CHAPTER

1 ASSESSING GLOBAL FINANCIAL RISKS

Developments since the September 2006 *Global Financial Stability Report* (GFSR) have been broadly in line with the baseline scenario of solid economic growth, while near-term economic risks have eased. However, changes in underlying financial risks and conditions in some areas require heightened surveillance. This chapter discusses those changes in risks and conditions, and introduces the global financial stability map, a tool for assessing and summarizing how financial risks have evolved.

The map shows that financial stability risks have increased modestly in some areas. While none of the individual areas of risk identified constitutes a direct threat to financial stability, an adverse event affecting any one of those areas could lead to a reappraisal of risks in the others. This possibility is reinforced by low nominal and real interest rates and the environment of low volatility that has continued to encourage risk-taking and leverage, suggesting that the markets' adjustment to a higher level of volatility may not be smooth. A box at the end of the chapter assesses the implications of the February–March 2007 correction.

The risks identified as the main spokes of the global financial stability map are examined by exploring several topics. For instance, credit risk is examined by way of a deeper look into the U.S. mortgage market and the current wave of leveraged buyouts (LBOs) and their implications for corporate credit. The chapter then examines the financing of the U.S. current account in light of still-high global imbalances, which has implications for the spokes identified as macroeconomic and market risks. The assessment then turns to emerging market (EM) risks. While those risks have diminished somewhat given the positive global economic backdrop and improvements in fundamentals, the chapter notes that increased risk appetite, which is a financial condition in the stability map, has played a role in the rapid pace and changing composition of capital inflows to EMs—a situation that has been challenging for the officials in these countries. Finally, several risks identified in the spokes are pulled together in a discussion of the low level of volatility and how this may be affecting various trading strategies, including the carry trade, and the possibility of its disorderly unwinding. The chapter concludes with the implications for policy and financial surveillance. The challenge is to ensure that the financial system remains resilient should current benign financial conditions change. Thus, policymakers should use the current "good times" to prepare for a period when conditions are less favorable.

Four annexes complete the chapter. Annex 1.1 details the methodology and analytical underpinning of the global financial stability map. Annex 1.2 assesses the credit quality of banking systems in mature and emerging markets. Annex 1.3 assesses recent developments in credit derivatives and structured credit markets. Annex 1.4 provides an update on developments in the hedge fund industry and its oversight.

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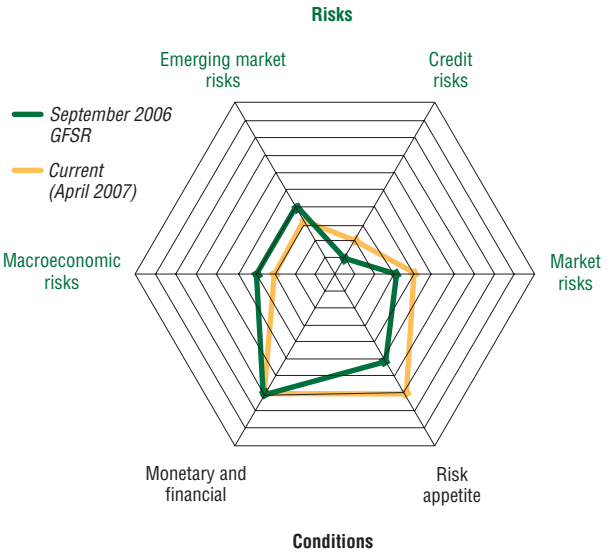
Global Financial Stability Map

The new global financial stability map provides a schematic presentation of key underlying conditions and risk factors that bear on stability, and illustrates how global financial stability has changed since the September 2006 GFSR (Figure 1.1). The concepts used in the risk map are broad and serve as a starting point for a deeper analysis of risks that affect global financial stability.

Figure 1.1. Global Financial Stability Map



Source: IMF staff estimates.
Note: Closer to center signifies less risk or tighter conditions.

The judgment of International Monetary Fund (IMF) staff on the overall level of risk is reflected in the positioning of points along the axis. The map documents the extent to which each element is supporting or undermining stability at present (shown by where the yellow line crosses each axis), and compares that with the assessment at the time of the previous GFSR (the green line).

Beginning with the left-most axis, near-term macroeconomic risks have diminished somewhat. The April 2007 *World Economic Outlook* forecasts healthy global growth for this year and declining inflation (IMF, 2007). Risks to growth are still tilted to the downside but have declined since last September. There is still potential for a disorderly adjustment of global imbalances, but the U.S. fiscal deficit is coming down, growth differentials are lessening between regions as domestic demand picks up in Europe and EMs, and some Asian currencies are exhibiting increased flexibility.

The other large macroeconomic risk that loomed at the time of the September 2006 GFSR was the weakening of the U.S. housing market and potential cross-border spillovers (IMF, 2006b). Although the U.S. housing market appears to be stabilizing, risks of further deterioration cannot be ruled out. Overall, the U.S. mortgage market has remained resilient, although the subprime segment has deteriorated a bit more rapidly than had been expected at this point in a housing downturn. The fallout has so far been limited to a small number of lenders, but could yet spread to the structured credit markets. This chapter assesses the extent to which such a deterioration in the housing market would increase credit stress in the mortgage market, particularly in the subprime and related segments, and how changes in the structure of the U.S. mortgage market—including its securitization and distribution to a global investor base—may have altered potential spillover risks.

Overall, corporate profits appear robust, balance sheets are strong, credit spreads have declined further, and default rates remain low.

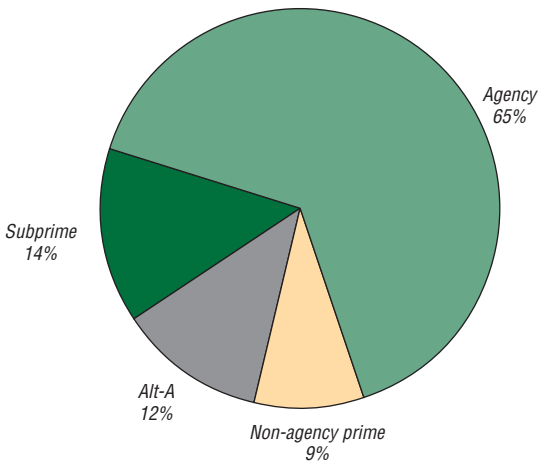
However, corporate leverage in private markets is now rising from low levels with the boom in leveraged buyout activity. The current wave of LBOs differs from that in the 1980s and late 1990s in that the size of the deals being made is much larger, and the degree of leverage used is rising (although it remains low relative to the 1980s), while the way the deals are funded—with more leveraged loans and fewer high-yield bonds—has altered the distribution of risks. So far, target firms are mostly those with high cash flows and low leverage, and easily obtained loans are distributed widely through structured credit products. However, there are signs that credit risks have risen while easy *financing conditions*, coupled with rising *risk appetite*, have contributed to higher prices and less due diligence. Moreover, there is a general weakening of loan covenants and possibly credit discipline. The LBO-acquired firms have become heavily indebted and thus may be more fragile in the event of an economic downturn. In view of these developments and those in the housing market, our overall assessment is that *credit risks* have increased since last September, albeit from a low level.

While overall macroeconomic risks have diminished and the underlying causes of global imbalances are beginning to ebb, the risks to financing of the U.S. current account deficit remain. The chapter examines the implications of the rising role that fixed-income inflows have played in financing this deficit. Empirical analysis shows that inflows from abroad to U.S. fixed-income markets have become more responsive to changes in world interest rate differentials, and thus potentially more sensitive to shifts in market sentiment.

Emerging market risks appear to have improved since September as EM countries generally continue to follow sound macroeconomic policies and are making further progress toward exchange rate flexibility and prudent debt management. External positions generally remain very strong, and robust growth has led to an improvement in fiscal positions in many countries. Despite recent declines, commodity prices remain broadly supportive. Where sovereign issuance in international capital markets has declined, private corporate issuance has filled the void. The benign external environment and accompanying rise in *risk appetite*—reflected in the rapid rise in capital flows to some EM countries—pose challenges for those authorities and could threaten financial and economic stability, especially if capital flow reversals were to occur. Private sector flows into emerging Europe have already risen significantly, and banks have been heavy issuers of foreign-exchange-denominated debt in international markets. In some countries, the generally strong external position of the government may mask potentially growing vulnerabilities for corporations and banks. Portfolio flows into sub-Saharan Africa, where local markets are still small, could affect monetary and exchange market conditions and pose risks of a capital flow reversal.

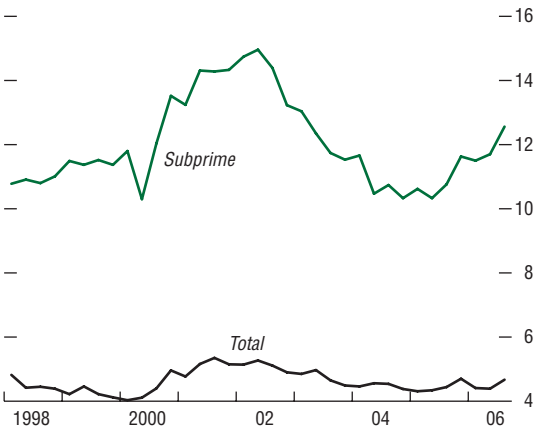
Financial market volatility across a broad range of assets has continued to move to remarkably low levels and risk spreads are tight, both relative to historical levels and to the same point in previous business cycles. Notwithstanding the broadly favorable economic environment, investors may be giving insufficient weight to downside risks and may be assuming that the low risk premia are a more permanent feature of the financial market landscape. The growth of carry trades is another sign that market participants do not view the cyclical factors contributing to the low volatility environment—abundant low-cost liquidity, low leverage in the corporate sector, and high risk appetite—as likely to reverse in the near term. Moreover, competitive pressures and risk models may help to perpetuate risk-taking that, from an individual institution's view, responds rationally to the current environment but collectively could raise systemic risks. A market correction, potentially triggered by a volatility shock, could be amplified by leveraged positions and uncertainties about concentrations of risk exposures stemming from the rapid growth in innovative and complex products, some of which have rather illiquid secondary markets.

Figure 1.2. Residential Mortgage-Related Securities Market
($5.8 trillion as of January 2007)



Sources: Credit Suisse, LoanPerformance.
Note: Includes only first lien securitized mortgages. Estimates are based on a securitization rate of 75 percent.

Figure 1.3. Mortgage Delinquency Rates
(In percent of total loans)



Source: Mortgage Bankers Association.

For these reasons, market risks are assessed as being greater.[1]

The sections that follow assess specific issues raised in the different risk areas of the global financial stability map.

Deterioration in the U.S. Subprime Mortgage Market—What Are the Spillover Risks?

This section explores the extent to which the cooling U.S. housing sector and a consequent rise in credit risk could pose a risk to financial stability, including potential spillovers of that risk to global investors. U.S. residential mortgage-related securities represent one of the largest pools of fixed-income securities in the world, totaling around $5.8 trillion as of January 2007.[2] Non-U.S. holdings of these securities, estimated at $850 billion as of mid-2006, represent a significant portion of foreign holdings of U.S. securities.[3] Because credit risk is highly concentrated among subprime borrowers—i.e., those borrowers with impaired or limited credit histories—it is important to study the U.S. mortgage market, since it is one of the few markets where such borrowers represent a notable portion of the overall market.[4] At an estimated $824 billion, the stock of securitized subprime mortgages

[1]This also illustrates the linkages between the various components of the map. Carry trades are popular as a result of the relatively easy monetary and financial conditions and the rising level of risk appetite. But the buildup of such positions represents a market risk. When those conditions change and carry trades as well as other strategies that involve leverage and the selling of insurance (credit default swaps) no longer look attractive, there is clear potential for perturbations across a wide range of markets.

[2]This estimate includes only first lien agency and nonagency mortgage-related securities. An estimate of all mortgage debt exceeds $13 trillion.

[3]Non-U.S. holdings of mortgage-related securities represented an estimated 10 to 12 percent of total foreign holdings of U.S. securities as of end-2005.

[4]See Bank for International Settlements (BIS) Committee on the Global Financial System (2006). The BIS attributes the lack of a subprime market elsewhere in part to consumer protection laws in some countries that cap mortgage lending rates, thus making it insufficiently profitable for mortgage lenders to lend to high-risk borrowers.

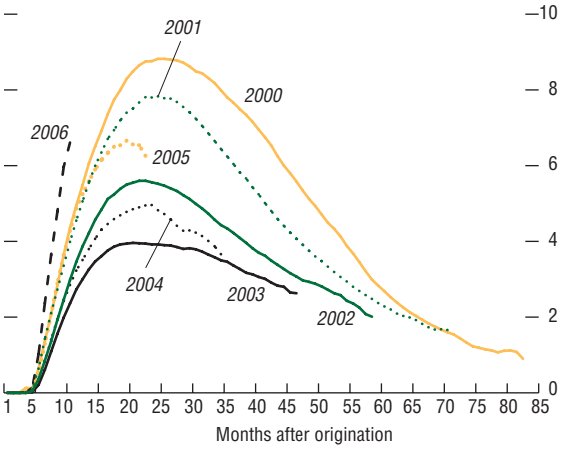
represents roughly 14 percent of outstanding mortgage-related securities (Figure 1.2).

The U.S. housing market cooled significantly in 2006 as sales fell and inventories rose sharply. So far, the resulting credit deterioration has been primarily confined to subprime mortgages, though it has begun to spread to Alt-A mortgages.[5] Subprime delinquency rates have picked up from cyclical lows in 2005, though they remain substantially below the previous cyclical peak in 2002 (Figure 1.3).[6] However, many market participants expect subprime delinquency rates to eventually surpass previous peaks. Indeed, growth rates of subprime delinquencies for recent mortgage vintages, notably 2006, are on steeper trajectories than the previously steepest vintage of 2000 (Figure 1.4).

This deterioration reflects a combination of regional economic factors and a shift in the structure of the U.S. mortgage market over the last few years. Specifically, the weaker mortgage collateral has partly been associated with adverse trends in employment and income in specific U.S. states rather than with particularly rapidly rising housing markets.[7]

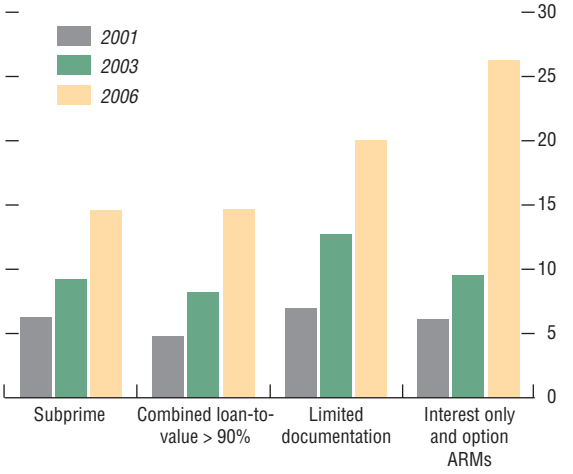
In addition, a prolonged period of high home price appreciation coincided with a relaxation in underwriting standards, resulting in a rise in the proportions of less creditworthy borrowers, more highly leveraged loans, and more risky mortgage structures (Figure 1.5).[8] The

Figure 1.4. Subprime 60-Day Delinquencies by Mortgage Vintage Year
(In percent of payments due)



Sources: Merrill Lynch; and Intex.

Figure 1.5. U.S. Mortgage Universe
(In percent of total mortgages)



Source: Lehman Brothers.
Note: ARM = adjustable rate mortgage.

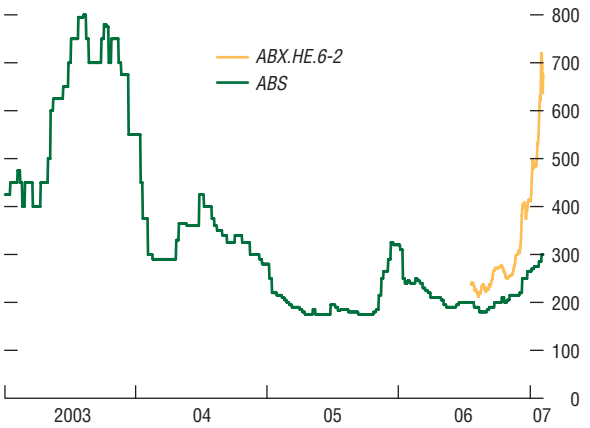
[5]Alt-A mortgages, though of higher quality than subprime mortgages, are considered less than prime credit quality due to one or more nonstandard features related to the borrower, property, or loan that are usually associated with such mortgages.

[6]Other measures of mortgage credit deterioration show a similar trend, such as foreclosures and early payment defaults, generally defined as mortgage loans that are more than 30 days delinquent within six months of the start of the mortgage.

[7]Home price increases have been below the national average in nine of the 10 states with the highest concentration of problem loans. A number of these states have suffered large losses of manufacturing jobs, especially associated with the downturn in the auto industry.

[8]Such mortgages include interest-only and option ARMs, which offer borrowers a range of payment options that can include negative amortization, i.e., payments less than the total interest due.

Figure 1.6. Synthetic (ABX) and Cash (ABS) BBB- Subprime Spreads
(In basis points)



Sources: JPMorgan Chase & Co.; and Markit.

proliferation of so-called affordability products, which were intended to minimize borrowers' initial monthly payments, has exposed borrowers to payment shock, or substantial increases in monthly payments, as adjustable rate mortgages (ARMs) reset to a higher rate, low introductory rates expire, or mortgages start to amortize.[9] Subprime mortgages are especially exposed to such payment shocks, since a disproportionate share originated as ARMs.[10] Once faced with payment shock, borrowers with limited built-up equity may be unable to avoid default by extracting that equity to meet monthly payments. Similarly, they may be unable to pay off a mortgage by selling their home, particularly in an environment of weak home price appreciation. Either way, this is likely to boost the overall rate of default on subprime mortgages.

At the same time, recent U.S. regulatory guidance that tightened underwriting standards on nontraditional mortgages could exacerbate risk in the short term by reducing the refinancing options for subprime borrowers just as their mortgages are resetting to a higher rate, though some market participants believe underwriters were already tightening standards anyway. The regulatory changes may ultimately strengthen underwriting standards in the longer term, but they have no impact on previously originated mortgages.

The deterioration in the credit quality of subprime mortgages has, in turn, translated into wider spreads on securities collateralized by them. Spreads on BBB- asset-backed home equity loan (HEL) securities, which are collateralized by subprime mortgages, have widened 175 basis points since August. Credit default

[9]Conventional ARMs, which are fully amortizing from the beginning of their term, are subject to payment shock as underlying interest rates rise. A "teaser rate," or a low interest rate, is often offered to attract borrowers to ARMs, but it then rises at each rate adjustment period. Interest-only and option ARMs also embed such payment shocks in their structure at the time they become amortizing. Market participants estimate that around $1.1 trillion to $1.5 trillion of such loans will be reset this year.

[10]Roughly 85 percent of subprime loans are ARMs, whereas only 55 to 60 percent of prime and Alt-A loans are ARMs, and less than 20 percent of agency loans.

Table 1.1. Stress Test: Impact of Home Price Appreciation (HPA) on Asset-Backed Securities (ABS) Collateralized by Subprime Mortgage Loans
(Percent impairment of ABS tranches)

Tranche	Home Price Appreciation Scenarios (Average 5-year HPA in percent per year)								*Memo Item:* Percent of subprime deals in 2006[1]
	–12	–8	–4	0	4	8	12	16	
AAA	0	0	0	0	0	0	0	0	75.0
AA	0	0	0	0	0	0	0	0	10.1
A	79	48	0	0	0	0	0	0	4.5
BBB	100	100	96	32	0	0	0	0	2.9
BB	100	100	100	100	25	0	0	0	0.7

Source: Lehman Brothers.
[1]Not rated or not available amounts to 6.7 percent.

swaps (CDS) on these securities, where—in contrast to the cash market—investors can take an outright short position to express a negative view on subprime credit, have widened by even more, particularly on those backed by more recent mortgages. Spreads on BBB- rated indices of ABX (indices of CDS on subprime securities) have widened sharply since November (Figure 1.6 and Box 1.1).

This weakness has been contained to certain portions of the subprime market (and, to a lesser extent, the Alt-A market), and is not likely to pose a serious systemic threat. Stress tests conducted by investment banks show that, even under scenarios of nationwide house price declines that are historically unprecedented, most investors with exposure to subprime mortgages through securitized structures will not face losses. These stress tests simulate how slowing house price appreciation would produce losses for asset-backed securities (ABS) collateralized by subprime mortgages. The stress test illustrated in Table 1.1 shows that tranches rated A and higher would not face losses unless house prices fell 4 percent per year for five years.[11]

[11]The illustrated stress test is by Lehman Brothers and it used loan-level data for subprime mortgage loans that were originated during 1999–2005. These data were used to estimate losses for subprime collateral under different house price scenarios. Those losses were then applied to representative ABS deals using private deal modeling software in order to determine the extent of losses for each tranche of the securities. Stress tests by Bear Stearns and JPMorgan give qualitatively similar results.

This is because the lower-rated tranches absorb the risk of default first. Since, typically, nearly 90 percent of subprime ABS deals are rated A or higher, this suggests the amount of potential credit loss in subprime mortgages may be fairly limited. In fact, even the relatively risky BBB tranches only begin to face losses once housing prices fall by 4 percent per year.[12]

Potential Spillovers to Credit Markets and Market Participants

Notwithstanding that the impact of a cooling housing market has been primarily confined to subprime mortgages and securities issued on them, the growth in the subprime segment of the mortgage market and its increased linkages to various types of securities mean that shocks could create some of the following dislocations in broader asset markets:

- *Looser credit standards may extend beyond the subprime sector.* There is a risk that other higher-quality mortgage collateral may be subject to the same underwriting weaknesses observed in the subprime sector. For instance, more recent vintages of Alt-A mortgages show higher leverage ratios, lower credit scores, lower levels of documentation, more lax requirements for insurance, and other riskier characteristics

[12]The latest data from the Office of Federal Housing Enterprise Oversight show housing price appreciation for the fourth quarter of 2006 running at 5.9 percent year-on-year.

Box 1.1. The Alphabet Soup of Subprime Mortgage Securitization—ABS, ABX, and CDOs

This box discusses the securitization process and carving up of mortgage cash flows into different types of securities. Over one-half of all U.S. subprime mortgage loans, prime second lien home equity loans, and home equity lines of credit are used as collateral for the issuance of asset-backed securities. Various types of credit enhancement are used to protect the securities issued from shortfalls in cash flows from the underlying collateral (see figure). Credit enhancement is achieved in several ways:

- *Subordination.* Securities are grouped in tranches with losses from defaults or foreclosures on the underlying mortgages applied to junior tranches before they are applied to more senior tranches.
- *Excess servicing.* A preset amount of interest is explicitly set aside from the servicing of the collateral each month to be used to make up any shortfalls in cash flows for senior tranches.
- *Residual tranching.* Additional cash flows above and beyond excess servicing are set aside to cover losses as needed.
- *Over-collateralization.* More collateral than the total par value of all the tranche securities may be pledged, generally in order to obtain a better credit rating.
- *Monoline insurance.* Third-party insurance or other financial guarantees may be provided to protect investors from losses.[1]

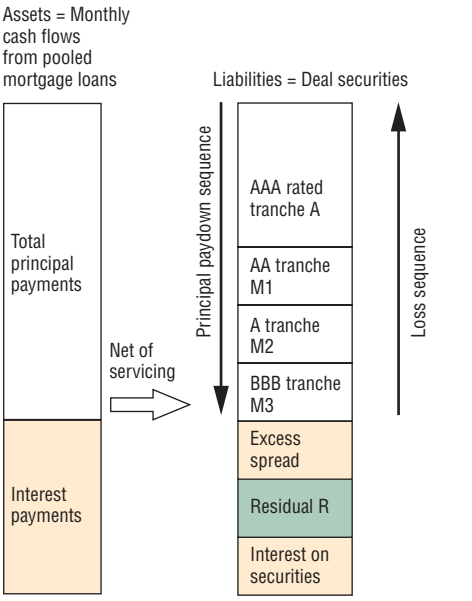
With these various credit enhancements, the most senior tranches are relatively secure against credit risk, even on subprime mortgage collateral. Accordingly, they are rated AAA and offer lower yields than other tranches in a deal.

