

# Global Financial Stability Report

## Containing Systemic Risks and Restoring Financial Soundness

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APR 08

World Economic and Financial Surveys

# **Global Financial Stability Report**

Containing Systemic Risks and  
Restoring Financial Soundness

**April 2008**



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The following symbols have been used throughout this volume:

- . . . to indicate that data are not available;
  - to indicate that the figure is zero or less than half the final digit shown, or that the item does not exist;
  - between years or months (for example, 1997–99 or January–June) to indicate the years or months covered, including the beginning and ending years or months;
  - / between years (for example, 1998/99) to indicate a fiscal or financial year.
- “Billion” means a thousand million; “trillion” means a thousand billion.  
 “Basis points” refer to hundredths of 1 percentage point (for example, 25 basis points are equivalent to  $\frac{1}{4}$  of 1 percentage point).  
 “n.a.” means not applicable.

Minor discrepancies between constituent figures and totals are due to rounding.

As used in this volume the term “country” does not in all cases refer to a territorial entity that is a state as understood by international law and practice. As used here, the term also covers some territorial entities that are not states but for which statistical data are maintained on a separate and independent basis.

## PREFACE

The *Global Financial Stability Report* (GFSR) assesses key issues in global financial market developments with a view to identifying systemic vulnerabilities. By calling attention to fault lines in the global financial system, the report generally seeks to play a role in preventing crises and, when they do occur, helping to mitigate their effects and offer policy advice, thereby contributing to global financial stability and to sustained economic growth of the IMF's member countries.

The analysis in this report has been coordinated in the Monetary and Capital Markets (MCM) Department under the general direction of Jaime Caruana, Counsellor and Director. The project has been directed by MCM staff Peter Dattels and Laura Kodres, Division Chiefs; and Brenda González-Hermosillo and L. Effie Psalida, Deputy Division Chiefs. It has benefited from comments and suggestions from Jonathan Fiechter and Christopher Towe, both Deputy Directors, and Mahmood Pradhan, Assistant Director.

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This particular issue draws, in part, on a series of discussions with accountancies, banks, securities firms, asset management companies, hedge funds, auditors, credit rating agencies, financial consultants, and academic researchers, as well as regulatory and other public authorities in major financial centers and countries. The report reflects information available up to March 21, 2008.

The report benefited from comments and suggestions from staff in other IMF departments, as well as from Executive Directors following their discussion of the *Global Financial Stability Report* on March 26, 2008. However, the analysis and policy considerations are those of the contributing staff and should not be attributed to the Executive Directors, their national authorities, or the IMF.



## EXECUTIVE SUMMARY

The events of the past six months have demonstrated the fragility of the global financial system and raised fundamental questions about the effectiveness of the response by private and public sector institutions. While events are still unfolding, the April 2008 *Global Financial Stability Report* (GFSR) assesses the vulnerabilities that the system is facing and offers tentative conclusions and policy lessons. Some key themes that emerge from this analysis include:

- There was a collective failure to appreciate the extent of leverage taken on by a wide range of institutions—banks, monoline insurers, government-sponsored entities, hedge funds—and the associated risks of a disorderly unwinding.
- Private sector risk management, disclosure, financial sector supervision, and regulation all lagged behind the rapid innovation and shifts in business models, leaving scope for excessive risk-taking, weak underwriting, maturity mismatches, and asset price inflation.
- The transfer of risks off bank balance sheets was overestimated. As risks have materialized, this has placed enormous pressures back on the balance sheets of banks.
- Notwithstanding unprecedented intervention by major central banks, financial markets remain under considerable strain, now compounded by a more worrisome macroeconomic environment, weakly capitalized institutions, and broad-based deleveraging.

In sum, the global financial system has undoubtedly come under increasing strains since the October 2007 GFSR, and risks to financial stability remain elevated. The systemic concerns are exacerbated by a deterioration of credit quality, a drop in valuations of structured credit products, and a lack of market liquidity accompanying a broad deleveraging in the financial system. The critical challenge now

facing policymakers is to take immediate steps to mitigate the risks of an even more wrenching adjustment, including by preparing contingency and other remediation plans, while also addressing the seeds of the present turmoil.

### Chapter 1—Assessing Risks to Global Financial Stability

Chapter 1 documents how the crisis is spreading beyond the U.S. subprime market—namely to the prime residential and commercial real estate markets, consumer credit, and the low- to high-grade corporate credit markets. The United States remains the epicenter, as the U.S. subprime market was the origin of weakened credit standards and was the first to experience the complications arising from the associated structured credit products. But financial institutions in other countries have also been affected, reflecting the same overly benign global financial conditions and—to varying degrees—weaknesses in risk management systems and prudential supervision. Industrialized countries with inflated house price levels relative to fundamentals or stretched corporate or household balance sheets are also at risk.

Emerging market countries have been broadly resilient, so far. However, some remain vulnerable to a credit pullback, especially in those cases where domestic credit growth has been fueled from external funding sources and large current account deficits need to be financed. Debt markets, particularly for external corporate debt, have felt the impact of the turbulence in advanced countries and costs of funding have risen and further shocks to investors' risk appetite for emerging market assets cannot be ruled out if financial conditions worsen.

Losses stemming from credit deterioration and forced sales, as well as reduced earnings growth, have significantly tested the balance sheets of both banks and nonbank financial

institutions. Chapter 1 revisits and extends the analysis of subprime-related losses in the October 2007 GFSR and projects that falling U.S. housing prices and rising delinquencies on mortgage payments could lead to aggregate losses related to the residential mortgage market and related securities of about \$565 billion, including the expected deterioration of prime loans. Adding other categories of loans originated and securities issued in the United States related to commercial real estate, the consumer credit market, and corporations increases aggregate potential losses to about \$945 billion. These estimates, while based on imprecise information about exposures and valuation, suggest potential added stress on bank capital and further writedowns. Moreover, combined with losses to nonbank financial institutions, including monoline bond insurers, the danger is that there may be additional reverberations back to the banking system as the deleveraging continues. The risk of litigation over contract performance is also growing.

Macroeconomic feedback effects are also a growing concern. Reduced capital buffers and uncertainty about the size and distribution of bank losses, combined with normal credit cycle dynamics, are likely to weigh heavily on household borrowing, business investment, and asset prices, in turn feeding back onto employment, output growth, and balance sheets. This dynamic has the potential to be more severe than in previous credit cycles, given the degree of securitization and leverage in the financial system. Thus, it is now clear that the current turmoil is more than simply a liquidity event, reflecting deep-seated balance sheet fragilities and weak capital bases, which means its effects are likely to be broader, deeper, and more protracted.

Macroeconomic policies will have to be the first line of defense containing downside risks to the economy, but policymakers need to move on broader fronts. A key challenge is to ensure that large systemically important financial institutions continue to move quickly to repair their balance sheets, raising equity and medium-term

funding, even if it is more costly to do so now, in order to boost confidence and avoid further undermining the credit channel. Equity inflows have already been forthcoming from various investors, including sovereign wealth funds, but more equity infusions will likely be needed to help recapitalize institutions.

In addition to forceful monetary easings by a number of major central banks, liquidity has also been provided to money markets at various maturities to ensure their smooth functioning. These actions, in some cases coordinated across central banks, have been supported by a strengthening of their operational procedures. Looking forward, recent developments suggest that central banks need to reflect further on the role that monetary policy may have played in fostering a lack of credit discipline and to improve their instruments for relieving liquidity stress in today's more global financial system. However, the immediate priority facing policymakers in some mature market countries is to address vulnerabilities to systemic instability in ways that minimize both moral hazard and potential fiscal costs. In addition to an examination of underlying causes, it will be important to address private sector incentives and compensation structures so that a similar buildup of vulnerabilities is less likely in the future.

## Chapter 2—Structured Finance: Issues of Valuation and Disclosure

The proliferation of new complex structured finance products, markets, and business models exposed the financial system to a funding disruption and a breakdown in confidence. Chapter 2 investigates in some detail how and why this set of instruments has had such an adverse effect on financial stability. In particular, it examines the implications for financial stability that arise from the valuation and accounting practices for structured credit products, both at origination and subsequently. The implications for bank balance sheets of the market pricing of assets during times of stress or shallow markets are also discussed. Because credit rating agen-

cies continue to play a large role in how these products are structured and valued, the chapter examines how the ratings are produced, finding that improvements in the models that rating agencies use should be considered.

Aside from uncertainty surrounding their valuation and accounting, the business funding model for structured credit products appears to have been flawed. These instruments were frequently housed and financed in bank-associated off-balance-sheet entities, such as structured investment vehicles (SIVs) and conduits. The second part of Chapter 2 investigates the business and regulatory incentives in setting up such legal entities and the failure to address their risks in the context of banks' risk management systems—that is, the piecemeal perimeter of risk consolidation was evidently too narrow for the risks to be properly assessed. Although asset-liability maturity mismatches are a common feature of the banking business, these highly leveraged SIVs and conduits took on extreme maturity mismatches. They relied too heavily on wholesale markets for funding, suggesting in turn that adverse incentives and a lack of transparency were complicit in the strains that arose. This also suggests that if risks are allocated where they are borne and adequate capital is held against such risks, these entities may be much less viable—at least in their current form—as a business model.

### Chapter 3—Market and Funding Illiquidity: When Private Risk Becomes Public

As the crisis progressed from a funding problem for SIVs and conduits to a widespread reduction in interbank liquidity, liquidity risk management systems within banks were implicated. Chapter 3 looks at the nexus between market liquidity (the ability to buy and sell an asset with a small associated price change) and funding liquidity (the ability of a solvent institution to make agreed-upon payments in a timely fashion). It finds that some new instruments may have increased the potential for adverse

“liquidity spirals” in which market illiquidity leads to funding illiquidity and vice versa. Empirical work supports the notion that relationships between funding and market liquidity, both within the United States and among mature economies, have intensified during the crisis period, whereas prior to the summer of 2007 such linkages were practically nonexistent. Correlations between several emerging market debt and sovereign prices and U.S. funding markets also show marked increases during the crisis, suggesting such financial markets continue to be highly interconnected during crises.

Chapter 3 notes that trends in the status of large banks in advanced countries show these banks have less protection against a liquidity event than in the past. The reliance on wholesale funding and the benign financial environment permitted financial firms to become more complacent about their liquidity risk management systems and “underinsure” against an adverse liquidity event, depending more heavily on central bank intervention for their liquidity problems. Similarly, bank supervisors had been focused on the implementation of Basel II, and the Basel Committee had only recently begun to re-examine liquidity risk issues.

Lower liquidity in funding markets has induced unprecedented intervention by central banks to ease strains in the interbank money market. Chapter 3 evaluates the success of such efforts, focusing on the actions of the Federal Reserve, the European Central Bank (ECB), and the Bank of England. The ability to provide liquidity to a broad array of counterparties using a relatively diverse collateral pool aided the effectiveness of the ECB's liquidity operations. The Federal Reserve had to alter its procedures to provide liquidity to the banks that needed it and to reduce the stigma attached to the use of the more widely available discount window. The Term Auction Facility has worked better, and additional facilities have been established recently to further contain liquidity pressures. Chapter 3 attempts to empirically gauge the effectiveness of emergency liquidity support and finds that Federal Reserve and ECB actions were

helpful in reducing the volatility of money market interest rates, though the impact on spread levels appears to have been small.

## Conclusions and Policy Initiatives

Although the growth and prosperity of recent years gave ample illustration of the benefits of financial innovation, the events of the past eight months have also shown that there are costs. Credit risk transfer products—innovations that were meant to disperse risk broadly—were not always used to move risk to those best able to bear it. In fact, a surprising amount of risk has returned to the banking system from where it was allegedly dispersed. Even though the GFSR and others warned of higher leverage embedded in the new structured credit instruments and higher risk-taking, banks (and other financial institutions) now appear to be far more leveraged than most had anticipated. As well, regulation and supervision of these new instruments and techniques did not keep pace.

What follows are a number of short- and medium-term recommendations relevant to the current episode. Several others groups and fora—such as the Financial Stability Forum, the Joint Forum, the Basel Committee on Banking Supervision—are concurrently developing their own detailed standards and guidance, much of which is likely to address practical issues at a deeper level than the recommendations proposed below.

### *In the short term...*

The immediate challenge is to reduce the duration and severity of the crisis. Actions that focus on reducing uncertainty and strengthening confidence in mature market financial systems should be the first priority. Some steps can be accomplished by the private sector without the need for formal regulation. Others, where the public-good nature of the problem precludes a purely private solution, will require official sector involvement.

Areas in which the private sector could usefully contribute are:

- **Disclosure.** Providing timely and consistent reporting of exposures and valuation methods to the public, particularly for structured credit products and other illiquid assets, will help alleviate uncertainties about regulated financial institutions' positions.
- **Bank balance sheet repair.** Writedowns, undertaken as soon as reasonable estimates of their size can be established, will help cleanse banks' balance sheets. Weakly capitalized institutions should immediately seek to raise fresh equity and medium-term funding even if the cost of doing so appears high.
- **Overall risk management.** Institutions could usefully disclose broad strategies that aim to correct the risk management failings that may have contributed to losses and liquidity difficulties. Governance structures and the integration of the management of different types of risk across the institution need to be improved. Counterparty risk management has also resurfaced as an issue to address. A re-examination of the progress made over the last decade and gaps that are still present (perhaps inadequate information or risk management structures) will need to be closed.
- **Managerial compensation structures.** Incentives that may act to shorten the horizon of top management of deposit-taking financial institutions need corrective action. Ideally, compensation at such regulated financial institutions should provide incentives to correct risk management failings early, provide for adequate capital and liquidity buffers, and generally take decisions that enhance the long-run viability of the firm so as to lessen systemic risks.  
Short-term official sector actions would be most helpful in the following areas:
- **Consistency of treatment.** Along with auditors, supervisors can encourage transparency and ensure the consistency of approach for difficult-to-value securities so that accounting and valuation discrepancies across global financial institutions are minimized. Supervisors should be able to evaluate the robustness of the models used by regulated entities to

value securities. Some latitude in the strict application of fair value accounting during stressful events may need to be more formally recognized.

- **More intense supervision.** Supervisors will need to better assess capital adequacy related to risks that may not be covered in Pillar 1 of the Basel II framework. More attention could be paid to ensuring that banks have an appropriate risk management system (including for market and liquidity risks) and a strong internal governance structure. When supervisors are not satisfied that risk is being appropriately managed or that adequate contingency plans are in place, they should be able to insist on greater capital and liquidity buffers.
- **Special stability reports.** To help reduce uncertainty and correct negative public misperceptions, especially in the current context of illiquid, hard-to-value structured credit securities, special stability reports could be helpful. Such reports could usefully draw on relevant supervisory information, assess current risks objectively, and highlight plans to address vulnerabilities in the countries involved.
- **Early action to resolve troubled institutions.** The public sector should proactively stand ready to promptly address stress within troubled financial institutions. In such cases, early remedial action or intervention may be warranted.
- **Public plans for impaired assets.** National authorities may wish to prepare contingency plans for dealing with large stocks of impaired assets if writedowns lead to disruptive dynamics and significant negative effects on the real economy. The modalities of doing so will differ across countries and sectors, but successful instances in which fire sales of impaired assets have been prevented could usefully be emulated.

For emerging market countries, policy actions should focus on lowering vulnerabilities to the knock-on effects from mature markets. Specifically, banks in countries experiencing rapid credit growth funded by external sources will

need to develop robust and realistic contingency plans to address reductions in such funding. Countries that have relied on external funding should expect to see domestic pressures develop if international liquidity becomes scarce. Financial market supervisors in locations where housing prices have experienced run-ups could usefully re-examine how foreclosures would be handled and whether the legal setting is conducive to a smooth unwinding of excesses. Nearly all emerging market countries should review the reliability and depth of detail in financial institutions' public disclosures and the robustness of their accounting frameworks as uncertainty about the health of major financial institutions breeds financial instability. Emerging market supervisors, regulators, and central banks should review their own contingency plans—particularly those related to managing liquidity disruptions. Steps should be taken with home supervisors of foreign banks to coordinate such plans and ongoing supervision.

*In the medium term...*

More fundamental changes are needed over the medium term. Policymakers should avoid a “rush to regulate,” especially in ways that unduly stifle innovation or that could exacerbate the effects of the current credit squeeze. Moreover, the Basel II capital accord, if implemented rigorously, already provides scope for improvements in the banking area. Nonetheless, there are areas that need further scrutiny, especially as regards structured products and treatment of off-balance-sheet entities, and thus further adjustments to frameworks are needed.

Given their role in the crisis, structured finance and the originate-to-distribute business model of securitization require a careful examination of what needs to be fixed. It is important to note that securitization, per se, was not the problem—it was a combination of lax underwriting standards in the U.S. mortgage market, the concomitant extension of securitization into increasingly complex and difficult-to-understand structures, collateralized by increasingly lower quality assets, and a favorable financial environ-

ment in which risks were insufficiently appreciated. In retrospect, not enough capital was allocated to cover these risks. Although Chapter 2 does not attempt an exhaustive analysis of the adverse incentives that led to the extreme growth in structured finance underpinning the crisis, some tentative policies can be put forward.

The private sector could usefully move in the following directions:

- **Standardization of some components of structured finance products.** This could help increase market participants' understanding of risks, facilitate the development of a secondary market with more liquidity, and help the comparability of valuation. Standardization could also facilitate the development of a clearinghouse that would mutualize counterparty risks associated with these types of over-the-counter products.
  - **Transparency at origination and subsequently.** Investors will be better able to assess the risk of securitized products if they receive more timely, comprehensible, and adequate information about the underlying assets and the sensitivity of valuation to various assumptions.
  - **Reform of rating systems.** A differentiated rating scale for structured credit products was recommended in the April 2006 GFSR. Also, additional information on the vulnerability of structured credit products to downgrades would need to accompany the new scale for it to be meaningful. This step may require a reassessment of the regulatory and supervisory treatment of rated securities.
  - **Transparency and disclosure.** Originators should disclose to their investors relevant aggregate information on key risks in off-balance-sheet entities on a timely and regular basis. These should include the reliance by institutions on credit risk mitigation instruments such as insurance, and the degree to which the risks reside with the sponsor, particularly in cases of distress. More generally, convergence of disclosure practices (e.g., timing and content) internationally should be considered by standard setters and regulators.
- The official sector should examine the following areas where the application of various standards may have systemic consequences.
- **Greater attention to applying fair value accounting results.** The prospects of forced sales triggered by fair value below some threshold will need to be examined thoroughly. Ways of guiding firms to review the elements underlying the valuation without being forced to sell would be helpful. The extent to which such fair value "triggers" are either encouraged or mandated in regulation and supervisory guidance would need to be re-evaluated. It is the role of prudential supervision to judge the reliability of various methods used to establish fair values, especially when a marked-to-model approach is used. Accounting standard setters will increasingly need to take into account the financial stability implications in their accounting practices and guidance.
  - **Incentives to set up SIVs and conduits.** In principle, Basel II provides less incentive than Basel I to transfer risks to such entities for the purpose of lowering regulatory capital charges. Nonetheless, a strict implementation of Basel II by national supervisors, possibly armed with stronger guidance regarding conditions for risk transfer and appropriate capital relief, will be needed. Accounting standards setters, in cooperation with supervisors, should revisit consolidation rules to address incentives that may encourage a lack of transparency regarding off-balance-sheet activities and risks.
  - **Tighten oversight of mortgage originators.** In the United States, broadening 2006 and 2007 bank guidance notes on good lending practices to cover nonbank mortgage originators should be considered. The efficiency of coordination across banking regulators would also be enhanced if the fragmentation across the various regulatory bodies were addressed. Consideration could be given to devising mechanisms that would leave originators with a financial stake in the loans they originate.

Another area in which weaknesses contributed to the crisis is financial institutions' liquidity management. It is now obvious that various factors may have encouraged financial institutions to insufficiently protect themselves against an adverse liquidity event—a situation that needs to be addressed.

For financial institutions, the crisis has provided many important lessons including those involving:

- **Liquidity risk management.** Firms will need to factor in more severe price jumps (“gapping”) and correlation movements in their market risk models, employing adjustments to risk measures where possible. Better stress tests could be undertaken with longer periods of funding illiquidity and improved contingency plans. More transparency regarding how liquidity risk is managed within the firm could be available to investors.
- **More realistic assumptions about the liquidity of complex structured securities.** Firms' reliance on highly structured securities to generate collateral proved problematic during the crisis. Greater availability on balance sheets of highly liquid assets to use as collateral could allow institutions easier access to funding sources during periods of stress.

Financial regulators and supervisory authorities also need to take a more active role in reviewing liquidity management issues and supervisory guidance, and considering other regulatory improvements.

- **Strengthen existing international liquidity guidance.** The Basel Committee's Working Group on Liquidity is already considering how to strengthen its existing guidance in this area, and prompt review would be welcome. The use of multiple currencies for funding globally active banks suggests that a more unified approach to liquidity management across countries may be needed.
- **Monitoring best practices.** A better method of monitoring progress toward achieving “best practices” for liquidity management (e.g., those of the Basel Committee, the Joint Forum, and the Institute of International

Finance) could help prevent gaps across institutions. If progress is insufficient, a Pillar 2-like system may be needed, whereby supervisors are tasked with ensuring that adequate bank liquidity management systems are in place and that banks hold sufficient liquidity buffers and have well-formulated contingency plans.

Monetary authorities as well need to review their operational practices in light of the crisis. This event has required unprecedented liquidity infusions to the interbank market and the use of operational instruments that had not been used before. Central banks should now converge to policies that have worked during the crisis to improve the functioning of interbank markets and better distribute liquidity. Such policies to be considered are the following:

- **Broader range of collateral.** To be expedient, central banks need to be able to operate with a wide range of collateral, perhaps agreeing on collateral that could be posted at multiple central banks. However, central banks will need to have a well-established collateral pricing policy to avoid taking undue credit and liquidity risks onto their own balance sheets.
- **Wide group of counterparties.** Central banks should have a wide group of counterparty banks established during normal times that are eligible to receive liquidity during stressful times. Altering this group during periods of stress can signal that certain banks, with perhaps newly acceptable collateral, are receiving preferential treatment.
- **Maturity structure of liquidity provision.** Operational procedures enabling the provision of liquidity at different maturities can be helpful. However, altering the maturity profile of the central bank's balance sheet needs to be accompanied by communication indicating how this is consistent with the monetary policy strategy.
- **Better coordination among financial overseers.** Central banks and others with oversight over financial institutions could usefully develop closer ties and improved information

sharing so as to better anticipate liquidity and solvency difficulties. Central banks should ensure that they have continuous access to individual bank information so as to be able to independently judge the health of potential counterparties.

- **Supervising responsibility and enforcement.** Supervisors must be provided with sufficient legal powers and resources. For example, if institutions answer to multiple regulators and supervisors, the scope for ambiguity and arbitrage is magnified. Therefore, it would be preferable if supervisory and enforcement responsibilities for a single institution were to be vested in a single agency. Cross-border information sharing and coordination among such bodies should also be strengthened.

In sum, there are a number of areas that require increased attention by private market participants and the public sector. For its part, there is room for the International Monetary Fund to more actively promote best practices for financial crisis and central bank liquidity management. These issues are covered in IMF Financial Sector Assessment Programs, and even greater efforts will be made to apply them in the IMF's bilateral and multilateral policy advice.

As the crisis is still unfolding, lessons are as yet incomplete. Nonetheless, some issues need to be addressed urgently—shoring up the confidence in financial institutions should be a priority. Other issues will require more reflection and study so as to minimize unintended consequences of regulations or supervisory practices.

*What began as a fairly contained deterioration in portions of the U.S. subprime market has metastasized into severe dislocations in broader credit and funding markets that now pose risks to the macroeconomic outlook in the United States and globally. This chapter first examines the deepening of losses in the U.S. subprime mortgage market and the potential breadth of credit deterioration amid significant economic slowing along with declines in real estate prices. Estimates of potential losses and an analysis of their systemic effects are discussed next, including the potential reverberations through financial guarantors, and spillovers to emerging market countries. The linkages through the credit channel to output growth are empirically examined and two potential downside scenarios are explored. Against the backdrop of continued weakness in global credit markets and threats to financial stability, the chapter concludes with some immediate policy measures to help foster counterparty confidence and to contain further downside risks.*

Overall risks to financial stability have increased sharply since the October 2007 *Global Financial Stability Report* (GFSR). The crisis that originated in a small segment of the U.S. mortgage market has spread to broader cross-border credit and funding markets through both direct (via exposure to subprime mortgage markets) and indirect (via perturbations in banking and funding markets) channels. A broadening deterioration of credit is likely to put added pressure on systemically important financial institutions. The risks of a credit crunch have increased, threatening economic growth. In turn, the potential for spillovers to emerging markets has increased through funding channels and trade linkages.

Note: This chapter was written by a team led by Peter Dattels and comprised of Sergei Antoshin, Sean Craig, Martin Edmonds, Kristian Hartelius, Phil de Imus, Rebecca McCaughrin, Ken Miyajima, Michael Moore, Chris Morris, Mustafa Saiyid, Ian Tower, and Chris Walker.

### Global Financial Stability Map

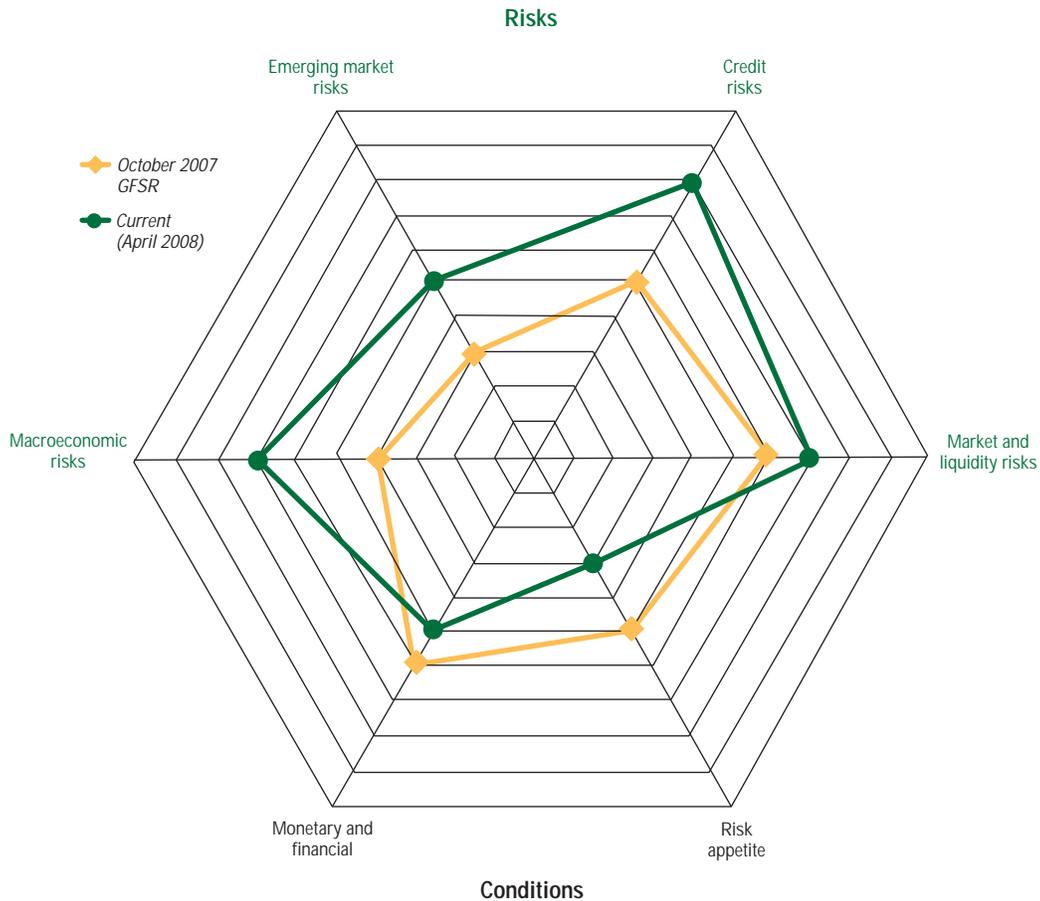
The global financial stability map (Figure 1.1) presents an overall assessment of how changes in underlying conditions and risk factors bear on global financial stability in the period ahead.<sup>1</sup> Nearly all the elements of the map point to a degradation of financial stability, with credit and macroeconomic risks having deteriorated the most.

#### *Downside risks to the macroeconomy...*

A significant increase in risks to financial stability stems from an increase in our assessment of *macroeconomic risks*. Since the October 2007 GFSR, concerns about the potential for a significant economic slowdown have been reinforced by a string of weaker-than-expected economic data and weaker confidence in

<sup>1</sup>Annex 1.1 details how indicators that compose the rays of the map are measured and interpreted. The map provides a schematic presentation that incorporates a degree of judgment, serving as a starting point for further analysis.

Figure 1.1. Global Financial Stability Map



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

the United States and other mature markets, underscored by a sharp dip in leading global growth indicators. The *World Economic Outlook* (WEO) baseline projection is for global growth to moderate to 3.7 percent in 2008. However at this juncture, the macroeconomic outlook is clouded by a great deal of uncertainty, and risks to the baseline case are skewed to the downside. The key risk to the economic outlook appears to be unfolding. In particular, the dislocations in credit and funding markets are beginning to restrict the overall provision and channeling of credit.

Downside macroeconomic risks that are concentrated in the U.S. economy have a significant impact on systemically important financial institutions that may spill over to global markets. Of particular importance for financial stability are the linkages between the real and financial sector, including the effects of credit or financial decelerators on the real economy, the extent of balance sheet adjustments, and the absorptive capacity of financial markets. Our analysis indicates that a contraction in the supply of private sector credit and market borrowings could bring a significant slowdown in U.S. output growth in

the following several quarters, as some securitization markets are functioning poorly in the wake of the crisis and banks are seeking to repair their balance sheets (see the section entitled “Credit Squeeze or Credit Crunch?”). Europe is also at risk, given the size of bank losses and disruptions in bank funding and securitization markets.

*...threaten a deeper and wider deterioration in credit beyond subprime mortgages, weakening the capital and funding positions of systemically important financial institutions.*

The increase of macroeconomic risks contributes to raising our assessment of *credit risks*.<sup>2</sup> This assessment reflects the potential for a sharper slowdown in U.S. and global growth, which, coupled with past credit indiscipline, has heightened strains on the capital of systemically important financial institutions.

Credit deterioration has widened beyond subprime mortgages, and mark-to-market losses have mounted as markets anticipate a more difficult economic and financial environment. Nonprime mortgage losses have continued to rise, while the credit performance of higher-quality residential mortgages, commercial mortgages, and consumer credit products has also begun to weaken (see the section entitled “Systemic Risks Have Risen Sharply”).

An area of specific concern is the leveraged segment of the corporate debt market. As flagged in prior GFSRs, weak credit discipline in the mortgage market had also figured in leveraged corporate financing in recent years, as reflected by elevated low-tier corporate debt issuance and the marked rise in covenant-lite loans, fewer creditworthy deals, and high leverage and price multiples in the leveraged buyout sector. Defaults have already begun to rise on U.S. and European high-yield corporate debt, albeit from historically low levels, as higher spreads

and diminished liquidity have put pressure on stressed companies.

Difficulties faced by institutions that underwrite credit risk have exacerbated systemic concerns. Financial guarantors that sold credit enhancements on mortgage-related products containing subprime assets have come under pressure as losses on structured securities have mounted. This poses risks for the municipal bond market, where half of the market is insured by financial guarantors, and for banks and other markets that rely on insurance provided by financial guarantors.

*Higher market and liquidity risks underscore the uncertainty surrounding economic and systemic spillovers...*

Reflecting the exposure of systemically important financial institutions to credit markets and the potential rise in market losses, we have raised our assessment of *market and liquidity risks* (signifying higher risks to financial stability).<sup>3</sup> Strains in interbank money markets have intensified since the October 2007 GFSR, and the composite indicator of funding and market liquidity risks indicates that pressures exceeded levels observed during the market turbulence in 1998. Coordinated central bank actions have eased some of the liquidity strains, but pressures in term money markets have recently intensified, reflecting growing concerns about counterparty credit risk. Meanwhile, volatility has continued to rise across major asset classes to a level comparable to earlier in this decade, reflecting uncertainty associated with the size and location of credit losses as well as valuations of structured products. This leaves financial institutions—most recently hedge funds—vulnerable to mutually enforcing funding and market liquidity spirals, in which investors sell assets to meet funding requirements, creating price declines, a loss of confidence, and further funding pressures (see Chapter 3).

<sup>2</sup>Credit risks measure changes in credit quality that have the potential for creating losses resulting in stress to systemically important financial institutions.

<sup>3</sup>Indicators on market and liquidity risks measure the potential for instability in funding and pricing risks that could result in broader spillovers and/or mark-to-market losses.

*...and risk appetite has continued to retrench, restricting flows of global capital and forcing a further deleveraging in the financial system.*

Investor *risk appetite* has diminished partly owing to greater uncertainty over the economic outlook, but also in reaction to a loss of confidence in structured finance and a collapse in some funding markets, which has forced a broad deleveraging in the financial system and threatens a disorderly adjustment of markets and further strains on bank balance sheets.

*Monetary policy easing has been offset by a tightening of financial conditions.*

Since the October 2007 GFSR, real short-term interest rates have declined across a range of economies, owing to a combination of the easing in monetary policy and actions by global central banks. As a result of the weaker economic outlook, markets are pricing in even more monetary policy easing across a range of economies. However, the easing in monetary policy to date has been offset by the sharp repricing in credit and funding markets, resulting in slightly tighter *monetary and financial conditions* overall.<sup>4</sup> The repricing has been triggered by tighter lending conditions across the major economies, making credit more difficult to access for corporates and households. Faced with the increasing probability of unintended balance sheet expansion and losses, banks have become increasingly reluctant to extend credit while securitization markets may remain impaired. Combined with widening spreads, this increases the risks to the economy of a credit crunch.

*Emerging markets have so far been resilient, but strains are already evident in those economies most vulnerable*

<sup>4</sup>Monetary and financial conditions represent a broader measure than that presented in the WEO, in that they incorporate both quantity and price aspects, whereas the WEO metric only captures price effects. See Annex 1.1 for further details and Figure 1.4 in the April 2008 WEO (IMF, 2008).

*to a repricing of credit risks and restricting of external funding.*

Unlike past financial crises, emerging markets have remained relatively resilient, supported by solid fundamentals, prudent macroeconomic policies, and financial cushions built up over recent years. However, we have raised our assessment of *emerging market risks*, as the market turmoil has exacerbated vulnerabilities in a number of emerging markets—notably in some countries in emerging Europe that had relied excessively on foreign bank credit or wholesale funding to finance rapid domestic credit expansion (see the section entitled “Will Emerging Markets Remain Resilient?”).

The risk of potential funding pressures stemming from over-reliance on external portfolio inflows and bank loans was a key theme in the October 2007 GFSR (IMF, 2007a), and these risks have since become more pronounced. Broader emerging sovereign risks have also risen, albeit from historic lows, primarily due to deterioration in financial fundamentals. Markets are concerned that emerging economies will become increasingly linked to mature economies if the latter’s growth continues to slow.

## Credit Deterioration—How Deep and Widespread?

*The U.S. nonprime mortgage sector continues to deteriorate.*<sup>5</sup>

As detailed in the April 2007 GFSR, the deterioration in the U.S. nonprime mortgage market initially reflected a combination of lax underwriting standards, “risk layering,” and

<sup>5</sup>Nonprime refers primarily to subprime and alt-A mortgages. Subprime loans are typically made to borrowers that display one or more of the following characteristics at the time of origination: weakened credit histories that include payment delinquencies and bankruptcies; reduced repayment capacity as measured by credit scores or debt-to-income ratios; or incomplete credit histories. Alt-A mortgages, though of higher quality than subprime mortgages, are considered lower credit quality than prime mortgages due to one or more nonstandard features related to the borrower, property, or loan.

adverse trends in employment and income in certain U.S. regions (IMF, 2007b).<sup>6</sup> Since then, delinquency rates on subprime mortgage loans originated in 2005–06 have continued to rise, exceeding the highest rates recorded on any prior vintage (at comparable seasoning). Mortgages originated in 2007 are on track to perform even worse, based on their current trajectory. With declines in U.S. home prices, recent vintages will have lower (and possibly negative) equity cushions, a greater probability of becoming delinquent, and lower recovery rates on foreclosure. Within recent cohorts, the deterioration has been primarily associated with the least creditworthy borrowers defaulting on adjustable-rate mortgages (ARMs).<sup>7</sup> Going forward, as initial “teaser” rates on ARMs expire, the rise in interest payments is likely to cause a further rise in delinquencies.<sup>8</sup>

<sup>6</sup>“Risk layering” refers to the practice whereby mortgage lenders combine nontraditional mortgages with weaker credit controls, for instance, by accepting high combined loan-to-value ratios, reduced documentation, and little or no downpayment.

<sup>7</sup>As of the third quarter of 2007, 43 percent of foreclosures were on subprime ARMs, 19 percent on prime ARMs, 18 percent on prime fixed-rate mortgages, 12 percent on subprime fixed-rate mortgages, and 9 percent on loans with insurance protection from the Federal Housing Administration. That foreclosures have been dominated by ARMs likely reflects the shift in the mortgage landscape from fixed to floating rates over the last few years. Indeed, anecdotal evidence suggests that foreclosures have primarily occurred well ahead of the reset period, suggesting that the deterioration thus far has been a function of fraud, speculation, over-extension by borrowers, and the effects of weak underwriting standards.

<sup>8</sup>In 2008, \$250 billion of subprime mortgages are scheduled to reset, versus \$82 billion in prime mortgages and \$29 billion in alt-A mortgages. Easier monetary policy (and hence lower six-month LIBOR rates to which ARMs are traditionally indexed) helps to alleviate, but not fully eliminate, some payment shock as ARMs reset. IMF staff estimates suggest that average monthly payments on subprime mortgages will still rise by roughly 15 percent upon reset, while alt-A and jumbo interest-only ARMs will be subject to even higher payment shock, as borrowers are required to amortize their principal at the initial reset. Moreover, it will be difficult for borrowers to benefit fully from any further monetary policy easing, since most ARMs have floors and caps. Refinancing would be difficult in the current environment of tighter lending

*Lax underwriting standards also played a role in higher-quality segments of the U.S. mortgage universe, but downward real estate prices and the employment rate are now the key drivers.*

The same pattern of weakly performing recent vintages has emerged in higher-quality alt-A and nonagency prime (“jumbo”) sectors, although the degree of underperformance is much lower (Figure 1.2).<sup>9</sup> Delinquencies on prime mortgages are more significantly driven by weakness in underlying economic fundamentals.<sup>10</sup> However, most prime borrowers have more equity cushion to withstand possible future headwinds, including interest rate resets. Even with the declines in nationwide home prices, on average, outstanding mortgage equity stands at 40 to 50 percent of home value on ARMs extended to prime borrowers, compared with less than 5 percent for subprime borrowers. Going forward, however, if home prices continue to fall and other macroeconomic fundamentals weaken, there is a risk of higher defaults on prime mortgages, especially on recent vintages. Reflecting the deterioration in the underlying collateral, prices have continued to slide on nonagency securitized mortgages (Figure 1.3).

*Some similar features are beginning to emerge in Europe, as housing cycles start to turn.*

European housing and mortgage markets have unique characteristics that vary considerably from country to country. Signs of a downturn are becoming evident in certain European housing markets. Market pricing of property derivatives points to outright home price declines in the United Kingdom, following

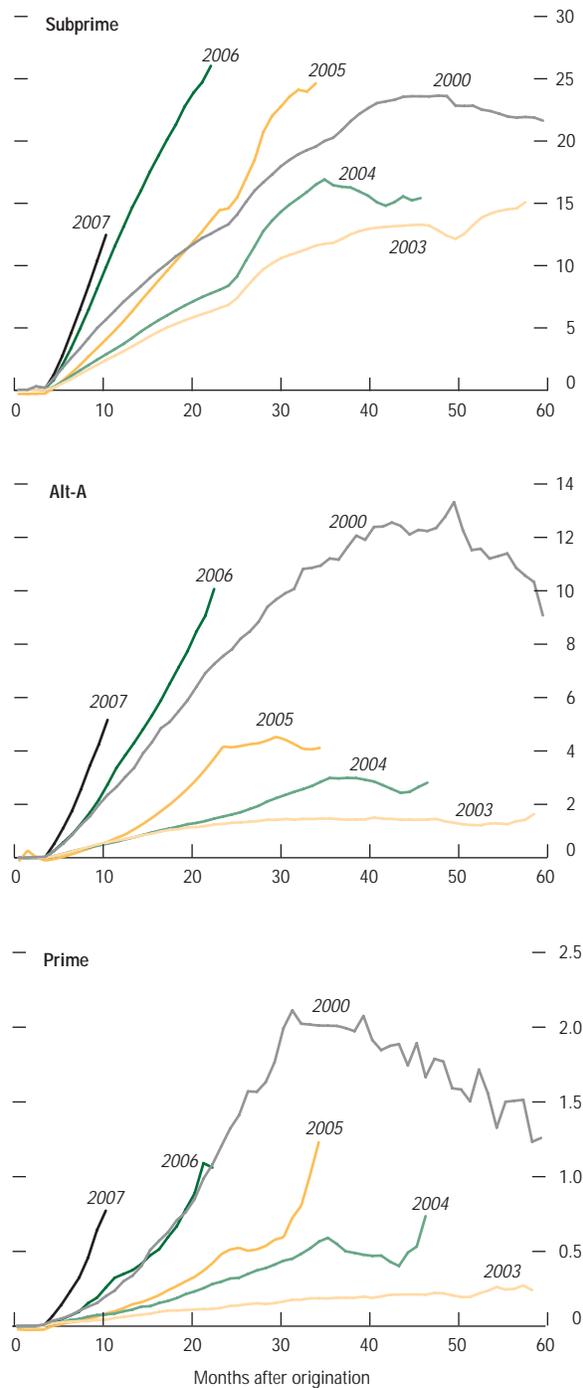
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conditions or just as costly, since fixed rates on mortgages are still elevated.

<sup>9</sup>The prime mortgage market is comprised of loans, which conform to the standards of government-sponsored entities (GSEs), and jumbo loans extended to creditworthy borrowers who do not conform to the GSEs’ criteria for securitization.

<sup>10</sup>Econometric work suggests that the deterioration in lending standards typically contributes only partially to the deterioration in prime mortgage performance, with other factors, especially the unemployment rate, proving to be a more important determinant.

**Figure 1.2. Mortgage Delinquencies by Vintage Year**  
*(60+ day delinquencies, in percent of balance)*



Sources: Merrill Lynch; and LoanPerformance.

the U.S. trajectory with a one- to two-year lag (though with a shortage of participants seeking to take long positions, property derivative markets can be fairly illiquid, failing fully to reflect market views). In other over-extended markets (see Box 3.1 in the April 2008 WEO), industry analysts are also forecasting declines in home prices (Figure 1.4). In addition, in the United Kingdom a sizable share of mortgage loans face interest rates that will reset to higher levels this year, just at a time when lenders are tightening standards, adding another source of stress.<sup>11</sup> Nevertheless, underlying collateral performance remains strong in Europe. As a result, recent prime delinquencies are trending in line or lower relative to prior vintages, and loss rates remain low. More conservative mortgage financing arrangements in European countries suggest effects of house price declines will likely be more muted than those in the United States.

If growth slows in Europe, as predicted in the latest WEO, repossessions and write-offs will rise. Some analysts foresee a near doubling of repossessions in the United Kingdom, for example, pushing writedowns to 1.4 percent of total mortgages outstanding or around \$32 billion, driven mainly by nonprime and high loan-to-value loans.<sup>12</sup> Delinquency rates on UK nonconforming loans would therefore rise (Figure 1.5).

*Spillovers have emerged in the U.S. commercial real estate sector, which is unlikely to remain insulated from a cyclical deterioration and tightening in financing conditions.*

The \$3.3 trillion commercial real estate market, like the residential market, has experienced rising property prices, rapid origination growth, and increasing securitization, and has also begun to show signs of strain (Figure 1.6). Property price appreciation has already slowed

<sup>11</sup>Many UK borrowers coming off fixed rates will face rate increases of 100 to 200 basis points.

<sup>12</sup>As mentioned in the October 2007 GFSR, UK nonconforming loans have some features in common with U.S. nonprime loans (IMF, 2007a). Lending criteria for UK nonconforming loans were tightened in late 2007 and early 2008.

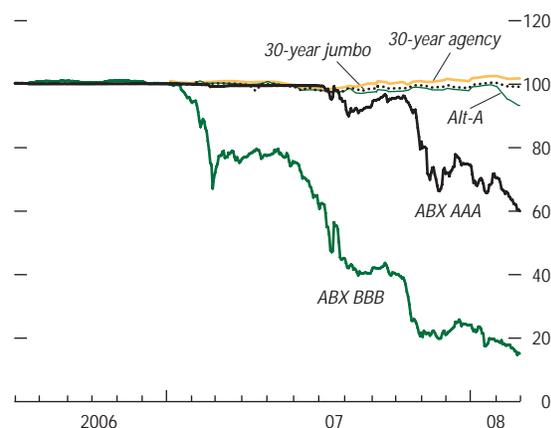
and securitization has stalled so far this year. Although product innovation and risk layering techniques have been less widespread, loan-to-value ratios have risen, debt service coverage ratios have dropped, and an increasing share of loans have been originated under looser standards.<sup>13</sup> So far, delinquency and loss rates have remained low as rents have stayed high and vacancy rates low. However, the weaker U.S. economic outlook, combined with tighter lending standards, is likely to lead to increasing losses, particularly on recently originated loans. Commercial mortgage-backed security (CMBS) spreads have widened to near-record levels, even on the highest-rated tranches, implying market expectations for default and loss rates worse than any yet experienced in the U.S. commercial property market (Figure 1.7).<sup>14</sup>

There are notable differences, though, that may prevent the risks to the commercial real estate sector from intensifying to the same extent as in the residential mortgage sector. First, only about one-quarter of the commercial real estate sector is securitized, substantially lower than the 80 to 90 percent securitization rates observed in the subprime residential market at its peak, and there is less repackaging into structured products. This should increase the “skin in the game” for the sector as a whole. Second, commercial mortgage borrowers are less likely to face payment shocks associated with resetting mortgage rates, since most commercial mortgages are standard, 7- to 10-year fixed-rate loans. Third, borrowers in the commercial sec-

<sup>13</sup>For instance, an increasing proportion of new loans were full-term, interest-only loans. Such loans do not amortize until the final payment, and thus offer less amortization over the life of the loan than other types of mortgages. In addition, subordination levels in securitized products declined, typical of the countercyclical pattern observed in rating cycles. Only in early 2007 did the major rating agencies begin to require higher subordination levels on new deals, leading to some improvement in credit quality later in the year.

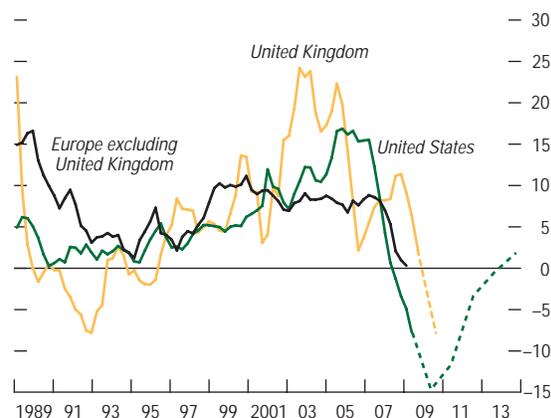
<sup>14</sup>Technical factors may have played a role in the spread widening, as speculative and hedging activity shifted from the ABX to the CMBX, indices of credit default swaps linked to a subset of underlying subprime and commercial mortgage-backed securities, respectively.

