

**FOR  
AGENDA**

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February 14, 2002

To: Members of the Executive Board

From: The Secretary

Subject: **Global Financial Stability Report**

Attached for consideration by the Executive Directors is the first quarterly *Global Financial Stability Report*, which is tentatively scheduled for discussion on Wednesday, February 27, 2002.

Questions may be referred to Mr. H. Tran (ext. 37324).

The report will be revised for publication in light of the Executive Board discussion. If Executive Directors have additional comments, they may notify Mr. Tran by close of business on Tuesday, March 5, 2002. An edited version of the report will be published on the Fund's external website on Wednesday, March 13, 2002 in preparation for a press conference to be held on Thursday, March 14, 2002.

Att: (1)

Other Distribution:  
Department Heads



INTERNATIONAL MONETARY FUND

**Global Financial Stability Report**

Prepared by the International Capital Markets Department  
(In Consultation with other Departments)

Approved by Gerd Häusler

February 14, 2002

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## Preface

This is the first *Global Financial Stability Report*, a quarterly publication produced by the IMF's International Capital Markets Department. It replaces two IMF publications: the annual *International Capital Markets Report* (published since 1980) and the quarterly *Emerging Market Financing* (published since 2000). The report was created to provide a more frequent assessment of global financial markets and to address emerging market financing in a global context. The report focuses on current conditions in global financial markets, highlighting issues of financial imbalances, and of a structural nature, that could pose a risk to financial market stability and sustained market access by emerging market borrowers. As a quarterly, it will focus on relevant contemporary issues and not try to be a comprehensive survey of all potential risks, nor delve too much into macroeconomic imbalances within or among countries. It will regularly contain, as a special feature, articles on structural or systemic issues relevant to international financial stability. Thus, the report is part of a broad effort by the IMF to strengthen bilateral and multilateral surveillance of international financial markets, with a view to promoting financial stability as a global public good. Other components of this broad effort include integrating financial market assessment with the *World Economic Outlook*, the World Economic and Market Developments review, work on private sector involvement in the resolution of financial crises, work on standards and codes, the Financial Sector Assessment Program (FSAP), and Special Data Dissemination Standards (SDDS).

The *Global Financial Stability Report* was prepared in the International Capital Markets Department, under the direction of the Counsellor and Director, Gerd Häusler. The *Global Financial Stability Report* project is directed by an Editorial Committee comprised of Hung Q. Tran (Chairman), Bankim Chadha, Donald J. Mathieson, and Garry J. Schinasi, and benefits from comments and suggestions from William E. Alexander, Charles R. Blitzer, Matthew Fisher, Peter Dattels, Ronald Johannes, and Effie L. Psalida. Other contributors to the report from the International Capital Markets Department are Torbjorn Becker, Peter Breuer, Jorge Chan Lau, Anna Ilyina, Charles Kramer, Subir Lall, Gabrielle Lipworth, Jens Nystedt, Jorge Roldos, Srikant Seshadri, R. Todd Smith, Krishna Srinivasan, Amadou Sy, and James Yao. Martin Edmonds, Silvia Iorgova, Anne Jansen, Oksana Khadarina, Yoon Sook Kim, Advin Pagtakhon, and Peter Tran provided research assistance. Maame Baiden, Caroline Bagworth, Lucia Buono, Vera Jasenovec, Sheila Kinsella, Ramanjeet Singh, Adriana Vohden, and Joan Wise provided expert word processing assistance. Jeff Hayden of the External Relations Department edited the manuscript and coordinated production of the publication.

This particular quarterly issue of the report draws, in part, on a series of informal discussions with commercial and investment banks, securities firms, asset management companies, insurance companies, pension funds, stock and futures exchanges, and credit rating agencies in London, New York, and Tokyo. The report reflects mostly information available up to February 8, 2002.

The study has benefited from comments and suggestions from staff in other IMF departments, as well as from Executive Directors following their discussions of the *Global Financial Stability Report* on February 27, 2002. However, the analysis and policy considerations are those of the contributing staff and should not be attributed to the Executive Directors, their national authorities, or the IMF.



## I. Overview

The year 2001 has yet again demonstrated how resilient the international financial system was in the face of a number of serious challenges. In chronological order, the past year saw the continuing deflation of the telecom, media, and technology (TMT) bubble across global markets, the onset of a recession in the United States amid a synchronized global slowdown, a financial crisis in Turkey, the terrorist attacks on September 11, the bankruptcy of Enron—the biggest in a year marked by a record number of bond defaults—and the default by Argentina after a long and drawn-out crisis. Throughout these events, several of which represented serious problems requiring prompt attention by the appropriate authorities, the international financial system has shown remarkable resilience. This capacity to absorb shocks has been bolstered by the robustness of the infrastructure of the financial system and the key players in it; the vigilance and ready action of the financial and monetary authorities to ensure the smooth functioning of the system, including through the timely provision of liquidity support; and the increasingly discriminating investment behavior of market participants. Going forward, this resilience would again be tested if a global economic recovery is subdued and/or delayed. However, the starting conditions this year would be weaker than those at the beginning of 2001.

As analyzed in *Chapter II*, financial markets ended the year on a positive note. Equity markets recovered and rallied noticeably from their lows of late September. In bond markets, yield spreads of corporates and high-yielding bonds, particularly emerging market bonds, narrowed against U.S. Treasuries. At the same time, the U.S. Treasury yield curve steepened, and the U.S. dollar has strengthened. Financial markets thus anticipate, and have priced in, a recovery in economic activity and corporate earnings during 2002. In the emerging market bond markets, signs of financial contagion moderated markedly. Fallout from the Argentina crisis and default has been quite limited, in contrast to most previous experiences. The reasons for such noncontagion include more discriminating investment behavior by market participants, the lack of any surprise element as the crisis slowly proceeded to what the markets anticipated would be an inevitable default event, as well as various technical factors such as limited leveraged positions and the significant reduction in Argentina's weight in emerging market bond indexes, such as the EMBI+. New issuance by emerging market sovereign borrowers has revived since November and this rebound has continued in the new year. For those emerging market countries, which have so far avoided financial contagion from Argentina, it is important to reinforce the positive sovereign and credit risk assessment currently held by investors. This can be most effectively achieved by both strengthening sustainable macroeconomic policies where necessary, and consolidating the microeconomic reform and institution building achieved in recent years.

At present, the consensus view that the global economy will recover during the course of 2002 is being buttressed by recent economic statistics. In spite of this widespread expectation, as well as the demonstrated resilience of the international financial system, there is no reason for complacency. In the view of many market participants, the risk of a subdued and/or delayed global economic recovery, subjecting the world to a second straight year of

slow growth, as well as opening a gap between financial market expectations and economic performance, is not insignificant. If that were to materialize, it would exacerbate some of the underlying weakness in the financial sector. From a historical and cyclical perspective, it is important in the months ahead to see whether the recovery in economic activity and corporate earnings will validate market expectations, especially for equities. If not, the likely adjustment in asset prices and deterioration in credit quality could erode the still fragile business and consumer confidence. The implications of a subdued—and/or a delay in—economic recovery for financial market stability are explored in *Chapter III*. First, downward asset price adjustment and further deterioration in credit quality could weaken balance sheets of corporates, households, and financial institutions in the major industrialized countries, all of which have increased their exposure to traded financial assets in recent years. Second, a subdued recovery would put further pressure on banks' profitability. These developments could be more worrisome in light of the fact that present levels of indebtedness in the major industrialized countries, both in the corporate and the household sectors, are still high from a cyclical perspective, even though their burden has been lessened by cyclically low interest rates. Consequently, adverse financial market developments could impair the incipient recovery and make a sustainable recovery more difficult to achieve. The appropriate policy response by the international community to help sustain demand has been described in the IMF's *World Economic Outlook*, December 2001. However, to the extent that the eventual recovery is accompanied by a further rise in the level of indebtedness, thereby increasing the sensitivity of these economies and financial systems to financial asset price fluctuations, the situation warrants close monitoring in the period ahead.

Of some concern is the health of individual financial institutions in the major industrialized countries that have been weakened by the events of 2001. The resilience of the international financial system mentioned above has been due largely to the strength of banking systems, and financial systems in general, in key countries, particularly the United States. The banks in these countries have built up their capital strength through improved profitability during the long expansion of the 1990s, ongoing consolidation, and improvements in operational technology and risk management practice. However, progress was not uniform or even among banks in the industrialized countries; those lagging behind in the pace of consolidation and restructuring have continued to cope with overcapacity, stiff competitive pressure, and poor profitability in their home markets even before the synchronized growth slowdown. For some other institutions, diversifying into overseas markets, including emerging markets, and pursuing new activities, including lending to the telecom industry and engaging in credit derivative business, have exposed them to the potential of additional losses. In particular, in Japan, the weight of nonperforming loans amid a prolonged period of deflation has seriously weakened many banking institutions, leading to their downgrading by the major rating agencies. Adverse financial market developments would further squeeze the weak institutions between sharply reduced earnings expectations and a still rigid cost base, now burdened with the need for further loan loss provisioning. In the period ahead, such conditions would probably speed up the financial sector consolidation process, both in market and cross border.

Slow economic growth would also, if it were to occur, provide an important test of the performance and stability of the market for credit risk transfers that has grown rapidly in recent years. Overall, the proliferation of credit risk transfer instruments, including credit risk swaps, credit derivatives, and collateralized debt obligations (CDOs), has enabled banks to remove credit exposures from their balance sheets and to distribute them more widely among market participants. In 2001, the market seemed to be able to cope with a series of credit events, with payments by and large being made by credit risk protection sellers to protection buyers; even though in some cases only after arbitration (these cases have led to improvements in the International Swap and Derivatives Association documentation, widely used in the market). Further deterioration in credit quality, which as a lagging indicator could persist for some time even if the global economy recovers, would continue to test the market.

Independent of economic performance, several areas of risk are surfacing. First, to the extent that *regulatory arbitrage* drives the growth of the market, banks may be encouraged to originate more credit business than they would have done otherwise, and then to transfer the credit risks to non- or less-regulated entities, particularly with regard to capital adequacy requirements, such as insurance companies and, to a lesser degree, hedge funds. Banks, having significantly substituted traditional credit risks for counterparty risks, now depend on their counterparties to perform when a credit event occurs to keep their exposure within limits *ex post*. This, however, has been shown to be uncertain in many cases. Second, the group of important *nontraditional players* has expanded to include industrial companies with an active financial arm. Due to the lighter (or lack of) financial regulatory regime, their disclosure has been less adequate than from regulated financial institutions, leading to a lack of information and transparency about the overall development of the market and the pattern of risk distribution and concentration in the financial system. This makes it difficult for market participants to gauge accurately the creditworthiness of companies and institutions in a timely fashion. Third, the *complexity* of instruments and transactions has grown over time, and when a credit event occurs, it is not clear that all contracts can be expected to be automatically executed in a way that protection buyers expect and with a high degree of certainty. This is a risk even if one allows for the fact that new financial instruments will have “teething” problems initially as to solid legal documentation. The collapse of Enron, and subsequent events, illustrates the three areas of risk described.

As a consequence, there seems to be the need to review and possibly update regulatory regimes in the industrialized countries to keep pace with the ongoing process of modernization and globalization of finance. Specifically, there is the issue of regulatory arbitrage that might distort the origination, distribution, and pricing of credit risks; and the need to identify and address the gaps in regulation that have allowed significant players in the financial markets, be they banks or nonbanks, not to operate under a comparable and consistent regulatory framework (“same business, same risk, same rule”). The national authorities are already looking to develop and enforce appropriate disclosure requirements to enhance transparency in these complex markets. In addition, accounting rules and standards are also in the process of being updated to address the increasing complexity of financial transactions. Of immediate interest is the enhanced transparency of off-balance-sheet risk management structures such as special purpose vehicles (SPVs)—particularly the extent to

which such vehicles genuinely remove risks from the balance sheet of the originating entity rather than merely disguise them. Such enhanced transparency could strongly bolster the effectiveness of market discipline as the first line of defense against financial instability by enabling market participants to more clearly identify financial imbalances at an early stage. The resulting repricing of credit to those institutions could work to limit the buildup of such vulnerabilities before they reach an unsustainable level and potentially pose risks to financial stability.

On the heels of slow global growth and of crises in Turkey and Argentina, the need to further develop and refine early warning systems (EWS) as a tool for crisis prevention has again become relevant to the international financial community. *Chapter IV* analyzes the performance of existing early warning systems models that focus mostly on foreign exchange markets. The way forward includes building models for banking and debt crises in addition to enhancing the existing ones on foreign exchange crises, examining the linkages among different types of crises and across countries (contagion), and making more efficient use of information embedded in financial asset prices. *Chapter IV* also lays out a research program in this area for the IMF in the period ahead.

*Chapter V* addresses the role of alternative debt instruments—other than new “plain vanilla” bonds and regular loan issues—in enabling emerging market sovereigns to maintain access to global capital markets and better manage their debt through risk diversification. The need for such instruments may increase at times of financial stress, when investor appetite for emerging market debt could diminish and borrowing costs increase. In such circumstances, emerging market sovereigns often have adjusted their debt management strategies, and have made use of debt instruments embodying innovative features, including debt augmentations, time varying and state contingent instruments, structured notes, and collateralized borrowing. *Chapter V* evaluates these instruments and presents a comparative analysis of the benefits and costs of their use, including the risks of locking into high debt-service costs for prolonged period of time and creating inflexible debt structures, as well as the implications of the difficulty that markets often have in pricing these instruments.

## II. Recent Developments in International Capital Markets

Changing perceptions of the economic slowdown and the prospects for recovery dominated global market developments during the fourth quarter of last year, and continue to do so in 2002. Markets had reacted strongly to the events of September 11, before staging a sharp rally from the beginning of the quarter as global risk aversion subsided (see Figure 2.1).<sup>1</sup> The heightened market uncertainty associated with the events surrounding September 11 initially translated into high levels of risk aversion at the beginning of the fourth quarter. Measures of risk aversion steadily dissipated during October and November, with a consensus emerging that, in hindsight, financial markets overreacted to the potential impacts of the September 11 events. The subsequent rally, in conjunction with a strong revision of views on economic recovery and its strength and scope, was also influenced by several technical factors and ample liquidity on the part of investors.

### The Recovery Rally

During October and November, financial markets rose markedly to price in an imminent recovery in global activity, led by the United States, though opinion remained divided on the timing and speed of the recovery (see Figure 2.2). These expectations of economic recovery combined with a decline in the “political” risk premium, reflecting progress in the operation in Afghanistan, and led to a decline in measures of global risk aversion to well below pre-September 11 levels and

Figure 2.1. Global Risk Aversion

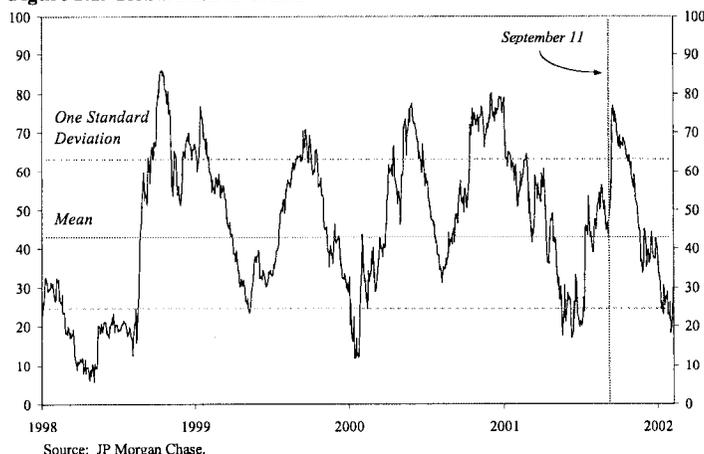
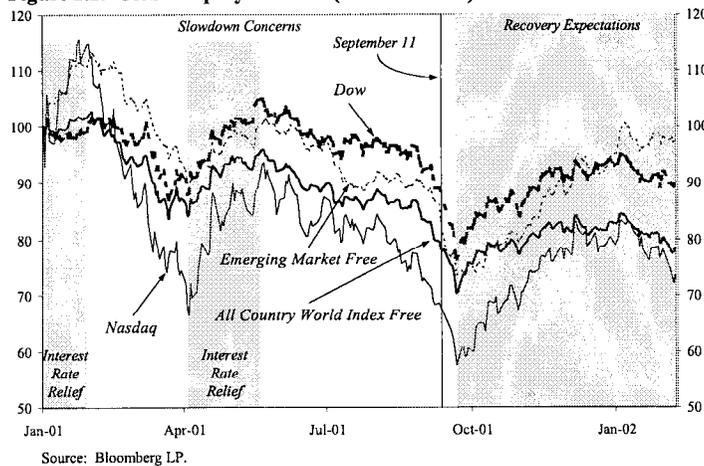


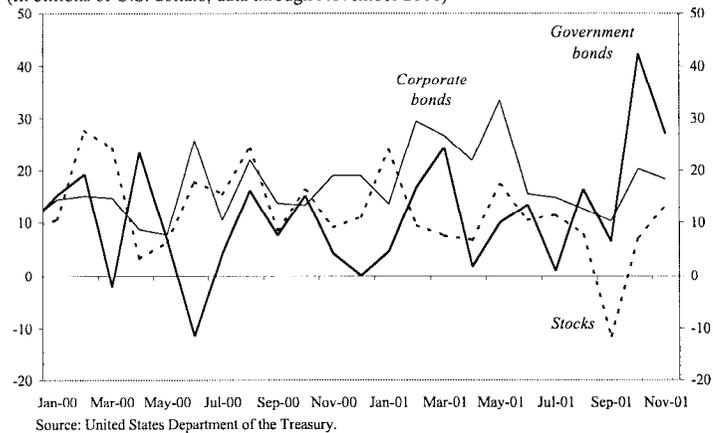
Figure 2.2. Global Equity Markets (Jan 2001=100)



<sup>1</sup> JP Morgan's Liquidity and Credit Premia Index (LCPI). This index attempts to measure risk aversion more broadly, and, therefore, captures not only risk appetite but also the liquidity premia demanded in U.S. financial markets. See *Emerging Market Financing* (November 14, 2001) for a detailed discussion.

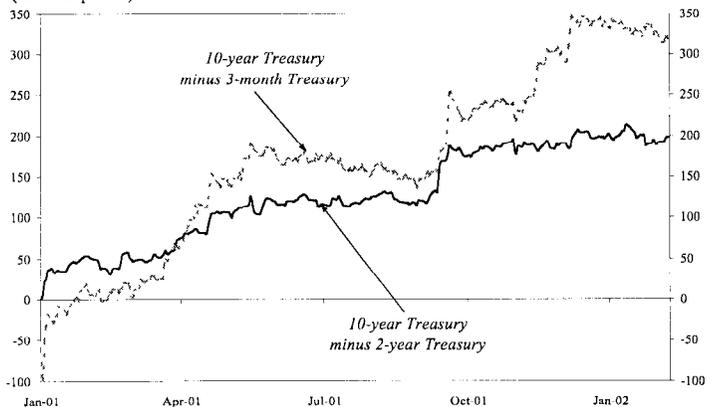
into markedly benign territory. Oil prices remained low, supporting a benign outlook for inflation. Equity markets rallied first, followed by a sharp sell-off in U.S. bond markets, while spreads in high-yield (sub-investment grade) and emerging market bonds (except Argentina) narrowed. Foreign investors in the United States reduced net purchases of both stocks and bonds in September as global risk aversion rose (see Figure 2.3). By October, however, they began participating in both the U.S. equity and bond market rallies, and by November, as risk aversion declined further, they reduced purchases of bonds while adding to their purchases of U.S. stocks.

**Figure 2.3. Net Purchases by Foreigners from U.S. Residents**  
(In billions of U.S. dollars; data through November 2001)



With the sharp movement in asset prices to price in an imminent economic recovery raising questions about whether financial markets were being too optimistic, the dynamics of the turnaround in global market sentiment are of interest. While changes in market perceptions regarding the U.S. growth outlook, and the budget deficit were the fundamental factors causing the steepening of the U.S. yield curve, several technical factors had triggered, and later reinforced, this trend (see Figure 2.4). One technical factor was the rebalancing by asset allocation funds (mostly insurance company related) from their government bond portfolios, which had impressively overperformed in the aftermath of September 11, toward their equity portfolio. This rebalancing aimed at restoring funds' preferred weightings between equity and fixed income that had become skewed by up to 15 percentage points.

**Figure 2.4. U.S. Treasury Yield Curves**  
(In basis points)



Simultaneously, many investors overweighted their portfolio holdings of U.S. Treasuries in the aftermath of September 11, expecting an aggressive monetary policy response by the U.S. Federal Reserve. These long positions initially proved highly profitable. However, following the turnaround in the U.S. stock market, they became increasingly unattractive, and by the second week of November the liquidation of these long positions contributed to a surge in the yield on U.S. 10-year benchmark bonds (36 basis points on November 15 alone). Furthermore, portfolios including mortgage backed securities (MBS) faced a significant increase in the duration of their

holdings as a result of the decline in interest rates (by as much as 40 percent). In order to bring the duration of their portfolios back, MBS holders sold longer maturity U.S. Treasury bonds, such as the benchmark 10-year, thereby contributing to the spike in yields.

During the fourth quarter, *equity market performance* also reflected perceptions of recovery. Morgan Stanley's All Country World Index—Free (ACWIF) gained 9 percent, the S&P 500 rose 10 percent, while the Nasdaq posted a record quarterly return of 30 percent. An indication of investor expectations driving the rally is provided by the fact that cyclical sectors (mainly consumer durables, commercial services, and technology) significantly outperformed defensive sectors during the rally, indicating investors were positioning for an imminent recovery (see Table 2.1). A similar pattern was also in evidence in European

markets, whereas there is little evidence of Japanese equities pricing in a strong economic recovery. The impact of the crisis in Argentina, however, sparked a sell-off in Spanish stocks, especially banks and telecom companies. The strong rebound in *emerging equity markets* (see Figure 2.2), viewed as a "high beta" (that is, more than proportional comovement) play on the state of the global economy, exactly on cue with global equity markets, also suggests investor positioning on expectations of a global recovery. Technology was by far the best performing

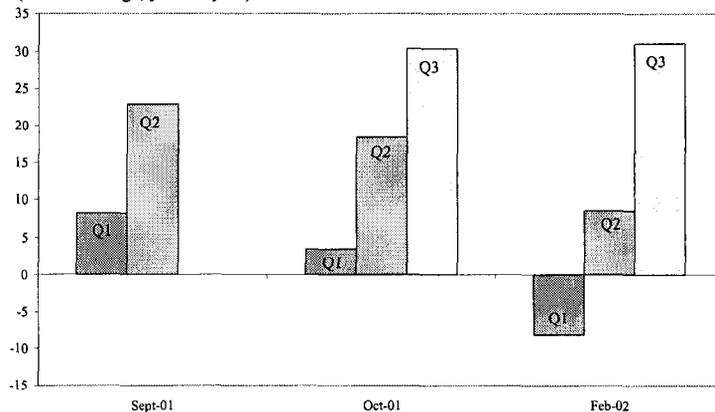
Table 2.1. Total Return Performance of Mature Equity Markets  
(In percent)

	Jul. 1 - Sep. 10	Sep. 10 - Sep. 21	Sep. 21 - Dec. 31	Sep. 10 - Dec. 31
MSCI US\$ index	-10.7	-11.6	18.2	4.5
Cyclical sectors	-17.2	-16.1	27.5	7.0
Defensive sectors	-2.5	-6.7	8.6	1.3
Banks and financials	-11.8	-12.5	21.8	6.6
MSCI EU\$ index	-10.0	-13.9	23.8	6.7
Cyclical sectors	-11.3	-17.4	31.4	8.6
Defensive sectors	-9.4	-7.7	15.4	6.5
Banks and financials	-8.5	-20.7	29.8	2.9
MSCI Japan \$ index	-14.4	-4.1	-6.2	-10.1
Cyclical sectors	-17.9	-8.1	3.1	-5.3
Defensive sectors	-9.6	4.9	-12.7	-8.4
Banks and financials	-6.3	-1.9	-29.6	-30.9

Source: Morgan Stanley Capital International.

Technology was by far the best performing sector, with returns for the sector exceeding the average for other sectors by more than two standard deviations. This equity market rally occurred despite continuing downward revisions to near term *corporate earnings forecasts* (see Figure 2.5). The rally lost some steam in early December and January, coinciding with Enron's bankruptcy filing which raised, among other things, doubts about the reliability of corporate income statements.

Figure 2.5. S&P 500 Earnings Growth Forecasts for 2002  
(Percent change, year on year)



Source: Thomson Financial First Call.

The increasing appetite for risk in the fourth quarter was clearly apparent in *credit markets* where, for example, in the United States the pronounced flight to quality of the third quarter in the aftermath of September 11 was more than reversed (see Table 2.2). In sharp contrast to the third quarter, where returns were positively related to credit ratings, returns in the fourth quarter were inversely related to credit ratings. European investment grade corporates performed similarly, with evidence of flight to quality in the third quarter (while AAA corporates posted a 3.3 percent return, BBB corporates had a -0.7 percent return) followed by a partial reversal in the fourth quarter.

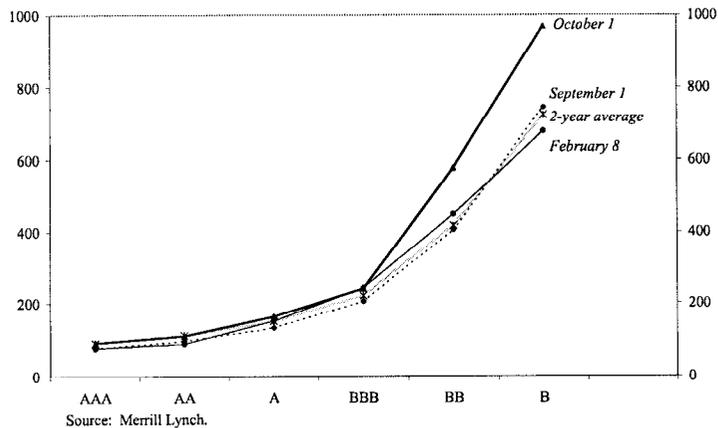
**Table 2.2. U.S. Corporate Bond Total Returns**  
(In percent)

	Sept. 10- Sept. 26	Third Quarter	Fourth Quarter	2001	Year-to- Date 1/
AAA	0.9	4.8	0.5	9.4	1.2
AA	0.8	4.6	0.9	10.7	1.3
A	0.5	4.4	0.7	11.0	0.9
BBB	-0.1	3.7	0.8	10.5	0.4
BB	-4.9	-1.9	4.4	11.1	-0.3
B	-6.2	-4.9	6.5	2.6	0.9
C	-9.7	-8.3	7.0	4.3	-0.2

Source: Merrill Lynch.  
1/ February 8.

The post September 11 steepening of the “*credit quality curve*,” (average spreads measured against average credit quality of issuers) was fully reversed by early December (see Figure 2.6). By early January, reflecting expectations of economic recovery and a further move down the credit spectrum, the credit quality curve had flattened relative to pre-September 11 levels. However, high-yield spreads remain high by historical standards, consistent with market expectations (reinforced by the bankruptcies of Enron, Kmart, and Global Crossing) of continued high rates of corporate defaults. For the year as a whole, investment grade bonds posted their best year since 1995, while high-yield bonds turned in a modestly positive performance after a dismal 2000.

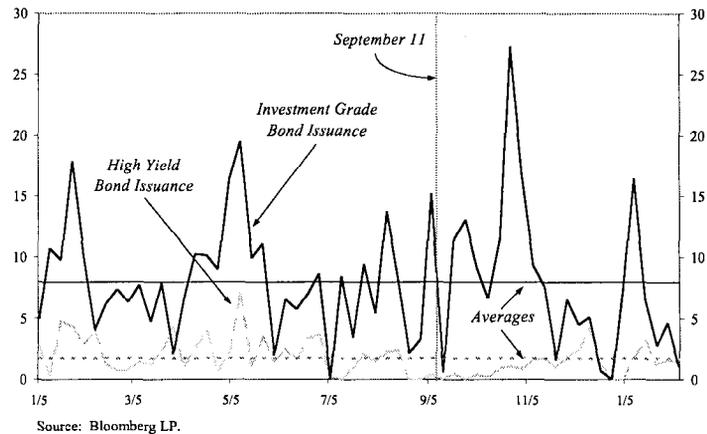
**Figure 2.6. U.S. Credit Curves**  
(Spreads in basis points)



In *primary markets*, U.S. high (investment) grade corporate bond issuance reached a record weekly level of \$27 billion by the end of October, reflecting pent up demand to issue as a result of disruptions in the aftermath of September 11, and an increased demand to issue

debt in the low interest rate environment (see Figure 2.7). With the rally in credit markets losing steam by late November, and many issuers having pre-financed their needs, high-grade issuance fell well below average levels by the end of the year, picking up again in early January. High-yield issuance, in contrast, was slow to recover, not reaching weekly average levels over the previous year until December and was slow to pick up again in January.

Figure 2.7. U.S. Domestic Bond Issuance  
(In billions of U.S. dollars)

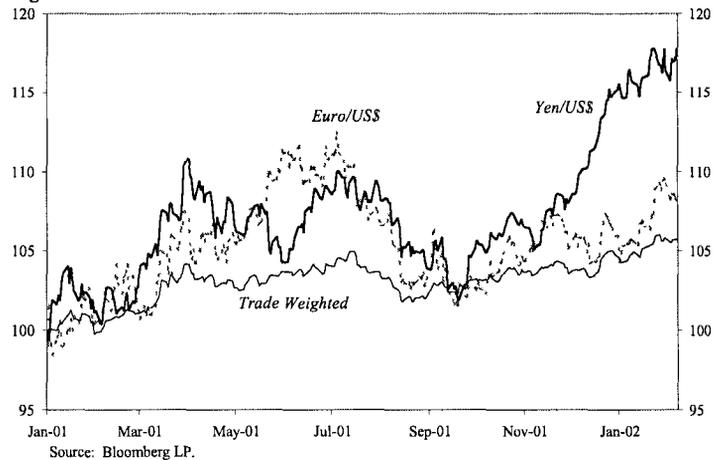


The fourth quarter saw a pickup in *syndicated lending* in the mature markets.

Lenders, however, remained discriminating regarding credit quality, with U.S. bank lending standards continuing to tighten. Refinancings continued to dominate deal flows as borrowers sought to take advantage of lower interest rates and the interest rate cycle was perceived as reaching a turning point (see next subsection). Reflecting the impact of the global slowdown and the sharp fall off in mergers and acquisitions and telecom financing, however, 2001 volumes were significantly lower than in 2000, with Euroloan volumes down roughly 30 percent. This decline in activity, and reliance on refinancings, is reportedly placing pressure on banks, with (stand alone) investment banks suffering disproportionately, as commercial banks increasingly tie the less lucrative extension of their balance sheets to the provision of more profitable fee-driven business. The move to a “one-stop shop” reflects not only the strengthened position of commercial banks with a large balance sheet in the context of the global slowdown, but also the advances made by some of these banks in developing their mergers and acquisitions and investment banking businesses in recent years.

In *foreign exchange markets*, consistent with the view that global economic recovery was not only imminent but would be led by the United States, the U.S. dollar strengthened (see Figure 2.8). At the same time, data confirmed further weakening in Japan, and the yen suffered a sharp sell off to levels not seen since 1998. The euro, while weakening against the dollar, strengthened sharply against the yen during the quarter.

Figure 2.8. The U.S. Dollar



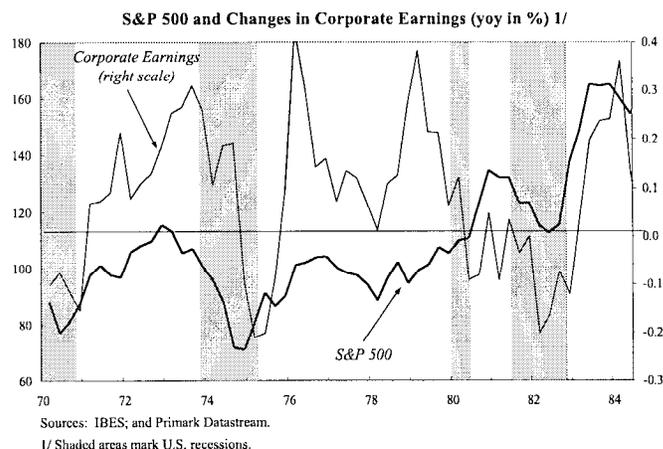
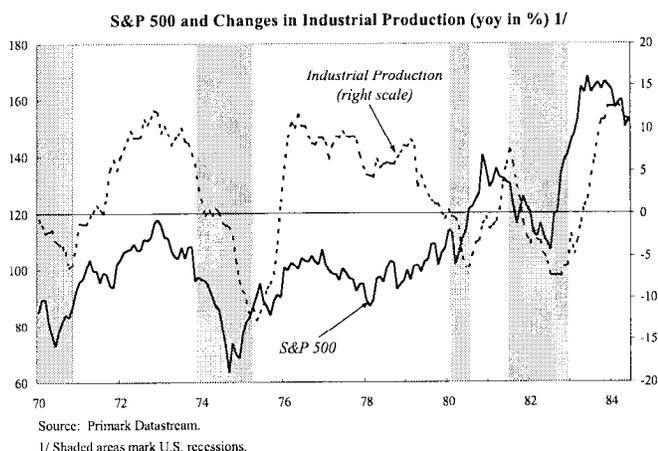
### **What Are Markets Anticipating About Recovery?**

The speed and magnitude of the turnaround in global markets during the fourth quarter of 2001 on expectations of a turnaround in the global economy, led by the United States, were remarkable. Such a turnaround raised questions about whether the equity market rally, and in particular the performance of telecom, media, and technology (TMT) stocks, was justified by fundamentals, and the extent to which it represented a liquidity-driven “bear market rally” and even a “new tech bubble.”