There is also a growing market for credit default swaps on ABS (ABCDS), a market that has broadened ABS trading from a long-only, buy-and-hold activity by facilitating the execution of both long and short positions. ABCDS contracts are more complex than conventional corporate-backed CDS, as they must account for various "soft" credit events that are specific to ABS, such as temporary interest and principal shortfalls.

ABX indices, which are indices on ABCDS, started trading in January 2006. These allow market participants to more efficiently trade credit exposure to ABS portfolios. The ABX indices are based on the largest and most liquid ABS issues, and a new series is launched every six months that reflects the most recent loan originations. Each series is subdivided into five subindices based on the credit ratings of the tranches of the 20 ABS that comprise the series: AAA, AA, A, BBB, and BBB-. Contracts based on these indices are cash settled.

The BBB- indices may be useful indicators of U.S. household sector financial stress, although they may not be entirely representative of the market. Spreads on the BBB- subindices of the

Creation of Asset-Backed Securities from Mortgage Loans: Subprime and Prime Seconds



Sources: Fabozzi (2002); Western Asset Management; and IMF staff estimates.

Note: The main authors of this box are John Kiff and Mustafa Saiyid.

[1]Such "pool" insurance is in addition to any mortgage insurance required by law for homeowners.

three most recent ABX series have widened sharply since November 2006, reflecting increasing defaults and stress in the lower-quality home equity loans, particularly for the two most recent (07–01 and 06–02) series, which are based on ABS issued during the first and second halves of 2006, respectively. These series and the underlying loans have demonstrated much higher early default rates relative to the loans underlying the ABS issued in the second half of 2005 (reflected in the first ABX series, 06–01). For example, the 06–02 series has experienced delinquencies 60 percent higher than those of the 06–01 series at comparable seasoning. On February 14, 2007, trading in standard tranches of the BBB- and BBB ABX indices (TABX) began providing exposure to specific slices of ABX credit risk.

An additional layer of complexity in the transmission of subprime mortgage risk has been introduced by the creation of collateralized debt obligations, securities whose cash flows are derived from pools of lower-rated ABS. Like an ABS, a CDO uses multiple tranches from an unrated "equity" tranche that absorbs the pool's first losses, through to one or more AAA-rated "senior" tranches. These senior tranches are protected from credit losses by one or more "subordinate" and "mezzanine" tranches that are typically rated from A to BBB. Unlike in an ABS, this underlying CDO collateral is managed; individual ABS may be bought and sold within limits written into the terms and conditions of the CDOs.

These CDOs concentrate mortgage default risk into highly leveraged equity tranches. For example, $220 billion of the outstanding stock of subprime mortgages and second-lien loans packaged into ABS in 2006 was comprised of noninvestment-grade tranches, most of which were repackaged into CDOs (Lehman Brothers, 2006). These CDOs were comprised of about $175 billion of senior tranches, $40 billion of mezzanine tranches, and only $5 billion of equity tranches. Hence, CDO equity tranches represent highly leveraged exposures to the underlying collateral pools, in that they are exposed to the bulk of the expected pool losses for an upfront payment equal to only a small fraction of the total pool.[2]

[2]For a more detailed discussion of the leverage inherent in CDO structures, see IMF (2006a, Box 2.5).

relative to earlier vintages. Such collateral has begun to perform more poorly than earlier vintages. Altogether, the Alt-A and subprime mortgage sectors account for roughly one-quarter of outstanding mortgage-related securities, thus exposing a wider segment of the mortgage market to downside risks.

- *The wider market for structured products, particularly asset-backed securities collateralized debt obligations (ABS CDOs), may start to see deterioration.* With the lower-rated tranches of subprime ABS forming 50 to 60 percent of the collateral for ABS CDOs, such structured products are especially sensitive to a deterioration in mortgage credit quality. One mitigating factor may be that there is some evidence that CDO managers may have been selecting higher-quality deals (for instance, eschewing the poorer performing 2006 vintage securities).
- *Other consumer credit markets, including credit card-backed ABS and CDS structures, could experience losses.* As housing price gains accelerated, homeowners were able to extract equity from their homes and pay down higher interest rate credit card and other debt. With home equity withdrawal slowing, charge-offs and delinquencies on credit cards have risen, albeit very modestly.[13] Still, as long as household income continues to grow, the spillover effects to other forms of household debt should be limited.

[13]A charge-off occurs when payments are no longer collectible, due either to bankruptcies or defaults.

A variety of market participants are active in the riskier segments of the subprime and related markets. Each group has different exposures and risks, including:

- *Mortgage lenders, servicers, and insurers.* Low barriers to entry have resulted in the proliferation of smaller, less-experienced subprime lenders that are now at risk from declining lending volumes, weakening credit quality, and falling profit margins. A number of lenders have already declared bankruptcy or are in the process of being consolidated following a sharp rise in early payment defaults on mortgages (which they are required to reabsorb). More are expected to follow suit. Servicers are also at risk if mortgage payments decline dramatically or if the insurance they buy to protect against losses on individual deals fails.[14] By the same token, mortgage insurers—especially those exposed to the subprime sector—may see an increase in their liabilities, though losses are typically limited to the amount of coverage extended and insurers can choose to foreclose property or pass the risk on to the originator. In addition, market consolidation should weed out the smaller, less-diversified, and poorly capitalized lenders, servicers, and insurers.
- *Banks.* A deterioration in mortgage performance would hurt profitability at banks that invest in, originate, securitize, and structure subprime mortgages into CDOs. Modeling performance of nontraditional mortgage products is difficult, given the limited time series data, and hedging exposure to such products may be imprecise. While roughly 70 percent of subprime lending is done by specialty mortgage companies, subprime lending accounts for a significant share of mortgage lending at a few more broad-based financial institutions. Also, some investment banks have been acquiring some small subprime mortgage lenders, consolidating an industry experiencing financial distress. This development suggests the need for close monitoring, as this could lead to unexpected concentrations of risk exposure to the subprime mortgage market.
- *Overseas investors and hedge funds.* Anecdotal evidence suggests that overseas investors and hedge funds have significant exposure to the riskier portions of the CDO capital structure. Since many overseas investors are not permitted to invest directly in below-investment grade ABS, they may instead invest in CDOs as a means of gaining indirect exposure to the U.S. subprime market.

The complex market structure of mortgage-related securities can mask how risks are allocated and the degree to which they are hedged. As a case in point, the announced bankruptcy in December 2006 of Ownit Mortgage Solutions—a small subprime mortgage lender—prompted swap spreads to widen significantly (representing a three-standard deviation daily move) as market participants scrambled to assess counterparty risk, while spreads on other risky assets also widened. Fortunately, this was a one-day event and asset markets quickly recovered. However, the episode illustrates how the opacity and uncertainty about how mortgage-related securities allocate underlying mortgage risk could trigger volatility and disrupt broader asset markets. Major dislocation still appears to be a low-probability event, but the risks would be heightened if many subprime credit events were to take place simultaneously.

What Is Driving the Leveraged Buyout Boom and Does It Pose Stability Risks?

One of the most striking features of financial markets over the last year or so has been the massive increase in private equity buyouts, which has resulted in a sharp rise in leverage in targeted companies. This wave of LBOs differs from prior waves in that the size of the deal is much larger, and the degree of leverage is rising, while deal funding favors leveraged loans

[14]Servicers are responsible for collecting monthly mortgage payments and maintaining accurate records of payments and balances, and they often pay taxes and insurance on behalf of the borrowers.

over high-yield debt. At the same time, the way deals are funded—with more leveraged loans and fewer high-yield bonds—has altered the distribution of risks. This section explores the potential financial risks associated with the rapid increase in activity and leverage.

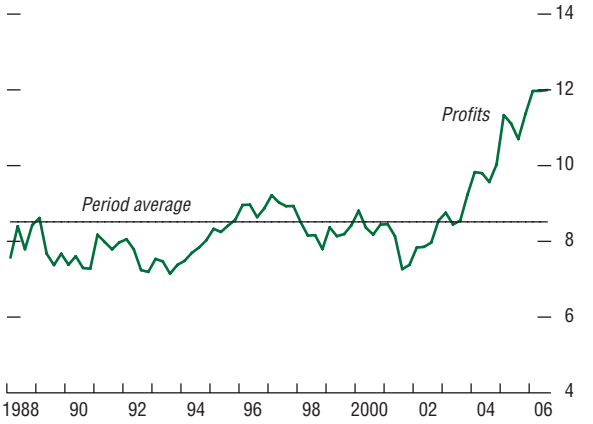
Key Drivers

In 2006, global merger and acquisition (M&A) activity totaled $3.6 trillion, surpassing the previous record reached at the height of the equity market boom in 2000. A number of factors have contributed to the rise. First, strong corporate balance sheets, combined with the reticence of some publicly traded companies to undertake new investment, has provided fertile ground for M&A and LBO activity. Against the backdrop of robust global economic growth and low real interest rates, the share of profits in GDP reversed sharply at the turn of the century and has risen to about 25 percent above its longer-term average (Figure 1.7). Corporate cash flows are also strong, with corporate saving positive across G-3 countries in 2006. Notwithstanding high profitability, strong balance sheets, and low real interest rates, corporations have been less willing than in the past to invest in new capacity.[15] This has created a ripe environment for M&A activity, in which private equity funds have played a key role.

Second, some firms are seen as having capital structures that have a lower proportion of debt to capital than is optimal in the current environment of low interest rates and ample funds available for investment (Figure 1.8). As such, the current wave can be characterized as an exercise in capital structure arbitrage. Where such firms are in sectors with relatively stable earnings and

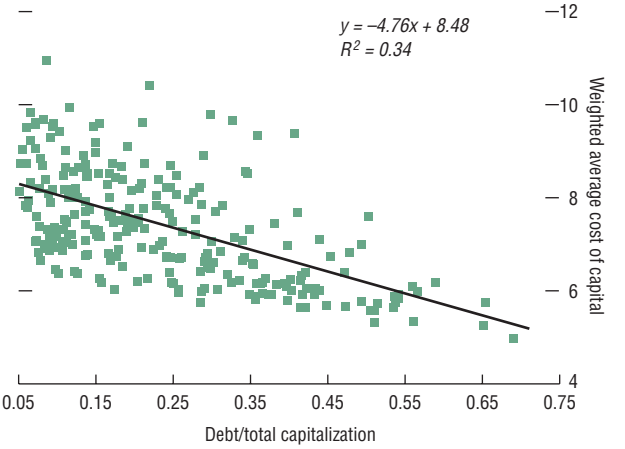
[15]In emerging Asia, Europe, and the United States, this reticence to invest may reflect some lingering cautiousness stemming from the excess capacity and overzealous investment of the late 1990s and the high hurdle rates used by companies in assessing new investments. In Japan, the current financial discipline may be related to the corporate sector's experience with deleveraging during the deflation period.

Figure 1.7. Corporate Profits for Euro Area, Japan, and the United States
(In percent of GDP)



Sources: Bloomberg L.P.; Haver Analytics; and IMF staff estimates.

Figure 1.8. Weighted Average Cost of Capital versus Debt as a Share of Capitalization
(In percent)



Sources: Morgan Stanley; and IMF staff estimates.

cash flows—such as utilities, consumer goods, and retail—they make tempting targets for buyouts.

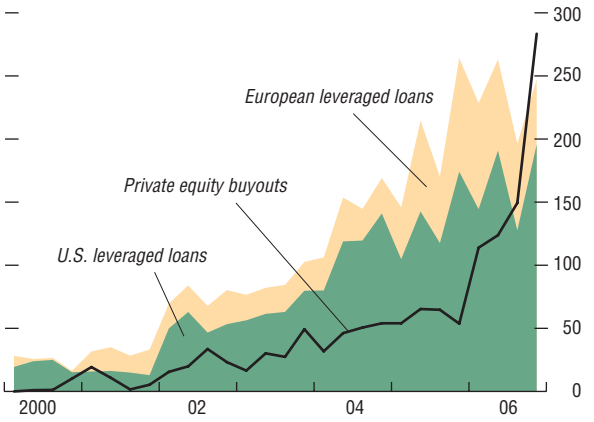
Third, in some cases, public firms have been brought private to overcome costs (both perceived and actual) associated with regulatory compliance and shareholder scrutiny. For instance, in the United States, managers of some publicly traded companies subject to more stringent regulation following implementation of the Sarbanes-Oxley Act have reportedly opted to pursue management buyouts as a means to reduce the regulatory burden.

A fourth factor contributing to the rise in LBO activity has been the large influx of capital into private equity funds (Figure 1.9). The private equity industry is forecast to raise $500 billion this year, having raised $430 billion in 2006. In many cases, private equity funds are being boosted by the distribution of profits and dividends from earlier deals, and these are being reinvested in new deals.[16] In addition, Asian central banks, institutional investors, and wealth managers have made small allocations to private equity as part of their portfolio diversification to include alternative asset classes.[17] Middle East sovereign wealth funds, which recycle some of the petrodollar profits from high oil prices, are also believed to have invested in private equity funds.

In many ways, this wave is distinct from the M&A boom of the late 1980s and 1990s. Specific differences include the following trends:

- Deal sizes are getting bigger, and few firms are now thought to be too large to be the target of a takeover. The average LBO size has risen

Figure 1.9. Private Equity Buyouts and Leveraged Loan Issuance
(In billions of U.S. dollars)



Source: Bloomberg L.P.

[16]Market participants note that private equity funds have been generating and distributing returns on their investment at an accelerated pace, as short as 20 months following acquisition, versus a standard length of four to eight years.

[17]To achieve returns similar to those they achieved in the past, many pension funds and insurers have had to increase their exposure to higher-yielding alternative asset classes, including private equity funds. Pension fund legislation prompted pension funds to shift a larger share of assets into longer-duration and often lower-yielding debt instruments in order to better match the duration of their assets with their liabilities.

from roughly $400 million in the prior cycle to $1.3 billion during the current cycle. Previously, the largest deal completed was the $31.3 billion acquisition of RJR Nabisco, whereas a few LBOs have already exceeded that level during this cycle. Deal size has grown, in part, because a larger number of LBOs are being completed by groups of sponsors that pool their resources (so-called "club deals").

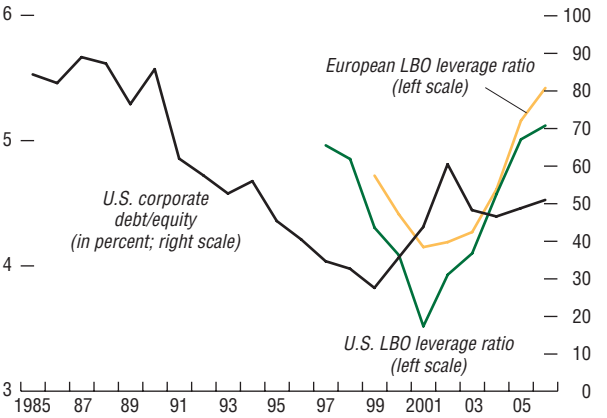
- The degree of leverage in the current wave of deals is rising, although it remains low relative to the 1980s cycle. The ratio of debt to earnings before interest, tax, depreciation, and amortization (EBITDA) among European LBOs reached almost 5.5 times by late 2006, up from around 4 times in 2002 (Figure 1.10). Leverage ratios have followed a similar trend in the United States, with debt/EBITDA rising from 3.5 times in 2000 to 5.1 times in late 2006.
- In contrast to prior LBO waves, much of the financing is from leveraged loans—defined as loans that carry an interest rate more than 150 basis points above LIBOR—rather than from the high-yield bond market (Figure 1.11). Unlike bonds, leveraged loans are sold though a process of syndication to a highly professional investor base. Also unlike bonds, loan contracts help overcome the collective action problem by providing for circumstances under which creditors can intervene and impose management changes if management fails to deliver on an agreed plan for the firm.[18] Importantly, the expansion of the collateralized loan obligation (CLO) market has greatly broadened the investor base for these loans, with institutional lenders eclipsing banks (Figure 1.11).[19]

At the same time, the recent wave of M&A is exhibiting some worrying symptoms of the

[18]Bondholders, by contrast, generally only have a say in the management of the company if it has defaulted (or is close to doing so). Bonds are traded in the secondary market much more than loans. Being numerous and uncoordinated, bondholders often face a collective action problem that prevents them from intervening effectively.

[19]CLOs pool loans and allocate rights to the cash flows into tranches, the most senior of which can then earn a high credit rating.

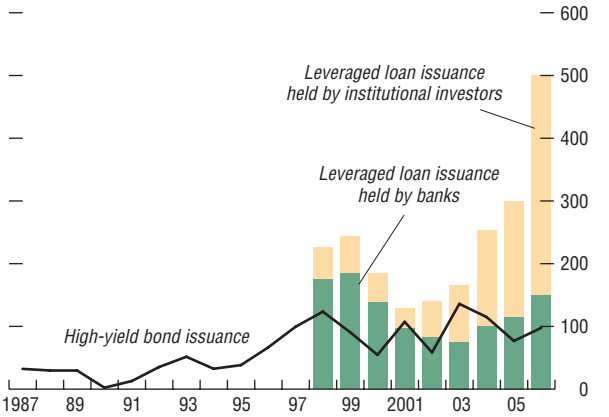
Figure 1.10. U.S. Corporate and Buyout Leverage



Sources: Standard & Poor's; Board of Governors of the Federal Reserve System; and IMF staff estimates.

Note: LBO = leveraged buyout. Leverage ratio is calculated as debt divided by earnings before interest, taxes, depreciation, and amortization.

Figure 1.11. U.S. Corporate Bond and Loan Issuance
(In billions of U.S. dollars)



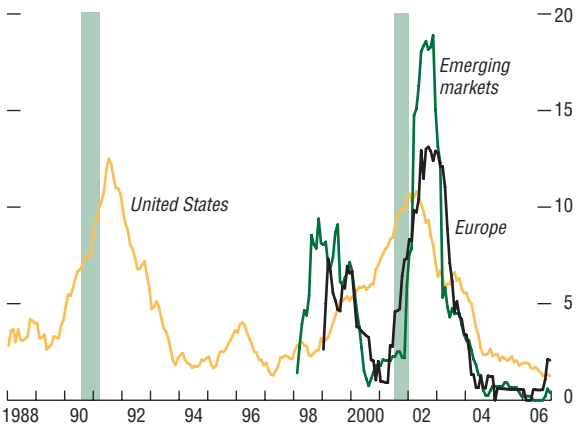
Sources: Bloomberg L.P.; and Standard & Poor's.

past, and has introduced some new risks. First, while the low interest rates, longer maturities, and increasing average size of the deals may make the effective average debt burden on the target more manageable relative to previous M&A booms, all else being equal, higher debt levels potentially increase the vulnerability of acquired firms to economic shocks. This is reflected in the downgrade in credit ratings of several targeted companies. Such a development is not necessarily a systemic concern, but it does increase the risks of failure that could impact credit markets more broadly.

Second, a rise in corporate leverage tends to precede a spike in defaults. Defaults among corporates remain low (Figure 1.12), but trends may now be in place that could eventually cause defaults to rise. Already, the ratio of debt to equity among U.S. corporations has picked up from the low levels it reached at the turn of the century. The share of bonds rated CCC or lower has also begun to rise as a percent of total corporate issuance, after having troughed in mid-2006. Access to capital markets has therefore extended to companies that could be vulnerable to even a marginal deterioration in macroeconomic or financial conditions.

Third, while the increased use of leveraged loans as the primary form of debt financing suggests that risks may be less concentrated, banks face a number of risks during the syndication process, which can take several months. During this time, adverse market events could render the deal unattractive. The bank that has provided bridge finance or has underwritten the provision of the leveraged loans would be at risk during that period and could suffer large losses as a result of adverse market developments.[20]

Figure 1.12. Global Speculative Default Rates
(In percent)



Sources: National Bureau of Economic Research; and Standard & Poor's.
Note: Bars indicate U.S. recessions.

[20]Banks often have some risk-sharing provisions with the sponsoring buyout firm under such circumstances, but they could still be left with assets that declined in value and that they are unable to distribute, or they might have provided a bridge facility that is unlikely to be replaced swiftly by longer-term funding (and which fails to reward the bank for the higher risk it is bearing). The latter situation is sometimes referred to as a "hung bridge."

The fact that deal sizes have grown and pricing has become finer means these risks are now larger.

Fourth, there are signs of weaker financing conditions. The average contribution that private equity investors are providing, though still higher than during prior waves in the 1980s and 1990s, has declined in recent years, and is currently only about one-third of the total. In addition, deal terms have loosened, as reflected by weaker, fewer, or dropped loan covenants. The strength of demand for leveraged loans from investors has led to a shift of power from creditors to borrowers, often resulting in negotiated loan covenants. Thus one of the main advantages of loans over bonds as a financing medium has diminished. Finally, financing has grown more aggressive, as demonstrated by the higher proportion of second liens and other riskier forms of debt financing.[21]

Fifth, anecdotal evidence suggests the due diligence being performed by some investors may be weakening. Leveraged loans are in high demand, and many deals are fully subscribed soon after they are announced. In the case of deals sponsored by some of the larger and more established private equity funds, investors in leveraged loans may be relying unduly on the due diligence performed by the sponsor and may therefore not perform a full level of due diligence on the firm. Some market participants argue that the time horizon over which private equity firms are interested in the fate of their investments is much shorter than the maturity of the loans used to finance the buyouts.

Finally, with allocations to private equity funds continuing to rise, it appears likely that in the future, more funds will be chasing fewer attractive deals. Already, rating agencies have warned that the number of viable targets has diminished. The strong demand for all elements of the capital structure of these deals means that prices are often bid up to levels that represent high multiples of earnings.

Current takeover activity is taking place against a benign backdrop of continued global growth, low real interest rates, high corporate profitability, and low volatility. If one of these factors changes, deals that looked promising in a benign environment could suddenly appear much less attractive. It is therefore likely that some private equity deals will fail to live up to expectations. The risk from a financial stability viewpoint is that the collapse of several large and high-profile deals during the syndication stage would trigger a wider re-appraisal across a broader range of products—a sharp decline in the appetite for high-yield bonds, for example, has the potential to curtail market access for higher-risk corporates.

Implications of Financing of Global Imbalances with Debt Flows

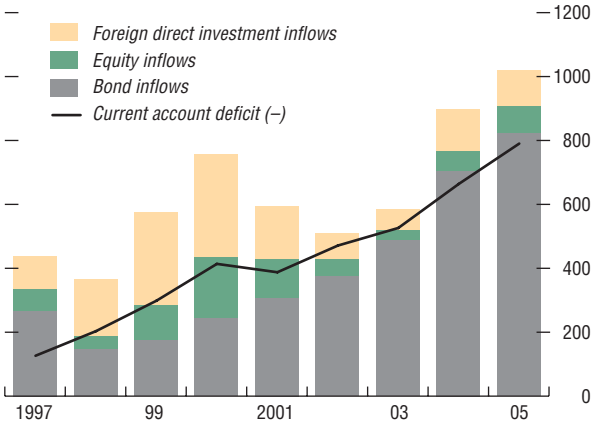
The persistence of global imbalances brings with it an important financial stability issue—the problem of sustaining the financing flows needed to support the imbalances. The April 2007 *World Economic Outlook* projects that imbalances are unlikely to fall much over the short term, and thus continued large cross-border net capital flows will be needed to finance current accounts at close to their present levels. This is clearly the case for the United States, which had an estimated current account deficit of $848 billion, or 6.4 percent of GDP, in 2006.

The rising dependence on fixed-income inflows to finance the U.S. current account deficit suggests that capital flows may have become more sensitive both to changes in world interest rate differentials and to expected exchange rate shifts. This section assesses the extent to which this has occurred and the implications for financial markets.