**Figure 1.3. U.S. Mortgage-Related Securities Prices**



Sources: JPMorgan Chase & Co.; and Lehman Brothers.  
Note: ABX = an index of credit default swaps on mortgage-related asset-backed securities.

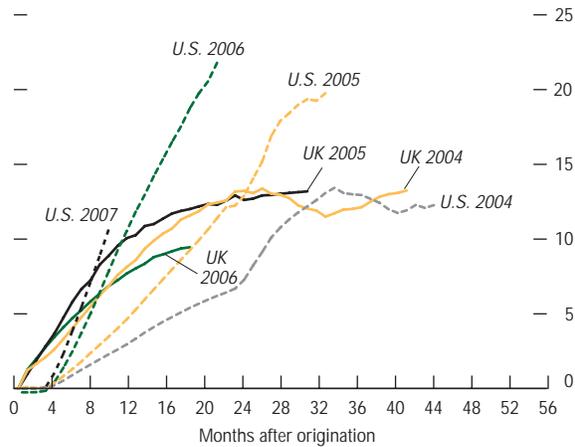
**Figure 1.4. U.S. and European House Price Changes (Percent year-on-year)**



Sources: Standard & Poor's/Case Shiller; national authorities; and IMF staff estimates.

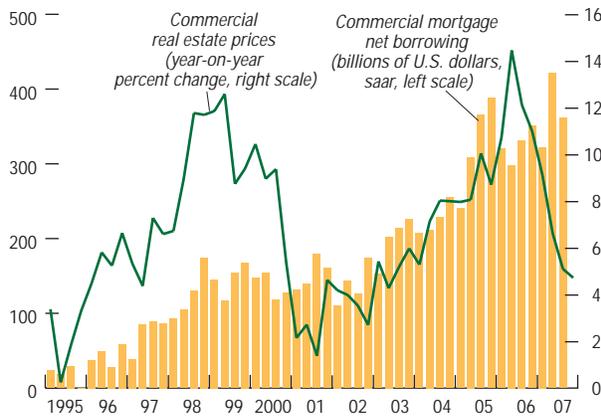
Note: Europe excluding the United Kingdom: unweighted average of Spain, Germany, Italy, Netherlands, Greece (from 1995), and Ireland (from 1997). Estimates are based on futures prices. Dashed lines are futures implied.

**Figure 1.5. U.S. and UK Nonconforming Delinquencies by Mortgage Vintage Year**  
(In percent of balance)



Sources: Fitch Ratings; LoanPerformance; Merrill Lynch; and IMF estimates.  
Note: UK delinquencies for 90+ days; U.S. delinquencies for 60+ days.

**Figure 1.6. Commercial Mortgage Borrowing and Real Estate Prices**



Sources: Federal Reserve; and Standard and Poor's.  
Note: saar = seasonally-adjusted annual rate.

tor typically have audited financial statements, which should help keep the incidence of fraud well below that observed in the residential sub-prime sector.

*Concerns about the economic outlook and tighter lending conditions are also starting to weigh on U.S. consumer credit markets.*

Despite the weakening in mortgage markets, credit quality in the \$2.5 trillion U.S. consumer debt market has remained fairly strong, suggesting that some borrowers have made it a priority to stay current on credit card and auto debts.<sup>15</sup> Delinquency and charge-off rates have picked up slightly since late 2005 across the various consumer credit markets, but remain low relative to levels observed during the last U.S. economic downturn in 2001 (Figure 1.8).<sup>16</sup> This may reflect the fact that consumer loans have not grown at the same pace as mortgages over the last few years and that declaring bankruptcy to avoid paying consumer debt has become a less attractive option for some borrowers following bankruptcy reforms in 2005.<sup>17,18</sup> However, consumer credit performance is expected to weaken as the rate of personal bankruptcies rebounds and unemployment increases. Econometric work used to estimate consumer loan losses indicates that rising unemployment rates have made the most significant contribution to increases in consumer loan charge-offs.

<sup>15</sup>As of 2007, U.S. households held \$2.5 trillion in consumer debt in the form of revolving (\$900 billion), primarily credit card debt, and nonrevolving debt (\$1.6 trillion), most of which is auto loans. The securitized market represents roughly \$780 billion, spanning a wide range of assets, including credit cards (\$343 billion), auto leases (\$199 billion), student loans (\$236 billion), and other miscellaneous securitized loans.

<sup>16</sup>A charge-off occurs when payments are no longer collectible, due either to bankruptcy or default.

<sup>17</sup>Consumer debt grew at an average annual rate of 5 percent during 2002–06 compared with the 12 percent growth rate of secured mortgage debt, which included home equity loans.

<sup>18</sup>Consumer charge-off rates dropped significantly after a spate of accelerated personal bankruptcies in late 2005 before the implementation of a stricter bankruptcy law.

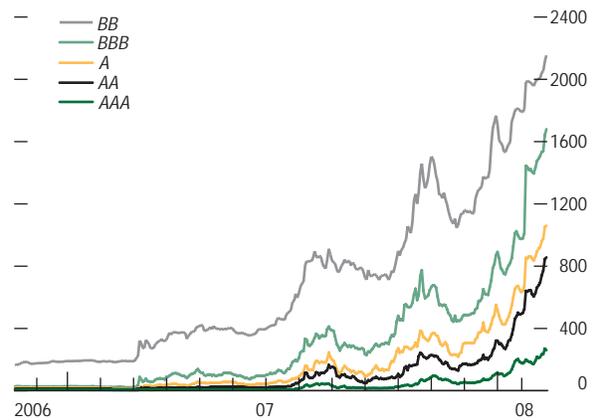
Reflecting concerns about the deteriorating outlook, spreads on consumer-related asset-backed securities (ABS) have widened to record levels. However, a simple comparison of credit card charge-off rates to discounts on consumer credit ABS suggests that spreads are implying an extreme high in charge-off rates relative to the historical trend (Figure 1.9).<sup>19</sup> As in some other credit markets, the repricing in risk premia appears to be more reflective of the broader credit market stress than of the underlying collateral quality.

*The corporate debt market appears vulnerable as default rates are set to rise, owing to both macroeconomic and structural factors.*

Financial innovation and low policy rates have helped keep corporate default rates at historically low levels long after they had been forecast to rise. The October 2007 GFSR warned that highly leveraged firms were vulnerable to business and economic shocks (IMF, 2007a). Experience is already bearing out this view. U.S. corporate defaults on high-yield debt in January 2008 alone roughly equaled defaults for the whole of 2007, and January’s leveraged loan defaults were twice those seen in all of 2007. Meanwhile, the ratio of downgrades to upgrades on U.S. debt has already risen back to the level of May 2005, when General Motors and Ford were downgraded to subinvestment grade. Downgrades occurred across a range of assets, not just structured finance, and rating agencies appear to be ready to change ratings more promptly than in the past. At the same time, supply factors continue to weigh on the market. The pipeline of leveraged loans and related high-yield bonds has shrunk only modestly, as banks have preferred to take loans onto their balance sheets rather than sell them at deep discounts. Nevertheless, loan prices have fallen (Figure 1.10) in secondary markets and some

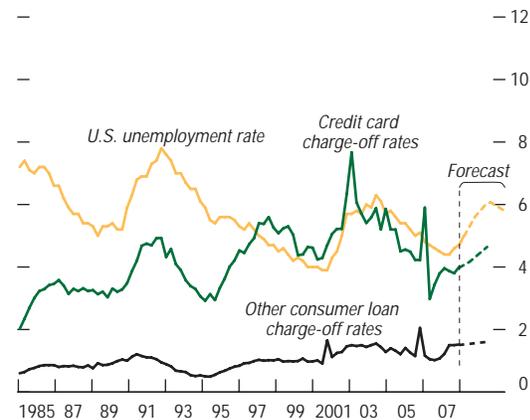
<sup>19</sup>An alternative explanation could be that markets are anticipating a deeper downturn and retrenchment of credit card debt, which would increase the correlation among the underlying individual risks, and would have an impact on valuation and capital requirements.

**Figure 1.7. CMBX Spreads**  
(In basis points)



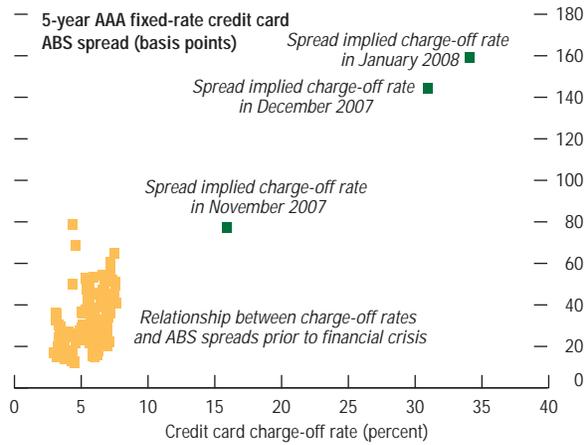
Source: JPMorgan Chase & Co.  
Note: CMBX = an index of 25 credit default swaps on commercial mortgages.

**Figure 1.8. Charge-Off Rates for U.S. Consumer Loans**  
(In percent)



Sources: Federal Reserve; and IMF staff estimates.

**Figure 1.9. Credit Card Charge-Off Rates versus Credit Card Asset-Backed Spreads on Securities**



Sources: Federal Reserve; JPMorgan Chase & Co.; Standard & Poor's; and IMF staff estimates.  
 Note: Data are based on monthly observations. ABS = asset-backed security.

collateralized loan obligations (CLOs) used to repackage leveraged loans are unwinding, forcing banks to take loans back onto their balance sheets.

Looking ahead, high-yield default rates may rise to 4 to 12 percent if the economy goes into recession (see Box 1.1). The higher side of that range would be comparable to the last recession in 2001 and come close to the peak in defaults during the 1990–91 recession. The unprecedented issuance of low-tier corporate debt over 2003–07, combined with the increase in leverage, may exacerbate corporate distress during the credit downturn (Figure 1.11).<sup>20,21</sup> Refinancing risk could further pressure defaults in the near term as \$650 billion of leveraged loans are set to mature starting in 2008 over the next three years.<sup>22</sup>

### Systemic Risks Have Risen Sharply

The previous section detailed the deepening and the broadening of the crisis to other market segments. This section attempts to quantify the potential losses that can be expected from the crisis, while tracing the potential systemic effects.

**Figure 1.10. LCDX Prices and Spreads**



Source: JPMorgan Chase & Co.  
 Note: LCDX = an index comprised of 100 credit default swaps referencing first-lien loans.

*Broader credit deterioration, a weakening economy, and falling credit prices combine into a substantial hit to the capital of systemically important financial institutions.*

We estimate aggregate potential writedowns and losses to be approximately \$945 billion as

<sup>20</sup>Over the last five years, low-tier bonds accounted for an average of 21 percent of total high-yield debt issuance (peaking at 37 percent in 2007), compared with an average of 15 percent in 1998, which preceded escalating defaults over 1999–2002. Typically, 60 percent of CCC-rated bonds default before they mature, and 36 percent default within three years of issuance.

<sup>21</sup>Leverage was needed to boost returns over the last few years, owing to a lack of distressed debt. This led to 7 times (and sometimes as much as 10 times) leverage on U.S. leveraged buyouts. In Europe, debt multiples also were stretched, with leverage of 5.5 times in 2007, versus 4.7 times in 1998.

<sup>22</sup>The increase in “covenant-lite” loans may hinder early intervention by lenders, possibly delaying some defaults until later in the cycle, but potentially increasing the probability of default.

of March 2008 (see Table 1.1 and Annex 1.2 for details on the methodology).<sup>23,24</sup> Aggregate losses are on the order of \$565 billion for U.S. residential loans (nonprime and prime) and securities and \$240 billion on commercial real estate securities. Corporate loans (including leveraged loans and CLOs) are expected to account for \$120 billion of losses, while consumer loan losses are likely to add an additional \$20 billion. Most of the nonprime losses are in securities rather than unsecuritized loans. At present, pricing of mortgage-related derivative indices suggests higher losses than do calculations based on projected cash flows for the underlying loans.<sup>25</sup> Since the October 2007 GFSR, ABS prices have declined between 20 and 40 percent across tranches rated AAA to BBB-, and as much as 50 percent on ABS collateralized debt obligations (ABS CDOs) across all ratings categories, reflecting market expectations of future deterioration and illiquidity of the underlying securities. (See Boxes 2.2 to 2.4 in Chapter 2 for more details on the fragility of structured product ratings and their valuations.) Market prices continue to adjust on an almost daily basis, pressuring market-to-market losses higher.

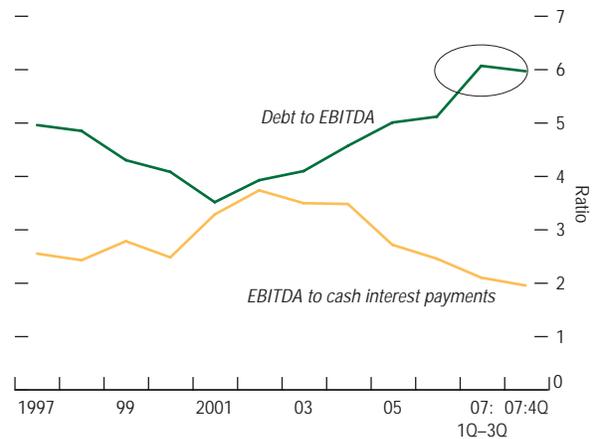
Potential credit losses would lower aggregate capital adequacy ratios at U.S. banks by

<sup>23</sup>Loss estimates vary considerably, given different assumptions about inputs and valuation methods, so IMF staff estimates should be regarded as merely an exercise to help gauge the indicative magnitude of risks to the financial system. We estimate losses in two parts as indicated in Table 1.1, which is a composite of market-implied accumulated losses in the securitized markets and potential loan losses associated with the slowdown in economic activity. The top panel estimates projected losses on unsecuritized loans, net of recoveries, on real estate, consumer, and corporate loans, based on projected shortfalls in cash flows in the near term. Underpinning cash flow estimates is an expected deterioration in the U.S. economy, consistent with increasing macroeconomic risks highlighted in the global financial stability map and detailed in the April 2008 WEO.

<sup>24</sup>Note the term "losses" used in this context refers to potential writedowns, as opposed to negative net profits.

<sup>25</sup>ABS prices are based on the ABX, an index of credit default swaps linked to 20 underlying subprime mortgages. ABS CDO prices are based on the TABX, an index that tranches synthetic CDOs based on the BBB- and BBB ABX indices.

Figure 1.11. U.S. Leveraged Buyout Loans: Credit Quality Indicators



Sources: Standard & Poor's LCD; and IMF staff estimates.  
 Note: EBITDA = earnings before interest, tax, depreciation, amortization.

**Table 1.1. Estimates of Financial Sector Potential Losses as of March 2008***(In billions of U.S. dollars)*

|                                       | Estimates of Losses on Unsecuritized U.S. Loans          |                               | Breakdown of Losses on Unsecuritized Loans |                |                  |                     |                           |
|---------------------------------------|--|-------------------------------|--|----------------|------------------|---------------------|---------------------------|
|                                       | Outstanding  | Estimated loss                | Banks                                      | Insurance      | Pensions/Savings | GSEs and government | Other (hedge funds, etc.) |
| Subprime                              | 300  | 45                            | 20–30                                      | <5             | <5               | 10–15               | 5–10                      |
| Alt-A                                 | 600  | 30                            | 15–20                                      | <5             | <5               | 5–10                | <5                        |
| Prime                                 | 3,800  | 40                            | 15–20                                      | <5             | <5               | 15–20               | <5                        |
| Commercial real estate                | 2,400  | 30                            | 15–20                                      | <5             | <5               | <5                  | <5                        |
| Consumer loans                        | 1,400  | 20                            | 10–15                                      | <5             | <5               | —                   | <5                        |
| Corporate loans                       | 3,700  | 50                            | 25–30                                      | <5             | <5               | —                   | 15–20                     |
| Leveraged loans                       | 170  | 10                            | 5–10                                       | <5             | <5               | —                   | <5                        |
| <b>Total for loans</b>                | <b>12,370</b>  | <b>225</b>                    | <b>100–130</b>                             | <b>10–20</b>   | <b>10–20</b>     | <b>30–50</b>        | <b>40–50</b>              |
|                                       | Estimates of Mark-to-Market Losses on Related Securities |                               | Breakdown of Losses on Securities          |                |                  |                     |                           |
|                                       | Outstanding  | Estimated mark-to-market loss | Banks                                      | Insurance      | Pensions/Savings | GSEs and government | Other (hedge funds, etc.) |
| ABS                                   | 1,100  | 210                           | 85–100                                     | 20–35          | 35–45            | 20–35               | 20–45                     |
| ABS CDOs                              | 400  | 240                           | 145–160                                    | 35–50          | 15–25            | 0–25                | 15–50                     |
| Prime MBS                             | 3,800  | 0                             | —  | —              | —                | —                   | —                         |
| CMBS                                  | 940  | 210                           | 85–95                                      | 20–35          | 30–45            | 20–35               | 20–45                     |
| Consumer ABS                          | 650  | 0                             | —  | —              | —                | —                   | —                         |
| High-grade corporate debt             | 3,000  | 0                             | —  | —              | —                | —                   | —                         |
| High-yield corporate debt             | 600  | 30                            | 10–15                                      | <5             | 5–10             | —                   | <5                        |
| CLOs                                  | 350  | 30                            | 15–20                                      | <5             | <5               | —                   | 0–10                      |
| <b>Total for securities</b>           | <b>10,840</b>  | <b>720</b>                    | <b>340–380</b>                             | <b>95–110</b>  | <b>70–120</b>    | <b>40–90</b>        | <b>70–150</b>             |
| <b>Total for loans and securities</b> | <b>23,210</b>  | <b>945</b>                    | <b>440–510</b>                             | <b>105–130</b> | <b>90–160</b>    | <b>70–140</b>       | <b>110–200</b>            |

Sources: Goldman Sachs; JPMorgan Chase &amp; Co.; Lehman Brothers; Markit.com; Merrill Lynch; and IMF staff estimates.

Note: ABS = asset-backed security; CDO = collateralized debt obligation; CLO = collateralized loan obligation; CMBS = commercial mortgage-backed security; GSE = government-sponsored enterprise; MBS = mortgage-backed security.

about 250 basis points, and at European banks by about 150 basis points. Although aggregate ratios remain above regulatory norms, a bottom-up analysis of losses indicates that some banks and regions will suffer disproportionately. Put in historical perspective, this crisis is of similar dollar magnitude to the Japanese banking crisis of the 1990s (Figure 1.12).<sup>26</sup>

*Uncertainty over the size and spread of losses further elevates systemic risks, even as markets price in losses for banks and insurance companies.*

Global banks are likely to shoulder roughly half of aggregate potential losses, totaling from

\$440 billion to \$510 billion, with insurance companies, pension funds, money market funds, hedge funds, and other institutional investors accounting for the balance.<sup>27</sup> Banks generally hold the most senior tranches of these products, but even these are now likely to incur substantial losses (see Boxes 2.3 and 2.4 in Chapter 2). European banks hold sizable amounts of complex structured products such as MBS and CDOs and have been exposed to losses related to structured investment vehicles (SIVs) (Figure 1.13).

By mid-March 2008, U.S. banks had reported most of their estimated losses, with European banks' disclosures catching up owing partly to the longer reporting lags of European banks

<sup>26</sup>It should be noted that the current scenario is not directly comparable to prior crises, since the subprime crisis reflects potential estimated losses to financial institutions, some of which have yet to occur.

<sup>27</sup>The exposure of market participants to losses is uncertain partly because placement data for various types of securities are imprecise.

(see Annex 1.2). In addition, nonbank financial institutions, including insurance companies, may yet also report sizable additional writedowns.

Bank equity and debt capital markets appear to have taken into account the effect of credit-market-related losses. The market capitalization of banks globally declined by some \$720 billion through March 2008. Insurance companies have also experienced a decline in market value that appears to be commensurate with the top-down loss estimate of \$105 billion to \$130 billion.

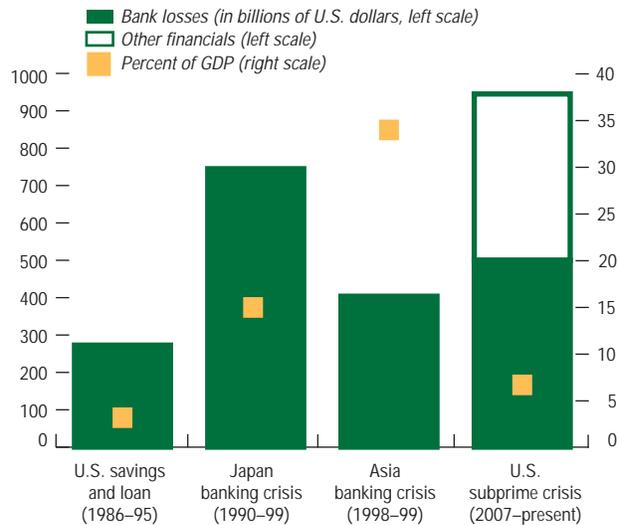
*Strains are compounded by pressures on financial guarantors...*

Additional bank losses may originate from the knock-on effects of rating downgrades on financial guarantors, as the ratings on insured bonds would decline and certain hedges would become less effective. IMF staff estimate the total losses to banks from potential downgrades of financial guarantors to be \$60 billion to \$90 billion, depending on whether the downgrade is one grade (from AAA to AA) or two (to A).<sup>28,29</sup> Since 1998, most financial guarantors (such as AMBAC, MBIA, and FGIC) have expanded their traditional business of insuring bonds issued by U.S. municipalities to include structured credit (i.e., ABS and ABS CDOs) and, to a lesser extent, corporate bonds. Losses on ABS protection have now eaten into the capital of a number of financial guarantors, threatening both their own credit ratings and those of

<sup>28</sup>These estimates are subject to considerable uncertainty given the limited information on individual banks' exposures, especially to credit default swap (CDS) contracts written by financial guarantors and used by banks to hedge CDOs.

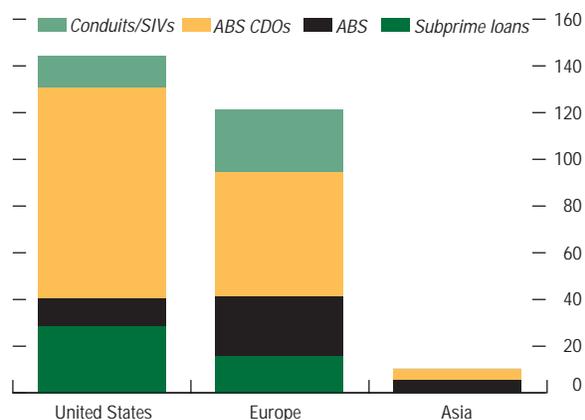
<sup>29</sup>Initiatives to resolve the problems affecting some financial guarantors are continuing. The New York state insurance regulator has been working with banks on plans to recapitalize and potentially restructure those companies most affected by losses on structured finance business. Some of the companies have now raised new capital, enabling them to retain AAA ratings for the time being. But it remains unclear whether there will be further ratings downgrades of financial guarantors in the future. The New York regulator has committed to a review of its regulatory approach to financial guaranty business.

Figure 1.12. Comparison of Financial Crises



Sources: World Bank; and IMF staff estimates.  
 Note: U.S. subprime costs represent staff estimates of losses on banks and other financial institutions from Table 1.1. All costs are in real 2007 dollars. Asia includes Indonesia, Korea, the Philippines, and Thailand.

Figure 1.13. Expected Bank Losses as of March 2008 (In billions of U.S. dollars)



Sources: Goldman Sachs; UBS; and IMF staff estimates.  
 Note: ABS = asset-backed security; CDO = collateralized debt obligation; SIV = structured investment vehicle.

**Box 1.1. Outlook for U.S. High-Yield Corporate Debt Markets and Default Rates<sup>1</sup>**

The corporate debt market is set to weaken and default rates are expected to rise from historic lows due to both macroeconomic and structural factors. Macroeconomic variables, credit and financial conditions, and market perception of risk are typically used to model and forecast default rates. All of these indicators and models have predicted rising corporate debt defaults since 2007. However, increased financing flexibility extended by lenders may have deferred

realized defaults. As well, structural changes in the composition of the corporate debt market may add to market distress in a downturn.

Three empirical approaches discussed below all point to a rise in defaults in 2008, with macroeconomic and credit market conditions being the key drivers.

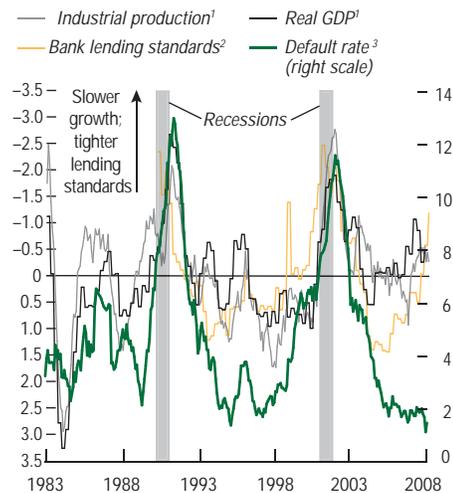
**Macroeconomic and credit conditions.** Historically, default rates are inversely related to the level of economic activity (see first figure). Both GDP and industrial production closely track the contemporaneous level of default rates. Bank lending standards tend to lead a rise in default rates and are considered a reliable forecasting indicator. Both macroeconomic and credit variables have been signaling a pickup in the default rate over the last year, with expected defaults far exceeding actual defaults.

**Financial and corporate indicators** (see second figure). Another way to project default rates

Note: Sergei Antoshin prepared this box.

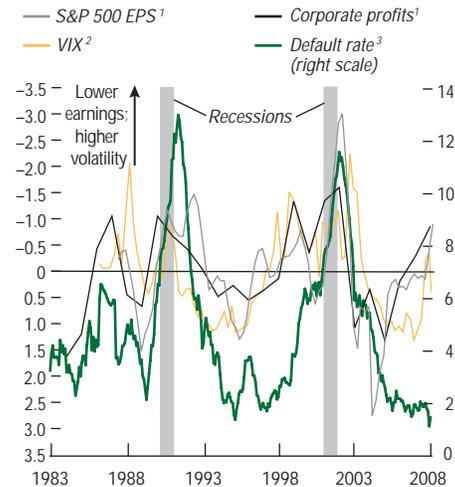
<sup>1</sup>While this box relates exclusively to U.S. credits, it is recognized that losses related to European-issued securities could be substantial. Indeed, European leveraged buyout deals saw a similar, albeit less pronounced, rise in leverage. In addition, the European high-yield market has also become riskier (as reflected by the higher share of low-tier debt issuance), although it still only represents 15 to 20 percent of the global high-yield debt market.

**Macroeconomic Indicators and Default Rates**



Sources: Bureau of Economic Analysis; Federal Reserve; JPMorgan Chase & Co.; Merrill Lynch; Moody's; National Bureau of Economic Research; and IMF staff estimates.  
<sup>1</sup>Year-on-year changes; standardized over 1983–present; inverted scale.  
<sup>2</sup>Net survey balances; standardized over 1990–present.  
<sup>3</sup>Issuer-weighted.

**Financial and Corporate Indicators and Default Rates**



Sources: Bloomberg L.P.; Bureau of Economic Analysis; JPMorgan Chase & Co.; Merrill Lynch; Moody's; National Bureau of Economic Research; and IMF staff estimates.  
<sup>1</sup>Year-on-year changes; standardized over the sample periods; inverted scale.  
<sup>2</sup>Standardized over 1986–present.  
<sup>3</sup>Issuer-weighted.

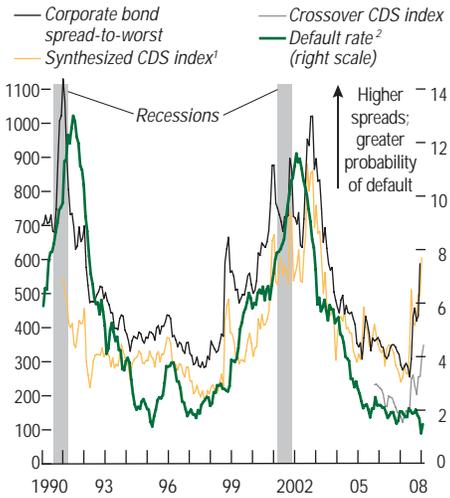
examines corporate profits (to proxy corporate debt market performance), the implied volatility of the S&P 500 (to capture uncertainty over the future earnings stream), and the debt-to-earnings ratio for high-yield companies (to capture the degree of debt burden relative to revenue). After posting strong growth during 2002–06, corporate profits contracted 1.9 percent year-on-year in 2007, and are expected by the market to remain flat in 2008. Implied equity volatility (VIX) rose from 11 percent in January 2007 to 25 percent as of February 2008, and futures markets expect volatility to remain elevated during 2008. The debt-to-earnings ratio for high-yield corporates has been growing since 2005, and is likely to increase further in 2008. In short, financial indicators also point in the direction of increasing default rates.

**Extraction of default probabilities from credit risk transfer markets.** Observed prices or yields on corporate bonds and credit default swaps can also be used to derive the implied probability of default. The corporate debt and credit default swap markets have already partly priced in a heightened probability of default (see third figure and Annex 1.2).

Weakening credit discipline may have both delayed and masked the rise in defaults. Loosening credit standards, especially in the leveraged buyout market, resulted in the growth of “covenant-lite” loans, whose holders are not obliged to meet quarterly maintenance criteria. This increased financing flexibility from the lender’s side may help to explain the unusually low number of defaults in the last two years.

As the credit cycle turns, the rise in default rates may magnify stress in bond markets

**Valuation of Financial Instruments Based on Implied Probability of Default**



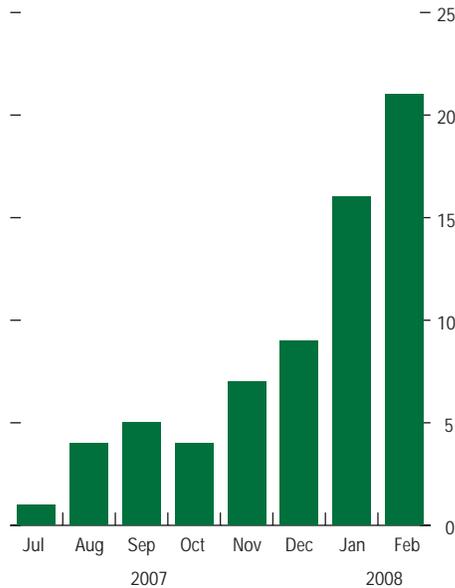
Sources: Bloomberg L.P.; Dow Jones; JPMorgan Chase & Co.; Merrill Lynch; Moody's; National Bureau of Economic Research; and IMF staff estimates.

<sup>1</sup>Index based on a blend of realized collateralized debt swaps (CDS) and high-yield bond indices.

<sup>2</sup>Issuer-weighted.

**Share of “Stressed Debt”**

(Percent of high-yield market trading 1000+ basis points above U.S. treasuries)



Source: Bloomberg L.P.

**Box 1.1 (concluded)****Forecasts of U.S. High-Yield Default Rates in 2008***(In percent)*

|  | Assumptions <sup>1</sup> |                   | Forecasts <sup>2</sup>                                |                                  |
|--|--------------------------|-------------------|---|----------------------------------|
|  | Industrial production    | Lending standards | <i>(In percent of U.S. high-yield corporate debt)</i> |                                  |
|  |                          |                   | Structural delay <sup>3</sup>                         | No structural delay <sup>4</sup> |
| Best case scenario<br>(No deterioration of economic conditions)      | 1.7                      | 20                | 4.0   | 9.3                              |
| Baseline scenario<br>(Moderate deterioration of economic conditions) | -2.0                     | 30                | 4.7   | 10.4                             |
| Worst case scenario<br>(Economic recession)                          | -5.5                     | 50                | 5.8   | 12.3                             |

Sources: Bureau of Economic Analysis; Federal Reserve; and IMF staff estimates.

<sup>1</sup>For industrial production, 2008:Q4 year-on-year growth in percent; for lending standards, 2008:Q4 net percentage of respondents reporting tightening lending standards for commercial and industrial loans to large and medium-size firms.

<sup>2</sup>The default rate is modeled as dependent on its lags, the current and past levels of industrial production growth, and lags of the lending standards indicator.

<sup>3</sup>Under the structural delay assumption, default rates depend on the economic and credit variables, but loosening financing standards continue to delay the full realization of default rates in 2008. The default rate for 2008 is forecast based on the 1990–2007 sample.

<sup>4</sup>Under the no-structural delay assumption, shadow default rates followed the fundamentals in 2007 and defaults are fully realized in 2008. The default rate for 2007 and 2008 is forecast based on the 1990–2006 sample.

owing to several factors. First, there was an unprecedented issuance of low-rated debt over 2003–07, which has raised the share of CCC-rated bonds in total high-yield debt above the end-2000 level. Second, increased leverage on corporate debt—amid deterioration in overall debt quality—may have aggravated vulnerability to external financial conditions, affecting asset quality and earnings streams. In addition, the increase in the share of secured corporate debt from 5 to 11 percent of total high-yield debt over the last seven years may lower recovery rates and prices of unsecured bonds. Third, the maturity profile of leveraged loans is fairly short, subjecting them to near-term refinancing risk as well as raising default risk.

When realized default rates diverge from fundamentals, some analysts rely on proxies for distressed debt, such as the share of “stressed debt” (trading 1000 basis points or more above U.S. treasuries). As the fourth figure illustrates, the pendulum has swung dramatically, presaging rising defaults, with the share of stressed debt rising from 9 percent in December 2007 to 21 percent in February 2008. Other measures of debt distress attempt to estimate the

number of companies that are able to raise additional debt in the absence of cash to pay interest on existing debt. Liquidity ratings compiled by the major rating agencies suggest that liquidity positions of leveraged borrowers weakened dramatically during 2007.

The different scenarios for the default rate in 2008 are outlined using econometric modeling based on macroeconomic and credit variables and taking into account the possibility of a delay in a full realization of defaults (see table). If the loosening financing standards from lenders continue to delay realized default rates, the default rate is projected in the range of 4 to 6 percent, depending on the extent of the U.S. economic slowdown. If default rates are set to revert to the levels implied by economic fundamentals that were observed before 2007, defaults could rise more sharply, in the range of 9 to 12 percent, based on our estimates.<sup>2</sup>

<sup>2</sup>These forecast ranges are in line with the 2 to 10 percent array of forecasts produced by credit agencies and market analysts.

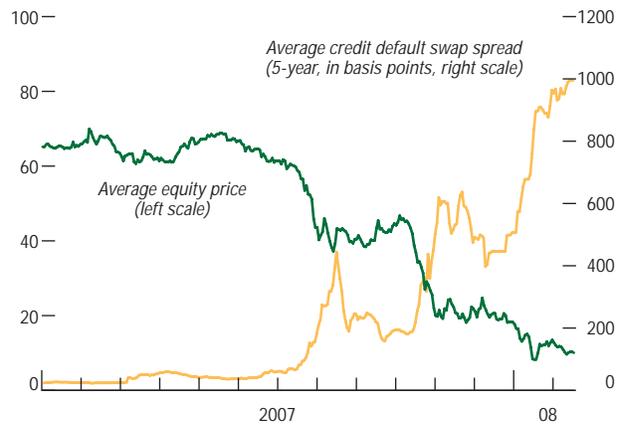
the debt they insure (Figure 1.14).<sup>30</sup> Additional downgrades of financial guarantors would cause the value of the \$800 billion of structured credit they have insured to fall further, imposing additional losses on banks.

*...raising concerns about counterparty risks and spillovers in the credit default swap market...*

In view of the weakened capital position of financial guarantors—and because guarantors are not required to post maintenance margins on credit default swap (CDS) contracts that they have sold—many banks have begun to write down the value of the protection they have bought from financial guarantors. For the CDS market overall, losses incurred by protection sellers should equal the gains of protection buyers, but specific sectors may be heavily positioned one way, leading to an increase in counterparty credit risk in the event of a rise in corporate defaults. The concentration of counterparty risk in the CDS market could further compound the risk of multiple failures, for instance, if an individual protection seller is unable to fulfill its payment obligations.<sup>31,32</sup>

Weaknesses in infrastructural arrangements for CDS markets may further exacerbate risks. Despite earlier attempts to address back-office processing delays, recent slippage in the timeliness of confirmations and affirmations in over-the-counter markets—including corporate CDS—means that many market participants cannot assess in real time changes in their CDS exposures. Moreover, the absence of a central counterparty and multilateral netting of contracts leaves the system dependent on potentially

Figure 1.14. Financial Guarantors



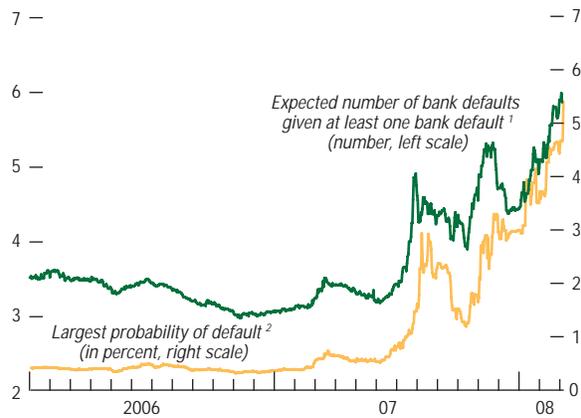
Source: Bloomberg L.P.

<sup>30</sup>Several financial guarantors have already been downgraded.

<sup>31</sup>The requirement to post margins mitigates this risk. A protection seller posts an initial margin (2 to 3 percent) and from then on daily margin equal to changes in the market value of the underlying security. Therefore, unless defaults increase abruptly and are largely unanticipated, most market participants will not experience substantial margin calls over a short period.

<sup>32</sup>The 10 largest market makers account for close to 90 percent of the \$45 trillion outstanding notional value of CDS.

**Figure 1.15. Systemic Bank Default Risk**



Sources: Bloomberg L.P.; and IMF staff estimates.  
<sup>1</sup> Among 15 selected large and complex financial institutions (LCFIs).  
<sup>2</sup> Measures the largest probability of default among the sampled 15 LCFIs each day.

long exposure chains that are vulnerable to a default at any one point. In addition, CDS contracts often require delivery of the underlying bond, and since the volume of contracts often exceeds the volume of underlying instruments, large-scale defaults could result in settlement problems. Since the corporate CDS market may be tested over the coming months, these potential problems need to be monitored closely by policymakers.

*...and stability at the core of the global financial system...*

Measures of default risk for large complex financial institutions and the potential for contagion within the financial system derived from market prices point to heightened concern about system risk (Figure 1.15).<sup>33</sup> The highest likelihood of a single default and the likely number of defaults in the event of a single default in the group—a measure of contagion risk within the global banking system—have both risen significantly.

*...despite sizable injections of bank capital from sovereign wealth funds and elsewhere.*

Sovereign wealth funds have contributed about \$41 billion of the \$105 billion of capital injected into major financial institutions since November 2007. This compares with total reported losses among global banks of some \$193 billion (see Box 1.2). Such injections are welcome and critical to restoring bank balance sheets. However, despite these injections, market indicators suggest that many investors believe that some banks still need to raise additional capital.

Bank funding strains are symptomatic of a broad deleveraging of the global financial system and systemic stress.

<sup>33</sup>This GFSR enhances the use of credit-derivatives-based credit risk indicators used in prior GFSRs to monitor the evolution of market perceptions of default risk in mature market financial systems. The mature market credit risk indicators measure the expected number of bank defaults given at least one bank default for 15 financial institutions, implied from the prices of CDS. See Box 1.5 for details.

Some banks have rapidly expanded their balance sheets in recent years, largely by increasing their holdings of highly rated securities that carry low risk weightings for regulatory capital purposes (see Box 1.3 on page 31). Part of the increase in assets reflects banks' trading and investment activities. Investments grew as a share of total assets, and wholesale markets, including securitizations used to finance such assets, grew as a share of total funding (Figure 1.16). Banks that adopted this strategy aggressively became more vulnerable to illiquidity in the wholesale money markets, earnings volatility from marked-to-market assets, and illiquidity in structured finance markets. Equity markets appear to be penalizing those banks that adopted this strategy most aggressively (Figure 1.17).

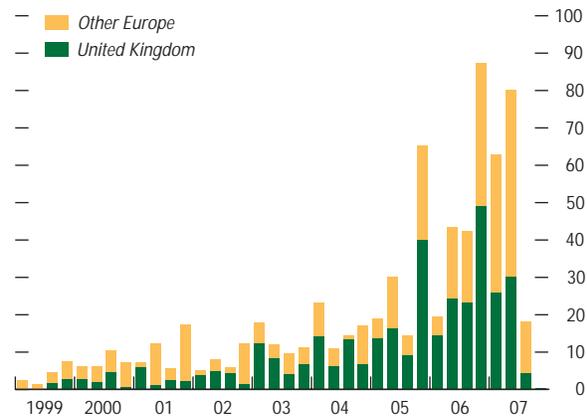
*The forced deleveraging has impacted other leveraged institutions, especially hedge funds.*

Until recently, one of the remarkable features of the current crisis was how few large hedge funds had failed. Among the funds that have folded, most appear to have unwound their positions without undue difficulty, suggesting that collateral was liquidated at close to the pledge value. Even as they shrank their balance sheets elsewhere, large banks tried to maintain their prime brokerage lending to hedge funds, on the basis that it enhanced the bank's long-run franchise value. This situation is changing with the intensification of the crisis as margin locks roll off and pressure on bank balance sheets increases.<sup>34</sup> "Haircuts" and margins have increased, and fewer hedge funds are able to secure the leverage required to meet return targets on low-yielding assets. A forced deleveraging of the type outlined in the October 2007 GFSR may therefore be under way, further reducing demand for AAA-rated assets. The example illustrated in Table 1.3 in

<sup>34</sup>Many hedge funds had negotiated "margin locks" that prevented their prime brokers from increasing the margins they pay when borrowing securities, or the "haircuts" they pay when pledging securities as collateral with their brokers for a fixed period of time.

**Figure 1.16. Securitization Volume in the European Union (EU-15)**

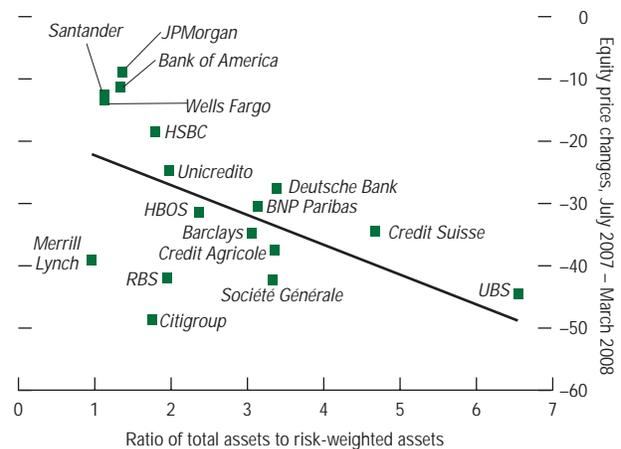
(In billions of euros)



Sources: Bloomberg L.P.; Citibank; and Dealogic.

**Figure 1.17. Bank Equity Price Changes and Balance Sheet Leverage**

(In percent)



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

### Box 1.2. Do Sovereign Wealth Funds Have a Volatility-Absorbing Market Impact?

Between November 2007 and February 2008, sovereign wealth funds (SWFs) were frequently in the news, as major mature market financial institutions required additional capital. This box examines the impact that SWF-provided capital may have had in current volatile market conditions. It may be premature to draw strong conclusions in the absence of a broader set of data and the need for a better understanding of the diverse investment policies and risk management practices of the SWFs. However, given their typically long time horizon and limited liquidity needs, SWFs can have a shock-absorbing role, at least in terms of abating short-term market volatility.<sup>1</sup>

**SWFs as investors.** There are several factors that facilitate the ability of the SWFs to act as a countervailing force in times of market stress.

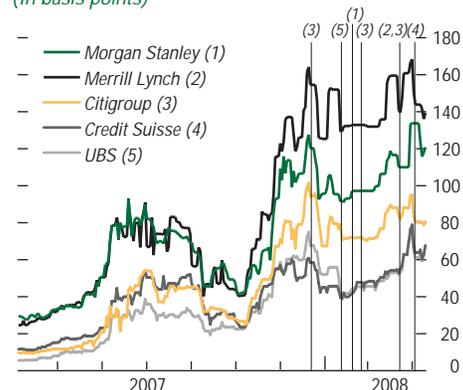
- Most SWFs have a long-term investment horizon and limited liquidity needs (with the notable exception of stabilization funds), as they are commonly established to meet long-term macroeconomic objectives;
- Many SWFs aim to meet long-term real return objectives, and accept short-term volatility in return for expected higher long-term returns and the diversification benefits from a less-constrained strategic asset allocation;
- Compared with other institutional investors, SWFs also have a stable funding base and no capital adequacy or prudential regulatory requirements;
- The below-average valuations of stocks in crisis-hit financial markets may have provided a window for SWFs to accumulate significant exposure in the global financial sector.

The table provides a summary of the transactions in which SWFs have injected capital into

Note: Kristian Flyvholm, Heiko Hesse, and Tao Sun prepared this box.

<sup>1</sup>It is not the first time that SWFs have invested in financial firms. For instance, China recapitalized its banking sector in 2003 (via Central Huijin Investment Company Limited, which was later merged into the China Investment Corporation as a wholly-owned subsidiary), and Temasek owns stakes in banks in the United Kingdom and in Asia.

#### Credit Default Swap Spreads on Selected Financial Institutions (In basis points)



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

Note: Vertical lines indicate capital injections to each institution on that date.

mature market financial institutions. Common features of these transactions are that they were (1) significant in size, while remaining minority stakes in companies; (2) privately negotiated rather than executed in public markets; and (3) often in convertible bonds, high-yielding bonds that are to be converted to equity stakes in the future. While many SWFs execute their strategic asset allocation decisions in public markets, historically, some of the major SWFs have also used privately negotiated transactions. Increasingly, some of the SWFs are broadening the set of eligible asset classes, including through private equity, in order to implement their long-term investment and strategic asset allocation decisions.<sup>2</sup>

**Recent capital injections.** The capital injections by SWFs have augmented the involved financial institutions' capital buffers and have been helpful in reducing their risk premium, at least

<sup>2</sup>For example, there are recent investments by the China Investment Corporation in Blackstone, and a prospective investment by the Government of Singapore Investment Corporation in the Texas Pacific Group.

