sup>

### The Asian Crises, 1997–98

As in the Mexican crisis, unhedged currency and interest rate exposures were key determinants of the severity and scope of the Asian crises (see IMF, 1998). Banks and nonfinancial corporations in Asia left their exposures unhedged because (1) domestic interest rates were higher than foreign interest rates, (2) the pegged exchange rates were generally perceived as stable, and (3) domestic hedging products were underdeveloped, while offshore hedges were expensive. Foreign banks were eager to lend to East Asian banks that tried to capture carry profits on the interest rate differentials. However, local prudential regulations, such as restrictions on the net open foreign exchange exposures and risk-to-capital ratios, limited the amount of profitable arbitrage trade. Therefore, Asian financial institutions turned to derivatives “to avoid prudential regulations by taking their carry positions off balance sheet” (Dodd, 2001, p. 10).

According to market sources, the majority of losses reported by both U.S. and European banks on their Asian lending were listed as due to swaps contracts, with the latter presumably including both total return swaps and currency

<sup>14</sup>Equity swaps are a subset of the total return swaps that are discussed later.

<sup>15</sup>At the end of 1994, foreign exchange reserves of the Banco de Mexico were at \$6.1 billion.

swaps (Kregel, 1998). In a total return swap, one counterparty paid the other the cash flows (both capital appreciation and interest payments computed on a mark-to-market basis) generated by some underlying asset (equity, bond, or loan) in exchange for dollar LIBOR plus  $X$  basis points. Thus, the flows between Asian financial institutions and foreign counterparties were similar to those in the tesobono swap described above. As in the case of tesobono swaps, offshore counterparties were buying the underlying assets to hedge their swaps positions, while local banks were left with short U.S. dollar positions. After weakening fundamentals led to a collapse of the exchange rate peg and domestic interest rates rose, both counterparties had incentives to either unwind the swaps or hedge their foreign exchange exposures, which exacerbated the sell-off in Asian assets and currencies.<sup>16</sup>

### Russia's Default and Devaluation, 1998

Although the poor state of Russia's fiscal accounts was well-known by mid-1998, the announcement of a 90-day moratorium on external debt payments on August 17, 1998 caught most market participants by surprise. At the time of the default and devaluation, the estimates of the outstanding notionals of the U.S. dollar-ruble NDF contracts ranged from \$10 billion to \$100 billion, and the total foreign exposure to the domestic bond market (GKO/OFZs) was around \$20 billion. According to market sources, the U.S. dollar-ruble foreign exchange forwards with Russian firms as counterparties were the largest source of credit losses by major swap dealers during 1997–98, exceeding the losses made on their Asian lending. The events in Russia highlighted the presence of convertibility risk even when local currency positions in

emerging markets were hedged, and raised the issue of the NDF valuation when an official rate was not available. In addition, Russia's default sent shock-waves through the credit-derivatives markets, with the cost of protection increasing in all sectors, including the investment grade segment. Ambiguous and often misleading definitions of reference obligations, credit events, and settlement mechanics made it very difficult for protection buyers to enforce the contracts. According to dealers, many CDS contracts were initially triggered under "failure to pay" clauses, but the attempts to enforce the contracts under such clauses were often frustrated by other credit events that appeared more significant and, therefore, had to carry more weight under contractual law. In order to address the legal issues highlighted during the Russian crisis, the International Swaps and Derivatives Association (ISDA) issued new credit derivative documentation guidelines in 1999.<sup>17</sup>

### Argentina's Default and Devaluation, 2001–02

In contrast with the Russian crisis, the Argentine default and devaluation in December 2001 were widely anticipated and occurred at a time when the credit derivatives market was relatively more mature. The protracted recession and gradual deterioration of the sovereign's credit quality gave market participants sufficient time to exit the bond and credit protection markets and also allowed the main sellers of credit protection on Argentine sovereign bonds (broker-dealers) to hedge their books in the repo market. According to market sources, liquidity in the Argentine CDS market dried up in August–September 2001, following a bout of volatility in July. The announcement of the moratorium on all debt payments on December 23, 2001 was unanimously accepted as

<sup>16</sup>Other structured instruments were also used in the run-up to the Asian crisis. For example, one of the well-known instruments was called a PERL—principal exchange rate linked note. A PERL was a dollar-denominated instrument that generated cash flows linked to a long position in an emerging market currency. If the exchange rate remained stable, the return on the PERL was significantly higher than the return on the similarly rated dollar paper, but in the event of major depreciation, the return could become negative (Dodd, 2001).