For several years, capital inflows to the United States have concentrated in fixed-income securities, including U.S. Treasury bonds, agency bonds, and corporate bonds. That tendency has become more pronounced since the 2001–02

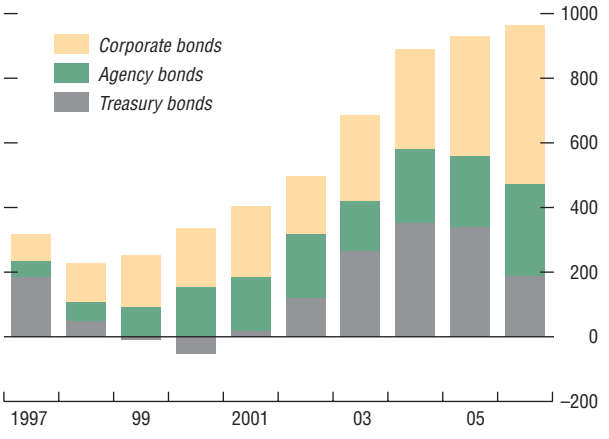
[21]Second liens, which have limited recovery rates, have reportedly risen in part to capitalize on cheap financing and to attract hedge fund and cross-over high-yield investors.

Figure 1.13. Sources of Financing for the U.S. Current Account Deficit
(In billions of U.S. dollars)



Source: IMF, *International Financial Statistics.*

Figure 1.14. Net Foreign Purchases of U.S. Fixed-Income Securities by Type
(In billions of U.S. dollars)



Source: Bloomberg L.P.

recession, even as the scale of the current account deficit to be financed has expanded rapidly (Figure 1.13).

Among the several factors cited as supporting the growth of fixed-income inflows to the United States, perhaps the most widely discussed is the accumulation of official foreign exchange reserves by foreign central banks, associated in some cases with efforts to limit appreciation against the dollar. In addition, the recycling of petrodollars—often through private sector intermediaries—has contributed to demand for U.S. fixed-income instruments. To some extent, bond purchases by the official sector may be insulated from market forces. However, the official sector, like the private sector, has become more sensitive to implicit interest rate differentials, in many cases weighing the cost of issuing domestic debt against the yield earned on foreign reserves (IMF, 2006b, Annex 1.4). At the same time, private sector demand for U.S. fixed-income instruments has also risen.

Increased private sector appetite for these securities may be attributable at least in part to global financial integration and—closely associated with this—a decline in asset home bias. As will be discussed in Chapter II, a combination of conditions has worked to ease the flow of capital across borders. In such circumstances, there should be an increase in substitutability between foreign and domestic assets. Accordingly, in a world of large current account imbalances, changes in relative interest rates or in other conditions that might once have had only a muted impact internationally could lead to sharp changes in capital flows or exchange rates.[22]

Greater responsiveness to yields on the part of investors into U.S. bond markets is seen, to some extent, in the types of fixed-income assets that they select. Since 2004, a growing share of purchases by foreigners—including by the official sector—has been in agency and corporate bonds (Figure 1.14). These categories include

[22]At the same time, an overall increase in the willingness to hold foreign assets—that is, a decline in home bias—would result in a secular shift toward such assets.

mortgage-backed securities (MBS) as well as a host of complex financial products, such as collateralized debt obligations (CDOs), constructed from the bonds.

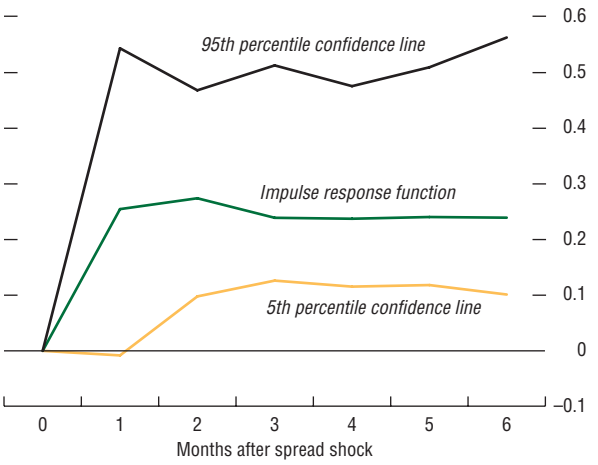
A set of econometric tests, as described in Box 1.2, gives further evidence that flows into U.S. bond markets have become more responsive to interest rate differentials (and, to a somewhat lesser extent, to domestic economic growth). As shown in Figure 1.15, in the second of two periods considered, the response to a sustained 1 percentage point increase in the spread of U.S. over foreign interest rates is statistically significant and persistent.

Notably, the tests fail to find any impact of exchange rate expectations on demand for U.S. bonds, even though it might be anticipated that such expectations should also play a role in determining flows.[23] Of course, this could mean simply that the model has not been able to capture how expectations are formed, especially if they are more forward looking. Nonetheless, the results are also consistent with the possibility that investors regard the path of exchange rates as a "random walk," believing that the best forecast about tomorrow's exchange rate is that it will be the same as today's. This provides some insight into the recent popularity of carry trades—the practice of borrowing in a currency where interest rates are low in order to invest in a currency where yields are higher. If investors believe that there is no real tendency for a lower-yielding currency to appreciate, then they will respond directly to increasing interest rate spreads. The decline in home bias and increased ease of engaging in cross-border transactions may be expected to amplify this tendency.

These results have some important inferences for financial markets.

First, the elasticity of substitution between foreign and U.S. bonds has increased, even as demand for U.S. assets has also become more

Figure 1.15. Response (of Bond Flows/GDP) to a 1 Percent Spread Increase: Period 2 (2002–05)
(Bond flows to the United States in percent of GDP)



Source: IMF staff estimates.

[23]More formally, this is the notion of "uncovered interest parity," which holds that a positive interest rate differential should be matched by a justified expectation of depreciation by the higher-yielding currency.

Box 1.2. Bond Flows: Demand Response to Interest Rate and Exchange Rate Shifts

This box describes empirical work on the determinants of bond flows, which, as shown in Figure 1.13, are the dominant source of private sector funding for the U.S. current account deficit (Walker and Punzi, forthcoming). The model estimates the impact on foreign purchases of U.S. Treasury securities of several variables that are hypothesized to influence foreigners' investment decisions, and whether that impact has increased over time. The tests are based on a panel data set that uses interest rate spreads between the United States and another country as an explanatory variable, along with that country's GDP growth and a measure of expectations for a bilateral exchange rate shift. There are 12 countries in the sample. Both cross-border interest rate spreads and the rate of growth of the other country's financial markets are shown as important determinants of outflows, with their importance increasing between 1995 and 2005. By contrast, exchange rate expectations appear to have little impact on such flows.

While previous work in this area has tended to focus on the bond market "conundrum" of the impact of foreign demand on domestic U.S. interest rates, the present research focuses on the converse problem in tracing the response of demand for the securities to interest rate shifts and other factors. Studies devoted to explaining and quantifying the "conundrum" of low long-term U.S. Treasury yields include Frey and Moëc (2005), who find that those yields would have been up to 115 basis points higher in 2004 had it not been for purchases by foreign central banks. Warnock and Warnock (2005) estimate the impact of overall foreign inflows on bond yields using ordinary least-squares regressions on aggregate, adjusted U.S. Treasury International Capital (TIC) data. They find a total impact from foreign inflows on U.S. long-term bond yields of 150 basis points.

Note: The main author of this box is Christopher Walker.

The Model

The present study uses monthly panel data on bilateral capital flows obtained from the TIC flows data set over 1994–2005. The data are adjusted to minimize custodial bias—that is, the fact that investors in one country may purchase securities through an intermediary in another country. The data are then divided into earlier and later periods, 1995–2001 and 2002–05. Although the break point between the two periods may be viewed as arbitrary to some degree, it was selected to correspond to the change in trends in the U.S. external accounts depicted in Figure 1.13, and (approximately) with the beginning of a business cycle.

In the model, which is derived from a simplified dynamic general equilibrium model of capital flows explored by Blanchard, Giavazzi, and Sa (2005), bond inflows as a ratio to GDP are a positive function of three independent variables—the spread between U.S. and foreign interest rates, the expected appreciation of the dollar against the domestic currency, and the country's growth rate.

While it is straightforward to obtain interest rate spreads and GDP growth rates (the latter proxied by month-on-month industrial production), there is no clear choice for a variable to represent exchange rate expectations. Although the notion of using forward prices to proxy such expectations is appealing, as this is a market-based indicator, this will not work, since—by covered interest parity—the difference between the spot and forward price is equal and opposite to the spread between the domestic and foreign interest rates. "Consensus" expectations obtained by polling market participants are a potential alternative, but these data are not available for every country over the entire span of the data set. In practice, an "adaptive" model of exchange rate expectations is employed, such that the expected rate of appreciation of a given currency is assumed to be related to past changes. While there are clear limitations to this approach, to the extent that investors do take past exchange rate move-

Two-Stage Least-Squares Regressions
(Dependent variable is bond flows as 1/1000 percent of own-country GDP)

Variable	Lagged Bond Flows	Interest Rate Spread (in percent)	Growth (percent, annualized)	Expected Dollar Appreciation (in percent)
1995–2001	.112 (1.81)	.174 (1.23)	.080 (1.62)	–.011 (–0.45)
2002–05	–.024 (–0.12)	.789 (2.31)	.238 (2.11)	–.004 (–0.05)

Note: *t*-statistics in parentheses.

ments into account in forming expectations about future movements, this approach should pick up these effects.

Estimation of the parameters raises standard identification issues typically associated with estimation of supply and demand elasticities. In particular, the spread variable $(r_{US} - r_i)$ is likely to be correlated with the error term ε_{it}, given that higher bond inflows (i.e., an increase in the quantity demanded) should be expected to lead to a lower spread (i.e., a higher price of U.S. bonds). Two distinct estimation techniques are used to minimize the identification problem.

Results from Estimations

Both estimators show a statistically significant, and in fact quite substantial, impact of the interest rate spread on bond inflows in the later period, whereas the effect in the earlier period does not register as significant at the usual confidence level. From a two-stage, least-squares estimator, the impact of the country's GDP growth is also increasing, and increasing in significance, from the earlier to the later period. By contrast, adaptive exchange rate expectations appear to have no impact on bond flows in either period, even though there is some positive autocorrelation of exchange rate returns during 1995–2001. On balance, these results lend support to the notion that the elasticity of substitution between domestic and U.S. bonds rose between 1995–2001 and 2002–05.

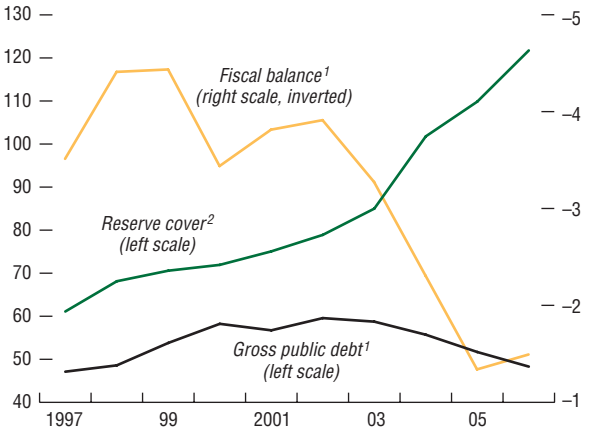
Results from a panel vector autoregression show a stronger impact of the cross-border spread on bond flows. Figure 1.15 shows an impulse response function for the later period, indicating a statistically significant and positive impact from a change in spreads on bond flows. Indeed, the persistence of the response to a permanent spread shock may be regarded as evidence in favor of the theoretical relationship between interest rate spreads and bond flows. The panel vector autoregressions also indicate a dramatic increase in the responsiveness of bond flows to interest rate changes between the earlier and later periods.

responsive to growth rates within the countries whose residents are purchasing U.S. bonds. This provides support for the view that international financial integration has made it easier for nations to sustain larger current account deficits, insofar as it suggests that the interest rate premium needed to sustain a given pace of inflows has declined.

Second, on the basis of the empirical work described here, the potential impact of a decline in interest rate spreads on bond flows could be significant. The higher of the two estimates obtained from this work would imply that a 1 percent reduction in the average spread of U.S. interest rates over foreign rates would, if sustained for a year, lead to a reduction of about $80 billion—out of a total of about $800 billion—in bond inflows to the United States.[24]

[24]Of course, any such estimate must be regarded with caution. The range of error of the estimate is fairly large (a 95 percent confidence interval ranging from $29 billion to $163 billion).

Figure 1.16. Indicators of External Vulnerability in Emerging Markets



Sources: National authorities; and IMF staff estimates.
Note: Simple unweighted average of data from 49 emerging economies.
[1]In percent of GDP.
[2]In percent. Ratio of reserves to short-term external debt at remaining maturity plus the current account deficit. If current account is in surplus, set to zero.

Emerging Market Risks and Challenges in a Benign External Environment

Emerging market risk has broadly declined since the September 2006 GFSR, supported by the benign global economic outlook, improved macroeconomic performance, and improving sovereign debt profiles. Investor flows to EMs have increased and demand has broadened, not just for external debt, but for local-currency-denominated assets. However, as investors move further out along the risk spectrum, such flows pose new challenges for policymakers, requiring concomitant advances in financial market development and regulation.

Two recent developments highlight the need for these advances. First, a rapid expansion of corporate debt issuance in emerging Europe, led by domestic banks, is contributing to rapidly expanding credit in some countries (see Annex 1.2). Second, as investors seek out "new frontiers" in EMs, recent inflows into local government securities of some countries in sub-Saharan Africa have exposed those markets to risks of reversal.

Emerging Market Fundamentals and Flows

The positive global outlook, including generally high levels of commodity prices in recent years, continues to provide a supportive backdrop for emerging markets and should allow for continued export-led growth. In addition, EM vulnerabilities have broadly continued to decline (Figure 1.16).

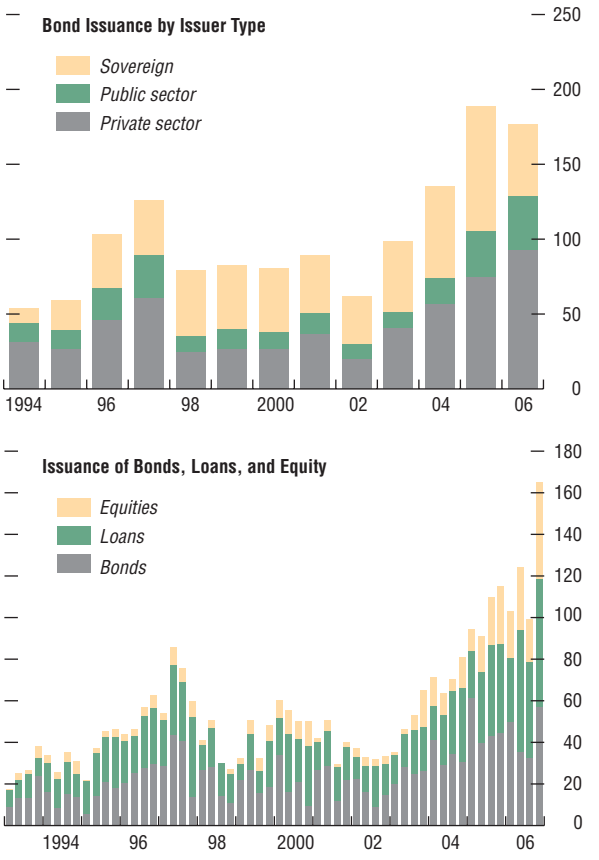
By and large, policy has supported improved market perceptions of EM sovereigns. Policy credibility continued to recover in Turkey following the central bank's sharp tightening of monetary policy in June and July 2006, and efforts to improve policy communications. In South Africa, the Reserve Bank's steady tightening of monetary policy helped consolidate market stability. In Hungary, market perceptions that fiscal policy was becoming increasingly credible helped restore investor confidence, leading to record levels of nonresident holdings of forint-denominated assets in late 2006. However,

policies have not been uniformly favorable. For instance, policy moves in Ecuador, Thailand, and Venezuela all led to adverse investor reactions.[25] However, these reactions remained confined to the countries concerned, suggesting investors have been discriminating—at least to some extent—on the basis of fundamentals.

The profile of external debt of EM sovereigns continued to improve in 2006. External debt issuance declined as improved fundamentals and increased reliance on domestic funding reduced external financing requirements (Figure 1.17, top panel). In addition, EM sovereigns aggressively retired external debt.[26] Looking forward, net sovereign external debt flows (including coupon payments) are expected to be negative during 2007, while private sector bond issuance is expected to fill the void.[27]

The combination of an improved external environment, better policies, and reduced external debt levels was reflected in a further rise in EM credit ratings to marginally below BB+, effectively a one-notch increase since end-2004 (Figure 1.18). Sovereign rating upgrades by Moody's and Standard & Poor's outpaced downgrades in 2006 for the fifth year in succession, with 38 upgrades versus only two downgrades.

Figure 1.17. Emerging Market External Issuance
(In billions of U.S. dollars)



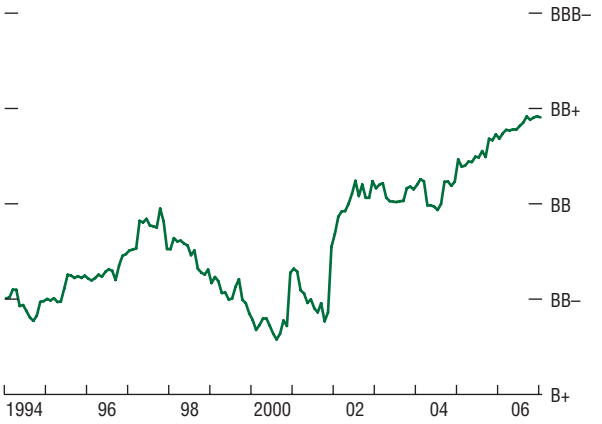
Source: Dealogic.

[25]In Ecuador, announcements that the authorities were considering pursuing a debt exchange and regarded some debt as illegitimate sparked a 250 basis point widening of external bond spreads in mid-January 2007, though spreads subsequently recovered. In Thailand, the imposition of a 30 percent unremunerated reserve requirement on short-term capital inflows sparked a 15 percent drop in the Thai stock market on December 19, 2006, leading the authorities to immediately announce a reversal in the requirement as it applied to equity markets. After the market partially recovered, subsequent announcements in January that the authorities would enforce restrictions on foreign ownership of domestic companies pushed the stock market down again. In Venezuela, the announcement of major nationalization plans sparked a 19 percent drop in Venezuela's stock market on January 9, 2007.

[26]Emerging market sovereigns are estimated to have bought back $23 billion worth of outstanding bonds in 2006, and exchanged roughly $2 billion worth for local currency debt.

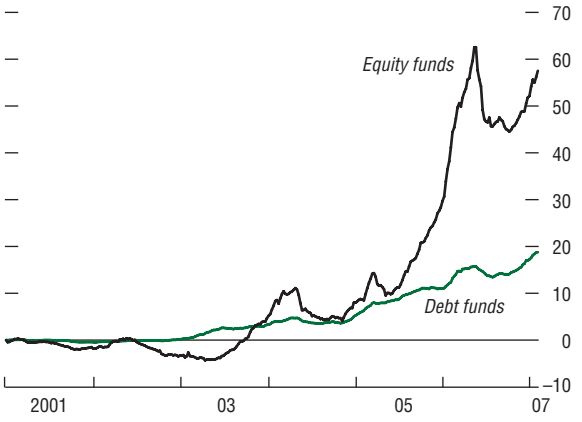
[27]Market analysts project gross sovereign bond issuance of a little more than $30 billion, against amortizations and coupon payments estimated to exceed $45 billion.

Figure 1.18. Emerging Market Credit Quality Index



Sources: JPMorgan Chase & Co.; Moody's; Standard & Poor's; and IMF staff estimates.
Note: Market-capitalization weighted credit ratings of EMBI Global constituent countries.

Figure 1.19. Cumulative Net Flows to Emerging Market Funds
(In billions of U.S. dollars)



Source: Emerging Portfolio Fund Research, Inc.

These fundamental improvements, combined with continued high investor risk appetite, brought EM spreads to record lows in early 2007. The model of EM spreads presented in the April 2006 GFSR (IMF, 2006a) suggests that spread compression was consistent with EM fundamentals and the improved external environment (see Annex 1.1).

Against this backdrop, foreign investor demand for EM assets has continued to expand, with continued inflows into dedicated EM bond and equity funds (Figure 1.19). As well, JPMorgan estimated that strategic inflows (flows from institutional investors such as pension funds and endowments) amounted to $25 billion in 2006, and projected a further increase to between $30 billion and $35 billion in 2007. Investor demand for local currency and corporate debt has also grown. For instance, local debt markets now account for roughly 60 percent of all EM debt trading volume, compared with about 35 percent in 2000.

The growing demand for EM assets continues to broaden. Total EM gross primary issuance of bonds, loans, and equities reached a record high of $484 billion in 2006, a 20 percent increase over 2005 (Figure 1.17, bottom panel). Growth was strongest in equities (albeit from a lower base), reflecting foreign investors' growing appetite for risk.[28] Gross loan issuance climbed 40.6 percent in 2006, reflecting commercial banks' search for higher returns amid strong competition in mature markets. By contrast, gross bond issuance fell 7.3 percent in 2006.

Rapid Growth in Corporate Bond Issuance

Emerging market corporate bond issuance rose to a record level in 2006, as declining sovereign bond issuance led to a "crowding in" of private sector debt. Corporates (including

[28]Equity issuance remains concentrated in Asia, and particularly in China, where rising issuance almost eclipsed U.S. issuance in 2006. However, about one-half the total for China was accounted for by a single initial public offering—the $19.1 billion raised by the Industrial and Commercial Bank of China in October.

those that are publicly owned) raised $125 billion from international bond markets in 2006, a nearly 20 percent increase over 2005, and market participants are projecting issuance to continue to rise.

The credit quality of new EM bonds, in aggregate, continues to rise, with the proportion of total corporate bond issuance rated investment grade rising to 58 percent in 2006. There are important regional differences, however, with corporate bond quality deteriorating in 2006 in emerging Europe, the region which saw the most significant increase in issuance.

In fact, the majority of recent corporate bond issuance in Europe, the Middle East, and Asia (EMEA) is rated subinvestment grade and is increasingly dominated by banks, specifically in Kazakhstan and Russia. Fitch Ratings (2006a) noted that the average rating for issues from Kazakhstan and Russia during 2006 was BB, markedly below the sovereign ratings of BBB and BBB+, respectively.

Corporates in Kazakhstan and Russia alone accounted for over 40 percent of EMEA's total (corporate and sovereign) bond issuance in 2006 (Table 1.2). This debt issuance is supporting rapid growth in bank loans to the private sector, which could lead to a deterioration in asset quality if banks' credit assessment capacity becomes overstretched.[29] This is of some concern because capital adequacy is declining in Russia and in Kazakhstan is relatively low for an EM country (see Table 22 in the Statistical Appendix). Also, in Kazakhstan, the nonperforming loans ratio is relatively high, especially in the context of rapid credit growth. Also in Russia, concentration risks are high as large loan exposures represent 150 to 200 percent of capital at some banks. Emerging market corporate bond growth, including for banks, remains predominately foreign currency denominated, increasing foreign currency exposure. However, all these risks may be offset to some degree by banking customers' rapid growth in wealth and relatively low leverage levels.