### Sovereign Wealth Fund (SWF) Capital Injections into Financial Institutions and Market Response

| Date of Announcement | Financial Institutions | Writedown (of financial institution) | SWFs and Other Investor(s)  |  | Amount (percent of total stakes) from SWFs and Other Investor(s)   |                      | Immediate Market Response (change after announcement compared to previous transaction day) |         |
|----------------------|------------------------|--------------------------------------|---|--|--|----------------------|--|---------|
|                      |                        |                                      | SWFs  | Other investor(s)  | SWFs   | Other investor(s)    | Stock price (%)  | CDS (%) |
| Nov. 26, 2007        | Citigroup              | \$6 billion in 2007:Q3               | Abu Dhabi Investment Authority  |  | \$7.5 billion (4.9%)   |                      | -1.2   | -6      |
| Dec. 10, 2007        | UBS                    | \$18 billion in 2007                 | Government of Singapore Investment Corporation                              | Unknown Middle Eastern investor  | \$9.7 billion (10%)  | \$1.8 billion (2%)   | 1.4  | -9      |
| Dec. 19, 2007        | Morgan Stanley         | \$9.4 billion in 2007:Q4             | China Investment Corporation  |  | \$5 billion (9.9%)   |                      | 4.2  | 0       |
| Dec. 21, 2007        | Merrill Lynch          | \$8.4 billion in 2007:Q3             | Temasek Holdings  | Davis Selected Advisors, L.P.  | \$4.4 billion (9.4%)   | \$1.2 billion (2.6%) | 1.9  | 0       |
| Jan. 15, 2008        | Citigroup              | \$18.1 billion in 2007:Q4            | Government of Singapore Investment Corporation, Kuwait Investment Authority | Sanford Weill, Saudi Prince Alwaleed bin Talal, Capital Research Global Investors, Capital World Investors, New Jersey Investment Division | \$6.8 billion from Government of Singapore Investment Corporation (3.7%) and \$3 billion from Kuwait Investment Authority (1.6%) |                      | -7.3   | -5      |
| Jan. 15, 2008        | Merrill Lynch          | \$14.1 billion in 2007:Q4            | Korea Investment Corporation, Kuwait Investment Authority                   | Mizuho Financial Group Inc.  | \$2 billion (3.2%) from Korea Investment Corporation and Kuwait Investment Authority, respectively                               | \$2.6 billion (4.1%) | -5.3   | -12     |
| Feb. 18, 2008        | Credit Suisse          | \$2.85 billion                       | Qatar Investment Authority  |  | Approximately \$500 million (1% to 2%); the purchase was on the open market  |                      | 3.2  | 2       |

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

Note: The stock price of Citigroup rose 6.5 percent on November 28, 2007, the third day after the announcement of the first capital injection. The stock price declines of Citigroup and Merrill Lynch on January 15, 2008 were confounded owing to the simultaneous announcement of huge writedowns and dilution of the claims of existing shareholders.

in the short term, as the injection curtailed the need to reduce bank assets to preserve capital. The figure and table suggest that the announcements of capital injections from SWFs have assisted in stabilizing share prices

and the elevated CDS spreads, at least over the short run.

In most cases, after the announcement of new capital injections, the initial share price reactions to the SWF investments were positive, since announcements of asset writedown

**Box 1.2 (concluded)**

went hand-in-hand with a solution based on the capital injection from investor groups in which the SWF had a significant role (see table). Also, share price volatility declined somewhat following the capital injections, which supports the view that SWFs could have a volatility-reducing impact on markets. However, the long-term impact and the potentially stabilizing role of SWFs as major institutional investors will require a broader set of data and assessment.

*Next steps.* The IMF is currently working across a broad range of issues relating to SWFs. Recognizing the growing importance and relevance for its surveillance activities, the Finance Committee has encouraged the IMF to analyze SWF issues and engage in a dialogue with SWFs to identify best practices. The IMF Executive Board has endorsed the call and asked the staff to prepare a set of commonly agreed best practices for SWFs, which will be a voluntary framework developed in close partnership with SWFs during 2008.

the October 2007 GFSR shows that, even with no change in value or redemptions by investors, an increase in margin to 10 percent, from an initial 3 percent, would force a fund to sell nearly 70 percent of its holdings (IMF, 2007a). Table 1.2 shows that such increases in margins have been far from unprecedented. Some hedge fund indices already suggest cumulative hedge fund returns have been zero for the last 12 months, even before taking account of the survivorship and reporting biases that tend to overstate returns. It would therefore be unsurprising if there were more hedge fund failures in coming months.

*Central banks have worked to contain the crisis, giving direct support to term funding markets...*

Central banks have adopted a novel and pivotal role in interbank funding markets, different from previous periods of market stress. As private banks retrenched from interbank markets and nonbanks backed away from term funding markets, major central banks became key counterparties in those markets (Figures 1.18 and 1.19).<sup>35</sup> They accepted collateral—including some structured products—that many private banks would not. For example, the European Central Bank has accepted as

collateral highly rated ABS and MBS, allowing banks to continue to securitize some high-quality assets to use as collateral (see Chapter 3 for more detail).

*...but while liquidity strains have eased, bank counterparty credit risks remain elevated, making a central bank exit difficult.*

Central bank operations had relieved some of the liquidity strains, especially during the turn of the year, but term interbank rates picked up again, possibly reflecting a significant counterparty credit risk component (Figure 1.20).<sup>36</sup> Thus, it is difficult for central bank operations to target liquidity concerns in term funding markets without distorting (lowering artificially) the market pricing of credit risk. This makes other private and official measures to restore counterparty confidence and reduce risks in the financial system vital to diminish the need for central banks to interpose themselves as counterparties in term funding markets.

<sup>35</sup>In the United States, Federal Home Loan Banks have also stepped in to re-intermediate the credit market.

<sup>36</sup>Figure 1.20 subtracts the average CDS spread referencing U.S. banks from the 1-year LIBOR overnight index swap spread to give an indicative decomposition into a credit and other component, the residual of which likely represents liquidity. See Bank of England (2007, pp. 499–500) for more detail.

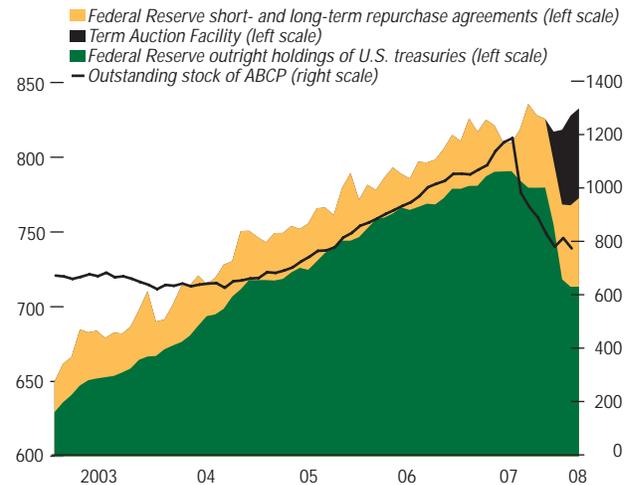
**Table 1.2. Typical “Haircut” or Initial Margin**  
(In percent)

|                          | January–May 2007 | April 2008 |
|--------------------------|------------------|------------|
| U.S. treasuries          | 0.25             | 3          |
| Investment-grade bonds   | 0–3              | 8–12       |
| High-yield bonds         | 10–15            | 25–40      |
| Equities                 | 15               | 20         |
| Investment grade CDS     | 1                | 5          |
| Synthetic super senior   | 1                | 2          |
| Senior leveraged loans   | 10–12            | 15–20      |
| 2nd lien leveraged loans | 15–20            | 25–35      |
| Mezzanine level loans    | 18–25            | 35+        |
| ABS CDOs:                |                  |            |
| AAA                      | 2–4              | 15         |
| AA                       | 4–7              | 20         |
| A                        | 8–15             | 30–50      |
| BBB                      | 10–20            | 40–70      |
| Equity                   | 50               | 100        |
| AAA CLO                  | 4                | 10–20      |
| AAA RMBS                 | 2–4              | 10–20      |
| Alt-a MBS                | 3–5              | 20–50      |

Sources: Citigroup; and IMF staff estimates.

Note: ABS = Asset-backed security; CDO = collateralized debt obligation; CDS = credit default swap; CLO = collateralized loan obligation; RMBS = residential mortgage-backed security.

**Figure 1.18. U.S. Funding Market Liquidity**  
(In billions of U.S. dollars)



Source: Federal Reserve.  
Note: ABCP = asset-backed commercial paper.

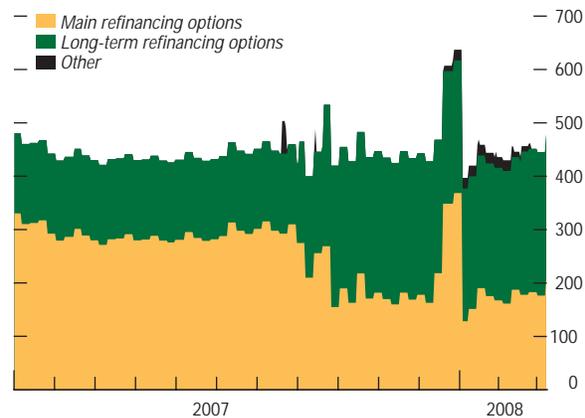
### Will Emerging Markets Remain Resilient?

Emerging markets have so far proved broadly resilient to the financial turmoil. Improved fundamentals, abundant reserves, and strong growth have all helped to sustain flows into emerging market assets. However, as noted in the October 2007 GFSR, there are macroeconomic vulnerabilities in a number of countries that make them susceptible to deterioration in the external environment (Table 1.3). Eastern Europe, in particular, has a cluster of countries with current account deficits financed by private debt or portfolio flows, where domestic credit has grown rapidly. A global slowdown, or a sharp drop in capital flows to emerging markets, could force painful adjustment.

There are several distinct risks to emerging markets arising from the current turmoil.

First, mature market banks may pare back funding to their local subsidiaries, particularly in circumstances where external imbalances are large.

**Figure 1.19. Euro Area Funding Market Liquidity**  
(In billions of euros)



Source: European Central Bank.

**Table 1.3. Macro and Financial Indicators in Selected Emerging Market Countries***(Estimates for 2007)*

|  | Current Account<br>(percent of GDP) | Growth in Private Credit<br>(percent year-on-year) | Change in Private<br>Credit as Share of GDP<br>(percentage points) | External Position<br>vis-à-vis BIS<br>Reporting Banks<br>(percent of GDP) |
|--|-------------------------------------|--|--|---|
| <b>Europe, the Middle East, and Africa</b> |                                     |  |  |   |
| Bulgaria                                   | -21.4                               | 62.5   | 19.7   | -11.9   |
| Croatia                                    | -8.8                                | 17.8   | 3.4  | -50.8   |
| Estonia                                    | -16.0                               | 41.8   | 15.1   | -68.7   |
| Hungary                                    | -5.6                                | 16.8   | 1.6  | -42.5   |
| Kazakhstan                                 | -6.7                                | 55.2   | 12.5   | -9.5  |
| Latvia                                     | -22.9                               | 45.0   | 10.7   | -53.9   |
| Lithuania                                  | -13.3                               | 45.3   | 10.9   | -34.7   |
| Poland                                     | -3.7                                | 39.6   | 8.0  | -12.7   |
| Romania                                    | -14.5                               | 60.4   | 10.7   | -25.7   |
| Russia                                     | 5.9                                 | 51.0   | 7.1  | 8.3   |
| Serbia                                     | -16.5                               | 40.1   | 6.0  | -7.6  |
| South Africa                               | -7.4                                | 22.0   | 5.4  | 9.6   |
| Turkey                                     | -7.6                                | 26.5   | 4.1  | -13.9   |
| <b>Asia</b>                                |                                     |  |  |   |
| China                                      | 11.1                                | 19.5   | 2.1  | 0.8   |
| India                                      | -1.4                                | 21.7   | 2.6  | -3.0  |
| Indonesia                                  | 2.3                                 | 22.4   | 2.0  | -7.9  |
| Korea                                      | 0.6                                 | 13.5   | 8.7  | -13.9   |
| Malaysia                                   | 13.7                                | 11.8   | 3.4  | 0.5   |
| Philippines                                | 4.4                                 | 3.3  | -1.5   | -0.4  |
| Thailand                                   | 5.6                                 | 3.9  | -1.4   | 5.1   |
| <b>Latin America</b>                       |                                     |  |  |   |
| Argentina                                  | 0.7                                 | 37.0   | 1.4  | -7.1  |
| Brazil                                     | 0.3                                 | 28.5   | 5.1  | -7.8  |
| Chile                                      | 4.7                                 | 20.8   | 5.9  | -8.0  |
| Colombia                                   | -3.8                                | 23.5   | 4.7  | -7.3  |
| Mexico                                     | -0.8                                | 19.0   | 2.2  | -5.8  |
| Peru                                       | 1.6                                 | 22.3   | 6.2  | -0.5  |
| Venezuela                                  | 9.2                                 | 72.5   | 4.9  | 2.9   |

Sources: Bank for International Settlements (BIS); European Central Bank; IMF, *International Financial Statistics* and *World Economic Outlook*; and IMF staff estimates (preliminary data as of March 3, 2008).

Note: The gray boxes of the table point to areas of potential concern. Cutoff values are as follows: current account balance below -5 percent of GDP; private sector credit growth greater than 20 percent year-on-year; growth in the ratio of private sector credit to GDP of more than 10 percent year-on-year; and net external position to BIS banks less than -10 percent of GDP.

Second, balance sheet contraction by global financial institutions may reduce funding for investments by hedge funds and other institutions, raising their dollar funding costs, and inducing financial stress within some emerging markets.

Third, emerging market corporate credit risks may continue to increase. Emerging market corporate debt spreads have already moved out about as much as those of similarly rated credits in mature markets.

Fourth, emerging market financial institutions may yet prove vulnerable to financial contagion

through exposure to subprime or other structured credit products.

Fifth, a spike in exchange rate volatility could slow or reverse flows into emerging market fixed-income assets, leading to higher funding costs. Negative terms-of-trade shocks could raise difficulties for emerging markets in Latin America and elsewhere that have benefited from the commodity price boom. More broadly, a global slowdown could affect flows into emerging market assets.

For some emerging markets there remains a risk of overheating. Countries whose monetary

policy is tied to the U.S. dollar may experience a buildup of domestic liquidity.

*Potential funding pressures on foreign banks active in emerging Europe pose risks to a soft landing.*

Domestic banks in Eastern Europe have built up large negative net foreign positions vis-à-vis parent banks and international lenders, as credit growth has far outpaced growth in domestic deposits (Figure 1.21). Most European parent banks have plans to sustain cross-border financing of their subsidiaries in the Baltics and southeastern Europe, while gradually slowing credit to cool the economies. Swedish, Austrian, and Italian banks take a long-term view of the growth opportunities in the Baltics and southeastern Europe, and seek to protect their franchise values.

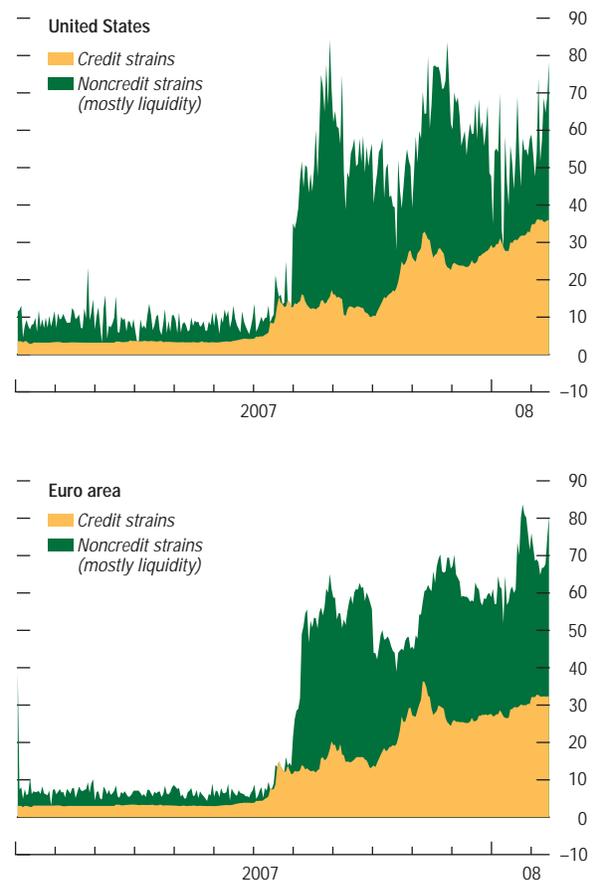
The main parent banks are vulnerable to continued financial turbulence because they obtain a substantial part of their funding on international wholesale markets, as do many mid-sized European banks (Figure 1.22). A soft landing in the Baltics and southeastern Europe could be jeopardized if external financing conditions force parent banks to contract credit to the region. For example, with about half of their funding denominated in foreign currencies, Swedish banks—the main suppliers of external financing to the Baltics—could come under pressure.<sup>37</sup>

Locally owned banks make up one-third of the banking sector in Latvia. These banks are under substantial external funding pressure, which could force them to curtail lending. As with other banks that rely heavily on external bond markets, liquidity for these banks has all but dried up, and spreads have widened 500 basis points. In response, local banks are seeking alternative sources of financing and have worked to increase local deposits.

In Bulgaria and Romania, tighter credit risk controls by parent banks have not been effec-

<sup>37</sup>So far, Swedish banks have been able to access euro funding through private placements with European investors, and the Swedish covered bond market has continued to function even when the European market has shut down.

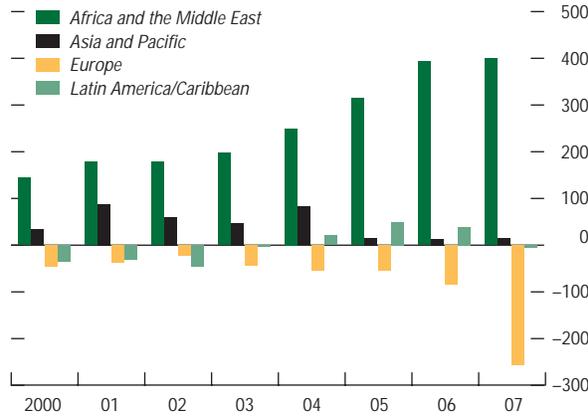
**Figure 1.20. Decomposing Interbank Spreads**  
(In basis points)



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

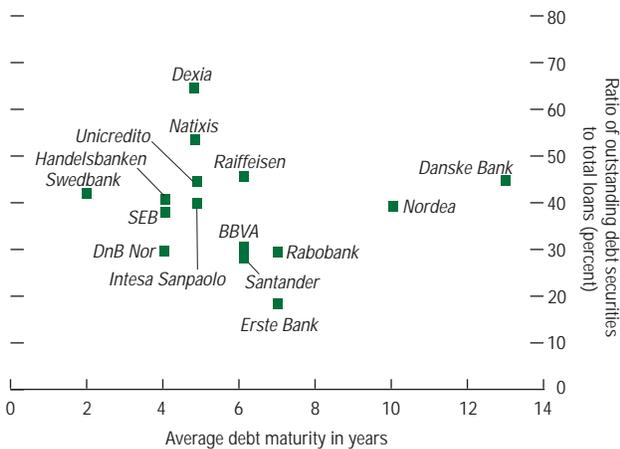
Note: Credit strains are derived by averaging the one-year credit default swap spreads of the banks that determine dollar LIBOR and euro LIBOR rates. These results are then subtracted from the spread between LIBOR and overnight index swaps (OIS) to determine noncredit strains, which are likely to be liquidity related.

**Figure 1.21. External Position of Emerging Markets by Region vis-à-vis BIS Reporting Banks**  
(In billions of U.S. dollars)



Source: Bank for International Settlements (BIS).

**Figure 1.22. Selected European Banks: Dependence on Wholesale Financing as of March 2008**



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

tive in slowing aggregate credit growth, as new entrants, notably Greek and Portuguese banks, have sought to expand market share. Since Bulgaria and Romania only recently joined the European Union, they are still seen by many banks as offering attractive growth opportunities. However, there is a danger that local banks may underestimate the deterioration in the quality of loan portfolios that often accompanies rapid credit growth.

*A credit crunch could create pressures for asset quality deterioration in many of the central and southeast European countries.*

Banks active in the region also face risks on the asset side of the balance sheet. House prices have soared in tandem with domestic credit growth, and the credit portfolios of banks in emerging Europe have increasingly become exposed to the real estate sector (Figures 1.23 and 1.24). In Estonia and Latvia, house prices have now started to fall, which has led banks to curtail lending to many construction projects, while more developers have resorted to pre-selling apartments in order to receive financing for them. Banks have not experienced a significant increase in loan losses so far, but they have centralized and strengthened risk management in a manner similar to mature market banks. Internal risk controls could force a sharp reduction in credit to protect bank capital, if asset quality deteriorates sharply.

Perceptions of higher risks are reflected in bank stocks exposed to the region, in CDS, and in the Romanian leu (Figure 1.25).<sup>38</sup> The stocks of Swedish banks exposed to the Baltics have underperformed other Nordic bank shares partly owing to significant short-selling. CDS spreads on sovereign debt have surged since August 2007, as investor demand for credit protection has pushed up prices.

<sup>38</sup>The Romanian leu is the only floating currency with a liquid forward market among the group of eastern European countries with large external imbalances. It has depreciated substantially since July 2007, as some investors have expressed negative views on the region as a whole.

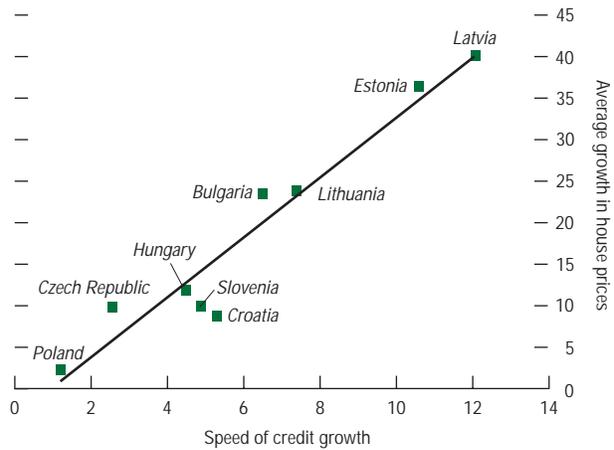
*Reduced access to international funding is having an impact across regions, with some risks to domestic credit markets.*

External funding difficulties have arisen in a number of emerging markets and have been particularly acute among some emerging market economies. In Kazakhstan, banks that relied heavily on bond and syndicated loan markets, and where investors are now more concerned about credit risks and weak disclosure practices, have run into funding difficulties, as evidenced by the recent sharp widening in bank CDS spreads. Some private Russian banks have encountered similar problems. In Hungary, tightening credit conditions have pushed up swap and interbank rates, prompting some leveraged investors funding at the swap rate to sell off holdings of government bonds. While pressures on Turkish banks are not as strong, there has been a shift in funding sources away from external bond markets and back toward syndicated loan markets. At the same time, spreads in the cross-currency swap market—used to transform currency exposure and maturities—have moved against domestic Turkish banks.

Despite generally strong external positions, some concerns about dollar funding have arisen in Asia, particularly in Korea, Taiwan Province of China, and, to an extent, in India. Korea's large stock of external dollar-denominated banking debt—about \$95 billion as of September 2007—presents some potential rollover risk, although much of it reflects currency hedging by exporters (notably shipbuilders) enjoying record order flows. In India, some corporations have borrowed dollars and swapped the resulting debt into yen, increasing the difference between borrowing and lending rates, but leaving a large open exposure.<sup>39</sup> Nevertheless, the risk to the

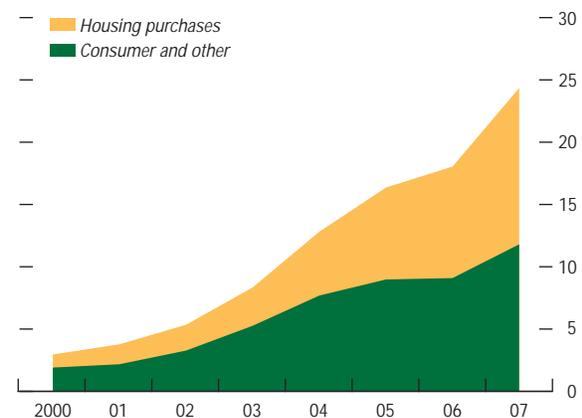
<sup>39</sup>Indian corporations had net cross-border obligations of \$31 billion as of September 2007, while Indian banks had very limited net exposure as of January 2008, according to the Bank for International Settlements. The October 2007 GFSR cited estimates that up to one-half of Indian firms' short dollar positions had been swapped into yen (IMF, 2007a). Market sources suggest that the ratio of yen borrowing has likely diminished since then.

**Figure 1.23. Central and Eastern Europe: Growth in Private Credit and House Prices, 2002–06**  
(In percent)



Sources: Égert and Mihaljek (2007); and IMF staff estimates.  
Note: The speed of credit growth is defined as the annual percentage point increase in the private credit-to-GDP ratio, averaged over 2002–06.

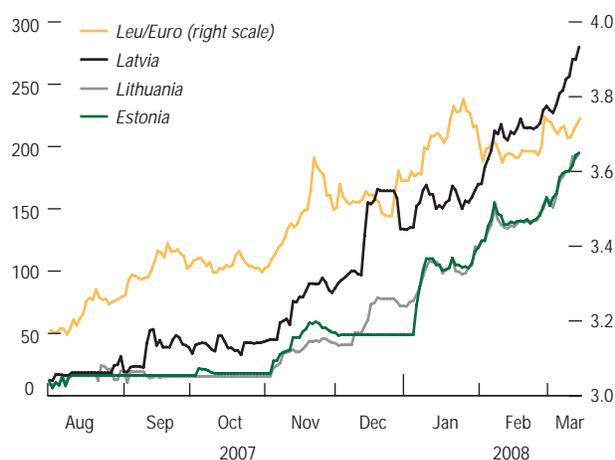
**Figure 1.24. Baltic States, Bulgaria, and Romania: Credit to Households by Type**  
(In percent of GDP)



Sources: European Central Bank; and IMF staff estimates.  
Note: The figure aggregates credit and GDP across countries. The ratio of household credit to GDP is considerably higher in Estonia and Latvia (above 40 percent in 2007), and lower in Romania (18 percent in 2007).

**Figure 1.25. Baltic States' 5-Year Credit Default Swap Spreads and Romanian Leu**

(In basis points, left scale, unless indicated)



Sources: Bloomberg L.P.; and Datastream.

Indian financial sector arising from these transactions currently appears manageable.

External funding pressures in Latin America remain modest by the standards of past episodes of financial turmoil, due in part to a decline in regional dependence on foreign capital flows. In many countries in the region, much of the financing for domestic credit growth in recent years has come from an expanding domestic deposit base. In Brazil, the development of this credit channel is evident in domestic currency interbank spreads that have remained stable despite the global turmoil. Nevertheless, dollar spreads in Brazil have widened somewhat, particularly at longer maturities. Elsewhere in the region, external funding costs, as indicated by corporate global bond spreads, have also risen.

*The widening in corporate spreads could point to future funding issues.*

Emerging market corporate spreads have widened substantially since the beginning of the turmoil, signifying that the concerns about funding and credit risks in mature markets have spilled over to emerging market credit. Corporate credit has been more highly correlated with similarly rated mature market credit than it has with other types of emerging market assets, particularly sovereign bonds. In contrast to corporate spreads, the widening in sovereign bond spreads has so far been quite moderate by the standards of previous financial crises, due in part to debt repurchases that have reduced outstanding supply.

With the expansion of emerging market corporate debt as an asset class and the development of CDS and index-based contracts that facilitate the trading of that debt, investors have drawn fewer distinctions between mature and emerging corporate bonds. That perspective, while positive for the asset class, has opened a new potential channel of contagion. Should mature market credit spreads widen further, emerging market corporate funding costs would probably increase, pushing credit demand into domestic banking systems,

and increasing domestic funding pressures (Figure 1.26).

*The degree of exposure to mortgage-related credit is not yet fully known.*

Thus far, exposure to subprime instruments appears to be quite limited in most emerging markets. Some emerging Asian financial institutions have revealed subprime exposures, but writedowns have been less than \$1 billion. There has also been rapid growth in Asian-originated structured credit products—most of which are not related to real estate—but the growth has been from a low base, and the total outstanding is likely still below \$100 billion.<sup>40</sup> Purchases of subprime and structured credit products in Latin American markets appear to have been quite limited, as yield-seeking domestic investors have regarded high domestic nominal interest rates as an attractive alternative to offshore instruments, while tight banking regulations have helped limit exposure to riskier assets. In the emerging Europe region, banks have typically focused on expanding domestic lending, often at high expected real rates of return, rather than acquiring foreign assets. Nevertheless, experience in mature markets suggests that subprime exposure often turns out to be larger than initially indicated.

*Exchange rate volatility could prompt outflows.*

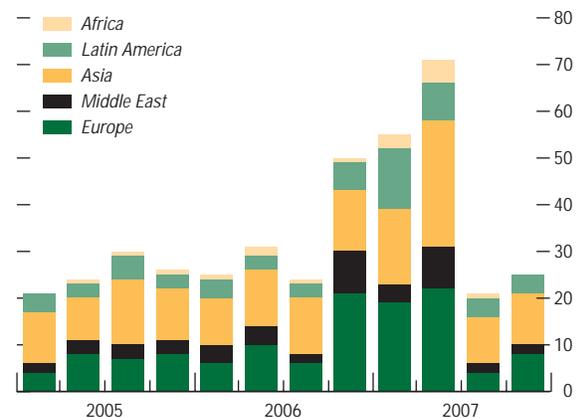
Cross-border carry trades into emerging market currencies that have flourished during the past half-decade may still be vulnerable to bouts of volatility (Figure 1.27).<sup>41,42</sup> Popular carry trade

<sup>40</sup>In fact there have already been some writedowns. For example, one Korean bank has written down \$440 million in mortgage-backed CDO exposure and \$20 million in nonmortgage-backed CDO exposure.

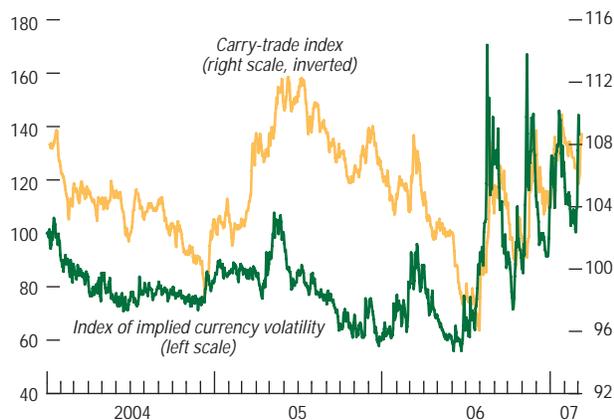
<sup>41</sup>Currency volatilities have risen across the board, in both actual and implied terms, for mature and emerging market currencies.

<sup>42</sup>A cross-border carry trade is normally defined as the combination of a short position in a lower-yielding currency with a long position in a higher-yielding currency, with the aim of collecting the interest rate differential between the two. Such trades can be highly leveraged and entail exposure to currency risk.

**Figure 1.26. Emerging Markets: Private Sector External Bond Issuance**  
(In billions of U.S. dollars)



Source: Dealogic.

**Figure 1.27. Carry-Trade Index and Currency Volatility**

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

Note: Implied currency volatility obtained from 1-month U.S. dollar–Japanese yen options.

destinations have included Brazil, Colombia, Iceland, Indonesia, New Zealand, Turkey, and South Africa, with funding most often from the Japanese yen or Swiss franc, as well as, now, the U.S. dollar. Since July 2007, risk repricing and yen appreciation have prompted the unwinding of a substantial proportion of yen carry trades, but cross-border interest rate differentials have persisted, and lower U.S. interest rates have increased the use of the dollar as a carry trade funding currency. The continued strength of a number of emerging market currencies—including the Brazilian *real* and the Indian rupee—suggests that some carry trades have persisted. This could present a channel of vulnerability in the event of future volatility spikes.

*A generalized slowdown could still prompt a broad retreat from emerging market assets.*

A global slowdown, in turn, could lead to a decline in most types of capital inflows to emerging markets. While there have been some signs of slowing, inflows to emerging equity markets have generally remained positive. Some supply-side factors continue to favor emerging markets, with institutional investors in Europe and North America still seeking portfolio diversification, retail investors in Japan continuing to look for higher returns abroad, and institutional or sovereign investors in the Middle East recycling oil-based surpluses. High commodities prices are also supportive. Nevertheless, the experience of previous bouts of global risk reduction in the midst of slowing growth suggests that the possibility of a reversal in equity flows remains considerable, particularly if other factors are unfavorable.

*For certain emerging markets there may be a risk of overheating as investors shift away from mature market assets.*

For countries with strong balance of payments positions and tight links to the dollar, the possibility of overheating remains.<sup>43</sup> A number

<sup>43</sup>See the April 2008 WEO for other sources of overheating, including high energy and food prices in some emerging market economies (IMF, 2008).

### Box 1.3. The Rise in Balance Sheet Leverage of Global Banks

For the past decade, high levels of liquidity and low volatility supported significant asset growth among the largest banks, while asset growth that contributed to holdings of regulatory capital was more moderate. This trend is evident in the 10 largest publicly listed banks from Europe and the United States, which doubled in aggregate assets in the last five years to 15 trillion euros, while risk-weighted assets, which drive the capital requirement, grew more moderately to reach about 5 trillion euros (see figure). While considerable differences are present among individual institutions, the widening gap between risk-weighted assets and total assets reflects an expanding share of assets that for regulatory capital purposes carried a lower risk weighting. Two key factors are responsible for the difference.

- The adoption of international financial reporting standards (IFRS) in Europe caused the re-recognition on the balance sheet of substantial activity associated with

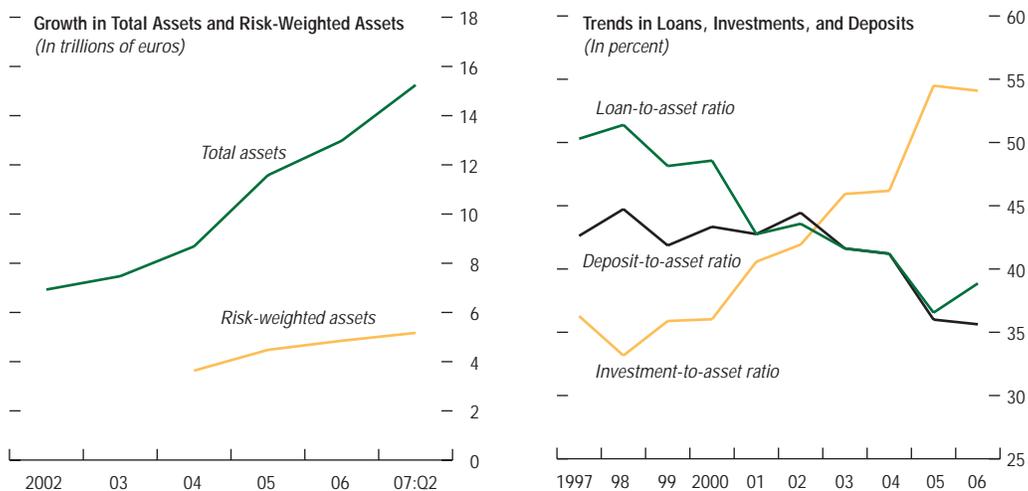
the originate-to-distribute business model. Activities that were earlier transferred under national accounting standards to special-purpose vehicles (SPV) were brought onto bank balance sheets. Under Basel I, which used a different measure for risk transfer, the banks were able to record a lower or no risk weight for the associated assets (and for backup credit lines extended to SPV).

- The increase in trading and investment activities (e.g., asset-backed securities, and hedging). The associated risk weights on these instruments were substantially less than loans because they were generally highly rated, showed relatively stable prices, or were used for hedging.

Regulatory capital requirements did not constrain asset growth. The banks continued to meet the Basel I capital requirement with relative ease. The banks showed on average a Tier 1 capital-to-risk-weighted-asset ratio of between 7 and 9 percent—well above the 4 percent minimum. With the high capital ratios, many of the large banks were able to engage in stock repurchases through the third quarter of 2007.

Note: Michael Moore prepared this box.

#### Balance Sheet Profiles for 10 Large Publicly Listed Banks



Sources: Thomson Financial; and IMF staff estimates.

**Box 1.3 (concluded)**

The composition of bank balance sheets for large banks moved away from loans funded by deposits. Loans declined as a share of total assets, and investments (securities holdings and trading activities) grew (see figure). A companion to the loan decline was a falloff in the importance of retail deposits as a source of stable funding, which is most significant among the banks that grew the quickest.

Banks became more reliant on liquidity from money markets (i.e., interbank borrowing and other forms of short- and long-term

debt, including securitized funding) or from the sale of marketable securities. These funding sources, however, entailed higher market-sensitive interest costs (compared to slower growing consumer deposits), which increased and became more difficult to obtain with the tightening of market liquidity starting in the third quarter of 2007. Moreover, the ability to sell marketable securities at close to book values proved increasingly more difficult, as fears of underlying credit quality tainted market valuations.

of Middle East oil exporters have currencies that are closely linked to the dollar, and many of these have already experienced strong inflationary pressures. In some Asian economies, steps taken to limit the pace of appreciation against the dollar may lead to monetary policy settings that are looser than would otherwise be optimal. Despite the financial turmoil, some “Asia play” flows into currencies such as the Chinese renminbi and Indian rupee have continued.<sup>44</sup> In contrast to the predominant view in prior crises, a few investors have even taken the position that emerging market assets could provide a form of safe haven from mature market upheavals. Under such circumstances, further downward pressure on the dollar, particularly if it emanates from subprime or similar shocks, could boost liquidity and lead to an intensification of inflationary pressures in some emerging markets.

### Credit Squeeze or Credit Crunch?

What began as a fairly contained deterioration in portions of the U.S. subprime market

has metastasized into severe dislocations in broader credit and funding markets that now pose risks to the macroeconomic outlook in the United States and globally. This is best illustrated by Figure 1.28, which documents how the deterioration that first emerged in nonprime mortgage markets spread to leveraged finance and mortgage-related structured credit markets, global money markets, and then moved up the credit spectrum from low- to high-grade corporate credit markets, and to prime residential and commercial mortgage markets, finally threatening to broaden to emerging market assets. Spreads have widened across the full range of credits—not only subprime but high-grade—and around the globe to Europe as well as the United States and to emerging as well as mature markets (Figure 1.29).

*Off-balance-sheet structures and leveraged entities are being forced to unwind leverage, adding supply to the market from distressed debt sales and a downward spiral of credit prices.*

Rising funding costs and low valuations are forcing off-balance-sheet credit vehicles, some hedge funds, and some investment funds to sell assets to raise liquidity and reduce leverage. SIVs are under rising pressure to sell assets as they struggle to roll over much of their medium-term financing. Falling prices on lever-

<sup>44</sup>The “Asia play” can be loosely defined as the purchase of Asian-currency-denominated assets on the view that the local currency will likely appreciate against the dollar, especially if authorities are expected to reduce the scope of interventions.

aged loans have triggered unwinds of some of the \$300 billion of market-value CLOs, requiring their managers to sell the underlying loans onto the market, depressing prices further.<sup>45</sup> These sales added to the pressure from the estimated \$230 billion overhang of debt sitting on bank balance sheets from buyout deals completed in 2007.<sup>46</sup> Financial guarantor concerns have spilled over to municipal markets and guaranteed bonds, as funding pressure is now being felt across markets wherever AAA-rated paper was issued to finance assets with lower ratings. Markets for other types of short-term securities have also come under pressure, suggesting some contagion effects.<sup>47</sup> Spreads on the municipal bonds backed by the financial guarantors have widened, and corporates are also finding it more expensive to issue.

*Both engines of credit creation are sputtering.*

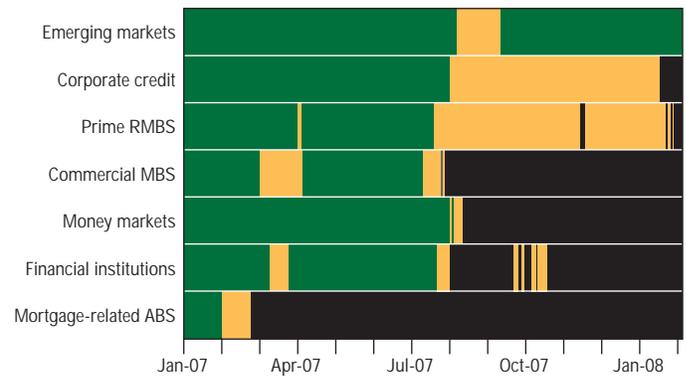
Against this backdrop, the environment for new issuance in some securities markets is more challenging. This year, private sector net debt issuance is expected to contract markedly. Investment-grade corporate issuance is thought likely to hold up relatively well, and highly rated firms should still be able to borrow on reason-

<sup>45</sup>CLOs are securitized packages of leveraged loans. A market-value CLO is one in which the manager has latitude to trade assets within the portfolio. Payments to investors come from both cash flows from the underlying assets and sales of some assets. Payments to tranches are not contingent on the adequacy of the underlying assets' cash flows (as in a "cash-flow CLO"), but rather on whether the market value of the CLO exceeds certain thresholds. If those thresholds are breached, an automatic unwind of the structure is triggered to protect the position of the senior creditors.

<sup>46</sup>The \$175 billion or so of leveraged loans include the \$17 billion issued by Bell Canada Enterprises, \$15 billion by Clear Channel Communications, \$10.5 billion by Alltel, \$6 billion by Harrah's Entertainment, and \$8.8 billion by the Texas Utility Corporation. The remainder is high-yield bonds.

<sup>47</sup>For example, demand for auction rate securities issued by student loan lenders and some U.S. municipalities have fallen dramatically. Similar dislocations are observed in the tender option bond (TOB) sector, primarily reflecting concerns that a downgrade of a financial guarantor will lead to a downgrade of the municipal bonds that serve as collateral for TOB products.

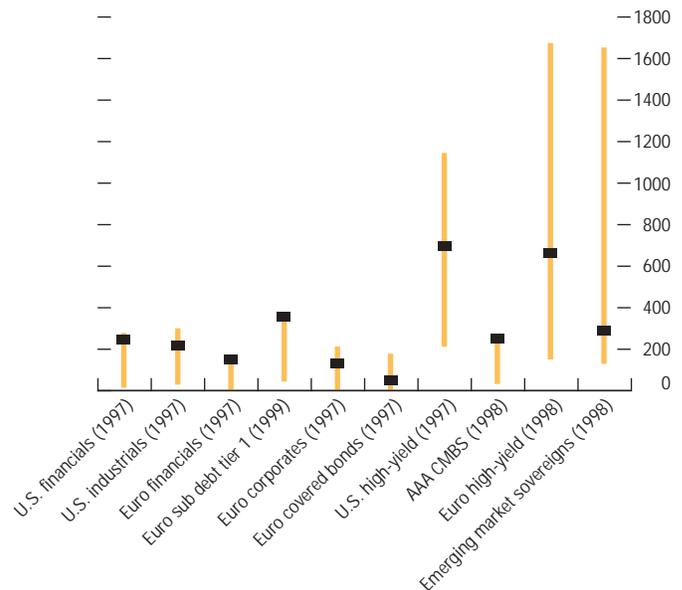
**Figure 1.28. Heat Map: Developments in Systemic Asset Classes**



Source: IMF staff estimates.

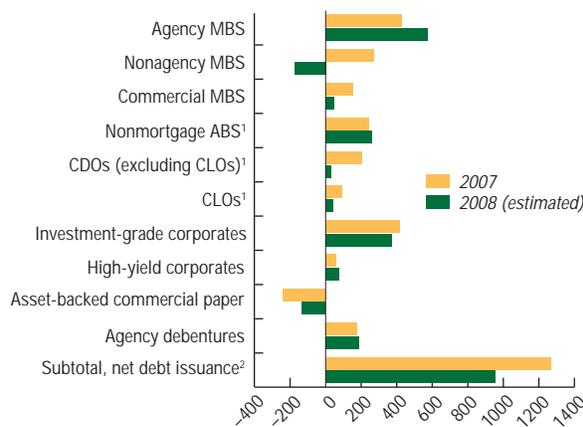
Note: The heat map measures both the level and 1-month volatility of the spreads, prices, and total returns of each asset class in terms of deviation relative to the average during 2004–06 (i.e., wider spreads, lower prices and total returns, and higher volatility). That deviation is expressed in terms of standard deviations. Green signifies a standard deviation under 1, yellow signifies 1 to 4 standard deviations, and black signifies greater than 4 standard deviations. ABS = asset-backed security; MBS = mortgage-backed security; RMBS = residential mortgage-backed security.

**Figure 1.29. Spreads Across Credit: Historical Highs, Lows, and Current Levels (In basis points)**



Sources: JPMorgan Chase & Co.; Merrill Lynch; and IMF staff estimates. Note: Yellow lines indicate period ranges. Black squares are as of March 2008. Data inception in parentheses. CMBS = commercial mortgage-backed security.

**Figure 1.30. U.S. Private Sector Net Debt Issuance by Sector**  
(In billions of U.S. dollars)



Sources: Bloomberg L.P.; industry reports; and IMF staff estimates.  
 Note: ABS = asset-backed security; CDO = collateralized debt obligation;  
 CLO = collateralized loan obligation; MBS = mortgage-backed security.  
<sup>1</sup>Only gross debt issuance data are available.  
<sup>2</sup>Subtotal is based on data for which net figures are available.

able terms, but mortgage issuance and high-yield corporate loan issuance are likely to fall sharply (Figure 1.30). Many of the structures created over recent years are struggling, as the traditional buyer base of the high-rated securities has shifted to more liquid and less risky assets. Confidence in the architecture, ratings, and process of structured finance will require reform and time to be restored.

*Bank balance sheet adjustment could crimp or bind credit.*

The possible immediate credit impact of the aggregate loss estimates on banks is that credit growth could be substantially squeezed. Estimating the impact on credit to the private sector is difficult. One gauge is to assume that banks will cut back lending to offset part, but not all, of the worsening of their key ratios that would result from the losses they will incur and involuntary balance sheet expansion. Using this approach, and spreading the credit withdrawal over three quarters, the pace of credit growth in a squeeze would be reduced to a little over 4 percent of the outstanding private sector debt stock in the United States. It is worth noting that credit had grown on average by nearly 9 percent in the United States in the post-war period. A credit squeeze might therefore feel roughly like the normal constriction of credit seen at the bottom of the business cycle in mature markets.

A supply shock to credit would result in a more painful credit crunch. In a negative scenario, funding markets remain restricted, forcing banks to de-lever and hold more capital in support of their balance sheets, banks' profits fall and fee-earning sources shrink, and raising fresh capital is more difficult. Banks may not only limit exposure to lower-quality loans, but curtail credit across the board—central bank surveys show a remarkably consistent picture of tightening of credit standards, including across categories of lending (Figure 1.31). In this case, credit growth could be reduced to 1 percent of the outstanding private sector debt in the United States. The resulting slowing of credit growth would be similar to that experienced

during the 1990–91 recession, and worse than those in previous recessions (Figure 1.32).<sup>48</sup>

*Simulations suggest that a supply shock to credit is likely to have a significant impact on economic growth.*

We develop a simple vector autoregression model to get some feel for how credit growth and other economic variables affect one another. The model includes real GDP growth, inflation, private sector borrowing, and the prime loan rate on quarterly data for the United States between the first quarter of 1952 and the third quarter of 2007.<sup>49</sup> Private sector borrowing is measured as a percentage of the outstanding stock of private sector debt.<sup>50</sup>

The model detects a statistically significant impact of a negative shock to credit growth on GDP growth.<sup>51</sup> A credit squeeze and a credit crunch spread evenly over three quarters will reduce GDP growth about 0.8 and 1.4 percentage points year-on-year, respectively, assuming no other shocks to the system (Figure 1.33). This suggests that the adjustment process is likely to

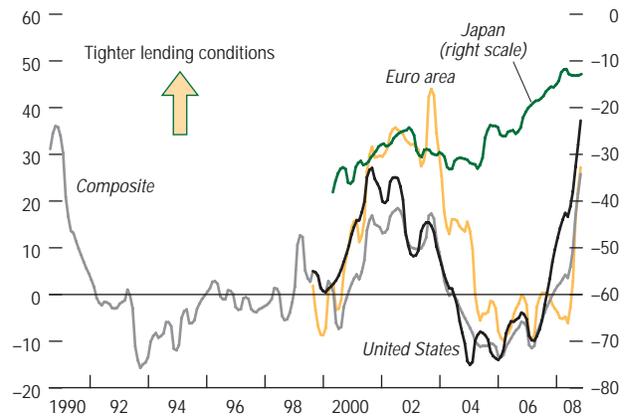
<sup>48</sup>The shock will be mitigated to the extent banks can raise fresh capital, either from existing shareholders or from new ones (see Box 1.2). Other important factors include the rate at which losses are recognized, the amount of profits insulated from the credit crunch, and the extent to which some banks (and rating agencies) tolerate a temporary dip in capital ratios.