On the one hand, many view the run up in equity markets as appropriately pricing in the recovery, brought forward by the decisive monetary and fiscal policy responses, and view the recent positive economic data as ratifying these expectations. Box 2.1 examines the anticipation of economic recovery by equity markets in past recessions. Many argue that precisely because the cyclical downturn partly reflects the bursting of the tech bubble, recovery will be fast since the half-life of technology investment spending is estimated at only 18 months compared to several years for traditional physical capital. The optimists argue that the run up in TMT sector equity prices is justified by changes in fundamentals, with signs that excess capacity in the sector is being worked off, and the “winners being picked,” thereby creating the necessary conditions for fast profit growth in the sector. Others view the September 11 events as having created a (V-shaped) kink in an otherwise unaltered U-shaped recovery and, therefore, not representative of broader recovery. These market participants see the equity market rebound as pricing in a quick rebound in earnings growth that is faster than was evident in previous business cycles. The pessimists argue that the overcapacity built up during the TMT bubble will in fact take longer (than previous business cycles) to work off as it would only follow a recovery in other sectors.

**Box 2.1. Anticipating Economic Turnarounds: The Record of the Stock Market**

How well have stock markets done in anticipating recovery from past recessions?



The first figure documents the historical behavior of stock markets during the six recessions since 1970, where the National Bureau of Economic Research's (NBER) definitions of recessions are denoted by the shaded areas. Since 1970, U.S. recessions have lasted between 7 to 17 months and averaged about 12 months.

The data suggests that in the previous five recessions, equity markets have in fact had a *relatively "good" record in anticipating the end of recessions*. That is to say, historically, at least in the United States, equity markets began rising in anticipation of recovery, that is, before the end of recessions, and, critically, these expectations of recovery were validated, that is, the recessions ended soon after.

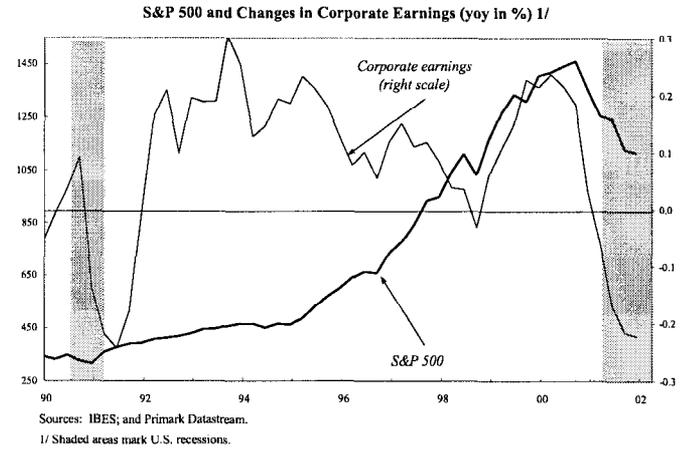
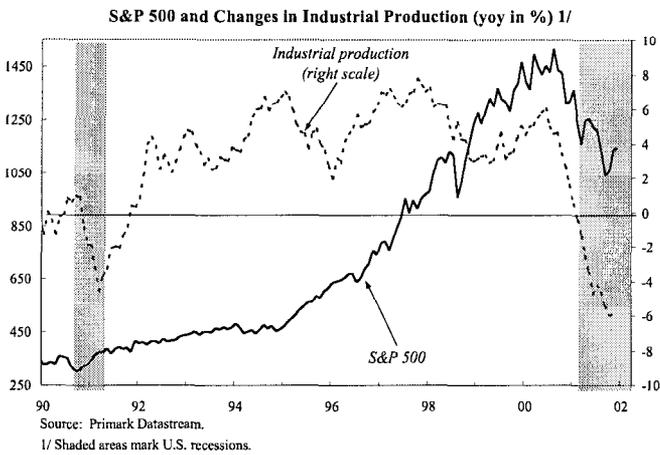
**Comparing Troughs: Stock Market Troughs Versus Industrial Production and Corporate Earnings' Troughs**

Recession Dates 1/	U.S. Stock Market Trough 2/	(Preceding in Months)		
		End of Recession	Industrial Production Trough	Earnings Trough
Dec-69 to Nov-70	Jun-70	5	4	7
Nov-73 to Mar-75	Oct-74	5	7	17
Jan-80 to Jul-80	Apr-80	3	3	17
Jul-81 to Nov-82	Jul-82	4	2	14
Jul-90 to Mar-91	Nov-90	4	4	17
Mar-01 to present	Oct-01		1	
Average Past Recessions		4.2	4.0	14.4

Sources: IMF staff estimates; and Primark Datastream.

1/ NBER.

2/ S&P 500.

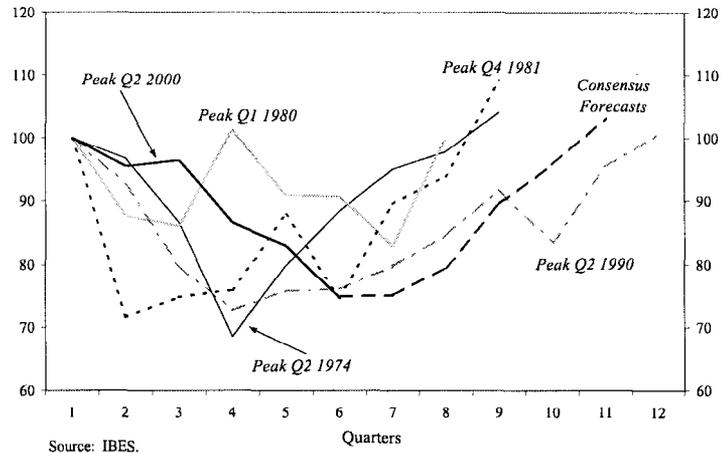


By how much did the recoveries in stock markets precede the economic recoveries? Troughs in equity markets preceded the end of recessions as defined by the NBER on average by 4.4 months, and turning points in industrial production by a similar 4.2 months. The beginning of the equity market recovery rallies generally occurred ahead of turnarounds in corporate earnings, which occurred on average slightly more than a quarter later (based on quarterly data; see the table). If the recession of 1981–82, where earnings actually began to rebound before the stock market trough, is excluded, the average was 1.75 quarters. These averages can be viewed as the average time it took for the recoveries in equity markets to be validated by actual developments in the real economy. In reality, of course, these should be viewed as minimum times for the equity market rebound to be validated by data since it is only after the availability of (several) post turning point data that the trough would clearly become apparent.

Turning to the current recession:

- The equity market has already had one false start in April–May 2001, in predicting an economic recovery.
- For the present rebound in equity markets to be validated by developments in the real economy in accordance with past historical experience, *industrial production would need to have reached a turning point (trough in year-on-year growth) between November of last year and February of this year.*

U.S. Corporate Earnings (Actual) Index



- Similarly, *corporate earnings would have to turn around in the first quarter of this year.* Historically, corporate earnings (see the second Figure) have troughed four to seven quarters (measured along the x-axis) following their pre-recession peak (an index value of 100). Current market expectations on earnings are for stable earnings in the first quarter of 2002 (seven quarters into the downturn), and a recovery during the second quarter, which is in line with earnings experience from past recessions. Based on historical trends, industrial production and earnings need to turn around this quarter. If this turnaround does not materialize, there is a risk of a market correction.

With the expectations of imminent economic recovery driving financial markets since the last quarter, many policymakers are cautioning markets may be getting ahead of themselves. While, as Box 2.1 notes, equity markets have had a “good” record in anticipating the timing of recovery, the combination of rising equity prices and falling earnings estimates has pushed the *12-month forward price-earnings ratio* for the S&P 500, as well as for other countries (e.g., Germany), to higher than average levels (see Figures 2.9 and 2.10). This has led to concerns about the sustainability of growth assumptions priced into the stock market valuations.<sup>2</sup>

In other markets, many market participants view the sell off in the *U.S. bond market* in the second week of November as having been considerably exaggerated by technical factors as noted above. Similarly, there is a consensus that “capitulation” selling in the federal funds futures market resulted in a disconnect in the form of a very pronounced U shape for federal funds futures—that is, economic recovery would be so rapid that there would have to be a very quick turnaround (tightening) in U.S. monetary policy (see Figure 2.11).

Figure 2.9. Twelve-Month Forward Price-Earnings Ratio for the S&P 500

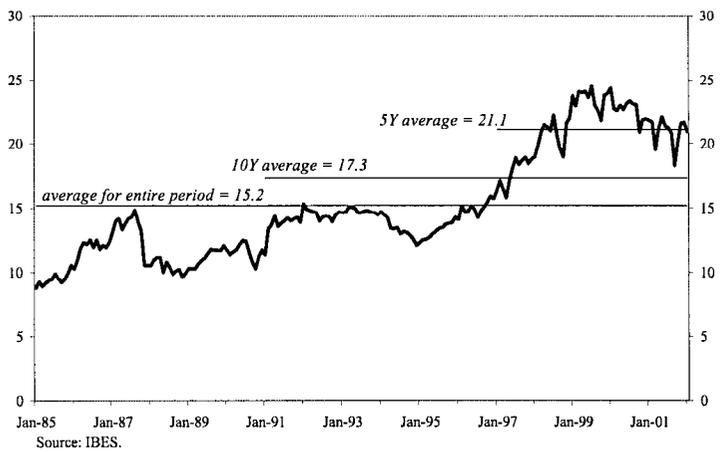


Figure 2.10. Twelve-Month Forward Price-Earnings Ratio for the Group of Three

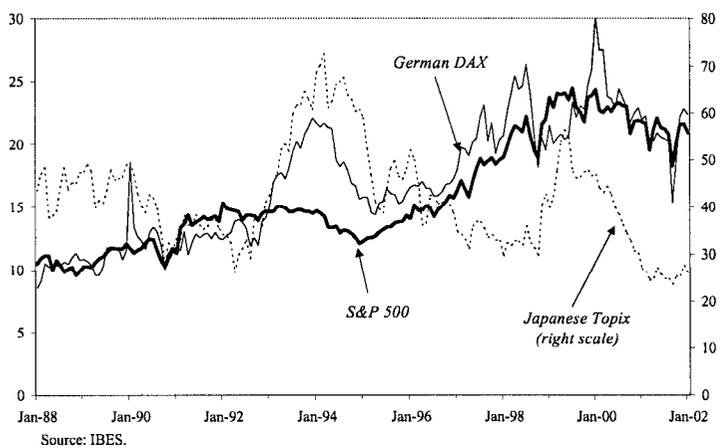
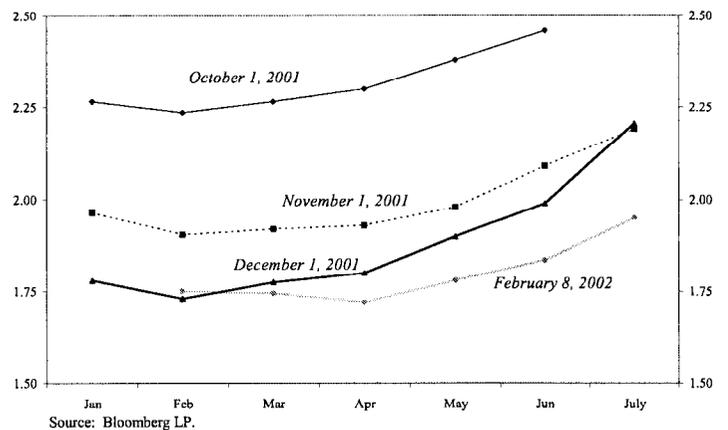


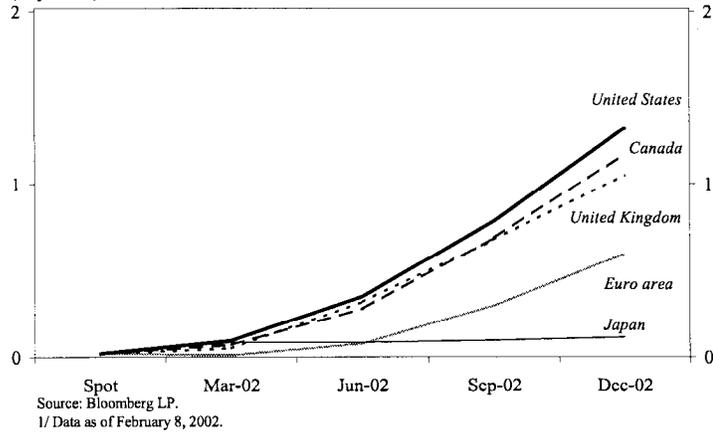
Figure 2.11. Expected Policy Rates: Federal Funds Futures (2002, in percent)



<sup>2</sup> See, for example, IMF, *International Capital Markets* (various issues through 2001).

In particular, by December 1, federal funds futures were pricing in further cuts by the U.S. Federal Reserve, followed by a rate hike in March this year. However, interpreting the signals from futures data may be misleading as once again technical factors have distorted pricing in the markets. Few in fact expected that U.S. economic recovery will be so rapid that rates would have to be raised by March. A fall-off in speculative capital for year-end reasons is the main explanation attributed to the lack of position taking and the disconnect in prices. The disconnect has now diminished, with expected rate increases now shifted out to June, though most would argue that even this would be too aggressive. Futures markets are in fact pricing in a tightening of short rates by aggressive amounts across the Group of Seven (with the exception of Japan), and 150 basis points by the end of the year in the United States (see Figure 2.12).

Figure 2.12. Expected Changes in Forward Rates in the Group of Seven 1/  
(In percent)



We argued above that a variety of technical factors contributed to some extent to the sharp sell off in government bond markets in November last year. While these technical factors have continued to unwind and prices have corrected, the current pricing in of rapid central bank rate hikes, and especially the extent of tightening priced in, still appears disproportionate relative to current economic data, and it is hard to argue that technical factors continue to cause a persistent mispricing. The view presented by some in the market, and one that we would subscribe to, is that rather than the market pricing in a rapid recovery in economic activity as its baseline scenario, the *bond market sees risks that the recovery may actually be stronger than anticipated in the United States*. Forward rates for other mature economies suggest less of a tightening. The *spike in forward short rates then actually represents a risk premium* incorporating the uncertainty of a stronger-than-baseline recovery.

## Emerging Market Financing

In the fourth quarter of 2001 in particular, emerging markets followed the broad trends set by price movements and perceptions about a U.S. economic recovery in mature markets. In spite of Argentina-related turmoil, emerging bond markets had a strong performance, while equity markets outperformed their mature market counterparts. In primary bond markets, issuance picked up in November, and has been healthy so far since the beginning of 2002. Syndicated lending remained supportive, despite a worldwide drop in mergers and acquisitions.

### Emerging Bond Markets

Having faced a tumultuous year, the EMBI+ closed 2001 with a surprisingly small decline, which was wholly driven by the poor performance by Argentina (see Table 2.3 and Figure 2.13). Even Brazil, whose spreads had over the year been highly correlated with those of Argentina, posted a positive return after rallying by over 16 percent during the fourth quarter. Other Latin sovereign credits did even better, and Ecuador and Colombia were, respectively, the second and third best performers during 2001. Russia was the best performer throughout the year, continuing to benefit from both a strong fundamental outlook and also the EMBI+ reweighting. For those investors who had retained significant underweights in Argentina, 2001 represents the third year of relatively strong performance, which is likely to attract renewed crossover investor interest going into 2002. In 2002, following the preceding end-of-year rally, market participants generally viewed many of the emerging market credits as having gone too far too fast and a round of profit taking ensued. Venezuela and Colombia were in particular focus during this latest sell-off.

**Table 2.3. Performance of Emerging Bond Markets 1/**  
(In percent)

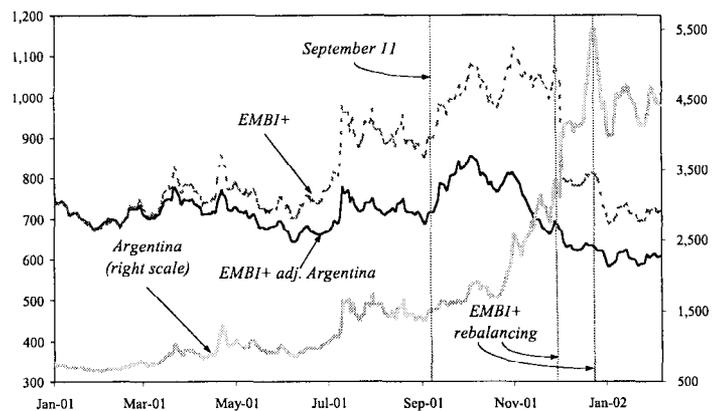
	Fourth Quarter	2001	Year-to-Date 2002 2/
Argentina	-57.1	-66.8	2.4
EMBI+	-0.9	-0.8	2.7
Venezuela	-3.4	5.5	-4.4
Brazil	16.3	7.2	1.3
Poland	1.6	10.6	2.0
Morocco	5.7	11.1	2.0
Mexico	6.5	14.2	3.4
Korea	1.9	14.5	1.4
Panama	6.7	17.9	2.8
EMBI+ Adj. Argentina	11.4	19.8	2.7
Qatar	6.4	21.4	3.9
Turkey	16.1	21.7	3.7
Nigeria	10.3	22.4	5.8
Bulgaria	15.3	25.7	-1.3
Peru	10.7	26.2	5.9
Philippines	15.3	27.6	1.9
Colombia	6.1	30.8	-0.7
Ecuador	20.0	36.1	6.7
Russia	19.1	55.8	6.4

Source: JP Morgan Chase.

1/ Total return is equal to the return from price appreciation and received coupon payments that are reinvested.

2/ February 8, 2002.

**Figure 2.13. Emerging Market Spreads**  
(In basis points)



Source: JP Morgan Chase.

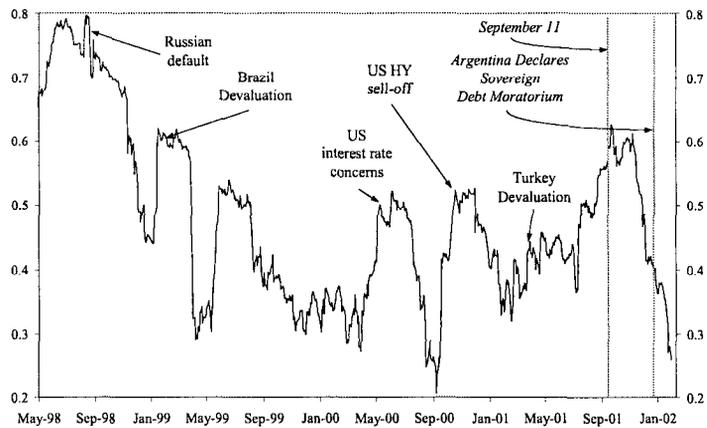
In December, Argentina completed one of the largest bond swaps to date. It exchanged \$41 billion of original dollar and peso-denominated government bonds for guaranteed loans paying a below market coupon and which represented a maturity extension for many participating bondholders. By replacing a largely nontradable loan in exchange for a bond, the swap reduced significantly the amount of debt eligible for inclusion in the EMBI+, with significant effects on the emerging market bond asset class as a whole (Box 2.2). JP Morgan adjusted Argentina's EMBI+ weight for the exchange in two steps. The first step, which took place on December 5, adjusted for the bonds that were swapped by simply reducing the face value of the bonds tendered into the exchange and brought Argentina's weight to 5 percent from 10.6 percent. In the second step, on December 31, the index was adjusted taking into account liquidity requirements—that is, some bonds had to be automatically excluded if the face value of the outstanding bonds fell below \$500 million, or they became illiquid. This last adjustment brought the Argentine weight to 2.6 percent, thus allowing investors to safely have zero allocations to the credit without incurring large risks of underperforming the benchmark in the (unlikely) event of a large rally in Argentine bond prices.

A salient feature of the quarter was the *continued absence of any significant contagion from events in Argentina* (see Figure 2.14). Past issues of the quarterly *Emerging Market Financing* have highlighted the following reasons for why contagion could have been expected to be more moderate this time around (see IMF 2001a and b). Heightened credit concerns about Argentina came at a time of much lower exuberance in emerging markets,

with net emerging market fundraising substantially below its 1997 peak. In the case of Argentina, investor concerns had been building for some time, thereby allowing dedicated investors to take underweight positions in risky credits (initially including Brazil) and to overweight those that were seen as relatively immune. This increase in investor discrimination has been a positive development and shows

maturity in at least the dollar-denominated segment of the asset class. We have in the past attributed the increase in investor discrimination to the rising relative importance of dedicated and local investors, and to the decline in importance of leverage in the system. Of course, in the past the major episodes of contagion in emerging markets have been a result of surprises, while Argentina's default at the end of December clearly was not.

Figure 2.14. Average Cross-Correlation of Emerging Debt Markets



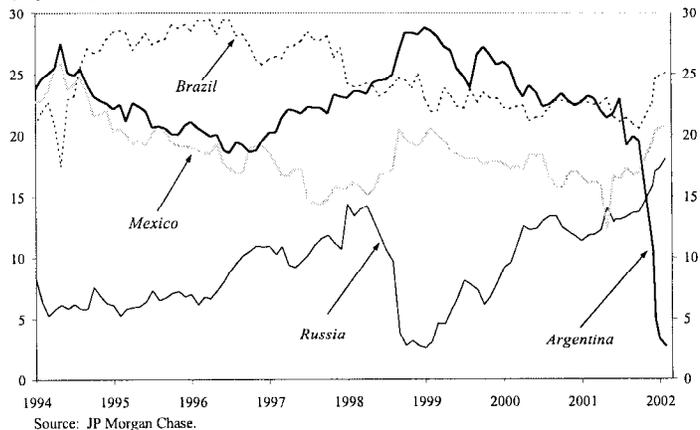
Source: IMF staff estimates.

Turning to the fourth quarter of 2001, we attribute the surprising lack of secondary market spillovers from Argentina additionally to the supportive global environment for fixed

### Box 2.2. Argentina and the Asset Class

Argentina's large stock of foreign currency denominated bonds had been an important source of market concern about potential contagion in the run up to a default. Recently, Argentina had the highest or second highest weight in the EMBI+, and the sovereign was also the largest emerging market issuer in the euro-market. Even during non-crisis times, dedicated investors benchmarked to the EMBI+ kept a "structural" underweight toward Argentina, in an attempt not to concentrate their portfolios excessively in one credit. Given Argentina's large weight, however, these investors could not reduce their portfolio allocations to zero in Argentina without running the risk of larger-than-tolerable index tracking error. Hence, there was a fear that losses in Argentina would force dedicated investors to liquidate profitable overweight positions elsewhere (Russia and Brazil). This "common ownership" motivation for contagion was further exacerbated by concerns that a default on a quarter of the benchmark index could frighten end-investors, thereby triggering a withdrawal of capital from the asset class. In the euro and yen markets, Argentine bonds were largely held by less sophisticated "buy-and-hold" retail investors who were not benchmarked to any index. The extent of contagion from the default hence differed across the three segments:

Historical EMBI Weights  
(In percent)



- In the case of dollar-denominated emerging market bonds*, investor discrimination was supported by the falling weight of Argentina in the market cap weighted EMBI+. This allowed dedicated investors to automatically reduce their exposure to Argentina further. The debt swap in early December created further support for the decoupling of Argentina from the rest of the asset class. There had already at that time been signs of speculative investors and the street "front-running" the eventual change in dedicated investors' portfolio allocations. In the end, Argentina's weight in the EMBI+ fell to 2.6 percent. The retrenchment by dedicated investors away from Argentina benefited those index constituents that stood to gain most from the reweighting (notably Brazil, Mexico, and Russia, see the figure) and hence negated any contagion effects at that stage.
- The "common ownership" explanation for contagion played a larger role for contagion across Latin credits within the investor base for *euro-denominated emerging market bonds*. When capitulation selling of Argentine bonds by mainly Italian, German, and Spanish retail investors occurred, these investors also largely exited other Latin American sovereign bonds. Following the Argentine default, the euro-denominated market is currently in a state of disarray, as the large-scale exit of retail investors has pushed the spreads of several euro-denominated emerging market bonds beyond those of comparable dollar-denominated bonds. As a result, the overall appetite for emerging market bonds has substantially declined, both in terms of supply (it is no longer price competitive relative to dollar issuance) and demand. It remains an open question whether the classic European retail demand will again invest, in any size, in higher risk emerging markets.
- In Japan, retail demand for any form of higher risk bond issue has suffered from both the Enron and Argentine defaults. The Samurai market remains firmly shut despite appearances to the contrary in the quarter. In the wake of Argentina-related credit concerns and then the actual default, the market is expected

to remain closed for some time to other low rated credits. The Philippine shibosai (privately-placed Samurai) went to European investors who were comfortable with the 97.5 percent credit enhancement by the Japanese Export Import Agency NEXI (2.5 percent risk on the underlying Philippines risk was enough to deter Japanese investors), while mid-December's Thai Samurai was taken up mainly by Japanese banks operating in Thailand to fulfill local reserve requirements. As a result, there has been so far no issuance of any emerging market bond since mid-December.

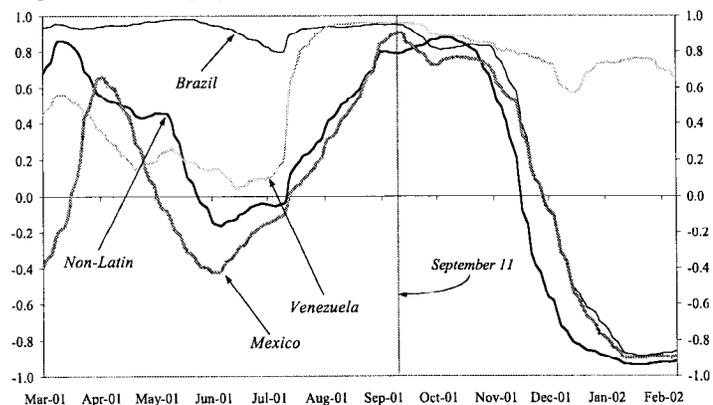
In conclusion, Argentina's impact on the emerging market bond class has been more substantial in the euro and yen markets, where retail investors held on in the somewhat optimistic belief that emerging market sovereigns would not default. While these two markets will have to go through a transformation, it is indeed possible that these necessary changes will in the end lead to a more developed and sophisticated institutional investor base for emerging market bonds with similar characteristics to that of the dollar segment, which has weathered the Argentine default quite well.

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income products, the EMBI+ reweighting due to the Argentine bond swap, and market beliefs throughout October and November that the exchange rate regime would either remain as is or involve a stabilization, thereby supporting Argentine bond prices in the secondary market.

Our measure of contagion,<sup>3</sup> the average cross-correlation of individual country returns in the EMBI+, continued to fall throughout December and January despite the increased turbulence in Argentina and is currently around 0.3, below even the long-term average of 0.4. With respect to individual cross-country correlations, Argentine sovereign bonds continue to decouple from most other emerging market sovereigns (see Figure 2.15). However, the pair wise correlation with Venezuela has clearly been high, as Venezuela faces increasing investor concerns against a backdrop of political turmoil and oil price weakness. Looking ahead, the risk of contagion has certainly not disappeared completely and there remains a concern about contagion either through the foreign exchange markets, as seen during a few days in January, or through primary markets (renewed closures) or a fall off in foreign direct investment (FDI) flows to emerging markets.

Figure 2.15. Emerging Market Spread Correlations with Argentina 1/



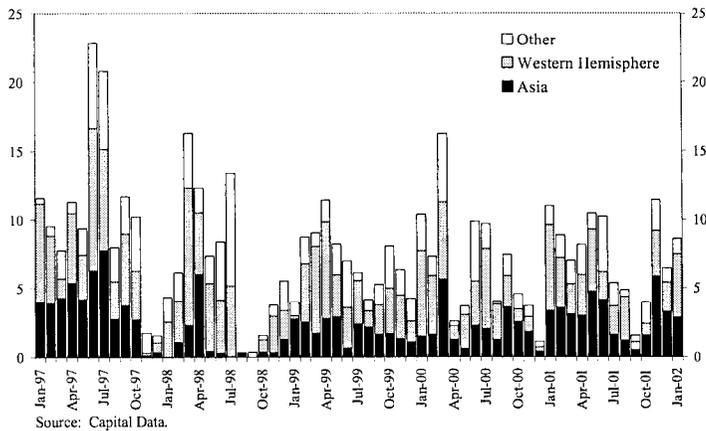
Source: IMF staff estimates.  
1/ 80-day rolling correlations.

<sup>3</sup> The measure uses the average cross-correlation of spreads for a rolling 50-day window on the external debt of nine emerging markets (Argentina, Brazil, Ecuador, Mexico, Panama, Peru, Poland, Russia, and Venezuela). A criticism of similar measures can be found by Forbes and Rigobon (2000), who point out that in measuring contagion, increases in volatility during crisis periods can bias correlations upwards. However, Baig and Goldfajn (2000), argue that it is unclear the Forbes and Rigobon correction should be made, as the same factors that result in increased volatility (thin markets, panic, margin calls) are precisely the factors responsible for contagion and controlling for one, causes a loss of power for the other.

Turning to *primary markets*, following the recovery in global financial markets and decline in risk aversion, *capital markets reopened in November* to emerging market issuers following the longest bond market drought (11 weeks) since the Russian crisis (13 weeks). As expected, those issuers highest up the credit spectrum were able to re-access markets first, using plain-vanilla structures in the case of sovereigns, and political risk insurance in the case of non-investment-grade corporates. After near-record bond issuance in November, issuance levels remained robust in

December, allowing a substantial amount of pre-financing for emerging market borrowers. In the last quarter, bond issuance reached \$21.5 billion, which is about halfway between the healthy issuance level of the second quarter and the dismal third quarter of 2001 (Figure 2.16). As anticipated, investment-grade issuers dominated the quarter and accounted for 62 percent of total bond issuance (SingTel issued

**Figure 2.16. Monthly Bond Issuance**  
(In billions of U.S. dollars)



\$2.3 billion), while, at least initially, non-investment-grade issuance was dominated by credits that could be seen as diversification plays (such as the Dominican Republic, Guatemala, or Bulgaria) or were seen as enjoying the support of the international community—for example, Turkey. The fourth quarter also marked the recovery of euro-denominated issuance, following both Turkey’s and the City of Moscow’s return to the market. Dollar-denominated issuance also took a larger share, while bond issuance denominated in Japanese yen fell back closer to its average historical quarterly level (see Table 2.4). For 2001 as a whole, the recovery in issuance during the last quarter brought total

issuance to nearly \$90 billion (excluding exchanges) exceeding the levels of 1998–2000, but was nonetheless still below the \$100 billion plus issuance of 1996 and 1997.

**Table 2.4. Currency of Issue**  
(Shares in percent)

	1998	1999				2000				2001			
	Fourth Quarter	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
U.S. dollars	83	62	67	59	53	62	51	65	60	57	72	63	73
Euro	0	26	28	36	37	33	28	18	21	31	17	7	20
Yen	1	2	1	1	8	3	17	14	13	7	6	19	6

Source: Capital Data.

Since the beginning of the year, emerging market bond issuance has remained at relatively healthy levels and \$1 billion plus bond issues by both Brazil and Mexico were seen as validating perceptions of continued market access for these creditors despite the

deteriorating situation in Argentina.<sup>4</sup> Investor demand has been largely driven by higher-than-normal cash levels among dedicated investors at the start of the year, and increased allocations by U.S. crossover investors to higher-rated emerging market issuers after three years of good performance, particularly for the majority of investors who stayed underweight Argentina. Given the amount of pre-financing achieved during the last two months of 2001, however, the typical January surge in bond issuance has been less pronounced, with issuance so far running at about 80 percent compared to January 2001. While dollar emerging market bond issuance is well under way, the European retail investor base is widely seen as being in disarray following the default in Argentina and we have yet to see the first Latin euro-denominated emerging market bond this year (Box 2.2). In the case of the Japanese Samurai market, the traditional retail investor base has also suffered substantially from Argentina's default, and it remains unclear when the market will reopen to new issuers. The absence of the "safety valve" presented by the euro and yen markets, in the past will make emerging market issuers, especially non-investment grade ones, more vulnerable to any abrupt market closures in the dollar-segment.

Looking ahead, with many of the "traditional" emerging market sovereign issuers having completed large parts of their financing needs for 2002, we expect market access to continue to roll down the credit spectrum to corporate issuers. In the absence of negative surprises on the U.S. recovery or from Argentina, we expect sovereigns to focus increasingly on early pre-financing of 2003 and debt management operations.

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<sup>4</sup> Other sovereign issuers in 2002 have included Costa Rica, Croatia, the Philippines, and Turkey.

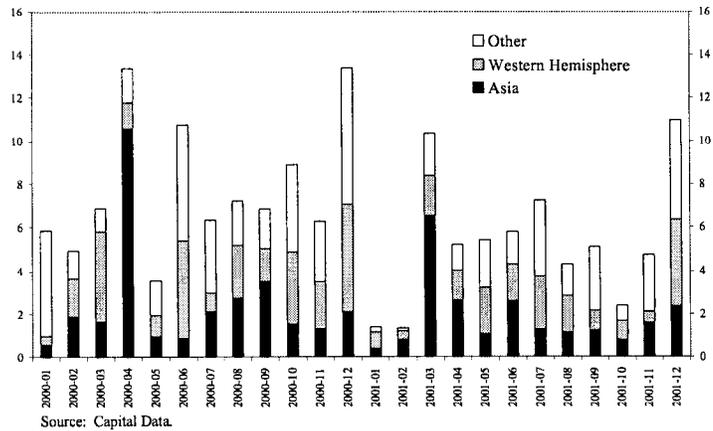
## Syndicated Loans

Expectations of an imminent recovery in global activity, particularly by U.S. and European investors, combined with the desire of lenders to fulfill their annual internal lending targets, helped push lending to the emerging markets up to \$17 billion in the fourth quarter, compared to \$16.8 billion in the third (see Figure 2.17). Asian players, however, remained skeptical about prospects for a U.S.-led global economic recovery, with creditworthy borrowers expressing little demand for investment capital, and new borrowing primarily related to balance sheet restructuring or consolidation. As testimony to the increased differentiation of market participants and limited contagion, eight Brazilian corporates borrowed a total of \$1.6 billion, although much was for refinancing purposes or secured. Elsewhere, Chilean, Mexican and Venezuelan corporates were recipients of substantial funding.