As banks account for a significant proportion of new EM corporate debt issuance, it is essential that domestic bank regulation and supervision develop in parallel. Regulators need to ensure that local banks upgrade their risk man-

Table 1.2. Foreign Currency Bond Issuance and Banking System Soundness: Europe, Middle East, and Asia (EMEA), and Kazakhstan and Russia

	2004	2005	2006	2007[1]
	(in billions of U.S. dollars)			
Foreign Currency Bond Issuance				
EMEA total	47.8	75.7	88.1	. . .
Of which				
Russia and Kazakhstan	19.7	27.0	37.6	10.1
Other	28.1	48.7	50.5	. . .
Russia				
Financial institutions	3.1	13.3	19.6	3.6
Nonfinancial institutions	10.4	10.0	9.4	0.3
Sovereign	0.0	0.0	0.0	0.0
Kazakhstan				
Financial institutions	3.5	3.7	8.4	6.3
Nonfinancial institutions	2.7	0.0	0.2	0.0
Sovereign	0.0	0.0	0.0	0.0
/Indicators of Banking System Soundness				
Russia				
Growth in credit to the private sector[2]	47.0	35.0	48.0	. . .
Regulatory capital ratio[2]	14.0	13.2	12.5	. . .
Nonperforming loans to total loans[2]	3.8	3.2	2.7	. . .
Kazakhstan				
Growth in credit to the private sector[2]	54.0	74.0	79.0	. . .
Tier 1 capital to total assets[2]	8.0	8.0	9.0	. . .
Nonperforming loans to total loans[3]	11.9	9.6	10.2	. . .
	(in billions of U.S. dollars)			
Memorandum Item:				
Russian local currency issuance[4]				
Financial institutions	1.2	3.2	9.9	0.3
Nonfinancial institutions	5.7	25.2	17.2	2.5

Sources: Bloomberg L.P.; IMF, *International Financial Statistics;* national authorities; and IMF staff estimates.
[1]2007 data are year-to-date through February 13, 2007.
[2]2006 data as of September.
[3]2006 data as of March.
[4]Converted to dollars at period average exchange rate.

[29]In an effort to dampen rapid expansion in Kazakhstan, the authorities broadened and raised reserve requirements (effectively tripling required reserves, albeit from very low levels) in mid-2006, introduced foreign currency liquidity norms and limits on short-term external liability ratios to bank capital, and tightened regulations on related-party lending, real estate exposure, and cross-border loans. A second round of prudential tightening, which would include extension of borrowing limits to banks' total external obligations, was to have been implemented in March 2007.

agement, especially to manage growing currency mismatches on their balance sheets. Furthermore, policymakers should monitor potential bunching in corporate rollover requirements given that the majority of new bonds are of three- to five-year maturity.

"New Frontiers"

Investor interest in the "new frontier" of sub-Saharan Africa grew significantly in 2006, albeit from a very low base. Portfolio investors have become increasingly active, especially in local currency debt markets, led by dedicated EM hedge funds and institutional investors.[30] A trading volume survey by the Emerging Market Traders Association (EMTA) shows sub-Saharan debt trading volume reached $12.7 billion in 2006, nearly double the volume in 2005.[31] Portfolio inflows to the region have been concentrated in high yielding, commodity exporting countries and in those with a positive macroeconomic outlook and more "open" capital markets, notably Nigeria, Zambia, and, recently, Ghana.[32]

Investors have been attracted by the region's improving fundamentals. Sovereign balance sheets in many countries have improved significantly, benefiting from debt relief. High commodity prices and improved macroeconomic management are also contributing to reduced default risk and raising the prospects for sustained growth. Investors recognize that the international policy consensus for poverty reduction, crystallized in the Millennium Development Goals and supported by the Heavily Indebted Poor Countries Initiative and Multilateral Debt Relief Initiative, offer significant one-off boosts to fiscal stability and growth.

In addition, sub-Saharan markets may offer investors the benefits of diversification, as those markets were uncorrelated with the more liquid EMs during the May/June 2006 correction.[33] Meanwhile, the ability of foreign investors to access the region's markets has improved as an increasing number of the region's assets can now be settled via Euroclear, lowering transaction costs. Prior to 2006, only the South African rand among sub-Saharan African currencies was a settlement currency within Euroclear. In 2006, seven additional sub-Saharan currencies were added.[34]

However, a surge in inflows can overwhelm underdeveloped markets and leave them vulnerable to sudden outflows, posing challenges for policymakers (see Box 1.3). The region's authorities need to ensure that market development and policy keep pace with growth in foreign portfolio flows. For instance, Nigeria's rapidly developing local pension sector provides a constant source of demand for local currency assets, so that secondary market liquidity continues to rise. Importantly, increased foreign flows require disciplined financial and macroeconomic policy in order to avoid distortions in local asset prices, and to ensure foreign investor confidence is established and retained.

Are Global Financial Markets Too Complacent?

Financial market volatility across a broad range of assets has continued to decline to

[30]Some specialist funds with longer-term investment horizons and sufficient local resources to overcome initial information asymmetries are also increasing their activity in regional equity markets.

[31]The EMTA's survey reflects input from 66 major dealers, banks, and money management firms worldwide and includes data on secondary market trading in sovereign and corporate eurobonds, local treasury bonds, and other instruments from more than 90 emerging market countries.

[32]Analysts estimate that Nigeria received roughly $1 billion in inflows in the first half of 2006, over five times greater than estimated foreign capital inflows for all of 2005. Significant though smaller flows were also received by Zambia (approximately $250 million in 2006), Tanzania ($150 million), Ghana, Côte d'Ivoire, and, to a lesser extent, Kenya and Uganda.

[33]However, this low correlation could have reflected the limited involvement of foreign investors in the region.

[34]In part, this reflects efforts by the African Development Bank (AfDB) to foster local financial market development. The AfDB has issued a number of local currency bonds, in each case working with the authorities to ensure Euroclear status is achieved. Euroclear is the world's largest settlement system for securities transactions.

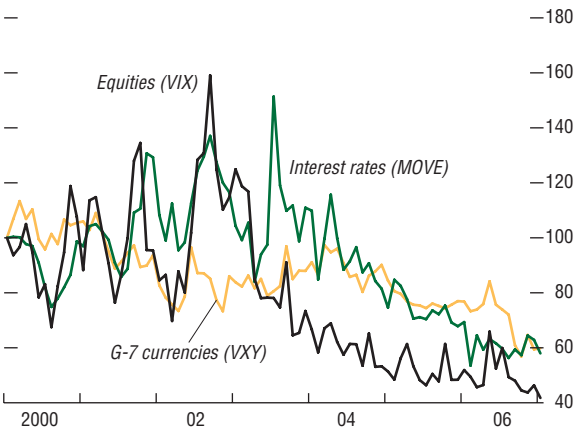
remarkably low levels (Figure 1.20) and risk spreads are historically tight. A number of *structural* reasons have been advanced to explain this persistently low level of asset market volatility. One is that inflation risk is less of a concern, partly because emerging economies, in particular China and India, can help meet growing global demand for both goods and services despite narrowing capacity constraints in industrial countries. Other explanations appeal to a shallower credit cycle due to improved macroeconomic policies, including the credibility attached to central banks. In addition, the wider dispersion of risks in the financial system, facilitated by financial innovations and deepening markets for credit derivatives, may also have contributed to lower volatility.

However, *cyclical* components are also likely to be important in explaining the current low volatility. Despite the increase in uncertainty normally associated with this stage of the business cycle, volatility appears low. Figure 1.21 compares equity volatility through the last three U.S. business cycles.[35] Three key factors are abundant global liquidity, still-low corporate leverage, and a high risk appetite. These factors could reverse in the future.

With respect to liquidity conditions, low real interest rates encourage investors to borrow in order to amplify the returns on their investments. As long as markets remain calm and liquid, this is a successful strategy, and market participants may be inclined to keep increasing leverage. Even as short-term nominal rates have risen in the United States and elsewhere (although real rates remain at or below long-term trend levels), funds have been available

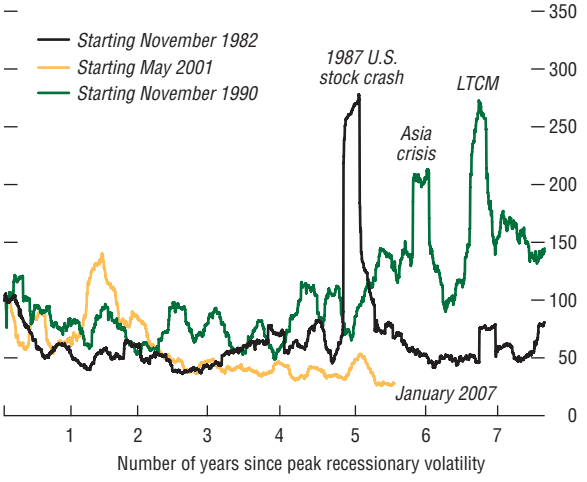
[35]This commentary refers both to *realized* volatility, as measured by the standard deviation of realized asset returns, and to *implied* volatility. The latter is computed from options or swaptions prices as the expected standard deviation that must be imputed to investors to satisfy risk-neutral arbitrage conditions. Volatility indices such as the Chicago Board Options Exchange S&P 500 Volatility Index (VIX) typically track implied volatility. Actual and implied volatility generally, but not always, move in tandem.

Figure 1.20. Implied Volatility Indices
(January 2000 = 100)



Sources: Bloomberg L.P.; and IMF staff estimates.
Note: VIX is the Chicago Board Options Exchange S&P 500 Volatility Index. MOVE is the Merrill Lynch Option Volatility Estimate Index. The JPMorgan VXY index measures volatility in a basket of G-7 currencies.

Figure 1.21. Volatility and the U.S. Business Cycle
(Index rebased to 100 at inception date)



Sources: Goldman Sachs; Bloomberg L.P.; and IMF staff estimates.
Note: Historical volatilities on S&P 500 index; LTCM = Long-Term Capital Management.

Box 1.3. Zambia: A Case Study

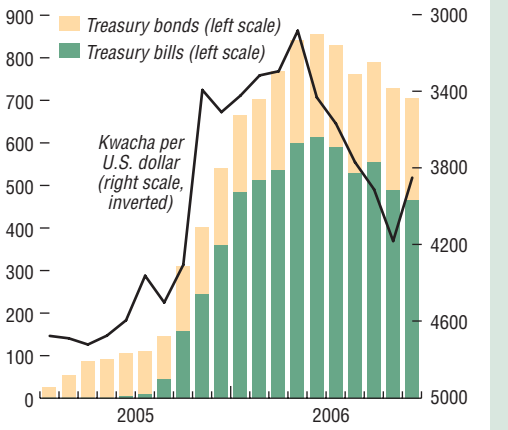
The experience of Zambia between late 2005 and end-2006 provides a case study on the impact that foreign investor entry and subsequent exit can have on small local markets. Zambia had achieved the completion point under the Heavily Indebted Poor Countries Initiative in April 2005, and was poised to benefit from the G-8's post-Gleneagles Summit commitment to enhance poverty reduction resource flows to Africa. In addition, as a copper exporter, the dramatic rise in that metal's price—up 173 percent from end-2004 to its peak in May 2006—had strengthened prospects for Zambia's macroeconomic performance.

Against this favorable economic backdrop, foreign investor interest in local Zambian markets rose. High nominal interest rates (18 percent in September 2005) and prospects of gains from currency appreciation drew in foreign investors, despite very limited market liquidity and the undeveloped state of local markets.

Foreign inflows into local Zambian government securities markets increased from almost nothing to a sizable share of the domestic market. By the second quarter of 2006, nonresidents held 15 percent of the outstanding stock of bonds and 23 percent of the treasury bill market.[1]

The influx of foreign inflows accentuated the appreciation pressure on the Zambian currency. The kwacha rose by 44 percent from the second half of 2005 to the first quarter of 2006, significantly more than other commodity exporting countries. At the same time, inflows into local government securities brought with them a pronounced drop in nominal yields, accompanied by a decline in inflation. The one-year yield fell to 7 percent by late May 2006, while inflation declined about 10 percentage points to 8.6 percent year-on-year.

Zambia: Foreign Ownership of Outstanding Debt
(In billions of kwacha)



Sources: National authorities; and IMF staff estimates.

However, amid growing political uncertainty ahead of the September 28, 2006 elections and a fall in copper prices, foreign investors retreated from local markets. This retreat added significantly to pressure on the local currency and interest rate markets. Between end-May and end-September, the kwacha depreciated by 16 percent against the dollar, compared with a decline in copper prices of 4 percent. Foreign investors' share of the outstanding stock of treasury bills declined from 24 to 19 percent during this period. By year-end, the one-year yield had moved back above 9 percent, reflecting, in part, the impact of foreign investors' exit from local markets.

Note: The main author of this box is Mark Walsh.
[1]Foreign investors' indirect holdings, through products such as total return swaps, are likely to have been significantly higher as a share of the outstanding debt stock.

from economies where nominal rates remain low, notably Japan and Switzerland. The resulting opportunity to borrow cheaply and invest in higher-return assets provides an incentive for investors to engage in cross-border carry trades (Figure 1.22).

Carry trades have typically targeted high-yielding assets in both mature market

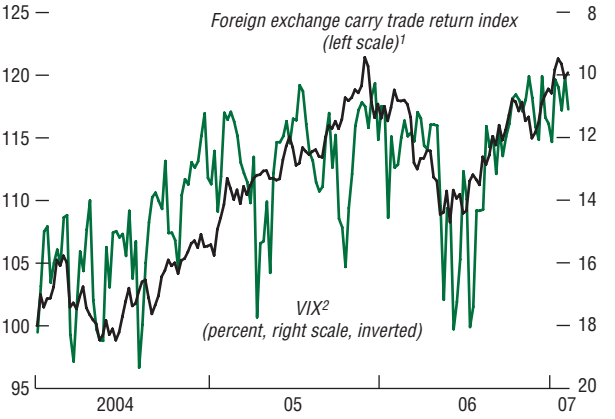
economies—the United States, Australia, New Zealand, and the euro area—as well as EM economies, including Brazil, Hungary, South Africa, Turkey, and some Asian economies. While there has been a secular interest by Japanese retail investors in overseas investment given low domestic returns, purchases by Japanese retail investors of bonds denominated in New Zealand dollars (part of the so-called "uridashi" bonds) have increased in recent years to around $2 billion per month, spurred by an interest spread of around 700 basis points. One measure of the shift toward carry trade strategies is provided by Figure 1.23, which shows that institutional investors (so-called "real money") have positioned themselves strongly in favor of carry trades over the past six months—funding in Japanese yen and Swiss francs and investing in high-yielding assets in other currencies—to an extreme percentile position (assessed over 1994–2007).

The scale of yen-funded carry trades can be glimpsed by the level of "other" investment outflows from Japan, which include lending and derivatives flows from Japanese banks to nonresidents (Figure 1.24). This component of the nation's balance of payments has become the major source of outflows in 2006, amounting to about $170 billion. The last time there were such bank and derivatives outflows was in 1997, in advance of the Asian financial crisis, the collapse of Long-Term Capital Management, and a sudden appreciation of the yen. While still a small proportion of foreign exchange trading, further evidence of the rising popularity of carry trades can be found in the speculative positions of traders of currency futures on the Chicago Mercantile Exchange, where short yen and Swiss franc positions reached record levels in January.[36]

A second cyclical factor currently depressing volatility is the low *degree of leverage* among nonfinancial corporations. Low corporate leverage has the effect of dampening credit market volatility, as debt service costs are small and the threat

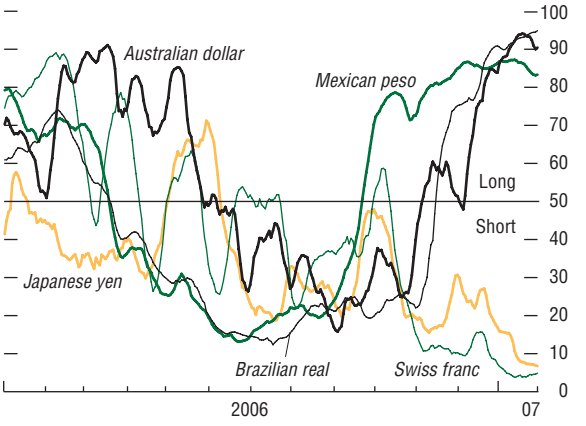
[36]See the September 2006 GFSR (IMF, 2006b) for an extensive discussion of the yen carry trade.

Figure 1.22. Foreign Exchange Carry Trade Returns and Volatility



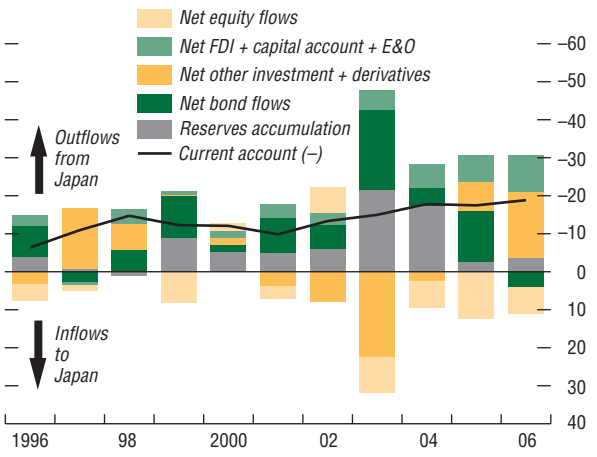
Sources: Deutsche Bank; Bloomberg L.P.; and IMF staff estimates.
[1]The Deutsche Bank G-10 Currency Future Harvest Index. Rebased, January 1, 2004 = 100.
[2]VIX is the Chicago Board Options Exchange S&P 500 Volatility Index.

Figure 1.23. Institutional Currency Positioning
(Percentile rank)



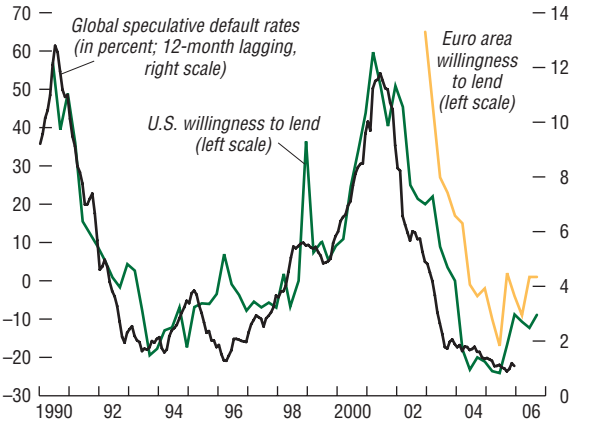
Source: State Street Global Markets.

Figure 1.24. Japanese International Capital Flows
(In trillions of yen)



Sources: Bank of Japan; and IMF staff estimates.
Note: 2006 data for 12-month period ending September 2006. FDI = foreign direct investment; E&O = errors and omissions.

Figure 1.25. Bank Willingness to Lend and Corporate Default Rates



Sources: Board of Governors of the Federal Reserve System; European Central Bank; and Standard & Poor's.

of default is remote. Default rates have so far remained low, but easy financing conditions may have, in part, suppressed default rates, encouraging some to take on added exposures in credit risk. Pressure is building from private equity buyouts and the leverage cycle is beginning to turn. Figure 1.25 shows that U.S. high-yield defaults tend to rise a year or so after the willingness to lend has turned back up as it did in 2005.

Third, strong *risk appetite* may also work to perpetuate low volatility. Hedge funds and other investors have been actively engaged in "selling volatility," which is the practice of selling options, collecting the option premium in the (so far largely justified) expectation that market moves will not be large enough for the option to finish in the money. Such strategies are also apparent in the willingness of investors to sell protection against default through credit default swaps (most notably in leveraged form through instruments such as constant proportion debt obligations) (see Annex 1.3). A further manifestation of increased risk appetite leading to low volatility is illustrated by the behavior of the price of options that are deeply out of the money, and used to insure against extreme outcomes. This suggests that "tail risk" is relatively cheap, at least with respect to the historical average difference between the implied volatilities of deeply-out-of-the-money and at-the-money options (Figure 1.26).[37] Examples abound from other asset classes: what they have in common is the apparent confidence of investors that extreme events will not occur. High risk appetite is apparent in the increased demand for leveraged loans and an acceleration in the search for yield in riskier assets, including local-currency-

[37]Tail risks are the risks of moves in market prices that are several standard deviations from the average of those prices. Conventionally, financial markets are well aware that large price moves are not uncommon, as herding behavior and options trading can cause prices to tumble one way or another. The cost of insuring against these tail events is therefore generally high relative to the cost of insuring against small moves. This is shown by the typical volatility "smile" that shows higher volatilities (implying higher costs of insurance) for large price moves than for small moves.

denominated EM instruments and the rise in exposure to market risk or leverage by hedge funds (Box 1.4).

Risks

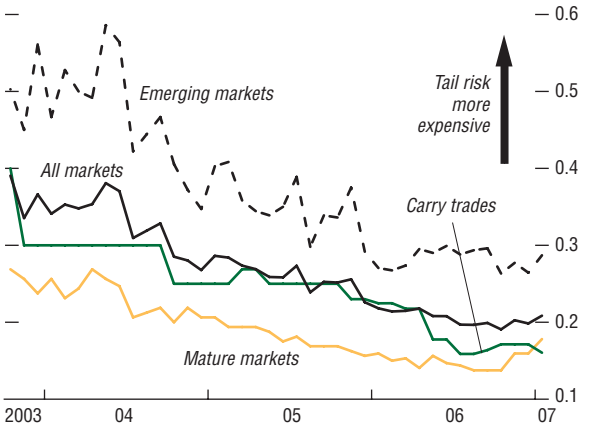
The cyclical factors contributing to the low volatility environment—abundant low-cost liquidity, low leverage in the corporate sector, and high risk appetite—may reverse. Overall liquidity may be expected to diminish with the eventual removal of monetary accommodation by the Bank of Japan and the European Central Bank. The leverage cycle has turned, and with it, default rates should rise. High risk appetite may reflect an underestimate of economic risks and an overestimate of liquidity in higher-risk and more leveraged investments. Financial markets may well adjust smoothly in the transition from the current state of low volatility to one in which volatility returns to historically more normal levels.

However, there is a risk that the adjustment will be less smooth. A volatility shock—perhaps caused by a downward shift in growth expectations or by renewed inflation pressures—could precipitate sharp portfolio adjustments and a disorderly unwinding of positions. The consequences of such a shock would be amplified by the rise in leveraged investment positions, the increased use of complex derivative instruments that remain untested in more volatile market conditions, rising portfolio exposure to illiquid instruments, and the prevalence of crowded trades.

Furthermore, rising correlations in returns across asset classes have meant that the volatility of the overall market basket has not declined as much as the volatility of its component parts—indeed, by some measures it has increased. Insofar as markets have become overly complacent, they may not yet have priced in this covariance risk, which could lead to the further amplification of any volatility shock (Figure 1.27). For instance, the recent market sell-off in late February 2007 illustrated how seemingly minor, unrelated developments

Figure 1.26. Relative Price of "Tail Risk" in Foreign Exchange Markets

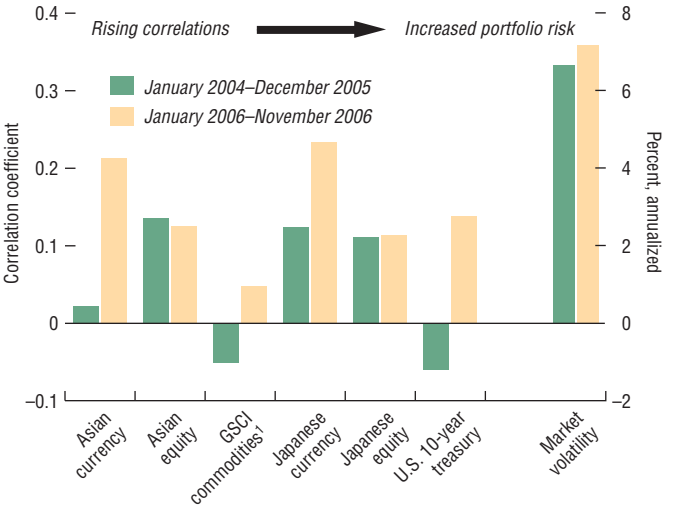
(Excess implied volatility of deep out-of-the-money options; in percent)



Source: Bloomberg L.P.

Note: Data represent the average excess implied volatility of a deep out-of-the-money options contract (delta = 0.25) relative to an at-the-money options contract (delta = 0.5).

Figure 1.27. Correlation of Asset Classes with S&P 500 and Broad Market Volatility



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

Note: Calculations based on daily returns. Market volatility is calculated as an average of the annualized standard deviation of returns for each of the listed asset classes and the S&P 500. Correlations are plotted on the left scale, market volatility plotted on right scale.

[1]GSCI = Goldman Sachs Commodity Index.

Box 1.4. Have Hedge Fund Risks Also Risen?