<sup>49</sup>The model includes two lags, which is what the Schwarz information criterion prescribes for this particular sample. Parameters are stable according to Quandt-Andrews tests.

<sup>50</sup>The data on borrowing and debt are from the Federal Reserve’s Flow of Funds Accounts. Borrowing is defined as the increase in credit market liabilities for households and nonfarm, nonfinancial corporations. It includes mortgages, consumer credit, bank loans, and issuance of commercial paper and corporate bonds. Over the sample period, private sector borrowing has averaged 8.8 percent of outstanding private sector debt, quarterly annualized, with a standard deviation of 2.9 percent.

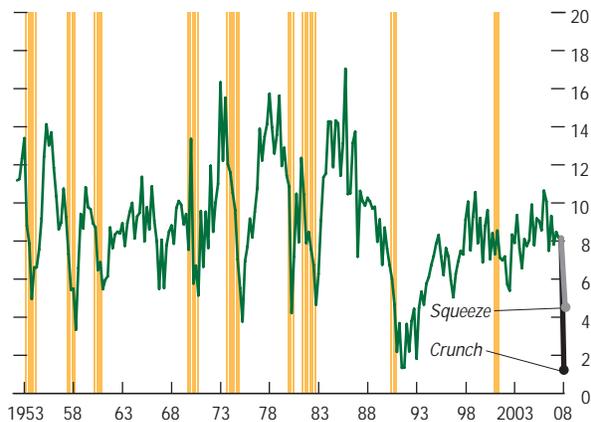
<sup>51</sup>The impulse response function is based on Cholesky decomposition, with the variables ordered as above. One caveat is that this simple model cannot distinguish between demand and supply shocks to credit. Figure 1.33 introduces three sequential shocks to borrowing, which bring borrowing growth down to 4 and 1 percent in a credit squeeze and a credit crunch, respectively. The simulation takes into account the model’s endogenous path for borrowing, as well as the dynamic effects of previous shocks.

**Figure 1.31. G-3 Bank Lending Conditions**  
(Net percentage of domestic respondents reporting tightening standards for loans)



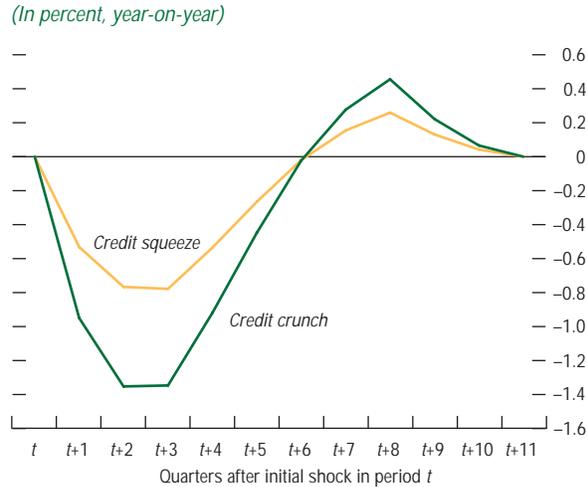
Sources: Bank of Japan; European Central Bank; Federal Reserve; and IMF staff estimates.  
Note: Monthly interpolated GDP-weighted average. Euro area 1999:Q1 to 2002:Q4 based on values implied by credit growth.

**Figure 1.32. U.S. Private Sector Borrowing**  
(Borrowing by households and nonfinancial corporations as a percent of debt outstanding)



Sources: Federal Reserve; National Bureau of Economic Research; and IMF staff estimates.  
Note: Yellow bars represent recession periods.

**Figure 1.33. Impulse Response of U.S. GDP to Credit Shocks**  
(In percent, year-on-year)



Source: IMF staff estimates.  
Note: Credit withdrawal spread over three quarters.

be long lasting, and would continue to dampen growth well into 2009.

A great deal of uncertainty surrounds such an exercise. The model does not account for the unusually aggressive monetary policy easing being undertaken by the Federal Reserve, which is likely to mitigate some of the predicted impact on growth. At the same time, however, the effect on GDP could get substantially larger if market dislocations were to affect the issuance of non-financial corporate debt more significantly. Furthermore, the fact that this credit shock is taking place in the heart of the banking system, where securitization and structured credit products have been used to shift credit risks to other holders, not simply in smaller banks where such risks were retained, means that the impact could be more profound than suggested by historical patterns in the data. Finally, although not modeled here, the slowing of credit growth in Europe would be substantial, and the greater role of banks in credit intermediation in many European economies than in the United States means that the impact on European economies could be significant.

### Immediate Policy Challenges

Against a backdrop of continuing weakness in global credit markets, threats to systemic stability have intensified. Despite some reductions in policy rates in the United States, United Kingdom, Canada, and a few other economies, as well as a sizable U.S. fiscal package, global growth is likely to slow significantly in 2008. The risks of a credit crunch are heightened by spreading dislocations in securities markets, significant bank balance sheet adjustment, and growing concerns about counterparty credit risks. This more negative scenario, however, is not a forgone conclusion. Banks are seeking capital injections and private participants, including banks, financial guarantors, and credit rating agencies are taking steps to rebuild market confidence and stem systemic risks.<sup>52</sup> Nevertheless, a range of finan-

<sup>52</sup>In response to the crisis of confidence, market participants have already begun to strengthen their due

cial policies—in addition to macroeconomic policies—will be needed to mitigate downside risks. These policies aim to foster counterparty confidence, and set the stage for more medium-term reforms discussed in Chapters 2 and 3.

*Restoring counterparty confidence is an immediate priority to reduce systemic threats and spillovers.*

Lack of reliable information about exposures and risks has led to misunderstandings and misperceptions that have amplified systemic risks. More rapid and informative disclosure by financial institutions is needed, including how complex structured credit securities are valued and the extent of losses. However, some financial institutions may lack incentives to do this, and addressing such shortcomings will take time and require international agreements. More immediately, national authorities should seek to remove misperceptions about the vulnerabilities of national financial institutions and markets. One approach would be to issue special financial stability reports drawing information from supervisory authorities that assesses risks, provides information and analysis relevant to financial stability, and highlights plans to restore financial soundness as needed. Such reports would complement other policy measures aimed at containing systemic risks.

*Systemically important financial institutions need to continue to raise capital and funding to support balance sheets.*

To strengthen confidence and avoid capital reductions that could constrain lending, banks with weak capital positions should be strongly encouraged to raise capital. In some instances, supervisors may need to direct banks

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diligence. With less support from rating agencies, financial guarantors, and traditional prepayment and cash flow models, though, credit analysis is now more operationally intensive. For instance, in the mortgage sector, each loan in a pool must be analyzed to determine equity build-up, prepayment history, triggers, and other credit attributes to forecast borrower behavior. Typically, each pool has 7,000 loans, with 70 different credit attributes across each pool that must be analyzed against several different home price scenarios.

to strengthen capital ratios and fortify funding positions, even in the more costly current environment. To improve confidence in reported information in Europe, consideration could be given to making nonconfidential information from supervisory prudential reports public, as is the practice in a few other countries. Financial guarantors along with others will need to continue to explore avenues for shoring up capital to back up commitments to structured credit products and protect or restore ratings, while reinforcing risk management and governance. Regulators will need to develop a capital adequacy framework for financial guarantors that is less dependent on rating agency ratings and models.

A strengthening of supervisory oversight should reduce the incidence of unsuspected risk exposure and contribute to the rebuilding of counterparty confidence.

Repeatedly during the crisis, banks have revealed unexpectedly large risk exposures. This risk came through many channels—purchases of securities based on loans that had initially been sold on by banks, implicit guarantees provided to off-balance-sheet vehicles, and large lines of credit extended to hedge funds and other high-risk clients, among others. At the same time, the degree of leverage undertaken by hedge funds and other market participants has often turned out to be much higher than expected. The revelation of such high and previously unsuspected levels of systemic risk underlines the important role that supervisory oversight should play in ensuring that institutions' risks are well managed. Confidence in financial institutions can be enhanced through supervisory oversight that examines more broadly the risks banks are taking, with closer coordination among supervisors when they are international. There is an urgent need to review the regulatory framework and effectiveness of supervision. In particular:

- Banks must be able to show sufficient capital to absorb shocks from the reduction in mark-to-market valuations or losses on asset sales. They need to demonstrate that they have sufficient capital and liquidity resources to reassure counterparties that good access to funding and

money market liquidity, including during periods of severe turbulence, can be maintained. Pillar 2 of Basel II—supervisory review—can be used to ensure that banks hold additional capital beyond the minimum requirement identified by risk weights or by internal models under Pillar 1, when the supervisors identify deficiencies (see Chapter 2).

- Bank supervisors need to take more account of balance sheet leverage as they assess capital adequacy. The risks (particularly market and liquidity risks) that have accompanied balance sheet growth need to be properly considered for capital adequacy purposes. While banks continue to meet the minimum regulatory capital requirements, the low absolute capital levels for many large banks at present and the prospect of further losses are adding to concerns about whether capital is sufficient. Banks that must be particularly vigilant are those that hold high levels of assets subject to mark-to-market valuations, that are highly reliant on wholesale funding markets, and that employ high leverage.
- Banks need to improve their management of liquidity risk. This may include improvements in measurement, evaluation of the backup contingency lines, severe stress tests, and contingency plans for long periods when wholesale markets are unavailable. Supervisors need to be more proactive in countering signs that banks have inadequately protected against liquidity risks (see Chapter 3).
- Stricter rules are needed on the use of off-balance-sheet entities by banks, and disclosure should be improved so that investors can assess the sponsor's risk to the entity. Supervisors may need to strengthen guidelines regarding the circumstances under which risk transfers to off-balance-sheet entities warrant capital relief (see Chapter 2).

*Public measures can help alleviate some stress in the U.S. mortgage markets, but longer-term policy repercussions need to be considered carefully.*

Public measures to alleviate mortgage-related stress should help cushion some of the fallout

from the crisis. In addition to a sharp easing in monetary policy and broader tax relief, measures adopted in the United States include a moratorium on interest rate resets for subprime borrowers; an increase in the limit on the size of loans that conform to packaging requirements at the GSEs; a removal of the cap on the GSEs' retained portfolios; and an expansion in the Federal Housing Administration lending program. These steps, though helpful, are not a panacea. The planned moratorium, for example, seeks to limit foreclosures, but may also redistribute the cost from borrowers to lenders, servicers, and investors. Other measures will need to be weighed carefully to ensure that a balance is struck between (legitimate) issues of consumer protection and protection of legal contracts that underpin modern finance, as some of these measures may undermine existing contracts.

*If systemic risks significantly increase, remedial measures may be warranted.*

Public policy should seek to safeguard financial stability and market functioning. However, care should be taken to avoid creating adverse incentives or moral hazard that undermines discipline imposed on private players by such events. At the same time, the public resources should be kept as small as possible. Supervisors need to ensure prompt recognition of mark-to-market losses but should recognize that prices in illiquid markets can overshoot their new equilibrium (see Chapter 2). In a case of depleted capital, the preferred approach would be to take remedial measures and resolve the institution if it is no longer viable. Shareholders should bear the brunt of the adjustment, and the resources raised by the liquidation of the institution should be shared with creditors. When the failure of the institution poses a systemic threat, the case for public assistance may need to be considered, but only after shareholders have borne the full brunt, with clear mechanisms in place to ensure that operations continue on a commercial basis, and with an unambiguous plan for exit by the public sector.

Resolution should avoid adding to pressures of distressed debt sales. Under extreme sce-

narios, sales of structured finance assets from off-balance-sheet entities and banks under resolution could place further pressure on credit and may force other banks to become undercapitalized, leading to potentially disruptive and costly strains on insured depository institutions. Accordingly, disposition of assets should be managed in an orderly fashion.

*Resolving institutions should go hand-in-hand with reforms to strengthen the financial system.*

An important lesson from the crisis has been the role that underlying vulnerabilities and weakness in the financial system architecture has played in amplifying problems and raising costs to both private and public parties. Although a rush to regulate should be avoided, supervisors need to be able to respond proactively to address misaligned incentive structures—such as in the “originate-to-distribute” model—that together with an overall resolution strategy should reduce future risks. For example, some German Landesbanken were particularly exposed to subprime instruments, and IMF missions have called for a restructuring of these state-sponsored banks—a process that may gain new impetus. In the United Kingdom, a review of financial stability arrangements is under way—following the events at Northern Rock. This anticipates the establishment of a stronger system for the detection of banking sector problems, and associated with this a special resolution regime. An addition reform of the payment system oversight arrangements is being considered. In the United States, the experience of the financial guarantors argues for reforms to U.S. insurance regulation. Responsibility currently resides with the states, which has impeded coordination of regulatory efforts across states and with federal bank and securities regulators where spillovers are now evident. A new strategy for regulation of the financial guarantor sector needs to be implemented, including a coherent approach to capital adequacy and new limits on financial guarantors’ activities.

*Restoring counterparty confidence in funding markets should support an exit by central banks as conditions stabilize.*

Central bank operations in the term funding markets pose challenges for monetary operations in the presence of counterparty credit concerns. Term premiums reflect, in part, market perceptions and pricing of credit risk. Therefore, determining the size, tenor, and vigor of such operations needs to balance the desire to stabilize market conditions without unduly distorting the market pricing of credit risk. Importantly, central banks will find exiting the role of term funding support difficult without the implementation of the above policy measures, because central bank operations can address liquidity but not credit problems. Once counterparty confidence is restored and banks have strengthened their liquidity and funding positions, central banks should seek to gradually exit from significant support to term funding markets.

*Emerging markets need to strengthen their resilience to global turmoil.*

Policy improvements have contributed to the resilience of many emerging markets in the face of the global turmoil. In many countries, macroeconomic stabilization programs have helped to eliminate distortions and reduce external imbalances, making domestic markets less vulnerable to external shocks. Countries vulnerable to external financing shocks and higher inflation need to adjust to the new tighter external financing conditions and adopt policies to reduce domestic repercussions of sustained financial turmoil. These policies may include a tightening of limits on external borrowing by banks and other financial institutions. In addition, to prepare for the possibility of a deeper global liquidity shock, policymakers should map out contingency plans with potential responses to short-term funding problems. The importance of transparency in bolstering investor confidence has also become more apparent. The limited exposure to subprime and other impaired instruments in emerging

markets should not lead to complacency, as the same benign conditions have underpinned higher risk-taking in some countries. As well, the lessons from the turmoil underscore the need to make further progress on fine-tuning the design and strengthening the implementation of accounting and disclosure standards for financial institutions.

The IMF is developing new methods to examine various types of risk and is seeking to strengthen its assessments of macro-financial linkages (see Box 1.4). These efforts will be intensifying given the now more urgent task of limiting the knock-on effects of the current crisis to the IMF's broader membership.

### Annex 1.1. Global Financial Stability Map: Construction and Methodology<sup>53</sup>

This annex outlines our choice of indicators for each of the broad risks and conditions in the stability map. To complete the map, these indicators are supplemented by market intelligence and judgment that cannot be adequately represented with available indicators.

To begin construction of the stability map, we determine the percentile rank of the current level of each indicator relative to its history to guide the assessment of current conditions, relative both to the October 2007 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. Table 1.4 shows how each indicator has changed since the October 2007 GFSR and the overall assessment of the movement in each risk and condition.

#### Monetary and Financial Conditions

*The availability and cost of funding linked to global monetary and financial conditions (Figure 1.34).* To capture movements in general

<sup>53</sup>The main author of this annex is Ken Miyajima.

**Table 1.4. Changes in Risks and Conditions Since the October 2007 Global Financial Stability Report**

| Conditions and Risks  | Change since October 2007 GFSR |
|---|--------------------------------|
| <b>Monetary and Financial Conditions</b>                      | ↓                              |
| G-7 real short rates  | ↑                              |
| G-3 excess liquidity  | ↓                              |
| Financial conditions index                                    | ↔                              |
| Growth in official reserves                                   | ↓                              |
| G-3 lending conditions  | ↓                              |
| <b>Risk Appetite</b>  | ↓↓                             |
| Investor survey of risk appetite                              | ↔                              |
| Investor confidence index                                     | ↓                              |
| Emerging market fund flows                                    | ↓                              |
| Risk aversion index   | ↓                              |
| <b>Macroeconomic Risks</b>                                    | ↑↑↑                            |
| <i>World Economic Outlook</i> global growth risks             | ↑                              |
| G-3 confidence indices  | ↑                              |
| Economic surprise index                                       | ↑                              |
| OECD leading indicator  | ↑                              |
| Implied global trade growth                                   | ↑                              |
| <b>Emerging Market Risks</b>                                  | ↑↑                             |
| Fundamentals EMBIG spread                                     | ↑                              |
| Sovereign credit quality                                      | ↑                              |
| Credit growth   | ↑                              |
| Median inflation volatility                                   | ↑                              |
| Corporate spreads   | ↑                              |
| <b>Credit Risks</b>   | ↑↑↑                            |
| Global corporate bond index spread                            | ↑                              |
| Credit quality composition of high-yield corporate bond index | ↑                              |
| Speculative-grade corporate default rate forecast             | ↑                              |
| Banking stability index                                       | ↑                              |
| G-3 loan delinquencies  | ↑                              |
| <b>Market Risks</b>   | ↑                              |
| Hedge fund estimated leverage                                 | ↑                              |
| Speculative positions in futures markets                      | ↓                              |
| Common component of asset returns                             | ↓                              |
| World implied equity risk premia                              | ↓                              |
| Composite volatility measure                                  | ↑                              |
| Financial market liquidity index                              | ↑                              |

Source: IMF staff estimates.

Note: Changes are defined for each risk/condition such that ↑ signifies more risk or easier conditions and ↓ signifies the converse; ↔ indicates no appreciable change. The number of arrows for the six overall conditions and risks corresponds to moves on the global financial stability map.

monetary conditions in mature markets, we begin by examining the cost of short-term liquidity, measured as the average level of real short rates across the G-7. From there, we take

### Box 1.4. Quantitative Financial Stability Modeling

*In the wake of the U.S. subprime crisis, the IMF has expanded its research agenda in quantitative financial stability modeling to strengthen the analysis of macro-financial linkages.*

The IMF is developing new applications for stress tests and other risk assessment models to help identify and address financial system vulnerabilities in member countries. This work aims at enhancing the quality of quantitative analyses performed in the context of the Financial Sector Assessment Program, supporting technical cooperation on risk-based supervision and Basel II implementation, and facilitating offsite surveillance of national and global financial systems, and hence IMF surveillance more broadly.

Among the specific areas in which the IMF has been active are the further development of credit risk modeling; analysis of the “second-round effects” of shocks—both interactions within the financial sector and feedback between the financial sector and the real economy; and expansion of existing approaches to liquidity risk modeling.

#### ***Credit Risk Modeling***

Work in this area revolves around three methodologies. One application models portfolio credit risk based on CreditRisk+, a tool used by financial institutions and supervisors to compute credit portfolio loss distributions (Avesani and others, 2006). This application can be useful for scenario stress testing when complemented with models of the probability of default and loss given default. Other recent work includes macro stress testing in the presence of data constraints, an approach that seeks to quantify the impact of macroeconomic shocks on banks’ economic capital in the presence of short time series of default probabilities (Segoviano Basurto, 2006). It simultaneously accounts for changes in the correlation among banks’ assets through the economic cycle. The contingent claims approach (CCA)—a method

that combines balance sheet and market information with widely used finance techniques to construct risk-adjusted balance sheets—is also being used to conduct scenario analysis and can be applied to financial institutions that issue securities in sufficiently deep markets (Gray, Merton, and Bodie, 2007).

#### ***Measurement of Second-Round Effects***

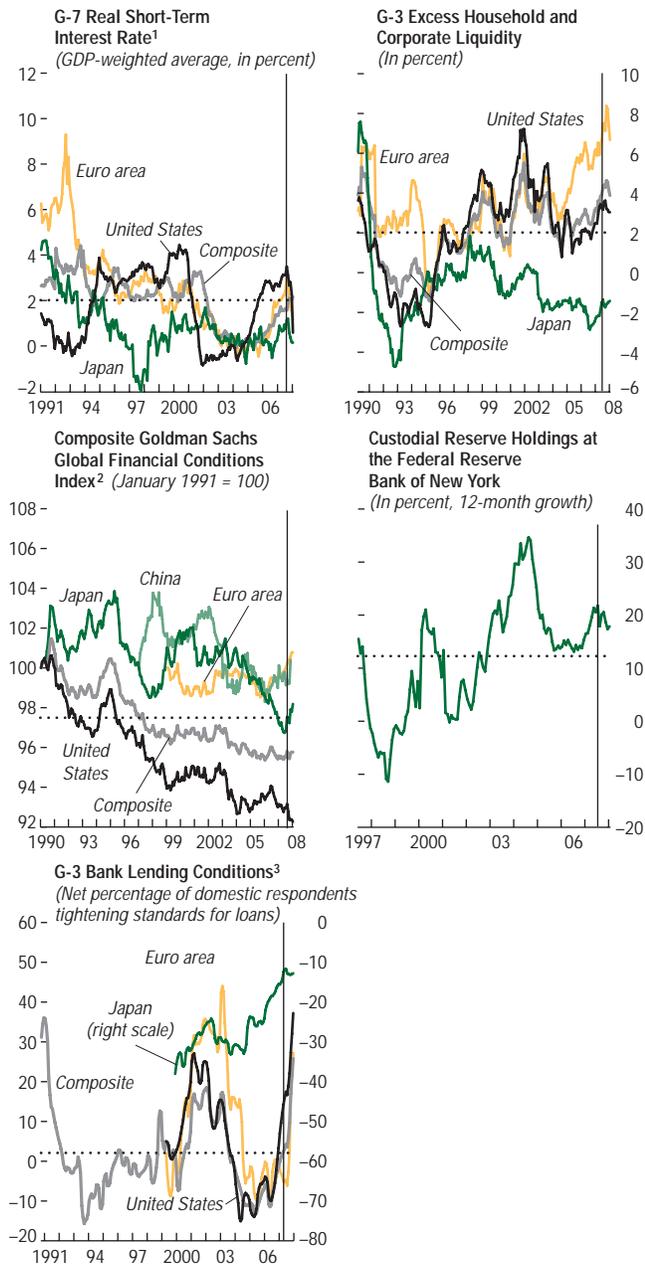
This includes a measure of financial fragility at the system level—a banking stability index—based on banks’ joint probability of default (see Box 1.5). This approach can also be applied at the global level by looking at joint probabilities of default (or other measures of stability) for key large complex financial institutions. Another approach to modeling contagion uses the extreme value theory framework to capture the possibility that large, extreme shocks are transmitted across financial systems differently than small shocks (Chan-Lau, Mitra, and Ong, 2007). A third approach is to develop a CCA-based framework that provides risk indicators and can be linked to macroeconomic models of varying degrees of complexity.

#### ***Liquidity Risk Modeling***

Work is under way to enhance the range of tools and methods available to stress test exposures to liquidity risk—a risk area that the current turmoil has made more apparent. The three main directions of work in this area are (1) building on existing methodologies to identify funding liquidity risk (including non-traditional sources, such as securitization) and expanding them to incorporate market liquidity risk (including the effects of asset fire sales and crowded trades); (2) capturing off-balance-sheet concentration risk—for example, excessive committed and uncommitted credit lines to a single counterparty; and (3) extending the CCA-based framework using information from equity option prices to capture the effects of increased uncertainty of asset values, market illiquidity, potential for fire sales, and funding liquidity risk.

Note: The main author of this box is Marina Moretti.

**Figure 1.34. Global Financial Stability Map: Monetary and Financial Conditions**



Sources: Bloomberg L.P.; Goldman Sachs; OECD; lending surveys by Bank of Japan, European Central Bank, and Federal Reserve Board for households and corporates; and IMF staff estimates.

Note: Dashed lines are period averages. Vertical lines represent data as of the October 2007 GFSR.

<sup>1</sup>Only G-3 subindicators are shown.

<sup>2</sup>A GDP-weighted average of China, euro area, Japan, and the United States. Each country index represents a weighted average of variables, including interest rates, credit spreads, exchange rates, and financial wealth.

<sup>3</sup>Monthly interpolated GDP-weighted average. Euro area 1999:Q1 to 2002:Q4 based on values implied by credit growth.

a broad measure of excess liquidity, defined as the difference between broad money growth and estimates for money demand. Realizing that the channels through which the setting of 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 real exchange rates, real short- and long-term interest rates, credit spreads, equity returns, and market capitalization. Rapid increases in official reserves held by the central bank create central bank liquidity in the domestic currency and in global markets. To measure this, we look at the growth of official international reserves held at the Federal Reserve. While the above measures capture the price effects of monetary and financial conditions, to examine the quantity effects, we incorporate changes in lending conditions based on senior loan officer surveys in mature markets.

**Risk Appetite**

*The willingness of investors to take on additional risk by increasing exposure to riskier asset classes, and the consequent potential for increased losses* (Figure 1.35). We aim to measure the extent to which investors are actively taking on more risk. A direct approach to this exploits survey data. The Merrill Lynch Fund Manager Survey asks about 200 fund managers what level of risk they are currently taking relative to their benchmark. 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. The State Street Investor Confidence Index uses changes in equity holdings by institutional investors relative to domestic investors to measure relative risk tolerance.<sup>54</sup> The index extracts relative

<sup>54</sup>The estimated changes in relative risk tolerance of institutional investors from Froot and O’Connell (2003) are aggregated using a slow, exponentially weighted moving average in order to account for slow-moving secular

risk tolerance by netting out wealth effects and assuming that changes in fundamentals symmetrically affect all kinds of investors. We also take account of flows into emerging market equity and bond funds as these represent another risky asset class. 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.<sup>55</sup> By comparing returns between government bills and equities, the model allows the level of risk aversion to move over time. Taken together, these measures provide a broad indicator of risk appetite.

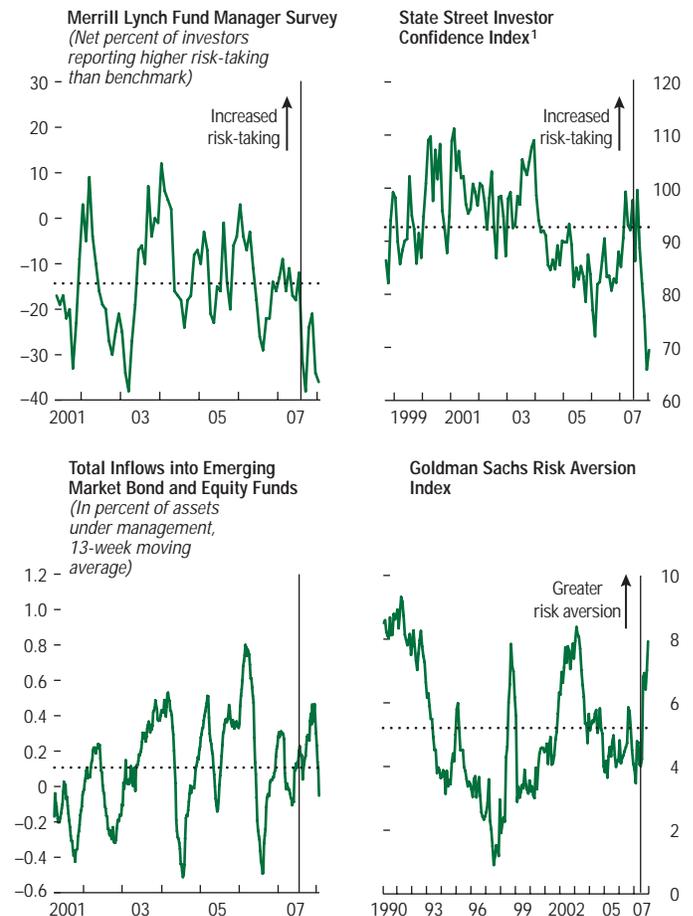
### Macroeconomic Risks

*Macroeconomic shocks with the potential to trigger a sharp market correction, given existing conditions in capital markets* (Figure 1.36). Our principal assessment of the macroeconomic risks is based on the analysis contained in the WEO and is consistent with the overall conclusion reached in that report on the outlook and risks for global growth (see, in particular, Figure 1.12 of the April 2008 WEO). We complement that analysis by examining various economic confidence measures. The first of these is a 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. A second component is a "surprise" index that shows whether data releases are consistently surprising financial markets on the upside or downside. The aim is to capture the extent to which informed participants are likely to have to revise their outlook for economic growth. Third, recognizing the importance of turning points between expansions and slowdowns of

changes in the data. The index is scaled and rebased so that 100 corresponds to the year 2000.

<sup>55</sup>The index represents the value of the coefficient of risk aversion, constrained to values between 0 and 10.

**Figure 1.35. Global Financial Stability Map: Risk Appetite Conditions**

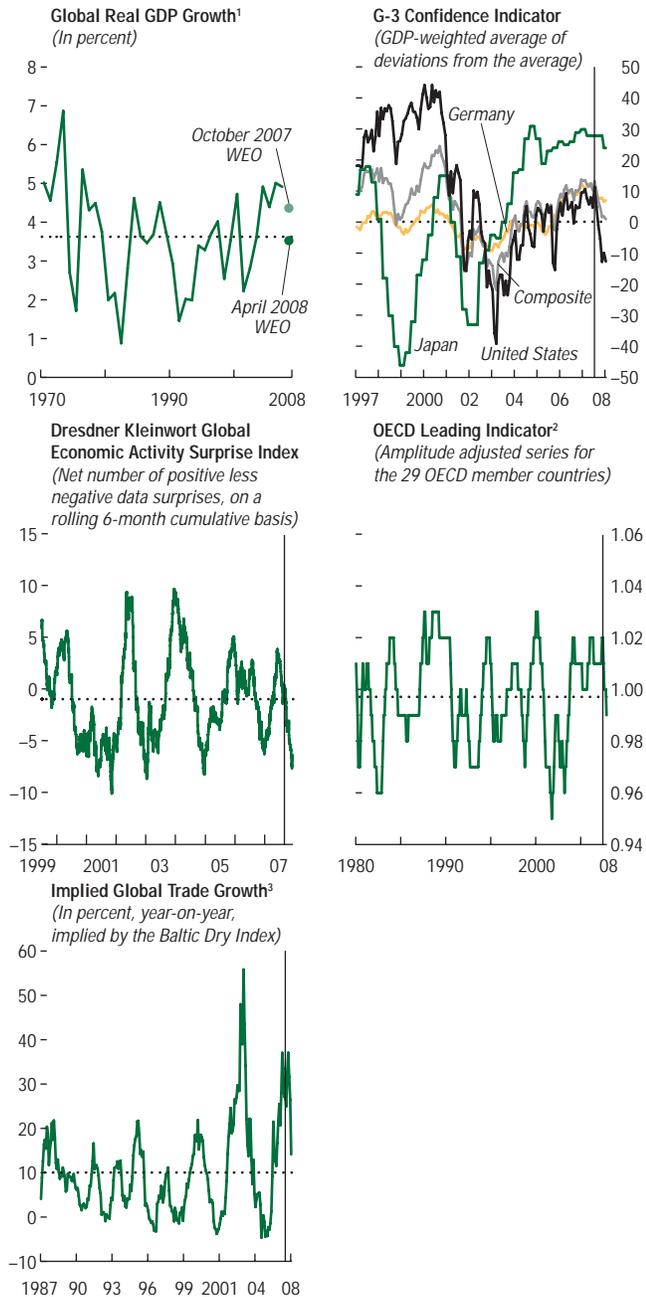


Sources: Emerging Portfolio Fund Research, Inc.; Goldman Sachs; Merrill Lynch; State Street Global Markets; and IMF staff estimates.

Note: Dashed lines are period averages. Vertical lines represent data as of the October 2007 GFSR.

<sup>1</sup>The estimated changes in relative risk tolerance of institutional investors from Froot and O'Connell (2003) are integrated to a level, scaled, and rebased so that 100 corresponds to the average level of the index in the year 2000.

**Figure 1.36. Global Financial Stability Map: Macroeconomic Risks**



Sources: IMF, *World Economic Outlook*; Bloomberg L.P.; Dresdner Kleinwort; OECD; The Baltic Exchange; and IMF staff estimates.  
 Note: Dashed lines are period averages. Vertical lines represent data as of the October 2007 GFSR.

<sup>1</sup>The 2008 revised datapoint accounts for skewness in the distribution of risks to the baseline forecast.  
<sup>2</sup>Amplitude adjustment is carried out by adjusting mean to unity and the amplitude of the raw index to agree with that of the reference series by means of a scaling factor.  
<sup>3</sup>The Baltic Dry Index is a shipping and trade index measuring changes in the cost of transporting raw materials such as metals, grains, and fuels by sea.

economic activity, we incorporate changes in the Organization for Economic Cooperation and Development's composite leading indicator. Finally, to gauge inflection points in global trade, we include global trade growth estimates implied by the Baltic Dry Index, a high-frequency indicator based on the freight rates of bulk raw materials that is commonly used as a leading indicator for global trade.

**Emerging Market Risks**

*Underlying fundamentals in emerging markets and vulnerabilities to external risks* (Figure 1.37). These risks are conceptually separate from, though closely linked to, macroeconomic risks insofar as they focus only on emerging markets. Using an econometric model of emerging market sovereign spreads, we identify the movement in Emerging Market Bond Index Global (EMBIG) spreads accounted for by changes in fundamentals, as opposed to the movement in spreads attributable to other factors. Included in the fundamental factors are changes in economic, political, and financial risks within the country.<sup>56</sup> This is complemented with a measure of the trend in actions by sovereign rating agencies, such as Moody's and Standard & Poor's, to gauge changes in the macroeconomic environment and progress in reducing vulnerabilities arising from external financing needs. We also measure fundamental conditions in emerging market countries that are separate from those related to sovereign debt, particularly given the reduced need for such

<sup>56</sup>The model uses three fundamental variables to fit EMBIG spreads: economic, financial, and political risk ratings. The economic risk rating is the sum of risk points for annual inflation, real GDP growth, the government budget balance as a percentage of GDP, the current account as a percentage of GDP, and GDP per capita as a percentage of the world average GDP per capita. The financial risk rating includes foreign debt as a percentage of GDP, debt service as a percentage of GDP, net international reserves as months of import cover, exports of goods and services as a percentage of GDP, and exchange rate depreciation over the last year. The political risk rating is calculated accounting for 12 indicators representing government stability and social conditions.

financing in many emerging market countries, by including an indicator of growth in private sector credit. Other components of the subindex include a measure of the volatility of inflation rates, and a measure of corporate credit spreads relative to sovereign counterparts.

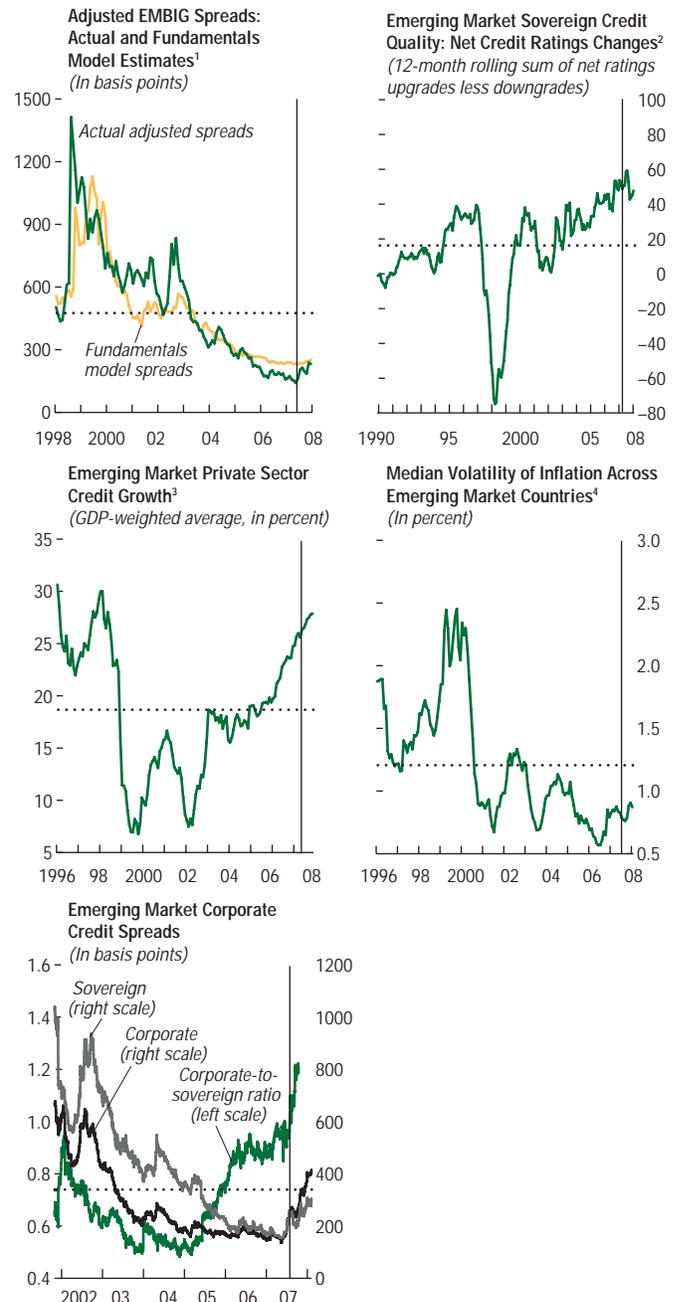
### Credit Risks

*Changes in and perceptions of credit quality that have the potential for creating losses resulting in stress to systemically important financial institutions* (Figure 1.38). Spreads on a global corporate bond index provide a market-price-based measure of investors' assessment of corporate credit risk. We also examine the credit-quality composition of the high-yield index to identify whether it is increasingly made up of higher- or lower-quality issues, calculating the percentage of the index comprised of CCC or lower-rated issues. We also incorporate forecasts of the global speculative default rate produced by Moody's. Another important component of the subindex is a Banking Stability Index (see Box 1.5), which represents the expected number of defaults among large complex financial institutions (LCFIs), given that at least one LCFI defaults. This index is intended to highlight market perceptions of systemic default risk in the financial sector. Finally, to capture broader credit risks, we include delinquency rates on a wide range of noncorporate credit, including residential and commercial mortgages and credit card loans.

### Market and Liquidity Risks

*The potential for instability in pricing risks that could result in broader spillovers and/or mark-to-market losses* (Figure 1.39). An indicator attempting to capture the extent of market sensitivity of hedge fund returns provides an indirect measure of institutional susceptibility to price changes. The subindex also includes a speculative positions index, constructed from the noncommercial average absolute net positions relative to open interest of a range of

**Figure 1.37. Global Financial Stability Map: Emerging Market Risks**



Sources: Bloomberg L.P.; JPMorgan Chase & Co.; The PRS Group; IMF, *International Financial Statistics*; Credit Suisse; and IMF staff estimates.

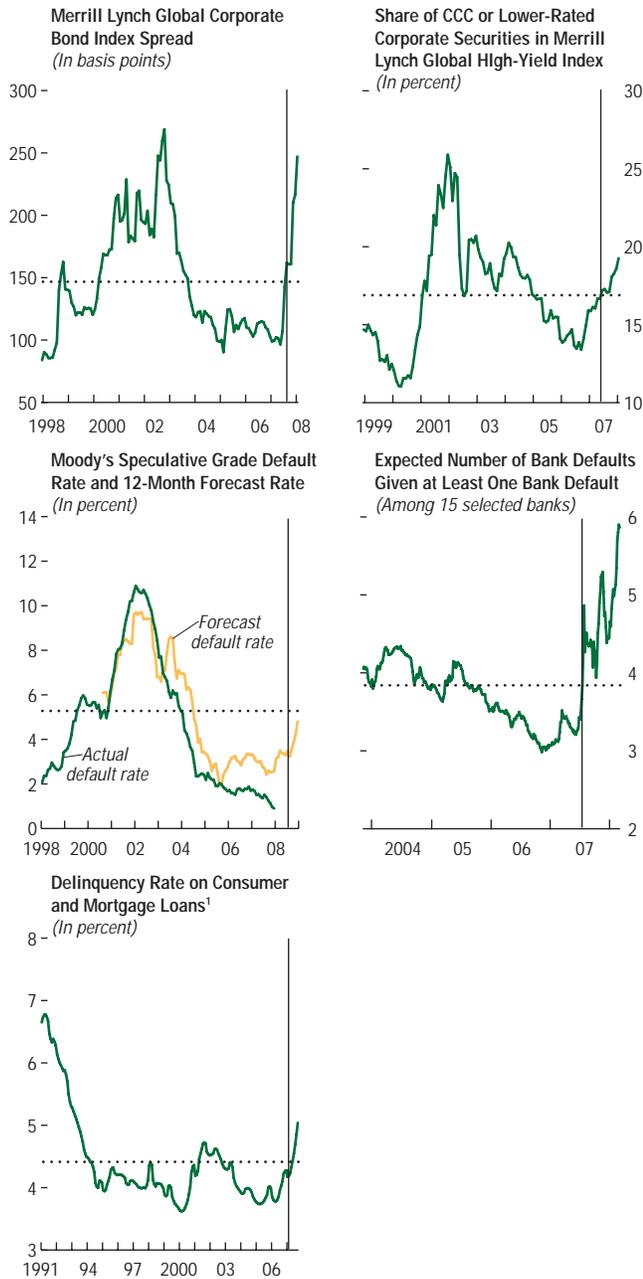
Note: Dashed lines are period averages. Vertical lines represent data as of the October 2007 GFSR. <sup>1</sup>EMBIG = Emerging Market Bond Index Global. The model excludes Argentina because of breaks in the data series related to debt restructuring. Owing to the short data series, the model also excludes Indonesia and several smaller countries. The analysis thus includes 32 countries.

<sup>2</sup>Net actions of upgrades (+1 for each notch), downgrades (-1 for each notch), changes in outlooks (+/- 0.25), reviews and creditwatches (+/-0.5).

<sup>3</sup>44 countries.

<sup>4</sup>Average of 12-month rolling standard deviations of consumer price changes in 25 emerging markets.

**Figure 1.38. Global Financial Stability Map: Credit Risks**



Sources: Merrill Lynch; Moody's; Bloomberg L.P.; Mortgage Bankers Association; Federal Reserve; and IMF staff estimates.  
 Note: Dashed lines are period averages. Vertical lines represent data as of the October 2007 GFSR.  
<sup>1</sup>30-, 60-, and 90-day delinquencies for residential and commercial mortgages, and credit card loans in the United States.

futures contracts as reported to the Commodity Futures Trading Commission. These typically rise when speculators are taking relatively large positional bets on futures markets, relative to commercial traders. Also included is an estimation of the proportion of return variance across a range of asset classes that can be explained by a common factor. The higher the correlations across asset classes, the greater the risk of a disorderly correction in the face of a shock. An additional indicator is an estimate of equity risk premia in mature markets using a three-stage dividend discount model. Low ex ante equity risk premia may suggest that investors are underestimating the risk attached to equity holdings and so increasing potential market risks. There is also a measure of implied volatility across a range of assets. Finally, to capture perceptions of funding, secondary market trading, and counterparty risks, we incorporate the spread between major mature market government securities yields and interbank rates, the spread between interbank rates and expected overnight interest rates, bid-ask spreads on major mature market currencies, and daily return-to-volume ratios of equity markets.

**Annex 1.2. Methodology for Calculating Global Losses and Bank Exposures<sup>57</sup>**

This annex describes the methodology for estimating losses on holdings of U.S. residential and commercial mortgages, consumer credit, and corporate debt.

Loss estimates vary widely depending on the methodology employed. Our estimates are based on potential loan losses that have occurred since the subprime crisis began and over the next two years, consistent with the period of expected slowing of the U.S. economy and mark-to-market losses on related securities over the course of the past year reflecting the credit deterioration that has occurred and is anticipated to occur. The objective of the analysis is to identify the scale of losses that market participants have already

<sup>57</sup>The main author of this annex is Mustafa Saiyid.

recognized and could potentially recognize in the period ahead. Losses on loans are based on projections of cash flow shortfalls, while losses on securities are based on changes in the market pricing of cash and derivative indices.

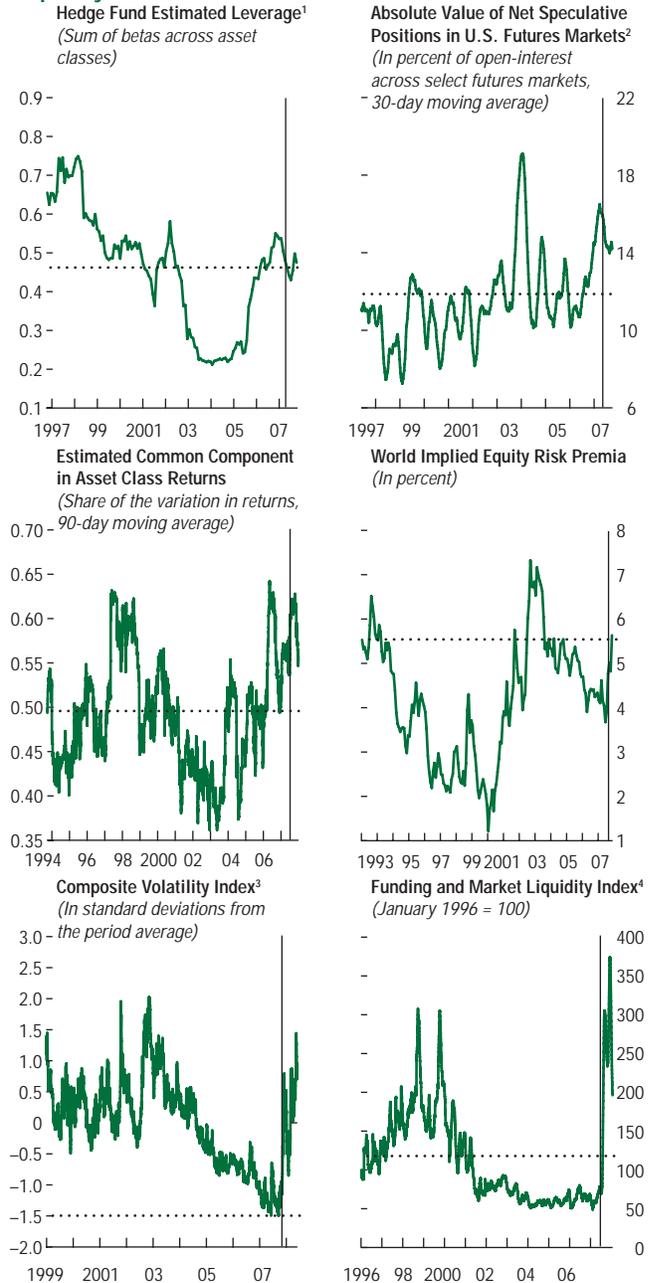
The loans captured in the exercise include subprime, alt-A, prime residential and commercial real estate mortgages, consumer, corporate, and leveraged loans. Securities include ABS and ABS CDOs based on subprime and alt-A residential mortgage loans, prime MBS, CMBS, auto loan and credit card ABS, CLOs, and high-yield and investment-grade corporate debt.