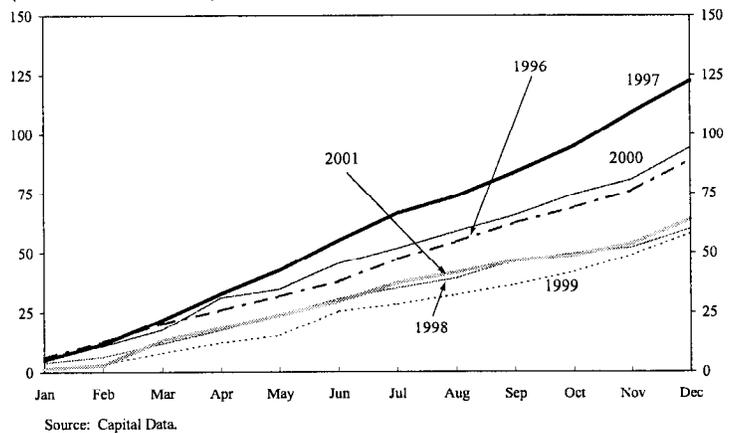
For the year as a whole, 2001 loan volumes were sharply lower than in 2000 and closer to trends in 1998–99. With demand for new money limited amid concern about the global slowdown and a dearth of mergers and acquisitions activity, the volume of lending reached \$63.4 billion in 2001 compared with \$94.2 billion in 2000 (see Figure 2.18).

On the *pricing* front, the syndicated lending market in Asia remains characterized by a high degree of competition between banks to lend to the handful of top tier corporates and financial institutions, while shutting out lower tier borrowers. With little demand for new money, banks competed to lend to borrowers, making pricing very tight at the top end, while rationing

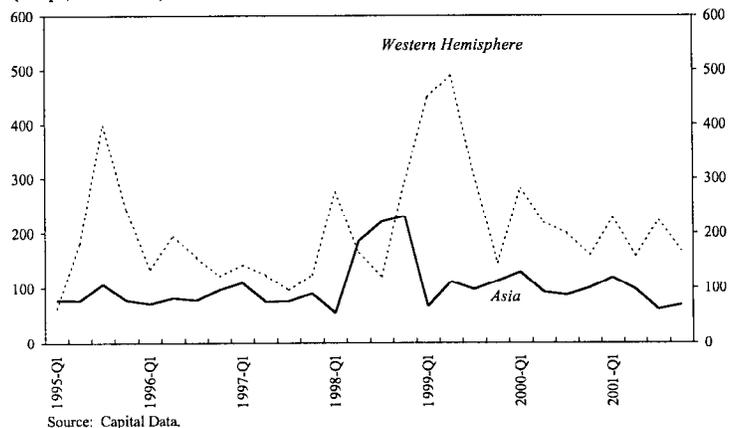
**Figure 2.17. Loan Issuance**  
(In billions of U.S. dollars)



**Figure 2.18. Cumulative Gross Annual Issuance of Hard Currency Loans**  
(In billions of U.S. dollars)



**Figure 2.19. Loan Weighted Interest Margin**  
(In bps, 1995-2001)



out those entities that may be most in need of capital. As a result, syndicated loan spreads remained broadly flat in Asia at low levels, while spreads declined in Latin America, reflecting this quarter's distribution of lending among Latin corporates (see Figure 2.19).

### Emerging Equity Markets

Emerging equity markets recovered on cue with their mature market counterparts as a "high beta" play on global growth and reflecting their higher (than global markets) concentration in TMT stocks (see Table 2.5). Emerging equity markets comfortably outperformed their mature market counterparts, with returns resembling those of the Nasdaq. Cyclical sectors including technology led the rally. The initial rally, particularly in tech heavy markets such as Korea and Taiwan Province of China, was led by foreign investors increasing exposures to Asian equities in order not to underperform in the event of a global rally. Local investors were notably absent from the rally. Asian emerging markets received the bulk of substantial foreign investor flows into emerging equity markets during October and November (see Figure 2.20). While having similar earnings growth forecasts as in mature markets, Asian equities are still seen as cheap, encouraging investors to maintain neutral to overweight positions in Asia.

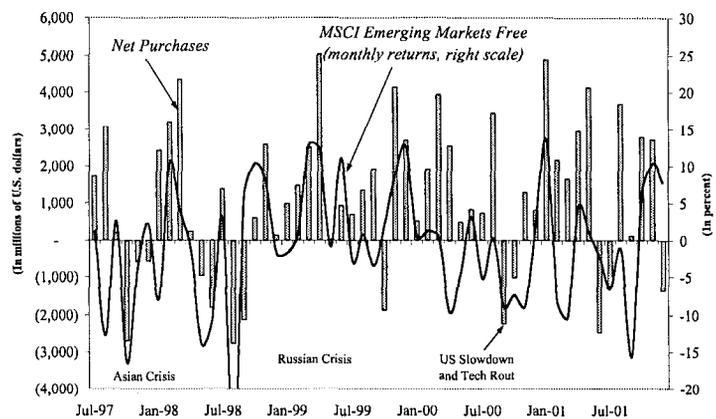
Table 2.5. Total Dollar Return Performance of Emerging Equity Markets (In percent)

	Q1	Q2	Q3	Q4	2001	Ytd* 2002
<b>Regions</b>						
EM Free	-6.2	3.1	-22.1	26.3	-4.9	2.3
Asia	-0.1	-1.6	-20.1	32.8	4.2	4.6
LatAm	-3.5	7.1	-24.0	21.8	-4.3	-2.8
EMEA	-22.0	4.5	-25.8	36.3	-17.7	-2.0
<b>Mature market comparators</b>						
ACWI Free	-12.8	2.3	-15.0	9.1	-17.3	-4.5
S&P 500	-12.1	5.5	-15.0	10.3	-13.0	-2.8
Dow	-8.4	6.3	-15.8	13.3	-7.1	-6.7
Nasdaq	-25.5	17.4	-30.7	30.1	-21.1	-5.1

Source: Morgan Stanley Capital International.

\*February 8.

Figure 2.20. Net Foreign Purchases and Monthly Returns on Emerging Equity Markets 1/



Sources: IMF staff estimates; Central banks; and Bloomberg L.P.

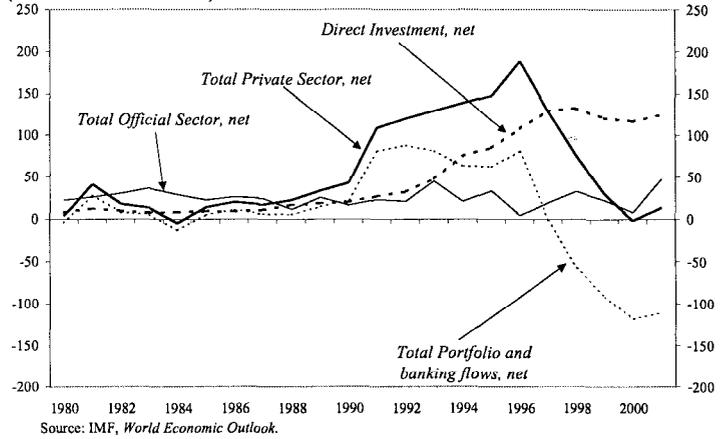
1/ August data excludes \$8.9 bn for Mexico the purchase of Banamex by Citigroup.

Primary market issuance in the fourth quarter (of \$2.6 billion compared with \$1 billion in the third) was again dominated by Asian names, but 2001 as a whole was only slightly higher than 1998 but lower than the succeeding two years. Issues were mainly privatization deals from China, along with banking sector issuance from Singapore and the tobacco sector in Korea.

## Foreign Direct Investment

In 2001, despite an estimated 42 percent drop in global FDI to \$760 billion, and an estimated 45 percent drop in cross-border mergers and acquisitions activity, net FDI flows to emerging market countries are estimated to have held steady at \$163 billion (IMF, 2001c) (see Figure 2.21). Reflecting an ongoing trend, FDI flows to emerging market countries remained highly concentrated, with 10 countries accounting for nearly 70 percent of net FDI flows to emerging markets, and China, Brazil, and Mexico alone accounting for about one-half of net FDI flows. Looking ahead, net FDI flows to emerging markets are expected to fall further as mergers and acquisition activity is expected to remain slow to recover, while the high cost of equity capital in emerging equity markets will hinder privatization related FDI inflows.

**Figure 2.21. Capital Flows to Emerging Economies**  
(In billions of U.S. dollars)



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### **III. Stability Implications of Global Financial Market Conditions**

As mentioned in Chapter I, during 2001 the international financial system has shown remarkable resilience in the face of sizeable disruptions. Moreover, recent economic data seems to support market expectations that the global economy will recover around mid-year. Nevertheless, for the purpose of identifying vulnerabilities in international financial markets, this chapter considers the risks to international financial stability that could be associated with the potential financial fallout of a subdued and/or delayed global recovery. At the end of 2001, and into the early part of 2002, global equity and fixed-income markets were pricing in an imminent recovery in economic activity, and especially in corporate earnings, in the second half of 2002. This is more optimistic than the baseline projections in the IMF's December 2001 special issue of the *World Economic Outlook*, which include a more modest recovery starting in the first half of the year. In light of accumulated financial imbalances that have not yet been worked off, the main uncertainties would seem to be associated with the resilience of household, corporate, and bank (and nonbank financial institution) balance sheets in the presence of the renewed declines in equity prices and deterioration in credit quality that might occur during a weaker than expected global recovery. If balance sheets are impaired and financial imbalances are aggravated as a result of such asset price adjustments during the recession, this could itself lead to a subdued recovery and could possibly delay it, which in turn could feed back to a further deterioration in financial conditions (and so on). This would lead to a less friendly operating environment for financial institutions, especially for those already weakened by the events of 2001, and to possible stress within the international financial system.

Another closely related source of risk derives from the ongoing structural transformation in global finance. Many such sources can—and in future issues of this report will—be identified. For the period immediately ahead, with uncertainties about the outlook for growth, the increasing reliance on credit risk transfer mechanisms could develop to be a source of financial market risk. The recent global rise in corporate debt defaults to historically high levels, and the relatively low degree of financial disclosure and market transparency about these instruments and markets—and about who owns the credit risk—would seem to pose some risk that market participants might have difficulty in accurately gauging the nature and extent of the credit deterioration. Even though these instruments and markets have coped fairly well with the events of 2001, it is still an open question how effectively they are working in the presence of a global slowdown and record high default rates.

#### **Financial Market Implications of a Subdued or Delayed Recovery**

As analyzed in previous *International Capital Markets* reports, the structure of financial markets in the major international financial centers and the international financial system have changed significantly. So too have the linkages between economic activities and financial conditions. In this respect, one of the most significant structural changes in the past

two decades has been the increased reliance by corporations and households on financial market instruments.<sup>1</sup> There has also been a corresponding increase in the dependence of households' and corporations' financial conditions—and accordingly, household and corporate spending—on movements in financial asset prices. In addition to the direct impact, this represents another transmission channel from movements in asset prices to the quality of banks' balance sheets. Accordingly, just as asset price adjustments have shaped the strength and contours of the U.S. and worldwide expansion in the 1990s, they are also likely to determine the extent of the present global economic slowdown and later the pace of the recovery.<sup>2</sup>

### **How Prevalent were Financial Imbalances Before the Present Global Slowdown Compared with the Recession in 1990–91?**

In trying to assess the impact of the current recession on financial conditions, and the prospects for financial markets remaining resilient, it would be useful to have an historical perspective drawing on relevant experience and precedents. Unfortunately, given the changes in financial systems in the last two decades, there are few historical experiences of recessions that are useful for calibrating the international financial market implications of a delayed and/or subdued global recovery. This is particularly so given the greater effect that asset price adjustments are having on household and corporate balance sheets and financing compared with previous recessions. Such effects may be especially important to consider in view of the current conjuncture, which is characterized by accumulated corporate and household sector financial imbalances, a synchronized slowdown in the world's three largest currency zones and significant global economic, financial, and political uncertainties.

In terms of financial market structure, and the dependence of balance sheets on financial asset prices, perhaps the only comparable recession is the U.S. recession of 1990–91. In the period leading up to the 1990–91 recession, both domestic and external financial imbalances had accumulated across a wide range of sectors, markets, and financial institutions, for example, in the U.S. junk bond market (recall the collapse of Drexel Burnham) and especially on bank balance sheets. Because of the domestic financial imbalances, and in particular in the banking system, the recovery from the U.S. recession in the early 1990s occurred against what U.S. Federal Reserve Chairman Alan Greenspan referred to as strong headwinds, and for this reason monetary policy remained relatively flexible and supportive of growth up until early 1994.

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<sup>1</sup> Chapter I in International Monetary Fund (2001a) examines household, corporate and financial balance sheets; Dynan and Maki (2001) and Ludwig and Sløk (2002) discuss wealth effects. The latter paper finds that consumption in OECD countries is about twice as sensitive to changes in stock market wealth than it is to changes in housing wealth.

<sup>2</sup> See Arora and Vamvakidis (2001) for an empirical analysis of the apparently important “locomotive” role of the U.S. economy in global growth.

As might be expected, there are financial and economic parallels between the run-up to the 1990–91 U.S. recession and the period leading up to the present global slowdown and U.S. recession that began in March 2001 (Table 3.1 and Figure 3.1). The most relevant similarities are:

- a sharp slowdown of about 5-6 percentage points in U.S. economic growth;
- accumulated financial sectoral excesses (junk bonds and real estate in the 1980s and the TMT sector in the 1990s) that adversely affected financial institution earnings and capital and caused market volatility in many countries;
- run-ups in U.S. corporate and household debt to cyclical highs relative to net equity, assets, and even GDP (for corporations, to a level that is 5 percentage points higher than in 1991, and for households, to 10 percentage points of GDP higher);
- sharp increases by U.S. banks in the cost of loans and tightening of loan standards;
- and record corporate bond defaults globally, including on investment-grade debt.

There are also important economic and financial *differences* in the current situation from 1990–91. *First*, the current slowdown is more globally synchronized than the previous one. Both Japan and the United States experienced recessions, European economies experienced weak growth, and economies in other regions have also experienced a recession or a slowdown in growth. Counterbalancing this to some extent are the much lower inflation and fiscal deficits in many countries, which provide degrees of policy flexibility, and the ample liquidity enjoyed by investors, which can be quickly moved to asset markets if sentiment improves.

The recession in Japan—the world’s second largest economy—has restrained global growth and aggravated Japanese financial market imbalances and fragilities at a time when support for world demand would be beneficial. Several financial imbalances are worth noting. Government debt has grown to 140 percent of GDP and is projected to grow to over 150 percent of GDP in 2002, and this could pose financial risks in the Japanese government bond (JGB) market in the future (International Monetary Fund (2001b), p. 44). Concerns about rising government debt have been reflected in downgrades of Japan’s sovereign ratings to Aa3 (Moody’s) and AA (S&P). Household debt has remained above 130 percent of disposable personal income. In the corporate sector, debt burdens remain high while at the same time asset price deflation and rising corporate bankruptcies are continuing to weaken financial institutions’ balance sheets.<sup>3</sup> Part of the problem is that corporations and financial institutions have not taken advantage of the various reforms implemented in Japan, as for example in bankruptcy laws, to address some of these imbalances and their root causes. As a

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<sup>3</sup> In December 2001 and January 2002, the Japanese authorities began to more publicly discuss the possibility of another round of emergency capital injections and an increase in Deposit Insurance Corporation funds for financial crisis management.

**Table 3.1. U.S. Financial Conditions During the 1990/91 and 2001 Recessions**

*(In percent, except where noted otherwise)*

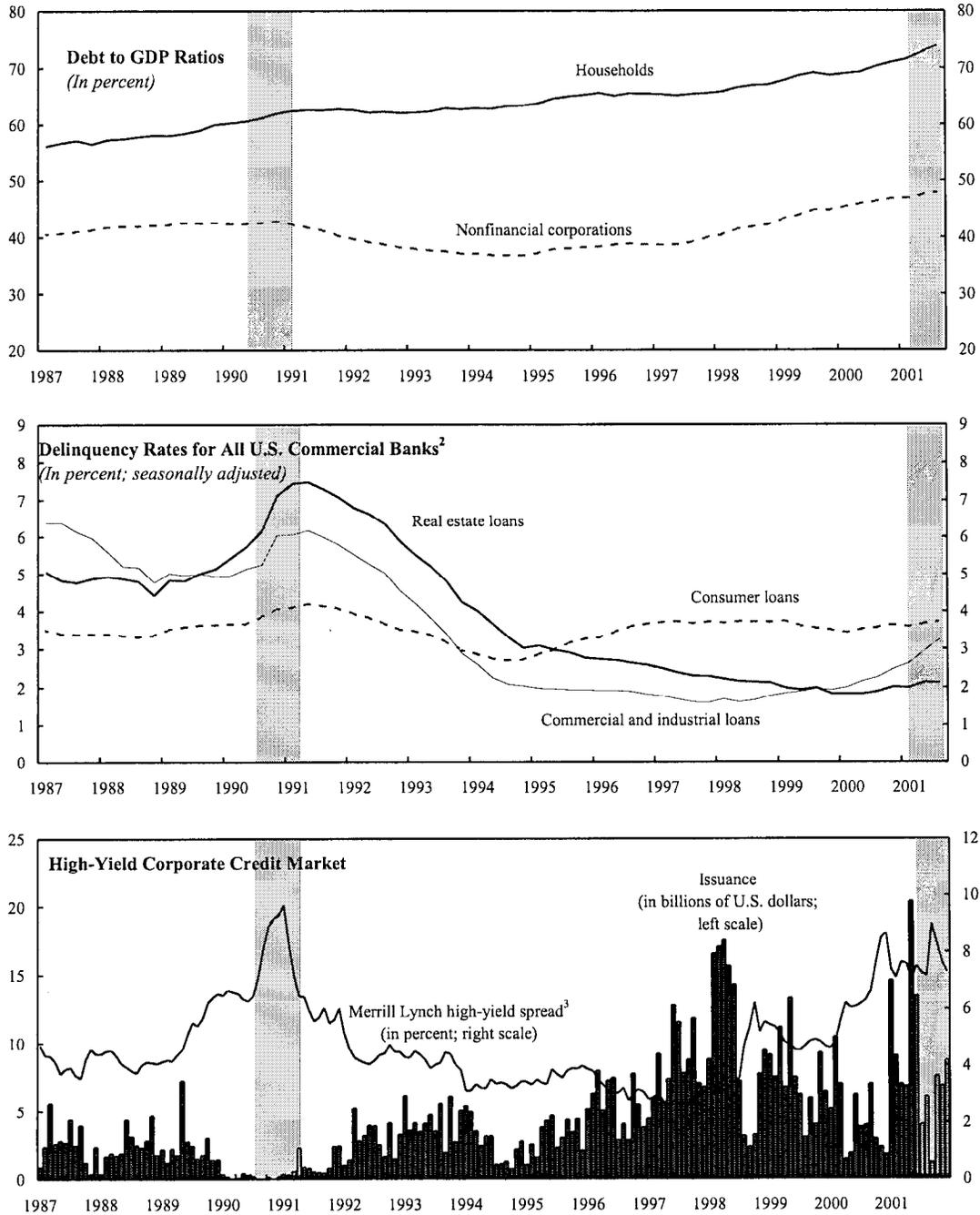
	1990/91 Recession <sup>1</sup>			2001 Recession <sup>1</sup>	
	Pre-recession Average	Recession Average	Post-recession Average	Pre-recession Average	Recession Average
<b>Banking system</b>					
Delinquency rates	5.1	5.8	4.0	2.2	2.5
of which:					
Consumer loans	3.5	4.0	3.4	3.6	3.7
Commercial and industrial loans	5.4	5.8	3.5	1.9	2.9
Real estate loans	5.0	7.1	4.9	2.0	2.1
Charge-off rates	1.13	1.35	0.93	0.64	0.87
of which:					
Consumer loans	1.59	2.03	1.88	2.43	2.64
Commercial and industrial loans	1.10	1.40	0.81	0.55	1.18
Real estate loans	0.54	0.94	0.67	0.08	0.19
Net income/assets	0.65	0.50	1.07	1.13	1.20
Noninterest income/assets	1.5	1.7	1.9	2.4	2.5
Equity capital/assets	6.3	6.6	7.8	8.5	8.8
Nonaccruals/loans	2.5	3.2	1.7	0.7	1.0
Reserves/nonaccruals	100	84	156	243	179
<b>Credit markets</b>					
Default ratio <sup>2</sup>	1.4	3.4	0.9	1.8	4.0
Defaulted debt (in billions of U.S. dollars)	4.1	22.4	3.4	30.5	115.0
Credit spreads (basis points)					
AAA	83	84	92	176	208
High-yield	624	826	573	691	764
<b>Household sector</b>					
Household debt growth	9.3	6.1	6.4	8.2	8.4
Debt/GDP	58.2	61.9	63.2	68.3	72.8
Debt service/disposable income	13.7	13.4	12.2	13.7	14.1
Net worth/liabilities	545.2	553.2	535.5	579.8	513.7
<b>Corporate sector</b>					
Corporate debt growth	8.3	1.7	4.1	10.8	5.8
Debt/GDP	41.9	42.6	37.7	43.9	47.4
Net interest/pretax income	21.7	23.9	12.8	13.1	14.0
Net worth/liabilities	119.5	104.4	91.9	100.6	93.9

Sources: United States Board of Governors of the Federal Reserve System; Fitch; Merrill Lynch; and Standard and Poor's.

<sup>1</sup>Except for credit spreads, pre-recession averages cover from 1987 or 1998 respectively. Recession averages cover recession period (July 1990-March 1991; March 2001-present) or nearest available window based on data frequency. Post-recession averages cover period through 1995. For credit spreads, pre- and post-recession averages cover a one-year period.

<sup>2</sup> Percent of outstanding rated issues on which the obligor defaulted during the year (based on all issues rated by Standard & Poor's, including U.S. and overseas issuers).

Figure 3.1. United States: Financial Conditions, 1987-2001<sup>1</sup>



Sources: United States, Board of Governors of the Federal Reserve System; Bloomberg Financial Markets L.P.; and Merrill Lynch.

<sup>1</sup>Shaded areas indicate recessions.

<sup>2</sup>The charge-off rates for any category of a loan are defined as the flow of a bank's net charge-offs during a quarter divided by the average level of its loans outstanding over the quarter. These rates are calculated from the available data in the Report of Condition and Income (Call Report), filed each quarter by all commercial banks.

<sup>3</sup>Spread against yields on a 10-year U.S. government bond.

result, they may not be able to contribute much to Japan's recovery when it materializes. Price movements in asset markets in Japan have also continued to strain household and corporate balance sheets. Finally, as suggested by market expectations extracted from foreign exchange options prices, the risks of a yen depreciation and appreciation seem to be equally likely (symmetric), with a high probability of a significant move ("fat-tailed") (Figure 3.2). It is possible that a depreciation might accompany further aggressive monetary easing, while an appreciation could be triggered by simultaneous decisions by many Japanese investors to repatriate capital in order to finance corporate and financial sector restructuring.

In Europe, economic growth has slowed by more than anticipated, reflecting stronger-than-expected economic and financial linkages with the United States. For example, measures of European and U.S. financial conditions such as equity prices and the profitability of financial institutions (including those that are active in both regions) have tended to move together. Looking ahead, rising debt burdens may act as a constraint on the recovery of growth in Europe: since 1997, household debt has risen from less than 44 percent to about 48 percent of GDP, while corporate debt has grown from about 47 percent to about 56 percent of GDP (Figure 3.3). Household debt in the United Kingdom and Germany has reached 117 and 115 percent, respectively, of disposable personal income, compared with 106 percent in the United States.<sup>4</sup>

A *second* difference from 1990-91 is that in the period leading up to the present global slowdown, both U.S. and European banks were in relatively strong financial condition compared with prior years. This partly reflects the effects of the record-length economic expansion during 1991-2000, strengthened supervision and regulation, and improved private risk management. Accordingly, in the first half of 2001, U.S. bank income/assets and equity/assets ratios stood at 1.2 percent and 8.8 percent respectively, well above 1990-91 levels (Fitch (2001)). Similarly, charge-off and delinquency rates are half or less of those attained at the same point in the 1990-91 cycle. In 2000, the largest banks' returns on equity and on assets were at relatively strong levels by international standards (16 percent and 1 percent respectively), broadly similar to their levels in 1993. Between 1993 and 2000, major European banks' credit quality, profitability, and capitalization relative to assets all improved (Table 3.2). During that period, nonperforming loans (NPLs) declined from 3.6 percent to 2.3 percent of loans; charge-offs fell from 0.7 percent to 0.2 percent of loans; return on equity increased from under 10 percent to 16 percent; and equity as a percent of assets rose slightly to 4.4 percent.<sup>5</sup> However, the average figures for the largest European

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<sup>4</sup> Source: OECD.

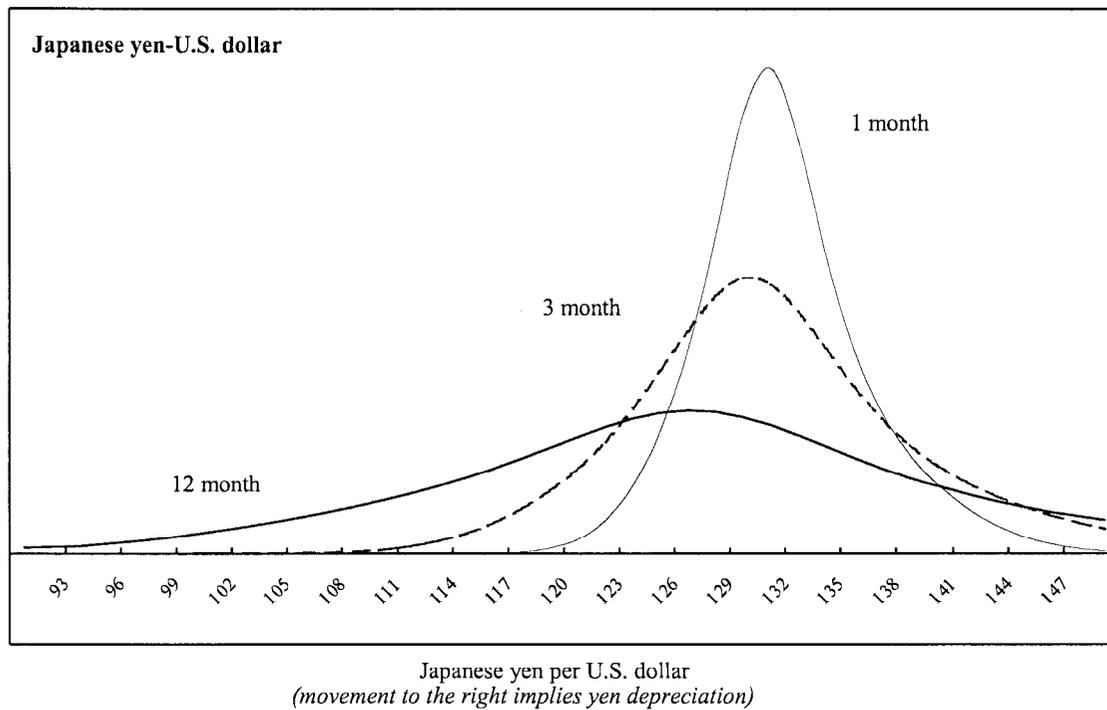
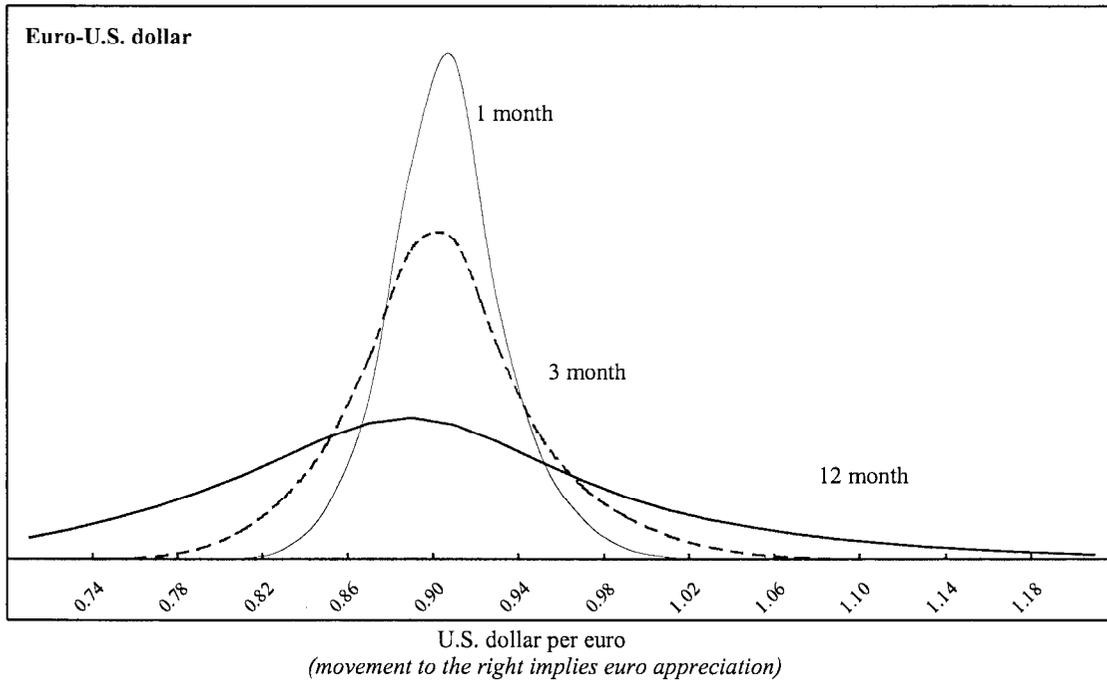
<sup>5</sup> The crisis in Argentina will likely affect the profits of two major Spanish banks that have a local presence in the country. Nevertheless, credit rating agencies and bank analysts consider that losses will be manageable for these banks, because Argentina accounts for a relatively small share of their assets, and the banks have already set aside special reserves that cover the full amount of their Argentine banking equity investments.

**Table 3.2. Performance of Large European Banks**  
(In percent)

	1993	1994	1995	1996	1997	1998	1999	2000
<b>Asset quality</b>								
Nonperforming loans/gross loans	3.6	2.7	3.0	2.1	2.1	2.3	2.6	2.3
Net charge-offs/average gross loans	0.7	0.6	0.4	0.3	0.3	0.2	0.2	0.2
Loan loss reserves/nonperforming loans	88.8	118.2	96.0	111.3	100.0	99.0	94.7	89.8
Loan loss reserves/gross loans	3.2	3.2	2.9	2.3	2.1	2.3	2.4	2.0
Loan loss provisions/net interest revenue	32.3	17.8	15.0	13.1	15.2	19.0	15.4	12.9
<b>Capitalization</b>								
Equity/total assets	4.2	4.4	4.4	4.4	3.8	3.9	4.1	4.4
Equity/net loans	8.5	9.0	9.2	9.5	8.6	9.0	9.4	10.4
Equity/liabilities	4.5	4.7	4.7	4.6	4.0	4.2	4.3	4.7
<b>Revenue and profitability</b>								
Net interest revenue/average assets	2.0	2.1	1.9	1.8	1.6	1.5	1.3	1.2
Other operating income/average assets	1.3	1.2	1.2	1.5	1.5	1.4	1.4	1.7
Return on average assets	0.4	0.6	0.5	0.5	0.5	0.5	0.5	0.7
Return on average equity	9.7	12.7	12.0	11.5	11.4	12.6	13.7	16.0

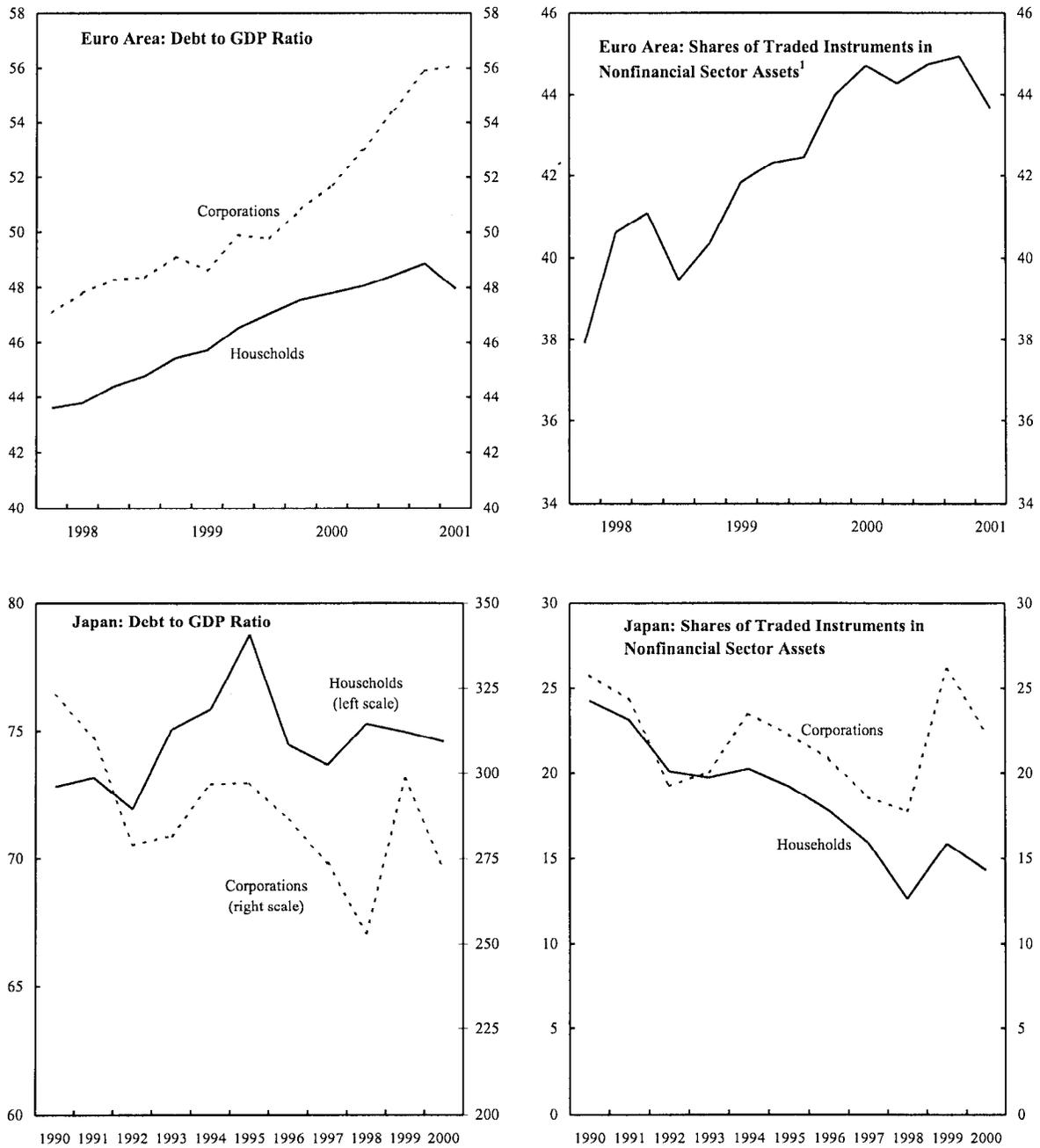
Source: Bankscope; data for 30 largest European banks by assets.