Hedge funds now account for a third of trading volume and, therefore, the liquidity provided in several markets. Their role as liquidity provider is enhanced by their ability to bear more risk than a typical retail investment vehicle and other institutional investors. They do this in a number of ways, including by investing in riskier segments of asset markets and through the use of leverage. They typically use leverage to amplify the returns from their trading strategies. The smooth functioning and stability of financial markets may depend on how well hedge funds manage the use of their leverage. Hedge funds can take on leverage in two ways: *direct* leverage, when a hedge fund borrows from its prime broker; and *financial* leverage, when a hedge fund buys a derivative which has the leverage embedded in it. Leverage increases the chances that hedge funds will be forced to sell assets into a falling market, potentially accentuating market volatility. Unfortunately, hedge fund leverage is notoriously difficult to measure, so we adopt here a measure that gauges the sensitivity of hedge fund returns to market prices. This provides an indirect gauge of both types of leverage as well as the relative riskiness inherent in their portfolio choices into a single indicator.

To determine which asset prices have the biggest impact on hedge funds, monthly hedge fund returns were regressed over a range of asset classes over a 12-year span. On the view that hedge funds could be characterized as "leveraged mutual funds," changes in an index representing all hedge fund returns were regressed on returns from major stock, bond, and commodity indices. To give an idea of how hedge fund sensitivities might be changing, perhaps due to changes in leverage, the coefficients on asset returns were summed for each of a sequence of "rolling" regressions on overlapping 36-month windows.[1] This indicator suggests that the sensitivity to these factors has risen steadily over the last two years, moving back to levels last seen during the equity market bubble in 2000.[2] However, it is still below levels seen in previous financial market crises. Difficulties at several high-profile hedge funds in late 2006 do not seem to have triggered a reduction in these sensitivities, which actually picked up sharply at the end of last year as equities rallied.

Measure of Market Sensitivity of Hedge Fund Returns
(Sum of betas)

Source: IMF staff estimates.

Note: The main authors of this box are Christopher Morris and Christopher Walker.

[1]The indices included in the regression are the S&P 500, the Eurofirst 300, the Nikkei 225, the JPMorgan EMBIG Index, the Goldman Sachs Commodity Index, and the Lehman Aggregate Index of mature market bonds. Because the regressions leave out assets (for example, foreign exchange or real estate) that are important to some hedge fund returns, the sum of the coefficients in this exercise should be expected to be less than the actual amount of leverage. Accordingly, the direction of change in the indicator may be more significant than the level.

[2]The measured sensitivity will represent leverage under the joint assumptions that the average share of invested portfolios devoted to the assets measured here stays roughly unchanged, and that hedge funds invest, on average, the same proportion in the measured indices rather than other assets not included in the regression. To the extent that hedge funds invest, on average, in "high-beta" assets within the included asset classes, the measure may overstate direct leverage.

Several factors may help explain the rise in this indicator. First, other studies have concluded that hedge funds tend to increase leverage when markets have been stable for a while, only taking it off when markets become volatile again. The long period of low market volatility across a range of asset classes in recent years may therefore have led hedge funds to add to leverage, and thus their sensitivity to asset returns has increased. Second, and relatedly, inflows to hedge funds have fallen over recent months, even as the number of hedge funds has risen. Some are therefore finding it increasingly difficult to find profitable trading opportunities and are increasing the leverage or the riskiness of their portfolios in an attempt to deliver the excess returns investors are seeking. Third, hedge fund returns may simply have become more sensitive to the asset classes included in these regressions. This may be because hedge funds are selling options as a source of premium income. In any event, the increase in hedge fund sensitivities may be relevant for financial stability if an event induces abrupt or exaggerated reversal or alteration in their portfolio choices.

across markets quickly led to the unwinding of risk positions across a wide range of financial assets (see Box 1.5).

A volatility shock could lead to the rapid unwinding of carry trades. To the extent that such unwinding involves a reduction in yen funding, a sharp yen appreciation would be possible, particularly in light of global imbalances. While in some cases a relief from appreciation pressures would be welcome in target-currency countries, rapidly depreciating exchange rates could fan inflation, or force higher interest rates that could destabilize financial markets.

The impact of such a volatility shock would have a significant effect on emerging markets. Figure 1.28 shows the impact on EM sovereign spreads of changes in equity implied volatility, a proxy for risk appetite.[38] A reversion in volatility to two standard deviations above the average since 1990 would see spreads widen 225 basis points (i.e., more than doubling from their end-2006 levels), according to the model.[39] Such a move would be equivalent to a two-notch ratings downgrade for every sovereign included in the Emerging Markets Bond Index Global (EMBIG) underlying the model.

A disruptive unwinding of yen carry trades occurred in October 1998. From October 6–9, the U.S. dollar fell by almost 15 percent against the yen because of a large-scale unwinding of the yen carry trade, amplified by complex options and various hedging strategies. While the effects on the real sector were minimal, the unwinding of short yen positions by hedge funds and large financial institutions led to a rapid drying up of liquidity in key markets. This resulted in highly disruptive market conditions for a short period.

However, the current situation seems less worrisome than the run-up to the 1998 episode for a number of reasons. First, a gradual narrowing of interest rate differentials is the central scenario for monetary policy in the relevant countries. Second, the long side of the carry trade appears to be spread across a number of currencies, while in 1998 it was narrowly concentrated on the U.S. dollar. Third, global macro hedge funds are now less dominant market players, and hedge funds in general have shown flexibility in unwinding their positions, thanks to better risk management techniques. Fourth, the investor base in Japan

[38]This presentation uses an updated version of the model presented in the April 2006 GFSR (IMF, 2006a, Box 1.6).

[39]Such rises in volatility are by no means rare: the VIX, the measure of equity market volatility used here, and a proxy for risk appetite, has breached this level 10 times since 1997.

is more diversified, with retail investors adding stability to the financial landscape. Finally, financial markets are in general deeper than a decade ago and better able to absorb asset price volatility.

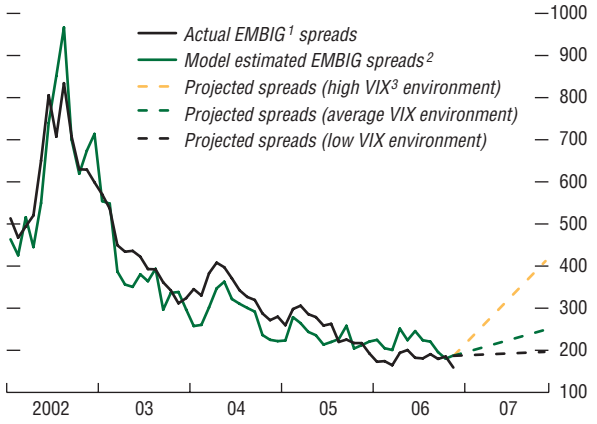
Policies to Mitigate Stability Risks

Global economic conditions have been supportive of a benign financial environment, but there are now emerging developments that have the potential to weaken financial stability. No single factor examined in this chapter constitutes an elevated risk by itself, but if the downside risks were to broaden or intensify, there could be knock-on effects elsewhere in the financial system. The challenge, therefore, is to further strengthen the financial system to ensure its resilience should current benign financial conditions change.

While the weakening U.S. housing market has had a limited effect on the overall financial system, the U.S. subprime segment is showing credit quality strains. So far, this has not affected financial stability overall, but because the complex market structures of mortgage-related securities can disguise how risks are allocated, who holds them, and the degree to which they are hedged, financial supervisors need to identify the potential for spillovers. In this regard, ensuring that underwriting standards are maintained is critical to supporting market discipline and, in this regard, recently issued guidelines are welcome.

For policymakers in mature markets, the substantial growth in private equity buyouts will require continued scrutiny. Financial intermediaries active in these transactions need to understand the risks and be prepared for unlikely constellations of risks—supervisors can encourage them to do so. Specifically, banks that underwrite, provide bridge financing, or are involved in the syndication and distribution of leveraged loans must ensure they are managing their risks appropriately. Regulators need to be mindful that the intense competition for deals could lead to a weakening of credit dis-

Figure 1.28. Volatility Shocks to Sovereign Spreads
(In basis points)



Sources: Bloomberg L.P.; JPMorgan Chase & Co.; The PRS Group; and IMF staff estimates.
[1]EMBIG = Emerging Markets Bond Index Global.
[2]Model excludes Argentina because of breaks in the data series related to debt restructuring. Owing to short data series, the model also excludes Indonesia and several smaller countries. The analysis thus includes 32 countries.
[3]VIX is the Chicago Board Options Exchange S&P 500 Volatility Index.

cipline and lending standards by some market participants.

While the risks of a disorderly unwinding of global imbalances have diminished somewhat, concerns are still present. The shift in composition of inflows to the United States to finance the current account deficit toward fixed-income securities suggests that bond inflows have become more responsive to alterations in interest rate differentials—and thus potentially more sensitive to swings in market sentiment. Policy actions should continue to focus on reducing vulnerabilities associated with global imbalances. Continued enhancement of their communications strategies would help monetary policymakers ensure an orderly market adjustment, including by minimizing risks of excessive buildup (and disorderly unwinding) of carry trade activity. In addition, regulators should warn retail investors of the risks in foreign currency or highly leveraged investments and ensure that investment firms selling such instruments provide adequate warnings.

Regarding EMs, capital inflows should help economic development, but they also have the potential to reverse swiftly. If the global economic environment becomes less benign, financing conditions are likely to become more difficult, in particular for those countries that rely heavily on portfolio inflows (IMF, 2006b, Chapter I). Ensuring that macroeconomic management is sound and stable so that capital inflows are put to effective long-term use will help stem the likelihood of a rapid withdrawal. And an investment environment conducive to the maintenance of confidence, the efficient use of capital, and the development of local financial markets will help countries reap the benefits of foreign capital. In this regard, policies to strengthen and deepen local capital markets are an important element of the medium-term strategy to improve the resilience of financial systems in the face of capital flows. As discussed in Chapter II, moderate participation by foreign investors can help improve liquidity and lengthen the maturities that can be traded in local markets. However, if foreign participation swamps the local investor base, domestic currency asset prices can be driven more by global than by local factors, and regulatory and supervisory capacity may be insufficient to deal with the risks. Policymakers are therefore encouraged to develop an institutional investor base—pension funds, insurance companies, and mutual funds—to help develop the domestic market. As part of this, EM countries should support efforts to free up local institutions to make investment choices on their merits, rather than being subject to central direction or tax or regulatory distortions.

The systemic risks associated with market participants' increased risk-taking are best addressed through policies aimed at assuring that participants adequately understand and appreciate the risks they are taking, and that "innocent bystanders" are protected from the fallout that may result from abrupt reversals in behavior. In this regard, hedge funds have been under increased scrutiny lately—in part because of their rapid growth in recent years and their opacity. Hedge funds play an increasingly important role in capital markets—in transferring risks, providing liquidity, and fostering financial innovation (see Annex 1.4). However, by facilitating interlinkages among asset and geographic markets, they also raise the likelihood of spillovers.

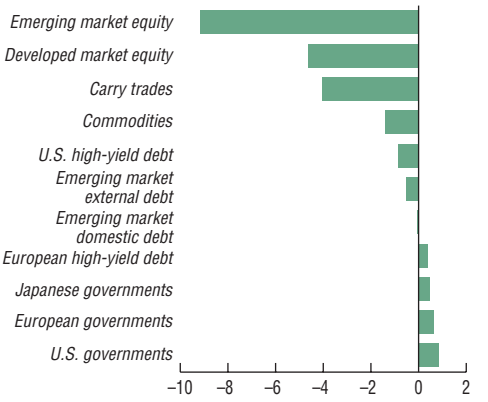
Specifically, as regards hedge funds, there are several areas that deserve attention. Investors are, of course, responsible for monitoring and seeking to influence the behavior of the institutions in which they hold stakes, but with investor demand generally exceeding hedge fund capacity to take in new capital, such market discipline may be less reliable. Even though transparency for hedge fund investors and their bank and broker counterparties has improved since the failure of Long-Term Capital Management in 1998, it is recommended that investors and counterparties continue to seek more transparency. For the purposes of financial stability, indirect monitoring of hedge fund

Box 1.5. Causes and Implications of the February–March 2007 Market Correction

In late February through early March 2007, markets were hit by a bout of volatility that took prices of many risky assets back to their late-2006 levels. That volatility had subsided by mid-March. The broad widening of risk premia in equity and credit markets was associated with a flight to quality, with yields on risk-free assets falling across the major sovereign debt markets. Following a prolonged period of low volatility and rising valuations, these market moves were attributed to an unwinding of a number of positions that had grown extended. Market participants had become more sensitive to weaker economic data, prompting a reassessment of downside risks to growth. The unwinding of carry trades during this episode highlighted risks to emerging markets that are overly reliant on portfolio inflows. A reestablishment of risk premia should tighten financial conditions, result in greater credit discipline, and, if sustained, could help to support global financial stability.

Asset Class Returns, February–March 2007 Correction

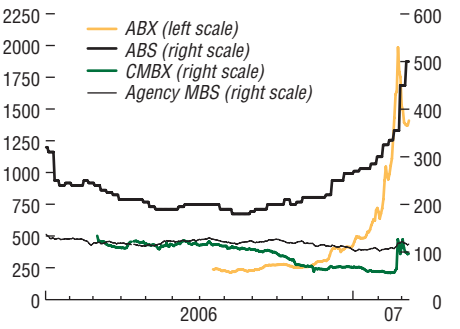
(Percent change)



Sources: Bloomberg L.P.; Deutsche Bank; JPMorgan Chase & Co.; Merrill Lynch; and IMF staff estimates.

Spreads on Residential Prime, Subprime, and Commercial Mortgage-Backed Securities

(In basis points)



Sources: Bloomberg L.P.; and JPMorgan Chase & Co.
Note: ABX = credit default swaps on mortgage-related asset-backed securities; CMBX = synthetic index of commercial mortgage-backed securities; ABS = tranched securities collateralized by subprime mortgages; Agency MBS = mortgages securitized by government-sponsored enterprises.

Causes of the Sell-off

The correction reflected a reappraisal of market risks, triggered by both valuation and fundamental concerns. The long rally in several markets made overextended positions especially vulnerable to downside risks. Moreover, in order to sustain strong returns, investors had reportedly taken larger, more leveraged positions, exposing them to potentially more violent swings in asset prices. Although the sell-off began with an unwinding of long equity positions in China, the broad and global scope of the sell-off suggested the underlying causes lay elsewhere. The flight to safer investment havens was highlighted by the fall in the price of risky assets (especially equities and credit products) and the rise in mature sovereign debt prices.

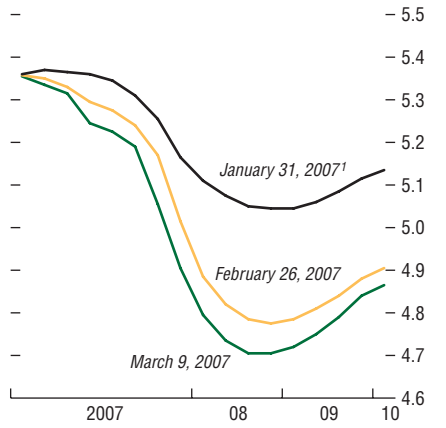
Prior to the sell-off, the deterioration in the U.S. subprime mortgage market had already contributed to a widening of subprime mortgage spreads and related derivatives products. Through early 2007, market participants had generally believed the U.S. housing downturn would have a limited impact beyond the small subprime mortgage sector and the specialized firms involved in origination, servicing, and insuring subprime loans. Those beliefs were already starting to weaken in early January as

Note: The main authors of this box are Rebecca McCaughrin and Chris Morris.

Cost of Insurance Against Default by Selected U.S. Financial Institutions
(In thousands of U.S. dollars per year for 5-year cover on $10 million of senior debt)

Source: Bloomberg L.P.
[1]Index of investment-grade corporate credit default swaps.

Rates Implied by Eurodollar Futures
(In percent)



Source: Bloomberg L.P.
[1]January 31, 2007 was the date of the prior monetary policy meeting by the Federal Open Market Committee (FOMC).

credit default swaps written on subprime mortgages (as represented by the ABX index) rose to distressed levels. Spreads on the underlying subprime mortgages were relatively insulated from the widening through early February, but they too finally widened in late February, despite extremely light issuance. The underperformance of cash and synthetic subprime markets then spread to higher-rated mortgage products and tranches of collateralized debt obligations amid the broader market sell-off.

The cost of insurance against default by some of the United States' largest financial institutions rose as investors started to worry that they may have underestimated the impact of strains in the subprime market on their earnings. However, some commentators noted that, even after the widening, default spreads were still near historically low levels. They therefore argued that it did not signal a significant weakening in the financial soundness of these institutions. Interest rate swap spreads also widened, reflecting concerns about rising credit risks in the financial sector. Other asset markets signaled a rise in broader credit risk premia, with high-yield cash spreads widening, while corporate credit default swap spreads widened due to strong protection buying.

Market participants generally believed that the base case scenario of a soft landing for the U.S. economy was still likely, but the correction brought downside risks into sharper focus. Ahead of the correction, market participants were growing increasingly concerned about potential downside risks, partly, but not exclusively, related to softness in the housing market. Data on the housing sector suggested that a bottom may not have been reached, with new home sales continuing to fall and inventories continuing to rise. Furthermore, data showed some signs of weakness in U.S. business investment.

Global monetary policy projections and key macro forecasts did not significantly change as a result of the turbulence. Eurodollar, euroyen, euribor, short sterling, and other interest rate futures markets showed only modestly greater expectations of additional easing following the correction.

Box 1.5 *(concluded)*

Which Markets Were Affected Most?

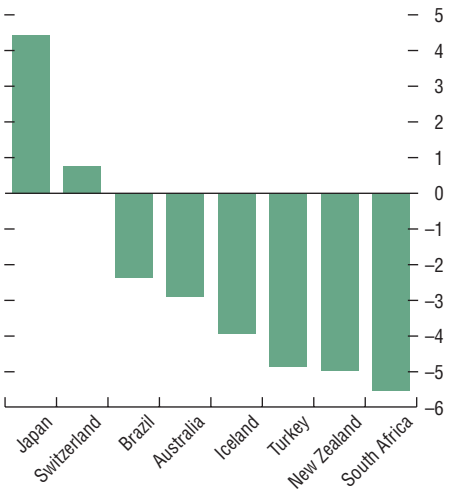
As discussed in detail in this chapter, the low volatility environment, rising risk appetite, and relaxed financing conditions had encouraged leveraged investment positions across a wide range of risk assets and strategies. Accordingly, **the markets that sold off the most were those that were most reliant on a continuation of this environment, and most susceptible to a rise in risk aversion.** In contrast to the correction in May–June 2006, which was mostly concentrated in emerging markets, the February–March 2007 risk reduction episode was more broadly based. More specifically, the most volatile moves relative to recent historical episodes were in the carry trades targeting higher-yielding currencies, implied volatility, mature sovereign debt markets, and both developed and emerging market equities. Corporate credit also saw significant movements.

The most extended carry trades were partially unwound, representing their worst performance since early 2006, with implied volatility experiencing moves greater than two standard deviations. The yen appreciated by 4 percent against the dollar, and higher-yielding currencies, especially in Brazil, Turkey, and South Africa, fell. An (unleveraged) investor funding a long rand money market position in yen would have lost an entire year's interest differential as a result of the currency move.

Implied volatility spiked across fixed-income, currency, and equity markets, reflecting the increase in realized volatility. Prior to this episode, many hedge funds were said to have played a part in pushing down volatility by selling options.

Prices in mature equity markets fell in response to perceived risks in the U.S. outlook. U.S., Japanese, and European equities fell in tandem as the increase in economic uncertainty was reflected in lower equity prices and the rise in equity volatility. Shares of financial companies declined on concerns over potential exposure to credit markets.

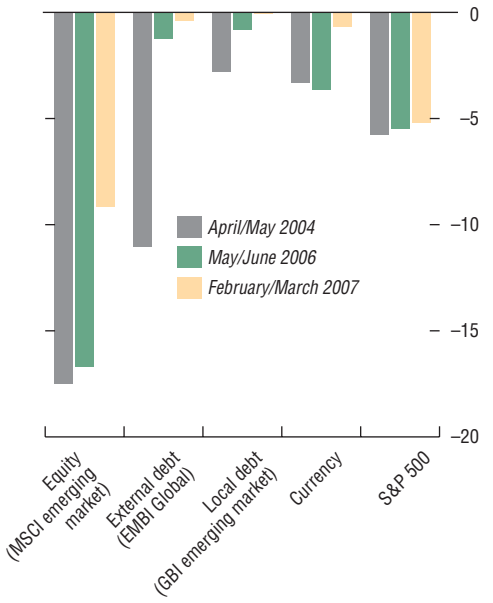
Carry Trade Currency Performance versus U.S. Dollar During the February–March 2007 Correction
(Percent change)



Equity prices in emerging markets fell, but by less than during the May–June 2006 period. The markets that had seen large rallies in the first few months of the year—China, Malaysia, the Philippines, Turkey—and where pricing had thus become rich, declined the most. In contrast to the May–June 2006 episode, emerging market sovereign debt spreads were less affected. There was little differentiation across regions and no fundamental driver other than an unwinding of risk.

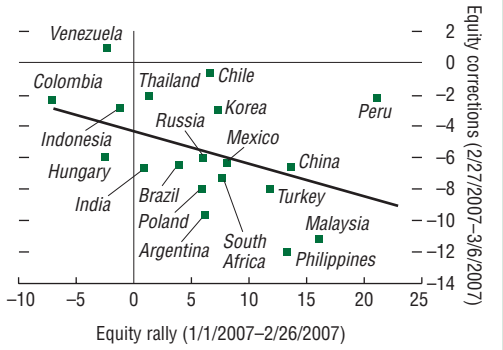
Most notable about the February–March 2007 sell-off was the breadth and speed of the sell-off of riskier assets. The correlation of returns across asset classes was rising at the end of 2006, and the turbulence drove it higher still, thus reducing the benefits of diversification. However, even at the height of the February–March sell-off, volatility was still below the peak seen during the May–June 2006 correction. Two-way liquidity was maintained in all markets, and credit derivatives markets functioned smoothly.

Comparison of Emerging Market Corrections
(Percent change)



Sources: Bloomberg L.P.; JPMorgan Chase & Co.; Morgan Stanley Capital International; and IMF staff estimates.

Emerging Market Equity Rally and Correction
(Percent change)



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

Implications

Despite recent market corrections, global financial stability continues to be underpinned by the favorable economic baseline scenario. However, financial market and credit risk have shifted to the downside, and warrant attention by market participants and regulators.

The unwinding of carry trades highlighted risks to emerging markets that are overly reliant on portfolio inflows. Some emerging market countries with large current account deficits and external vulnerabilities have relied on foreign investor inflows into local bond markets, attracted by higher yields, but the correction demonstrated that such flows can dwindle or reverse if financial volatility becomes elevated.

activity through enhanced dialogue with supervisors and oversight of the regulated banks and brokers that service hedge funds will likely be the most effective and practical approach, and one that does not limit the hedge funds' potential to contribute to financial stability. As with standard practices in other financial industries, efforts by the private sector and supervisors to consider and possibly develop a code of best practices for the hedge fund industry is to be welcomed. Finally, monitoring developments in the global hedge fund industry from an international and multilateral perspective should be increasingly useful as a complement to domestic efforts.

Annex 1.1. Implementing the Global Financial Stability Map

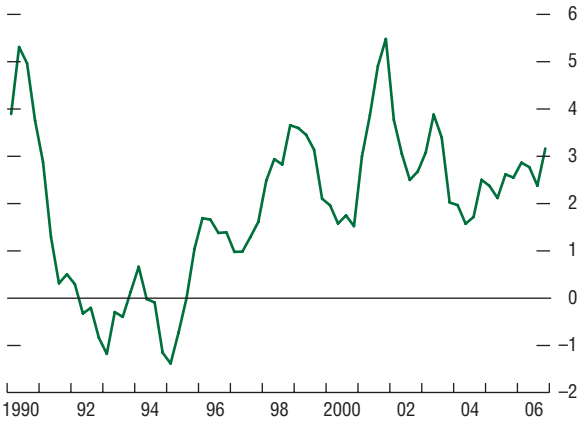
Note: The main author of this annex is Brian Bell.