Losses on different types of loans were estimated from regression analysis using various relevant factors, such as changes in unemployment, lending standards, and housing and commercial real estate pricing, as relevant. In each case, the outstanding stock of the type of loan was multiplied with the change in the forecasted loss (charge-off) rate. The underlying historical data on loan loss rates and changes in lending standards were obtained from the Federal Reserve. Although the loan loss data are for banks only, it was assumed that loans held by other lenders would exhibit similar performance.

Losses on residential and commercial mortgages were also estimated by a second procedure. This one involved a three-step process. We first estimated the percentage of loans that would become delinquent, then the percentage of delinquent loans that would default, and finally losses on defaulted loans after completion of the foreclosure or recovery process. Each of these steps is detailed below.

In the first step, we projected delinquencies on residential and commercial loans over a multi-year period using historical patterns and the current trajectory of recent vintage loans. An average delinquency for each loan type (prime, alt-A, subprime, and commercial) was computed by weighting the maximum projected delinquency on loans issued each year by the size of issuance. In the second step, 70 percent of prime, alt-A, and commercial real estate

**Figure 1.39. Global Financial Stability Map: Market and Liquidity Risks**



Sources: Credit Suisse Tremont Index LLC; Bloomberg L.P.; JPMorgan Chase & Co; IBES; Morgan Stanley Capital International; and IMF staff estimates.

Note: Dashed lines are period averages. Vertical lines represent data as of the October 2007 GFSR.

<sup>1</sup>36-month rolling regressions of hedge fund performance versus real asset returns. <sup>2</sup>Data represent the absolute value of the net position taken by noncommercial traders in 17 select U.S. futures markets. High values are indicative of heavy speculative positioning across markets, either net-long or net-short. <sup>3</sup>Represents an average z-score of the implied volatility derived from options from stock market indices, interest, 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 where data are available). Values of +/-1 indicate average implied volatility is one standard deviation above or below the period average. <sup>4</sup>Based on the spread between yields on government securities and interbank rates, term and overnight interbank rates, currency bid-ask spreads, and daily return-to-volume ratios of equity markets. A higher value indicates tighter market liquidity conditions.

### Box 1.5. Banking Stability Index

Simultaneous large losses in several banks can affect a banking system's financial stability, and so the likelihood of such an event needs to be monitored and measured. This box describes the banking stability index and additional indicators.

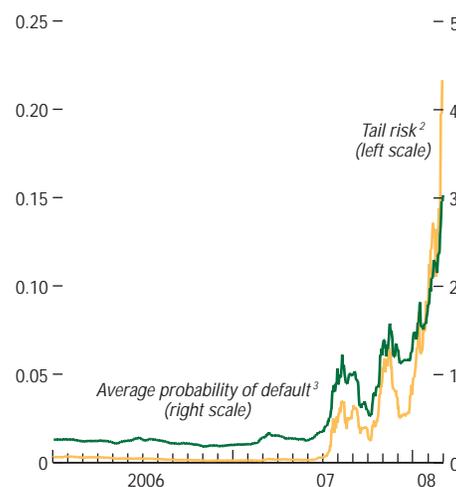
The proper estimation of default dependence among banks is vital for financial stability surveillance because banks are usually linked—either directly, through the interbank deposit market, or indirectly, through lending to common sectors. This default dependence varies across the economic cycle, rising in times of distress so that the fortunes of banks decline concurrently. Thus, simultaneous large losses in several banks could affect stability in the overall banking system. Supervisors should assess both the risk of large losses and possible default of a specific bank, and the impact that this would have on other banks in the system.

To model the stability of the banking system, we follow Goodhart and Segoviano (forthcoming) in treating the banking system as a portfolio of banks. Then, using market-based probabilities of default (PoDs) of individual banks, and employing a novel nonparametric copula approach, we derive the joint probability of default (JPoD) of the banking system.<sup>1</sup> The JPoD represents the probability of all the banks in the portfolio going into default, that is, the tail risk of the system. In periods of financial distress, the banking system's JPoD may experience larger and nonlinear increases than those experienced by the PoDs of individual banks. Based on the JPoD, we estimate a Banking Stability Index (BSI), which reflects the expected number of bank defaults given that at least

Note: The main author of this box is Miguel Segoviano.

<sup>1</sup>The structure of linear and nonlinear dependencies among banks in a system can be represented by copula functions. Our approach infers copulas from the joint movement of individual banks' PoDs. This is in comparison with traditional approaches, in which parametric copulas have to be chosen and calibrated explicitly—usually a difficult task, especially under data constraints.

#### Tail Risk and Average Probability of Default<sup>1</sup> (In percent)



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

<sup>1</sup>From January 1, 2007 to March 10, 2008, the average probability of default increased by a factor of 14.8, while the JPoD, measure of tail risk, increased by a factor of 203.6.

<sup>2</sup>Joint probability of 15 simultaneous defaults.

<sup>3</sup>Unweighted average of individual banks' probabilities of default.

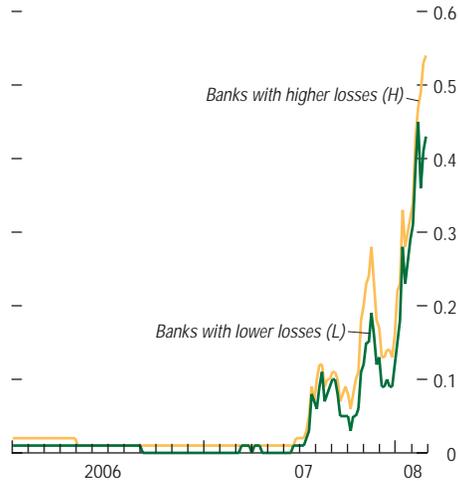
one bank defaults. A higher number signifies greater instability. This framework allows for the estimation of additional measures of stability, including the probability that each bank in the system will default, given that another bank in the system defaults. Such pair-wise conditional probabilities provide insights into the likelihood of contagion and can be presented in a default contagion matrix (DCo).

To examine the effects of the current credit turmoil on the banking system, the average PoD for a portfolio of 15 systemically important large and complex financial institutions (LCFIs) is compared with changes in the system's JPoD.<sup>2</sup> As stress grew from mid-2007 to the present, the JPoD increased more than 10 times than the

<sup>2</sup>ABN Amro, Bank of America, Bear Stearns, BNP, Citigroup, Credit Suisse, Deutsche Bank, Goldman Sachs, HSBC, JPMorgan, Lehman Brothers, Merrill Lynch, Morgan Stanley, UBS, and Société Générale.

### Joint Probability of Default (JPoD) for Banks with Higher and Lower Losses<sup>1</sup>

(In percent)

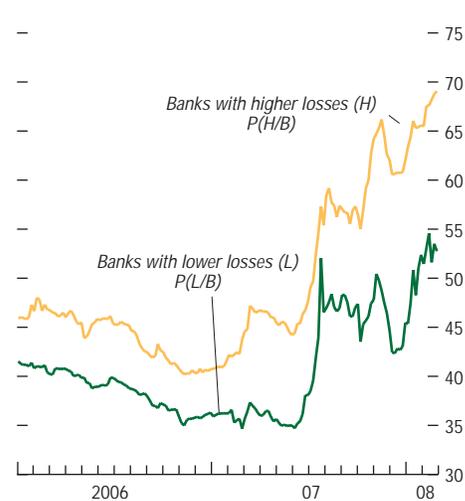


Sources: Bloomberg L.P.; and IMF staff estimates.

<sup>1</sup>On March 5, 2008, the JPoD for *H* banks was higher than that for *L* banks by a factor of 1.3.

### Mean Default Contagion (DCo) for Banks with Higher and Lower Losses<sup>1</sup>

(In percent)



Source: IMF staff estimates.

<sup>1</sup>Unweighted average of pair-wise conditional probabilities of default, which indicate that *H* banks or *L* banks default given that any other bank (*B*) defaults. In order to keep the confidentiality of the analyzed institutions, we report the mean-DCo, rather than the institution-specific DCo. From January 1, 2007 to March 5, 2008, the mean-DCo rose by a factor of 1.5 among *L* banks, and by a factor of 1.7 among *H* banks.

average PoD. The difference is mainly explained by an increased default dependence among the banks in the system, which has significantly augmented the tail risk in the system (see first figure) and sharply increased the BSI.<sup>3</sup> This increased instability was driven by banks under greater stress, which can be seen when grouping the 15 LCFIs into two categories; that is, lesser-stressed banks (*L*) and higher-stressed banks (*H*).<sup>4</sup> As the credit woes worsened, the JPoD

<sup>3</sup>The BSI is used to construct the credit risk component of the global financial stability map.

<sup>4</sup>This classification was based on the expected size of banks' losses due to subprime mortgage exposures relative to Tier 1 capital. The methodology used for this classification is further explained in Annex 1.2.

for each group increased significantly, though more severely for *H* banks, indicating that tail risk within the *H* banks increased more sharply (see second figure). Also, contagion among the *H* banks is higher, as indicated by the mean-DCo (see third figure). These estimations provide evidence that a bank's resilience to shocks is affected by the overall resilience of the other banks within the financial system. Thus, unless banks' default dependence is taken into account, supervisors may not accurately estimate the banking system's stability.

loans were assumed to convert from late stage (60-day) delinquency into default. One hundred percent of 60-day delinquent subprime loans were assumed to default. These figures are broadly consistent with market estimates.

For the final step, the recovery rate of principal from the foreclosure process was assumed to be 60 percent for prime and commercial real estate loans, and 50 percent for both alt-A and subprime loans. The loss on

each category of residential and commercial loans was computed as the vintage-weighted delinquency times the conversion-to-default rate multiplied by the loss given default (or one minus the recovery rate). Average projected cash flow losses were estimated to be 15 percent of principal for subprime, 5 percent for alt-A, 1 percent for prime, and 1 percent for commercial loans.

Losses for securities were next estimated by multiplying the outstanding stock of each type of security by the change in the market price of the relevant index over the course of a year. The average price change was obtained by weighting price changes for constituent indices comprised of different vintages and ratings by the issuance in each of these categories.

Beginning with the residential mortgage market, subprime-related ABS and CDO securities were priced using ABX and TABX derivative indices, respectively. Average losses on securities were estimated as 30 percent of principal for ABS and 60 percent for ABS CDOs since last year. The corresponding dollar loss estimates for subprime and alt-A securities were adjusted for any overlap of losses on ABS with those on CDOs. For prime-mortgage-related securities, conforming and nonconforming issues were treated separately and weighted appropriately. The prices of on-the-run agency pass-through securities were used as reference for conforming securities, while quotes on pools of jumbo loans were used to represent the pricing of nonconforming securities. Spreads on agency pass-throughs have widened versus U.S. Treasury securities, as have spreads on pools of jumbo loans versus agency securities. However, the absolute change in market prices of these prime securities has been positive over the course of the past year because of falling yields on U.S. treasuries. No losses were therefore estimated on holdings of prime securities.

Appropriately weighted indices were also used for other types of securities: CMBS, consumer ABS, and corporate debt. The CMBX derivative indices were used to estimate losses on CMBS, while cash indices were used

for consumer ABS (autos and credit cards), investment-grade corporate debt, high-yield debt, and for the LCDX for CLOs. No losses were estimated for holdings of consumer ABS or investment-grade U.S. corporate debt, as corresponding indices have been positive over the last year.

The loss estimates are subject to the following caveats and uncertainties:

- The fall in market prices may be overshooting potential declines in cash flows over the lifetime of underlying loans.
- Projected delinquency patterns may not fully account for recent structural changes in markets, including a rise in the proportion of adjustable-rate mortgages likely to experience rate resets in the near term.
- Falling U.S. house prices and further deterioration in the macroeconomic environment could increase rates of delinquency, default, and loss. Conversely, fiscal stimulus, monetary easing, and loan modification measures could lower these rates.

Based on this approach, we estimate total losses from broad credit market deterioration of \$945 billion globally, \$565 billion of which is due to losses on residential mortgage debt, \$240 billion on commercial real estate debt, \$120 billion on corporate debt, and \$20 billion on consumer credit debt.<sup>58</sup> Securitized debt (rather than whole loans) accounts for the bulk of losses (Table 1.5).

Banks globally are expected to shoulder roughly half of the subprime mortgage-related losses, based on bottom-up analysis using publicly disclosed exposures. Specifically, banks are estimated to have \$740 billion of net subprime exposure, mostly held by U.S. banks (53 percent), with the remainder held by European (41 percent), Asian (5 percent), and Canadian

<sup>58</sup>Losses on the residential mortgage market were estimated as the sum of losses on subprime, alt-A, and prime loans, as well as on ABS, ABS CDOs, and prime mortgage securities. Losses on corporate debt were estimated as the sum of losses on corporate and leveraged loans, as well as on related securities, including investment-grade debt, high-yield debt, and CLOs.

**Table 1.5. Losses by Asset Class as of March 2008**  
(In billions of U.S. dollars)

|                                | Base Case Estimates of Losses on Unsecuritized U.S. Loans          |  |   |
|--------------------------------|--|--|---|
|                                | Outstanding  | Estimated loss<br>October 2007 GFSR                | Estimated loss<br>March 2008                |
| Subprime                       | 300  | 30   | 45  |
| Alt-A                          | 600  | 10   | 30  |
| Prime                          | 3,800  | Not estimated                                      | 40  |
| Commercial real estate         | 2,400  | Not estimated                                      | 30  |
| Consumer loans                 | 1,400  | Not estimated                                      | 20  |
| Corporate loans                | 3,700  | Not estimated                                      | 50  |
| Leveraged loans                | 170  | Not estimated                                      | 10  |
| Total for loans                | 12,370   | 40   | 225   |
|                                | Base Case Estimates of Mark-to-Market Losses on Related Securities |  |   |
|                                | Outstanding  | Estimated mark-to-market loss<br>October 2007 GFSR | Estimated mark-to-market loss<br>March 2008 |
| ABS                            | 1,100  | 70   | 210   |
| ABS CDOs                       | 400  | 130  | 240   |
| Prime MBS                      | 3,800  | Not estimated                                      | 0   |
| CMBS                           | 940  | Not estimated                                      | 210   |
| Consumer ABS                   | 650  | Not estimated                                      | 0   |
| High-grade corporate debt      | 3,000  | Not estimated                                      | 0   |
| High-yield corporate debt      | 600  | Not estimated                                      | 30  |
| CLOs                           | 350  | Not estimated                                      | 30  |
| Total for securities           | 10,840   | 200  | 720   |
| Total for loans and securities | 23,210   | 240  | 945   |

Sources: Goldman Sachs; JPMorgan Chase & Co.; Lehman Brothers; Markit.com; Merrill Lynch; and IMF staff estimates.

Note: ABS = asset-backed security; CDO = collateralized debt obligation; CLO = collateralized loan obligation; CMBS = commercial mortgage-backed security; MBS = mortgage-backed security.

(1 percent) banks. In terms of composition, U.S. banks (together with government-sponsored enterprises) hold a greater proportion of overall exposure to the subprime market through unsecuritized subprime loans and ABS CDOs compared with European banks. On the other hand, European banks hold a greater proportion of their exposure to the subprime market via ABS. Banks are assumed to hold the most senior tranches.

Based on average loss estimates of 15 percent for unsecuritized mortgage loans, 30 percent on ABS, and 60 percent on ABS CDOs as described above, potential losses of U.S. banks (\$144 billion) are likely to be similar to those borne by European banks (\$121 billion). Losses of Asian banks are likely to be less than one-tenth of losses in Europe. More than half of the aggregate subprime-related loss would likely come from exposure to CDOs, while the remainder is expected to come from ABS, unsecuritized

subprime loans, and losses on off-balance-sheet liquidity lines. In particular, potential losses on off-balance-sheet conduit and SIV liquidity lines could result in \$40 billion of losses globally (\$27 billion for European banks and \$13 billion of losses for U.S. banks). These estimates are based on the assumption of an average loss of 5 percent on liquidity lines to off-balance-sheet conduits and SIVs. The 5 percent loss assumption is based on losses on a typical asset composition for conduits and SIVs. Losses on conduit assets are assumed to pass directly to the liquidity line, but losses on SIV assets are assumed to be mostly absorbed by the junior notes, given their funding structures (see Box 2.5 in Chapter 2). Conduits and SIVs are weighted by their market proportions—90 percent and 10 percent of the total, respectively—and it is assumed that all liquidity lines eventually get called.

Through mid-March 2008, banks had reported \$190 billion in losses on U.S. mort-

**Table 1.6. Global Bank Losses as of March 2008**  
(In billions of U.S. dollars)

| Country/Region           | Total Reported Losses | Estimated Losses on U.S. Subprime/Alt-A Loans | Estimated Losses on ABS | Estimated Losses on CDOs | Estimated Losses on Conduits/SIVs | Total Estimated Subprime-Related Losses | Remaining Subprime-Related Losses Expected |
|--------------------------|-----------------------|---|-------------------------|--------------------------|-----------------------------------|---|--|
| Europe                   | 80                    | 16  | 27                      | 53                       | 27                                | 123                                     | 43   |
| <i>Of which:</i>         |                       |   |                         |                          |                                   |   |  |
| United Kingdom           | 19                    | 16  | 1                       | 12                       | 11                                | 40                                      | 22   |
| Switzerland              | 23                    | 0   | 7                       | 15                       | 1                                 | 23                                      | 0  |
| Scandinavia              | 0                     | 0   | 0                       | 0                        | 1                                 | 1                                       | 1  |
| Euro area                | 33                    | 0   | 10                      | 20                       | 15                                | 45                                      | 12   |
| Unallocated              | 5                     | 0   | 9                       | 6                        | 0                                 | 14                                      | 9  |
| United States            | 95                    | 29  | 12                      | 90                       | 13                                | 144                                     | 49   |
| Asia excluding Japan     | 1                     | 0   | 3                       | 0                        | 0                                 | 4                                       | 3  |
| <i>Of which: China</i>   | 1                     | 0   | 3                       | 0                        | 0                                 | 3                                       | 2  |
| Japan                    | 10                    | 0   | 5                       | 5                        | 0                                 | 10                                      | 0  |
| Asia                     | 11                    | 0   | 9                       | 5                        | 0                                 | 13                                      | 3  |
| Canada                   | 7                     | 0   | 2                       | 5                        | 0                                 | 7                                       | 0  |
| Gulf Cooperation Council | 1                     | 0   | 1                       | 1                        | 0                                 | 1                                       | 0  |
| <b>Total</b>             | <b>193</b>            | <b>44</b>                                     | <b>50</b>               | <b>153</b>               | <b>40</b>                         | <b>288</b>                              | <b>95</b>                                  |

Sources: Goldman Sachs; UBS; and IMF staff estimates.

Note: Bank allocation to asset-backed securities (ABS) in Table 1.1 includes estimated losses on ABS and conduits/SIVs. CDO = collateralized debt obligation; SIV = structured investment vehicles.

gage market exposure. Much of that, however, represents mark-to-market losses, and some could yet be recoverable going forward. Most of subprime-related losses appear to have been reported already. U.S. banks and government-sponsored enterprises could report a further \$49 billion in additional writedowns, while European banks could report as much as \$43 billion in additional writedowns (Table 1.6). These loss estimates should be regarded with caution for the following reasons:

- Loss estimates ultimately depend on the quality of disclosure about holdings. Where data have not been available, we have used estimates of exposure to subprime loans, ABS, and CDOs.
- Because the loss ratio on CDOs differs from that on unsecuritized loans, the aggregate loss estimate is highly sensitive to the estimated proportions of bank exposure accounted for by unsecuritized loans, ABS, and CDOs.
- The timing of loss recognition is uncertain. UK banks, in particular, appear to have significant exposure to unsecuritized loans, for which it may take some time to recognize losses relative to holdings of securities. There are also differences in methodology across countries regarding recognition of losses.
- Estimates are also sensitive to the breakdown of exposure to different tranches of securities, as there is substantial variation in the pricing on which the mark-to-market estimates are based. For instance, a recent vintage AAA-rated ABX is quoted at 75 cents on the dollar, while a subordinated A-rated tranche of a different vintage is quoted at 16 cents. Lack of information appears to be an even bigger problem in Asia, including in Japan, where the breakdown of bank holdings of ABS and CDOs is largely unavailable.
- Estimates of bank exposure to ABS and CDOs rely upon market indices, which may not represent the secondary market prices of actual bank holdings, as individual ABS and CDO tranches held by banks could have significantly different collateral and cash flow characteristics.
- Implementation of remedial measures, including modification of mortgage loan terms, could lower loss estimates.

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*This chapter focuses on two aspects of structured finance that have contributed fundamentally to the duration and depth of the crisis, namely, the valuation and disclosure of structured finance products. It concludes that the complexity of these products, coupled with weak disclosure, left the system exposed to a funding and confidence crisis. Looking forward, it is likely that structured finance will recover, but that the products will likely be more standardized and transparent to both investors and regulators.*

The financial crisis that began in late July 2007 represented the first test of the new complex structured finance products, markets, and business models that have developed over the past decade.<sup>1</sup> The crisis has been both deep and protracted: one-month and three-month interbank interest rates remain elevated despite coordinated central bank operations and rate cuts; there is significant uncertainty about the valuations and disclosures of structured instruments; counterparty risk remains a concern; and the balance sheets of financial institutions have been weakened. As a result, important questions are being asked about whether structured finance products provided the intended benefits, the extent to which these products increased the risk of a crisis and exacerbated its consequences, and the need for both the official and private sectors to address systemic weaknesses.

The conclusion of this chapter is that, although structured finance can be beneficial by allowing risks to be diversified, some complex and multi-layered products added little economic value to the financial system. Further, they likely exacerbated the depth and duration

of the crisis by adding uncertainty relating to their valuation as the underlying fundamentals deteriorated. The recovery of the structured market will likely entail more standardized products, at least for some time to come, and better disclosure both at origination and subsequently. To this end, policy measures should aim to strengthen design and market weaknesses and to close the regulatory gaps in structured finance, without impeding innovation.

This chapter first explores in some detail the implications for financial stability arising from the valuation and accounting practices for complex structured products both at origination and subsequently. In considering the difficulties of valuation, the chapter briefly discusses the associated role of credit rating agencies. It then examines, in relation to the crisis, the impact of fair value embedded in the two main accounting standards along with the related disclosure frameworks; and the role of off-balance-sheet entities, such as structured investment vehicles (SIVs) and conduits. The chapter argues that the relevant perimeter of risk consolidation and disclosure for banks is broader than their balance sheet when significant off-balance-sheet entities are present. The chapter also touches on the implications of Basel II implementation, before finishing with some key conclusions and a short discussion of structured finance going forward.

Note: This chapter was written by a team led by L. Effie Psalida and comprised of John Kiff, Jodi Scarlata, and Kenneth Sullivan. Yoon Sook Kim provided research support.

<sup>1</sup>Box 2.1 defines structured products and describes their function.

## Valuation and Disclosure of Complex Structured Finance Products

One of the factors driving the need for coordinated central bank action to aid interbank liquidity needs in the second half of 2007 was banks' loss of confidence in the ability of their counterparties to meet their contractual obligations.<sup>2</sup> This was driven by fears of contagion from the rising level of defaults in subprime underlying instruments, many of which were incorporated in complex and difficult-to-value structured finance products. As a result, many investors withheld funding from complex structured products, even those with high-quality underlying assets. This compounded the internal worries of financial institutions about the valuation and financing of their own holdings of structured securitized products. The absence of liquid markets and the reliance on models for valuations meant that parties were unsure of the undisclosed losses on their own and others' balance sheets, as the interaction of credit and liquidity risk drove market valuations down to levels below theoretical assumptions.

### The Role of Credit Ratings in the Valuation of Structured Finance Products

In the second half of 2007, the three main credit rating agencies were forced to make precipitous downgrades on a large number of structured finance products backed by U.S. subprime mortgages, on which default rates had risen abruptly relative to earlier assumptions. The downgraded securities included some rated AAA, which is the safest rating possible.

Credit ratings have been a key input for many investors in the valuation of structured credit products because they have been perceived to provide a common credit risk metric for all fixed-income instruments. In particular, when reliable price quotations were unavailable, the price of structured credit products

often was inferred from prices and credit spreads of similarly rated comparable products for which quotations were available. For example, the price of AAA ABX subindices could be used to estimate the values of AAA-rated tranches of mortgage-backed securities (MBS), the price of BBB subindices could be used to value BBB-rated MBS tranches, and so on (IMF, 2007b, Box 1.1.). In this way, credit ratings came to play a key mapping role in the valuation of customized or illiquid structured credit products, a mapping that many investors now find unreliable.

Credit ratings are also important because many institutional investors are mandated to invest only in rated fixed-income instruments. In fact, successful structured credit issuance has largely depended on the ability to attain AAA credit ratings on large portions of these products (Box 2.2). Although it has long been known that, during credit downturns, structured credit ratings are more prone to severe downgrades than are ratings on traditional fixed-income securities (e.g., corporates and sovereigns), the benign performance of credit markets since the early part of this decade gave investors a false sense of security.

Although credit rating agencies insist that ratings measure only default risk, and not the likelihood or intensity of downgrades or mark-to-market losses, many investors were seemingly unaware of these warnings and disclaimers. However, in a welcome development, credit rating agencies have recently proposed the introduction of differentiated rating scales for structured credit products, possibly with qualifiers that indicate the amount of downgrade risk (Moody's, 2008; Standard & Poor's, 2008). Nevertheless, credit spreads on structured credit products tend to be wider than on similarly rated traditional fixed-income securities, indicating that markets are pricing in other types of risks, such as liquidity or market risks, in addition to just default risk (Box 2.3).

Furthermore, the spread widening that has occurred since mid-2007 suggests that market participants have come to view credit rating

<sup>2</sup>See Chapter 3 for a discussion on the provision of central bank liquidity.

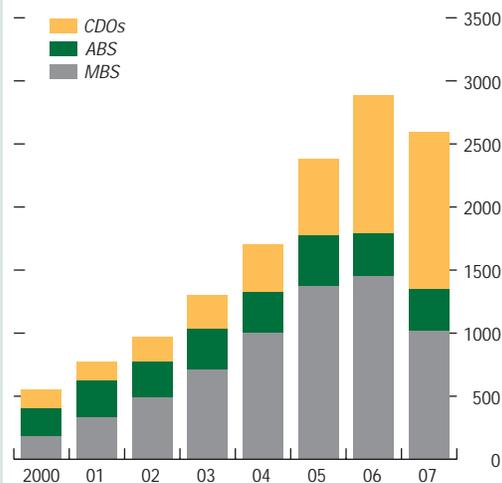
### Box 2.1. Structured Finance: What Is It and How Did It Get So Large?

*Structured finance can be beneficial, allowing risks to be spread across a larger group of investors, each of which can choose an element of the structured finance product that best fits its risk-return objectives. However, some complex, multi-layered structured finance products provide little additional economic value to the financial system and may not regain the popularity they garnered before the U.S. subprime mortgage crisis.*

“Structured” finance normally entails aggregating multiple underlying risks (such as market and credit risks) by pooling instruments subject to those risks (e.g., bonds, loans, or mortgage-backed securities) and then dividing the resulting cash flows into “tranches,” or slices paid to different holders. Payouts from the pool are paid to the holders of these tranches in a specific order, starting with the “senior” tranches (least risky) working down through various levels to the “equity” tranche (most risky). If some of the expected cash flows into the pool are not forthcoming (for instance, because some loans default), then, after a cash flow buffer is depleted, the equity tranche holders are the first to absorb payment shortfalls.<sup>1</sup> If payments into the pool are reduced further, the next set of tranche holders (the “mezzanine” tranche holders) do not receive full payment. Typically, the super senior tranches and the senior tranches at the top of the “capital structure” are constructed so that they qualify for AAA ratings from the credit rating agencies, meaning there should be a very low probability of not receiving their promised payments (see Box 2.2).

Until July 2007, when the financial crisis hit, the growth in structured credit finance products had been exponential. For example, issuance of selected structured credit products in the United States and Europe grew from \$500 billion in 2000 to \$2.6 trillion in 2007, while global issuance of

**European and U.S. Structured Credit Issuance**  
(In billions of U.S. dollars)



Sources: *Inside MBS & ABS*; JPMorgan Chase & Co.; and European Securitization Forum.

Note: CDOs = collateralized debt obligations; ABS = asset-backed securities, including auto, credit card, etc., and excluding MBS; and MBS = mortgage-backed securities, excluding U.S. agency MBS.

collateralized debt obligations grew from about \$150 billion in 2000 to about \$1.2 trillion in 2007 (see figure).

The motivations for creating structured finance products and for the rapid growth of issuance are several:<sup>2</sup>

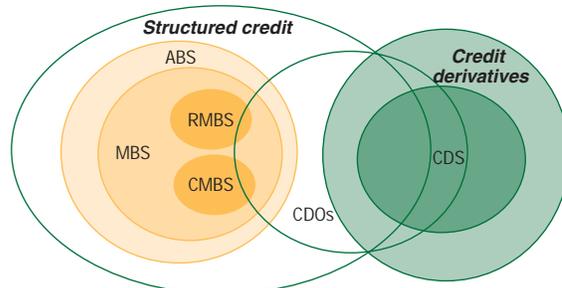
- Pooling is meant to differentiate and diversify risks, and as a result of the tranching, holders of the top tranches have a smaller chance of losing money than if they held a pro-rata portion of the pool’s assets directly.
- Investors can choose among the tranches to reflect their own risk-return trade-offs, allowing different types of investors (e.g., insurance companies or hedge funds) to hold different parts of the capital structure of structured finance products.

Note: Laura Kodres prepared this box.

<sup>1</sup>Structured finance differs from securitization.

While securitization diversifies risks by pooling instruments, the cash flows are not “tranching” and are instead provided to holders of securitized instruments on a pro rata basis.

<sup>2</sup>For further information, see Chapter 2 of the April 2006 GFSR (IMF, 2006); Box 1.1 of Chapter 1 of the April 2007 GFSR (IMF, 2007a); and Chapter 1 of the October 2007 GFSR (IMF, 2007b).



Note: ABS = asset-backed security; MBS = mortgage-backed security; RMBS = residential mortgage-backed security; CMBS = commercial mortgage-backed security; CDS = credit default swap; and CDOs = collateralized debt obligations. Not proportionally representative.

- In the period leading up to the crisis, benign financial market conditions encouraged investors to “search for yield” and raised demand for structured products, since they paid higher returns than many other similarly rated corporate or sovereign securities. Structured credit products were especially attractive to institutional investors seeking AAA-rated securities, where the pickup in yield appeared to bear no additional risks. In some cases, AA, A, and BBB rated tranches also paid more than similarly rated sovereign and corporate securities.
- Issuance of credit-risk-based structured finance products has been motivated by the desire of banks to manage regulatory capital more efficiently. Under Basel I, the transfer of credit risk through a structured finance product lowers capital charges to the bank. Under Basel II, these motivations are less pronounced, since Basel II is meant to better reflect underlying credit risks (see discussion in main text).
- Some financial institutions found that producing structured credit products allowed them to originate more underlying loans while not having to fund them directly, or bear the associated credit risk.
- Some issuers were motivated by the large fees they were able to charge given the strong demand. As the peak of the credit cycle was reached, the underlying assets used to piece together some types of structured credit products were of increasingly lower quality. For instance, one-fifth of all U.S. mortgages originated in 2006 were of

the subprime variety and many were included in structured finance products, since the tranching could raise the rating of some parts. As a result, new products dividing up the cash flows were devised in order to manufacture AAA securities (see Box 2.2).<sup>3</sup> The overconfidence about U.S. house prices and the expected liquidity of these instruments, even during times of stress, permitted the demand to continue even as the fundamentals underlying the pools deteriorated.

While some underlying portfolios are comprised of well-diversified, good-quality loans and securities, those backed by subprime U.S. mortgages and issued in the last few years have deteriorated rapidly. The universe of structured finance products is quite broad, but investor experiences with these newer complex securities have undermined confidence in many structured credit products, and new issuance in these markets is expected to be negligible for some time (see figure).<sup>4</sup> Many market participants do not expect the most complex products to reappear at all.

<sup>3</sup>These included some forms of collateralized debt obligations, where underlying debt instruments are placed in the pool to be tranching, and collateralized loan obligations, where leveraged loans are placed in the pool.

<sup>4</sup>Credit derivatives are also related to structured finance in that some structured credit products are backed by portfolios of credit default swaps. In addition, a market for credit derivatives based on portfolios of credit default swaps grew from about \$1 trillion of outstanding contracts at end-2004 to \$18 trillion at mid-2007, according to the Bank for International Settlements.

agencies as being slow to recognize the deterioration of some of the fundamental inputs to their rating methodologies. Indeed, since early 2007, credit rating agencies have been scrambling to anticipate and keep up with the rapid and material deterioration in the fundamental performance of subprime mortgages and the contagion to financial markets more broadly. (Box 2.4 demonstrates the rating dynamics of some simple collateralized debt obligation transactions.)

### Accounting Frameworks

The accounting framework for disclosing valuations of structured finance products differs according to an institution's location. U.S. firms adopt that country's generally accepted accounting principles (U.S. GAAP) while European firms with listed securities use international financial reporting standards (IFRS).<sup>3</sup> Nonlisted European firms may use IFRS or their respective national guidelines, each of which may allow different valuation approaches. In the rest of the world, firms may use either national standards or IFRS (Table 2.1).

As most holders of structured finance products, including collateralized debt obligations (CDOs), wish to retain the ability to sell them before maturity, the majority adopt fair value for valuing these products.<sup>4,5</sup> Accounting frameworks require professional judgment in deter-

mining the mechanisms for fair value, including the use of unobservable inputs in cases of the absence of an active market for an instrument. Such judgment allows the possibility of different outcomes for similar situations, which in times of market uncertainty may compound the risk of illiquidity.

Since the assumptions underlying the accounting for structured products are framed for normal market conditions, the current period of stress is providing a significant test of the robustness of the accounting standards. It is important to note that the standard setters never intended any methodology for calculating fair value, including those classified as level three (U.S. GAAP), to provide any value other than an exit price.<sup>6,7</sup> The reclassification of assets under U.S. GAAP from one level to another reflects changes in the availability of market inputs for valuation. However, investors seem to have a perception contrary to what the standard setters intended because a firm risks a negative market reaction with a reclassification of assets from level two to three, as events during the turmoil indicated. (Figure 2.1 denotes the increase of assets in levels two and three in 2007 for selected large U.S. financial institutions). Market analysts may judge, correctly, that such a move reflects further illiquidity in the market or, incorrectly, that the firm's recategorization of fair value methodologies represents a deliberate overestimation of the value that the assets would generate in a sale.

It is understandable that in times of instability the absence of observable inputs to verify valuations exacerbates market uncertainty

<sup>3</sup>Annex 2.1 discusses the implications for structured products under the two standards.

<sup>4</sup>Fair value as defined in Financial Accounting Standards 157 is "...the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date" (see Annex 2.1 for more details).

<sup>5</sup>Both IFRS and U.S. GAAP contain provisions for the disclosure of fair value changes in the income statements or directly on the balance sheet to equity. An entity designates the reporting of fair value through income or directly to equity at the time of acquisition of the asset. Those assets classified as available for sale (both IFRS and U.S. GAAP) have fair value changes taken directly to equity. Entities must report all other fair value changes through profit and loss.

<sup>6</sup>U.S. GAAP require the classification of financial instruments into one of three levels depending on the basis for determining their fair value. Level one valuation uses observable market data while level three valuation uses material inputs that are not observable, requiring a "mark to model" approach (see Annex 2.1 for a detailed definition of the three classification levels).

<sup>7</sup>Classification of fair value methodologies as level one, two, or three is a different issue from their original classification as trading, available for sale, or held to maturity. If the entity classifies assets as trading or available for sale, it must report them at fair value.

### Box 2.2. When Is a AAA not a AAA? (Part 1: The ABCs of MBSs and CDOs)

*This box provides an introduction to the structural mechanics of subprime mortgage-backed securities (MBS) and structured-finance collateralized debt obligations (CDO). It shows that successful issuance depends on the ability to attain AAA credit ratings on large portions of these securities. This box and the subsequent two boxes explore the fragility of these AAA ratings, and, by implication, their valuations.*

About 75 percent of recent U.S. subprime mortgage loan originations have been securitized. Of these, about 80 percent have been funded by AAA-rated MBS “senior” tranches, and about 2 percent by noninvestment grade (BB+ and lower) “junior” tranches (see figure). Most of this 2 percent was typically an unrated “equity” tranche created by overcollateralization—that is, the value of the loan pool exceeds the total principal amount of securities issued. The remaining 18 percent was funded by investment-grade “mezzanine” tranches (rated from AA+ to BBB–) that are “recycled” into structured-finance CDOs.

The risk transformation process relies on internal credit enhancements, including overcollateralization and subordination.<sup>1</sup> Subordination involves the sequential application of losses to the securities, starting with the equity tranche and moving up through the other junior tranches before being applied to the mezzanine and then the senior tranches. Only when a tranche is depleted are losses applied to the next tranche in the sequence. Under normal circumstances, the most senior tranches should be very secure against credit risk. For example, if subordination were the only credit enhancement, losses in the above-described structure would have to total 20 percent before the senior tranches would suffer losses.

Structured-finance CDOs also transfer risk by using similar credit enhancements to transform MBS tranches (and other structured-finance CDO tranches) into even more primarily investment-grade securities (see figure). High-

grade, structured-finance CDOs restructure MBS tranches (subprime- and prime-backed) and other CDO tranches rated A– and above. Mezzanine structured-finance CDOs restructure BBB-rated MBS and CDO tranches. Over 90 percent of a typical high-grade, structured-finance CDO liability structure is comprised of AAA-rated senior tranches (of which all but about 5 percent is comprised of a “super-senior” tranche, which is the very last tranche to incur losses). Reflecting the higher risk of the underlying MBS tranches, the senior tranche of a typical mezzanine structured-finance CDO comprises just over 75 percent of the structure (of which about 60 percent is super-senior). Most of the A- and BBB-rated CDO tranches are recycled into CDO of CDO (“CDO-squared”) securities, about 85 percent of which are comprised of AAA-rated senior and super-senior tranches.<sup>2</sup> These CDO-squared and structured-finance CDOs were created almost solely to restructure MBS and CDO mezzanine tranches, for which there was not sufficient demand from investors. Therefore their value added in transferring risk is questionable.

Before the model’s default probability and loss severity inputs were tested by the subprime crisis, it had been thought that a 20 percent enhancement amount (overcollateralization plus subordination) would make it virtually impossible to “break” a AAA-rated subprime MBS tranche. For example, it had been typical to assume that when a subprime mortgage foreclosed, about 65 percent of its outstanding balance could be recovered. Such a 35 to 50 percent loss-severity assumption implied that from 50 to 65 percent of the mortgages would have to default before losses would impact the MBS senior tranche. However, a more realistic loss-severity assumption for subprime mortgages might be as high as 70 percent, for which a 28 percent mortgage default rate would

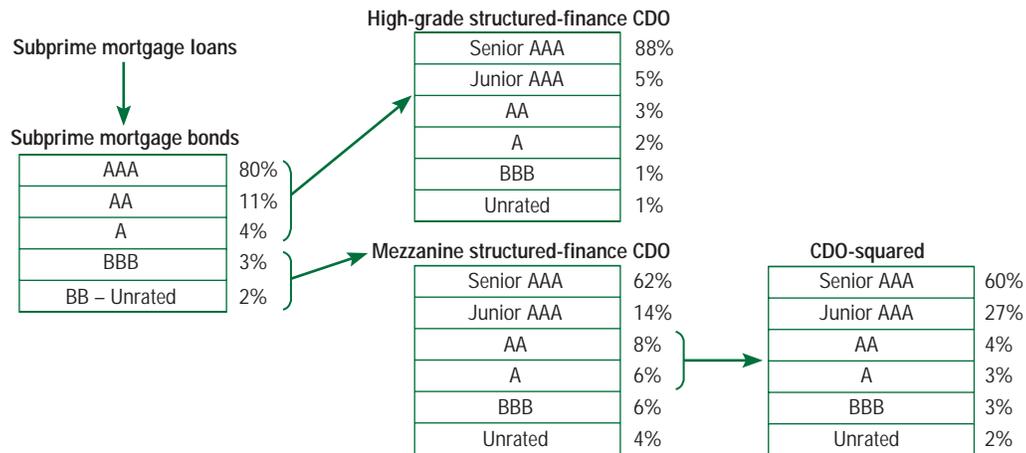
Note: John Kiff prepared this box.

<sup>1</sup>Other important MBS credit enhancements include excess spread, shifting interest, and performance triggers (see Ashcraft and Schuermann, 2007).

<sup>2</sup>CDO-squared products repackage tranches of other CDOs, whereas structured-finance CDOs are comprised of recycled CDOs, MBS, and asset-backed securities.

Box 2.2 (concluded)

Matryoshka — Russian Doll: Multi-Layered Structured Credit Products



Source: IMF staff estimates.  
 Note: CDO = collateralized debt obligation.

compromise the senior tranche. This highly simplified analysis ignores the impact of other material credit enhancements, but it shows that the probability of MBS senior tranche defaults could be higher than the 0.05 percent or so default probabilities associated with AAA corporate securities (at a five-year maturity).

Structured-finance CDOs are even more fragile than noted above because they effectively leverage BBB- to AA-rated subprime MBS tranches. Not only are the default probabilities

associated with these underlying securities likely to be higher than had been assumed when the CDOs were first rated, but if losses do exceed senior MBS tranche enhancement levels, the underlying BBB- to AA-rated tranches will experience 100 percent loss severities. Clearly, these potential risk scenarios are not consistent with maintaining a AAA rating at the top of the structure such as those associated with AAA corporate, where only five of 10,000 firms default.

and, therefore, market illiquidity. However, as the reclassification is often based on technical rather than substantive grounds, the market’s reaction may reflect both a misunderstanding of how the relevant accounting standard (Financial Accounting Standards [FAS] 157) works and a broader misunderstanding of what fair value represents. The apparent negative response to level three reclassifications also included the market’s generalized reaction against securitized products during the crisis.

**Auditors’ Recommendations on Fair Value Calculations**

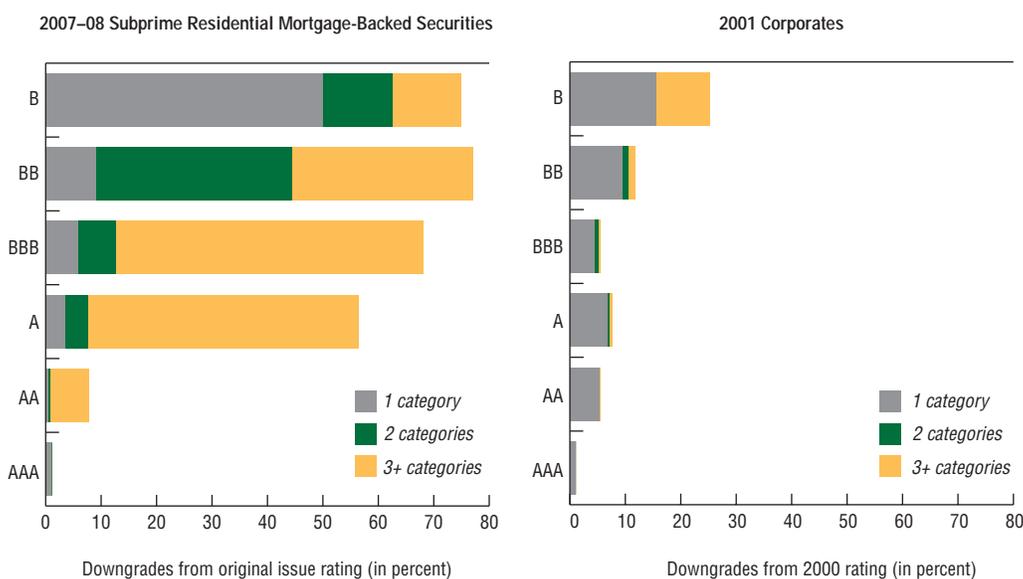
The absence of active markets for complex structured credit products and the observed sales at values below the theoretical value of their underlying cash flows have presented challenges to financial institutions as to the degree to which they could be considered “orderly sales” and hence depended on as a measure of fair value. The major audit firms have argued collectively

### Box 2.3. When Is a AAA not a AAA? (Part 2: Actual versus Market-Implied Mortgage-Backed Security Ratings)

*Most institutional investors require that their fixed-income holdings have a credit rating. Hence, credit rating agencies play a significant role in the marketing of structured credit products. However, recent market developments have raised questions as to whether investors performed their own due diligence and fully understood that the risk profile of structured credit products can be very different from that of similarly rated corporate or sovereign bonds.*

shows that of the RMBS rated BBB– to BBB+ at origination, about 6 percent were downgraded by one rating category (BB+ to BB–), 7 percent by two (B+ to B–), and 56 percent by more than two categories (CCC+ to D).<sup>2</sup> The second figure shows the same statistics (on the same severity scale) for corporate rating actions in 2001, the most recent year of significant corporate downgrades. The difference is striking: only 6

#### One-Year Cohort Rating Downgrades



Source: Standard & Poor's.

Structured credit products are inherently likely to suffer more severe, multiple-notch downgrades than the typically smoother downgrade paths of corporate bonds (CGFS, 2005; IMF, 2006).<sup>1</sup> To illustrate this point, the first of the two figures above breaks down Standard & Poor's 2007 rating actions through February 25, 2008 on subprime residential mortgage-backed securities (RMBS) originated since 2005. It

percent of all rating downgrades of BBB– to BBB+ rated corporates were by one or more categories (versus 68 percent for BBB– to BBB+ rated subprime RMBS in 2007–08). Although the AAA and AA RMBS downgrades appear

<sup>2</sup>A more granular analysis (i.e., by rating notch) would have been preferred, but comparable corporate data were not available for 2001. Also, it would have been preferable to have rating changes from end-2006, although it is unlikely that many of the pre-2007 RMBS ratings would have changed much from origination to end-2006. In "normal" times, structured credit ratings are extremely stable.

Note: John Kiff prepared this box.

<sup>1</sup>See Mason and Rosner (2007) for a more technical and critical appraisal of structured credit ratings.

**Box 2.3 (concluded)**

rather benign, on January 31, 2008, 47 percent of the AAA tranches of RMBS backed by 2006-originated mortgages rated by Standard & Poor's were on their negative "credit watch," as were 57 percent of AA+ tranches, 74 percent of AA tranches, and 80 percent of AA- tranches.

The multiple-notch downgrades and the severe valuation losses during the second half of 2007 and early 2008 also suggest that the credit rating agencies' key assumptions on the underlying subprime mortgage performance have been overly optimistic. It appears that the agencies underestimated the impact of the housing-cycle downturn on the speed with which subprime mortgage performance deteriorated and on the severity of potential losses. Even when delinquencies for 2006-vintage mortgages started to rise to alarming levels in early 2007, the credit rating agencies were slow to tighten their rating criteria, holding to the view that it was premature to extrapolate the impact of generally rising delinquencies to defaults on specific securities.<sup>3</sup>

More specifically, the joint effect of house price declines and high loan-to-value ratios seems to have been underestimated, and the risk assumptions for low- and no-documentation housing loans were too low. In addition, the

<sup>3</sup>See Demyanyk and Van Hemert (2008) for an in-depth analysis of the characteristics and performance of recent vintage subprime mortgage originations.

likelihood of early delinquencies going into foreclosure seems to have been underestimated.