**Figure 3.2. Probability Density Functions for G-3 Exchange Rates Implied by Option Prices**  
*December 31, 2001*



Source: IMF staff estimates.

**Figure 3.3. Household and Corporate Sector Balance Sheets in the Euro Area and Japan**  
(In percent)



Sources: ECB; and Nomura database.

<sup>1</sup>Includes general government.

banks mask the poor performance of banks in the countries where the pace of consolidation and restructuring has noticeably lagged behind that of the United States and the European average. Those institutions have already struggled to cope with overcapacity and poor profitability in their home markets. Moreover, their efforts to diversify business overseas (to emerging markets countries) and into new business activities (such as lending to the telecom industry and engaging in credit derivatives businesses) have exposed them to new sources of weakness.

Financial institution weaknesses are most pronounced in Japan. The cost of loan write-offs continues to exceed banks' operating profits, while reported NPL ratios have risen owing to the weak economy and tighter loan classification criteria (Table 3.3). During the first half of FY 2001 alone, major banks' NPLs increased by 13 percent from March 2001 to ¥22.5 trillion (\$275 billion). According to official figures—which are lower than estimates by some market analysts—total banking system NPLs are about ¥43 trillion (\$320 billion), equivalent to about 8 percent of GDP, or roughly double the level present in the U.S. banking system during the 1980s S&L crisis. Japanese banks are also significantly exposed to market volatility through their equity holdings (equivalent to more than 150 percent of bank capital), as well as JGBs and swap holdings. At the same time, the zero-interest policy has contributed to a further narrowing of spreads on corporate loans—the banks' traditional mainstay—and ongoing restructuring efforts have not yet significantly increased profits in other business areas. Meanwhile, insurance companies have been adversely affected by low premia, the negative spread between high guaranteed returns on life policies and low returns available in Japanese financial markets, and losses associated with the September 11 attacks (which caused the bankruptcy of one insurance company).

Concerns about these problems seem to have mounted in the run-up to the planned withdrawal of blanket deposit insurance, which is intended by the government to demonstrate its commitment to reform. Confidence in the banking sector has sharply fallen, as reflected in a steep decline in bank stock prices. In addition, the Nikkei's decline to an 18-year low has fed concerns about banks' losses on their large cross-shareholdings, particularly now that these losses directly affect banks' already-weakened capital following the introduction of mark-to-market accounting in April 2001. Nevertheless, the Japan premium remains at very low levels compared with past episodes of banking crises (Figure 3.4)—reflecting a perception that the government will support the banking system, and thereby replace the private risk of lending to Japanese banks with public-sector risk. In addition, the potential for stress in Japan's financial system to give rise to international spillovers may have declined. Major Japanese banks' international loan portfolios have contracted every year since FY 1996, as they reportedly cut back overseas operations (see Table 3.3).

*Third*, U.S. household and corporate interest burdens relative to income are below the peaks attained during (or in the run up to) the previous recession, even though household debt is higher relative to income—partly reflecting today's lower nominal interest rates (Figure 3.5). By the same token, interest burdens could rise if interest rates picked up amid an early recovery. *Fourth*, the levels of household and corporate net worth were boosted by asset price increases—including in real estate markets—during the last decade, although

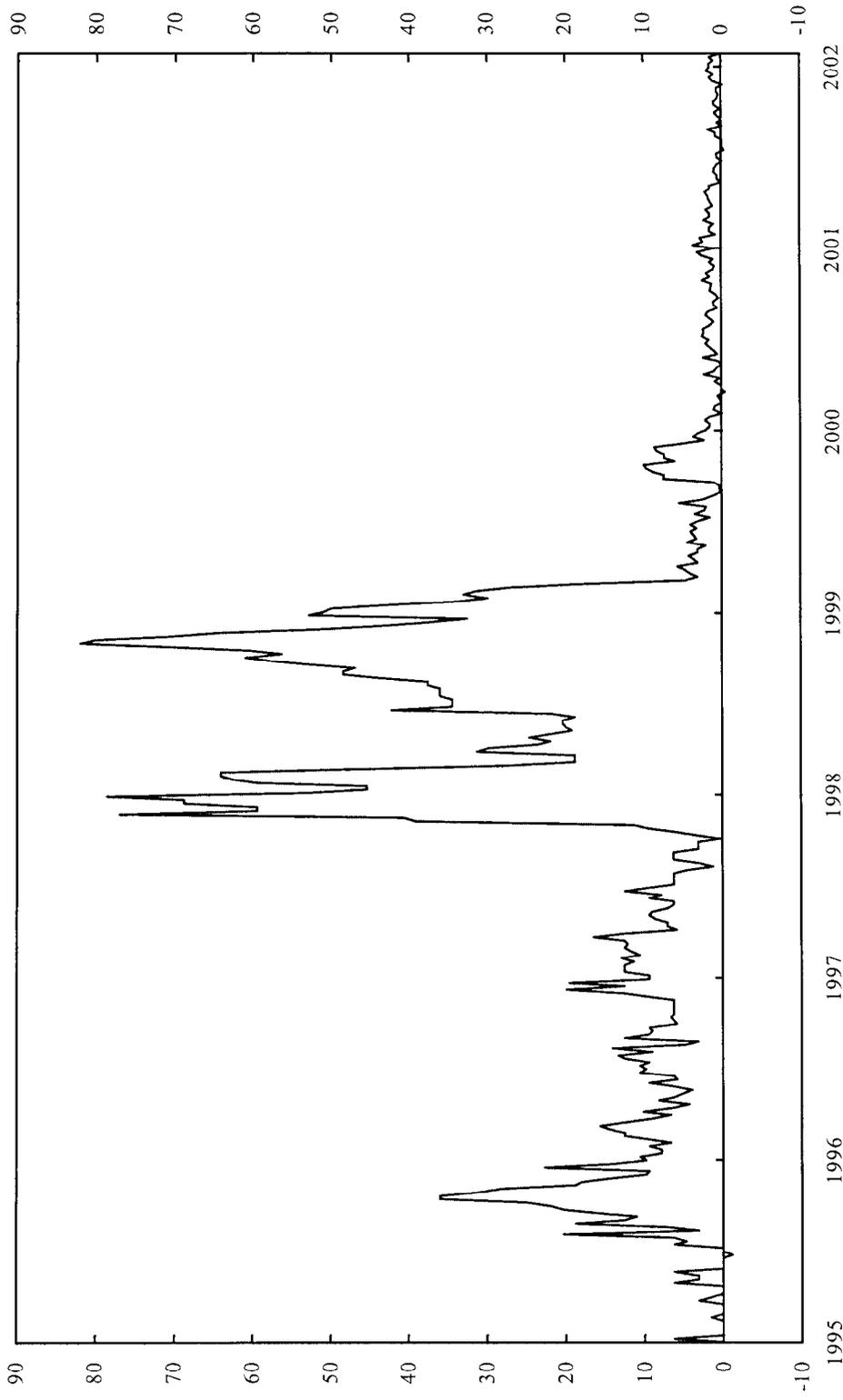
**Table 3.3. Performance of Major Japanese City Banks<sup>1</sup>**  
*(In percent, except where noted otherwise)*

	FY 1996	FY 1997	FY 1998	FY 1999	FY 2000
<b>Assets Quality</b>					
Nonperforming loans/loans	3.89	4.82	5.53	5.01	5.34
Credit expenses/average loans	1.25	2.78	2.90	1.32	1.36
Loan loss reserves/nonperforming loans	53.26	67.69	49.02	42.93	36.64
Loan loss reserves/gross loans	2.07	3.28	2.71	2.15	1.96
<b>Capital</b>					
Equity/total assets	3.11	2.40	4.42	4.69	4.12
Equity/net loans	4.83	3.92	7.02	7.41	7.49
Equity/liabilities	3.21	2.46	4.62	4.95	4.30
<b>Operations</b>					
Net interest income/average assets	1.07	0.96	1.01	1.08	0.98
Return on average assets (ROAA)	-0.01	-0.72	-0.57	0.15	-0.01
Return on equity (ROE)	-0.19	-29.93	-13.42	3.15	-0.32
<b>Loan Portfolio (trillion yen)</b>					
International loans	71.3	60.8	40.8	29.2	28.3
Domestic loans	219.2	217.8	221.0	224.1	222.4
of which:					
Wholesale loans	64.4	64.9	72.5	67.6	68.4
Housing loans	36.2	38.9	40.7	41.8	41.6

Source: Moody's Investors Service, Banking Statistical Supplement: Japan.

<sup>1</sup>Data for fiscal year ending in March.

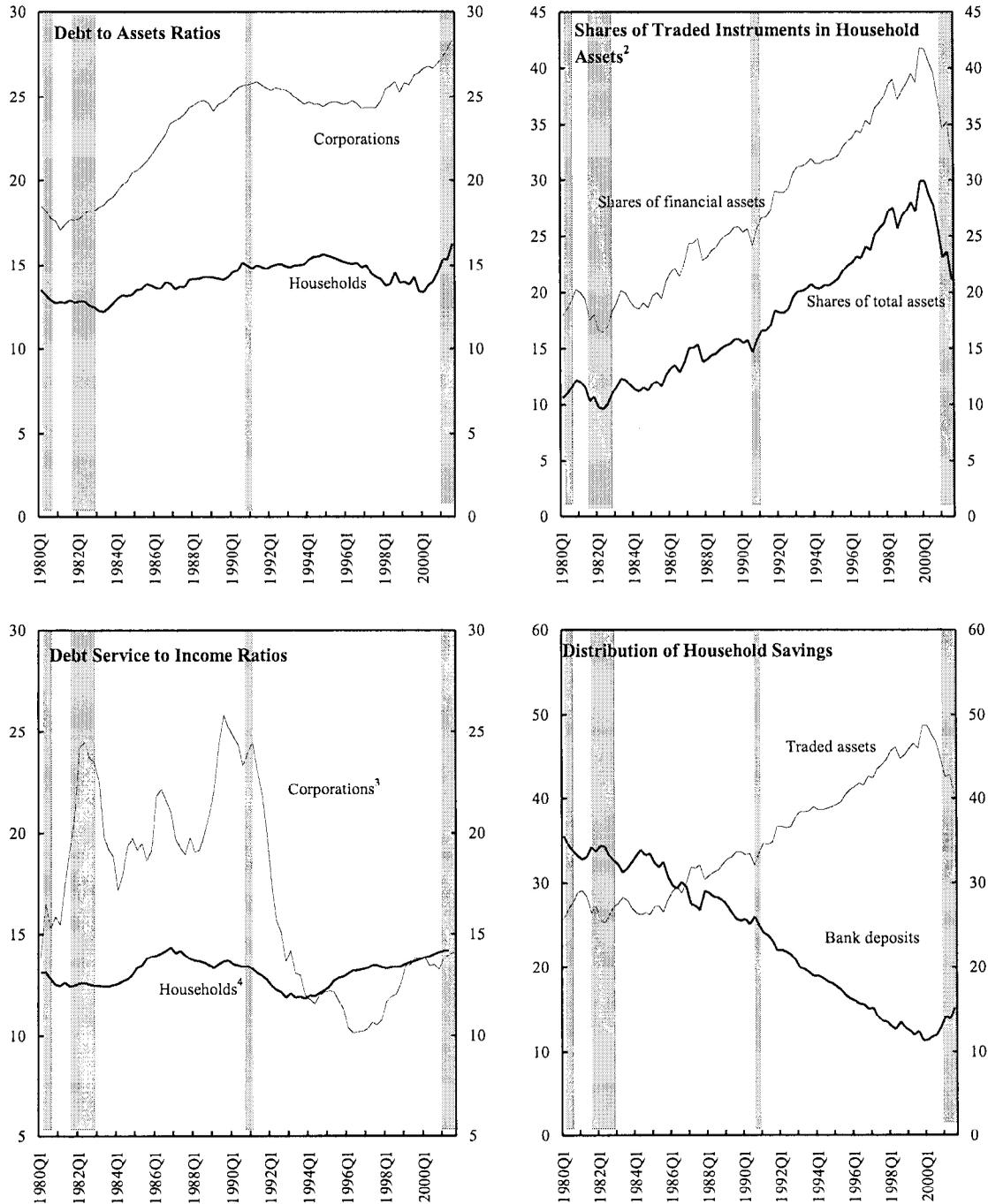
Figure 3.4. Japan Premium<sup>1</sup>  
(In basis points)



Source: Bloomberg Financial Markets L.P.

<sup>1</sup>Average U.S. dollar LIBOR of Fuji Bank and Bank of Tokyo minus the LIBOR fix (three-month rate).

**Figure 3.5. United States: Household and Corporate Sector Balance Sheets and Debt Service Ratios<sup>1</sup>**  
(In percent)



Source: United States, Board of Governors of the Federal Reserve System.

<sup>1</sup>Shaded areas indicate recessions.

<sup>2</sup>Credit market instruments, corporate equities, and mutual fund shares as a percentage of assets. Includes assets of nonprofit organizations.

<sup>3</sup>Ratio of nonfinancial corporate business net interest to pretax income.

<sup>4</sup>Ratio of household debt-service payments to disposable personal income.

liabilities have grown more rapidly than net worth in both sectors, leading to a decline in the net worth/liabilities ratio. *Fifth*, despite mounting concerns about the dollar's overvaluation and large U.S. current-account deficits, the dollar has continued to strengthen even as the U.S. economy has weakened and markets have become more volatile. This may reflect sustained capital inflows into the United States. In this environment, a change in foreign appetite for U.S. assets could affect the magnitude and composition of capital flows into the United States, leading to asset price adjustments. *Sixth*, compared with investments during the 1980s junk bond and real estate booms, investments during the 1990s TMT boom may have had more fundamental, productivity-enhancing underpinnings and could therefore contribute more significantly to medium-term growth (as evidenced by 3.5 percent U.S. productivity growth during the fourth quarter of 2001). This may partly offset the negative wealth effect from the deflation in TMT stock prices that occurred during 2000–01. *Seventh*, a number of recent initiatives undertaken by the international community have worked to strengthen the international financial architecture and improve the functioning and stability of international financial markets. For instance, enhanced transparency and data dissemination have improved the scope for market analysts and international investors to discriminate between emerging markets borrowers that have sound fundamentals and those that have relatively weak fundamentals. This improved discrimination would tend to reduce contagion from countries that experience crises owing to weak fundamentals.

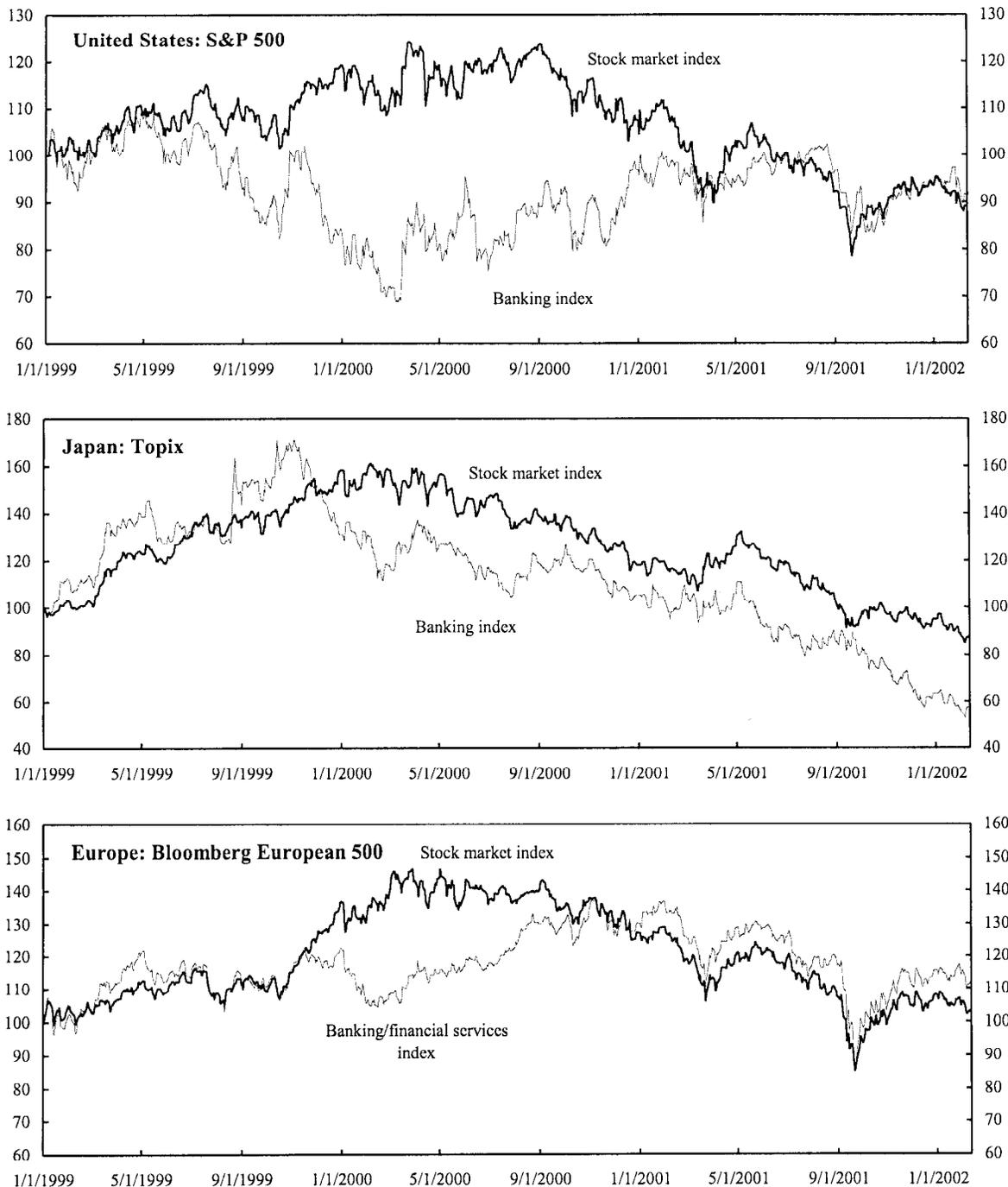
Overall, the preceding analysis suggests that financial conditions during the period leading up to the present global slowdown were more favorable in many respects compared with those prevailing in 1990–91. But several weak links in the international financial system are present. The higher dependence of balance sheets on traded financial assets—in the context of greater indebtedness—is a potential source of risk.

### **How Have Financial Conditions Deteriorated During 2001?**

During 2001, global financial conditions have deteriorated across a broad range of markets, financial institutions, and sectors, but in some cases from a strong position (see Table 3.1). In addition to financial problems associated with the September 11 events and defaults by Argentina and Enron, bank delinquency and charge-off rates have increased somewhat for commercial and industrial, consumer, and real estate loans. Financial asset prices have also weakened on balance, as the performance of European and U.S. bank stock indices has been lackluster, and Japanese bank stocks have fallen by over 40 percent (Figure 3.6). Broad stock market indexes fell during 2001, although markets recovered losses following the post-September 11 rebound. In the U.S. equity markets, price-earnings ratios ended the year at high levels that seem to be pricing in a mid-2002 global recovery (as discussed in Chapter II). In particular, they imply an increasingly optimistic outlook for U.S. corporate earnings growth (Figure 3.7), which contrasts with downward revisions to analysts' near-term earnings forecasts.

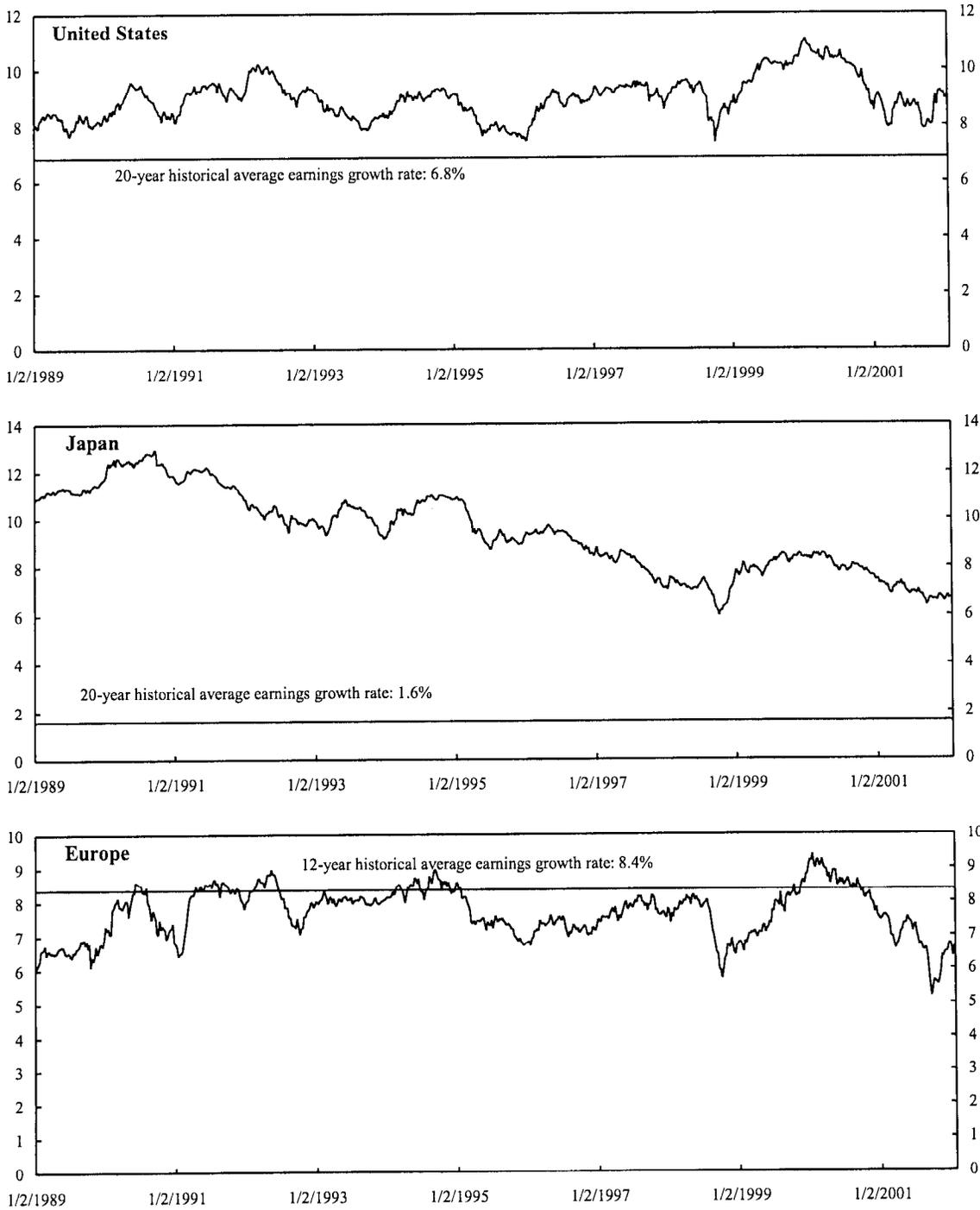
At the same time, and amid an unusually strong cyclical erosion in U.S. corporate profits as a share of GDP, credit market default rates have increased sharply to an average of almost 4 percent (they are normally in the range of 1 to 2 percent) exceeding those in

**Figure 3.6. Performance of Bank Stock Indices**  
(January 1, 1999=100)



Source: Bloomberg Financial Markets L.P.

**Figure 3.7. Implied Earnings Growth Rates<sup>1</sup>**  
(In percent; weekly data)



Sources: Datastream; and IMF staff calculations.

<sup>1</sup>Expected earnings growth rates implied by levels of price-earnings ratios and long-term interest rates. Based on 8-percent equity premium.

1990-91. The amount of defaulted debt reached a new annual record high of about \$115 billion in 2001 and a new monthly high of \$31 billion in January 2002. In addition, spreads on high-yield debt surged and peaked above 900 basis points in September 2001—only slightly below the peak reached in 1990–91. AAA spreads are presently 168 basis points and somewhat above 1990–91 levels. High-yield issuance has slowed sharply while investment-grade issuance has continued apace (see Chapter II).

Meanwhile, corporate and household debt have continued to rise relative to GDP, suggesting that these imbalances accumulated during the expansion have not yet been fully worked off. At the same time, aggressive reductions in interest rates and active mortgage refinancing activity have worked to limit upward pressure on corporate and household debt service. However, equity prices exhibited sharp price movements in 2001 in both directions, and, on balance, the net worth of U.S. households and nonprofit organizations has been reduced by about \$1.2 trillion as a result of equity price adjustments. More specifically, and based on an end-2000 equity-portfolio wealth of \$7.5 trillion, according to U.S. flow of funds data, U.S. household and nonprofit organizations experienced a capital loss of \$1.1 trillion in the first quarter of 2001, a capital gain of \$400 billion in the second quarter, a capital loss of \$1.1 trillion in the third quarter, and a gain of about \$600 billion in the fourth quarter.<sup>6</sup> Comparable flow-of-funds data do not appear to be available for Europe, but during 2001, EMU equity market capitalization fell by 14.2 percent, equivalent to €718 billion (\$640 billion). By contrast, U.S. equity market capitalization fell by 8.4 percent.<sup>7</sup>

The aforementioned financial adjustments are a manifestation of structural changes that are likely to be particularly relevant for gauging risks to financial market stability going forward: the significantly greater exposure of households and corporate balance sheets and net worth to financial asset prices and markets. In the past, commercial banks acted as a shock absorber for many of their corporate clients, as they continued to provide financing through good and bad economic conditions, up to a point. Traded instruments now account for about one-third of U.S. household financial assets, compared with one-quarter about a decade ago (see Figure 3.5); likewise, traded instruments now account for about 44 percent of euro-area nonfinancial sector assets, compared with 38 percent in 1997 (see Figure 3.3).<sup>8</sup> Companies have also increasingly relied on the buoyancy of their own share prices to acquire other companies, to raise funds through new stock issuance, or to guarantee loans to their own special purpose financing entities.

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<sup>6</sup> Derived from Board of Governors of the Federal Reserve, Flow of Funds, Table R.100 and staff estimates.

<sup>7</sup> Figures based on Datastream indexes covering about only 85 percent of market capitalization.

<sup>8</sup> Includes general government, corporate, and household sectors.

Financial institutions themselves also depend more on markets. Commercial and investment banks actively use securities and derivatives markets to fund their activities, earn underwriting and trading income, and manage risks. Financial institutions are now more exposed to market, liquidity, and counterparty credit risks. This market re-orientation has been facilitated by the rapid growth of the global over-the-counter (OTC) derivatives markets (including credit derivatives, discussed in the next section), which between 1995 and 2001 virtually doubled in notional size to nearly \$100 trillion. As a result of the global slowdown and these structural factors, financial institutions have been affected through two channels. First, asset price adjustments have adversely affected balance sheets and asset quality. Second, the deteriorating general economic climate has put downward pressure on revenues and profitability as fee-based incomes have declined (for example, from brokerage commissions, initial public offerings, and mergers and acquisitions). In addition, domestically-oriented financial institutions face intensified competition in markets from the large complex financial institutions (LCFIs) that dominate the mature and international capital markets and intermediate the bulk of international capital flows. LCFIs' international activities, particularly in the global interbank and OTC derivatives markets, have also strengthened the linkages among the major financial systems and financial centers. This may have increased the potential for spillovers across financial institutions and centers.

Based on the comparison with 1990–91, and even with the adverse effects of the considerable shocks of the September 11 attacks, Argentina's default, and the failure of Enron, the international financial system has shown remarkable resilience thus far, even if weak institutions have become more vulnerable. Moreover, in some ways the experience during the 1990s provides a basis for optimism that the international financial system will continue to cope. During that decade, markets proved resilient during a series of tests—the collapse of ERM; several episodes of bond market turbulence and equity price adjustments; crises in Mexico, Asia, and Russia; and the failures of Barings and Long-Term Capital Management (LTCM). In each case, despite considerable market volatility and substantial losses experienced by individual institutions, the systemic economic and financial costs were well-contained. Of course, all of this occurred against the background of the longest U.S. economic expansion on record. It remains to be seen how long the system can remain resilient during a period of slower global growth.

In considering the risks going forward, two observations are worth re-emphasizing. First, the systemically-important European and U.S. banks still seem to be well-capitalized, and probably could withstand a further deterioration in financial conditions and asset quality without posing a substantial risk of instability: however, there exists heightened stress for weak institutions (although none of the weaker U.S. or European institutions may be systemically important). Second, at the same time, the increased reliance on market finance intensifies the effects of asset market adjustments on corporate and household balance sheets, with the potential for feedback onto economic activity and then onto financial market conditions.

### **What Are the Implications for Financial Market Stability Going Forward?**

Against this background, and in light of the financial imbalances that accumulated in major countries during the 1990s, the key question surrounding the implications for financial market stability going forward is *how well will financial markets fare if the global recovery is subdued or delayed?* The answer to this question depends on how closely the economic outturn conforms with market expectations. Two scenarios can be identified that illustrate this.

Under a baseline scenario, the U.S. and global economies would begin to recover around mid-2002. Since markets broadly reflect an expectation that this will take place, no widespread adjustment in asset prices or flows would be likely to occur. Some adjustments might be associated with unexpected developments in some sectors or regions—such as new evidence of fragility in the high-tech sector, or signs of difficulties in emerging market countries that have so far avoided financial contagion. This could cause investors to rebalance portfolios toward those sectors or countries that would then be perceived as offering better risk-adjusted returns than before. In addition, according to some estimates, present U.S. equity valuations seem to imply higher levels of year-end corporate profits than consensus estimates now suggest. This suggests that asset prices could weaken even if the recovery matches the baseline forecasts for economic and profit growth. Nevertheless, as long as the global recovery was not delayed, any increased credit and market risks would probably be modest and could likely be readily absorbed by most investors and financial institutions. Therefore this scenario would be very unlikely to cause major problems in financial markets. Even in this benign scenario, however, the situation in Japan could worsen considerably—for example, if progress in implementing corporate and financial sector reforms is seen as faltering, if ongoing asset-price deflation continues to impair bank and corporate balance sheets, or if banking system strains reach critical proportions.<sup>9</sup>

Under an alternative scenario, the recovery would be subdued and/or delayed compared with market expectations. In this case, a slower pace of corporate earnings growth could lead to broad-based corrections in global equity markets. This may be particularly likely to occur in the United States, where price/earnings ratios reflect an optimistic outlook for corporate earnings growth, notwithstanding an unusually large cyclical decline in corporate profits as a share of GDP. In addition, reduced corporate earnings growth, along with rising corporate default rates (particularly among more highly-leveraged sectors and companies) could cause credit spreads to increase and tighten conditions in domestic and international loan and bond markets as financial intermediaries and investors sought to limit their exposures. Under this scenario, more market-risk-sensitive investors would probably rebalance their portfolios toward less cyclically-vulnerable sectors, waiting for signs that the

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<sup>9</sup> Another risk in this benign scenario is that shocks could affect the pattern of international capital flows and national and international financial conditions. Future reports will devote further analysis to this issue.

recovery had materialized in earnest before taking on significant exposure to cyclically-sensitive risky assets. The credit market adjustment could also entail a higher interest burden for households and corporations that have relied heavily on floating-rate or short-term financing, particularly if risk premia in credit markets rise sharply. Along with the negative household wealth effects of asset price deflation, reductions in investment and consumption expenditure would work to constrain economic growth.

This scenario could have significant adverse effects on Japan and on emerging-markets borrowers. In particular, reduced external demand stemming from a global slowdown would put downward pressure on Japan's economic growth. This in turn could give rise to an increase in bankruptcies and add to asset-price deflation, and thereby heighten the stresses on Japan's already-weakened financial system. Slower global growth, along with increased investor risk aversion, could also be reflected in tighter terms of access to international capital markets for emerging-markets borrowers (see Chapter II). This could pose challenges to countries that have relied heavily on international markets to meet their financing requirements.