This annex outlines the choice of indicators—and the particular advantages and disadvantages of each measure—for each of the broad

Figure 1.29. G-3 Real Short-Term Interest Rates
(GDP-weighted average; in percent)

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

Figure 1.30. G-3 Excess Household and Corporate Liquidity
(In percentage points)



Sources: Organization for Economic Cooperation and Development; Bloomberg L.P.; and IMF staff estimates.

risks and conditions on the global financial stability map (Figure 1.1). The map is supplemented by market intelligence and judgment where available indicators cannot be adequately represented.

To begin constructing the stability map, we determine the percentile rank of the current level of each indicator relative to its history to guide our assessment of current conditions, relative to both the September 2006 GFSR and over a longer horizon. Where possible, we have therefore favored indicators with a reasonable time series history. However, the final choice of positioning on the map is not mechanical and represents the best judgment of IMF staff. The stability map is a work in progress and will be developed further in future GFSRs. As the concepts underlying the risks and conditions are refined, more effective indicators could replace some of those discussed below. Table 1.3 shows how each indicator has changed since the last GFSR as well as our overall assessment of the movement in each risk and condition.

Monetary and Financial Conditions

Measures the availability and cost of funding linked to global monetary and financial conditions.

To capture movements in general monetary conditions in mature markets, we begin by examining the cost of central bank liquidity, measured as the average level of real short rates across the G-3 (Figure 1.29). We then take a broad measure of excess liquidity, defined as the difference between broad money growth and estimates for money demand (Figure 1.30). Realizing that the channels through which monetary policy is transmitted to financial markets are complex, some researchers have found that including capital market measures more fully captures the effect of financial prices and wealth on the economy. We therefore also use a financial conditions index that incorporates movements in exchange rates, interest rates, credit spreads, and asset market returns

Table 1.3. Changes in Risks and Conditions Since the September 2006 *Global Financial Stability Report*

Conditions and Risks	Change since September 2006 GFSR
Monetary and Financial Conditions	↔
• G-3 average real short rate	↓
• Adjusted broad monetary growth	↑
• Financial conditions index	↑
• Growth in official reserves	↔
Risk Appetite	↑↑
• Merrill Lynch investor survey	↑
• State Street investor confidence	↑
• Flows into EM bond and equity funds	↑
• Goldman Sachs risk aversion index	↑
Macroeconomic Risks	↓
• *World Economic Outlook* global growth risks	↓
• G-3 confidence indices	↓
• Economic surprise index	↑
Emerging Market Risks	↓
• Fundamental EMBIG spread	↔
• Ratings agency upgrades/downgrades	↓
• Volatility of median inflation	↑
• Implied volatility of EM foreign exchange	↓
Credit Risks	↑
• Global high-yield index spread	↓
• Credit quality composition of high-yield index	↑
• Speculative default rate forecast	↔
• LCFI portfolio default probability	↔
Market Risks	↑
• Value-at-risk of investment banks	↔
• Hedge fund market sensitivity measure	↑
• Speculative positions in futures markets	↑
• Implied volatility across asset classes	↓

Note: Changes are defined for each risk/condition such that ↑ signifies more risk or easier conditions and ↓ signifies the converse. ↔ indicates no appreciable change.

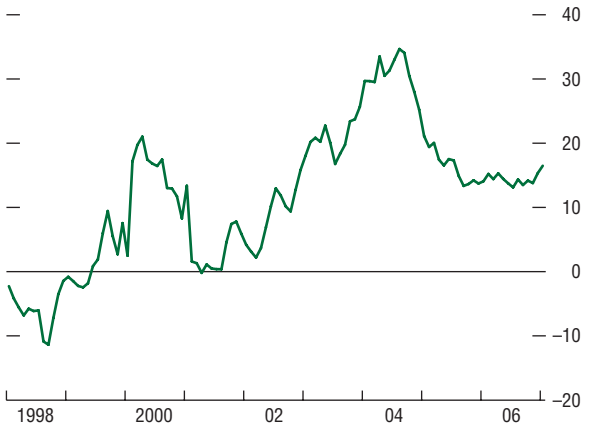
Figure 1.31. Goldman Sachs Global Financial Conditions Index

Sources: Goldman Sachs; and IMF staff estimates.

(Figure 1.31).[40] Rapid increases in official reserves held by the central bank create central bank liquidity in the domestic currency and in global markets. In recent years, the investment of a large share of these reserves into U.S. treasuries and agencies has contributed to the low yields in global fixed-income markets. To

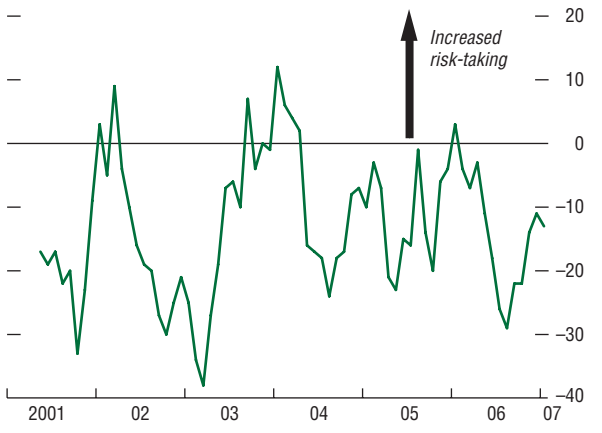
[40]Several investment banks produce broad financial condition indexes. This annex reports on one produced by Goldman Sachs. The benefits of including broad measures of financial conditions are discussed in English, Tsatsaronis, and Zoli (2005). For more discussion on gauging liquidity conditions, see the April 2005 GFSR (IMF, 2005, Box 2.1).

Figure 1.32. Custodial Reserve Holdings at the Federal Reserve Bank of New York
(In percent; 12-month growth)



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

Figure 1.33. Merrill Lynch Fund Manager Survey Question on Risk Appetite
(In percent)



Source: Merrill Lynch.
Note: Value indicates the net percent of surveyed investors reporting risk-taking in excess of benchmark level.

measure this, we look at the growth of official international reserves held at the U.S. Federal Reserve System (Figure 1.32).

Monetary and financial conditions remain broadly positive, particularly relative to historical experience. The growth in broad money and official reserves has remained robust, and financial conditions continue to ease as a result of rising equity markets and the continued narrowing of credit spreads. Indeed, the financial conditions index remains close to the easiest it has been in the last 10 years. Offsetting this to some extent, real short rates have risen as a result of both increased expectations of policy tightening and lower inflation outcomes, though they remain moderate compared to the longer run. Overall, monetary and financial conditions remain favorable and at broadly the same level as at the time of the September 2006 GFSR.

Risk Appetite

Measures the willingness of investors to take on additional risk by increasing exposure to riskier asset classes, and the consequent potential for increased losses.

This measure looks at the extent to which investors are actively taking on more risk. A direct approach to this exploits survey data that explicitly seek to determine the risk-taking behavior of major institutional investors. The Merrill Lynch Investor Survey asks more than 300 fund managers what level of risk they are currently taking relative to their benchmark (Figure 1.33). We then track the net percentage of investors reporting higher-than-benchmark risk-taking. An alternative approach is to examine institutional holdings and flows into risky assets, on the basis that an increase in such positions signals an increased willingness of institutional investors, relative to individual domestic investors, to take on risk. The State Street Investor Confidence Index uses changes in investor holdings of equities relative to other, safer, assets to measure risk appetite, covering portfolios with around 15 percent of the world's

tradable assets (Figure 1.34).[41] In addition, we take account of flows into EM equity and bond funds, as these represent another risky asset class (Figure 1.35). Risk appetite may also be inferred indirectly by examining price or return data. As an example of this approach, the Goldman Sachs Risk Aversion Index measures investors' willingness to invest in risky assets as opposed to risk-free securities, building on the premises of the capital asset pricing model (Figure 1.36). By comparing returns between treasury bills and equities, the model allows the level of risk aversion to move over time. Taken together, these measures cover various aspects of risk-taking and provide a broad indicator of risk appetite.

The level of risk appetite has increased in recent months, as investors have become more confident that global growth will remain strong through 2007 and the U.S. economy will experience a soft landing. Investors report increasing risk-taking relative to benchmarks, and flows into riskier assets have been rising. As discussed in this chapter, investors are increasingly moving up the risk curve reflected in rising capital flows into local and corporate EMs and greater interest in more exotic markets. However, most of the measures we have looked at remain comfortably below the extremes of risk appetite observed at previous points. This suggests that, while risk appetite is rising, it is not yet at levels that cause significant concern for financial stability.

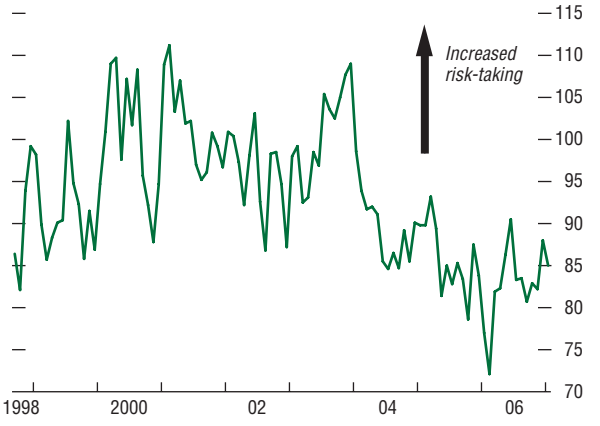
Macroeconomic Risks

Measures the risk of macroeconomic shocks with the potential to trigger a sharp market correction, given existing conditions in capital markets or a stress on financial institutions.

The principal assessment of macroeconomic risks is based on the analysis contained in the April 2007 *World Economic Outlook* and is consistent with the overall conclusion reached in

[41]See Froot and O'Connell (2003) for a discussion of the benefits of using data on portfolio holdings to capture risk appetite.

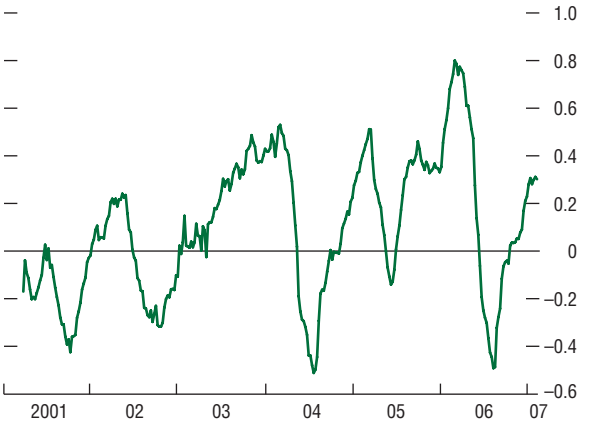
Figure 1.34. State Street Investor Confidence Index



Source: State Street Global Markets.

Figure 1.35. Total Inflows into Emerging Market Bond and Equity Funds

(In percent of assets under management; 13-week moving average)



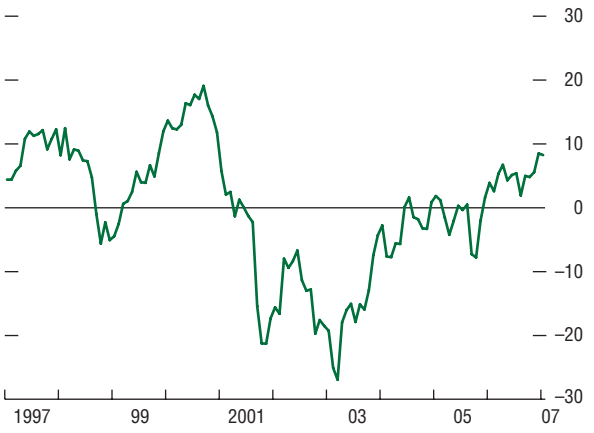
Sources: Emerging Portfolio Fund Research, Inc.; and IMF staff estimates.

Figure 1.36. Goldman Sachs Risk Aversion Index

Source: Goldman Sachs.

Figure 1.37. G-3 Average Economic Confidence Indicator

(Index)



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

that report on the outlook and risks for global growth (IMF, 2007). We complement that analysis by examining measures that focus on movements in confidence regarding the overall economic outlook. First, we look at the GDP-weighted sum of confidence indices across the major mature markets to determine whether businesses and consumers are optimistic or pessimistic about the economic outlook (Figure 1.37). Second, we examine an index of economic activity surprises that shows whether data releases are consistently surprising financial markets on the upside or downside (Figure 1.38). The aim is to capture the extent to which informed participants are likely to have to revise their outlook for economic growth in light of realized outcomes.

Macroeconomic risks appear to have declined since the September 2006 GFSR. The *World Economic Outlook* forecasts healthy global growth for 2007 and argues that, while risks to growth are still tilted modestly to the downside, these risks have declined since the last assessment. This is consistent with the indicators outlined above, which show an increased level of confidence in the macroeconomic outlook and expectations of robust global growth through 2007. Risks remain, however, including the weakness of the U.S. housing market and a disorderly adjustment of large global imbalances.

Emerging Market Risks

Measures risks associated with underlying fundamentals in EMs and their vulnerabilities to external risks.

The risks measured here are conceptually separate from, though closely linked to, macroeconomic risks, since they focus only on EMs, as opposed to the global environment. Using the model of EM sovereign spreads presented in previous GFSRs, we can identify the movement in EMBIG spreads accounted for by changes in the fundamentals of EM countries as opposed to the spread changes resulting from external factors (Figure 1.39). These fundamental factors account for changes in economic, political,

and financial risks within the country. This is then complemented by examining the trend in sovereign rating actions of S&P and Moody's (Figure 1.40). The measure attempts to capture improvements in both the macroeconomic environment facing such economies and in progress in reducing vulnerabilities arising from external financing needs. We also want to measure fundamental conditions in EMs that are separate from those related to sovereign debt, particularly given the reduced need for such financing across many EMs. Consequently we examine the volatility of inflation rates across EMs (Figure 1.41). To the extent that monetary policy has become more predictable and dedicated to controlling inflation, we might expect a decline in this measure. Finally, we use the recently constructed JPMorgan EM currency volatility index for a market-price-based perspective on risk across emerging markets (Figure 1.42).

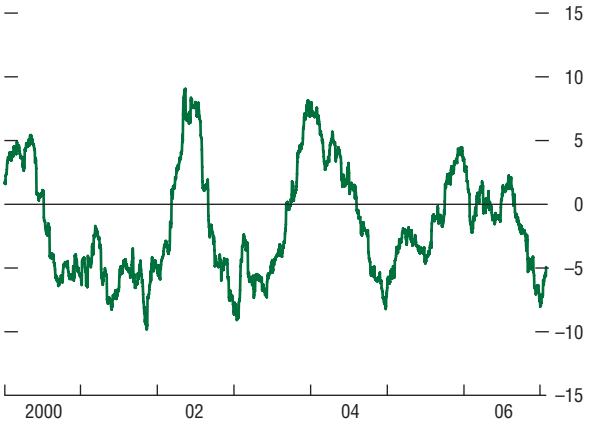
Emerging market risks remain low by historical standards and have probably declined slightly since the September 2006 GFSR. Spreads on sovereign debt have declined to record lows as fundamentals have improved strongly across EMs, and ratings actions continue to be very favorable in spite of some recent high-profile downgrades. Having said this, there has been some increase in inflation volatility across a number of EMs, admittedly from low levels, that may challenge the commitment of policymakers to price stability, and there remain concerns over reform fatigue in a number of countries. Implied volatility on EM assets is also low, suggesting that market participants are not unduly concerned over EM risks. While there are significant risks in some countries, the market appears confident that such risks will not spread across the wider EM universe.

Credit Risks

Measures credit exposures creating the potential for defaults that could produce losses in systemically important financial institutions.

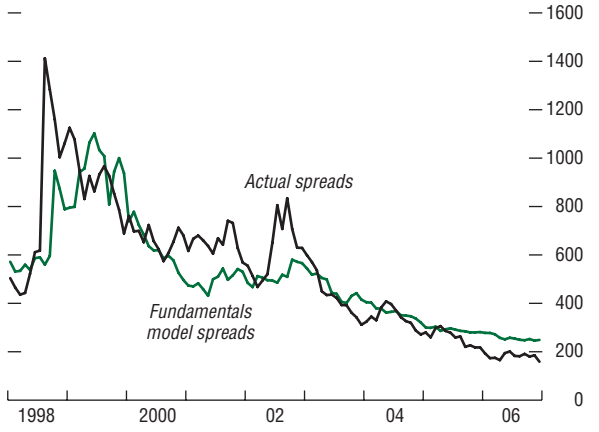
Spreads on a global high-yield index provide a market-price-based measure of investors' assess-

Figure 1.38. Dresdner Kleinwort Global Economic Activity Surprise Index
(On a rolling 6-month cumulative basis)



Source: Dresdner Kleinwort.
Note: Net number of positive less negative data surprises.

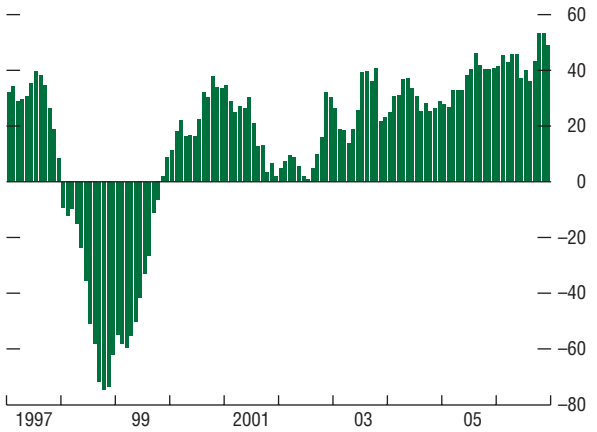
Figure 1.39. EMBIG Spreads: Actual and Fundamental Model Estimates
(In basis points)



Sources: Bloomberg L.P.; JPMorgan Chase & Co.; The PRS Group; and IMF staff estimates.
Note: EMBIG = Emerging Market Bond Index Global. The model excludes Argentina because of breaks in the data series related to debt restructuring. Owing to short data series, the model also excludes Indonesia and several smaller countries. The analysis thus includes 32 countries.

Figure 1.40. Emerging Market Credit Quality: Net Credit Ratings Changes

(12-month rolling sum of net ratings upgrades less downgrades)



Sources: JPMorgan Chase & Co.; Standard & Poor's; Moody's; and IMF staff estimates.

Note: Data compiled as net sovereign credit actions of upgrades (+1 for each notch), downgrades (–1 for each notch), changes in outlooks (+/– 0.25), and reviews and creditwatches (+/– 0.5).

Figure 1.41. Median Volatility of Inflation Across Emerging Market Countries

(In percent)

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

Note: Average of 12-month rolling standard deviations of consumer price changes in 25 emerging markets.

Figure 1.42. JPMorgan Emerging Market Foreign Exchange Implied Volatility Index

(In percent)

Sources: JPMorgan Chase & Co.; and Bloomberg L.P.

Figure 1.43. Merrill Lynch Global High-Yield Index Spread

(In basis points)

Sources: Merrill Lynch; and Bloomberg L.P.

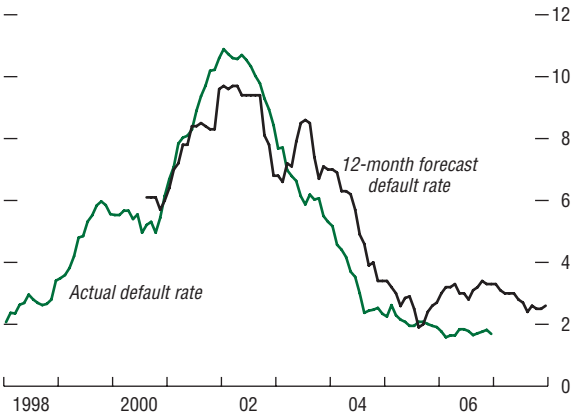
ments of corporate credit risk (Figure 1.43). We recognize, however, that such an assessment forms only part of the pricing of such assets, and that prices can deviate from fundamental valuations over extended periods of time. Consequently, we also focus on more direct measures of credit quality. To do this, we examine the credit-quality composition of the high-yield index to identify whether it is increasingly made up of higher- or lower-quality issues (Figure 1.44). To be precise, we report the percentage of the index comprised of CCC or lower rated issues. This captures two distinct effects: first, a change in the ratings of corporate issues already in the index; and second, differences in the quality of new issues that are entering the index compared with the current constituents. Both are important in measuring the overall level of credit quality. We also examine forecasts of the global speculative default rate produced by Moody's (Figure 1.45). While forecast default rates depend on the robustness of the underlying econometric model, they at least conceptually present a forward-looking measure of defaults as opposed to the traditional trailing realized default rates. Finally, we use the credit risk indicator for large complex financial institutions (LCFIs) discussed in Annex 1.2 to highlight market perceptions of systemic default risk in the financial sector, given our remit of focusing on financial stability (Figure 1.46).

Credit risks remain low, particularly given the stage of the business cycle. Credit spreads are tight and default rates are low, with little expectation of a major pickup over the course of the year. Having said that, there has been some marginal deterioration in the credit quality of the high-yield corporate debt indices and, as discussed in this chapter, corporate leverage in private markets is rising. In addition, the downturn in the U.S. housing market implies a rise in credit risk in mortgage-related instruments. While this does not imply an immediate risk to financial stability from the credit market, it does suggest that risks are gradually building that could materialize in the event of a major credit event or risk retrenchment. Hence we would

Figure 1.44. Share of CCC or Lower-Rated Corporate Securities in Merrill Lynch Global High-Yield Index
(In percent)

Source: Merrill Lynch.

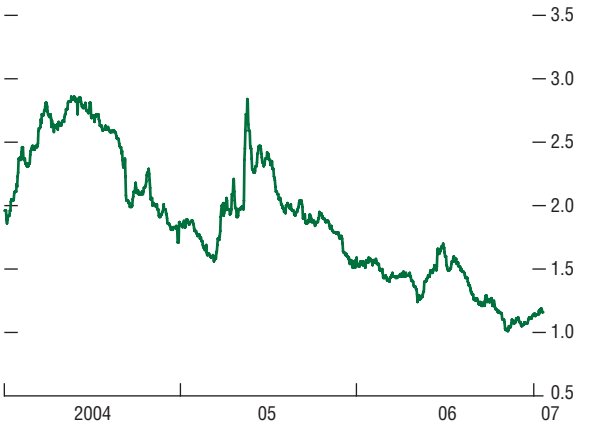
Figure 1.45. Moody's Global Speculative Grade Default Rate
(In percent)



Source: Moody's.

suggest that credit risks have risen marginally, though they remain at historically low levels.

Figure 1.46. Probability of Multiple Defaults in Select Portfolios for Large Complex Financial Institutions
(In percent)



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

Figure 1.47. Hedge Fund Market Sensitivity Measure
(Sum of betas across asset classes)

Sources: Bloomberg L.P.; and IMF staff estimates.
Note: Data represent a 36-month rolling regression of hedge fund performance versus real asset returns.

Market Risks

Measures exposures of systemically important financial institutions and the potential for consequent mark-to-market losses, as well as the extent to which markets may be underpricing risk.

The value-at-risk (VaR) across major investment banks provides a standard measure of the market exposure of this systemically important part of the financial sector, while an indicator attempting to capture the extent of market sensitivity of hedge fund returns provides a market risk indicator for this increasingly important trading group (Figure 1.47; see also Box 1.4). We also produce a speculative positions index, constructed from the noncommercial average absolute net positions relative to open interest across a range of futures contracts covering most asset classes as reported to the Commodity Futures Trading Commission (Figure 1.48). This measure will rise when speculators take relatively large positional bets on futures markets relative to commercial traders. Finally, we look at a measure of implied volatility across a range of assets to assess the extent of market concern over risk, though it may also indicate the extent to which markets are too complacent about those risks (Figure 1.49).