This underestimation became apparent in the waves of mortgage security credit rating downgrades that began in July 2007. Even more striking has been the gap between rating agency and market participant mortgage performance expectations. For example, credit spreads on AAA-rated U.S. RMBS have been priced at about the same level as BBB-rated corporate bonds since August 2007 (see figure).

**Credit Spreads on AAA Mortgage-Backed Securities Versus AAA and BBB U.S. Corporate Bonds**  
(In basis points)



Source: JPMorgan Chase & Co.

that the presence of a price below theoretical valuation does not necessarily represent a distressed sale. In such cases, the auditors require firms to demonstrate why a sale price is not indicative of fair value before accepting a reclassification of an asset to level three.<sup>8</sup> For example, a sale in a thin

<sup>8</sup>The major audit firms, comprising BDO International, Deloitte, Ernst & Young, Grant Thornton International, KPMG, and PricewaterhouseCoopers, met and prepared their joint approach, which they have issued through the Center for Audit Quality for U.S. GAAP and a

market at a heavy discount by a liquidator may qualify as a distressed sale, while a similar sale by a solvent entity may not.

This approach aims to prevent "cherry picking" of valuation methods to manage losses. External auditors are likely to adopt a cautious approach to minimize the risks of material post-balance-sheet-date writedowns that would

similar paper for IFRS through the Global Public Policy Committee.

### Box 2.4. When Is a AAA not a AAA? (Part 3: Collateralized Debt Obligation Rating Dynamics)

*The three major international credit rating agencies use similar letter-grade scales (AAA to C, Aaa to C) to rank the relative default risk of all long-term, fixed-income securities, including structured credit products, despite the significantly more abrupt downgrade dynamics of those products discussed in Box 2.3.<sup>1</sup>*

*This box uses the examples of some stylized structured credit products to demonstrate why such dynamics are inherent to these products and to the methodologies used to rate them.*

The structured credit product-rating process starts with the construction of a probability distribution of the estimated losses on the structure's underlying risk. For mortgage-related securities, this is ultimately tied to estimates of foreclosure rates and loan-loss severities, driven by assumptions about fundamental factors such as house prices and interest rates. Structured credit ratings also depend importantly on assumptions regarding the correlation of defaults among the individual underlying risks. The first of the two figures in this box shows the cumulative probability distribution for a portfolio of 125 equally sized credits evaluated at three different correlation levels. It measures the probability that the number of defaults exceeds the level along the x axis, and shows that the higher the correlation, the more likely are multiple defaults.<sup>2</sup>

The probability distribution is then used to determine the credit enhancements and other

embedded rules governing the distribution of gains and losses (see Box 2.2). For example, in the 125-credit example under the 5 percent correlation assumption, subordination that absorbs the losses associated with the first 40 defaults could get a AAA rating from Standard & Poor's. This is because, for AAA ratings, the target default probability is 0.06 percent and the probability of there being more than 40 defaults under the 5 percent correlation assumption is 0.06 percent. This is shown in the second figure, which zooms in on the lower right-hand corner of the first figure. Hence, the AAA "attachment" point is 16 percent of the underlying portfolio's notional value (40 defaults  $\times$  50 percent loss severity/125 credits).<sup>3</sup> The figure also shows that if the asset correlation were 15 percent, AAA subordination would have to increase from 16 to 25.6 percent (64 defaults). In fact, it shows that if the correlation were to jump from 5 to 15 percent, the originally rated AAA tranche should be downgraded to single-A or below (the probability of more than 40 defaults jumps from 0.06 percent to 1.88 percent, and the target default probabilities for A and BBB ratings are 0.46 and 2.32 percent, respectively). Increasing the loss severity from 50 to 70 percent (holding the correlation at 5 percent) would also downgrade the AAA tranche to single-A or below, and downgrading the underlying credits from BB to B could downgrade the AAA tranche rating to BB or below.<sup>4</sup> The principles used to determine Fitch's collateralized debt obligation ratings are very similar to those used above by Standard & Poor's in that they also target the tranche default probability. However, the process for determining Moody's ratings is somewhat more complex because they target expected loss and their targets are somewhat more stringent than

Note: John Kiff prepared this box.

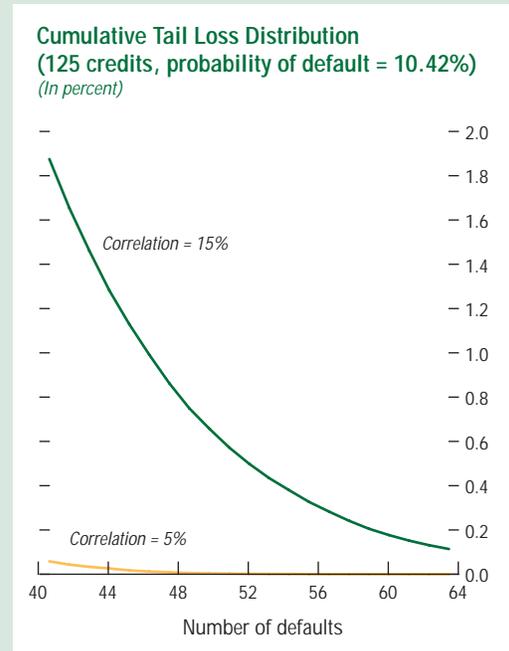
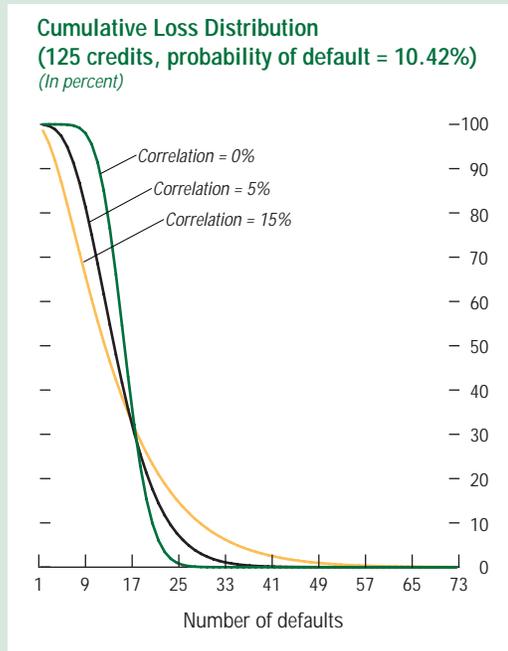
<sup>1</sup>Standard & Poor's and Fitch Ratings use a letter-grade scale that starts at "AAA" for the least risky credits and goes down to "C" (via AA, A, BBB, BB, B, CCC and CC) for obligations that are very likely to default. Moody's uses a scale that goes from "Aaa" down to "C" (via Aa, A, Baa, Ba, B, Caa, and Ca).

<sup>2</sup>All of the examples in this box are based on a portfolio of 125 identical five-year digital default swaps with a 50 percent loss-given-default referencing BB-rated corporate credits with a 10.42 percent default probability. A digital default swap is a credit default swap with a fixed recovery rate. For details on the Gaussian copula methodology used to construct the cumulative probability distribution, and the meaning of the asset correlation parameter, see Belsham, Vause, and Wells (2005, Box 2.2).

<sup>3</sup>The process is more complex when the loss severity is not fixed, but the principles are the same.

<sup>4</sup>When the underlying credits are downgraded from BB to B, the default probabilities increase from 10.42 to 24.46 percent, and the AAA tranche default probability rises from 0.06 to 16.16 percent, which is about halfway between the BB- and B+ default probability targets (14.6 and 18.57 percent).

**Box 2.4 (concluded)**



those of Standard & Poor’s and Fitch (Fender and Kiff, 2005). Also, the expected loss-basis more accurately measures the risk associated with mezzanine tranches, which tend to have very high loss severities.

Default probabilities and expected losses are both flawed metrics for evaluating the default risk of portfolios of credit risk because neither appropriately accounts for correlation and diversification. For example, a risk-averse investor should prefer a portfolio of two of the above underlying credits to a portfolio consisting of just one of them, but an expected loss criterion would be indifferent between them, and the

default probability criterion would prefer the single credit portfolio. More specifically, the expected loss associated with both portfolios is 5.21 percent, and the default probabilities are 19.75 percent for the two-credit portfolio and 10.42 percent for the single-credit portfolio. As the number of credits increases, the portfolio expected loss remains at 5.21 percent, but the default probability approaches 100 percent. Although credit rating agencies do not actually rate whole portfolios, a methodology that cannot appropriately rank the default risks of whole credit portfolios does not seem appropriate for ranking default risks of tranches of portfolios.

leave the auditor open to charges of negligence. Hence, the level of additional writedowns in the audited financial statements will likely reflect the convergence of the entity’s valuation assumptions with those adopted by the auditors.

The adoption of the auditors’ approach raises the risk of a negative bias in the valuations. Managers of firms may even be tempted to over-

state the level of the current year writedowns in order to maximize the revaluation gains when the market recovers, thus increasing their future potential bonus pool. However, the risk of a negative valuation bias may be offset by the fact that audit liability is not defined by overvaluation of assets but rather by the appropriate exercise of professional judgment.

**Table 2.1. Accounting for Securities Held as Financial Assets**

| Asset Classification               | Measurement After Recognition | Treatment of Valuation Changes | Disclosures   |
|------------------------------------|-------------------------------|--------------------------------|---|
| <b>IFRS</b>                        |                               |                                | Disclosure as per national regulatory framework   |
| Fair value through profit and loss | Fair value                    | Profit and loss                | Fair value techniques and assumptions for each class asset  |
| Available for sale                 |                               | Equity                         | Where nonobservable inputs are used, the effect of using different reasonably possible alternative assumptions when the difference is significant                           |
| Held to maturity                   | Amortized cost                | Impairment to profit and loss  | Disclosure of fair value  |
| <b>U.S. GAAP</b>                   |                               |                                | SEC mandates quarterly disclosures  |
| Trading                            | Fair value                    | Profit and loss                | Valuation techniques used to measure fair value and changes in techniques   |
| Available for sale                 |                               | Equity                         | Based on observability of pricing inputs, classification of assets into Levels 1, 2, or 3 (see Annex 2.1)<br>For Level 3 assets, a reconciliation of reported value changes |
| Held to maturity                   | Amortized cost                | Impairment to profit and loss  | Disclosure of fair value  |

Note: IFRS = international financial reporting standards; U.S. GAAP = generally accepted accounting principles; SEC = Securities and Exchange Commission.

### The Role of Fair Value During a Crisis

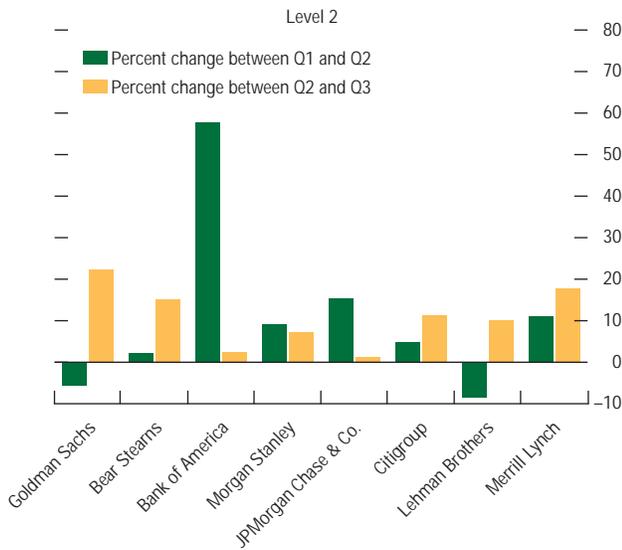
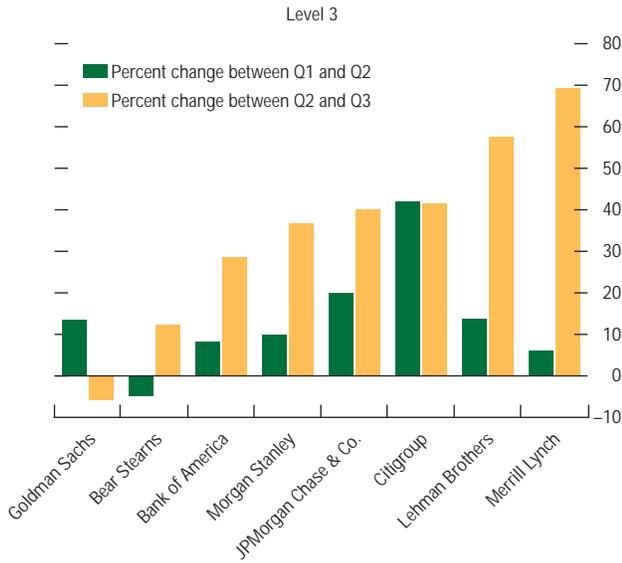
The abnormally tight market liquidity conditions during the crisis intensified discussions on the role of fair value in contributing to its severity (Shin, 2007). One argument suggests that fair value is compounding market instability by applying the valuations arising from sales in these abnormal market conditions across all fair-valued portfolios, regardless of the intention of holding them. While the need for liquidity drove values to discounts that were greater than the underlying cash flows would imply, the argument challenges the appropriateness of subjecting those portfolios to mark-to-market volatility where there is no intention or need to sell at the full amount of the liquidity induced discounts. This requirement to apply fair value without considering underlying conditions may be compounding instability by activating market-value triggers for liquidation in other portfolios.

Even if the markdown does not force a sale, it may trigger margin calls or additional collateral requirements that would further compound market illiquidity by reducing a firm's supply of assets available for further liquidity operations.

Without opining on the merits of the argument, both IFRS and U.S. GAAP have a presumption of fair value for any financial asset that a financial institution is not committed to holding to maturity. Even for those firms able to value held-to-maturity assets at amortized cost on the balance sheet, both U.S. GAAP and IFRS require the disclosure of the assets' fair value elsewhere in the notes to the accounts, thus limiting the potentially stabilizing impact of amortized cost on the underlying economic value.

While many view fair value as the best indicator of asset value at the time of measurement, taken on its own it may not be the best measure for making long-term, value-maximizing decisions. This arises because fair value reflects a single, point-in-time exit value for the sum of all the risks the market assigns to the asset, including credit and liquidity risks. If the market overreacts in its assessment of any risk component, then fair value will reflect this. Hence, the heavy discounting during the crisis of any asset containing securitized instruments produced fair values much lower than their underlying expected future cash flows would imply, even

**Figure 2.1. Selected U.S.-Based Financial Institutions: Change in Level 3 and 2 Assets**  
*(Percent change; 2007:Q1–2007:Q3)*



Source: Quarterly reports.  
 Note: Level 2 assets use a more illiquid market where prices are observable for similar products, or for the same product but at different dates. Level 3 defines the absence of a material observable input used in the item's valuation.

allowing for the possible impairment of sub-prime elements.

Situations where firms use fair value levels to trigger decision rules, such as asset sales, may produce scenarios that both generate unnecessary realized losses for the individual firm and simultaneously contribute to a downward spiral of the asset price, thus compounding market illiquidity. It is therefore evident that the weaknesses arising from the use of fair value in a crisis need to be addressed. One possibility that should strengthen financial stability would be for financial institutions to define decision rules on the basis of fair value milestones that trigger a review of the elements, such as assumptions or special circumstances, underlying fair value. This would utilize the analysis produced by fair value in order to provide better information on a hold/sell decision, rather than trigger a compulsory sale, and would encourage firms to more carefully consider their expectations for future cash flows of their assets.

**Disclosure of Structured Product Valuations**

Apart from the requirements for annual financial statements, accounting standards do not specify the interim disclosure of financial asset valuations. Regulatory requirements may define interim reporting requirements, but in many cases it may be left to the discretion of the individual financial institutions. Within the United States, the Securities and Exchange Commission (SEC) requirement for quarterly disclosures provides a different framework than for European firms, whose regulatory disclosure requirements are less prescriptive.

In each firm, the professional judgment exercised by the chief financial officer in evaluating the degree to which a market price exists for each instrument may not necessarily conform with the firm's strategic considerations and underlying assumptions regarding the nature and duration of any downturn. This increases the scope for variability in the scale and timing of revaluation announcements. Within a range of entities holding similar instruments, different decisions

about the nature and duration of the downturn could lead to a variety of outcomes regarding the application of fair value techniques, both in terms of the timing of reporting losses and the scale of loss recognition. In the current crisis, the apparent piecemeal public release of revaluations—each of increasing gravity—contributed to growing concerns about the integrity of corporate balance sheets, thus compounding the uncertainty about counterparties and market illiquidity (Figure 2.2). If research confirms that inconsistency in the timing of the revaluation disclosures during the crisis materially contributed to its severity, a discussion among policymakers on the modalities of announcing repricing disclosures may be warranted.

Any such discussion promises to be contentious, as its objectives would be toward harmonizing disclosure patterns and timings at the expense of corporate strategic freedom in timing announcements. Within the framework of accounting standards, the discussion would need to recognize the principles-based foundation of IFRS and the desire to move U.S. GAAP toward a less prescriptive and more principles-based foundation. IFRS contain no prescriptive rulings regarding timeliness. Therefore, unless major changes to the approach of IFRS are envisaged, any rulings regarding the orderliness of valuation announcements would have to be prescribed through the market regulator rather than the standard setter. This issue indicates that there may be divergence between the information needs of investors, the desires of firms, and the stability of the financial system.

Both IFRS and U.S. GAAP require risk disclosures regarding financial instruments on the balance sheet. The focus of these disclosures is from the perspective of total-balance-sheet risk and so does not presume instrument-specific disclosures.<sup>9</sup> Thus, information about structured

credit products is subsumed in the disclosure of other financial instruments, making it difficult to gauge exposure to potentially risky and volatile subsets of these products.

IFRS mandate quantitative and qualitative disclosures for credit, market, and liquidity (maturity) risks; how the firm manages these risks; and the balance sheet sensitivity to material changes in these risks. The standards require firms to disclose the methods and assumptions used in preparing the sensitivity analysis along with how and why these have changed from previous periods. U.S. GAAP require quantitative disclosures covering market risk from SEC registrants.<sup>10</sup>

While the U.S. GAAP disclosure requirements for financial asset valuations improve transparency, they retain an aggregate balance sheet perspective. The lack of instrument-specific information limits the ability of investors and analysts to understand a firm's full exposure to changes in the value of the underlying instruments. This can be an important issue where the instruments are complex and carry unique features not found in market-traded instruments. However, the development of Web-based financial reporting, as demonstrated by the SEC's adoption of the extendable business reporting language (XBRL), raises the prospect of future reports providing Web-based linkages to valuation information for individual instruments.

### Disclosure Assumptions and Parameters When Marking to Model in the Absence of Market Prices

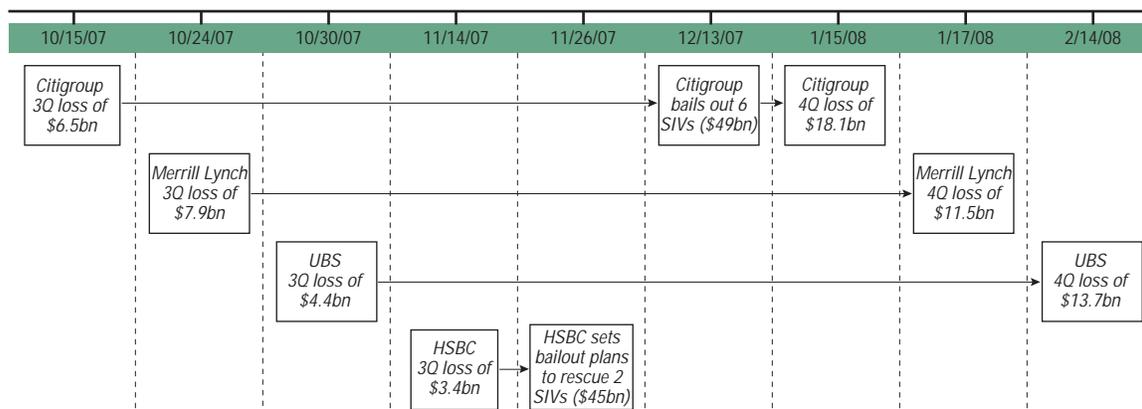
Investors and analysts require access to appropriate information before making any

from the entity's holdings of financial instruments and management's approach to managing these risks.

<sup>10</sup>Presentation of these disclosures is outside of the financial statements, usually within the Management Discussion and Analysis disclosures (this is part of the Form 10-K filings with the SEC). In December 2007, the SEC sent a letter to registrants outlining the additional information regarding the characteristics of off-balance-sheet holdings and CDOs.

<sup>9</sup>The qualitative disclosures consist, inter alia, of (1) the fair value of each class of financial asset and liability, along with information on the methods and significant assumptions employed in determining fair value; and (2) the terms and conditions of financial instruments, and qualitative information regarding the risks arising

Figure 2.2. Writedowns of Selected Financial Institutions, October 15, 2007–February 14, 2008



Source: Bank press releases.

Note: SIV = structured investment vehicle.

investment decisions regarding complex structured finance products. Effective price discovery assumes proper diligence from investors and appropriate transparency by issuers. While regulation cannot universally enforce investor diligence, it can prescribe appropriate transparency.

The bespoke nature of structured finance products means that investors require substantive information for accurate valuation in both the primary and, when appropriate, the secondary market. At the point of origination of a product, this information needs to be timely, comprehensible, and sufficient. During the height of the demand for structured products (late 2005 and early 2006), issuers were able to employ short periods between the issue of the prospectus and opening for subscription. Investors, faced with these tight deadlines, made purchasing decisions on the strength of the credit rating without a full investigation of the underlying risks and volatilities. As instruments became more complex, the process of evaluating an offer became correspondingly more difficult and less transparent.

To re-establish issuance of structured finance products, structurers will need to take account of investors' likely demand for greater transparency, which should include longer lead times

and more information regarding the sensitivity of key inputs. Difficulties could arise if the disclosure requirements were to include a firm's valuation model. Many are in-house models that firms have built to try to identify profitable pricing discrepancies in the market. As such, firms regard these models to be proprietary tools and will likely resist efforts to mandate disclosure of how they operate. This may not be a substantive barrier because one likely development from the crisis may be a move to a market convention on the presentation of valuation information relating to these instruments. So disclosure may be based on an agreed market convention and a universally accepted "vanilla" valuation model. Given that regulation should limit itself to situations of market imperfections, it is important that any regulatory initiative not frustrate these market initiatives.

Issuers should ensure that information regarding structured products and updates on underlying credit and valuation assumptions remain available to investors, though not necessarily free, throughout the duration of the instrument's life. Such disclosure would assume that investors have expertise in evaluating valuation models, and the larger institutional investors will maintain their own models. Other investors may use pricing advisory and valuation services.

However, the uniqueness and complexity of many of these products raises issues regarding their future disclosure framework. If an entity's balance sheet contains material portions of assets not priced from observable data, then prudent investors should expect to receive details of the valuation assumptions of the individual instruments. Reconciling this with the need to keep annual financial statements sufficiently concise to remain useful presents a challenge.

### The Role of Off-Balance-Sheet Entities

The financial market crisis that started in late July 2007 revealed the vast expansion in off-balance-sheet entities (OBSEs) that had taken place since the mid-1990s, which was not transparent to many supervisors and regulators. Box 2.5 shows the basic features of these entities and discusses issues that arose given their structure.<sup>11</sup> OBSEs, such as SIVs and commercial paper conduits, are entities that allow financial institutions to transfer risk off their balance sheet and permit exposures to remain mostly undisclosed to regulators and investors; to improve the liquidity of loans through securitization; to generate fee income; and to achieve relief from regulatory capital requirements. In addition, during the relatively long period of excess liquidity and low interest rates, OBSEs were part of the process that extended credit access to borrowers to levels beyond what they would otherwise have been able to obtain. In the face of declining deposits, the securitization process has also provided banks an additional source of funding, often of short maturities to fund long-term assets. However, some of these positive features became less attractive to their owners as uncertainties about asset valuations rose and, subsequently, caused systemic disruptions in money markets.

<sup>11</sup>Off-balance-sheet entities is the term used throughout this chapter. More commonly found terms in the accounting and banking literature are "variable-interest entities" and "special-purpose entities." For the purposes of this chapter, the differences between SIVs and commercial paper conduits are not material.

Accounting methods under IFRS and U.S. GAAP as applied to OBSEs enabled off-balance-sheet treatment of sizable financial operations with limited transparency to investors and regulators. In general, OBSEs are structured such that no single institution holds the majority of the risks and rewards, thereby avoiding consolidation and appearance on a financial institution's balance sheet.<sup>12</sup> Slight variations in consolidation criteria exist between U.S. GAAP and IFRS. But in general, both use criteria that relate to the degree of control and the way risks and rewards are distributed, including liquidity support. Sponsoring financial institutions can ensure that these OBSEs are not consolidated by selling off the riskiest portions of the entities, thereby dispersing risk to multiple parties. The ability of financial institutions to avoid consolidation—making it difficult for investors and regulators to detect these financial activities—suggests that standard setters need to reconsider the grounds for consolidation to improve the understanding of underlying risks by all parties.

Both IFRS and U.S. GAAP require very few disclosures about unconsolidated OBSEs, so long as the originating bank does not carry the majority of risks or rewards from the OBSE. The SEC specifies a range of OBSE-related disclosures that it recommends firms make in their annual 10-K Management Discussion and Analysis disclosures. IFRS have nothing similar in place, but reflect these disclosures in their discussion paper on Management Commentary (IASB, 2005). This limited disclosure framework makes it difficult for investors to be aware of OBSE exposures until they crystallize. Hence, investors would benefit from more comprehensive regulatory requirements for disclosures about the scope and scale of exposures to OBSEs.

<sup>12</sup>Although financial institutions are required to disclose "the nature of the relationship between the parent and a subsidiary when the parent does not own, directly or indirectly through subsidiaries, more than half of the voting power" (International Accounting Standards 27.40) of the OBSEs, such information is often in a footnote in a firm's report.

**Box 2.5. Conduits, SIVs, and SIV-Lites**

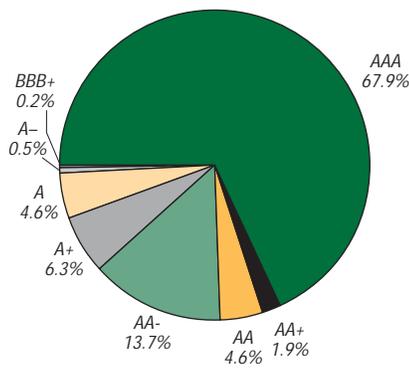
Commercial paper conduits, structured investment vehicles (SIVs), and SIV-lites are off-balance-sheet entities (OBSE) designed to transfer risk. Although commercial paper conduits and SIVs are closely related, their balance sheet structure differs (see figures and table). On the funding

side, a typical SIV issues more varied and mostly longer-maturity notes. On the asset side, a SIV is typically comprised of more complex, tradable assets than are conduits. In addition, SIVs tend to be more leveraged than conduits.

SIV-lites, of which there were five at the peak of their popularity, share many of the characteristics of SIVs, but are less conservatively man-

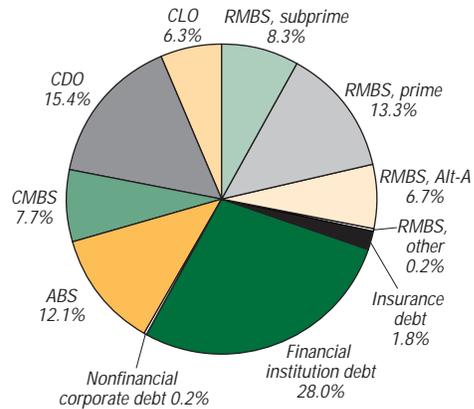
Note: Jodi Scarlata prepared this box.

**Structured Investment Vehicle Portfolio by Ratings, October 2007**



Source: Standard & Poor's.

**Structured Investment Vehicles by Type of Assets, October 2007**

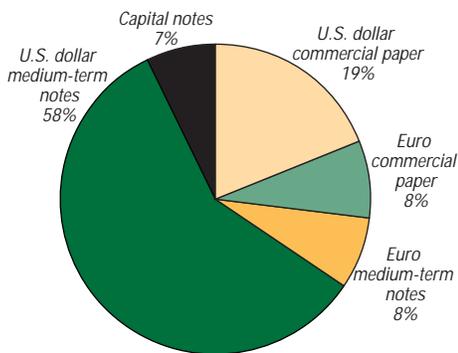


Source: Standard & Poor's.

Note: ABS = asset-backed security; CDO = collateralized debt obligation; CLO = collateralized loan obligation; CMBS = commercial mortgage-backed security; RMBS = residential mortgage-backed security.

**Funding Profile of Structured Investment Vehicles Held by Banks and Nonbanks, October 2007**

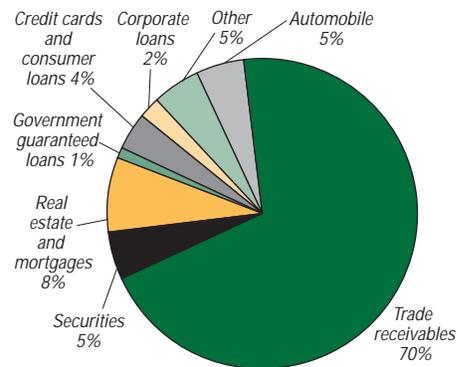
(Total liabilities: \$367.8 billion)



Source: Fitch Ratings, November 2007.

**Asset-Backed Commercial Paper Conduits by Traditional Assets, May 2007**

(In percent of total)



Source: Moody's.

**Features of Typical Conduits, SIVs, and SIV-Lites**

|                    | Conduit  | SIV   | SIV-Lite  |
|--------------------|--|---|---|
| Assets             | <ul style="list-style-type: none"> <li>• US\$ ≈1,400 billion</li> <li>• Nontradable loans</li> <li>• Less risky</li> <li>• 47% Traditional assets</li> <li>• 53% Securities and derivatives</li> </ul> | <ul style="list-style-type: none"> <li>• US\$ ≈ 400 billion</li> <li>• Assets are traded</li> <li>• Less risky</li> <li>• ≈ 28% Financial institutions' debt</li> <li>• ≈ 48% CMBS/RMBS/ABS</li> <li>• ≈ 22% CDOs/CLOs</li> <li>• ≈ 2% Other</li> </ul> | <ul style="list-style-type: none"> <li>• US\$ ≈ 12 billion</li> <li>• Assets are traded</li> <li>• Risky</li> <li>• ≈ 96% U.S. RMBS</li> <li>• ≈ 4% CDOs</li> </ul> |
| Liabilities        | <ul style="list-style-type: none"> <li>• 100% Commercial paper</li> </ul>  | <ul style="list-style-type: none"> <li>• 27% ABCP</li> <li>• 66% Medium-term notes</li> <li>• 7% Capital notes</li> </ul>   | <ul style="list-style-type: none"> <li>• Commercial paper</li> <li>• Medium-term notes</li> </ul>   |
| Credit enhancement | <ul style="list-style-type: none"> <li>• Varied (sponsoring bank)</li> </ul>   | <ul style="list-style-type: none"> <li>• Overcollateralization</li> </ul>   |   |
| Liquidity facility | <ul style="list-style-type: none"> <li>• Contractual 100% coverage</li> </ul>  | <ul style="list-style-type: none"> <li>• Contractual &lt; outstanding liabilities</li> <li>• ≈ 10 to 15 percent of senior debt</li> </ul>   | <ul style="list-style-type: none"> <li>• Partial contractual credit line; subject to market value tests</li> </ul>  |

Sources: Brunnermeier (2007); and IMF staff estimates.

Note: SIV = structured investment vehicle; RMBS = residential mortgage-backed security; CMBS = commercial mortgage-backed security; ABS = asset-backed security; CDO = collateralized debt obligation; CLO = collateralized loan obligation; ABCP = asset-backed commercial paper.

aged, structured with greater leverage, have less diverse asset portfolios, and are much smaller in size. Unlike the open-ended lifespan and ongoing business nature of SIVs and conduits, SIV-lites tend to be a one-off issuance vehicle with a finite lifespan. Unlike SIVs, SIV-lites had a substantially greater exposure to the U.S. subprime market.

Broadly, these entities borrow in the shorter term, including the commercial paper market, to purchase higher-yielding, longer-maturity debt, such as financial corporate bonds and asset-backed securities. SIV assets were traditionally comprised of loans and credit card receivables, while more recent SIV assets have focused increasingly on mortgage products and collateralized debt obligations, and now comprise just over half of the SIV's assets. Financial institutions that are originators and sponsors of OBSEs collect fees for establishing and running them. SIVs' profit, earned on the spread, is paid to the capital note holders and the investment manager. The capital note holders are also the "first loss investors" if any of the bonds default.

**Liquidity Facilities and Credit Enhancements**

SIVs and conduits are supported by mechanisms to both increase their attractiveness and

provide a measure of insurance to the investor. Credit enhancements serve to protect investors from the risk that the entity will default on its obligations as well as unexpected events that reduce the value of the OBSE's assets. They are used to absorb initial losses on the assets held by the OBSE, to enable the commercial paper to receive a higher rating, and include collateralization, third-party loan guarantees, and credit insurance. Banks also provide liquidity backstops as a safeguard in case of funding shortages, ensuring that the commercial paper holders are repaid upon maturity. Bank-sponsored SIVs have often been structured with liquidity facilities of 364-day maturities to avoid regulatory capital charges, and are renewed annually.

**SIV Tests**

As became evident in the second half of 2007, rollover (liquidity) risk is the greatest threat to a SIV. This maturity mismatch risk is evaluated by testing the minimum amount of liquidity needed in a SIV under various circumstances. Specifically, net cumulative outflow tests evaluate if there is sufficient liquidity to cover the maximum net cash outflows over one year. The tests for peak outflows (including maturities

**Box 2.5 (concluded)**

of commercial paper and medium-term notes) conducted daily by the SIV manager are commonly 1-, 5-, 10-, and 15-day tests.

Other key risks are credit migration (including default), recovery, asset yield spreads, interest rate, and exchange rate (Standard & Poor's, 2006). Capital adequacy tests assess the appropriate level of available capital, specifically determining the amount of funds needed to pay debt holders in the event of asset default or a decline in market value. These tests use either matrix-based tests (e.g., asset-by-asset approach where the discounted market value must exceed the value of senior liabilities) or Monte Carlo-based tests (e.g., simulating the future performance of the portfolio and calculating the likelihood of losses) (Fitch Ratings, 2007b).

**Issues**

The maturity mismatch from using short-term liabilities to fund long-term assets would be more transparent if these positions were

held on banks' balance sheets. In addition to this liquidity risk, SIVs face market risk if there is a decline in the value of the investments. Further, the asset-backed commercial paper issued by SIVs was purchased by money market mutual funds and U.S. state and local government investment funds, entities considered to have conservative portfolios by their investors. During the subprime crisis, the lack of transparency regarding SIVs compounded investors' uncertainty and resulted in banks struggling to either roll over or refinance the maturing debt through new commercial paper issuance or asset sales. Going forward, potential SIV investors will likely require funding liquidity lines with greater coverage of liabilities than the historically low levels. As the spread cost of providing such liquidity has increased, the spread between assets and liabilities for SIVs, a measure of profitability for structurers, will likely diminish. Consequently, the present format of SIVs is unlikely to continue in the future.

**Implications of the Consolidation of Off-Balance-Sheet Entities**

A sufficiently large reduction in the fair value of an OBSE's assets—as occurred in many cases during the second half of 2007—might find a sponsoring bank now absorbing more than half of the loss, thus triggering a requirement to bring the OBSE onto the balance sheet.<sup>13</sup> Consequently, the previously determined assets and liabilities of the OBSE might now have to be consolidated on the sponsoring bank's balance sheet and the exposures more clearly revealed. (See Box 2.6 for an illustrative example of a spon-

sor taking the underlying assets of its OBSEs on its balance sheet.)

The disclosure of the assets and liabilities of OBSEs through more frequent scrutiny or consolidation means that their relationship to the sponsoring financial institution may become more transparent. The 2007 white paper by the Center for Audit Quality on the consolidation of conduits stated that OBSEs should be re-evaluated regularly by sponsors of OBSEs to determine whether the initial conditions of the OBSE risk-reward structure had changed sufficiently to warrant consolidation.<sup>14</sup> Increased regularity in the monitoring and re-evaluation of OBSEs would provide greater transparency, especially as it relates to opportunities for consolidation measures, on-balance-sheet presence, and improved regulatory surveillance.

<sup>13</sup>Likewise, the need to provide liquidity support in the face of an escalation in the cost of funding, or a contraction in its supply, can produce a similar outcome. Other events that can make the sponsor absorb more than 50 percent include a sponsor taking additional interests in the vehicle, or a change in the initial contract and the subsequent re-evaluation of the initial assumptions for the OBSE (Center for Audit Quality, 2007).

<sup>14</sup>FIN46R (U.S. GAAP) also has this requirement, called a reconsideration event.

**Box 2.6. Consolidation of Structured Investment Vehicles:  
An Illustrative Example of Issues That Arise**

*In the second half of 2007, uncertainty surfaced about the rules governing consolidation of off-balance-sheet entities. In one case, Citigroup announced its intention to bring its structured investment vehicles (SIVs) onto its balance sheet. Several other banks have also acquired their SIVs. This box outlines the issues involved in the Citigroup case as an example.*

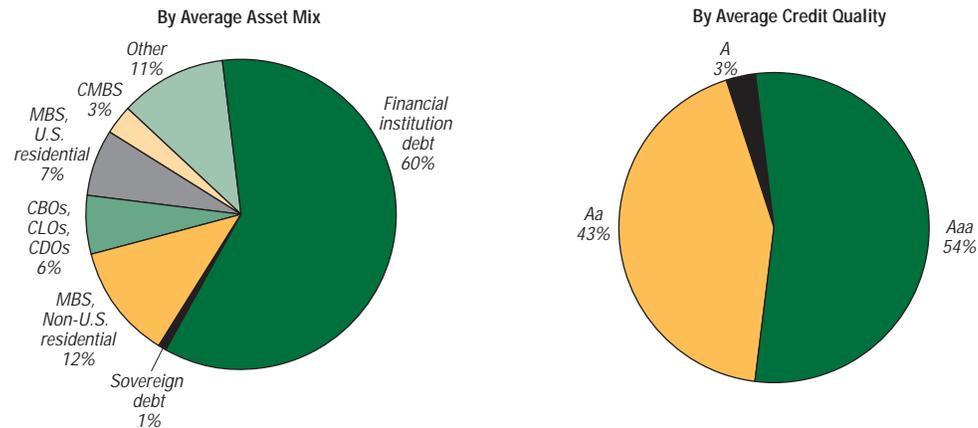
On December 13, 2007, Citigroup announced its intent to provide a support facility that would address the repayment of the senior debt in seven Citigroup-sponsored structured invest-

ment vehicles (see figure).<sup>1</sup> The intent was to support the ratings of the SIVs' outstanding senior debt, which faced potential downgrades by Standard & Poor's and Moody's, and to continue the orderly reduction of the SIVs' assets. As a result, the assets and liabilities of Citigroup's SIVs were taken on balance sheet and accounted for at fair value.

Note: Jodi Scarlata prepared this box.

<sup>1</sup>The seven Citigroup SIVs are Beta, Centauri, Dorada, Five, Sedna, Vetra, and Zela.

**Profile of Citigroup's Structured Investment Vehicle Assets as of December 12, 2007**



Source: Citigroup.  
Note: CMBS = commercial mortgage-backed security; MBS = mortgage-backed security; CBO = collateralized bond obligation; CLO = collateralized loan obligation; CDO = collateralized debt obligation.

Increased disclosure achieved through consolidation or some form of parallel disclosures of an entity's unconsolidated and consolidated positions also means these entities have a direct impact on the institution's regulatory capital requirements, funding sources, and liquidity. For example, if a sponsoring bank provided support to the OBSE by purchasing its commercial paper such that the bank now holds the majority exposure to the OBSE, accounting rules for consolidation would force the OBSE onto the bank's balance sheet. Even if consolidation of

the entire OBSE were not required, a supporting purchase of the OBSE commercial paper would now appear as an asset on the bank's balance sheet and result in a change in the financial ratios of the bank. Specifically, regulatory capital requirements would require applying the requisite Basel risk weights to these new assets, with a negative impact on the capital position of the bank. If the consolidation were sufficiently large or if purchased assets had deteriorated to the point where provisioning were necessary, this could impose further stress on the bank,

**Box 2.6 (concluded)**

Citigroup's operation raised a debate over the interpretation of rules governing off-balance-sheet entities (OBSEs) and what constitutes a "reconsideration event." According to the Financial Accounting Standards Board (2003), an entity's status as a variable interest entity and its primary beneficiary need to be re-evaluated based on certain events, including changes in the contractual arrangements governing these OBSEs, acquiring new assets, or a change in the value of the entities' assets or their risk (Center for Audit Quality, 2007).

Some argued that Citigroup needed to take these securities onto its balance sheet because, during the summer of 2007, it had purchased \$25 billion in commercial paper issued by some of its SIVs that could no longer be rolled over. Combined with Citigroup's previous \$18 billion exposure to those entities, Citigroup might be

exposed to more than half the losses, which argued for consolidation of all \$84 billion of the assets formerly held off balance sheet. Others disagreed, however, and asserted that there were no changes to Citigroup's contractual arrangements for the SIVs. It was argued that the obligation to provide backup arrangements was established when the vehicle was created, and therefore these actions were in keeping with the contractual arrangements for the vehicles.

Citigroup's final decision may have been prompted more as a result of its concern for its reputation rather than any conclusions drawn regarding compliance with consolidation standards. Nevertheless, the issue brought to the surface the uncertainty about the underlying parameters determining consolidation of complex OBSEs, parameters that should be clarified by regulators.

especially if it required the bank to replenish its capital or it reduced cash on hand, thereby constraining its lending ability.

**Basel II and the Capital Treatment of Securitization**

Some believe that had Basel II been in place in more countries, the current stressful episode could have been less severe.<sup>15</sup> Although there are elements in Basel II that would have reduced some of the pressures, it is difficult to conclude that the event could have been avoided.

Specifically, Basel II introduces enhanced guidance on the treatment by banks with regard to holding regulatory capital for OBSE exposures, and this should result in the increased transparency of bank exposures (Figure 2.3). For instance, based on certain conditions,<sup>16</sup> a

bank must assess capital charges for its exposures to an OBSE (or in case of deterioration in the underlying assets, if the bank is forced to take these assets onto the balance sheet).

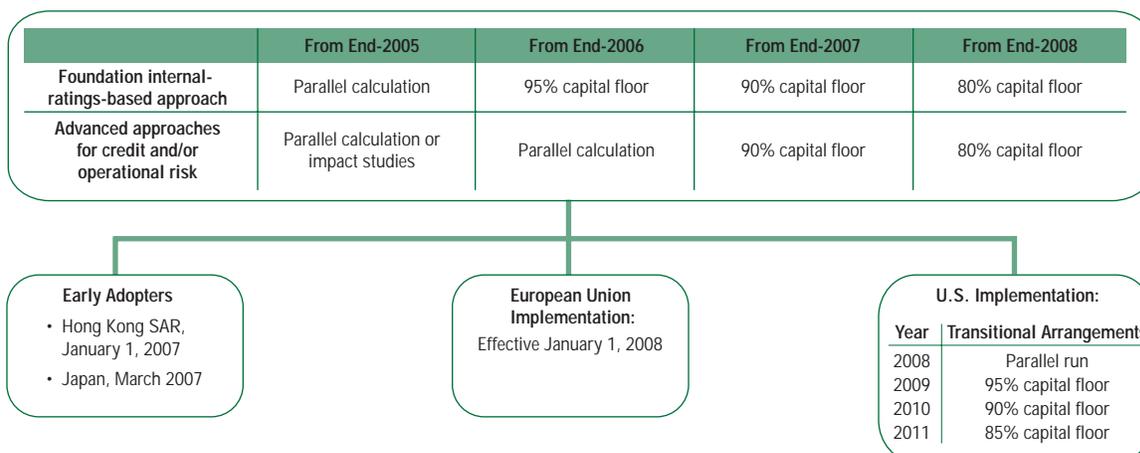
In addition, Pillar 3 of Basel II requires the disclosure of securitizations that includes, for example, qualitative discussions of the bank's securitization activities and the extent to which they transfer credit risk away from the bank, the accounting treatment for synthetic securitizations, and the separation of underlying assets held by OBSEs by type and quality of asset (Boemio, 2007). These regulatory requirements improve informational disclosures in a previously opaque and unregulated financial area. The supervisory review process of Pillar 2 supports these requirements and can serve to address existing issues or evolving ones, such as risks that might not be fully captured in the Pillar 1 process for capital requirements, such as credit concentration risk

<sup>15</sup>For those countries that have already introduced Basel II regulations or regulations comparable to Basel II, the impact of the regulatory changes discussed is lessened.

<sup>16</sup>Such conditions include the following: significant credit risk has not been transferred to a third party, the

transferor maintains effective or indirect control over the transferred exposures, or the securities issued are obligations of the transferor (see paragraph 554 of Basel II).

Figure 2.3. Timelines for Implementation of Basel II Framework



Sources: Bank for International Settlements; and Board of Governors of the Federal Reserve System.

Note: The capital floors are limits on the amount of capital reduction allowed under Basel II during the transition between Basel I and Basel II. The amount of capital reduction is limited to a percentage of the existing Basel I calculation.

or business-cycle effects (BCBS, 2006, paragraphs 784–807). Nonetheless, the qualitative nature of Pillar 3 leaves sufficient flexibility so that certain weaknesses in the disclosure arrangements remain.

Under Basel II, banks that are originators of OBSEs will need to take into account their capital requirements when deciding on the best way to structure these OBSEs. In funding the entity, the originator can choose to issue commercial paper, medium-term notes, or lower-rated securitizations (that comprise the equity tranche). However, Basel II regulation imposes sequentially higher-risk weights on capital once the securitization is rated below investment grade or unrated. For originating banks holding equity tranche exposure, these low-rated or unrated assets may become very costly in terms of capital charges, particularly if they remain unhedged. For example, under the internal-ratings-based approach for long-term debt,<sup>17</sup> a bank holding an instrument rated BB faces risk weights of 425 percent. Yet, for the riskiest assets, the risk weight reaches 1,250 percent. Further, Basel II rules require that banks must prove that “significant credit risk”

<sup>17</sup>Most banks issuing in these markets would likely use the internal-ratings-based approach.

has been transferred to a third party in order to achieve capital relief through securitization. It is unlikely that the originating bank’s on-balance-sheet holdings of the riskier equity tranche investments will meet these criteria.<sup>18</sup>

Likewise, as investors, banks under Basel II must hold capital against securitized instruments on their balance sheet. With charges of 650 percent for exposures rated BB–, the cost of holding below-investment-grade paper can be exorbitant. Investment-worthy assets and the associated reduced risk weights for investment-grade assets provide banks with a less costly alternative in terms of capital, thereby increasing the incentive to move away from low-grade instruments.

One question that arises under the disclosure and capital requirements of Basel II is whether originating banks will be discouraged from issuing below-investment-grade instruments. Although short and long maturities will likely still be issued by OBSEs, the funding structure of bank-originated OBSEs is likely to change, with an increased

<sup>18</sup>Further, Basel II requirements for eligible liquidity facilities include an “asset quality test,” as well as the requirement that, for facilities supporting externally rated securities, the securities must be externally rated investment grade at the time of funding.

issuance of higher-grade commercial paper and investment-grade securitizations relative to the period prior to Basel II adoption. Levels of leverage of these entities are likely to be lower than the current averages of about 14 times, as the riskiness of exposures will be accounted for more clearly in capital requirements.