In this kind of adjustment it is not possible to know how markets would behave. But in previous periods of adjustments in the 1990s, market intermediaries and participants have temporarily and selectively withdrawn from some types of risk taking in capital markets to protect their capital and assets. As in the past, risk management systems, mark-to-market accounting losses on securities holdings, and the increased risk of further losses could lead market makers to reduce their market exposures in particular market segments. Financial institution income and asset quality could also be adversely affected by reduced earnings (for some institutions, losses) from capital markets activities, and balance-sheet and off-balance sheet exposures. Meanwhile, counterparty credit risk exposures to institutions participating in derivatives markets would increase as well. If (as occurred in 1998 during the LTCM crisis) there were fears of further credit events, and in particular involving the soundness of some financial institutions, the prospect that OTC derivatives hedges might be unwound could lead to a rebalancing of portfolios. The experience with such adjustments in the 1990s, and the relative resilience of the international financial system at that time, is cause for optimism that adjustments would be manageable and contained. This is particularly so because there are likely to be countervailing forces working in the direction of maintaining financial stability, as for example through the markets' self-correcting mechanisms and as a result of possible further monetary policy adjustments. However, in the scenarios just described, all of these adjustments would occur against the background of a global slowdown and already somewhat weakened financial conditions, and it cannot be excluded that several of the weakened financial institutions might come under additional stress.

### **How Effectively is the Market for Credit Risk Transfer Vehicles Functioning When Global Economic Growth is Slow?**

The market for instruments that transfer credit risk from one investor to another—credit risk transfer vehicles such credit default swaps and collateralized debt obligations—is now undergoing the first major test in the form of a U.S. recession and global economic

slowdown. This test comes after a relatively short period of very rapid growth. Between 1997 and 2001, the notional amount of outstandings increased by about ninefold to an estimated \$1.6 trillion. A variety of market participants—including commercial and investment banks, and institutional investors (such as mutual funds, insurance companies, pension funds, and hedge funds)—are now using the market to hedge or take on credit risk (Figures 3.8 and 3.9).

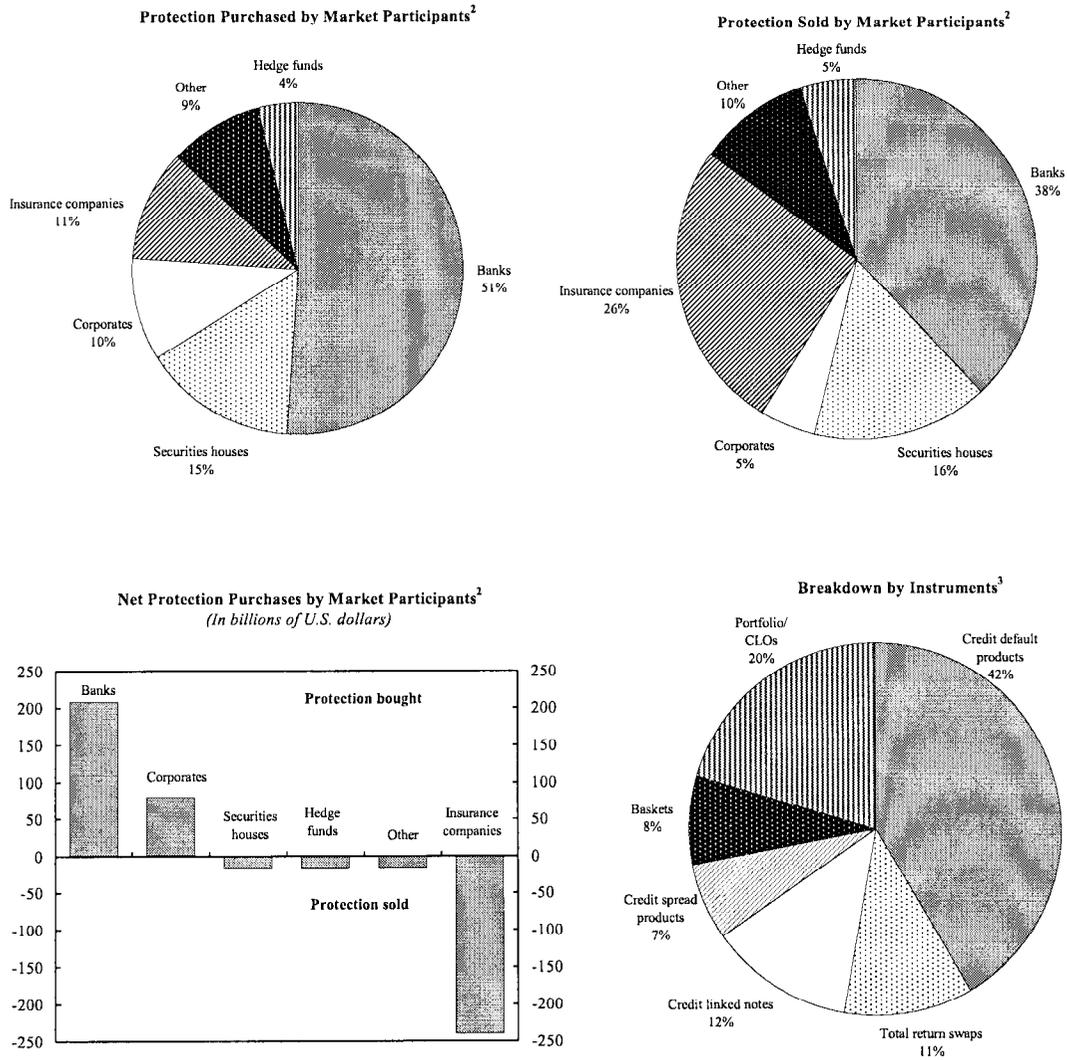
Measured in terms of notional principal—the reference amount on contracts—the credit risk transfer market is still small compared with the entire OTC derivatives market, which amounts to about \$100 trillion. But this comparison significantly understates the amount at risk in credit risk transfer contracts compared with most OTC derivatives contracts. For a standardized contract such as an interest rate swap, credit exposure is typically equivalent to about 3 to 5 percent of the notional principal. By contrast, for a credit derivative, credit exposure could be up to 100 percent of the notional amount. This is because some credit derivatives involve the exchange of a cashflow equivalent to the principal amount of the underlying credit instrument when they are exercised, whereas principal amounts are not exchanged in standardized interest rate swaps. Moreover, credit risk transfers will probably account for an increasing share of OTC derivatives markets owing to their rapid growth—which some market participants predict could range around 40-50 percent per year over coming years.<sup>10</sup>

Particularly as the markets mature and grow over time, credit risk transfers have the potential to improve the efficiency and stability of credit markets overall, by separating credit origination from credit risk bearing, augmenting price discovery, and allowing credit risk to be more widely dispersed throughout the financial system. At the same time *these instruments and markets are currently being driven by regulatory arbitrage, involve nontraditional players, and are adding to the complexity of financial transactions and markets*. In this way—and as will be explained in more detail below—they have posed new challenges or intensified existing ones. First, they are reducing transparency about the institutional distribution of credit risk and its concentration. Second, while they are dispersing credit risk to a broader set of market participants, they may be creating or magnifying channels through which the distress associated with credit events would spread across institutions and markets (including through the web of rapidly shifting counterparty exposures). Third, these instruments seem to have created demand for credit risk by a much larger and different set of market participants, generally less, or even, not regulated as well as banks, and not necessarily having the experience required for properly pricing or managing these risks. Finally, by their very nature, credit risk transfer mechanisms are leveraged instruments, and they can add to the total amount of credit that is internally created within the financial system. This increases the potential for mispricing and misallocation of capital. For

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<sup>10</sup> Deutsche Bank, “Credit Derivatives Outlook,” January 8, 2002, p. 2.

Figure 3.8. Global Credit Derivatives Market Size and Structure<sup>1</sup>



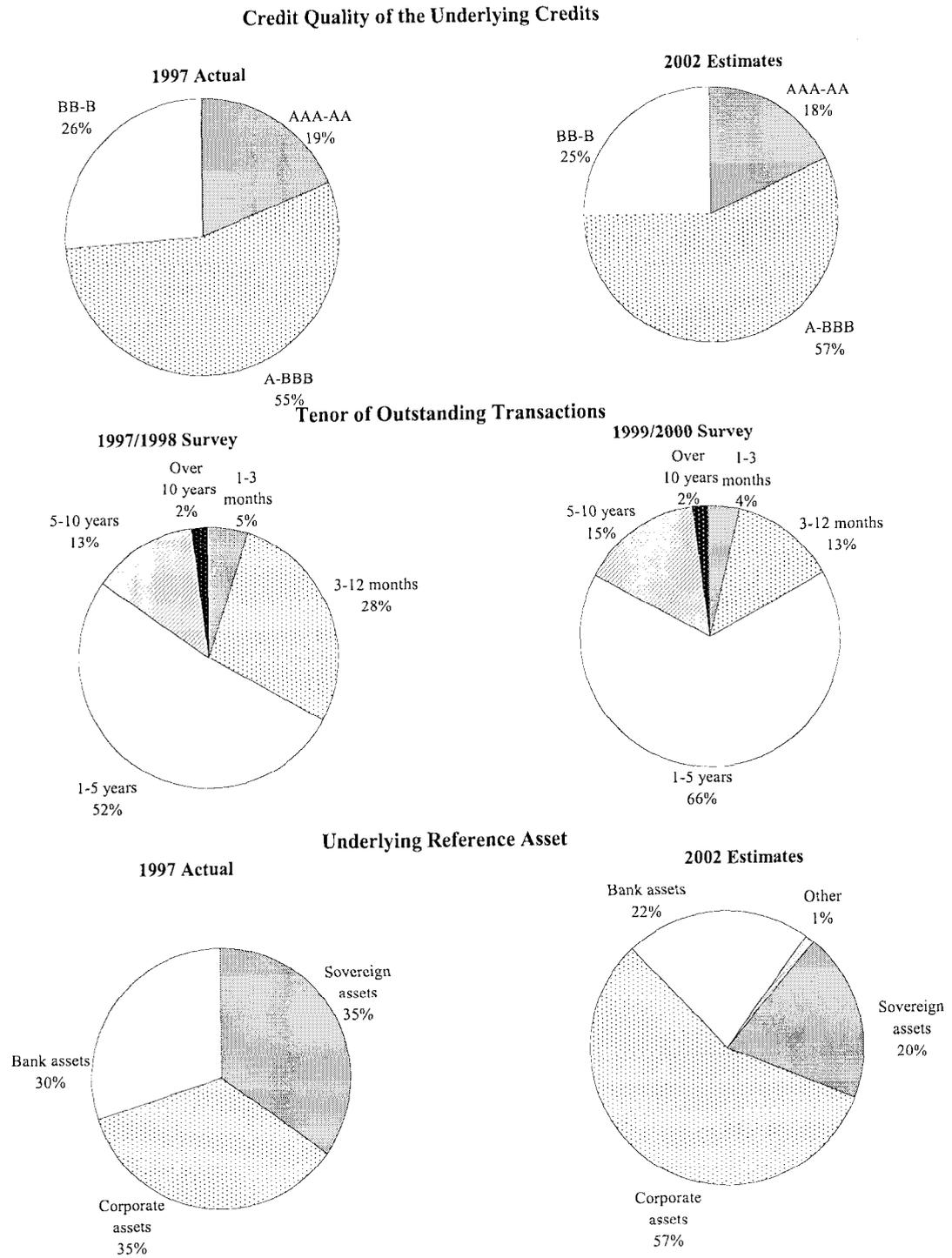
Sources: British Bankers' Association, *Credit Derivatives Survey 1999/2000*; and Bank of England (2001).

<sup>1</sup>Based on 2001 estimated market size and 2002 estimated shares of sales/purchases of protection.

<sup>2</sup>Other includes government/export credit agencies, mutual funds, and pension funds.

<sup>3</sup>CLO refers to collateralized loan obligations.

Figure 3.9. Key Characteristics of Credit Derivatives Markets



Source: British Bankers' Association, *Credit Derivatives Report 1999/2000*.

these reasons, the market's ability to efficiently and effectively transfer credit risk potentially has implications for financial efficiency, if not financial stability.<sup>11</sup>

### **Market Performance During the Slowdown**

Since the beginning of the slowdown in global growth, financial strains on corporate and sovereign entities have given rise to a number of credit events, some of which in turn have triggered payments on—or legal disputes about—credit risk transfer instruments. As noted earlier, in 2001, amid an unusually large cyclical erosion in U.S. corporate profits relative to GDP, corporate defaults rose to annual record levels, with 211 issuers defaulting on \$115 billion in debt. In January 2002, corporate defaults reached new monthly highs, with 41 issuers defaulting on \$31 billion in debt. Defaults also have been more clustered than expected, and recovery rates have been lower than expected. Accordingly, market participants have reportedly begun to adjust the pricing and collateral terms of contracts and scrutinize structured financial instruments (involving underlying and derivative instruments) more closely. Some investors and credit-protection sellers have sustained sharp losses. For example, American Express lost \$370 million in June 2001 on a \$1.4 billion collateralized debt obligation (CDO) portfolio, and several internationally active financial institutions have already experienced losses on credit enhancement transactions with Enron now that it is in the midst of bankruptcy proceedings, the full extent of which will not be known with certainty until the bankruptcy proceedings and related lawsuits are resolved. In addition, there is some uncertainty about the performance of some of the credit risk transfers used to hedge credit exposures to Enron.<sup>12</sup> According to credit analysts and market participants, except for Enron, no private counterparties to credit risk transfer vehicles have yet defaulted. Accordingly, they see the markets as having worked reasonably effectively to insure credit risk so far. Dealers and credit rating agencies see activity in credit risk transfer vehicles, which in the CDO market was reportedly fairly well-sustained through September 11, as reflecting continued investor and dealer appetite for credit risk.

As a result of these financial strains and credit events, and in particular recent private default events involving Railtrack and Enron, weaknesses in the legal and operational infrastructure of OTC derivatives markets have resurfaced—as they did during the LTCM crisis—and in particular have raised concerns about the performance and enforceability of some credit risk transfers.<sup>13</sup> There are three recent examples of this. First, hedge funds had

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<sup>11</sup> For an extensive discussion of the risks associated with OTC derivatives, see Schinasi and others (2000).

<sup>12</sup> See Financial Times (2002a, 2002b).

<sup>13</sup> Earlier watershed credit events included the Conseco restructuring (September 2000), which raised issues about whether restructuring should be treated as a credit event, and the National Power demerger (November 2000), which raised issues about the treatment of credit derivatives involving obligations that are split between successor companies. These issues

(continued)

arranged credit default swaps<sup>14</sup> to hedge credit risk in convertible bonds issued by Railtrack, which was placed in administration in October. Afterwards, uncertainty prevailed about whether convertible bonds could be delivered for the swaps. Some of this uncertainty was addressed in November when the International Swaps and Derivatives Association (ISDA) issued supplementary documentation.<sup>15</sup>

Second, in December 2001, Enron's failure and its involvement in credit and other OTC derivatives markets highlighted longstanding uncertainties about the legal effectiveness in bankruptcy of "closeout netting" provisions in OTC derivatives documentation (Box 3.1).<sup>16</sup> Without closeout netting, OTC derivatives holders could be exposed to a defaulting counterpart on a gross, rather than net, basis (U.S. banks' gross OTC derivatives exposures are about four times larger than their net exposures). U.S. bankruptcy legislation that would resolve this uncertainty for U.S. contracts is still under review in Congress, as it has been since the collapse of LTCM in the autumn of 1998.

Third, in early 2002, JP Morgan Chase sued insurance companies that failed to pay off on \$965 million worth of surety bonds issued to JP Morgan as insurance against the failure of Enron to make good on forward contracts involving the delivery of natural gas and oil. Surety bonds typically are used as a general form of protection against nonperformance

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were subsequently addressed in supplements and user guides issued by the International Swaps and Derivatives Association.

For discussion of legal risks in OTC derivatives markets, including credit derivatives, see Box 3.6 in Schinasi and others (2000).

<sup>14</sup> These contracts involve the payment of periodic premiums from a "protection buyer" to a "protection seller." In the event that a predefined "credit event" such as default occurs, the protection seller makes a payment related to the market value of an underlying reference instrument such as a bond. For example, the protection seller might either buy the reference instrument at par value from the protection buyer, or make a payment that is equivalent to the difference between par and market value. For more technical details on these and other instruments see *Handbook of Credit Derivatives* (1999).

<sup>15</sup> ISDA develops standards and serves as a forum for the discussion of legal and documentation issues surrounding OTC derivatives contracts.

<sup>16</sup> Closeout netting—the settlement of net outstanding obligations by a single payment in the event of default—mitigates the risk that a bankrupt counterparty will 'cherry pick' its obligations by attempting to enforce those that have positive value to it while repudiating the others. See Schinasi and others (2000).

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### Box 3.1. Financial Implications of Enron's Bankruptcy

Enron's collapse—the largest U.S. Chapter 11 bankruptcy in history—caused significant volatility in financial markets and will no doubt lead to significant losses for financial institutions and institutional and retail investors. So far, these effects have not been seen as having systemic financial consequences, because exposures to Enron are generally well diversified across institutions and markets. Remaining uncertainties include: the likelihood that hidden losses will be uncovered as Enron's highly complex financial operations are unwound; the magnitude of bank exposures to other energy companies that are also facing difficulties because of Enron's collapse; the size and structure of Enron's derivatives books; and the extent of insurance company exposure.

As described in the text, Enron's failure highlighted uncertainties about the effective functioning of credit-risk transfer vehicles. It also underscored three broader capital-markets issues.

*Inadequate oversight of financial activities of non-financial corporations.* Enron was the main dealer, market-maker, and liquidity provider in major segments of the OTC energy derivatives markets, and was also active in other derivatives markets segments (at end-September 2001, its overall derivatives trading liabilities stood at about \$19 billion). Despite its size, complexity (including many off-balance-sheet special purpose vehicles), and central role in the energy derivatives markets, its OTC derivatives activities were essentially unregulated.<sup>1</sup> In particular, it was not required to disclose information about its risks to counterparties; disclose information about market prices or conditions, even in markets that it dominated; or set aside prudential capital against trading risks. These gaps contributed to its demise and the associated financial market implications. Because its trading unit's capital was not segregated from the parent company's capital, a loss of confidence in the parent company's soundness led its banks to withdraw credit lines, which in turn contributed to a collapse in its trading operation. Some observers have since called for revisions to the 2000 Commodity Futures Modernization Act that exempted energy derivatives activities from key regulatory provisions, and U.S. Congressional hearings have since discussed this issue. Nevertheless, even if these exemptions had not been made, Enron's activities in e.g. credit and other financial derivatives markets would still have been essentially unregulated.

*Ineffective private market discipline, disclosure, corporate governance and auditing.* Enron's financial difficulties and vulnerabilities, including those associated with its extensive off-balance-sheet transactions, seemed to have gone undetected by analysts as well as its shareholders and creditors until it was on the brink of bankruptcy. In part this reflected inadequate accounting rules and standards as well as errors by its auditors, which (among other oversights) did not uncover related-party transactions or require Enron to properly consolidate its many and complex off-balance-sheet SPVs in its financial statements. In October 2001, the correction of this and other errors resulted in a restatement of income since 1997 by \$600 million and a writedown of shareholder equity by \$1.2 billion. Questions also arose about the auditor's possible conflict of interest owing to its parent company's extensive consulting business with Enron (in 2000 Enron paid it \$25 million in auditing fees and \$27 million in consulting fees). Along with allegations that the auditor destroyed documents relevant to a Securities and Exchange Commission inquiry, these revelations led to widespread calls for a closer examination of auditing standards and practices.

*Misallocation of retirement savings.* More than 10,000 of Enron's employees held most of their retirement savings in Enron stock, including Enron's contributions (entirely in company stock)—which the company prohibited them from selling until age 50. In addition, for three weeks in October, Enron required its employees

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<sup>1</sup> Testimony of Vincent Viola, Chairman New York Mercantile Exchange, before the Senate Energy and Natural Resources Committee, January 29, 2002. Energy derivatives are subject to the anti-fraud and anti-manipulation provisions of the Commodity Exchange Act, however.

to freeze their asset allocations as it switched plan administrators, during which time Enron stock fell by 35 percent. As a consequence of the pension plan's poor diversification and inflexibility, during 2001 a large share of employee savings were wiped out as Enron's stock price plummeted from about \$90 to less than \$1.00. In the early part of 2002, the U.S. authorities formed a working group to consider potential reforms to the Employee Retirement Income Security Act (ERISA) rules that govern private pension investments, and the U.S. Congress held hearings to discuss (among other topics) how to address gaps in ERISA that permitted a high concentration of Enron stock in the company's pension fund.

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of delivery of goods.<sup>17</sup> The insurance companies are alleging that JP Morgan had no intention of taking physical delivery and instead used the transactions as a way of extending loans to Enron collateralized by the surety bonds. These examples together highlight, in actual practice, the opacity and legal uncertainties associated with credit risk transfers.

Argentina's default in December also constitutes a major test of the rapidly growing market for emerging market credit default swaps. There presently are no reliable estimates or surveys of the total outstanding amount of Argentine default protection. But market observers suggest that the total could be in the range of \$10 to \$15 billion in notional amount covering a large number of contracts. These contracts are now in the process of being settled.

In sum, some progress has been made in addressing operational “teething problems” in the nascent credit risk transfer markets, particularly for standardized “vanilla” instruments such as credit default swaps. At the same time, as evident from ongoing legal disputes, some operational issues highlighted by the downturn and deteriorating credit environment remain to be addressed. Moreover, there may be significant operational risks in the CDO market, which involves heterogeneous instruments and SPV structures that can be complex and relatively nontransparent to investors. In addition, the potential for CDO investors to experience sudden and larger-than-anticipated losses (as in the case of American Express) raises a question about whether such vehicles pose reputational risks to banks. An originating bank might prefer to compensate its investors for losses or buy back the product, rather than risk damage to its reputation that could prevent it from selling such products in the future. If this occurred, the bank would wind up with a loss on the underlying credit exposure despite having bought credit protection in what seemingly had been an “arms length” transaction.

### **Challenges Going Forward**

The development of markets for credit risk transfers is still in an early stage of the new product cycle typical of new markets. As noted above, in 2001 the market seemed to be able to cope with a series of credit events that emerged as the global economy slowed. Payments were by and large made by credit risk protection sellers to protection buyers, even though in some cases this occurred only after arbitration. At the same time, the global slowdown—along with rising corporate defaults—has revealed some challenges in using these instruments and in understanding their impact on financial stability.

First, credit derivatives can reduce the transparency about who owns credit risk. This occurs, in part, because the transfer of credit risk reduces the informational content of balance sheets without necessarily providing additional information about where the risk is transferred or even how it is priced. By reducing transparency about credit exposures, the growth in credit derivatives complicates the assessment of private credit and counterparty

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<sup>17</sup> A surety bond is a bond issued by one party, the surety, guaranteeing that he will perform certain acts promised by another or pay a stipulated sum, up to the bond limit, in lieu of performance should the principal fail to perform.

risk in individual institutions. It also makes it more difficult to assess the overall distribution of credit risk across institutions and markets, and the challenges that credit risk transfers might pose to liquidity conditions in related underlying and derivative markets (i.e., it poses liquidity risks) and more generally to financial market stability. The fact that there are now nontraditional entities that are trading in these markets—such as Enron, for example—that are not subject to the same disclosure rules and standards as regulated financial institutions further adds to the lack of transparency. Moreover, and as illustrated by the case of Enron, there are also gaps in accounting rules and standards, particularly regarding special purpose vehicles, as well as in auditing practices, that apparently are also contributing to a lack of transparency.

Second, regulatory arbitrage involving credit risk transfer vehicles is shifting credit risk exposures to outside the banking system. This is a concern because regulatory incentives appear to encourage banks to transfer credit risk to other institutions—such as hedge funds, pension funds and insurance companies—that are not prudentially regulated like banks, in particular as regards capital adequacy, and that have not traditionally had cultures or risk management systems that are attuned to credit risk. Nevertheless, these nonbank financial institutions manage a large volume of assets distributed across global markets and are part of the global network of counterparty risk exposures. Some believe they are the weak links in the chain of counterparty relationships. A string of unanticipated credit events that caused those market participants to experience much larger than expected losses could lead them to reduce their willingness to supply credit protection when banks need it most. It could also lead to a withdrawal of capital devoted to market making in credit risk transfer markets. These reactions, if they were sharp and sustained, could significantly impair liquidity and create volatility in the credit derivatives and related markets, similar to the way in which the threat of default by LTCM affected credit markets in 1998.

Third, because the use of credit risk transfer vehicles tends to increase the linkages between markets and institutions, these new instruments tend to increase the potential for spillovers across markets or to augment existing ones. For example, unanticipated shocks to an underlying bond or loan transaction for which there is an associated credit derivative would give rise to increased demand for credit hedges. During a period of turbulence in the underlying market, situations could arise in which there would be one-sided, illiquid, and volatile credit derivative markets, which through counterparty relationships could spill over into connected markets. Likewise, in a market where there are relatively few very large counterparties, a cluster of credit events could trigger payments on many contracts at once and put considerable liquidity demands on one or more of the relatively small number of major market makers.<sup>18</sup> If these market makers had to sell a wide range of liquid securities

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<sup>18</sup> Global data are not available, but in the United States, one bank holds 60 percent of the banking system's outstanding notional credit derivatives; two banks hold 75 percent. As noted elsewhere, banks are net buyers of credit protection; it is unclear whether holdings of net protection sellers are similarly concentrated.

from their portfolios to cover payments, volatility could rise sharply in a variety of markets at once. In addition, as a number of the institutions that sell protection—particularly insurance companies—typically have access to bank credit lines, they might tap these lines to fund payments on credit risk transfer contracts, potentially putting pressure on bank liquidity. Finally, credit hedges could fail to perform as expected if a major protection seller came under financial stress and either contested the legality of the contract or was unable to pay. This could leave banks with unhedged credit positions, give rise to an increase in the demand for credit hedges and/or unloading of credit positions, and potentially lead to an increase in credit-market volatility.

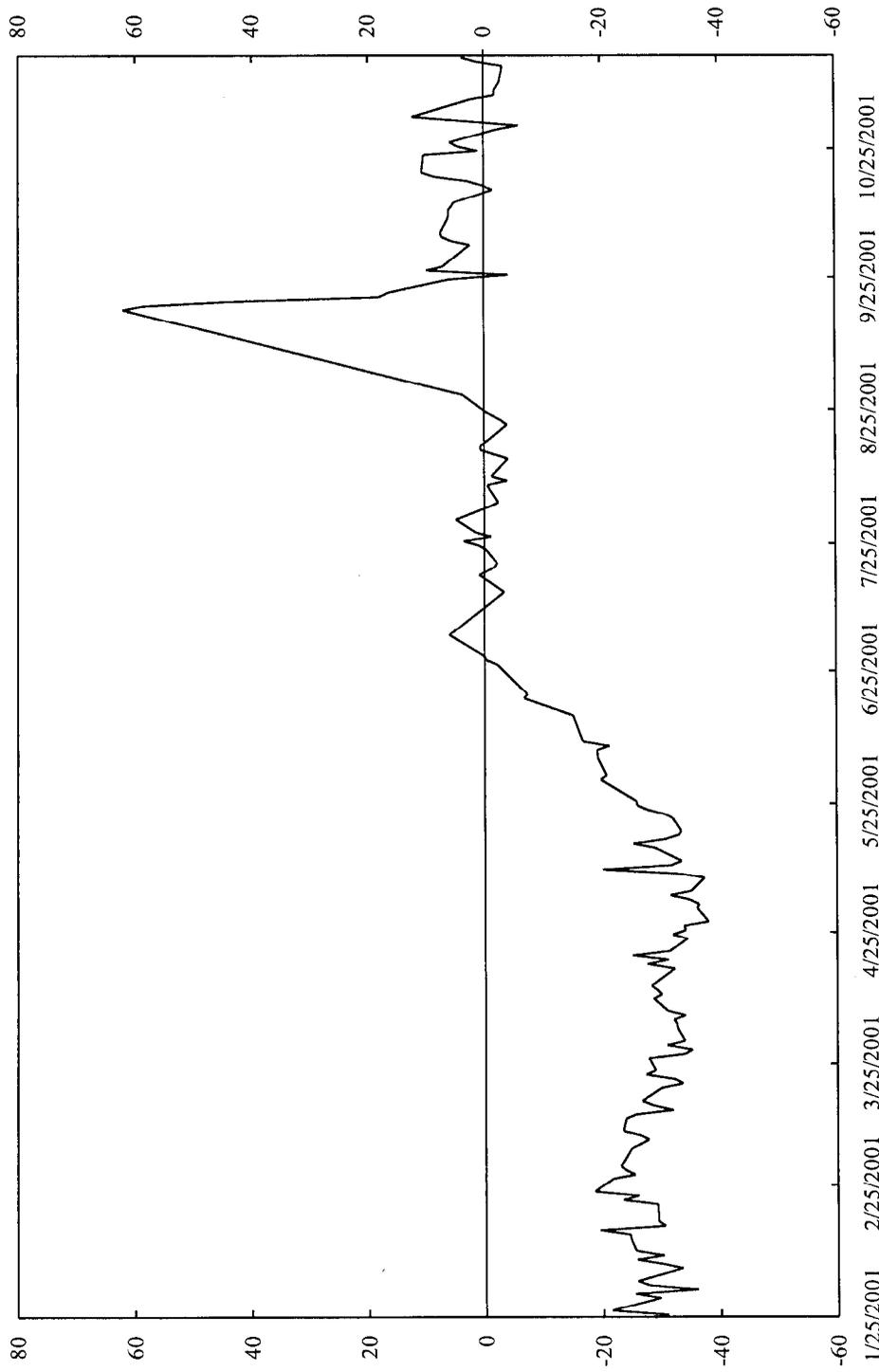
These transmission mechanisms can be magnified by the leverage inherent in credit derivatives. As with other OTC derivatives, credit derivatives allow investors to take on exposure to an underlying credit instrument while committing much less funds than would be required to actually buy the instrument. In addition, a single underlying credit transaction can give rise to multiple gross credit derivative transactions as dealers re hedge and lay exposures off on one another. The total gross credit exposures created through this process can in principle substantially exceed the exposure on the underlying instrument. For example, an initial \$1 billion credit transaction might give rise to 5 rounds of hedging as dealers pass the exposure around the market. Each transaction involves the creation of another \$1 billion in gross exposure to one counterparty; 5 such transactions therefore give rise to \$5 billion in gross credit exposure.

Fourth, because these are relatively new instruments and markets, and there is now easier investor access to credit risk markets, a significant amount of capital from nontraditional sources is flowing into credit risk transfers. Concerns have been raised that there is not yet a full understanding of the costs and benefits of these instruments. More generally, the tendency for credit derivative spreads to be volatile and even decline below the spreads on the underlying bonds raises questions about whether participants in the credit derivative markets—especially those that have not traditionally managed credit risks—have yet learned how to price these contracts appropriately. In early 2001, a strong supply of credit protection—including from institutional investors and money managers—compared with demand for credit protection from banks apparently contributed to narrow and sometimes even negative spreads between the credit default swap premium and the credit spread on the underlying security (Figure 3.10).<sup>19</sup> Whether or not contracts are being properly priced is

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<sup>19</sup> The premium is the spread over the London Interbank Offered Rate (LIBOR) that is paid for credit protection. Although the analytical theory is still being developed, the difference between the premium on a credit derivative and the credit spread on the underlying instrument partly reflects differences in tax treatment, liquidity, and counterparty risks for a bond versus a credit default swap. These structural features might limit the extent to which market participants can arbitrage away the difference in spreads between the two markets. The sharp blowout in spreads during September probably reflects an increased demand for credit protection following the attacks.

**Figure 3.10. Spread Between Credit Derivatives Premium and Underlying Bond Spread<sup>1</sup>**  
*(In basis points)*



Source: Deutsche Bank.

<sup>1</sup> Average for credit default swaps on four investment grade U.S. corporations.

difficult to know, in part because the theory of credit derivative pricing is still developing. If in fact credit derivative prices “overshoot” and are excessively volatile relative to the price of the underlying credit, this would distort signals about credit risks. Accordingly, it would also raise questions about whether credit risk transfer vehicles improve or reduce the efficiency of credit allocation in markets.

Looking ahead, improvements to the infrastructure for, and transparency of, credit risk transfers could help them to develop more fully, help market participants to manage the risks, and make the markets more efficient. This occurred in the OTC swaps markets during the 1990s, and there is good reason to expect the credit derivative markets would mature through time as well. Infrastructure improvements in the future will no doubt include better documentation that further refines the definition of a credit event. Bankruptcy legislation that would establish the legal effectiveness of closeout netting and a convergence in bankruptcy laws about what constitutes a default would also encourage further maturation of the market. Better information about the size and structure of the market and the exposures of bank and nonbank financial institutions active in the market would help market participants assess the attendant risks and gauge whether they are well-managed by the institutions involved in the markets. Accelerated progress on all these fronts would go a long way toward addressing the weaknesses highlighted above.

### **Potential Implications of Increasing Retail Investor Involvement**

Another issue that could become more important in the future is the now small, but increasing, exposure of retail investors to the risks associated with credit risk transfers. Hard data on retail participation and exposures are not available, but retail investors are seen by market participants as searching for higher-yielding alternatives to their traditional investment instruments such as stocks, government and corporate bonds, money-market mutual funds, and bank deposits in light of the low returns on such instruments in the recent period. Retail demand may also reflect the longer-term underlying trends of disintermediation and more direct retail investment in asset markets. In this environment, retail investors have increasingly invested and become exposed to the risks in a variety of structured products, including guaranteed funds—providing downside protection by hedging exposures in derivatives markets—and mutual funds that own CDOs.