Market risks appear to be rising gradually, though from reasonably low levels. Our estimate of hedge fund risk-taking has been rising, and this is supported by our market intelligence. VaR among investment banks has also risen in absolute levels, though it remains low as a percentage of total equity. Still, the increased trading activity and risk-taking of such institutions increases the risks of mark-to-market losses. Speculator activity has increased across a range of futures contracts, and the increase in carry trades, supported by data on speculative short positions in Japanese yen, raises the risk of a market dislocation. Implied volatility across asset classes remains low, which may be interpreted as suggesting some complacency among market participants.

Annex 1.2. Financial Systems in Mature and Emerging Markets

Note: The main authors of this annex are John Kiff and Nicolas Blancher, with input from regional divisions.

In most regions, available indicators point to resilient financial systems, largely due to the strong macroeconomic environment. In particular, financial soundness indicators generally highlight well-capitalized and profitable banking systems benefiting from diversity of earnings and improving asset quality. Also, mature market financial system default risk, as reflected in credit derivative markets, remains relatively low (Figure 1.50).[42] However, the LCFI risk indicator has risen slightly since October 2006, due to growing perceptions that the credit cycle may have peaked.[43] In addition, new vulnerabilities and challenges may have started to emerge in some countries, due, for example, to rapidly accelerating credit growth. A potential economic slowdown or disruption in external financing may exacerbate such vulnerabilities, highlighting the importance of further reform efforts to strengthen regulatory and supervisory frameworks and to promote improved risk management practices. The situation in EMs across various regions is detailed below.

Latin America

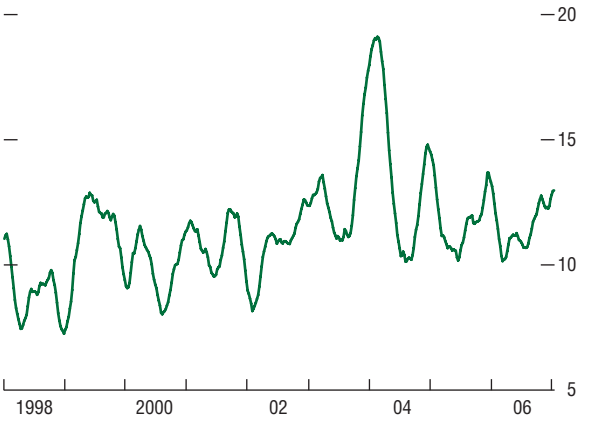
Reflecting the region's encouraging macroeconomic performance due in part to high commodity prices, countries in Latin America generally have attracted significant capital inflows. Central American countries, in particu-

[42]This issue of the GFSR continues the use of credit risk indicators to review the evolution of market perceptions of systemic default risk in mature market financial systems. The credit risk indicator index measures the probability of multiple defaults within three groups of 11 financial institutions, implied from the market prices of credit default swaps (IMF, 2005, Chapter II), LCFIs, commercial banks, and insurance companies.

[43]The late-2006 rise in the credit risk indicator was driven by a slight widening of the spreads on five-year credit default swaps referencing four of the 11 institutions.

Figure 1.48. Average Net Speculative Positions in U.S. Futures Markets

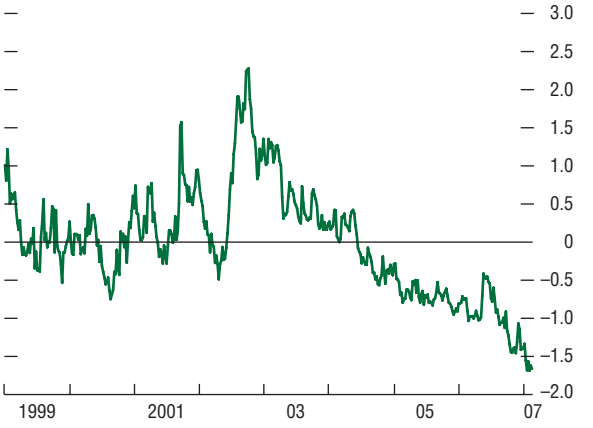
(In percent of open-interest across select futures markets; 30-day moving average)



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

Note: Data represent the absolute value of the net position taken by non-commercial traders in 17 select U.S. futures markets. High values are indicative of heavy speculative positioning across markets, either net-long or net-short.

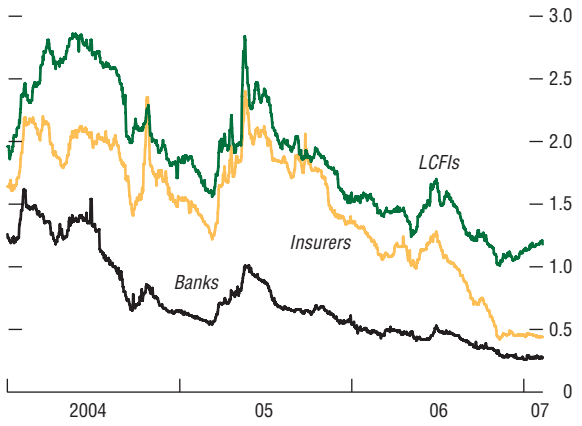
Figure 1.49. Composite Volatility Index



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

Note: Data represent an average *z*-score of the implied volatility derived from options on stock market indices, interest rates, and exchange rates. A value of 0 indicates the average implied volatility across asset classes is in line with the period average (from 12/31/98 from which data are available). Values of +/– 1 indicate average implied volatility is one standard deviation above or below the period average.

Figure 1.50. Probability of Multiple Defaults in Select Portfolios
(In percent)



Sources: Bloomberg L.P.; and IMF staff estimates.
Note: LCFIs = large complex financial institutions.

lar, have witnessed the acquisition of major local banks by international banks. In most countries, including Argentina, Brazil, and Mexico, the banking sector has continued to show adequate capitalization, improved asset quality, and rising profitability. Credit growth has begun to decelerate, but still outpaces GDP growth in most countries.

Against this backdrop, bank exposures to government debt remain high in some countries (e.g., Brazil), and indirect currency risk (from lending in foreign currency to unhedged borrowers) continues to be a potential vulnerability in dollarized economies, even though these risks appear to have declined in the current macroeconomic environment. The main macrofinancial risks appear to originate from the external sector, and include a potential drop in commodity prices, or the possible effects of a disruptive adjustment in global imbalances that could result in a decline or even reversal of capital flows to the region.

Asia

With few exceptions, banking systems seem well capitalized, liquid, and profitable, reflecting loan volumes, diversity of earnings, and improving asset quality. Capital markets also have performed well and continued to deepen (e.g., debt and derivatives markets). Such improvements have been facilitated by the ongoing restructuring and favorable macroeconomic environment, while regulatory changes and capital flows helped spur the capital markets. Nevertheless, vulnerabilities remain and new supervisory and risk management challenges are emerging. While nonperforming loans (NPL) have declined, they remain high in a few countries. Renewed capital inflows into many Asian countries may present challenges for stock market and currency valuations, as well as for monetary policy conduct. Intensified competition has led banks and nonbank institutions to aggressively diversify their activities (e.g., into microfinance, securitization, and credit derivative markets), while local banks strive to grow in

rapidly consolidating markets. Finally, economic growth is expected to slow as interest rates notch up to curb inflationary pressures and, in certain countries, banks may face substantial losses due to currency appreciation, while households will be increasingly vulnerable to housing price corrections and higher borrowing costs.

Going forward, despite substantial progress, the reform agenda remains large. Several countries have introduced medium-term financial sector strategies, state-run institutions are being reformed, regulatory frameworks have improved as part of preparations for Basel II implementation, and the focus is increasingly shifting to capital market development and deregulation. However, financial sector surveillance needs strengthening, including based on the use of more up-to-date information, and recently introduced corporate governance guidelines need to be enforced. Finally, credit growth and asset price bubbles remain a concern, and the policy response warrants careful evaluation.

Emerging Europe

Strong macroeconomic performance and the expansion of foreign financing continue to support buoyant lending to the private sector in most countries. Mortgage and consumer lending often remain the main drivers of the credit boom, as household indebtedness is still low compared to EU-15 average levels. Banking sectors appear relatively sound, with adequate capitalization, solid profitability, and good asset quality. With only a few exceptions, including Romania and Ukraine, the ratio of NPLs to total loans is below 5 percent (which also reflects rapid lending growth).

However, some risks have intensified. There is a growing exposure of banks to indirect foreign currency risk in certain countries, especially the Baltics, Bulgaria, and Croatia, where more than half of total lending is denominated in foreign currencies. The risk of a real estate price bust has become more pronounced in several countries, and mortgage foreclosure procedures have not yet been tested in a downturn environment. A slowdown or disruption of the external financing flows may also have significant consequences on the quality of banking assets in many countries. In this respect, the signature of a Memorandum of Understanding on the management of cross-border banking crises between the central banks of Sweden and three Baltic states in December 2006 was a welcome development.

Africa

Financial systems in sub-Saharan Africa continue to strengthen, supported by a favorable macroeconomic environment, including high commodity prices and private capital inflows. With few exceptions, capital adequacy ratios appear high, although less so if the concentrations in credit risks that plague most countries are taken into account. Banks are highly but decreasingly profitable given increased competition and declining opportunities for quick returns in treasury bill markets. Average NPL ratios are declining, due in large part to rapid credit growth (marginal NPL ratios do not seem to have improved significantly).

While a number of countries have started to implement long-term strategic development plans to strengthen their financial systems, progress is slow and vulnerabilities to a range of risks remain. The liquidity generated from high oil and commodity prices and rapid credit extension may also pose a challenge for monetary management, while increased bank lending may accentuate credit risk in countries with limited absorptive capacity, weak credit management capabilities, and a creditor-hostile environment. In some countries, foreign investment inflows into treasury securities markets might also introduce a dependency on potentially volatile foreign financing. Regulatory gaps remain in such areas as consolidated and cross-border supervision, where banks are regionally active. Finally, some risk is posed by the emerging trend of reviving development banks with a view to expanding and influencing the sectoral allocation of credit.

Middle East and Central Asia

Financial systems continue to strengthen as the overall economic and financial situation has improved significantly, particularly in oil exporting countries. The turbulence in stock markets in the Gulf Cooperation Council (GCC) seems to have subsided, even though there has been a drop in some stock market indices in 2007, and while other regional markets continue to register remarkable growth. A number of non-oil exporting countries are also benefiting from the desire of GCC investors to invest in the region.

Efforts are ongoing to reform the financial sector, adopt strong regulatory and supervisory frameworks, create a competitive environment, and improve the soundness of financial institutions. A number of countries (e.g., Egypt and Morocco) are addressing the vulnerabilities of their banking systems, while others have launched privatization programs and are proceeding with their financial modernization efforts. Despite these positive developments, financial sectors in a large number of countries remain underdeveloped and NPL levels persistently high. Furthermore, regional political uncertainties continue to weigh on financial market developments and prospects.

Annex 1.3. Credit Derivatives and Structured Credit Market Update

Note: The main authors of this annex are Todd Groome and John Kiff.

Since the report on developments in credit derivative and structured credit markets in the April 2006 GFSR (IMF, 2006a, Chapter II), these markets have continued to grow in terms of size and scope. Outstanding credit derivatives rose from about $12 trillion at mid-2005 to $26 trillion at mid-2006 (Figure 1.51). Growth continues to be driven by portfolio swaps—CDS that reference more than one credit name.[44] In addition, issuance volumes in the markets for asset-backed securities, mortgage-backed securities, and collateralized debt obligations continue to grow (Figure 1.52 shows new issuance volumes).[45] Since the April 2006 GFSR, activity in all of these markets has also emerged in Japan, and new credit derivative products have been introduced. Finally, issuance of CDOs backed by emerging market credit has also progressed somewhat.[46]

Market liquidity continues to vary considerably across the credit derivative product range. Although the published number of single-name CDS reference entities continues to expand, the number of names on which tight bid-offer spreads are quoted for reasonable size ($5 million to $10 million) remains around 600, and only about 150 names trade regularly. However, it is often now possible to execute much larger ($200 million plus) transactions in single-name CDS in about 50 of the most active names. Portfolio swaps that reference standardized CDS indices increasingly have demonstrated significant and consistent liquidity, but customized (i.e., "bespoke") portfolio swap and traditional structured credit products (ABS, MBS, and CDOs) are best characterized as buy-and-hold instruments, with very little secondary market activity.

[44]According to the Fitch Ratings (2006b) credit derivatives survey, about one-third of outstanding contracts reference multiple names.

[45]ABS are collateralized by loans, leases, receivables, or installment contracts, but when they are backed by mortgages, they are called MBS. Figure 1.52 does not include MBS issued by U.S. government-sponsored enterprises. In addition, the MBS number includes HEL, although some industry bodies (for example, the U.S. Bond Market Association) categorize HEL-backed securities as ABS. Also, only funded CDO issuance is plotted in Figure 1.52 (see IMF, 2006a, Box 2.1).

[46]Within the last year, a $106 million two-tranche "microfinance" CDO (BOLD 2006-1) and a $60 million three-tranche EM loan-backed CDO (CRAFT EM CLO 2006-1) were issued. Also, during the summer of 2006, the International Swaps and Derivatives Association formed a working group to create Shari'ah-compliant derivatives documentation, and an $18 million Shari'ah-compliant MBS transaction (KSA MBS 1 International Sukuk) was brought to market in the Kingdom of Saudi Arabia. This transaction benefited from credit support provided by the AAA-rated International Finance Corporation, as will several larger Shari'ah-compliant MBS issues reportedly being planned.

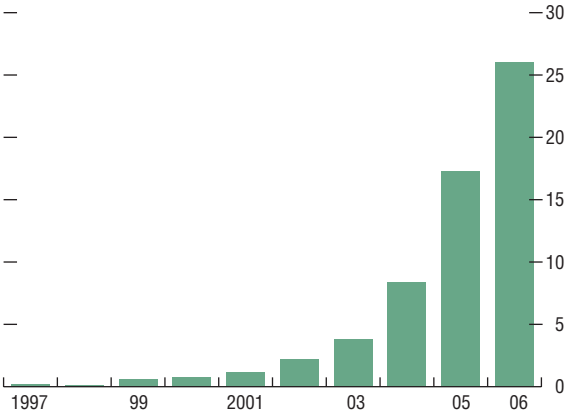
In the single-name CDS market, investment-grade corporate obligations (i.e., those rated BBB- and better) still comprise most of the underlying credit transferred. According to the September 2006 Fitch Ratings survey, investment-grade exposures comprised 69 percent of credit protection sold, compared with 76 percent in 2005 (Fitch Ratings, 2006b).[47] Fitch also reported that 80 percent of single-name CDS trading volume related to corporate obligations (compared with 76 percent in 2005), of which 18 percent was linked to financial institutions (14 percent in 2005), with an additional 4 percent linked to sovereign credits (6 percent). Although the number of underlying names being quoted continues to expand (reportedly now exceeding 2,000), Fitch found that the volume is becoming more concentrated, with the top 20 names comprising about 40 percent of single-name CDS activity (compared with 33 percent in the previous year's survey). Of these top 20 names, 13 were corporates (led by General Motors, Ford, and DaimlerChrysler), and seven were sovereign names (led by Brazil, Italy, and Russia).

A number of new credit derivative products have been introduced in the past year, including a variety of vehicles to transfer credit risk more effectively. For example, idiosyncratic risk is being distributed via rated equity notes, zero-coupon and zero-cost equity tranches, and systemic risk via leveraged super senior (LSS) products and constant proportion debt obligations (CPDOs).[48] The equity tranche vehicles effectively offer positions in the riskiest part

[47]The British Bankers' Association (2006) survey of London credit derivative market participants reported that investment-grade names comprised 70 percent of single-name CDS underlyings (mostly BBB and A rated), and 80 percent of CDS index underlyings.

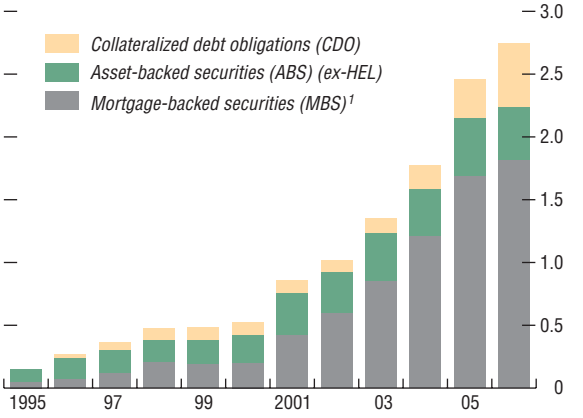
[48]A typical tranched "capital structure" is comprised of an "equity" tranche that absorbs the first 3 percent of underlying portfolio default-related losses, one or more "mezzanine" tranches that absorb losses that exceed 3 percent up to a 10 percent "detachment point," one or more "senior" tranches (10 to 30 percent), and one or more "super senior" tranches (the final 30 to 100 percent). The equity tranche is seen as absorbing idiosyncratic default risk, and the super senior tranches as absorbing systemic default risk (see IMF, 2006a, Box 2.1).

Figure 1.51. Global Credit Derivatives Outstanding
(In trillions of U.S. dollars)



Sources: Bank for International Settlements; International Swaps and Derivatives Association; British Bankers' Association; and *Risk* magazine.
Note: Credit derivatives, as reported here, comprise credit default swaps, credit-linked notes, and portfolio swaps. Data for 2006 are only available through the first half of the year.

Figure 1.52. Global ABS, MBS, and CDO Issuance
(In trillions of U.S. dollars)



Sources: *Inside MBS & ABS*; Fitch Ratings; Standard & Poor's; JPMorgan Chase & Co.; Merrill Lynch; European Securitization Forums; and Reserve Bank of Australia.
Note: HEL = home equity loan.
[1]Mortgage-backed securities include home equity loans.

Box 1.6. Constant Proportion Debt Obligations

Constant proportion debt obligations (CPDOs) are CDS-based, AAA-rated, fixed-income instruments that offer returns well above those on otherwise similar AAA-rated products. These above-market returns are made possible by leveraging investment-grade credit risk exposure (typically 15 times). The first CPDO was issued during the summer of 2006, and at year-end total issuance stood at between $2.5 billion and $3 billion. These transactions seek to exploit the empirical observation that investment-grade credit spreads generally overcompensate for pure default risk (see Hull, Predescu, and White, 2005).

A CPDO is a bond-like instrument that pays periodic coupons (LIBOR plus a fixed spread) until it matures (for example, after seven to 10 years), at which time the principal is repaid. At the outset, the principal is invested in a reserve account that earns approximately LIBOR flat. Default protection is sold on U.S. CDX and European iTraxx investment-grade CDS indices, which, when leveraged 15 times, left about 450 to 500 basis points to cover default payouts and coupon and principal payments (effectively a reserve), as well as underwriting costs and profits, when investment-grade CDS premia were trading at about 37 basis points. According to S&P and Moody's, this was sufficient for the CPDO to pay a 200 basis point spread and achieve a AAA rating, although they have indicated that at tighter index spreads, the spread to investors would have to be reduced to get a AAA rating.

The leverage is managed dynamically by increasing leverage when spreads widen (to capture the higher spreads) and decreasing it when spreads narrow (to lock in mark-to-market gains). In addition, the likelihood of default payouts is minimized by rolling the indices every six months, since any credits that have fallen below investment grade are removed from the indices. Also, because the credit spread curve usually is upward sloping, the six-month rolls generate mark-to-market gains that are an important source of income for the structure (about 75 basis points, according to S&P's current CPDO rating methodology).[1]

The transaction should produce the targeted return if actual default losses over the term of the note do not exceed those implied by the spreads on the underlying indices, unless the structure "cashes out." A "cash-out" unwinds the structure if the value of the reserve (as described above) drops below a certain threshold (usually expressed as a percentage of the note principal, for example, 10 percent). In such a case, investors are repaid only part of their principal. A cash-out is most likely to be associated with extreme spread widening and/or numerous defaults in the first couple of years. However, in return for capping the return (for example, LIBOR plus 200 basis points), the investor is protected against cash-outs in the transaction's later years by a "cash-in" trigger. The cash-in unwinds all protection positions and deposits the proceeds in the reserve until maturity, once the payment of all future coupon and principal payments can be assured. The earlier this cash-in event occurs the better for investors, and the structure can be vulnerable to late-life cash-outs if a cash-in has not occurred by the eighth year (of a 10-year transaction).

Financial Market Implications

The leveraged CDS index position-taking associated with CPDO issuance has been suggested as contributing in part to the tightening in 2006 of CDS index spreads. However, the total issuance to date is a fraction of typical daily CDX and iTraxx trading volume. At the margin, CPDO issuance (and, possibly more so, anticipations of future issuance) may have contributed to some index spread tightening and index implied correlation volatility, but broader credit demand from CDO managers (often referred to as the "structured credit or CDO bid") was

[1]See Bank of America (2006) for a quantification of the CPDO roll, and Teklos, Sandigursky, and King (2006) for a comprehensive performance and risk analysis.

probably the main driver of structured credit spread tightening during 2006.

Market participants have expressed more concern about the potential market impact of the six-month index rolls. In particular, it is thought that they may tend to compress spreads for the on-the-run indices, and possibly also tend to flatten the credit spread curve, which, in the long run may undermine some of the economics. A potentially greater concern for investors may be the possible mark-to-market volatility associated with the six-month rolls and repricing. These effects could be mitigated by referencing more diverse credit portfolios and/or a move to managed portfolios, which is said to be under consideration by managers for future issuance.

of the "capital structure," while LSS products and CPDOs offer leveraged (for example, 15 times in some products) exposure to the least risky positions. The other motivation for LSS products and CPDOs is to create higher-yielding investments from lower-risk credit products, particularly in light of current tight spread levels. Despite their relatively high leverage and credit spread risk, these products are generally rated AAA (Box 1.6).

In addition, a number of credit derivative product companies (CDPCs) are reportedly preparing to come to market, most with the backing of a major investment bank, and involving a hedge or private equity fund. CDPCs are limited-purpose companies that trade credit derivatives and structured credit products. Primus Guaranty (which started operations in 2002), Athilon Advisors (2004), Newlands Financial (December 2006), and Invicta Credit (January 2007), all rated AAA, are currently the only four operational CDPCs. The existing CDPCs focus on selling highly leveraged credit protection on the highest quality (AA- and better) single names and tranches. However, the new CDPCs in the pipeline reportedly will be taking on more leverage, taking both long and short credit protection positions, and may not be rated.

These new vehicles are seen as materially contributing to drive corporate credit spreads to ever-tighter levels. Similarly, U.S. consumer loan-backed ABS and MBS spreads may have remained tighter through most of 2006 due to the strong CDO manager demand (the "CDO or structured credit bid"). Not only may such credit market technical factors distort credit signals implicit in the prices of credit derivatives and structured credit products (i.e., the "canary in the coalmine"), but structural features in some of the newer products make the signal extraction more complex. In the case of ABS and other structured credit products, it has been suggested that credit-rating-driven enhancement levels may be useful metrics. In addition, the introduction of CDS on ABS (ABCDS) and the ABX indices of ABCDS may provide another indicator of household financial health (Box 1.1). CDS on leveraged loans (LCDS) and standardized LCDS indices (LevX), which have only just started trading, may also provide an indicator of corporate financial health.

On the operational risk front, banks and dealers, encouraged by the New York Federal Reserve and the U.K. Financial Services Authority (FSA), continue to make important credit derivative trading infrastructure improvements. For example, since September 2005, confirmations outstanding for more than 30 days had been reduced by 85 percent as of September 2006, and the proportion of trades confirmed on electronic platforms has doubled to 80 percent. However, completely eliminating the backlog may prove to be difficult, because it may be comprised of the more complex, customized ("bespoke") portfolio transactions, which may also represent very large and lumpy trades. Therefore, it is important that regulators and supervisors continue to monitor such operational issues at the banks and dealers, including encouraging them and their major clients to

move toward a common electronic trading platform. In this regard, the efforts of the Depository Trust & Clearing Corporation to build a straight-through processing system and a centralized trade information warehouse are welcome.

Potential settlement problems associated with defaults by entities for which the notional value of outstanding CDS contracts far exceeds the outstanding amount of deliverable obligations are expected to be reduced by a new protocol.[49] Since the April 2006 GFSR, the International Swaps and Derivatives Association has made cash settlement the standard for all CDS (single-name, index-based, and bespoke contracts).[50] The Dura bankruptcy, for which the settlement fixing took place on November 28, 2006, provided the first successful test of this new protocol. Recovery swaps, which effectively fix default-conditional recovery rates, may also play a role in allowing market participants to hedge and possibly reduce uncertainty regarding the final settlement amounts, but this market has yet to demonstrate material interest or liquidity.