Another consideration, which has a direct bearing on the general question about the “originate-to-distribute” business model underlying the interest in OBSEs, is whether banks in the future will retain part of the risk they originate. Will banks voluntarily take more of the OBSE’s assets onto the balance sheet to provide greater assurance to investors as to the vehicle’s quality? Or should banks be required to retain a stake in the performance of these assets, thus having the incentive to conduct better due diligence? In the latter case, one would need to consider the best choice as to who would prescribe and monitor such a requirement and the challenges of enforcing it, since financial institutions may find ways to circumvent it (e.g., by offsetting the risk with an off-balance-sheet derivatives hedge that may be difficult to observe).

While securitization is here to stay, the structure of bank-originated OBSEs as they exist today is likely to be altered, assuming banks will face the regulatory cost. In the short term, one can expect a move away from the complex highly structured products to simpler ones. However, products should emerge incorporating new elements, such as different asset classes, thicker tranches, or increased subordination in CDOs or other credit-tiered products—all methods to make these instruments less risky. The use of credit default swaps is likely to expand as Basel II encourages banks’ hedging of risk exposures to lower risk weights on asset holdings.<sup>19</sup> Additionally, there are opportunities for the new products and entities to bring greater transparency to the risks on banks’ balance sheets that will benefit both investors and regulators.

<sup>19</sup>While hedging credit risk through credit default swaps can be helpful, counterparty risk to those writing such swaps is still present.

In a macroeconomic context, it has been argued that the implementation of Basel II capital requirements could have a procyclical effect on the business cycle. Specifically, in an economic downturn, anticipated losses would require banks to increase their capital, putting further downward pressure on the provision of credit, thereby accentuating the downturn.<sup>20</sup> Moreover, as discussed in the section on fair value accounting, under certain circumstances, the application of fair value rules during periods of market weakness or turmoil can contribute to a downward spiral in asset prices and exacerbate financial instability. Therefore, policymakers need to be aware that, in a downturn, the combined application of fair value triggers and Basel II capital requirements could reinforce each other, thereby exacerbating economic weakness.

### Liquidity Facilities and Credit Enhancements

In addition to the risks stemming from the assets of OBSEs, originating banks are also tied to these entities via the liquidity facilities and credit enhancements that support these entities.<sup>21,22</sup> Under Basel I, capital charges do not need to be applied to liquidity facilities with less than a one-year commitment, while they are required for those with longer terms. Effective September 2005, with a view to enhancing accountability, U.S. regulators required capital to be held against short-term liquidity facilities as well, although most European regulators did

<sup>20</sup> This depends on the type of rating models used by banks, e.g., where the credit rating is sensitive to economic conditions.

<sup>21</sup> Liquidity facilities are the assurance of a loan or guarantee of financial support to back up an off-balance-sheet entity. Banks provide SIVs with liquidity backstops averaging 10 to 15 percent of the face value of senior funding outstanding, while conduits typically provide 100 percent coverage of commercial paper liabilities.

<sup>22</sup> Credit enhancements are defined as a contractual arrangement in which the bank retains or assumes a securitization exposure, and in substance provides some degree of added protection to the parties to the transaction. Forms of credit enhancement include collateralization, third-party loan guarantees, and credit insurance. Overcollateralization is used heavily to support SIVs.

not introduce a similar requirement. For the most part, however, the implications for the originating banks of these supporting facilities were not fully realized until difficulties arose in early August 2007.

Basel II requires banks to hold more capital in line with the risk from their off-balance-sheet exposures. Banks are required to hold regulatory capital for both liquidity facilities and credit enhancements, improving visibility to investors and regulators. For 2007, this was expected to have the largest impact on European banks, which had not yet imposed capital charges on these liquidity facilities. Using the standards of Basel I, Fitch Ratings estimated that, under a worst-case scenario, if liquidity lines were to be fully drawn down, declines in the Tier 1 capital ratio of European banks would peak at 50 percent and for U.S. banks at almost 29 percent (Fitch Ratings, 2007a).

Based on the terms and conditions according to which liquidity facilities are subject to capital requirements under Basel II, their transparency could be enhanced, but they could also be structured to reduce capital charges. There are various criteria determining the appropriate credit conversion factor (CCF) for liquidity facilities and, hence, the overall risk weights for the associated capital charges.<sup>23</sup> The guidelines for liquidity lines entail significant differences in the magnitudes of the CCFs to be applied. With the adoption of Basel II, these contingent facilities are expected to undergo structural changes as originators revamp the liquidity lines to minimize the cost to regulatory capital.

Marketability, as well as investor demand for greater security, could encourage the size and format of backup liquidity lines for SIVs to approximate those of conduits, approaching or equaling 100 percent coverage, as well as incorporating more substantial credit enhancements. In addition, alternatives to the more frequently

used third-party liquidity support include extendible commercial paper (i.e., a note whose maturity can be extended at the option of the user) and repurchase agreements.

### Implications for Nonbank Financial Institutions

By their nature, nonbank financial institutions (NBFIs) are not directly affected by the new disclosure requirements for OBSEs under Basel II, yet they are subject to financial risks.<sup>24</sup> Thus, the direct or indirect relationships of NBFIs with other counterparties and their membership in financial groups, including banks, can trigger, or act as channels for, systemic events (Table 2.2).

The involvement of insurance companies in credit risk transfer products has been primarily as sellers of protection (Table 2.3 and Figure 2.4). Insurance companies are affected on the asset side of their balance sheets as investors in structured products. They can also be exposed via their holdings in hedge funds, which tend to invest in the riskier tranches of structured products and SIVs. More generally, insurance companies are exposed to the effects of increased market volatility and stress. In addition, it is also possible that there could be a particular effect for insurance companies that are part of financial conglomerates, as they might be called on to provide liquidity lines or support asset purchases for stressed entities.

In general, variations in the regulatory treatment of securitization among different types of financial institutions may provide an opportunity for regulatory arbitrage across financial sectors. Some securitization exposures are evaluated for regulatory purposes differently for insurance companies than for banks. Insurance companies—especially life insurers with their longer-term investment horizons—tend to hold more low-rated positions than do banks, a situation that may be accentuated if, under Basel II,

<sup>23</sup>To determine capital requirements for off-balance-sheet exposures, one must first apply a credit conversion factor to the exposure, and then risk weight the resulting credit equivalent amount (Basel II, paragraph 567).

<sup>24</sup>NBFIs include insurance companies, hedge funds, mortgage originators, pension funds, and mutual funds, and comprise a sizable portion of OBSE originators (about 28 percent as of November 2007 for SIVs only).

Table 2.2. U.S. Subprime Exposures and Losses

|                            | Exposure <sup>1</sup>                             |       |                   | Losses |        |                   |
|----------------------------|---|-------|-------------------|--------|--------|-------------------|
|                            | 2005  | 2006  | 2007 <sup>2</sup> | 2005   | 2006   | 2007 <sup>2</sup> |
|                            | <i>Total amount (in billions of U.S. dollars)</i> |       |                   |        |        |                   |
| Banks <sup>3</sup>         | 155.3   | 263.9 | 126.5             | -8.8   | -62.8  | -28.8             |
| Hedge funds                | 69.8  | 98.1  | 77.6              | -6.7   | -26.9  | -20.4             |
| Insurance companies        | 78.4  | 105.9 | 83.7              | -1.6   | -20.8  | -15.1             |
| Finance companies          | 24.6  | 30.2  | 23.8              | -0.6   | -4.8   | -3.6              |
| Mutual funds/pension funds | 14.8  | 18.2  | 14.3              | -0.4   | -2.5   | -1.9              |
| Total                      | 342.9   | 516.3 | 325.9             | -18.1  | -117.8 | -69.8             |
|                            | <i>As a percent of total</i>                      |       |                   |        |        |                   |
| Banks <sup>3</sup>         | 45.3  | 51.1  | 38.8              | 48.6   | 53.3   | 41.3              |
| Hedge funds                | 20.4  | 19.0  | 23.8              | 37.0   | 22.8   | 29.2              |
| Insurance companies        | 22.9  | 20.5  | 25.7              | 8.8    | 17.7   | 21.6              |
| Finance companies          | 7.2   | 5.8   | 7.3               | 3.3    | 4.1    | 5.2               |
| Mutual funds/pension funds | 4.3   | 3.5   | 4.4               | 2.2    | 2.1    | 2.7               |
| Total                      | 100.0   | 100.0 | 100.0             | 100.0  | 100.0  | 100.0             |

Source: Goldman Sachs.

<sup>1</sup>Par amounts for securities and notional amounts for derivatives.

<sup>2</sup>As of November 2007.

<sup>3</sup>Including investment banks.

insurance companies face lower capital charges than banks for subinvestment-grade tranches (Figure 2.5).<sup>25</sup>

The spread of risk across the financial system is particularly relevant for monoline insurers compared with other insurance companies, as the impact of a potential rating downgrade of a major monoline insurer affects a much broader spectrum of players than the insurer alone. The exposure to monolines for banks and insurance companies also stems from direct holdings of monoline debt or equity, potential liabilities through reinsurance, and securities wrapped by monolines, where insurance companies are mostly exposed via holdings of monoline-wrapped securities (Barclays Capital, 2008). Most directly, the quality of the guarantee provided by the monoline insurer feeds through to the ratings on the securities and structured products supported by its guarantees (Figure 2.6).<sup>26</sup> At end-2006, monoline insurers

<sup>25</sup>However, if Solvency II on insurance regulation converges to Basel II, the opportunity for arbitrage would be reduced.

<sup>26</sup>The financial guarantee provided by an insurer provides an unconditional guaranteed payment of the principal and interest on the bonds that are guaranteed as they fall due. As a result, the quality of the bonds issued

supported \$2.5 trillion of insured risk (securities at par value), including about \$800 billion in structured finance obligations.<sup>27</sup>

What is key is the fact that a monoline not only provides an assessment of the creditworthiness of the issuer but also stands behind its assessment with financial support. A downgrade of a major monoline calls into question the quality of its assessment as well as the overall usefulness of such insurance. Further, the downgrade can have repercussions across financial sectors for those who hold monoline-guaranteed products. For example, banks holding such instruments would see a reduction in the value of the protection, thereby increasing the riskiness of the investment and the requisite regulatory capital charge that is applied (see Chapter 1). As a result, banks are exposed to either the underlying quality of the assets in the credit tranche or the counterparty risk of the monoline, whichever has the higher credit rating (Barclays Capital, 2008).

reflects the rating of the bond insurer, and the presence of a guarantee can reduce the amount of time invested by the buyer in researching the issuer. (See the Association of Financial Guaranty Insurers website at [www.afgi.org](http://www.afgi.org).)

<sup>27</sup>See Chapter 1 for more details on monolines.

**Table 2.3. Market Participants in Credit Derivatives, 2004 and 2006**

(In percent of total)

|               | Protection Buyers |      | Protection Sellers |      |
|---------------|-------------------|------|--------------------|------|
|               | 2004              | 2006 | 2004               | 2006 |
| Banks         | 67                | 59   | 54                 | 43   |
| Hedge funds   | 16                | 28   | 15                 | 31   |
| Pension funds | 3                 | 2    | 4                  | 4    |
| Insurance     | 7                 | 6    | 20                 | 17   |
| Corporations  | 3                 | 2    | 2                  | 1    |
| Mutual funds  | 3                 | 2    | 4                  | 3    |
| Other         | 1                 | 1    | 1                  | 1    |

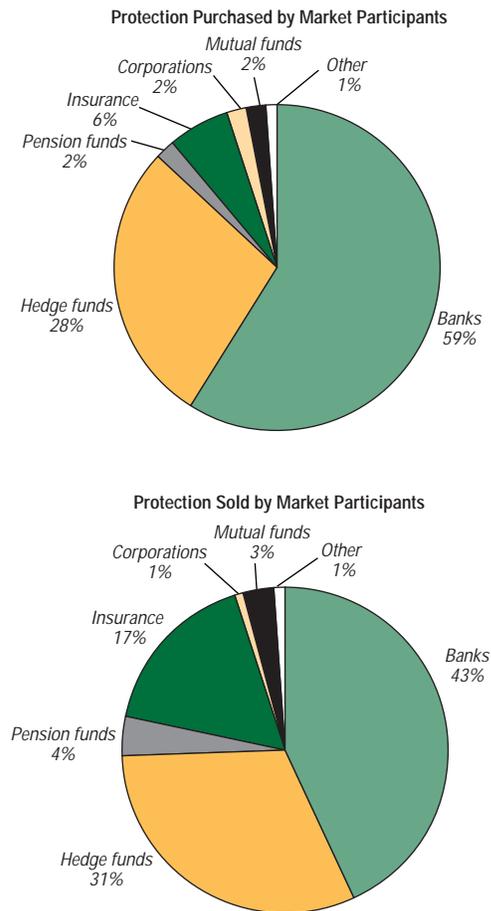
Source: British Bankers' Association (2006).

Hedge funds tend to hold the riskiest tranches of structured products. Discussions with market participants noted that 2006 saw an increase in the involvement of hedge funds in the CDO market. In the second half of 2007, while many hedge funds suffered from the subprime and ensuing broader crisis, some appeared to have gained from contrarian bets, while others bought assets at bargain prices when market liquidity dried up. As Basel II requirements provide the incentives for banks to gravitate toward high-grade assets, opportunities for hedge funds will likely increase for entering the riskier end of the structured market. In addition, there are opportunities for hedge funds to manage OBSEs on a fee income basis.

Calls continue for hedge fund disclosure, following up on the UK hedge fund industry initiative, which launched a working group backed by 14 of the largest UK hedge funds to develop a set of guidelines for the industry. But the recent turmoil appears to have strengthened the case of hedge funds in forestalling mandatory disclosure in any upcoming discussions with regulators as they provide needed liquidity and support for the affected markets. Looking forward, there needs to be a balance between disclosure that provides market and regulatory confidence, while not constraining hedge fund flexibility in contributing to the smooth functioning of the market.

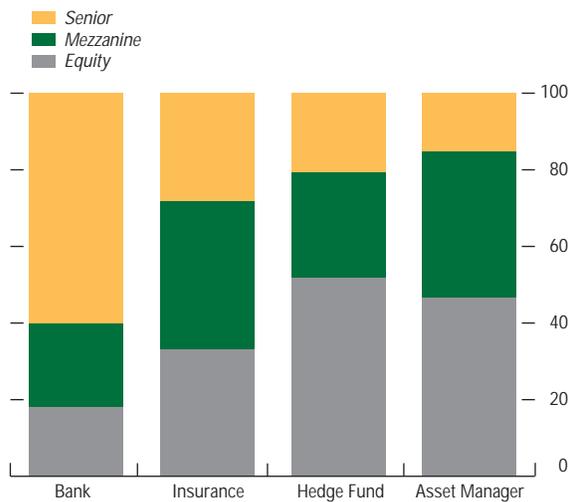
More stringent regulatory and disclosure requirements in the banking sector could

**Figure 2.4. Market Participants in Credit Derivatives, 2006**  
(In percent of total)



Source: British Bankers' Association (BBA) (2006).  
Note: End-2006 estimates based on BBA's 2006 survey.

**Figure 2.5. Structured Credit Products by Market Participants**  
(In percent)



Source: Citigroup.  
Note: As of the first half of 2007.

encourage a significant increase in NBFi involvement in OBSEs. Banks may look to hedge funds, insurance companies, or other financial institutions to provide liquidity facilities or credit enhancements, particularly to absorb first loss. If the equity tranche continues to be offered as part of OBSE operations, it is not likely to be done in its present form. Instead, the equity tranche might now be sold to NBFi investors under more lucrative terms to ensure a buffer to senior debt and the overall attractiveness of the entity to investors. This would entail “significant credit risk transfer” required of Basel II and eliminate charges to capital, albeit at the cost of impacting banks’ profit margins by providing handsome returns on capital notes. Alternatively, these NBFis may enter the market directly as originators of OBSEs themselves. For those NBFis that remain outside the scope of regulatory oversight, assuming OBSE-related credit and liquidity risks may raise the issue of possible systemic effects down the road.

### Conclusions and Outlook

The financial crisis that began in late July 2007 has constituted an important test of complex structured finance products and provided insights into their implications for financial stability. The conclusion seems to be that the complexity of those products, coupled with weak disclosure, has left the system exposed to a serious funding and confidence crisis that threatens to continue for a significant period.

The key challenge going forward will be for these products and markets to adapt in ways that both preserve the benefits they bring in tranquil times while at the same time addressing the additional systemic risks they encouraged in their original form. In the latter regard, the ongoing crisis starkly illustrates two points. First, investors were in many cases too complacent about the risks that they were taking on and did not exercise appropriate due diligence, relying too heavily on rating agencies for assessing the risks to which they were exposed. Second, the perimeter of risk for financial institutions—that

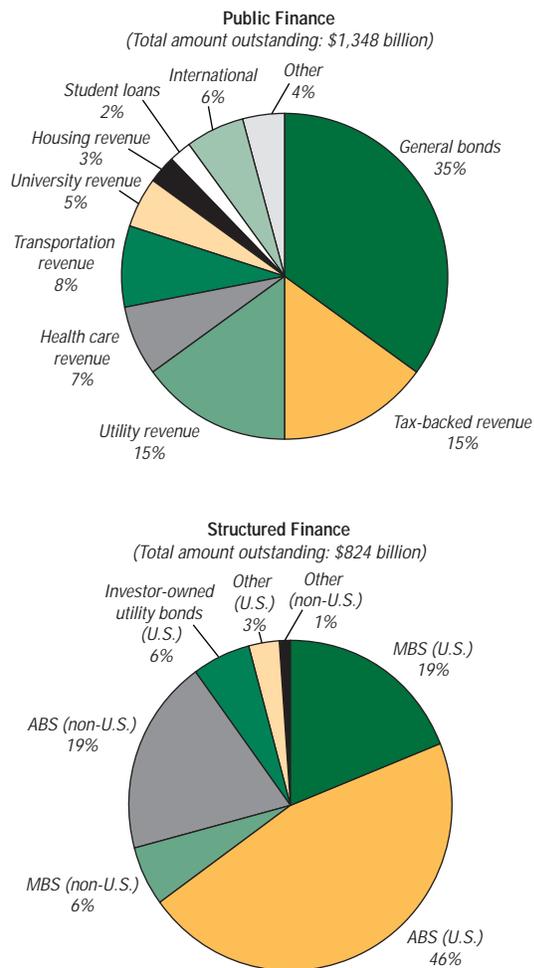
is, the risk assessment of all of an institution’s activities, including its related entities—did not adequately take into account the size and opacity of institutions’ exposures to SIVs, commercial paper conduits, and their related funding support. Effectively, market participants underestimated the credit risk in the underlying assets. This compounded the market liquidity risk inherent in these complex over-the-counter structured products.

In general, policy proposals relating to securitization should aim to strengthen the weaknesses and close the gaps in structured finance, without impeding market innovation. Overall, the policy proposals should focus on enhancing the underpinnings of the originate-to-distribute model, including strengthening underwriting standards and encouraging originators of structured finance products to improve disclosure of the underlying risks in the products in a timely and comprehensible manner. It would help if originators were to hold part of the risk of their originated loans, as then they might have greater incentive for due diligence and subsequent monitoring, though this may be difficult to implement in practice, particularly in the upswing of a credit cycle. Also important would be to encourage rating agencies to sharpen their methodologies to account for a wider range of risk factors, and to provide investors with more clarity as to the limitations of their ratings and the sensitivity of those ratings to the risk factors.

A number of the proposals would need to be implemented by the private sector, although official decision-making bodies could usefully provide encouragement in some cases:

- Most products could usefully be standardized at least to some extent. This should increase transparency as well as market participants’ understanding of the risks, thus facilitating the development of liquid secondary markets. Although there will always likely be types of investors that will demand bespoke complex products, securitization trade associations and securities regulators could encourage that these be structured, at least partially, from standardized building blocks.

**Figure 2.6. Financial Guaranty Industry Insured Portfolio Distribution, 2006**  
(Net par insured)



Source: Association of Financial Guaranty Insurers.  
Note: MBS = mortgage-backed security; ABS = asset-backed security.

- Transparency regarding product characteristics at origination is needed. Timely, comprehensible, and sufficient information should be provided to investors at origination, including information on the underlying assets, the valuation assumptions used, and the sensitivity of those assumptions to changes (sensitivity analysis of assumptions regarding volatility, default and delinquency, and loss given default under various scenarios).
- Originators that retain risks and rewards in off-balance-sheet entities should disclose aggregate information on a timely and regular basis. Such disclosure about off-balance-sheet entities should cover key risk characteristics of the originator's exposure in terms of the quantity and sensitivity to credit, market, foreign exchange, and liquidity risks; and changes in risk exposure due to the quantitative and qualitative impact on the originator's balance sheet of changes in key risk factors. Where specific off-balance-sheet entities present material risks that diverge from the aggregate, separate disaggregated disclosures are warranted. Specifying these disclosures would require close cooperation between regulators and standard setters.
- In addition to using a differentiated scale for structured credit products, rating agencies should provide investors with more analytical information regarding potential rating volatility. Given that, by design, structured credit products can suffer more severe, multiple-notch downgrades relative to corporate or sovereign bonds, a differentiated rating scale would help make these differences more explicit. The additional analytic information, which could take the form of a score or index, would provide investors with a quantification of the increased downgrade risk. Recommendations that lie mainly in the public domain include the following:
  - Greater attention to applying fair value results needs to be addressed. As experience is gained from the crisis, some weaknesses in the implementation of fair value as a valuation mechanism could usefully be addressed.

Research should investigate the degree to which decision-making rules based on fair value may compound a crisis, and identify strategies that could mitigate these adverse effects. Such strategies could involve defining decision rules on the basis of fair value milestones that trigger a review of the elements underlying fair value rather than compulsory sales. The results of such research should inform the decisions of securities and banking regulators as well as accountants and auditors, potentially requiring some fine-tuning of existing guidance.

- Further refinement and careful implementation of Basel II would substantially reduce current gaps. If properly specified and implemented, the emphasis of Basel II Pillar 3 on market monitoring, in particular by providing reliable and adequate information to investors and regulators, can be effective in closing the disclosure gaps of the Basel I framework. However, this chapter highlights that supervisors need to receive more rigorous guidance as to whether significant credit risk has been transferred to a third party before granting capital relief. As for applying the appropriate risk weights to contingent credit lines, Basel II guidance needs to be strengthened further. Some possibilities for regulatory arbitrage between banks and nonbank financial institutions may remain, however, as the same risk may be treated differently across regulatory regimes. Standard setters and supervisors need to be cognizant of unintended consequences across regulatory regimes, and to coordinate efforts, if needed, to resolve misuses.

The lessons learned from the turmoil are likely to shape structured finance decisively. Some of the changes may be short lived—simpler products and a more discerning investor base—and some may have more staying power, such as improved transparency and disclosure, and a better incentive structure for rating agencies. The innovation and flexibility associated with structured finance products and markets will likely guide the industry in the

post-stress period just as it drove it in its early expansion years. As such, it is important that any regulatory initiatives support rather than supplant market-driven responses to address the identified weaknesses. Such initiatives could involve (1) facilitating coordination between the different policy-making bodies, such as standard setters and regulators, in designing responses; (2) removing incentives for perverse outcomes, such as differential capital requirements on the basis of structure rather than risk; and (3) addressing systemic weaknesses identified in the crisis. It will be particularly important to address the incentives of various market participants in light of any existing or future regulation to ensure that they are aligned with a stronger, more resilient financial system.

## Annex 2.1. The World According to GAAP

*Note: Kenneth Sullivan prepared this annex.*

The International Accounting Standards Board promulgates the IFRS and the Financial Accounting Standards Board promulgates the U.S. GAAP. IFRS applies to all European Union/European Economic Area companies with listed securities, while U.S. GAAP, combined with SEC regulations, governs all U.S. companies.<sup>28</sup> This annex will focus on accounting standards for valuing structured finance products and for the treatment of OBSEs. In both cases, the U.S. GAAP and IFRS treatments are substantially the same, but there are some subtle differences. The standards FAS 157 and IFRS 7, which elaborate the disclosures for financial instruments, are new to their respective frameworks and at the end of 2007 disclosures under these standards were only made by early adopters that included most major financial entities.

FAS 157 defines fair value as "...the price that would be received to sell an asset or paid

to transfer a liability in an orderly transaction between market participants at the measurement date."<sup>29</sup> FAS 157 recognizes fair value as an exit value from a sale, while currently IFRS is less prescriptive.

In determining fair value, both IFRS and U.S. GAAP prescribe a hierarchy of fair value methodologies starting with observable prices in active markets and moving to a mark-to-model in which some of the material inputs are unobservable. However, only FAS 157 requires disclosure of a formal three-level classification of all financial instruments in the financial statements. "Level-one" valuation requires observable prices for the same instrument in liquid markets. When observable prices are unavailable for the valuation date, "level-two" valuation allows the use of prices on nearby dates, or the use of arbitrage-type valuation models that use the observable prices of other financial instruments. For example, such a model might value a CDO tranche on the basis of credit spreads or implied correlations of similar CDO tranches. For instruments for which level-one and level-two valuations inputs are not available, "level three" allows the use of theoretical valuation models that use as inputs various relevant fundamental parameters. For example, an MBS valuation might be based on estimated or market-implied delinquency and foreclosure rates, and loss severities. This makes valuation of level-three assets highly dependent on, and sensitive to, the model's assumptions. FAS 157 requires disclosures of information concerning changes to the levels of and valuation methodologies for level-three assets. These include:

- A reconciliation of opening and closing balances with a disclosure of total gains and losses and where they are reported in earnings (income statement or other comprehensive income), along with all changes in stocks, including transfers in and out from other levels.
- For the annual statements, the disclosure of valuation techniques used to measure fair

<sup>28</sup>A number of countries rely on their respective national accounting standards, which may differ from both IFRS and U.S. GAAP. These are not considered in this chapter.

<sup>29</sup>FAS 157, paragraph 5, "Definition of Fair Value."

value and any changes in techniques in the period.

While IFRS require disclosure of valuation assumptions, they do not have a classification framework like FAS 157.

Neither U.S. GAAP nor IFRS prevent a firm from changing the method for calculating an asset's fair value over its life. Changes in market conditions may move assets from a level two to three classification, or vice versa, as firms assess the availability and integrity of market data with regard to the valuation of their assets.

While the market-to-model valuation technique accepts the use of unobservable inputs, it still requires the use of those valuation assumptions commonly used by "market participants" in determining an exit price for the instrument. This means using information regarding market participant assumptions that is reasonably available without undue effort and cost. In cases where an active market no longer operates, entities must take account of any information that provides evidence of fair value, whether it be liquidity premia or credit spreads. For example, if the liquidity spreads are deemed to be so extreme as to not represent an orderly transaction, entities may still gain measures of credit risk on their structured products through reference to the prices of similar instruments such as ABX indices to value MBS. This provides a means of estimating the appropriateness of an asset's valuation. While the index is imprecise, it may be a better measure of the underlying creditworthiness of an instrument, as it is less affected by the liquidity risks priced into traded instruments. As discussed in the body of the main text, the major audit firms have reached a general consensus for determining an "orderly transaction" under current market conditions.

IFRS and U.S. GAAP both require disclosures of risk management issues relating to financial instruments, but IFRS 7 requires more extensive disclosures relating to liquidity risks and sensitivity analysis. SEC regulations prescribe additional disclosures outside of U.S. GAAP as part of statutory periodic reporting, resulting in differences in the overall disclosure frameworks.

Both frameworks differ in their accounting for the treatment of securitization-related OBSEs such as asset-backed commercial paper conduits and SIVs. Both require balance sheet consolidation on the basis of control or if the sponsoring entity absorbs the majority of the expected risks and benefits, including provision of liquidity support. U.S. GAAP define control as more than 50 percent of rights, while IFRS have a test of effective control that can be less than 50 percent. U.S. GAAP describe variable interest entities, which are open-ended OBSEs, and qualifying special-purpose entities, which have a defined termination. IFRS define special-purpose entities. Each framework provides tests to determine the level of control or balance of risks and rewards that will trigger consolidation.

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## MARKET AND FUNDING ILLIQUIDITY: WHEN PRIVATE RISK BECOMES PUBLIC

*The latest episode of financial turbulence has been marked by an extended and unusual period of illiquidity. This chapter explores the interrelationship between market and funding liquidity, and the role played by central banks in providing liquidity, both by examining recent events and through econometric analyses. New transmission mechanisms across markets and countries are evident, in part related to the recent proliferation of illiquid, hard-to-value structured credit products. Central banks have played a positive role in easing funding liquidity strains, though some have needed to adapt their operational procedures to do so. A key finding is that the private sector has increasingly relied upon the public sector for protection against liquidity shocks. Both sectors now need to re-examine how systemic liquidity risk management can be improved. Some tentative policy directions are proposed.*

The market turbulence that began in July 2007 stemmed initially from credit prospects deteriorating in U.S. sub-prime mortgages, but quickly spread to other markets. Growing uncertainty surrounding the valuation of structured credit instruments affected their liquidity, leading to difficulties in the asset-backed commercial paper (ABCP) market, where these instruments were partly funded. Illiquidity spread to the broader money markets as concerns grew over the extent of bank on- and off-balance-sheet exposures to these instruments, requiring bank rescues and capital injections.

The speed and extent of the transition from “market” illiquidity to “funding” illiquidity, and their subsequent interaction, was remarkable and required unprecedented intervention by mature market central banks to meet banks’ liquidity

needs.<sup>1</sup> As a result, important questions arise concerning the extent to which new financial instruments have increased the financial system’s vulnerability to liquidity events and the adequacy of the tools central banks have at their disposal to address such disruptions. The episode also has important implications for the clarity of central bank communications when balancing their responsibilities for formulating monetary policy and protecting financial stability.

This chapter examines recent events and makes some recommendations for the future. The concepts of market and funding liquidity that are relevant for understanding the episode are examined first, along with how banks have managed liquidity risks in recent months. The

Note: This chapter was written by Brenda González-Hermosillo, Heiko Hesse, Ulrich Klueh, Laura Kodres, and Paul Mills, with the aid of Nathaniel Frank on empirical liquidity modeling. Research assistance was provided by Oksana Khadarina. Markus Brunnermeier provided consultancy support.

<sup>1</sup>Market “illiquidity” arises when asset positions that are normally traded in reasonable size with little price impact can only be transacted at a substantial premium/discount, if at all. The concept is asset-specific. Funding “illiquidity” occurs when solvent counterparties have difficulty borrowing immediate means of payment to meet liabilities falling due. This concept is institution-specific. The former concept is a market-wide occurrence, whereas the latter applies to individual institutions, although a number can be affected simultaneously.

various ways in which market and funding liquidity can interact to cause self-sustaining “liquidity spirals” is then explained, including why such spirals may have become more prevalent. The response of central banks to the liquidity crisis, as well as their ability to address such disruption, is discussed in light of their operational frameworks. An empirical analysis suggests that liquidity transmission has been a key element during this period of stress and provides some evidence that certain types of central bank support can reduce the elevated volatility associated with these events. After identifying ways in which liquidity management has been deficient during this episode, the chapter concludes by proposing a set of reforms and policies to address these issues.

### The Nature of Market Liquidity Risks

During the period of stress that began in July 2007, “market liquidity”—the ease with which one can liquidate a position in an asset without appreciably altering its price—fell dramatically for a wide range of assets, reflecting both the characteristics of the markets in which these assets traded, and their specific characteristics (Box 3.1). Secondary market liquidity became extremely thin, most notably in markets for structured credit products—where securities were highly tailored to the needs of specific investors and, for the most part, were meant to be held to maturity. Moreover, since most trading took place in over-the-counter (OTC) markets, price reporting and a common venue to connect a wide variety of buyers and sellers were absent.

In other cases, traders attempted to hedge positions, meet margin calls, or realize gains in other safer or more liquid markets, transmitting demand for liquidity and the resulting volatility more widely. This demand for market liquidity migrated to robust trading platforms and easily valued securities, such as some highly liquid U.S. equities and Treasury securities. Robust price discovery mechanisms and the knowledge that even large trade sizes would be less likely to move prices appreciably attracted participants.

Market liquidity is often hard to measure precisely (Sarr and Lybeck, 2002). The interpretation of typical measures, such as bid-ask spreads and volumes, is more difficult during stressful periods, since they also reflect volatility and credit risks. In this latest event, anecdotal evidence suggests that the increased uncertainty and volatility, and higher default risks of potential counterparties, made posted bid-ask spreads in many instruments unreliable, as no trading took place at those prices.

Although recent developments would seem to make a strong case for amending market risk management procedures to take into account liquidity risk, doing so in the future will be challenging. One approach is to add a measure of liquidity risk to the value-at-risk measure, but this has proved difficult, especially given the absence of satisfactory measures of liquidity even in normal times (Box 3.2). Thus, financial firms have tended to use ad hoc approaches to control market liquidity risk, making their responses to crises difficult to anticipate.

### Funding Liquidity Risks

Events since July 2007 have demonstrated that funding liquidity risk is intimately related to market liquidity, potentially causing systemic difficulties. Funding liquidity risk captures the inability of a financial intermediary to service its liabilities as they fall due. It is intrinsic to financial intermediation where liabilities of shorter maturity are issued to finance longer-maturity assets with the intention of earning a yield premium, and is particularly relevant to commercial banks, whose core business historically has been to fund longer-term loans through short-term deposits. Moreover, funding liquidity difficulties can quickly result in insolvency if an illiquid firm is forced to sell assets quickly at fire-sale prices to raise cash, so reducing its capital.

### Complexities in Liquidity Risk Management

Measurement of a bank’s vulnerability to liquidity risk is inherently difficult. For instance, demand deposits are usually stable sources of funding, but can quickly be lost in a bank run. Conversely, banks

### Box 3.1. The Determinants of Market Liquidity

A market is considered liquid if an investor has the ability to buy or sell a reasonable amount of an asset without appreciably affecting the price. In practice, there are a number of contributing elements to market liquidity:

- **Information.** Liquidity is enhanced if information about the asset's value is distributed roughly evenly between intermediaries and potential buyers and sellers. Wide bid-ask spreads quoted by intermediaries can reflect concerns over asymmetric information.
- **Intermediaries.** The existence of intermediaries such as brokers, specialists, locals, or market-makers that can provide ongoing price quotes, maintain an inventory of the asset, and perform timely execution of trades will add to market liquidity.
- **Underlying funding of intermediaries.** Those acting as market intermediaries and carrying inventories can be constrained in providing liquidity by their own capitalization and their ability to finance their trading positions (see fuller discussion in text).
- **Trading venue.** How buyers and sellers congregate, physically or electronically, can also affect liquidity. Formal exchanges that have well-established methods of recording and publishing prices can preserve liquidity in stress circumstances better than over-the-counter (OTC) markets, where buyers and sellers must find one another to trade—often through brokers—and traded prices may not be widely available.<sup>1</sup>
- **Type of asset.** Customized credit derivatives and collateralized debt obligations that are highly tailored to meet specific investor needs in the primary market are often illiquid in secondary markets. An investor wishing to unwind or modify a position may have to rely on the initial arranger of the transaction, who may not be willing or able to provide liquidity under stressed market conditions, or may do so only at a significantly discounted price.
- **Size of tradable issue.** The larger the asset size freely available to trade, the more liquid the asset is likely to be.

<sup>1</sup>Not all OTC markets are less liquid. U.S. Treasury securities and wholesale foreign exchange markets, where par amounts and securities traded are quite standardized, are examples of highly liquid OTC markets.

perceived to be safer during crises may actually attract deposits from competitors (Gatev and Strahan, 2006). Similarly, the degree to which a bank's liquidity commitments may be called in a crisis is difficult to judge *ex ante* and can depend on firm-specific or systemic liquidity conditions, and on the perceived reputational risk of exercising them.

Given the inherent complexity of managing liquidity risk, bank regulators have adopted a diverse approach. For example, some countries maintain multiple metrics to gauge bank liquidity, although most impose some type of minimum liquidity requirement (Box 3.3). Banks and regulators can legitimately differ over how long they believe that a bank should be able to rely on internal sources to meet its cash flow commitments. The longer a bank must be able to survive on its own, the more liquid assets it needs to

hold, and the less efficient the banking system will be in providing maturity transformation services to the economy. Moreover, the systemic nature of much liquidity risk, and its "jump-to-crisis" fat-tailed distribution, also makes it very difficult to model funding liquidity risks so as to translate a given liquidity structure into a probability of default. Hence, banking regulators have yet to develop a liquidity equivalent to minimum capital requirements and have increasingly focused on the integrity of liquidity risk-management systems rather than specific liquidity ratios.

#### Recent Trends in Banks' Liquidity Management: Undervaluing Access to Liquidity?

The trend among major global banks has been toward greater reliance on wholesale mar-

### Box 3.2. Liquidity-Adjusted Value-at-Risk: At the Forefront of Market Liquidity Risk Management?

Value-at-risk (VaR) measures have become a standard metric for assessing and managing market and credit risks (IMF, 2007). Standard VaRs are calculated by taking the mid-market prices of positions over a one-day time horizon—assuming positions can be closed out at such prices within a day. Consequently, asset liquidity risk is subsumed into market risk assuming normal market conditions.

For market positions where this was unlikely to be the case, “liquidity-adjusted” VaRs (L-VaRs) were conceived in the late 1990s to adjust for the likely liquidity of market positions. The L-VaR represents the maximum loss that could be incurred with a given probability if a position was closed out in alternative market circumstances.

There are several ways in which liquidity adjustments can be made to a VaR calculation (Bervas, 2006). At their simplest, they lengthen the assumed VaR holding period (e.g., to 10 days) to account for the longer period taken to close a position in less liquid markets, resulting in substantially higher L-VaRs and a very different ranking of position risk (Joint Forum, 2001, pp. 25–26).

Despite early progress, L-VaR measures have not become widespread due to:

- **Data unavailability.** Market data on bid-ask spreads and turnover are not readily available, especially in over-the-counter markets.

- **Methodological uncertainty.** There is no agreed-upon standard way to calculate an L-VaR, even when bid-offer spread and turnover data are readily available.

- **Rare but extreme nature of liquidity crises.** Liquidity crises are extreme events that can only be accommodated through a “fat tail” and skewed probability distribution, as episodes of market illiquidity often coincide with declining fundamental asset values. VaR typically underestimates risks during systemic shocks. Also, at such times, counterparty risk usually rises and the gross, rather than hedged, trading position is at risk. Hence, an L-VaR will still underestimate exposures in a market liquidity shock.

In addition, systemic concerns would arise if L-VaR usage were to become widespread. For instance, a destabilizing feedback mechanism could develop if L-VaRs are used to set risk limits for traders or positions. If these reflect the latest market data, then a liquidity shock—manifested through a sharp increase in volatility, bid-ask spread widening, or a collapse in turnover—would raise the L-VaR and signal a reduction in position for a given risk appetite. If followed, this could raise volatility, search times, and L-VaRs, resulting in a vicious circle.<sup>1</sup>

<sup>1</sup>See Garleanu and Pedersen (2007). Chapter 2 of IMF (2007) describes how a similar mechanism can arise with standard VaR-based risk management.

ket sources of funding and a reduction in liquid asset ratios.<sup>2</sup> Notably, instead of retail deposits,

<sup>2</sup>Cross-country time series data on bank liquidity ratios are difficult to compile due to differences in definitions, merger and acquisition activity, and database limitations. Figure 3.1 gives a cross-country comparison of deposit-to-asset ratios for the largest commercial banks from 2004 to 2006. Most display a slight fall in deposit ratios, with the exceptions of Belgium, Switzerland, and France. Japanese banks remain the most dependent on retail funding. Box 1.3 in Chapter 1 illustrates the recent decline in deposit-to-asset ratios of the 10 largest publicly quoted banks in Europe and the United States.

banks are increasingly relying on interbank borrowing, short- and long-term debt (including securitized or collateralized funding), or the sale of marketable securities.<sup>3</sup>

<sup>3</sup>Bradley and Shibut (2006) document how overall U.S. bank deposit liabilities fell from 93 percent of total liabilities in 1965 to stabilize at around 60 percent since 2000. The European Central Bank (2006) shows that the largest 500 European banks are becoming increasingly dependent on money market funding sources, although reliance on retail deposits has remained stable since 2000.

### Box 3.3. Standard Ways to Measure and Control Bank Liquidity Risks

Banks and regulators have devised a number of ways to quantify and manage the varied dimensions of funding liquidity risk. These include:

- **Reserve requirements.** These can include minimum holdings of physical cash, deposits at the central bank, and securities for use as collateral in central bank monetary operations.
- **Liquidity ratios.** Measures of liquid asset holdings relative to total assets or short-term liabilities.
- **The degree of asset and liability cash flow mismatch.** Projected payment inflows and outflows are placed into maturity brackets and limits are placed on the degree of mismatch. This can also be calculated by currency denomination and different parts of the bank's business.
- **The degrees of diversification** of borrowing facilities and contingent loan commitments.<sup>1</sup>

<sup>1</sup>For a fee and/or a yield premium, banks and insurance companies commit to lend or contribute capital to another bank or client. In a systemic liquidity crisis, these commitments are more likely to

These reduce a bank's dependence on borrowing from, or the potential requirement to lend to, any single counterparty.

In addition, banks protect themselves against liquidity risk by:

- Limiting the liquidity options that they implicitly write (e.g., deposit withdrawal maxima and notice periods on time deposits);
- Acquiring contingent credit facilities from banks and other lenders;
- Holding high-quality securities that can be borrowed against, or sold, quickly; and
- Gaining access to central bank liquidity facilities (given collateral of sufficient quality) either through standing monetary policy operations or emergency facilities.

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be called on, making a bank's own liquidity position less certain. Conversely, smaller banks often make such arrangements with larger money center banks that have a wider range of liquidity sources. Such interlocking liquidity commitments increase banks' exposure to systemic risk (Gatev, Schuermann, and Strahan, 2006).

This trend has tended to raise funding liquidity risks. In principle, liquidity vulnerabilities could be reduced by issuing long-term notes, asset-backed securities (ABS), or covered bonds to match the associated asset's maturity, or by transferring its cash flows completely off balance sheet. However, in practice, much wholesale funding has been concentrated at shorter maturities requiring regular refinancing. Additionally, the maturity mismatch of a number of U.S. and European banks significantly increased as a result of the growth of off-balance-sheet bank conduits and structured investment vehicles (SIVs). These have held potentially illiquid longer-term securities, funded primarily through short-term ABCP and notes, sometimes without adequate capital charges to account for banks' contingent liquidity commitments.

Banks have an automatic incentive to economize on protection against funding liquidity risk. The higher return generally expected from longer maturity assets, the low frequency and systemic nature of liquidity crises combined with the limited liability of stockholders, deposit insurance, and the likelihood of central bank emergency operations, all encourage individual banks to underinsure against liquidity risk by holding insufficient liquid assets or liquidity facilities. This tendency explains prudential norms requiring minimum liquid-asset holdings and reserve requirements.

In an effort to raise the standards of bank liquidity risk management, the Institute of International Finance (IIF) published its *Principles of Liquidity Risk Management* in March 2007, which proved prescient in a number of respects (Box 3.4). The discussion appropriately high-

lighted the fact that standards of liquidity risk management and disclosure needed improvement, while raising concerns over the potential illiquidity of structured products and the growing reliance of firms on securitization and off-balance-sheet entities (e.g., conduits).

Subsequent events have shown where the IIF recommendations could have been taken further. In particular, the potential duration of a market stress event was underemphasized, while higher minimum holdings of cash assets by all firms would have eased systemic counterparty concerns.

### Observations on Funding Liquidity Arising from Recent Events

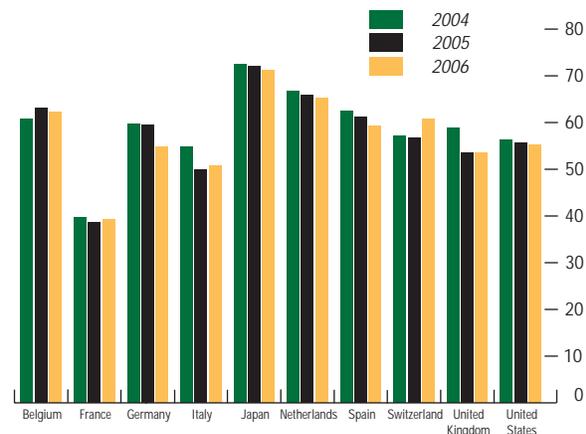
Events since July 2007 have revealed weaknesses in funding liquidity management. First, banks tended to hoard liquidity during the period of systemic stress. This resulted from uncertainty over whether contingent loan facilities would be called, as well as concerns that loans in the securitization pipeline would need to be retained on balance sheets, and over counterparty credit risk.

Second, liquidity-stressed banks were reluctant to use central bank standing facilities or the discount window for reputational reasons. Instead, some banks relied on more expensive backup facilities or nontraditional sources of funding.<sup>4</sup>

Third, commercial and investment banks that relied on securitized and wholesale markets to fund their mortgage and corporate lending quickly became unable to dispose of their warehoused loans. This prompted the need for emergency assistance where contingent liquidity lines were inadequate (Northern Rock) or an

<sup>4</sup>For instance, Countrywide Financial called on its \$11.5 billion of liquidity facilities in September 2007 and borrowed a further \$22 billion from the Federal Home Loan Bank (FHLB) system during the third quarter of 2007. The \$184 billion, or 29 percent, increase in FHLB advances in the third quarter of 2007 was funded primarily by an increase in discount notes (Federal Home Loan Banks, 2007; Bech, 2007).

**Figure 3.1. Commercial Banks: Deposit-to-Asset Ratios**  
(In percent)



Sources: ©2003 Bureau van Dijk Electronic Publishing-Bankscope; and bank annual reports.

Note: Asset-weighted deposit-to-asset ratios of banks with the equivalent of at least \$200 billion of assets in 2006.

### Box 3.4. Institute of International Finance Principles of Liquidity Risk Management

The Institute of International Finance published 44 recommendations as part of its *Principles of Liquidity Risk Management* in March 2007. The work constitutes a principles-based approach with which firms can comply, or explain why they have chosen not to. Throughout, the wide diversity of banks' approaches is recognized, reflecting different business models and circumstances. Few, if any, firms met all recommendations.

The principles focus on four areas where acceptable practice is defined:

- **Governance and organization:** Firms should define their liquidity risk appetite and publish their framework for controlling risk within those limits. The board of directors should have systems to monitor liquidity requirements and manage risk across subsidiaries and jurisdictions, consistent with the specified appetite.
- **Measurement and control of liquidity risk:** There is no single funding liquidity statistic that captures all aspects of a firm's risk, so a suite of measures is appropriate. Firms should develop diverse funding sources appropriate to their business model, have a range of assets against which they can borrow, and carefully model the retention of deposits and triggering of liquidity commitments.
- **Stress testing:** Liquidity needs should be modeled over a range of both firm-specific and market-wide stress events. When a reasonable stress test indicates a shortage of liquidity for the firm's risk appetite, business operations should be modified to address it.
- **Contingency planning:** Firms should maintain a minimum cushion of highly liquid assets and other contingency plans to prevent the escalation of liquidity concerns. Firms should not excessively rely on backup borrowing facilities

in a crisis due to possible credit concerns from their counterparties. A firm may factor in the use of central bank emergency lending facilities to be used only in extreme circumstances.