At present, credit analysts see retail investors’ relatively limited participation in credit risk transfer markets through three main channels: investments by “high net worth individuals,” mutual funds, and hedge funds.<sup>20</sup> Although data are not available, in view of their recent proliferation, hedge funds may be a principal channel for direct or indirect retail participation in credit risk transfer markets. Hedge funds invest in CDOs and employ credit

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<sup>20</sup> Retail participation takes place through mutual funds investing in CDOs rather than credit derivatives, as the latter trade only on OTC markets made up by financial-institution counterparties.

default swaps to hedge the credit risk in convertible bond arbitrage strategies. Retail investments in these strategies have become more accessible as hedge funds have reduced minimum investment requirements and instituted less restrictive “lock up” rules that allow investors to withdraw more quickly. Hedge funds that meet enhanced disclosure and regulatory requirements are allowed to increase the number of investors (thereby reducing their minimum investments), and are more readily accessible to pension funds and other institutional investors. Moreover, minimum investment rules are increasingly irrelevant, because one can invest any amount in recently created offshore-based funds, structured as “closed end” funds, which invest 100 percent of their assets in hedge funds (“funds of funds”). It is estimated that about 440 funds of funds exist and account for about 20 to 25 percent of the hedge fund universe of \$500 billion in capital under management (UBS Warburg, 2001).

Even if direct involvement and exposure in credit risk transfer mechanisms is limited, retail investors can become exposed to credit risk in many less transparent ways. For example, shareholders of American Express stock were adversely affected when it became known that American Express had taken significant losses on their investments in CDOs, which involved credit risk transfer mechanisms. Likewise, many retail investors may hold mutual funds that invest in riskier credit instruments in order to enhance their yields. One illustration of this is the unexpected impact of the collapse of Enron on Japanese mutual funds. These mutual funds invested in Enron’s samurai bonds and marketed shares in their funds to Japanese retail investors as a high yield alternative to bank deposits. The collapse of Enron caused a “run” on these mutual funds, as investors withdrew ¥2 trillion (\$16 billion) from 27 mutual funds. This was well in excess of the funds’ holdings of Enron samurai bonds (totaling ¥66 billion). The run necessitated an intervention by the Bank of Japan in the form of an injection of ¥6 trillion (\$49 billion) of liquidity to offset the potential adverse impact on the banking system. This injection followed the earlier injection of liquidity in Japan, of more than ¥8 trillion, as a result of the impact of the liquidity effects in Japan following the events of September 11.

As a result of all these changes, the hedge fund industry, including the segment that is active in credit risk transfer markets, is widely considered to have been “democratized.” For instance, many of the new retail investors are not the traditional “high net worth individuals”—minimum investments in hedge funds in Europe, Japan, and the United States are now as low as €20,000 (or \$18,000). Reflecting this easier access, retail hedge fund investments surged from \$8 billion in 2000 to over \$22 billion in 2001 through September. The potential for retail participation will increase further as more hedge fund investment vehicles begin to be offered publicly.

At present, the potential for active retail participation in credit risk transfer markets seems to be mainly an investor protection issue. As noted above, even some sophisticated market participants have encountered challenges in investing in and understanding how best to use credit risk transfers. In this regard, there may be cause for concern about, first, the ability of retail investors to understand fully the risks in credit risk transfer vehicles and price them accordingly—particularly given the difficulties that some sophisticated institutional

investors seem to have had with this—and second, whether the disclosure and transparency standards that have been developed for other instruments, such as mutual funds, would need to be updated.

An additional complication is that the activities of intermediaries that offer products such as guaranteed funds might be altering the distribution of credit risks in the financial system. Internationally active financial institutions trade actively in global exchange-traded and OTC derivatives markets in order to hedge their exposures to the retail products they sell, in effect arbitraging between professional hedging markets and the retail markets. As this activity effectively transfers credit risk from the fund to its counterparties—which can include a wide range of financial institutions such as hedge funds and insurance companies—it both complicates an assessment of who bears the ultimate risks associated with the products and raises questions about whether the counterparties can manage these risks well.

If and as retail investor participation grows over time, the broader dispersion of credit risks across investors could improve the effectiveness of credit risk transfer markets in mitigating the financial effects of periods of economic stress. Nevertheless, the relatively limited sophistication of individual investors and questions about disclosure and transparency could have implications for financial efficiency and/or stability. For instance, herding or “bandwagon” effects could occur in credit risk transfer markets if retail investment decisions are driven primarily by investor sentiment rather than information about changing fundamentals. Similarly, if disclosure and transparency to retail investors about the risks in these vehicles are insufficient, this would increase the potential for investment mistakes to occur, as well as rapid unwinding of investment positions when these mistakes are discovered. Both of these effects would tend to increase volatility in credit prices and spreads, and might also adversely affect the efficient allocation of credit in the financial system.

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## **IV. Early Warning Systems Models: The Next Steps Forward**

The Mexican (1994–95) and Asian (1997–98) crises stimulated a variety of empirical studies designed to identify both the causes of these crises and the determinants of the associated spillover effects (Kaminsky and Reinhart, 2000). To the extent that past crises can yield useful lessons about factors that contribute to a country's vulnerability to future crises, scholars and policymakers quickly realized that these empirical studies could be one element in a forward-looking early warning system (EWS). As a result, a growing number of international financial institutions (IFIs) and central banks are using EWS models in their surveillance activities. Similarly, several investment banks have developed in-house EWS models aimed at providing foreign exchange trading advice to their clients and complementing their economic analysis of emerging markets.

These models typically have an empirical structure that attempts to forecast the likelihood of a certain type of "crisis" using factors such as country fundamentals, developments in the global economy and/or global financial markets, and, in some cases, political risks. A number of considerations have influenced the development of existing EWS models. First, despite a common origin in the academic models of the mid-1990s, existing EWS models differ sharply among themselves in terms of their definition of a "crisis" and in terms of the time horizon over which they attempt to forecast a crisis. Not surprisingly, these differences reflect the different interests of the various end-users. For example, investment bank models define a crisis primarily in terms of variables such as changes in exchange rates and interest rates that are likely to affect the profitability of foreign exchange trading or investment positions. Moreover, investment bank models typically focus on one- to three-month forecast horizons that are regarded as most relevant for foreign exchange trading and investment positions. In contrast, EWS models used by IFIs and central banks in surveillance exercises tend to focus on variables associated with major balance of payments crises, namely large changes in exchange rates and/or central bank foreign exchange reserves. In addition, surveillance-linked EWS models typically attempt to forecast a country's vulnerability to crisis over a much longer time horizon than investment bank models. These models can have a forecast horizon of up to 24 months, reflecting in part the desire to have enough time to formulate corrective policy adjustments.

A second consideration that has affected the specification of the models and the interpretation of their forecasts has been the need to confront the trade-off between so-called type I and type II errors associated with the estimation of the statistical models. Type II errors (the acceptance of a false hypothesis of no crisis) can be minimized if EWS models are designed so that they have a low probability of missing a crisis. Unfortunately, adopting estimation procedures that minimize type II errors typically result in larger type I errors (the rejection of a true hypothesis of no crisis). In other words, the models can be calibrated to catch most crises, but only at the cost of many false claims.

A third consideration has been the availability and timeliness of data. For example, the absence of adequate historical time series on market interest rates and other financial variables has led to the exclusion of such variables in some EWS models. Moreover, variables available only with long reporting lags complicate the updating of forecasts and again discourage the use of what would otherwise be important explanatory variables.

This chapter briefly reviews the nature of the core EWS models used by the IMF in surveillance exercises, examines the performance of these models in terms of the accuracy of both in-sample and out-of sample forecasts, and considers various avenues for improving the usefulness of these models as surveillance tools. In particular, the use of alternative “building blocks” for predicting foreign exchange, debt, and banking crises, as well as the more efficient use of the information embedded in forward-looking asset prices, is discussed.

### **Current EWS Models at the IMF**

As part of the IMF’s surveillance activities, the IMF maintains two core EWS models: the Developing Countries Studies Division (DCSD) model and the Kaminsky, Lizondo, and Reinhart (KLR) Crisis Signals model (see Berg and others, 1999).<sup>1</sup> In addition, the results of a number of external EWS models are monitored on an ongoing basis.

The core models attempt to forecast a country’s vulnerability to a foreign exchange crisis defined as a large depreciation of the exchange rate and/or extensive losses of foreign exchange reserves over a 24-month forecast horizon. In this context, a crisis is said to have occurred when the “exchange market pressure” index—a weighted average of one-month changes in the exchange rate and foreign exchange reserves—is more than three (country-specific) standard deviations above the country average value.

The core models have parsimonious structures. For example, the DCSD model includes only five explanatory variables (real exchange rate overvaluation, current account, foreign exchange reserve losses, export growth, and the ratio of short-term debt to foreign exchange reserves).<sup>2</sup> In contrast, the KLR Crisis Signals model uses twice as many variables (the first four variables used in the DCSD model as well as the ratio of foreign exchange reserves to M2, the growth of the ratio of reserves to M2, domestic credit growth, change in the money multiplier, real interest rate, and “excess” M1 balances—defined as actual M1 less an estimated demand for money). Box 4.1 describes some of the statistical properties of the two core models.

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<sup>1</sup> These EWS models are just one of the many inputs into the IMF’s surveillance process, which encompasses a comprehensive and intensive policy dialogue.

<sup>2</sup> Efforts to incorporate fiscal sector variables are discussed in Kell and Schimmelpfennig (2002); corporate sector variables are covered by Mulder, Perrelli, and Rocha (forthcoming).

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**Box 4.1. The IMF's Core Early Warning Systems Models—A Primer**

The core Early Warning System (EWS) models used in the IMF are the Developing Country Studies Division (DCSD) and the “modified” Kaminsky, Lizondo, and Reinhart (KLR) models.<sup>1</sup> Both models define a crisis as an event during which an “exchange market pressure” index (EMPI)—a weighted average of monthly percentage depreciations in the nominal exchange rate and monthly percentage declines in foreign exchange reserves—exceeds its mean by more than three standard deviations.<sup>2</sup> The EMPI is used to create the dependent binary variable, a crisis indicator, that is equal to one if a crisis occurs in the subsequent 24 months, and equal to zero otherwise.

The DCSD model uses a multivariate panel probit regression technique to estimate the monthly probability that a country would suffer a crisis in the following 24 months. Explanatory variables include real exchange rate overvaluation, current account balance, foreign exchange reserve losses, export growth, and the ratio of short-term debt to foreign exchange reserves, measured in percentile terms. The model coefficients corresponding to the most recent estimation for the period December 1985 to July 1997 are shown in the table below.

DCSD Model Specification

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Variable	Coefficient*
Constant	-3.250
Overvaluation	0.013
Current account	0.007
Foreign exchange reserves	0.007
Export growth	0.002
Short-term debt to reserves	0.002

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\* Coefficients significant at least at the 10 percent level.

The probabilities obtained from the model are converted into a binary indicator, an early warning indicator that signals a crisis and also allows for the statistical evaluation of different models. The indicator is equal to one (and is said to “call” a crisis) if the probability exceeds a cutoff threshold probability, and equal to zero otherwise. When the indicator is equal to one, the model correctly calls or signals a crisis if one ensues within 24 months, and gives a false alarm otherwise. When the indicator is zero, the model correctly calls a tranquil period if no crisis ensues within 24 months, and misses a crisis otherwise.

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<sup>1</sup> The current versions of the models were developed in the IMF Research Department and are currently maintained by the International Capital Markets Department.

<sup>2</sup> Means, standard deviations, and weights are country-specific. Weights are calculated so that the variance of the two components of the index are equal.

A statistical evaluation of the different models' accuracy relies heavily on the choice of the cutoff threshold probability. Clearly, the choice of a low threshold would lead to many false alarms but few missed crises.<sup>3</sup> Alternatively, the choice of a large probability threshold would lead to few false alarms but many missed crises. In DCSD, the optimal selection of the threshold is obtained by minimizing an equally-weighted sum of false alarms and missed crisis.

The econometric methodology of the KLR signals model is somewhat different from that of the DCSD model, except for the final stage that determines the threshold probability for an aggregate crisis index and a crisis is called. The KLR model assumes that each individual explanatory variable signals a crisis if its mean exceeds a variable-specific optimal threshold and a crisis occurs in the next 24 months. This threshold, which is expressed in percentile terms and is assumed equal across countries, is determined by minimizing the noise-to-signal ratio: the number of months during which the variable signaled a crisis incorrectly (false alarm or noise) divided by the number of months during which the variable signaled a crisis correctly.

KLR constructs a single composite crisis indicator equal to the weighted-sum of the explanatory variables, with the weights being equal to the inverse of each indicators' noise-to-signal ratio. The probability of crisis for each value of the aggregate index is then obtained by observing how often, within the sample, a given value of the aggregate index is followed by a crisis within 24 months, and the optimal probability threshold for the KLR model is determined in a similar way as for the DCSD model.

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<sup>3</sup> From a statistical point of view, the former might be thought of as type I errors and the latter as type II errors, under the null hypothesis of no crisis.

The output of the core models is complemented by monitoring the results from three investment bank models: Credit Suisse First Boston Emerging Markets Risk Indicator (CSFB-EMRI), Deutsche Bank Alarm Clock (DBAC), and Goldman Sachs GS-Watch.<sup>3</sup> The forecasting horizon is one month for CSFB-EMRI and DBAC, and three months for GS-Watch. The choice of explanatory macroeconomic and financial variables is similar to those in the core IMF models. Among the three, there are some differences in the estimation methodology, but the major difference is in how each model defines crisis events. CSFB-EMRI defines a crisis as an exchange rate depreciation that exceeds 5 percent and is at least double the preceding month's depreciation. In contrast, DBAC defines exchange rate and interest rate events as currency devaluations and interest rate increases exceeding exogenous thresholds (typically a depreciation of more than 10 percent and an interest rate increase of more than 25 percent) and estimates the probability of both events simultaneously using a two-equation framework. Finally, GS-Watch defines a crisis event as one in which a financial price index (FPI) crosses an endogenous threshold, the latter being determined as a function of lagged values of the FPI.<sup>4</sup>

### **Model Performance**

How well have the EWS models performed, especially in periods outside the original sample period used for estimation of the relevant parameters, in terms of both the appropriate forecast of an actual crisis and the avoidance of false signals (either missing an actual crisis or falsely forecasting a crisis that did not occur)?

A thorough evaluation of the IMF's EWS models recently concluded that the core models' forecasts are significant predictors of actual crises but that they still generate a substantial number of false alarms and missed crises (see Berg, Borensztein, and Pattillo, 2001). The study stresses the importance of out-of-sample prediction for an EWS model to be a useful surveillance tool, as well as the trade-off between missing crises and generating false alarms. The relatively long 24-month prediction horizon led the authors to evaluate the models according to the forecasts issued in July 1999. Overall, the authors concluded that the DCSD model performed reasonably well, as countries with a predicted probability of crisis above 50 percent subsequently had crises, and no crisis country had a probability of crisis below 26 percent. Furthermore, the DCSD model called 59 percent of the crises correctly but issued a large number of false alarms, 78 percent.<sup>5</sup>

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<sup>3</sup> Roy (2001); Garber, Lumsdaine, and Longato (2001); and Ades, Masih, and Tenengauzer (1998). In the future, the IMF may add other models to the list.

<sup>4</sup> The FPI, a weighted average of three-month exchange rate and reserve changes, is similar to the "exchange market pressure index" used in DCSD.

<sup>5</sup> A false alarm may not necessarily be bad if it signals real risks which are eliminated through, for example, policy adjustments.

In contrast, investment bank models do not perform as well as the core models when predicting exchange rate crises out-of-sample, but they appear to have satisfied their commercial objectives. Both the GS-Watch and CSFB models have an adequate in-sample performance (the percent of crises correctly called is 66 percent and 61 percent, respectively), but their out-of-sample predictions are much weaker (the percent of crises correctly called falls to 54 percent and 27 percent, respectively).<sup>6</sup> However, investment bank models are regarded by the investment banks as performing reasonably well when evaluated solely on the merits of their short-term trading and/or investment recommendations. For example, the expected return of currency portfolios based on GS-Watch have consistently outperformed market neutral portfolios of emerging markets currencies (see Ades, Masih, and Tenengauzer, 1998).

The more recent performance of EWS models can be examined in terms of their forecasts in the periods surrounding two episodes that took place in 2001 and satisfy the EWS models definition of a crisis: namely, the devaluation of the Turkish lira in February 2001 and the devaluation of the Argentine peso in early January 2002.

The predicted probabilities of crisis and cut-off probabilities for the IMF's DCSD and KLR models before these episodes are shown in Figure 4.1. Both the DCSD and KLR Crisis Signals models correctly called for a crisis during the entire year preceding the Turkey crisis of February 2001. More precisely, both models correctly called the Turkey crisis in respectively 19 and 14 of the 24 months preceding the crisis. For the January 2002 crisis in Argentina, the DCSD model only started to signal problems in March 2001, when the run on the banks and foreign exchange reserves began. By October 2001, the DCSD model still called the crisis but only marginally and after a counterfactual decline in the probability of a foreign exchange crisis. The KLR model has not called a crisis in Argentina since August 2000.<sup>7</sup>

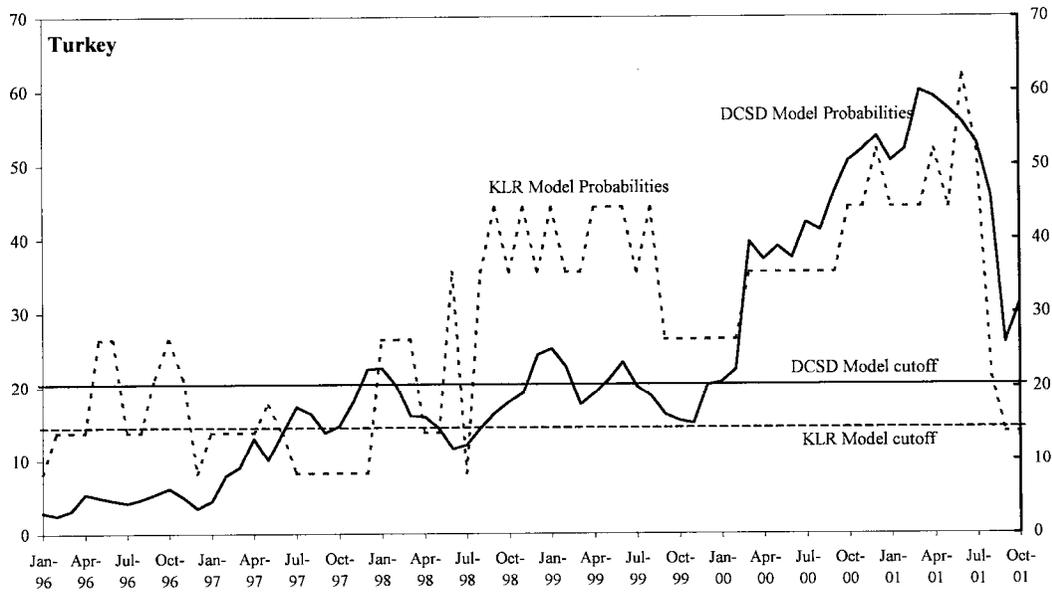
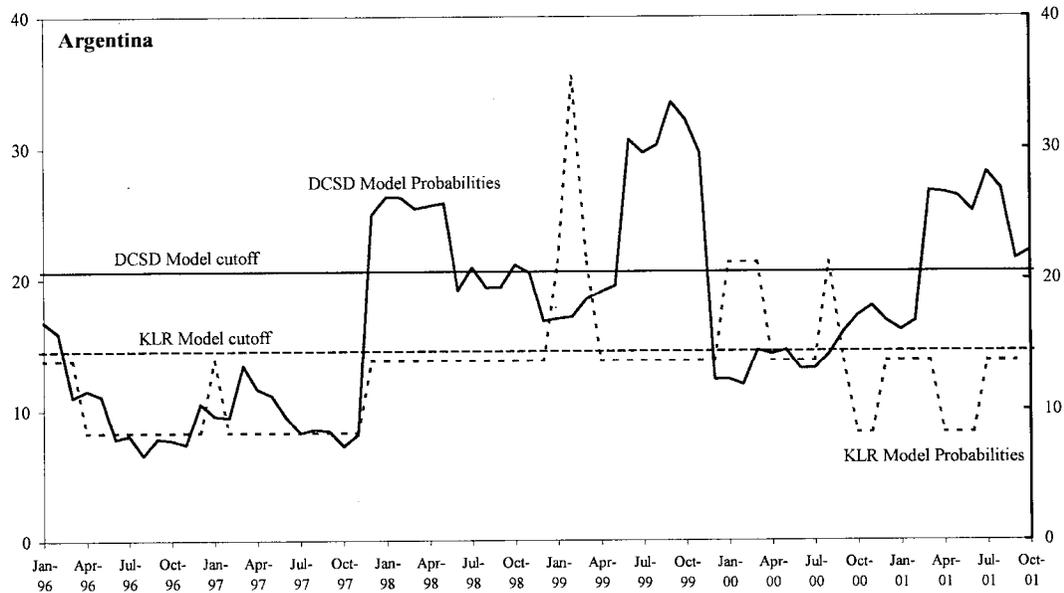
The performance of investment bank models during these two crises was also mixed. CSFB-EMRI missed the Turkish episode, since it was predicting a decline in risk one month ahead of the crisis. In Argentina, the model indicated a significant increase in the country's risk score. In October 2001, DBAC called the Argentine episode correctly and predicted a possible devaluation as large as 20 percent, in part owing to the inclusion of interest rates as part of the definition of crisis. However, DBAC also missed the devaluation of the Turkish lira. Finally, GS-Watch correctly signaled events in Turkey three months ahead. For Argentina, GS-Watch did call a crisis from September 2001 to early December 2001. However, as in the case of the DCSD model, the GS-Watch model indicated that the crisis

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<sup>6</sup> The corresponding number of false alarms as percent of total alarms are 74 percent and 94 percent (in-sample) and 87 percent and 96 percent (out-of-sample).

<sup>7</sup> One of the reasons for the models' contrasting performance in the Argentina and Turkey crises is explored in the discussion on debt crises in the next section.

**Figure 4.1. The IMF Early Warning System Models: Developing Country Studies Division (DCSD) and Kaminsky, Lizondo, and Reinhart (KLR) Probabilities of Crisis**



Source: IMF staffs calculation.

probability in Argentina declined in November and early December 2001. Also, as in the DBAC model, the GS-Watch model has issued a significant number of false alarms in the last quarter of 2001, as it called crisis in the next three months in almost every emerging market analyzed with the exception of Bulgaria, China, Chile, and Peru.

In sum, the current EWS models show mixed results in terms of forecasting accuracy, but they offer a systematic, objective, and consistent method to predict currency crisis, that helps avoid analysts' biases. Moreover, such models offer a single measure of risk in a statistically optimal way, that can be easier to interpret than, for instance, a large number of indicators giving different signals. Some analysts, noting the diverse group of countries singled out as most (and least) vulnerable by the different models, have suggested averaging the models' predictions. However, recent experience does not suggest that averaging leads to significant improvements.<sup>8</sup> As a result, the next section discusses other avenues of improvement of EWS models.

### **EWS: A Way Forward**

The recent evaluations of the performance of EWS models, as well as the experience with emerging markets crises around the turn of the century, suggest two potential avenues for increasing the usefulness of these models as surveillance tools. First, the different nature of recent financial crises suggests the desirability of developing a set of "building blocks" that would help forecast not only foreign exchange but also debt and banking crises, and identify the linkages between them. Second, EWS models could be improved or augmented by a more efficient use of the information embedded in forward-looking asset prices to anticipate financial market pressures. Although several crises took market participants by surprise, the increasing number of financial instruments available in emerging markets, combined with new techniques for extracting information from the prices of such instruments, suggest that this could be a fruitful avenue to pursue.<sup>9</sup>

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<sup>8</sup> See Forbes (2001). For example, the three most vulnerable countries in October 2001 were Malaysia, Israel, and Mexico for CSFB-EMRI; Turkey, South Africa, and the Czech Republic for DBAC; and Poland, India, and Argentina for GS-Watch. Furthermore, on many occasions the models' predictions of changes in the average vulnerability of emerging markets move in different directions. From February 2001 to August 2001, average vulnerability according to CSFB-EMRI increased by 26 percent. In the same period, average vulnerability according to GS-Watch declined by 16 percent.

<sup>9</sup> The use of financial market data suggests that the definition of a crisis and the prediction horizon may have to be adjusted to the shorter history and higher frequency of the data. Ideally, from the policymaker's point of view, it would be optimal to have indicators that signal a crisis several months or even years in advance. However, in the KLR model, all the indicators send their first crisis signal between a year and a year-and-a-half before the crisis erupts, and most of them give persistent signals that grow in intensity as one approaches the crisis. It seems that not much would be lost by moving to a 12-month horizon.

## Foreign Exchange Crises

Most of the existing EWS models omit the use of short-term interest rates as either a component of the definition of a foreign exchange crisis or as a determinant of the crisis. Domestic interest rates could be included as an independent event/equation along the lines of the DBAC model, or they could be combined with exchange rates in a more complete measure of “financial market pressures.” Similarly, excessive money or domestic credit creation is a key determinant of “first generation” foreign exchange crises, but the lags in the availability of monetary aggregates make them a less useful predictor of such crises; interest rates could reflect money market pressures in a more timely fashion.<sup>10</sup>

Stock market prices have some degree of predictive power in all market models, as well as in KLR,<sup>11</sup> and sectoral stock prices show promising results that are worth pursuing further. In particular, Becker, Gelos, and Richards (2000) argued that sectoral differences in stock market performance may constitute valuable leading indicators of currency crises in emerging markets. Using company level data, the study indicates that around a year before the 1994–95 Mexican currency crisis net importers and financial companies began to continuously underperform the market, while net exporters showed continuously high abnormal stock returns.

New methods to extract information about market expectations from derivative prices could also be used as part of an EWS. Traditionally, forward exchange rates have been used in the mature markets to extract information about expected future spot rates.<sup>12</sup> The proliferation of offshore nondeliverable forward markets for emerging market currencies, together with the deepening of onshore markets in some countries, increases the feasibility of applying these methods to emerging markets. For instance, a substantial increase in the probability of devaluation of the Argentine peso was priced in the 12-month nondeliverable forward rates by late July–early August 2001 (see Figure 4.2). Also, the experience with the Korean won shows that once restrictions are removed and the market deepens, the offshore

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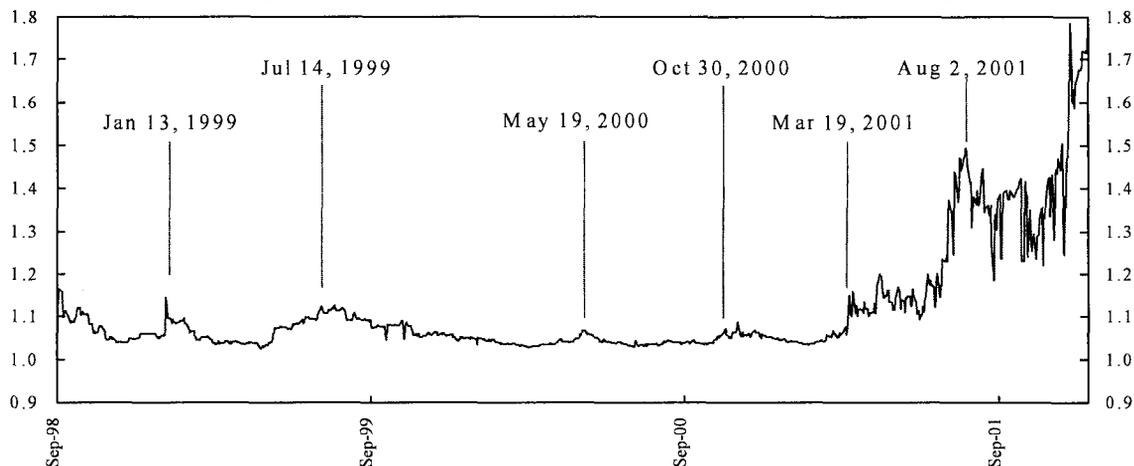
<sup>10</sup> First generation models of crises are driven by excessive domestic credit creation needed to finance budget deficits, while second generation models explain crises as the result of shifts in investors’ expectations whenever there is a conflict between a fixed exchange rate and other government objectives. Third generation models of crises emphasize financial frictions (Krugman, 1999).

<sup>11</sup> Berg and Patillo (1999) find that a rerun of the KLR model yields a noise-to-signal-ratio greater than one for stock prices; this is in part due to a change in sample that removes some European countries and adds other emerging markets.

<sup>12</sup> Although forward rates are generally biased predictors of future spot rates, they could be used together with survey expectations of exchange rates and other factors that explain systematic forecast errors in foreign exchange markets (Lewis, 1995).

nondeliverable forward market leads the domestic spot market—suggesting that price discovery happens primarily offshore and that information from offshore markets could be used to predict onshore financial pressures (Park, 2001).

**Figure 4.2. Forward Exchange Rates for Argentine Peso**  
(Twelve month Argentine peso per U.S. dollar nondeliverable forward exchange rate)

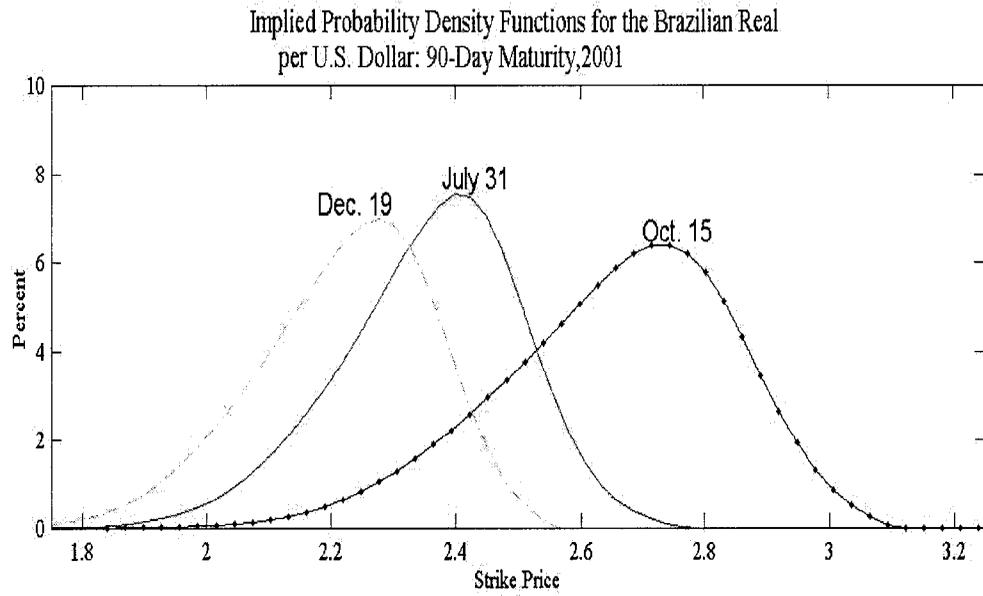
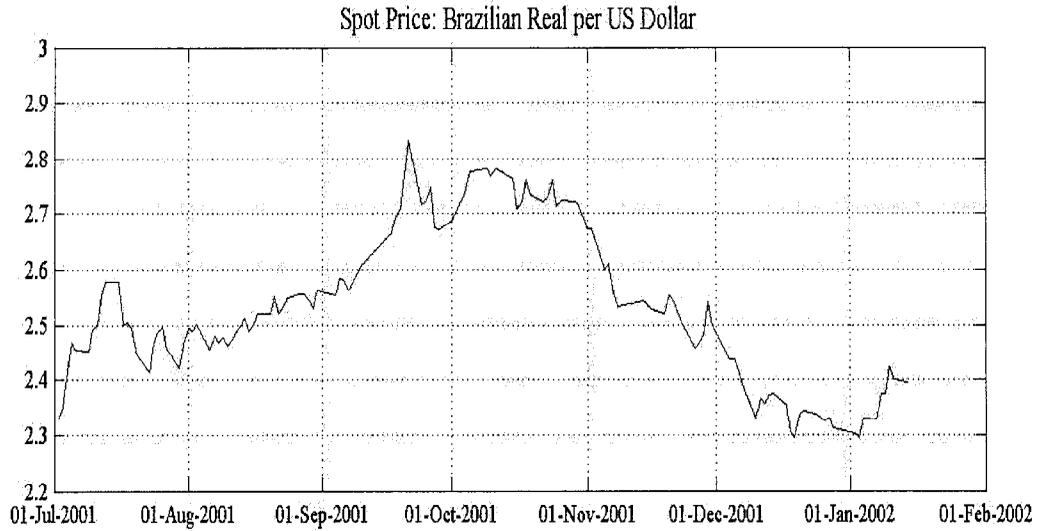


Source: IMF staff calculations based on data from Bloomberg Financial Markets, L.P.

More recently, new techniques based on foreign exchange option prices provide market expectations on the whole risk-neutral probability distribution of future exchange rates (see Soderlind and Svensson, 1997; and Annex II of IMF, 1997). Unlike traditional exchange rate forecasts that provide only a point estimate of the mean of future exchange rates, option prices allow for the derivation of the probabilities associated with different ranges for the values of the underlying price. An example of the potential usefulness of these techniques is provided in Figure 4.3, which plots the probability density functions for the Brazilian *real* at different dates in July, October, and December of 2001.<sup>13</sup> The July distribution shows that the contagion from events in Argentina to Brazilian financial markets was to some degree underestimated, as there is no probability mass beyond the 2.75 exchange rate and the *real* peaked at 2.84 on September 21, 2001 (see de Faria, 2001). However, the October probability density function displays a negative skewness, indicating that the market expected a “decoupling” and a relatively more appreciated *real* toward the end of the year. This evolution of expectations is confirmed by the shift of the December probability density function toward the left as well as by its reduced dispersion.

<sup>13</sup> While these methods have been applied mostly to mature market currencies, Campa, Chang, and Refalo (1999) used them to study the credibility of the Brazilian Real Plan of 1994–97. The method used to derive the probability density functions in Figure 4.3 differ from the ones used in that paper and follow that suggested in Malz (1996). In both cases, these are risk-neutral probability density functions, and there may be a bias derived from the need to compensate risk averse investors (Breuer, 2002).

Figure 4.3. Spot Price and Implied Probability Density Function for the Brazilian Real.