The April 2006 GFSR suggested that a differentiated ratings scale would be very useful (or even necessary), particularly to senior officers and companies that set portfolio or risk limits based on credit ratings, possibly driven by regulation. At the time, the major rating agencies maintained that users of their ratings in general understood the differences, and indeed, they were making efforts to ensure that this was the case. However, in August 2006, Fitch Ratings introduced "stability scores" for synthetic CDOs, and in October, it launched a specialist ratings group dedicated to credit derivative ratings and analytics ("Derivative Fitch"). Although the other rating agencies have not yet followed Fitch's examples, they appear to be considering similar steps to more clearly differentiate the ratings of these different products, and to better reflect their different risk profiles. On the other hand, the rating agencies continue to expand the application of their ratings beyond the traditional credit risk domain. For example, CPDO ratings are based largely on assessments of market risk, and securitized commodities and foreign exchange risks (for example, in CDO structures) have been rated on traditional corporate bond rating scales.

Little progress can be reported on the improvement and rationalization of credit derivative data gathering, at least in terms of better, as opposed to more, data. The Bank for International Settlements will soon be reporting Herfindahl indices on its credit derivatives data, which will provide some information on bank intermediation concentration. However, numerous surveys continue to compete for bank and dealer input.

[49]Most contracts call for physical settlement, whereby the protection buyer must deliver the reference bonds or loans to the protection seller in exchange for the par value.

[50]The ad hoc protocols used in previous default settlements applied only to index-based portfolio swaps. However, according to the British Bankers' Association (2006) survey, market participants were already moving toward cash settlement (24 percent of contracts in 2006 versus 11 percent in 2004).

Annex 1.4. Trends and Oversight Developments in the Hedge Fund Industry

Note: The main authors of this annex are Todd Groome and William Lee.

Assets under management (AUM) by hedge funds continue to grow rapidly, reaching over $1.4 trillion at the end of 2006, even as performance has moderated (Figure 1.53). Such growth has been fueled primarily by increased allocations from institutional investors (i.e., representing about 30 percent of capital managed at year-end 2005, with wealthy individuals still representing over 40 percent of the sources of capital of AUM by hedge funds). Although average aggregate hedge fund returns since 2003 have not matched past performance and may have become more correlated with broader equity and fixed-income benchmarks, they continue to exhibit less volatility than major indices.

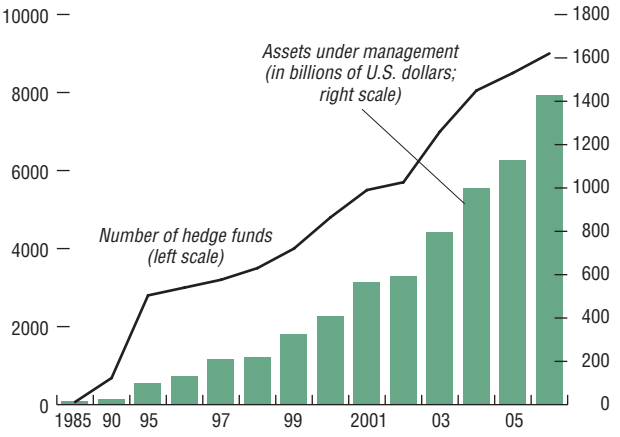
Institutional investors have increasingly sought to invest in hedge funds for their diversification benefits and attractive risk-adjusted returns. Equity-related strategies remain pre-

dominant and account for around 38 percent of AUM. However, in recent years, investors' desire to obtain diversification benefits and asset allocation expertise has led to growing interest in opportunistic hedge fund strategies (e.g., event-driven and macro funds, about 20 percent and 10 percent of AUM, respectively), multi-strategy funds (about 15 percent of AUM), and strategies involving alternative asset classes (structured credit and insurance products, commodities, and private equity).

While the geographic origin of capital invested in hedge funds is broadening, the vast majority of assets continue to be managed by advisers based in the United States and the United Kingdom. Investment in hedge funds by European and Asian investors represents a growing share of total hedge fund AUM, at approximately 26 and 10 percent, respectively (Figures 1.54 and 1.55). Globally, AUM remain concentrated with funds located in offshore centers. However, investment advisors operating from the United States and the United Kingdom control most of these funds. In recent years, a growing number of advisors have begun to operate in Asian locations due to more certain and consistent regulatory and infrastructure environments, and in some instances due to tax incentives offered by countries seeking to build up their asset management industry.

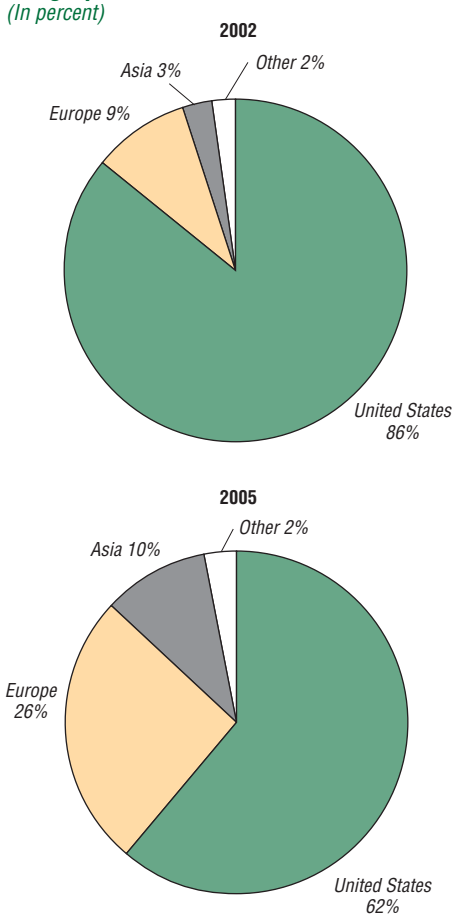
Hedge funds are increasingly considered key players in today's international financial markets and are having a greater influence on capital market dynamics. This influence derives from their active trading style, often setting the marginal price, and the expansion by hedge funds into more markets. Hedge funds have been prominent in fixed-income and credit markets, including most forms of credit derivatives, where they have represented up to 60 percent of U.S. market volume (Table 1.4). Their presence in a variety of risk transfer markets reflects hedge funds' leading role in financial innovation, often serving to complete certain markets. Compared with other investor groups, hedge funds are more active in pursuing global cross-market strategies, and may contribute to the increas-

Figure 1.53. Global Hedge Funds



Sources: Hedge Fund Research, Inc.; and Hennessee Group LLC.

Figure 1.54. Global Hedge Funds by Geographic Source of Funds
(In percent)



Source: International Financial Services, London.

ing linkage of various geographic and product markets.

The institutionalization of hedge funds and the convergence of their activities with other financial institutions and investment funds has continued, and even accelerated.[51] The more established hedge fund managers have significantly broadened their activities, and increasingly compete with other financial institutions in a variety of fields. For example, the larger hedge fund groups have sponsored private equity funds and actively manage long-only strategies to accommodate client demands and address potential capacity constraints.

Hedge funds are also seeking to secure more stable capital structures, and a few fund managers have privately placed debt securities and pursued initial public offering.

Meanwhile, major banks have developed in-house hedge funds as part of or alongside their traditional asset management businesses, and some banks have acquired equity participations in hedge funds. In addition, the proprietary trading desks of major banks have been pursuing strategies substantially similar to hedge funds for some time.

Finally, mainstream collective investment schemes (i.e., mutual funds) are increasingly making use of hedge fund investment techniques (e.g., short-selling). In addition, hedge fund-like products are being offered in numerous jurisdictions, particularly in Europe, by banks and traditional fund managers (e.g., structured notes, indexed to hedge fund returns). Together with the growth of funds of hedge funds, these developments contribute to an increased "retailization" of hedge fund investment.

[51]These trends possibly herald a structural shift toward a "barbell" industry structure composed primarily of large funds and small niche specialists. Based on June 2006 data, approximately 60 hedge fund groups reported at least $5 billion AUM, representing in aggregate over 50 percent of industry-wide AUM. Similarly, recent data show that the top 25 European hedge fund managers, the majority of which are located in the United Kingdom, accounted for 44 percent of total AUM as of June 2006.

Table 1.4. U.S. Fixed-Income Trading Volume—Hedge Funds, 2005

Fixed-Income Products	Trading Volumes[1] Total	Trading Volumes[1] Hedge funds	Hedge Funds as a Percent of Total Volume
U.S. fixed income—total[2]	19,650	2,940	15
High-yield[3]	335	84	25
Credit derivatives[4]	937	540	58
Distressed debt	34	16	47
Emerging market bonds	271	122	45
Leverage loans	133	42	32

Source: Greenwich Associates, based on trading volumes reported by 1,281 U.S. fixed-income investors, including 174 hedge fund respondents.
[1]In billions of U.S. dollars.
[2]Excludes short-term fixed income.
[3]Excludes below-investment-grade credit derivatives.
[4]Includes investment-grade, below-investment-grade, and structured credit products.

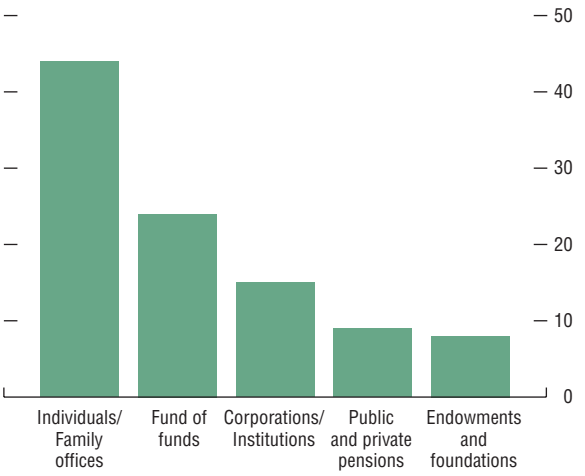
Implications for Financial Stability

In general, hedge funds have a constructive influence on market efficiency and stability. They can dampen market volatility by providing increased liquidity and improved price discovery. Their complex trading strategies and the strong demand from investors for diversification opportunities may broaden their trading activities and contribute to the development and completion of certain markets. For example, hedge funds have been an important catalyst for and a source of liquidity in credit derivative markets, as well as the much smaller but growing insurance-linked market.

However, together with proprietary trading desks in banks, hedge funds may also contribute to increased or even extreme volatility in some instances. This is most evident in crowded or less liquid market segments, particularly during periods of stress. Along with proprietary trading desks, hedge funds dominate activity in certain market segments, which can lead to "one-way" markets and occasional periods of price corrections, as markets rebalance and liquidity is provided only at less favorable prices.[52]

[52]In May 2005, many hedge funds found it very difficult to exit or hedge credit derivative portfolio swap positions, particularly since their dealer counterparties often had similar positions. However, the disruption remained relatively short lived, as new investors, primarily other hedge funds, entered the market and helped to restore stability (IMF, 2005).

Figure 1.55. Hedge Fund Sources of Capital by Investor Class, 2005
(In percent)



Source: Hennessee Group LLC.

Financial stability concerns focus on the potential impact that the failure of a hedge fund (or a group of funds) may have on major banks and brokers, as well as on hedge funds being possible transmitters or amplifiers of a shock. Systemic risks regarding hedge fund activities primarily concern their potentially negative effects on systemically important regulated counterparties. Hedge funds may also act as transmitters or amplifiers of shocks initiated elsewhere. For example, large portfolio liquidations by hedge funds—either preemptively or triggered by significant losses—may increase price volatility or result in a broader loss of market confidence.

Additional regulatory concerns relate to investor protection and market integrity, particularly in the context of pension fund or retail investments in hedge funds. The latter has been an issue of growing attention among regulators in jurisdictions where retail participation has grown.

Regulatory and Supervisory Developments, and Industry Reactions

The regulation, supervision, and oversight of hedge funds is a complex subject, and it is important to identify the intended purpose or goal of any public initiative. Different motivations underlie financial stability and investor protection concerns, as well as the possible role of regulation.

Financial stability concerns have been emphasized in jurisdictions with greater global hedge fund trading activity, such as the United States and the United Kingdom. In these countries (and elsewhere) a key policy challenge is to safeguard financial stability by ensuring that hedge fund failure(s) or other market activities do not jeopardize the safety and soundness of systemically important regulated counterparties (i.e., banks and broker-dealers), or otherwise create market disruptions resulting in financial instability, while seeking to maintain hedge funds' potential for positive contributions to market efficiency.

In jurisdictions where retail investors' exposure to hedge fund investments and related financial products has increased (e.g., continental Europe and Asia), registered hedge funds are usually subject to disclosure rules aimed at informing investors of the risks associated with hedge fund investments. Regulatory standards for eligible investors attempt to limit retail investor participation to those considered sufficiently informed to assess the risk profile and/or wealthy enough to retain advisors or sustain the potential losses. Over time, asset price inflation (including real estate prices) has eroded some of the nominal wealth and income eligibility criteria designed to limit the size of the eligible investor group, and some authorities have acted to restore their relevance.

The present approach to mitigate financial stability risks associated with hedge funds relies primarily on supervisory efforts to monitor the exposures and risk management practices of regulated banks and brokers. This approach utilizes established supervisory relationships with banks and brokers, and seeks to ensure that their counterparty risk management systems are appropriate, which may also act as a means to improve market discipline on hedge funds (IMF, 2004 and 2005). The major prime brokers and banks, which are the providers of credit and trading counterparties of hedge funds, also should be able to provide authorities and supervisors with a relatively complete assessment of market risk profiles. In this manner, some observers have referred to this as an "indirect" monitoring of hedge fund activities. An important part of the supervisory process involves asking the appropriate questions, which in itself may initiate internal or regulatory reviews of existing risk management practices and facilitate improved market discipline. Indeed, since the failure of Long-Term Capital Management, regulated institutions appear to have developed more robust risk management practices, including more sophisticated credit and collateral arrangements that allow for more graduated means to manage their hedge fund exposures, and thereby reduce

the risk of market disruptions and broader losses.[53]

The focus on counterparty risk management and efforts to indirectly monitor hedge fund and market risk profiles has been adopted to different degrees by national authorities, particularly by the New York Federal Reserve and the U.K. Financial Services Authority.

In the United States, regulatory bodies have expressed a variety of views in recent years regarding the appropriate means to monitor or supervise hedge fund activities.

First, the Securities and Exchange Commission (SEC) sought to register hedge fund managers and to gather basic information, with its traditional focus on investor protection. However, since the judicial overruling of SEC registration requirements, the agency has proposed revising its criteria for qualified investors by raising the minimum financial net worth of individuals (excluding a person's primary residence) able to invest in hedge funds from $1 million to $2.5 million (the "enhanced accredited investor" standard). More recently, the SEC has also more closely examined prime brokers' risk management practices. In addition, the Commodity Futures and Trading Commission has made ongoing efforts to improve its data classification scheme, intended to better identify commercial and "speculative" trading activities.

Moral hazard concerns associated with various forms of potential official monitoring or supervision have led the Federal Reserve Board of Governors to historically emphasize market discipline. The New York Federal Reserve Bank has pursued a more nuanced approach to evaluating and influencing risk management practices at regulated institutions, and to conducting surveillance of hedge fund activities through their regulated counterparties and more informal dialogue with unregulated market participants, including hedge funds.

Most recently, the principles and guidelines published by the President's Working Group on Financial Markets (PWG) on February 22, 2007, reflect the converging regulatory approaches of the agencies represented in the PWG regarding "private pools of capital." The PWG is chaired by the Treasury Secretary and composed of the chairmen of the Federal Reserve Board, the Securities and Exchange Commission, and the Commodity Futures Trading Commission. The PWG worked with the Federal Reserve Bank of New York and the Office of the Comptroller of the Currency to develop this guidance. In the context of the current regulatory framework, which is deemed appropriate, the principles regard public policies that support market discipline, participant awareness of risk, and prudent risk management as the best means to both protect investors and limit systemic risk. This emphasis on market discipline, by investors and counterparties, is in line with the Working Group's earlier pronouncement in 1999. In addition, acknowledging the global nature of both the funds and their counterparties and creditors, the PWG acknowledges the need for international policy coordination and collaboration. Overall, the PWG's approach aligns closely with the policy messages developed by the IMF in past GFSRs.

In the United Kingdom, the Financial Services Authority conducts surveillance in a generally more pro-active manner, collecting information through a (semi-annual) survey of prime brokers to assess their exposure to hedge funds and gauge broader market risk profiles. It uses this information to identify the need for more direct dialogue with and surveillance of managers of the relatively "higher" impact funds. For such an approach to be effective, it is important that the appropriate information and risk metrics be gathered and analyzed so as to identify those advisors or funds most relevant to financial stabil-

[53]In contrast to Long-Term Capital Management (LTCM), the benign market impact of the recent Amaranth failure may reflect these and other improvements in counterparty risk management practices, although it is difficult to evaluate precisely all the factors contributing to the smooth resolution. Despite the large reported losses (over $6 billion, compared with losses of $4.6 billion for LTCM), the lack of subsequent market disturbances was attributed in part to the presence of diverse market participants, the prime brokers' ability to unwind their exposure, and the ability of other market participants to assume Amaranth's positions, rather than those positions being liquidated hastily.

ity analysis. As such, overemphasizing size (assets under management), or being overly focused on prime brokerage positions (which may reflect an equity market bias) rather than on potentially higher-risk strategies or markets, or failing to evaluate exposures across the full array of businesses within banks or brokers (which would be needed to evaluate fixed-income or credit strategies and markets), may produce misleading or incomplete indicators. Furthermore, for greatest effectiveness, such an approach would benefit significantly from increased cooperation and dialogue among regulators, which has been evident in recent months.[54]

Industry reactions to calls for increased collaboration between the private sector (i.e., hedge funds, banks, and brokers) and the supervisory community have been generally positive. The largest hedge funds today generally recognize the need to further improve transparency and public sector understanding of their activities. Many express a willingness to provide financial information to supervisory authorities to help improve financial stability analysis and greater understanding of hedge fund activities. However, while voluntary codes of conduct and best practices have been proposed previously by the industry, they have not gained broad acceptance.

Suggestions to require hedge funds to periodically disclose position information (e.g., to the public, investors, counterparties, and/or supervisors) have been met with strong resistance from the funds, in part due to the proprietary nature of this information and the risk of "front running" by counterparties and competitors. Moreover, given the active investment style of most hedge funds and the difficulties related to the implementation of such a program, disclosures of this type may be impractical and provide limited value.[55]

From a financial stability perspective, efforts to develop standardized leverage and liquidity measures for hedge fund disclosure (to investors and counterparties) could be useful. Such disclosure could be augmented with large exposure data from banks and brokers to their supervisors, including both trading and prime brokerage activities (which are frequently not aggregated effectively).[56] Such additional information would facilitate the dialogue between hedge funds and their counterparties, and between banks and brokers with their supervisors. However, as evidenced by previous efforts, developing a framework or template for financial disclosure across different hedge fund strategies has proven very difficult. Nevertheless, such initiatives could be encouraged.

Most observers agree that risk management practices have improved at regulated banks and brokers. However, remaining risk management challenges include determining and obtaining adequate collateral to limit losses (including potential exposures). This challenge may be most acute in fixed-income and credit markets. In these markets, regulated counterparties may find it less easy to measure or monitor exposure to a single fund or a particular transaction, or to make related margin and collateral decisions.[57] This is all the more important as banks and bro-

[54]U.K., U.S., German, and Swiss regulators have heightened their monitoring and evaluation of hedge fund risk management practices, including a more coordinated effort to review margin and collateral practices related to hedge fund clients at their domestic institutions.

[55]Encouraging hedge funds to obtain credit ratings has also been suggested as a means to improve transparency and strengthen market discipline. However, whether rating agencies would prove better than regulated counterparties and investors at evaluating hedge funds remains an open question. Nevertheless, they may be able to adequately assess certain operational risks (e.g., valuation and audit processes, administration arrangements, and regulatory compliance).

[56]The Counterparty Risk Management Policy Group II recommended that the private sector collaborate with the official sector to consider the feasibility, costs, and desirability of creating an effective framework of large-exposure reporting of regulated financial intermediaries active with hedge funds.

[57]In fixed-income and credit markets, hedge funds tend to employ relatively more leverage, pursue multi-legged transactions with several counterparties selected from a broader universe of trading institutions (limiting transparency), and often involve products or market segments exhibiting less consistent liquidity. All of this leads to much greater risk management challenges for banks and brokers.

kers utilize cross-margining and portfolio margining practices.

Industry observers and participants generally agree that any new initiatives related to hedge fund oversight should seek to preserve hedge funds' contribution to financial stability against the new or emerging risks their activities present. Costs associated with new requirements (e.g., reporting systems, legal infrastructures, etc.) may drive some funds from the market and deter new funds from entering the market at the possible costs of reduced competition, innovation, market liquidity, and risk dispersion. Moreover, it is crucial that efforts to promote improved transparency and market discipline not inadvertently increase moral hazard. Such initiatives may create a perception that public authorities have superior knowledge regarding market stability, and potentially weaken market discipline.

Private Equity

Private equity funds have attracted increased attention from investors and public officials. Like hedge funds, private equity funds are a heterogeneous group of investment vehicles, employing investment strategies geared toward sophisticated and long-term investors. These are a highly differentiated group ranging from start-up venture finance to leveraged buyouts to vulture or distressed asset funds. The "typical" private equity fund has a relatively long investment horizon (e.g., five to seven years, or longer), and is often engaged in the operation or restructuring of acquired firms.[58]

The inflow of capital into private equity, much of it from institutional investors, has expanded the potential scale of private equity transactions. The potential for larger buyouts across a range of sectors reflects a variety of cyclical and structural factors, including, most importantly, the availability of debt financing through leveraged loans and other debt instruments.[59] The appetite for holding the debt of these highly leveraged transactions and companies by fixed-income investors is likely to be a key factor determining the size of transactions and the extent of market activity, and may also highlight the primary financial stability concern.

The potential for increased debt financing for ever-larger buyouts raises prospects that greater amounts of leverage may amplify underlying risks and vulnerabilities, or contribute to a loss of market confidence and withdrawal of liquidity, which may negatively affect particular institutions and broader markets. Put differently, the increased use of leverage, which is readily available from debt markets today, may increase defaults among private equity/LBO transactions, with economic and macroprudential implications. This may occur due to a series of company or transaction-specific defaults, due to an economic slowdown or tighter monetary conditions, or possibly due to the failure of a large LBO-related financing. Given that credit spreads are generally at historically tight levels, a failed LBO could trigger a broader withdrawal of market liquidity, producing a liquidity-led deleveraging that could prove disruptive to the broader markets.

In this way, financial stability concerns may primarily arise from a liquidity-driven deleveraging, possibly triggered by a failed private equity/LBO transaction. Such a deleveraging event may be amplified by significant procyclical selling pressures driven by a general loss of market confidence and the increasingly mark-to-market trading environment, particularly given

[58]For example, while LBOs often lead to downgrades of target companies, recent evidence also suggests instances where they may improve the creditworthiness of lower-rated companies with speculative-grade debt (e.g., rated Ca or C), due to improved efficiency and better management performance (see Moody's Investors Service, 2006).

[59]Recent private equity transactions (e.g., the approximately $35 billion HCA buyout in the healthcare industry and the recent bids of $39 billion and $41 billion for Equity Office Property Trust, a commercial office real estate investment trust, by Blackstone Group and Vornado Realty Trust, respectively) exceed the largest LBO of the 1980s (e.g., the $31.3 billion RJR Nabisco transaction). The CEO of a major private equity firm has noted that even larger deals (e.g., $50 billion or even $100 billion) are feasible in the near future.

the increased presence of relatively less-liquid structured credit products in a wider range of investors' portfolios. Such pressure could lead to a significant repricing of credit, with potentially negative medium- or longer-term reactions by institutional investors and regulators that may detract from the positive risk transfer developments in recent years.

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