<sup>17</sup>The most recent (1999) ISDA guidelines include the following types of credit events: "failure to pay," "obligation acceleration," "obligation default," "repudiation/moratorium," and "restructuring."

a “repudiation/moratorium” credit event consistent with the ISDA definitions. There were, reportedly, some disputes as to which bonds could be considered as “deliverable,” but they have been resolved fairly quickly. According to market sources, 95 percent of all CDSs were settled by mid-February 2002 and there were no reported failures to deliver, with the total sum of contingent payments from the protection sellers to the protection buyers estimated at \$7 billion (Ranciere, 2002).

### Concluding Remarks

Local derivatives markets in emerging economies have grown rapidly over the past few years, especially in countries that have removed capital controls and have developed their underlying securities markets. The growing use of derivative products by emerging market participants has also supported capital inflows, and has helped investors to price and manage the risks associated with investing in emerging markets. However, the use of derivatives has also made crises dynamics in some recent episodes more unpredictable by accelerating capital outflows, amplifying volatility, and, in some cases, increasing the correlation between asset and currency markets. In many of these episodes, the negative impact of derivatives on crisis dynamics was either due to the immaturity of local derivatives markets or to weak prudential supervision, which allowed some financial institutions to build up leveraged positions before the onset of a crisis. The policy implications of the trends described in this chapter will be discussed in the next issue of the *Global Financial Stability Report*, in a broader context of the development of local securities markets and of the role of these markets in providing an alternative source of funding, a vehicle for managing risks, and an attractive destination for foreign investments.

### References

- Bank for International Settlements, 2002, *Triennial Central Bank Survey: Foreign Exchange and Derivatives Market Activity in 2001*, March.
- \_\_\_\_\_, 2002, *Quarterly Review*, June.
- Chan-Lau, Jorge, and Amadou Sy, forthcoming, “A Comparative Study of Sovereign Risk Measures, IMF Working Paper.
- Credit Suisse First Boston/Tremont website: <http://www.tremont.com>
- Deutsche Bank, 2001, “Emerging Market Credit Derivatives,” Global Markets Research.
- Dodd, Randall, 2001, “The Role of Derivatives in the East Asian Financial Crisis,” Economic Strategy Institute, The Derivatives Study Center; see <http://www.econstrat.org>.
- Duffie, Darrell, 1999, “Credit Swap Valuation,” *Financial Analyst Journal*, Vol. 55 (January/February), pp. 73–87.
- Garber, Peter, 1998, “Derivatives in International Capital Flows,” NBER Working Paper No. 6623, (Cambridge, Mass.: National Bureau of Economic Research).
- Hayt, Gregory, and Richard Levich, 1999, “Who Uses Derivatives?,” *Risk* (August).
- International Monetary Fund, 1998, *International Capital Markets Developments, Prospects, and Key Policy Issues*, World Economic and Financial Surveys (Washington).
- \_\_\_\_\_, 2000, *International Capital Markets: Developments, Prospects, and Key Policy Issues*, World Economic and Financial Surveys (Washington).
- \_\_\_\_\_, 2001, *International Capital Markets: Developments, Prospects, and Key Policy Issues*, World Economic and Financial Surveys (Washington).
- \_\_\_\_\_, 2002a, *Global Financial Stability Report*, World Economic and Financial Surveys (Washington, March).
- \_\_\_\_\_, 2002b, *Global Financial Stability Report*, World Economic and Financial Surveys (Washington, September).
- Kregel, J.A, 1998, “Derivatives and Global Capital Flows: Applications to Asia,” *Cambridge Journal of Economics*, Vol. 22 (November), 677–692.
- Patel, Navroz, 2002, “The Vanilla Explosion,” *Risk* (February).
- Ranciere, Romain, 2002, “Credit Derivatives in Emerging Markets,” (unpublished; New York: New York University, Stern School of Business).
- Schinasi, Garry J., R. Sean Craig, Burkhard Drees, and Charles Kramer, 2001, *Modern Banking and OTC Derivatives Markets: The Transformation of Global Finance and Its Implications for Systemic Risk*, IMF Occasional Paper No. 203 (Washington: International Monetary Fund).

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