Source: IMF staff estimates based on JP Morgan data and Bloomberg.

## Debt Crises

There have been important recent crises (such as in Pakistan and Argentina) in which debt crises occurred either without or well before foreign exchange crises, and it may be that predicting debt crises is a worthwhile goal in and of itself. Recent research has highlighted the role of short-term external debt and rollover difficulties during such crises (Detragiache and Spilimbergo, 2001). However, while the inclusion of short-term debt in an early warning system has improved the performance of the DCSD model relative to others, the changing nature of crises suggests that it may be too restrictive to focus just on foreign exchange crises models. In particular, the short-term debt/reserves variable is a good indicator of liquidity problems, but it is not necessarily a good predictor of external solvency crises. This point is illustrated in Figure 4.4, which shows liquidity ratios, as well as debt service ratios (a traditional determinant of country risk) for Argentina, Turkey, and their peer group. While Argentina had a good external liquidity position relative to Turkey, the country's debt service indicator was more than twice that of its peer group in 1999–2000. This reflected, and anticipated, the sovereign's solvency problems that would become more evident in 2001.

Traditional models of country (credit) risk and external solvency indices could be used as part of an EWS for emerging market crises.<sup>14</sup> An example of a country risk model is provided by Eichengreen and Mody (2000), who developed an econometric model of the determinants of emerging market debt spreads. The model was estimated for the years 1991–95 and produced satisfactory out-of-sample forecasts for 1996.<sup>15</sup> The debt service to exports ratio is statistically significant in the regression,<sup>16</sup> and has a sample average of 0.20; Argentina's figure for 1999–2000 is more than three times that average. An example of a model using external solvency indices is provided by Cohen (1991), who develops a simple solvency index that allows him to empirically assess whether or not indebted nations may have passed the point where they would default on their debt service obligations.

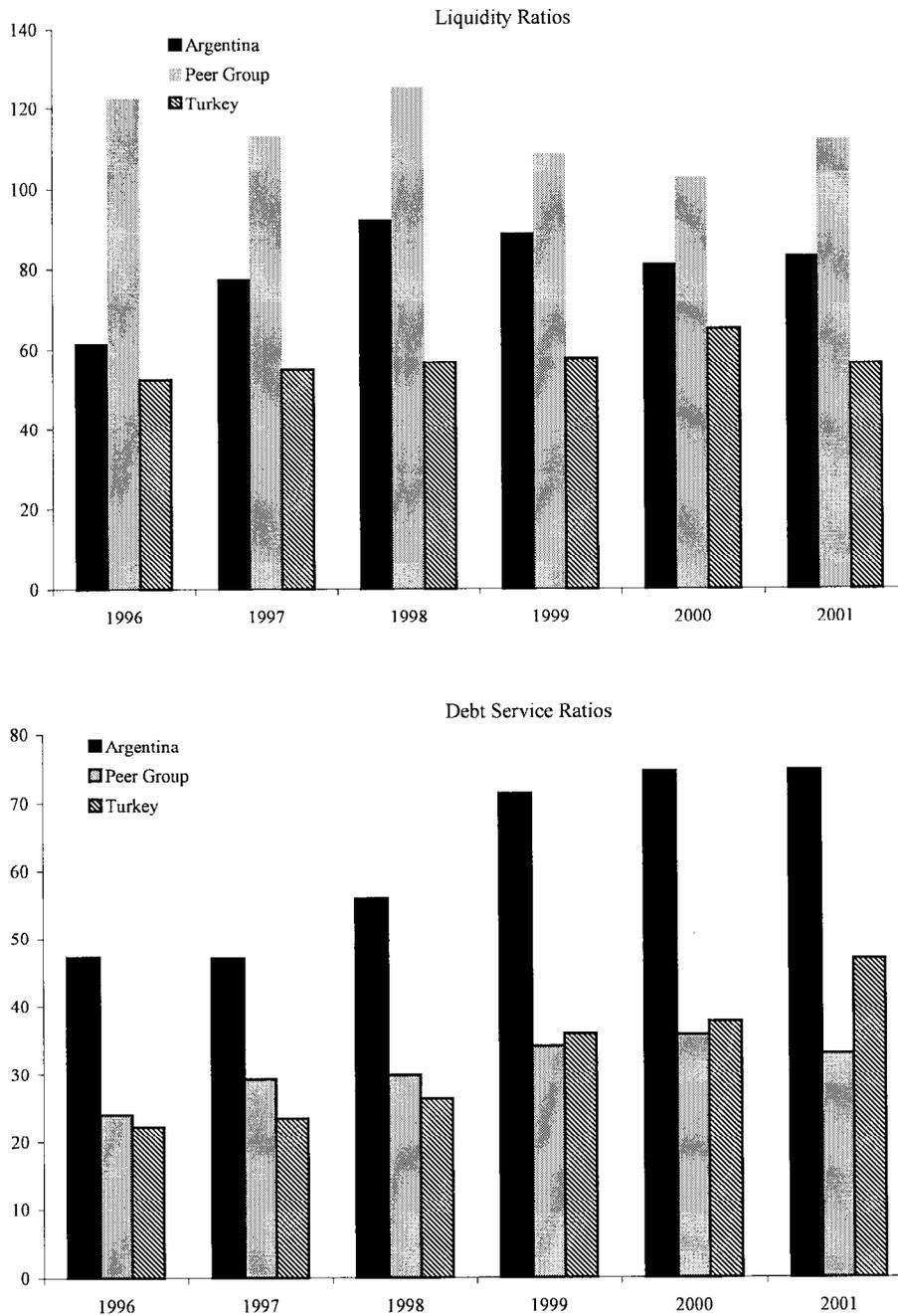
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<sup>14</sup> Just as in the case of a balance of payments crisis, one would need an operational definition of what constitutes a “debt” or “sustainability” crisis.

<sup>15</sup> Deviations of spreads from the levels predicted by credit ratings could also signal the need for further scrutiny of a country's fundamentals and market technicals, warning about potential reassessments of a country's creditworthiness (Sy, 2001).

<sup>16</sup> Other significant determinants of spreads included factors such as the ratio of external debt to GDP, debt reschedulings, maturity of the instruments, and the existence of a private placement.

**Figure 4.4. Argentina and Turkey: External Liquidity and Debt Service Ratios<sup>1</sup>**



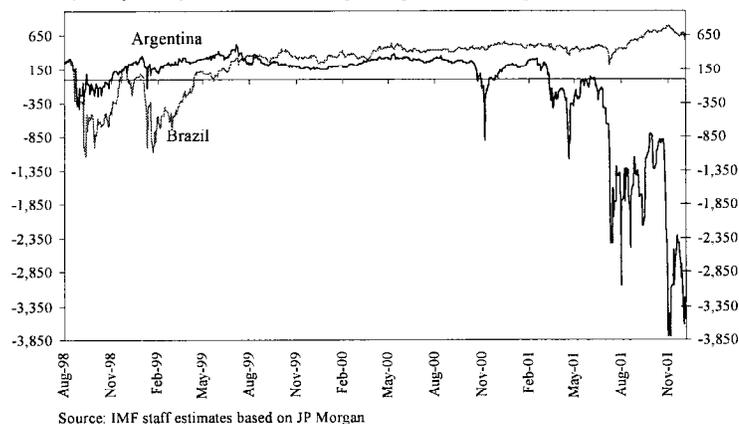
Source: FitchResearch; and IMF staff estimates based on FitchResearch

<sup>1</sup> The figures for 2001 are FitchResearch estimates. Liquidity ratio is defined as official reserves incl. gold *plus* banks' foreign assets/debt service *plus* liquid external liabilities; debt service ratio is defined as debt service/current receipts; Argentina's peer group by December 2000 included: Brazil, Colombia, Costa Rica, El Salvador, India, Kazakhstan, Lebanon, Panama, Peru, Philippines, Slovakia, Turkey, Venezuela.

The above models could be complemented with information on the term structure of emerging market bond spreads as well as on credit default swaps. The term structure of sovereign yield spreads could reflect expectations about the probable *timing* of any default, and the path of resolution and recovery of market access. In a recent study, Cunningham, Dixon, and Hayes (2001) show that Argentina's zero-coupon spread curve was sharply inverted by the end of July 2001

while the Brazilian curve was upward sloping, suggesting a heightened short-term credit risk in Argentina that was somewhat—but not totally—reduced after the June 2001 debt swap. The same pattern of curve inversion is indicated by default swap spreads: the differential between 10-year and one-year Argentina default swap spreads became strongly negative in the second half of last year (Figure 4.5), implying a higher short-term probability of default. Moreover, the differential is several times larger than the similar negative differentials observed during the Brazilian crises of 1998–99.

Figure 4.5. Slope of Default Swap Curve  
(Ten-year spread minus one-year spread, basis points)



Recent experience has shown that temporary market closures (also referred to as “sudden stops” in capital inflows) have become a feature of international capital markets, and that this could increase the vulnerability of countries with relatively large external financing needs. Market closures are systemic rather than country-specific events that can be defined as the weeks when aggregate gross flows to all emerging markets are below 20 percent of average issuance levels (see IMF, 2001b). While in some cases market closures start with difficulties in a particular emerging market, in others they are the result of conditions in mature markets that constrain the supply of funds to the emerging market asset class as a whole. Preliminary studies have shown that mature market factors—such as the closure in the U.S. high-yield bond market and global equity market volatility—increase the probability of closure for emerging market issuers. More generally, studies show that factors like high U.S. interest rates and high-yield corporate bond spreads are associated with less issuance of emerging market debt. At the same time, domestic emerging market factors, such as high local market returns and high debt amortizations, are associated with higher issuance levels and lower probabilities of bond market closures (see Annex III of IMF 2001a).

### Banking Crises

Banking crises share several common determinants with foreign exchange crises, and are sometimes a main cause of an exchange crisis, but recent efforts to predict banking crises have met with limited success. Kaminsky and Reinhart (1999) and Kaminsky (1998) find that excessive credit growth, recessions, and the burst of asset price bubbles tend to precede banking crises. However, with the exception of stock market prices, these variables (in

particular, monetary and credit aggregates) are available with relatively long lags in emerging markets. More important, models that appropriately assign a higher weight to type II errors for banking crises, had low predictive power relative to the Asian banking crises.<sup>17</sup> Also, studies that look at individual bank balance sheet indicators (see Gonzalez-Hermosillo, 1999), which could potentially identify problems in systemically important banks, find that loan quality and equity deteriorate rapidly before a bank fails. However, the lack of consistent cross-country results and the scarcity and lack of timeliness of data on these variables in emerging markets make individual bank failure quite difficult to predict.<sup>18</sup>

Bank stock prices may provide useful predictive information, and while only some emerging markets banks are publicly traded, these are in general the ones that would eventually cause systemic banking problems. Studies for the United States, for instance, show that stock prices help predict the financial condition of individual banks, even after taking into account past rating and financial statement information (See Berger, Davies, and Flannery, 2000; and Gunther, Levonian, and Moore, 2001). There is no systematic evidence for emerging markets, but Figure 4.6 demonstrates the potential usefulness of forward-looking bank stock prices to predict banking crises: the financial sector subcomponent of Korea's stock market index fell by more than three standard deviations almost a year before the onset of the foreign exchange crisis in Korea, a forewarning of potentially serious problems in the banking system.

Banking crises are intimately linked to corporate financial stress, and new tools developed to estimate forward-looking measures of credit risk of both banks and corporates could be used as part of an EWS. These methods combine structural models of default with standard portfolio theory to assess the probability of extreme portfolio losses related to emerging market credit events. Structural models of default rest on the premise that a firm defaults on its debt when the market value of assets falls below the book value of its liabilities; viewing equity claims as a call option on the underlying asset value allows for the use of stock market prices to estimate market-based default probabilities.<sup>19</sup> A preliminary application of these methods to selected emerging markets, using KMV LLC proprietary software and techniques (see Bohn and Chai, 2001), suggest that they are not only usable in emerging markets but also that they lead to results that the authors regard as superior to those of econometrically-fitted models given the problems with the availability and quality of the data.

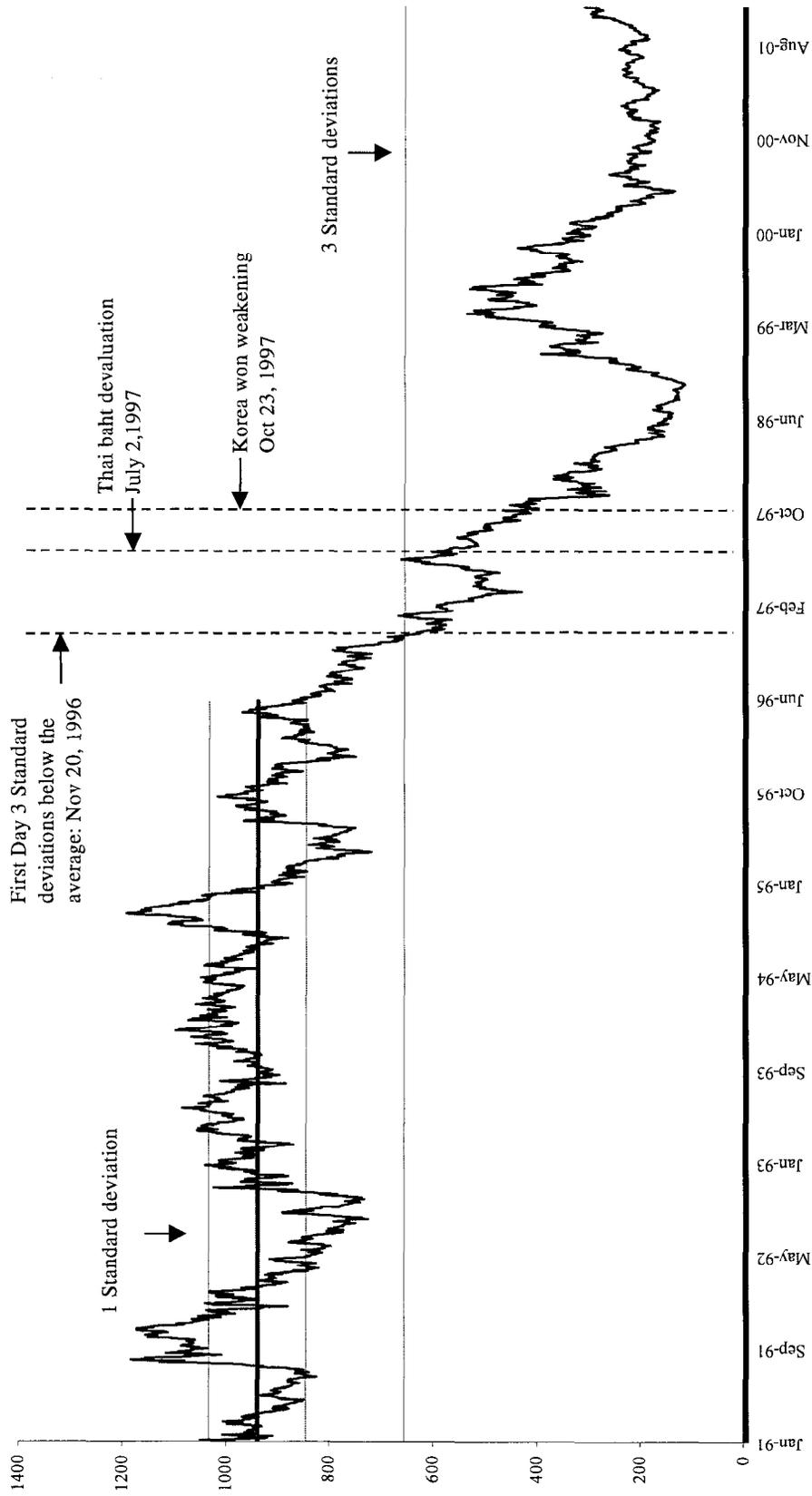
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<sup>17</sup> Demirguc-Kunt and Detragiache (1999) stress that, the higher the cost of missing a crisis relative to the cost of taking preventive action, the more concerned the policymaker will be about type II errors relative to type I errors.

<sup>18</sup> The Financial Soundness Indicators (FSI) database, currently under construction in the Monetary and Exchange Affairs Department, could provide a useful input for a banking crises building block of an enhanced EWS.

<sup>19</sup> These models are based on the work of Black and Scholes (1973) and Merton (1973).

Figure 4.6. Korea: Financial Institutions Index (1991-2001)<sup>1</sup>



Source: Korea Stock Exchange.

<sup>1</sup> Sectoral index based on the set of financial companies included in KOSPI of the Korea Stock Exchange. The thick solid line represents the average of the index through 05/30/96; the thin lines represent the corresponding standard deviation bands.

### **Financial Market Linkages**

The development of separate “building blocks” for predicting foreign exchange, debt, and banking crises should take into account the close links between financial markets, and that one should be able to capture spillovers across bond, equity, and loan markets. Some of these linkages are already incorporated into each building block, but others are more subtle and may require a second stage of (joint) estimation and/or the use of scenario analyses. For example, Flood and Marion (2001) argue that studying currency and banking crises either in isolation or in perfect correlation with each other is inappropriate, producing biased estimates of the likelihood of crises. A key linkage between the two crises derives from the fact that government guarantees to depositors weaken the government’s ability to fulfill other guarantees, such as that of maintaining a fixed exchange rate. Chang and Velasco (2000) relate bank and debt crises by jointly modeling the behavior of domestic bank depositors and foreign debt creditors. Finally, Christiano, Gust, and Roldos (forthcoming) show how a foreign exchange crisis could exacerbate the effects of a “sudden stop” in capital inflows (i.e., a debt crisis), by reducing the value of domestic assets that could be used as collateral in international credit markets. Although incorporating these linkages into a general EWS may be challenging, the insights could be taken into account in scenario analyses.

### **Contagion and Cross-Country Linkages**

Contagion measures are included in some of the investment bank EWS models, but the ad-hoc treatment in these models contrasts sharply with the research on the issue. Traditional measures of contagion compare sample correlations among asset returns of different countries during tranquil and crises periods (see, for example, IMF, 2001b). However, unconditional correlations ignore the existence of interdependencies, both through international trade and financial linkages across countries.<sup>20</sup> There are two ways to overcome these limitations.

One approach is to assume that standard interdependencies are associated with small shocks to fundamentals whereas large crises and sporadic shocks may generate panics and herding behavior unrelated to fundamentals. This approach assumes that linkages across asset markets in periods of stress can be characterized by means of a measure derived from extreme value theory, one that captures the dependence or correlation between the extreme values of returns (or the tails of the distribution of returns). The approach allows for the derivation of the probability that a crisis occurs in one country, conditional on a crisis happening in another one. Estimates for the G-5 countries suggest that simultaneous crashes in stock markets are about two times more likely than in bond markets (Hartmann, Straetmans, and de Vries, 2001). A recent application of these techniques to emerging

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<sup>20</sup> Forbes and Rigobon (2001), and Corsetti, Pericoli, and Sbracia (2001) review the main issues in the measurement of contagion.

markets (Box 4.2) suggests that the intensity of stock market linkages during crises periods in Latin America has increased in recent years, a phenomenon that could be explained by shifts in the investors base holding emerging market assets.

Another approach estimates the empirical relevance of the different channels of transmission of shocks across countries and argues that only the unexplained residual correlation across returns should be regarded as contagion. For example, Kaminsky and Reinhart (2000) examine the role of international bank lending, the potential for cross-market hedging, and international trade in the transmission of crises across countries. The authors conclude that contagion is more regional than global, and that, although it is sometimes difficult to distinguish between channels, financial sector linkages appear to improve forecasting performance relatively more than trade linkages. Also, they claim that even though these estimates reflect past contagion, to the extent that current cross-hedging strategies use historical correlations, they could be a good forecast of future contagion. The incorporation of these linkages to an EWS should take into account the evolving nature of the investor base for emerging market instruments in order to assess potential changes in the relative importance of different channels. For instance, the change in investor behavior toward sectoral (rather than country) allocations is likely to have changed the nature of cross-country equity market correlations.

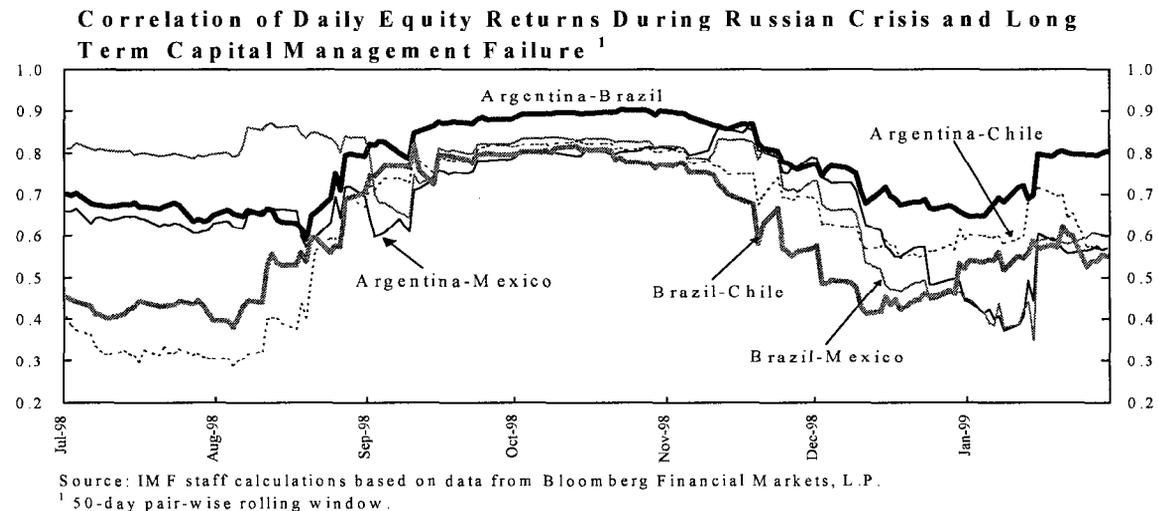
## **Conclusion**

Going forward, EWS models will continue to be one element in the IMF's multilateral surveillance activities. To enhance the usefulness of these models, the IMF staff will focus on incorporating more information from forward-looking asset prices as well as developing "building blocks" for the prediction of foreign exchange, debt, and banking crises. In addition, there will be further analyses of the determinants of the extent and scope of contagion during crises. The IMF staff will report periodically on the progress made in developing these additional tools of analysis.

#### Box 4.2. Alternative Measures of Contagion

The major emerging market crises of the 1990s were often associated with extensive spillover effects (contagion) across countries and markets. Such contagion has been viewed as arising from trade linkages, financial linkages (such as a common lender), a “wake-up” call that leads investors to reevaluate their view on countries that are “similar” to the crisis countries, and herding behavior.

The extent and pattern of contagion during a crisis has often been measured by examining changes in the level of correlation between financial variables in different markets and countries such as bond spreads and equity returns. For example, in the aftermath of the Long-Term Capital Management (LTCM) debacle and Russian default in the fourth quarter of 1998, the correlations between equity markets jumped upwards for all equity markets (see Figure 4.1). In contrast, the continuing problems faced by Argentina during the last quarter of 2001 did not affect stock markets in the region substantially as witnessed by the decline in correlations (see Chapter II).



Although the changing pattern of correlations provides one indicator of contagion, these correlations do not directly measure the behavior that is more relevant during crisis periods, namely the degree to which large negative returns in one country or market are associated with large negative returns in another country or market.<sup>1</sup> Understanding how large shocks are transmitted across markets, and characterizing this transmission mechanism quantitatively is important if the effects of small financial shocks in one country propagate to another country in a different manner than large shocks. Indeed, large negative returns might have a higher level of correlation across countries if their occurrence leads investors to reevaluate the risks associated with investing in certain groups of countries or classes of assets.

<sup>1</sup> Indeed, simple Pearson correlations can be deceptive when studying the comovements between large negative returns in two markets. For example, for a data sample obtained from a bivariate normal distribution with constant correlation coefficient, the correlation of the subsample including large returns is higher than the correlation of the subsample including small returns (Boyer, Gibson, and Loretan, 1997, and Embrechts, McNeil, and Straumann, 1999). Therefore, an increase in correlation does not necessarily identify a contagion episode.

Recent developments in extreme value theory (EVT) have allowed for a more precise measure of what can be called “extreme correlation”—the likelihood that a large negative financial return in one country is accompanied by a large negative return in another country. To derive this extreme correlation, one needs first to specify what constitutes a “large” or extreme negative return. In many studies, the criteria has been to focus on the bottom 5 percent of the negative returns over a specified sample period.<sup>2</sup> Given this criteria, one can show that the univariate distribution of extreme returns is well captured by the class of generalized Pareto distributions, and that the degree of extreme correlation between two series of returns is given by the so-called Chi dependence measure,  $\chi$ .<sup>3</sup>

The dependence measure  $\chi$  can be roughly regarded as the conditional probability that, when a return in one market is the lower say 5 percent of all its outcomes, the other return will also be in the lower 5 percent of its outcomes. A higher value of  $\chi$  implies an increasing likelihood that large negative returns in one market will be associated with large negative returns in the other.

While the value of  $\chi$  can be examined during any given period to measure the degree of contagion as represented by the extreme correlation of asset returns, one can also consider how the value of  $\chi$  has evolved over time to see if the degree of contagion has been rising or falling. As an example, the figure below portrays the evolution of the average  $\chi$  values for a number of Latin American countries using weekly returns on stock indices over a 15-year period between December 31, 1987 and October 25, 2001. The extreme correlation measure is estimated for the bottom 5 percent of the negative returns using five-year rolling windows.<sup>4</sup> A number of results stand out. First, there has been a secular increase in the values of the  $\chi$  throughout the 1990s. Second, the values of  $\chi$  become statistically different from zero (at the 5 percent level of confidence) only in the period since the Russian crisis of late 1998 (see Chan-Lau, Mathieson, and Yao, 2002). These results suggest that, for at least the Latin American economies included in the sample, a large negative return in the equity market in one country has become increasingly likely to be associated with large negative outcomes in the other markets. The reasons for this secular increase in the extreme correlation between the Latin American markets are as yet not fully understood. One possibility is that the nature of the investor base for Latin American equities has changed over the course of the 1990s, with so-called “crossover” investors playing an

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<sup>2</sup> More sophisticated methods can be used to determine the threshold value that determines whether returns are extreme or not. See Longin and Solnik (2000); and Poon, Rokinger, and Tawn (2001).

<sup>3</sup> See Coles, Heffernan, and Tawn (1999). If  $x$  and  $y$  are two series of returns on equities, the

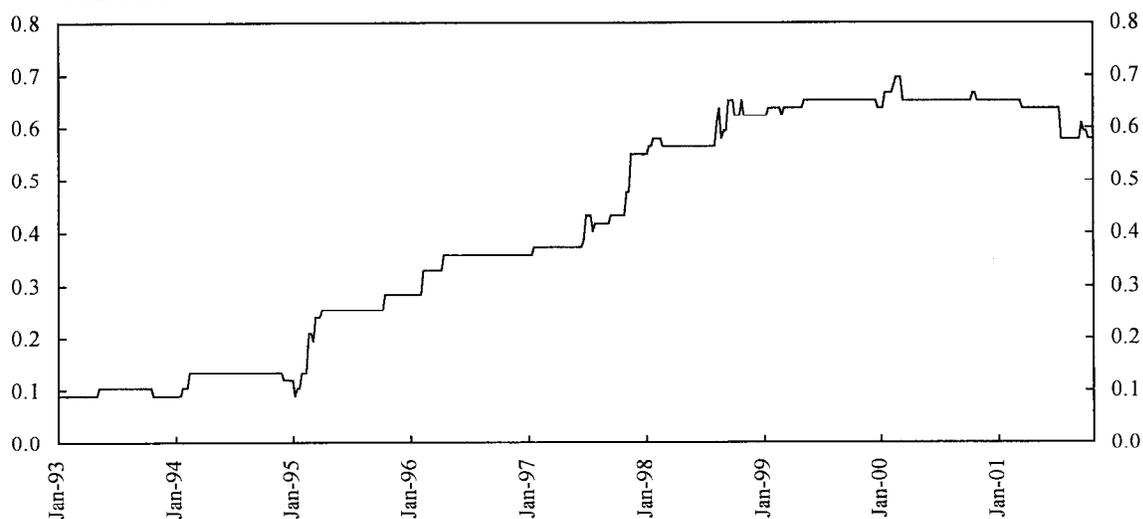
$$\chi = \lim_{u \rightarrow 1} 2 - \frac{\log \Pr(F_x(-x) > u, F_y(-y) > u)}{\log u}$$

where  $u$  is the threshold value whose exceedance defines large returns, i.e.  $u = 1 - 0.05 = 0.95$  for the bottom 5 percent negative returns,  $\Pr(i, j)$  is the joint probability of  $i$  and  $j$  occurring, and  $F_x, F_y$  are the cumulative marginal density functions of  $x$  and  $y$ .

<sup>4</sup> The temporal behavior of  $\chi$  is virtually the same if one starts with an initial five-year window and incrementally adds weekly observations until the full sample is utilized. These results and calculation of extreme correlations for emerging markets and for mature markets are discussed in Chan-Lau, Mathieson, and Yao (2002).

increasingly important role.<sup>5</sup> Such investors will place a relatively small fraction of large portfolios in emerging market investments if they expect them to offer an attractive return. However, since the benchmarks used to evaluate the performance of portfolio managers of crossover investors typically do not encompass emerging market assets, they can abruptly reduce or eliminate their holdings of emerging market assets if the outlook for emerging markets deteriorates or if managers become more risk adverse and seek lower overall volatility of their holdings.

### Average Extreme Correlations ( $\chi$ ) of Weekly Equity Returns for Selected Latin American Countries <sup>1</sup>



Source: IMF staff calculations based on data from Primark Datastreams.

<sup>1</sup> Average of five year rolling windows for estimates of  $\chi$  for the following country pairs: Argentina-Brazil, Argentina-Chile, Argentina-Mexico, Brazil-Chile, and Brazil-Mexico.

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<sup>5</sup> Such investors would include large mature markets institutional investors such as pension funds and insurance companies.

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## V. Alternative Financial Instruments and Access to Capital Markets

Over the past several years, emerging market borrowers have used a number of debt instruments, many of which embody innovative features, to maintain access to global capital markets and better manage their debt through risk diversification. While emerging market borrowers are quite likely to make use of alternative debt instruments<sup>1</sup> at times of relative tranquility, the need for their use may increase at times of market turbulence or financial stress, when investor appetite for emerging market debt diminishes and costs of borrowing rise. In these circumstances, emerging market countries must maintain sound economic policies, both to signal their commitment to economic reform and adjustment and/or to differentiate themselves from the countries in crisis and limit the potential damage from contagion. Notwithstanding the adoption of those policies, to meet their financing needs and maintain access to capital markets, sovereigns could face the daunting task of issuing debt that on the one hand appeals to investors, but that on the other avoids locking themselves into high debt-service costs for prolonged periods of time and creating inflexible debt structures that could exacerbate future crises and have implications for financial stability, more generally.

It is evident from Table 5.1 that over the past several years, in addition to reopening and augmenting existing debt issues, emerging market sovereigns sought to reduce borrowing costs and extend the maturity of debt instruments through the use of collateral, warrants, and a greater reliance on derivatives—all common features in mature financial markets, but less common in the sovereign emerging market debt context.<sup>2</sup> More recently, some of these instruments have been used less frequently, while others remain in common use.

While the role of alternative debt instruments in international finance and their implications for the new financial architecture have been discussed in earlier IMF studies, not much attention has been paid to comparing the relative merits of these instruments in enabling emerging market sovereigns to access capital markets or diversify risk on a

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<sup>1</sup> The term alternative financial instruments is broadly defined to capture various debt instruments (bonds and loans) other than new “plain vanilla” bonds and regular (unenhanced) loan issues used by emerging market sovereigns.

<sup>2</sup> The analysis focuses on sovereign borrowing (including the public sector) since the discussion of the role of innovations is intertwined with issues relating to sovereign debt management strategy and private sector involvement in the resolution of crises.

Table 5.1. Emerging Market Sovereign Bond and Loan Issues by Type  
(In millions of U.S. dollars, unless otherwise specified)

	1997		1998		1999		2000		2001	
	Jan-June	July-Dec								
Regular	34,839	28,818	41,659	15,404	21,995	14,773	29,247	14,588	21,211	12,953
of which loans	9,646	7,200	20,739	7,805	7,809	2,233	4,325	2,333	2,453	3,654
number of transactions 1/	158	119	132	58	64	58	80	45	51	44
Augmentations	9,139	5,093	8,338	2,830	10,908	6,126	6,777	5,584	8,891	7,178
number of transactions	9	8	17	15	26	24	14	14	19	19
Step-down	...	1,672	3,286	416	938	...	...	...	...	...
number of transactions	...	5	8	2	3	...	...	...	...	...
Step-up	300	405	564	...	162	...	...	...	...	...
number of transactions	1	1	1	...	1	...	...	...	...	...
Calls	2,547	1,044	150	1,550	33	100	1,120	310	300	...
of which loans	...	110	...	50	...	...	...	185	...	...
number of transactions 1/	10	8	1	3	1	2	4	7	1	...
Puts	2,742	310	2,695	1,369	1,233	1,310	80	1,215	...	2,062
of which loans	445	110	195	163	...	94	80	185	...	...
number of transactions 1/	17	5	4	8	4	8	1	6	...	3
Warrants	...	...	...	1,000	2,500	...	...	...	...	** 2/
number of transactions	...	...	...	1	3	...	...	...	...	1
Structured notes 3/	...	1,000	1,750	905	...	...	...	...	...	...
number of transactions	...	2	2	3	...	...	...	...	...	...
Collateralized	7,059	5,433	3,042	5,610	1,016	1,939	3,247	860	970	530
of which loans	6,700	5,233	2,942	3,110	93	1,261	3,247	860	970	530
number of transactions 1/	26	31	22	11	6	9	11	6	6	3
Total	56,626	43,775	61,484	29,083	38,785	24,247	40,471	22,557	31,372	24,041
of which loans	16,792	12,653	23,876	11,128	7,902	3,589	7,652	3,562	3,423	4,184

Sources: Bondware and Loanware.

Note: Includes all countries covered by the EMBI Global Index and covers issuance by all forms of government and the public sector.

1/ Includes bonds and loans.

2/ Panama issued warrants in the context of retiring/swapping some debt maturing in 2002.

3/ Owing to the non-transparency associated with structured notes, coverage may be incomplete.

sustained basis and the concerns they may raise for the management of sovereign debt, crisis resolution, and the functioning of emerging markets.<sup>3,4</sup>

This chapter focuses on the alternative debt instruments used by emerging market sovereigns to access capital markets from 1997 through 2001, a period marked by a number of financial crises. It examines the potential for conflict between a sovereign's desire to maintain access to capital markets and the principles of sound debt management practices recognized and endorsed by the international community. In particular, the analysis addresses the following questions:

- What kinds of alternative instruments have been introduced, and what impact do they have on sovereign borrowing costs and on enabling access to capital markets on terms consistent with medium-term viability?
- Is the use of various alternative debt instruments consistent with sound debt management practices or does it merely push risks and problems to the future?
- Are these techniques consistent with efforts of the international community to involve the private sector in crisis resolution, both in terms of the private sector maintaining exposure to a country at times of crises and in terms of creating flexible debt structures?

### **Alternative Financial Instruments: What Are They And How Do They Work?**

Financial market turbulence or financial stress is typically characterized by a loss of investor appetite for emerging market debt and higher borrowing costs for some or all of the following reasons: (1) reduced liquidity in secondary markets for emerging market debt; (2) higher risk premiums that (temporarily) push up borrowing costs; (3) a rise in the perceived risk of default by sovereign borrowers; (4) increase in market uncertainty, including from risks of contagion; (5) increased risk aversion among investors; and (6) increased uncertainty about future prospects of the sovereign borrower.

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<sup>3</sup> See the IMF's "Involving the Private Sector in Forestalling and Resolving Financial Crises—Background Paper," available at <http://www.imf.org/external/pubs/ft/series/01/index.htm>

<sup>4</sup> A key conclusion that has emerged from earlier discussions of the role of alternative debt instruments is that there is a potential for greater risk shifting, but at the same time, a concern that such instruments could burden emerging market sovereigns with an excessively rigid debt structure—an issue that comes back to haunt when the sovereign faces a financial crisis.

In such circumstances, emerging market borrowers often have adjusted their debt management strategies, and have made use of debt instruments, embodying innovative features, to maintain access to capital markets and diversify risks (Table 5.2).<sup>5</sup> The alternative debt instruments—which include debt augmentation, time varying and state contingent instruments, structured notes, and collateralized borrowing—seek to mitigate one or more of the above concerns by changing the nature of the debt instrument, its payoff, as well the commitment of the sovereign borrower to meet its debt obligations. The use of such instruments could, however, also be undertaken at times of relative tranquility provided they are consistent with the overarching and constant goals of improving fundamentals and sound debt management and build credibility with markets.

### **Augmentations**

Sovereign borrowers have become increasingly aware of the importance of well functioning secondary markets for their debt instruments. Liquidity of these markets can be improved through a practice of building large fungible issues along the yield curve by reopening and expanding existing debt, often termed “augmentation.” Reopening and expanding an existing issue with which investors are already familiar makes the existing stock of bonds more liquid—by widening the number of investors in a single issue, opportunities for secondary market transactions increase. It also makes it more likely that the larger bond stock will be included as a benchmark in several emerging market indices, thereby increasing the potential universe of portfolio investors. Liquid secondary markets, in turn, provide issuers with a benchmark for pricing new issues.

Augmentation offers advantages that are particularly useful in times of financial market turbulence. With reduced demand for new instruments in such circumstances, augmentation allows the sovereign to access capital markets in smaller amounts and across a series of bonds (as compared to a single large-size issue), helping the issuance to be more easily absorbed into the market and with minimum disruption (existing issues are already aligned with market conditions).<sup>6</sup> Furthermore, augmentations can also be used to maintain liquid markets when shortages of a particular bond series arise owing to a technical market squeeze by short sellers.<sup>7</sup> Reflecting these advantages, data presented in Table 5.1 show increasing use of augmentation, rising up from a share of only one-fifth in 1997, to more than

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<sup>5</sup> Risk diversification refers to linking debt-service costs to the underlying ability to pay.

<sup>6</sup> Recently, South Africa augmented by \$250 million one of its global bonds—in the wake of pressures on the Rand, one could interpret this as a “testing of the waters” for market access.

<sup>7</sup> Augmentations of this sort, which Argentina and others have used, are called “reverse inquiries.”

**Table 5.2. Market Conditions and Alternative Financial Instruments**

<b>Financial Market Conditions</b>	<b>Alternative Financial Instruments</b>	<b>Advantages</b>	<b>Disadvantages</b>
Diminished or uncertain secondary market liquidity  Reduced demand for new issuance	<b>Augmentation:</b> use of techniques for reopening of existing issues.	Builds large fungible issues that promote secondary market liquidity.  Allows sovereign to issue in smaller increments and to do so more seamlessly.	Bond covenants need to accommodate reopenings.  If too large, may impact overall yield curve and spread of all outstanding issues.
Higher risk premiums that (temporarily) push up interest rate costs for the borrower	<b>Time varying instruments:</b> <i>Step up and step-downs:</i> allow the sovereign to shape present and future cash flows differently.	Sovereign can issue instruments with longer maturity without locking in high short-term rates.	Provides investors with an upside potential reflected in higher average coupon rates.
Markets have different expectations (too pessimistic) compared to fundamental outlook of the authorities	<b>State contingent instruments:</b> Includes options and warrants.	Sovereign can reduce borrowing costs by providing insurance to investors against adverse outcomes.	Difficulty in pricing.  Relatively high market premium.  Puts—the exercise by investors may compound the difficulties of debt managers in adverse outcomes.
Market spreads may be volatile or out of line with medium run trends	<b>Structured Notes:</b> includes fixed income instruments linked to derivatives, such as swaps, caps, floors, and futures.	Allow the sovereign to hedge market outcome risk or to provide a payoff to investors based on future economic conditions.	Tend to be complex and may be difficult to price efficiently.  Nontransparent.  Need to be set into a sophisticated risk management strategy to avoid debt management risks.
Rise in the perceived risk of default by sovereign borrowers	<b>Collateralized instruments:</b> including instruments that borrow against future flows.	Reduce spreads and improve rating of instrument.  Could potentially provide significant market access when uncertainty is overwhelming and restricts other forms of market access.	May result in rise in spreads of uncollateralized instruments by subordinating existing instruments.  Inflexibility could complicate debt management.  Could run counter to efforts to secure private sector involvement in crisis resolution.

one-third of all bond issuance in 1999 and 2001, suggesting that augmentation has been usefully deployed to maintain market access during difficult periods.<sup>8 9</sup>

Augmentations are not, however, without limitations. In particular, augmentations, like all bond issuance, dilute the claims of previous holders of the bond, and may put pressure on secondary market bond prices, increasing the spreads and cost of issuance and potentially disrupting secondary markets. Investors sometimes demand explicit protection against such risks, including by embedding rules in bond contracts to protect primary market buyers of bonded debt—such as by ensuring that augmentations take place when prices are close to par. In other cases, investors might require an additional premium *ex ante* to allow for future augmentation, which in turn could bear upon sovereign debt management strategy.<sup>10</sup>

### **Time-Varying Instruments**

These include instruments in which coupon payments change over time.

#### *Step-ups and Step-downs*

In the period from 1997 through 1999, several key emerging market sovereigns issued bonds that included a step-down or step-up feature, where coupon payments are higher (lower) for a short initial time period, but then decrease (increase) over the medium to long term.<sup>11</sup> Table 5.1 shows that the issuance of step-downs increased during the Asian crisis and peaked during the first half of 1998—owing in large part to the issuance prior to the creation of the Euro by Argentina, and to a lesser extent, Brazil, Venezuela, and Turkey, of bonds in various Euro-11 currencies and at coupons that had step-down features that would merge into one highly liquid euro-denominated benchmark—before declining following the onset of the Russia crisis.

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<sup>8</sup> EMBI spreads increased sharply in 1999 to average 1,032 basis points, while in 2001, spreads averaged 890 basis points.

<sup>9</sup> Reflecting some of the benefits accruing from a well-developed yield curve, there has been a proliferation of augmentations of debt denominated in U.S. dollars relative to debt denominated in other currencies.

<sup>10</sup> For augmentations to be viable, some minimum number of bonds of an appropriate maturity need to be outstanding, while the bond documentation needs to incorporate a tap feature that allows the size of the issue to be increased at the discretion of the debtor.

<sup>11</sup> A bond can have several steps (e.g., some older Brady bonds had numerous steps). However, the recent sovereign emerging market bonds generally have only one step.

The motivation for step-downs is that it allows debt instruments with initially high coupons, reflecting existing market conditions, to converge to the yields being paid on already existing sovereign debt. By doing so, the instrument usually becomes fungible with another bond issue and the two are traded as one. Thus, the issue achieves the benefits of longer-term borrowing and enhanced liquidity, while avoiding locking the borrower into continuous high debt-service costs after the market has returned to more normal conditions. Despite the potential benefits, a limitation of the step-down feature is that it is considerably less flexible than a bond with an embedded call option (discussed below), because if the coupon rate that it steps down to is higher than the prevailing market rate at that future point in time, the issuer might find the initial choice less than optimal.

In contrast to step-downs, an embedded step-up feature in a bond reflects the willingness of the market to accept the sovereign's belief that economic prospects will improve over time, thereby improving the ability of the sovereign to service its debt. The cash-flow relief initially could help the borrower to put its house in order to ensure economic stability and growth. In this way, a step-up bond has positive risk diversification features. Step-up bonds are, in general, instruments with a long duration, and may appeal more to certain classes of investors who have a longer investment horizon. That said, the step-up feature in bond contracts have remained rare in recent *new issuance*, although Argentina used this feature in the context of a voluntary debt swap in June 2001.

### **State-Contingent Instruments**

These include instruments in which the payments depend upon future economic and/or market conditions.

#### *Options*

A call option would normally be reflected as a covenant in the bond or loan contract, stating that on a certain date (or dates) prior to the maturity date of the instrument, at the discretion of the issuer, the debt can be redeemed at par. The call option provides an important advantage to the issuer by allowing the possibility to refinance at a substantially lower rate, if market conditions improve. Consequently, it is able to capture the benefits of improved economic conditions without taking on additional funding risks (as would be the case for put options exercisable at the discretion of the creditor). In return, however, the holder (the seller of the call option) will demand a higher yield, both because he is exposed to reinvestment risk pertaining to the principal and because the price appreciation potential for a callable bond is restricted. Furthermore, in certain cases, the call option, by making the instrument more complex or less easily tradable, will require an additional premium on liquidity grounds. Call options are particularly attractive when there exists asymmetric risk preference and information, because of which the market and the issuer disagree about the likely future path of the sovereign's borrowing cost.

Notwithstanding the apparent advantages of the instrument, they have not proved popular in the *pure sovereign* context since the onset of the Asian crisis and the last use of the instrument was in the second half of 1998.<sup>12</sup> Arguably, difficulties in pricing the options efficiently to reflect their true value have deterred sovereigns from adopting this technique to access capital markets. It is also quite likely that market perception of a significant likelihood of a call option embedded in a new instrument issued at times of stress being exercised, would lead investors to seek a large upfront premium that borrowers are unwilling to pay, thereby leading to a decline in their overall use.

In contrast to a call option, a put option in a bond or loan contract would provide the creditor with the right, but not the obligation, to redeem the debt instrument before the maturity date. Borrowers write put options as a means to achieve lower spread in the belief that over time spreads will decline, or at least remain stable, in which case the put would not be in the money, and would not be exercised.<sup>13</sup> By issuing debt with an embedded put feature, however, the issuer risks being subject to a rapid increase in refinancing needs at times of emerging pressures, which could make a difficult situation worse. In the context of the Asian crisis, a number of emerging market borrowers, in the face of a total loss of access to international capital markets, faced significant pressures in their external accounts following creditors' decision to exercise put options. In the context of improvements in sovereign debt management strategy, put options have been relatively rare in their use in the pure sovereign context in recent times, although a number of public sector entities continue to use them.

### *Warrants*

An innovative feature, which has occasionally been used by emerging market sovereign borrowers, is the use of warrants embedded in new bond issues. Embedded warrants in nonsovereign bonds are fairly common and have usually been of the equity warrant type (i.e., they have included a call option that gives the bondholder the right, but not the obligation, to buy a certain amount of shares at a specified price). Bond warrants, in contrast, give the holder of the warrant the right, but not the obligation, to buy another sovereign bond (usually long term), at a predetermined price at some future date. Hence, warrants can be seen as sold call options by the sovereign issued out of the money (i.e., they become in the money if spreads come down faster than contracted before the exercise date) that are embedded in an otherwise plain vanilla bond. Argentina revived the use of bond

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<sup>12</sup> Refers to borrowing solely by the central government. They continue to be used, however, by quasi-sovereign borrowers.

<sup>13</sup> Such options would be exercised when they are “in the money”—that is, in circumstances in which the secondary market price of the underlying debt instrument (identical in every respect except for the absence of the put option) is below the put price (usually par).

warrants in November 1998 by embedding a warrant in a \$1 billion bond issue. This structure, which previously had not been used in a sovereign context since the early eighties, was well-received and subsequently copied by other issuers, with some alterations (Box 5.1).

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#### **Box 5.1. Recent Bond Warrants**

Following its introduction in the sovereign context by the Argentine government in November 1998, there have been several instances of sovereigns issuing a bond with an attached warrant.

##### **Argentina I**

On November 18, 1998, Argentina launched an unusual seven-year sovereign Eurobond that included a bond warrant. The bond was favorably received, and was increased from an initial \$750 million to \$1 billion, at a spread of 622 basis points over. The Eurobond (the so-called "host bond") included a warrant that gave the holder the right, but not the obligation, to buy the Argentine 2027 bond (the so called "back bond") at 93.3 percent of par. The value of the warrant was estimated at launch time to be 64 basis points, which was the sweetener provided by the issuer. The warrant, which was subsequently exercised, had a maturity of approximately one year and expired in December 19, 1999.

##### **Mexico**

Mexico launched a \$1 billion sovereign bond on February 5, 1999, which included a fairly complex warrant structure. The holder of the warrant was given the right, one year after the launch, to exchange some specific Brady bond issues into either: a yet to be issued floating rate note, due 2005, paying Libor plus 4.75 percent, or a reopening of the United Mexican States Bond, due 2016 with a 11.375 percent coupon. Exchange ratios, which provided for the exercise price of the warrant, were set at launch. Warrants were detachable at launch, and could trade separately. The warrants were subsequently exercised.

##### **Argentina II**

Argentina issued its second bond with an embedded warrant attached in February 1999. The major difference between this warrant and the previous Argentine one was that it was issued during considerably improved market conditions and the warrant, allowing another \$500 million to be issued, exercised into the host bond (maturing February, 2009) instead of a different bond. Market reactions were reportedly positive, yet the size was limited to \$1 billion in face of \$2 billion worth of demand (allowing certain investors to be targeted). The warrant was valued around 20 to 30 basis points, resulting in a modest yield curve pickup of 20 basis points compared to the outstanding bonds maturing in 2017. The warrants, which were subsequently exercised, were not detachable until one month after launch.

## **Colombia**

The Republic of Colombia launched in March 1999 a \$500 million Eurobond with a 10.875 percent semiannual paying coupon maturing in March 2004. The bond issue also included a warrant giving the right to exercise the warrant, one year from the host bond's issue date, into a yet-to-be-issued Republic of Colombia bond, with a maturity of 19 years. The attached warrants are said to have saved 87 basis points of the headline spread of the bond issue. Warrants were subsequently exercised.

## **Panama**

On June 26, 2001, Panama offered to purchase for cash and warrants up to \$245 million aggregate principal amount of its 7.875 percent notes due February 13, 2002 in order to minimize the carrying cost of this issue. The offer was to expire on July 10, 2001 or once the \$245 million aggregate principal of the 2002 notes was validly tendered, whichever came first. Under the terms of the offer, if Panama would purchase any 2002 notes, the tenderer would receive, for each \$1,000 principal amount of 2002 notes purchased a cash payment of \$1,039.375 and two warrants, each of which would entitle the holder, on January 16, 2002, to exercise an option to purchase \$1,000 principal amount of Panama's newly issued 9.375 percent Global Bonds due July 23, 2012 (the "2012 Bonds") for cash at an exercise price of \$990. If, however, the number of warrants exercised on January 16, 2002 would result in the issuance of less than \$100,000,000 aggregate principal amount of 2012 Bonds, Panama would instead issue and deliver, in respect of each warrant exercised, \$943.10 principal amount of its outstanding 9.625 percent Global Bonds due February 8, 2011 (the "2011 Bonds"). These 2011 Bonds, if issued would be a further issue of and form a single series with outstanding 2011 Bonds.

Finally, warrants were in the money and \$182 million (57 percent of the total) were exercised.

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In effect, warrants allow the issuer to "buy down" the headline spread today, in return for a commitment to pay more in the future should the outlook for the country improve and spreads fall to the extent that the warrants become in the money. The country will then issue new debt in the improved economic environment at rates above the prevailing market rates. Conversely, in the event that spreads do not fall below the strike price, the warrant will not be exercised and the country will have benefited from lower initial issuing costs.<sup>14</sup> Hence, warrants provide risk-shifting benefits, and entail risks only to the extent that effective borrowing costs in the future could increase if economic prospects improve sharply.

Market commentary has highlighted a number of technical benefits from this structure, including an increase in liquidity. Furthermore, warrants, being a type of call option paid for by the buyer, provide the owner of the warrant with a significant amount of extra leverage. They would appeal, in particular, to institutional investors who are forbidden by home market regulations to take regular option positions, but are allowed to hold warrants that are attached to a bond. Another factor affecting the use of warrants is the perceived

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<sup>14</sup> If there is a need to restructure the issued bond before the exercise date, it seems clear that the warrant would be worthless and hence be ignored from the standpoint of pricing the restructured instrument.

advantage of tailoring the instrument to a particular class of creditor. In the case of the Mexican sovereign bond issued in 1999, the warrant was immediately detachable, which according to market sources led relative value players to buy the bond plus warrant and immediately sell the bond, causing the bond price to drop immediately after syndication broke. In contrast, in the Argentine bond issue of February 1999, the warrant was first separable one month after the issue, and hence specifically targeted longer-term investors. Argentina's success in targeting the desired group of investors was also helped by excess demand for the issue, which allowed the lead managers to discriminate between new money accounts and switching accounts (investors that sell one Argentine bond to buy the one being issued, thereby shifting the yield curve in the process).

Despite their potential benefits, the use of warrants by sovereign issuers has significantly diminished in recent years—although Panama used this feature in 2001 in the context of retiring/swapping some bonds maturing in 2002—in large part because of the difficulty, and potential inefficiency, in the pricing of debt instruments containing warrants.<sup>15</sup> However, because of their risk diversification features (sweetener would only need to be paid in the “good” state of the world), emerging market sovereigns might consider the use of warrants in the future.

### **Structured Notes**

In the aftermath of the Asian crisis, structured notes became a popular means for emerging market borrowers to access international capital markets, although their popularity has waned significantly in recent years. These instruments are powerful tools for intermediating credit and risk, and can be used to achieve virtually any risk/reward profile, but their complexity and nonuniformity pose distinct challenges for emerging market borrowers and lenders.

Structured notes are fixed income securities linked to derivatives. The embedded derivative transactions are most commonly swaps, although options, futures/forwards, credit-linked derivatives, caps, and floors can be used as well. As such, they are often fairly complex transactions with varying contingent payoffs.<sup>16</sup> For emerging markets, structured

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<sup>15</sup> The absence of sufficient liquidity among other things affects adversely the fair pricing of warrants.

<sup>16</sup> Since their inception in 1983, structured notes rapidly increased in volume globally and, including secondary structured notes, amount in notional terms to more than \$300 billion. With maturities ranging anywhere from three months to as long as 10 years, structured notes have been mostly denominated in U.S. dollars and issued by corporations, financial institutions, including banks, specialized government agencies, sovereigns, and multilateral institutions, such as the World Bank. U.S. government agencies are among the largest issuers of structured notes, and the most active of these agencies are the Federal Home Loans Banks (FHLB).

notes have so far been issued by Argentina, Colombia, the Philippines, and Ukraine. These transactions have in total amounted to about \$3.7 billion, with a spike in issuance during the second half of 1998. Since then, however, they have seldom been used.

Structured notes allow for the hedging of almost any risk, and could be designed such that the payoff on the note is linked to the payment capacity of the issuer. Therefore, structured notes are unique in their ability to diversify risks and payments across states. In addition, since structured notes combine traditional debt instruments with derivatives, investors that might otherwise be off limits to derivative markets, can obtain indirect access to these markets. The market for this innovative financial instrument, however, is rather nontransparent. More often than not, structured notes are tailor made to suit specific investors and sold in relative obscurity. As a result, general market information relating to issuance of structured notes, the availability of various types, and information on market participants is hard to come by, which in turn renders the pricing of these instruments very difficult. A further limitation arising from tailor-making these instruments relates to liquidity. Given that they are customized, it is not surprising that structured notes are not very liquid instruments in secondary markets, and this would imply that potential buyers, despite the customization of the instrument, would expect a liquidity discount. From the sovereign's point of view, a structured transaction would only make sense when it has some benchmark bonds that would provide guidance in the pricing process of the structured note.

### **Collateralization**

Under some conditions of market stress, sovereigns could face prohibitive borrowing costs. In such circumstances, some emerging market borrowers have adjusted their debt management strategies to offer collateralized instruments. The use of collateral to back financial instruments is a common feature of private market borrowing, but outside of project financing, it has been less common in the sovereign context. In most cases, collateral has taken the form of current assets, or assets created or acquired using borrowed funds. In addition to traditional forms of collateralized borrowing, more recently, future flows of hard currency receipts have served as collateral for borrowing by a number of public enterprises, and this development could potentially have significant implications for sovereign market borrowers. The remainder of this section focuses on collateralization through the use of future flows, although the discussion of the costs and benefits applies equally to other forms of collateralized borrowing.

### *Borrowing Against Future Flows*

Following the Mexican crisis in late 1994, there was an increase in borrowing against the future flow of hard currency income from the export of goods and services (Box 5.2).<sup>17</sup> A number of these transactions have been backed by exports of goods, typically oil, but including metals, minerals, auto parts, plastics, and liquor. Other forms of collateral have included tourism-generated credit card receivables, workers' remittances, receipts from long-distance telephone calls, and airline ticket receivables from foreign routes.

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#### **Box 5.2. The Structure of Future-Flow Securitizations—Modalities and the Case of PEMEX**

In a typical securitization against future receivables, income is typically assigned to an offshore subsidiary created specifically for this purpose, called a special purpose vehicle, which issues the bond. The borrower provides irrevocable instructions to foreign importers that purchase its exports requiring them to make payments to an account controlled by the transaction's trustee. The trustee first pays debt service to investors, and transfers to the special purpose vehicle any excess receipts (the transactions are typically overcollateralized three to four times). These documents can have the force of contracts in foreign jurisdictions, binding companies such as Exxon, Mobil, AT&T, Visa, and MasterCard to make payments into the trustee account. The transaction shifts jurisdiction over hard currency payments to a court system trusted by investors; otherwise, borrowing against future flow of export income parallels industrial country finance institutions' practice of securitizing their loan receivables. The rating of the bond issued by the special purpose vehicle is determined by many factors, including the nature of the receivable, the degree of over collateralization, redirection of payment risk, the rating of the sovereign, and the rating of the receivable generating process. Ratings of individual tranches can be further enhanced by the use of mono-line insurers and/or subordination.

In one prominent example, PEMEX, the Mexican state-owned oil and gas company, issued \$4.1 billion of bonds in December 1998, February 1999 and July 1999 secured by future oil export receivables.<sup>1</sup> These transactions are notable for a number of reasons. First, they accounted for 24 percent of all emerging market issues backed by future flows of income. Second, PEMEX is an important source of tax and nontax revenue for the Mexican government. Finally, a bond insurance company, MBIA-Ambac guaranteed \$1.35 billion of the issues, raising the credit rating to AAA rating (S&P), while the nonguaranteed portions received a BBB rating (S&P). The sovereign credit rating for Mexico at that time was (and still is) BB (S&P).

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<sup>1</sup> Specifically, PEMEX issued the bonds through a special purpose financing vehicle, PEMEX Finance, incorporated in the Cayman Islands. The issues are secured by PEMEX's account receivables from foreign clients, through a contract (a "receivables purchase agreement") that gives PEMEX Finance the right to purchase, from time to time, accounts receivables that have been generated or will be generated in the future.

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As a result of the implicit insurance investors derive from the collateral, issues backed by future flows typically are rated above the sovereign foreign-currency rating, and have spreads below the sovereign spread, reflecting the belief of rating agencies and markets that these securities are *de facto* senior to sovereign international bonds. In addition to being

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<sup>17</sup> The technique was first used in an emerging market context by Telmex in 1987 to borrow against its net long-distance receivables from AT&T.

securitized, a number of these transactions have been supported by private bond insurance, which among other things enhances the creditworthiness of the instrument. The insurance company's guarantee of repayment raises the insured issue's credit rating to AAA, a practice common for industrial country municipal issues.<sup>18</sup>

A pledge of future flows as collateral can have benefits for both borrowers and lenders, often reflects normal commercial practice, and may foster a more efficient allocation of trade and external financing. Collateral increases the costs of default by increasing recovery ratios should default occur and enhances the willingness to repay, thereby signaling a commitment to policies that allow repayment. The decline in the probability of default lowers spreads and increases the range of creditors able and willing to hold the asset. During a period of financial turmoil, use of collateralization may help encourage new credits by effectively subordinating existing debt and ensuring that new creditors are repaid first. Collateralization, however, brings risks and costs—including the creation of less flexible debt structures, the potential delinking of the pursuit of good policies from market financing, and possibly increasing the cost of unsecured borrowing—that require close monitoring (see following section for further detail).

### **Policy Implications**

To maintain sustained access to capital markets on terms consistent with medium-term viability as well as for purposes of risk diversification, emerging market borrowers may wish to make use of alternative debt instruments embodying innovative features. Pressures to do so may increase at times of financial crises, when access to capital markets is significantly reduced. The issuance of such debt, however, must be consistent with sound debt management practices—among other things to ensure that efforts to maintain market access do not come at an excessive cost, either in terms of an inflexible debt structure or in terms of increasing effective borrowing costs. From a policy perspective, use of innovations must also be compatible with efforts of the international community to secure private sector involvement in the resolution of crises and improve the international financial architecture more generally.

Augmentations provide sovereign borrowers a simple means, reflecting sound debt management practice and devoid of significant costs, to maintain (and reaccess) capital markets. Their continued use over the past several years is a clear reflection of this realization. By improving the liquidity of existing debt instruments, and by catering to the specific needs of investors, augmentations enable sovereigns to maintain access to capital markets in a series of small steps until market sentiment improves. The successful use of augmentations in the context of financial crises will, however, depend among other things on

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<sup>18</sup> MBIA–Ambac is nearly the sole supplier of bond insurance for emerging market debt, having guaranteed over \$3 billion, including \$1.75 billion of PEMEX's' oil-backed issue.

whether the issuing sovereign is the source of a crisis or is a victim of contagion. If the sovereign is the source of a crisis, it is quite likely that markets would dictate the need for other types of enhancements for the sovereign to regain access on favorable terms, while if the sovereign is a victim of contagion, augmentations may be sufficient for the sovereign to maintain access to capital markets.

Time varying and state-contingent financial instruments, including step-downs and embedded call options, can provide market access at headline spreads and allow for a reasonable balance between the provision of enhancements to entice investors and the opportunity for the sovereign debtor to lower debt-servicing costs in the future. Neither technique, however, provides much in the way of risk diversification. In the case of call options, the future interest rate is uncertain, while in the step-down it is contracted ahead of time.<sup>19</sup> The proper timing of a call option is inherently difficult to determine before hand since it depends quite critically on the existence of asymmetric risk preference and information between the sovereign debtor and investors. However, because of the likelihood that the sovereign will have superior information than the market, the market will compensate by demanding a higher price for the option. Therefore, only in a select few circumstances, when the quality of the sovereign's information is better than anticipated (i.e., the information asymmetry is unexpectedly large) or when the risk preferences diverge significantly, will the sovereign find it advantageous to issue a bond with an embedded call option.

The use of put options in debt instruments, while providing emerging market borrowers access to capital markets on favorable terms, could come at a significant cost in terms of increasing the debt-service burden of borrowers at times of financial stress, and could thereby make a difficult situation worse. Therefore, from the sovereign's perspective, put options need to be carefully considered to ensure consistency with sound debt management practices, in particular, the management of debt profiles and risks arising from the possible exercise of the options.

In contrast to step-downs and options, bond warrants provide risk diversification to emerging market sovereigns by offering the opportunity to issue debt that "buys down" headline spreads prevailing at times of crises or contagion in return for an explicit commitment to pay higher spreads—on new bonds—in the future, if economic prospects and market sentiment improve, leading to a decline in market spreads on sovereign bonds. Without creating an inflexible debt instrument, warrants can provide significant risk-shifting benefits and breathing room at times of crises by lowering debt service in the near term, and

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<sup>19</sup> Between a bond embedded with a step-down feature and a plain-vanilla bond, the choice for the sovereign is basically the same, except that with the plain-vanilla bond the yield curve can be augmented, while with the step-down the new instrument can simply merge with an existing bond. Hence, the trade-off is between a better-defined yield curve and a more liquid benchmark-like bond (the merger of the new bond and the existing one).

only expose the sovereign to risk in terms of higher borrowing rates (than market rates) in the future when strong economic adjustment facilitates sharp economic recovery. As a result, from the sovereign borrower's perspective, warrants may be more cost-effective and consistent with sound debt management in the context of countries in crises, rather than for those suffering from contagion, since the upside potential for these countries will probably take time to manifest itself. Warrants are, however, more complex than conventional bonds, underscoring the importance for sovereigns to make thorough assessments of the associated benefits and risks prior to using them. Nonetheless, if properly understood and fairly priced, they can provide an important source of risk insurance for emerging market borrowers.

As with other derivative products, structured notes can be used to either manage existing risk or assume new risk. Among the numerous fixed income securities available in the market, structured notes are special in that they can be customized to satisfy the unique requirement of individual investors, allowing for the possibility of exotic payoffs and higher-than-market yields under certain scenarios, including links to any currency, interest rate, stock index or combination thereof, and exposure to different market sectors within one packaged security. In general, from a market access perspective, structured notes could play a useful role in expanding the interested emerging market investor class, by particularly catering to previously unsatisfied pockets of demand. There are, however, significant risks and impediment to their wider use. Owing to their complexity and nontransparency, structured instruments can be difficult to price, while the underlying structure could be inflexible. Therefore, like warrants, structured instruments, when properly understood, fairly priced, and issued in moderate amounts, can provide an important means for emerging market borrowers to maintain market access to capital markets.

Collateralized borrowing, by subordinating other forms of debt and providing insurance to assure creditors that debts to them will be serviced, could potentially provide the sovereign borrower significant market access, and possibly at terms consistent with medium-term viability, especially at times of financial stress and when overwhelming uncertainty restricts other forms of market access. Care and restraint is, however, required in their use since the costs that such borrowing will impose on the sovereign borrower could be significant.

In an unsecured sovereign bond issue, market access and spreads are determined by the level of confidence that investors have in the country's underlying policies and prospects, thus exerting crucial market discipline.<sup>20</sup> Collateralized borrowing can, however, weaken the link between the availability of finance and the quality of policies, as investors are assured of

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<sup>20</sup> This approach is mirrored in the IMF (and World Bank) policy of not demanding collateral for use of resources, but instead looking to the quality of macroeconomic and structural policies to provide "collateral." Collateralization may also raise a "safeguard" issue for international financial institutions since the earmarking of assets could affect the capacity of a sovereign debtor to service its financial obligations to them.

payment regardless of the policies pursued by the government. This weakens the incentives for sovereigns to adhere to appropriate policies, thereby eroding the quality of unsecured credits. Also, to the extent that such borrowing subordinates other forms of debt, it could increase the costs of unenhanced borrowing. Furthermore, since collateralized debt is effectively unreschedulable, it limits a country's room for maneuver in the event of future payment difficulties. In addition, the successful use of collateralized instruments by one emerging market sovereign to regain market access may lead to a proliferation of their use, including by other emerging market borrowers, as investors seek deals with similar security, thereby widening the scope of a potential financial crisis as debt structures become more inflexible.

Finally, by reducing the net exposure of the private sector to sovereign risk, collateralized borrowing also runs counter to the efforts of the international financial community to involve the private sector in the resolution of crises, while in light of their role in creating less flexible debt structures, they could be inimical to the efforts of the international community in encouraging a wider use of financial instruments that can facilitate a restructuring of sovereign debt in extreme circumstances.

### **Concluding Remarks**

Emerging market sovereigns may face significant risks in relying on debt issuance denominated in foreign currency. Therefore, prudent sovereign debt management practices would limit additional risks that arise from borrowing using debt instruments that create among other things inflexible debt structures and further shift risks to the sovereign borrower. A number of alternative debt instruments, including augmentations and those embedded with risk diversification features, such as warrants, can potentially provide emerging markets borrowers with access to capital markets without posing significant costs, while some, including bonds with put options and collateralized instruments, can pose significant risks (and costs). Hence, emerging market sovereign borrowers need to develop appropriate policies to assess risks associated with borrowing using alternative financial instruments prior to using them to maintain access to capital markets, both during normal market conditions and at times of financial stress.