The principles then derive implications for the official sector. In particular, the imposition of simple minimum liquidity requirements is rejected and national regulators are urged to assess a firm's cross-border liquidity management on a consolidated basis wherever possible. The principles call on central banks to expand and harmonize the pool of acceptable collateral, including less liquid securities, and provide greater clarity *ex ante* over their role and operating procedures as lenders of last resort.

The principles highlight two recent trends that add complexity to liquidity risk management:

- **Increasing reliance on secured funding and securitization.** Securities firms and large banks now rely on the ability to repo or securitize collateral and loans to manage liquidity, either to the market or central banks. Firms need to carefully consider the "haircuts" and discounts they charge others on such assets in normal and crisis conditions and the robustness of repo facilities.
- **Complex financial instruments.** Recording all the liquidity implications and contingent risks embedded in bespoke derivatives is now extremely complex; firms should not assume that even highly rated structured products will remain liquid in a crisis—the very opposite is possible due to their complexity; and the increasing use of off-balance-sheet conduits with contingent liquidity commitments from parent institutions means that greater attention needs to be paid to meeting these commitments in stress scenarios.

unanticipated expansion of balance sheets (e.g., holding of leveraged loans on the balance sheet).

Fourth, in one case, deposit insurance proved insufficient to prevent a retail deposit run. With regard to Northern Rock, the level of UK deposit insurance and the costs involved in gaining access to deposits gave retail depositors an

incentive to run against an apparently solvent institution—a tendency encouraged by the ease of Internet withdrawals.

Fifth, disruption in the foreign-currency swaps market resulted in cross-border banks having some difficulty matching their available liquidity to meet payment requirements in specific

currencies. To ease cross-currency payment difficulties, the Federal Reserve (Fed), European Central Bank (ECB), and Swiss National Bank announced the use of their cross-currency swap facility in December 2007.

## Market and Funding Liquidity Dynamics

Recent events have highlighted anew the close interrelationship between market and funding liquidity. This section describes how this interconnectedness amplified market stress during the 2007 crisis and argues that this tendency seems to have become more pervasive.

### Mutual Reinforcement

The recent episode illustrates how shocks to funding liquidity can lead to runs on markets, and thus market illiquidity (Bernardo and Welch, 2004). Runs on markets can occur when there is an increased likelihood of a deterioration in funding conditions, leading to a simultaneous attempt to sell assets by a number of investors. Faced with the decision to sell immediately or wait, speculative investors have to take into account that they could be hit by an unexpected need to sell before asset values recover from fire-sale conditions. The risk of eventual forced selling at a lower price causes a rush to the exit.

The intensity of such an event will depend on several factors:

- **Market-makers' absorptive capacity.** Market runs become more likely as market-makers face limits to their capacity to absorb short-run pressures on prices through inventory adjustment. Market-makers' absorptive capacity, in turn, depends on the cost of funding their inventory, internal capital limits, and the presence of unconstrained speculative investors.<sup>5</sup>

<sup>5</sup>More technically, it is the presence of time lags between the exit of market participants that face liquidity shocks and the entry of new market-making capacity that creates an incentive to run immediately.

- **The trading venue.** Some trading venues are more prone to market runs because they are less likely to ensure an orderly sequence of transactions. The uncertainty over one's "position" in the queue and the lesser ability to find the opposite side of the trade, as in many OTC markets, can greatly intensify the link from funding to market illiquidity.
- **Direct links between funding instruments.** Stress in specific funding markets may directly spill over to market illiquidity in related areas when the operations of financial intermediaries span multiple markets. In late 2007, European banks had difficulty obtaining dollar funding through foreign currency swaps, as the liquidity in underlying money markets dried up due to concerns over counterparty credit risk (Chavez-Dreyfuss, 2007).

Just as a lack of funding liquidity can impair smooth market functioning, market illiquidity can cause funding strains. Market illiquidity can severely impair a firm's ability to service its liabilities as they fall due by making it costly to liquefy existing assets through outright sales or repos; by making new funding sources inaccessible; by reducing a firm's perceived capital or the value of collateral against which it can borrow; and by raising general concerns over counterparty risk. These interactions became more important as the 2007 episode intensified, and operate through a variety of channels:

- **Margin requirements.** For speculative investors, margin requirements are sensitive to market liquidity. Larger price swings associated with market illiquidity lead to a re-assessment of volatility, feeding through to higher margin requirements and thus limiting speculative investors' leverage by inhibiting their ability to borrow. Such "margin spirals" were particularly visible in the subprime mortgage ABS market during the events surrounding the liquidation of hedge funds related to Bear Stearns Asset Management in July 2007 and other structured credit hedge funds in early 2008 (IMF, 2007, Chapter 1).
- **Internal risk limits.** For market-makers, funding constraints can result from internal risk

limits, as decreasing market liquidity is often associated with a rise in volatility. This feeds through risk management systems to reduce risk capital allocated to market-making inventory and the ability to underwrite primary issues (e.g., the U.S. municipal bond market in early 2008).<sup>6</sup>

- **Reduced market volume.** As revenues from trading and market-making activities decline, a reduction in market volume limits the inflow of funding to investment banks and their ability to take risk.
- **Trading losses.** Trading losses associated with lower market liquidity may constrict an entity's ability to raise new funds through equity and debt markets.
- **Inability to value assets.** As clearly illustrated by the events surrounding the onset of the turmoil in July 2007, a lack of market liquidity can hamper asset valuations (see Chapter 2), inducing financial institutions to refuse to provide funding to each other due to concerns over counterparty credit risk. On August 9, 2007, the French bank BNP-Paribas announced that it would freeze withdrawals from three of its investment funds, stating that illiquidity in the respective markets prevented it from valuing assets.<sup>7</sup> Prompted by the announcement, financial institutions—particularly money market funds fearful of a sharp increase in redemptions—started to hoard term liquidity simultaneously, causing gridlock in funding markets.

As funding liquidity risk feeds market illiquidity and vice versa, mutually reinforcing dynamics, or “liquidity spirals,” can emerge (Brunnermeier and Pedersen, forthcoming). As shocks to funding liquidity reduce the availability of funds to take positions, fire sales of

assets contribute to market illiquidity, feeding back into funding liquidity, and so forth. Most importantly, liquidity dynamics may increasingly impact correlations between different assets—as increased margin calls in illiquid markets are met by sales of more liquid assets—potentially leading to similar dynamics in other markets (see the empirical section below).

### Have Liquidity Spirals Become More Pervasive?

Have recent structural changes in financial systems made liquidity spirals more pervasive? Or at least do they change the nature of the underlying dynamics? Although the first question is difficult to answer, a number of factors suggest that this is so.<sup>8</sup> The changing dynamics can be seen in the following developments:

- The long-term shift from largely relationship-based toward more transactions-based business models resulting from the growth in securitized lending and credit risk transfer mechanisms. This has reduced the illiquidity of banks' asset holdings on average, but made access to liquidity more dependent on market conditions. In addition, it has increased the system's dependence on loan originators and securitizers who may not have direct access to central bank liquidity facilities.
- The emergence of new complex instruments that are difficult to value and appear prone to illiquidity in times of stress.
- The increasing dependence of market liquidity on hedge fund activity. While hedge funds have added generally to market liquidity, their increasing importance means that overall market liquidity often relies on their ability to leverage themselves, which is in turn affected by market volatility determining margining requirements.
- The low interest rate and favorable macroeconomic environment that spurred a

<sup>6</sup>See Caballero and Krishnamurthy (2007). See Chapter 2 of IMF (2007) for a more general discussion of amplification effects resulting from internal risk limits.

<sup>7</sup>In its statement, the bank said: “The complete evaporation of liquidity in certain market segments of the U.S. securitization market has made it impossible to value certain assets fairly regardless of their quality or credit rating.”

<sup>8</sup>In Persaud (2003), several contributors argue that adverse liquidity dynamics indeed have become more pervasive, and provide suggestive evidence to support this claim.

heightened risk appetite. This generated demand for more complex, higher-yielding assets without sufficient attention being paid to either the absorptive capacity of investors over the cycle, or the ways in which market participants can increase leverage using new and more opaque methods.

- The provision of emergency liquidity support, which remains tied to national currencies and payment systems, has not kept pace with the internationalization of financial institutions' treasury operations.
- The increasing importance of mark-to-market accounting, which has the potential to magnify liquidity dynamics through a variety of channels, including internal or external solvency constraints or risk limits that depend on the market value of assets (see Chapter 2).
- The increasing reliance on quantitative trading and risk management techniques, which often rely on a continuous availability of market liquidity. These may also have made the system vulnerable, since common responses to model signals can induce trading desks to withdraw simultaneously from certain markets.<sup>9</sup>

### Liquidity Dynamics Since July 2007: An Empirical Investigation

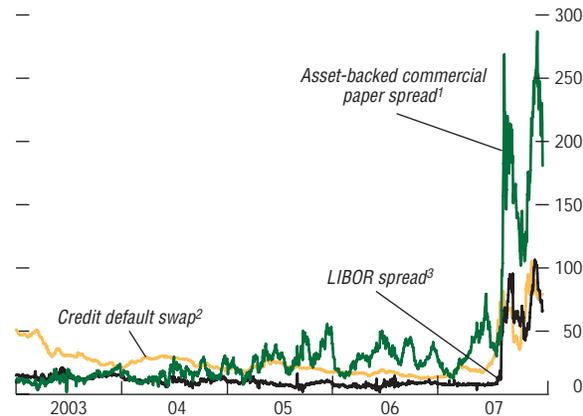
Having reviewed how market and funding liquidity can interact to cause systemic difficulties, we examine empirically how liquidity shocks were actually transmitted across financial markets and national boundaries during the 2007 crisis.<sup>10</sup>

In a first step, a parsimonious Generalized Autoregressive Conditional Heteroscedastic-

<sup>9</sup>An example of such dynamics was the behavior of so-called “quant” funds—hedge funds whose trading and investment strategies are tied to various quantitative models of market price behavior. In August 2007, as these funds attempted to hold on to their core strategies, they started liquidating assets in similar markets, collectively causing a transmission of market stress. See Khandani and Lo (2007).

<sup>10</sup>See Annex 3.1 for technical details of the empirical analysis.

**Figure 3.2. Aggregate Bank Credit Default Swap Rate and Selected Spreads**  
(In basis points)



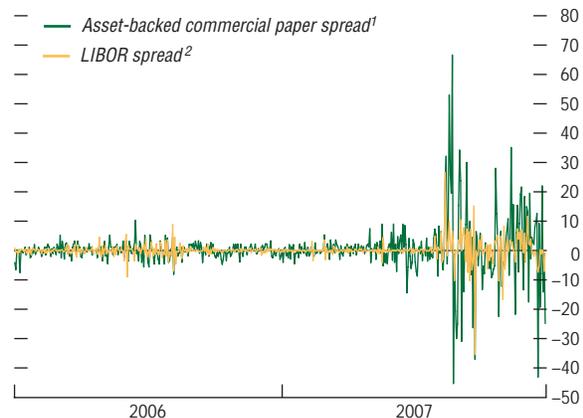
Sources: Bloomberg L.P.; and IMF staff estimates.

<sup>1</sup>Spread between yields on 90-day U.S. asset-backed commercial paper and on three-month U.S. Treasury bills.

<sup>2</sup>The unweighted daily average of the five-year credit default swaps for the following institutions: Morgan Stanley, Merrill Lynch, Goldman Sachs, Lehman Brothers, JPMorgan, Deutsche Bank, Bank of America, Citigroup, Barclays, Credit Suisse, UBS, and Bear Stearns.

<sup>3</sup>Spread between yields on three-month U.S. LIBOR and on the three-month U.S. overnight index swap.

**Figure 3.3. United States: Selected Money Market Spreads**  
(First difference; in basis points)

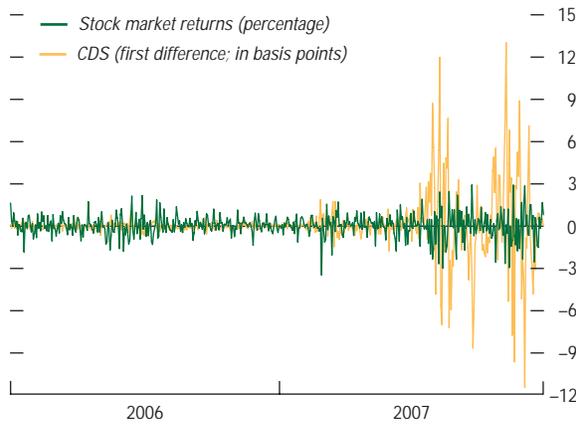


Sources: Bloomberg L.P.; and IMF staff estimates.

<sup>1</sup>Spread between yields on 90-day U.S. asset-backed commercial paper and on three-month U.S. Treasury bills.

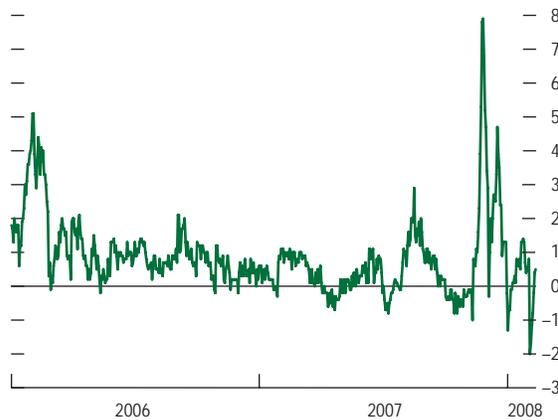
<sup>2</sup>Spread between yields on three-month U.S. dollar LIBOR and on the three-month U.S. dollar overnight index swap.

**Figure 3.4. United States: S&P 500 Stock Market Returns and Aggregate Bank Credit Default Swap (CDS) Rate**



Sources: Bloomberg L.P.; and IMF staff estimates.  
 Note: CDS is calculated as an unweighted daily average of the five-year credit default swaps for the following institutions: Morgan Stanley, Merrill Lynch, Goldman Sachs, Lehman Brothers, JPMorgan, Deutsche Bank, Bank of America, Citigroup, Barclays, Credit Suisse, UBS, and Bear Stearns.

**Figure 3.5. On-the-Run/Off-the-Run Five-Year U.S. Treasury Note Spread (In basis points)**



Source: Bloomberg L.P.  
 Note: Spread between yields on five-year off-the-run and on-the-run U.S. Treasury notes.

ity (GARCH) model is developed to analyze potential transmission channels in U.S. financial markets, where the shocks originated. While the shocks derived from the subprime mortgage market, they were readily transmitted to the ABCP market, where funding liquidity pressures for SIVs and conduits developed. This ABCP link is measured by the spread between three-month ABCP rates and U.S. Treasury bill yields (Figure 3.2). Banks came under pressure to fund their sponsored SIVs and conduits, and they too faced funding liquidity pressures. This is captured by the spread between the three-month U.S. interbank LIBOR rate and the overnight index swap (OIS) rate (Figure 3.3). Amid higher uncertainty, market volatility increased (Figure 3.4) and investors shifted their positions to a highly liquid asset class (Figure 3.5). These risks are proxied by the S&P 500 index return and the five-year on-the-run versus off-the-run U.S. Treasury yield spread, respectively. Finally, the cost of insurance against default, measured by credit default swap spreads, of representative large complex financial institutions proxies for solvency risk (Figure 3.4). Thus, five variables are assumed to capture the key links that created systemic risks in financial markets.

The model is estimated in first differences using a Dynamic Conditional Correlation (DCC) GARCH model for the period from January 3, 2006 to December 24, 2007. The main findings are:

- A clear break in the time-varying correlation structure of the variables occurs at the end of July 2007, consistent with the onset of the financial turbulence (Figure 3.6).
- Measures of market and bank funding illiquidity become strongly intertwined during the crisis. Moreover, the underlying dynamics are characterized by strong correlation shifts over the crisis period. While average correlations after July do not increase markedly, two extreme jumps in the correlation measure are observed in August and toward the end of the year (Figure 3.6).
- Whereas solvency measures were relatively unconnected to other variables before the

subprime crisis, all liquidity-related variables become closely associated with market perceptions of insolvency risk.

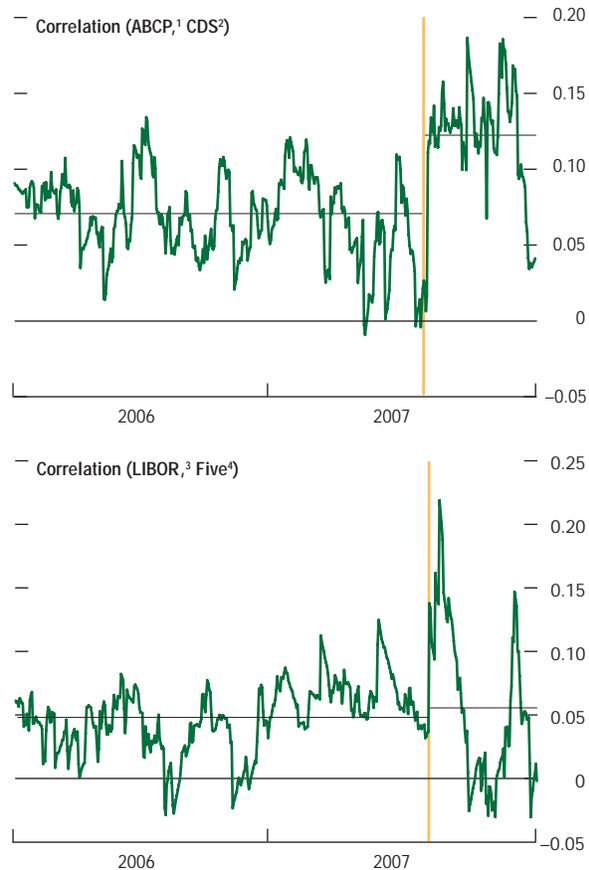
In a second step, the U.S. model is also extended to examine spillovers between U.S. and international money markets by adding similar funding spreads (LIBOR less the associated OIS rate) in Canada, the euro area, and the United Kingdom. The empirical results indicate that:

- The correlations between the U.S. funding liquidity measures (the ABCP and LIBOR spread), and the international LIBOR spreads in Canada, the euro area, and the United Kingdom are of relatively small magnitude and fairly stable before the subprime crisis. In contrast, correlations increase sharply during the crisis period (Figure 3.7).
- The correlation between international spreads and the U.S. LIBOR is more pronounced than the correlation between international spreads and the U.S. Treasury five-year on-the-run spread, suggesting that funding, more than market, illiquidity has been the important mode of transmission (Figure 3.7).
- Unlike the pre-crisis period, where interactions among the Canadian, euro area, and UK LIBOR spreads were limited, correlations rise sharply during the crisis period.

In a final step, the international model for advanced economies is extended to include some key emerging markets. Specifically, two measures of U.S. funding liquidity (one for the interbank money market and the other for funding liquidity in the ABCP market), as well as the five-year on-the-run spread measure of U.S. market liquidity, are linked to sovereign bond spreads and stock market returns in Brazil, Mexico, and Russia. The results indicate that:

- During the subprime crisis, a heightened interaction between the U.S. funding liquidity measures and stock markets is evident for all three emerging markets.
- The time-varying correlation between U.S. funding liquidity and sovereign bond spreads in Brazil, Mexico, and Russia becomes elevated.

**Figure 3.6. U.S. Model: Selected Implied Correlations from Dynamic Conditional Correlation GARCH Specification**



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

Note: The horizontal lines represent the arithmetic average of the correlations before and after the break in late July 2007.

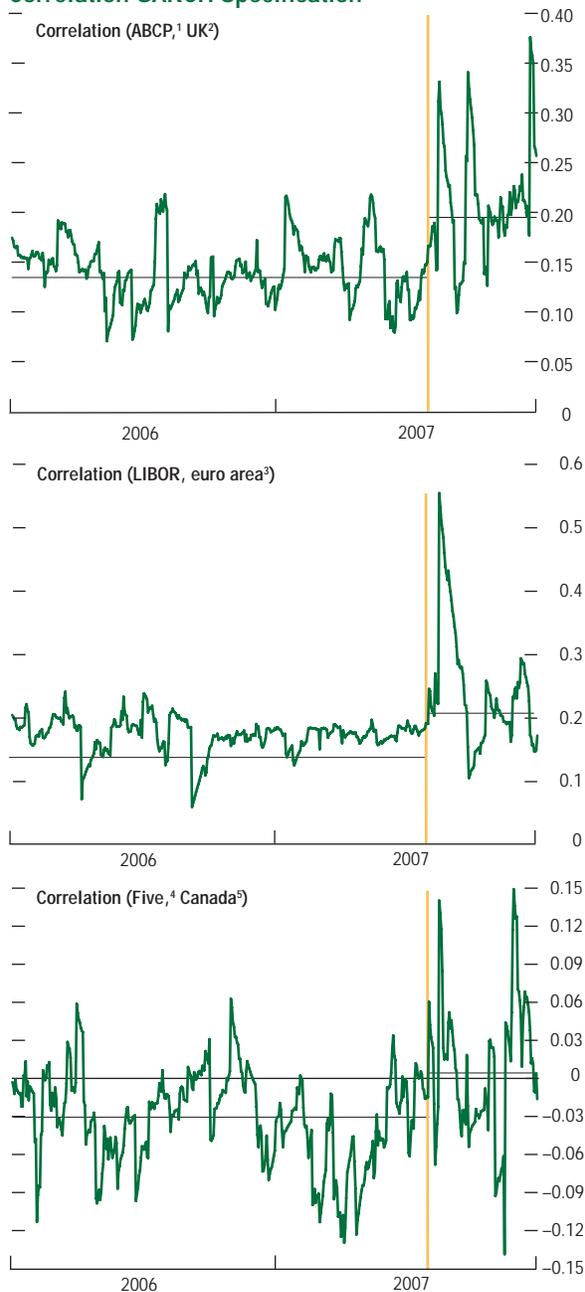
<sup>1</sup>Spread between yields on 90-day U.S. asset-backed commercial paper (ABCP) and on three-month U.S. Treasury bills.

<sup>2</sup>The unweighted daily average of the five-year credit default swaps for the following institutions: Morgan Stanley, Merrill Lynch, Goldman Sachs, Lehman Brothers, JPMorgan, Deutsche Bank, Bank of America, Citigroup, Barclays, Credit Suisse, UBS, and Bear Stearns.

<sup>3</sup>Spread between yields on three-month U.S. dollar LIBOR and on the three-month U.S. dollar overnight index swap.

<sup>4</sup>Spread between yields on five-year off-the-run and on-the-run U.S. Treasury notes.

**Figure 3.7. Advanced Economies Model: Selected Implied Correlations from Dynamic Conditional Correlation GARCH Specification**



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

Note: The horizontal lines represent the arithmetic average of the correlations before and after the break in late July 2007.

<sup>1</sup>Spread between yields on 90-day U.S. asset-backed commercial paper (ABCP) and three-month U.S. Treasury bills.

<sup>2</sup>Spread between yields on three-month pound sterling LIBOR and the UK three-month overnight index swap.

<sup>3</sup>Spread between yields on three-month euro LIBOR and the euro area three-month overnight index swap.

<sup>4</sup>Spread between yields on five-year off-the-run and on-the-run U.S. Treasury notes.

<sup>5</sup>Spread between yields on three-month Canadian dollar LIBOR and the Canadian three-month overnight index swap.

- For both the stock market and bond spread models, correlation magnitudes among the emerging countries examined is higher than with the U.S. funding liquidity during the sample period.

With market and funding liquidity risks increasingly intertwined, and their potential systemic consequences, central banks will likely need to reconsider their role and the instruments for intervention. The next section discusses this issue in the context of recent events, focusing on the ECB, the Fed, and the Bank of England.

### The Role of Central Banks During Periods of Market and Funding Illiquidity

Central banks assume a crucial role when market liquidity vanishes and funding strains imperil the viability of financial institutions. Their interventions typically are intended to address adverse dynamics described in the previous sections and prevent the collapse of financial intermediation. The central bank can provide funding liquidity to individual institutions and the market as a whole, either through market operations or bilateral arrangements. By signaling its willingness and ability to act decisively, the central bank's actions are intended to restore confidence in the system by avoiding fire sales of assets and supporting interbank lending.

Events since July 2007 have made the dual responsibilities of monetary policy execution and financial stability more challenging. During normal times, central banks provide sufficient liquidity to markets to set their policy interest rate on the expectation that (1) a reliable relationship links the target short-term rate and longer-term money market rates; and (2) counterparties effectively distribute liquidity to the wider market. But in mid-August 2007, the pattern of banks' liquidity demand changed—the short-term yield curve steepened and became more volatile, the gap between secured and unsecured rates widened, and the broader interbank market that distributed liquidity throughout the system was disrupted.

### Emergency Liquidity Support and the Stance of Monetary Policy

Communicating the distinction between monetary operations to provide general market liquidity and the stance of monetary policy has been difficult, partly as a consequence of the divergence in the tools and approaches used by different central banks. While the major central banks emphasized they would not adjust their monetary policy stance simply to improve market functioning, expectations to the contrary proved difficult to manage, in part because high and volatile term rates effectively tightened monetary conditions (Figure 3.8). In addition, the wider economic impact of the subprime mortgage crisis prompted a reappraisal of the appropriate monetary policy stance in some countries.

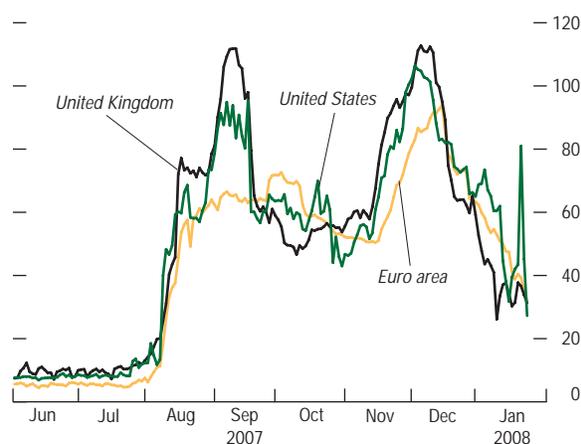
### Money Market Liquidity and Term Rates—Are Central Banks' Tools Sufficient?

At the immediate onset of the crisis, there was a strong increase in demand for central bank liquidity (i.e., reserves at the central bank), but as the crisis unfolded, commercial banks desired increased liquidity beyond central bank balances. Initially, both the ECB and the Fed provided additional funds, while the Bank of England allowed banks' increased demand for reserves to be reflected in higher reserve targets.<sup>11</sup> As uncertainty over the financial soundness of counterparties increased, trading of unsecured term interbank funds dwindled because banks—and others—wanted to borrow long-term funds but lend only in the short term. Hence, term lending dried up for both counterparty credit and liquidity reasons, and longer-term yields rose sharply.

Central banks were able to increase the volume of longer-term refinancing to the market without expanding their balance sheets by withdrawing liquidity at other maturities or

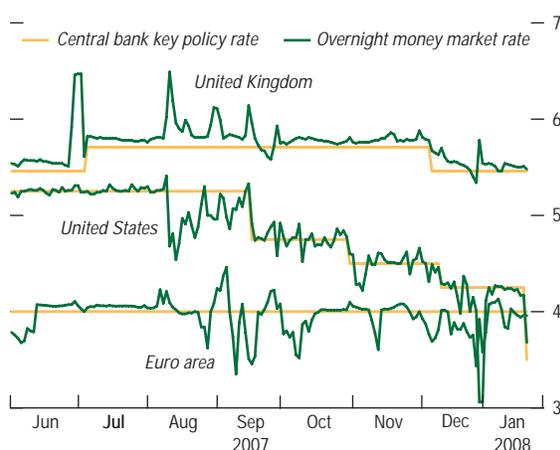
<sup>11</sup>Under the Bank of England framework, banks set their own target for reserves before the start of a new maintenance period.

**Figure 3.8. Three-Month LIBOR to Overnight Index Swap Spreads**  
(In basis points)



Source: Bloomberg L.P.

**Figure 3.9. Central Bank Key Policy and Overnight Money Market Rates**  
(In percent)

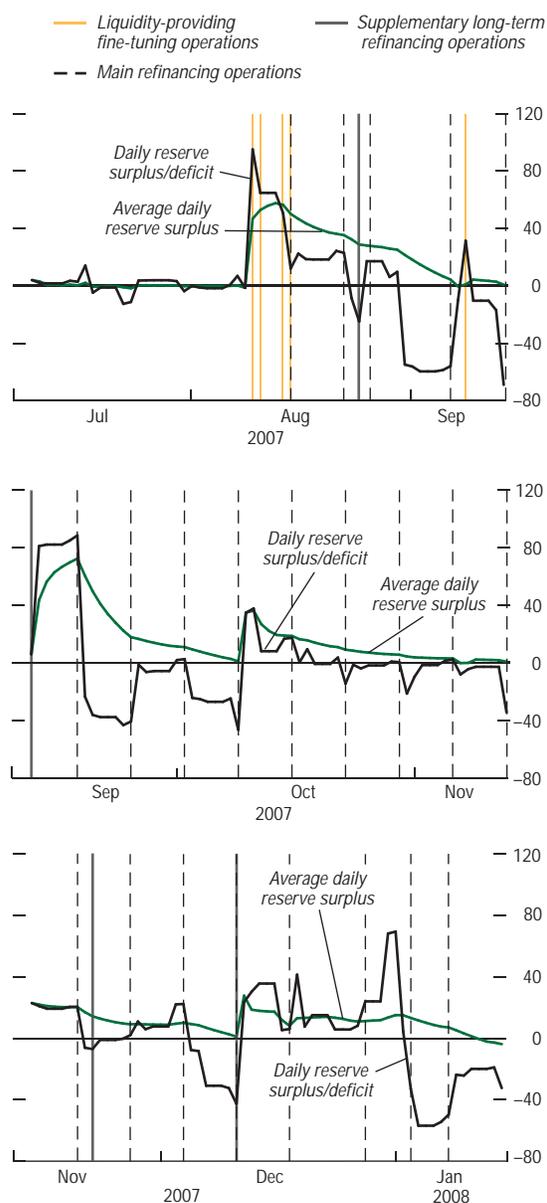


Source: Bloomberg L.P.

Note: Central bank key policy rates are the following: for the United States, federal funds target rate; for the United Kingdom, Bank of England's official bank rate; and for the euro area, main refinancing operation minimum bid rate.

Overnight money market rates are the following: for the United States, federal funds effective rate; for the United Kingdom, sterling overnight interbank average (SONIA); and for euro area, euro overnight interbank average (EURONIA).

**Figure 3.10. European Central Bank's Liquidity Provision and Reserve Holdings**  
(In billions of euros)



Sources: European Central Bank; and IMF staff estimates.

Note: Liquidity-absorbing operations are not shown. Supplementary long-term refinancing operations (LTROs) are three-month liquidity-providing operations in addition to the regular LTRO, which is typically carried out once a month (not shown). For the weekly main-refinancing operations, only the ones in which the allotted amount exceeded the benchmark allotment (the amount banks would need to fulfill the reserve requirements, as projected by the ECB) by more than 1 billion euros are shown.

periods. This approach—accommodating more term lending while maintaining enough short-term lending at or around the policy rate to implement monetary policy—helped achieve the twin goals of executing monetary operations while addressing financial stability concerns (Figure 3.9). Moreover, systems that combined relatively large remunerated reserve cushions with a long reserve maintenance period (RMP) have provided considerable flexibility. For example, the large reserve requirements in the euro area (some 200 billion euros on average), together with a four- to five-week RMP, enabled the ECB to accommodate banks' desire to frontload reserve holdings toward the earlier phases of the RMP, when uncertainty was greatest (Figure 3.10). The ECB added large amounts of reserves early on in the RMP and it then drained the extra liquidity, so that banks ended the RMP with average daily reserve surpluses approaching zero.

Central banks have had to face a number of challenges in addressing financial system stress:

- They had to deal with the breakdown of standard distribution channels for liquidity, both nationally and internationally. This was because the provision of sufficient liquidity to a small group of intermediaries no longer guaranteed that it would either flow through the system, or to those in need of funding in specific currencies, as stress in money markets spread to foreign exchange swap markets.
- Some banks lacked direct access to open market operations (OMOs),<sup>12</sup> either because they did not belong to the list of eligible counterparties, or lacked the eligible collateral.
- Central banks had to project liquidity demands at different time horizons, as demand patterns changed rapidly and unexpectedly, and the impact of factors such as year-end effects became increasingly unpredictable.

<sup>12</sup>Open market operations—that is, purchases and sales of financial instruments in the open market at the policy rate—are central banks' principal tool for implementing monetary policy.

- They had to provide liquidity in support of unsecured term markets.

### Counterparties, Collateral, and Pricing

The reluctance of banks to make use of central banks' standing credit facilities raised operational challenges. In addition to short-term funding at the policy rate and longer-term OMOs at market or bid rates, all three central banks make available a standing credit facility or discount window, allowing approved banks to access funds at a rate above the policy rate. However, banks have been reluctant to use these facilities, not only because of the price, but because of a perceived stigma, since the facility is often accessed when an institution cannot find other sources of funding. This has been particularly important where differences between OMO and standing facility counterparty groups and eligible collateral were most pronounced (Box 3.5).<sup>13</sup>

Central banks modified their liquidity operations by way of the following measures in order to address this perceived stigma:

- The Fed narrowed the distinction between its OMO and standing facility operations by reducing the discount rate spread over the Fed funds target to 50 basis points. Use of this facility was notably higher in August–September and December 2007, but the amounts remained small. Many banks had recourse instead to the Federal Home Loan Bank system, using mortgage assets to obtain term funding at a rate midway between the Fed funds and discount rates, and without the perceived discount window stigma.
- In mid-December, the Fed announced a temporary Term Auction Facility (TAF) that made longer-term (four- to five-week) funds available to a wider range of potential borrowers

(all standing facility counterparties) against the wider range of collateral usually permissible at the discount window. This direct provision of term funding through an open auction process with a minimum rate did not carry a stigma. The TAF was also linked through a foreign-currency swap operation with the ECB and the Swiss National Bank, allowing them to provide dollars to their much wider set of usual counterparties.

- The ECB extended the balance in the maturity of its operations. Already equipped with a very wide definition of acceptable collateral, the ECB's major challenge was the lengthening maturity profile of banks' liquidity needs.
- In the United Kingdom, the Bank of England was forced, by the rescue of Northern Rock, to accept collateral that fell outside its normal definition. But the bank subsequently chose to accept a broader range of collateral in some term operations open to all its counterparties.

While recent events have illustrated the benefits of a broad definition of eligible collateral, it also increases credit risk for central banks. The price of liquidity support (“haircuts” and discount rates applied to collateral that central banks accept) can help establish a floor for the value of a security, and effectively stem a market and funding liquidity spiral. However, accepting illiquid assets may encourage banks to retain tradable collateral to post with other counterparties, and to see the central bank as “lender of first resort.” It is also likely to reduce incentives for banks to hold and provide top-rated securities, and to lead to a deterioration of the quality of collateral offered to the central bank. This approach runs the risk of “adverse selection”—the central bank is likely to accumulate inferior collateral—and may effectively establish the value of illiquid securities.<sup>14</sup>

<sup>13</sup>The differences between counterparty groups and eligible collateral for OMOs and standing facility are greatest in the United States. In the ECB and the Bank of England cases, most banks that do not normally access OMO funds directly had the option of participating in the main or longer-term OMOs, using the same collateral as they would use for standing facilities.

<sup>14</sup>In addition, if the central bank holds more collateral for its lender-of-last-resort activities, it must reduce other asset holdings; but if assets backing short-term lending undertaken to implement monetary policy become too small, or if the central bank cannot meet market demand for term lending, operations could lose their impact.

**Box 3.5. Central Bank Counterparties**

Many central banks do not deal directly with all commercial banks (and securities firms) in their open market operations (OMOs), largely due to the costs of establishing a repo operation. Provided sufficient competition between counterparties, liquidity should be smoothly onlent by OMO counterparties in response to

market demand. However, in times of stress, the distribution function can break down, requiring the use of different operational instruments. Standing facilities are available to a wider group—normally all banks that hold transactions accounts at the central bank—but with the expectation that they will be used sparingly.

|                              | Federal Reserve                        | European Central Bank                | Bank of England                     |
|------------------------------|--|--------------------------------------|-------------------------------------|
|                              | Regular Open Market Operations         |                                      |                                     |
| Counterparties               | 20 primary dealers                     | 300 to 500 banks (potentially 1,700) | About 40 banks and securities firms |
| Range of eligible collateral | Narrow                                 | Wide                                 | Intermediate                        |
| Pricing                      | Bid price; Fed funds rate as guideline | Bid price above minimum rate         | Fixed price                         |
|                              | Standing Facilities                    |                                      |                                     |
| Counterparties               | 7,500 credit institutions              | 2,400 credit institutions            | About 60 banks                      |
| Range of eligible collateral | Wide                                   | Wide                                 | Intermediate                        |
| Pricing                      | Fixed price                            | Fixed price                          | Fixed price                         |

**Cross-Border Issues**

Stress in term funding markets inhibited activity in foreign-currency swaps, confronting central banks with additional challenges. Both U.S. and European-based lenders were reluctant to provide dollar term funds, due to both counterparty credit risk and liquidity concerns. As the term dollar money market dried up, particularly for loans to European institutions, so did the swaps market, as there was little underlying money market business to support.

The coordinated provision of term funding through the TAF by major central banks helped ease associated tensions. Providing U.S. dollars via the ECB and the Swiss National Bank, against banks' eligible collateral, facilitated European access to dollars. This cooperation was necessary to avoid complications to domestic monetary management. In particular, if central banks had acted directly, this could have affected monetary conditions in the home currency, potentially altering the euro/dollar exchange rate.

**Central Banks' Response to Liquidity Strains Since July 2007: An Empirical Investigation**

An econometric evaluation of the impact of central banks' emergency response to liquidity stress yields further insights into the underlying dynamics and the effectiveness of alternative policy tools. To this end, the volatility of euro and U.S. dollar term spreads is modeled using both a univariate GARCH specification and a Markov regime-switching approach with low-, medium-, and high-volatility "regimes" (Annex 3.1) (Hamilton and Susmel, 1994). A range of maturities for the dependent variables is considered, all based on changes in the spread between LIBOR and overnight interest rates swaps.<sup>15</sup>

To proxy the amount of "extra" liquidity injections used as intervention variables, the

<sup>15</sup>The reported results refer to three-month LIBOR spreads.

chosen measures should aim at capturing injections over and above the neutral level needed to just fulfill reserve requirements, any additional operations that provide extraordinary liquidity to deal with market stress, and, more broadly, the surprise element associated with the actions.

For the ECB, we employ a range of intervention measures, such as a variable that quantifies liquidity injections through supplementary long-term refinancing operations (LTROs) and, for main refinancing operations (MROs), a variable based on the MRO allotment exceeding the ECB's benchmark amount.<sup>16</sup>

For the Fed, we use the difference between actual repurchase agreements outstanding and estimates of the amount of repurchase agreements that would have been necessary to achieve neutrality with respect to fulfilling banks' needs over a reserve maintenance period.<sup>17</sup>

The results of both the GARCH and the Markov regime-switching approach are consistent with the analysis above and broadly support the policy recommendations summarized in the next section. In particular, additional term lending and the joint central bank response announced on December 12, 2007 were instrumental in reducing stress, conceptualized as a combination of spread levels and volatility:

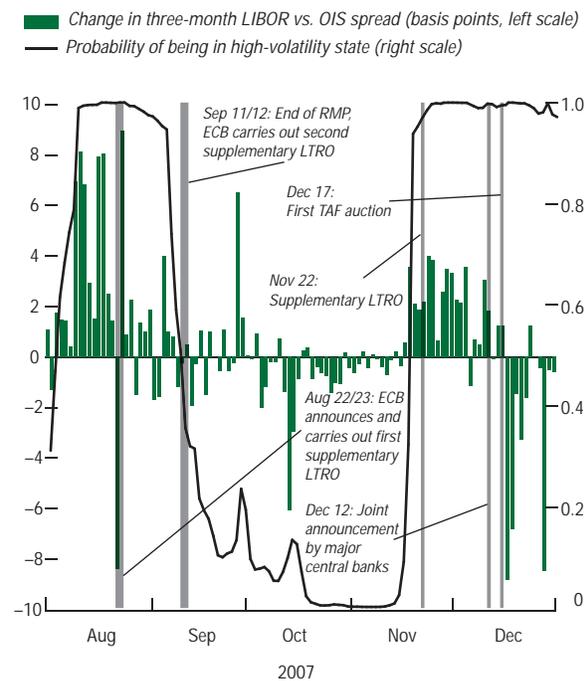
- While GARCH results for most of the ECB intervention variables are inconclusive, there appears to be a statistically robust and significant volatility-reducing effect in the case of the ECB's supplementary LTRO.<sup>18</sup>
- This is confirmed by the result from the Markov regime-switching model for the euro LIBOR spread (Figure 3.11). The probability of being in a state of very high volatility starts

<sup>16</sup>The benchmark allotment is the ECB's projection of the liquidity provision needed to smoothly fulfill reserve requirements.

<sup>17</sup>The estimates were provided by Wrightson ICAP.

<sup>18</sup>For both the ECB and U.S. GARCH models, the effect on the level of the benchmark rate is not economically very large. For instance, if the difference between actual and neutral repurchase agreements in place increases by \$25 billion, this would result in a contemporaneous decrease of the three-month spread by four basis points.

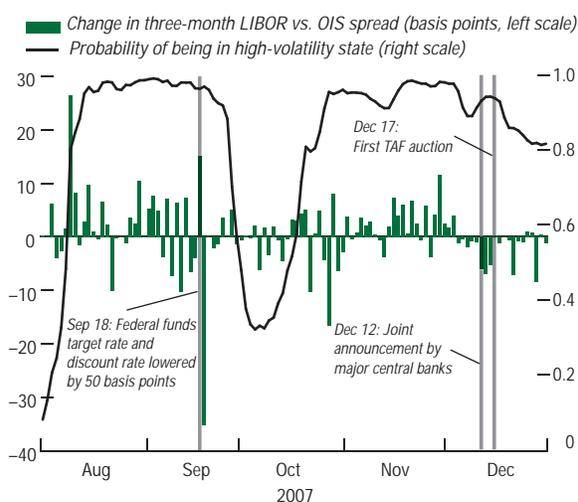
**Figure 3.11. Euro Area: Selected European Central Bank Policy Actions and Term Funding Stress**



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

Note: The green bars represent the change in the spread between three-month euro LIBOR and three-month euro overnight index swap, measured in basis points. These data are used in the estimation of a three-state Markov Switching ARCH model. The black line provides the subsequent probability of being in the highest volatility regime, which is determined by the variation in the LIBOR spread. The probabilities of being in the medium- and low-volatility states are not shown here. The gray bars indicate selected major central bank interventions. OIS = overnight index swap; RMP = reserve maintenance period; ECB = European Central Bank; LTRO = long-term refinancing operations; TAF = Term Auction Facility.

**Figure 3.12. United States: Selected Federal Reserve Policy Actions and Term Funding Stress**



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

Note: The green bars represent the change in the spread between three-month U.S. LIBOR and the three-month U.S. overnight index swap, measured in basis points. These data are used in the estimation of a three-state Markov Switching ARCH model. The black line provides the subsequent probability of being in the highest volatility regime, which is determined by the variation in the LIBOR spread. The probabilities of being in the medium- and low-volatility states are not shown here. The gray bars indicate selected major central bank interventions. OIS = overnight index swap; TAF = Term Auction Facility.

to decline on the day following the announcement of the first LTRO on August 22, 2007, and falls below the 50 percent margin by the end of the respective reserve maintenance period on September 11.<sup>19</sup>

- When year-end effects start to surface in mid-November, volatility as assessed by the regime switching model for the euro-LIBOR spread again increases markedly. Spread levels decrease only after the joint announcement of various central banks on December 12, 2007.<sup>20</sup>
- According to GARCH estimations, the Fed's interventions via additional repurchase agreements appear to have had a significantly negative contemporaneous effect on dollar spread levels and volatilities. The level effect, however, is largely offset by a rebound on the next day, and both effects are sensitive to the chosen lag structure.
- From the Markov regime-switching model for U.S. data, it is clear that the system transitions from a high- to a medium-volatility state toward the end of September 2007, following the reduction of the federal funds target rate on September 18 (Figure 3.12). After returning to stress levels shortly thereafter, the joint announcement of major central banks, and of the TAF auction, are followed by both a compression of the spread, and a continuous yet incomplete reduction in the probability of being in the high-volatility state.

## Recommendations to Enhance Liquidity Risk Management

Events since July 2007 have illustrated how liquidity risk impacts the stability of the global financial system and suggest important lessons for market participants and policymakers.

<sup>19</sup>Smoothed probabilities exceeding a value of 0.5 indicate that the data generating process is in that respective volatility regime.

<sup>20</sup>As a period of large increases in the spread is followed by a period of large decreases, volatility is not affected in a statistically significant way.

## Market Participants

For market participants, the ongoing crisis provides important lessons on managing market liquidity risk, though final conclusions will require further analysis. For example:

- Firms need to factor in more severe liquidity gapping and correlation jumps in their market risk models and stress tests, making sure that these are well tailored to firms' particular circumstances and positions.
- Where market liquidity can be measured robustly, a liquidity adjustment to market risk measures can be helpful, and its disclosure can usefully focus attention on liquidity risk, especially in "normal" conditions.<sup>21</sup> However, stress tests are better suited to examine the firm's potential exposures in extreme liquidity events, and recent turbulence has demonstrated that such tests should include a scenario where market liquidity is under strain for many months.
- The demonstrated links between market and funding liquidity suggest that there is a need for greater transparency regarding market liquidity management practices, including the models used for valuing structured products (and their liquidity assumptions).
- Margin requirements and pricing in financial markets—including for OTC derivatives—need to give greater weight to market liquidity risk, including considering longer-term measures of liquidity risk over the cycle and less sensitivity to the most recent time period.

There are similarly important lessons to be drawn regarding funding liquidity risk, including:

- Greater transparency is needed regarding commercial bank liquidity management policies and practices, including liquidity risk appetite, funding sources, liquidity commitments (especially to off-balance-sheet entities), maturity mismatches, contingency plans,

and assumptions made over deposit withdrawal prospects.

- More severe stress testing of funding liquidity should be adopted, taking into account the possible closure of multiple wholesale markets (both secured and unsecured) and wide-spread calls on liquidity commitments, taking into account commitments to off-balance-sheet entities. These stress test results and the underlying assumptions should be publicly available.
- Cross-border banks should take greater account of multi-currency funding liquidity shocks, taking into consideration the need to manage liquidity mismatches in each operating currency and the potential for stress in the foreign-currency swaps markets.
- Banks' reliance on highly structured securities, especially holdings of their own securitized assets, to generate collateral for secured funding have proven problematic. Illiquidity and volatility in these markets have coincided with interbank market disruption resulting in banks facing a correlated liquidity squeeze on both their repo-able assets and wholesale funding.

## Financial Regulators and Supervisory Authorities

In view of the under-insurance of large banks to the risk of liquidity shocks revealed by the 2007–08 crisis, there is now a case to consider tougher liquidity risk management standards. Recent experience and empirical work presented here illustrates that high levels of risk-weighted capital—well in excess of regulatory minima—did not prevent systemic liquidity concerns. The heightened price volatility of the value of complex assets held by banks, combined with opacity over these exposures, meant that capital adequacy margins quickly came into question. In such an environment, where formal liquidity risk management techniques are still somewhat underdeveloped and, where available, difficult to calibrate to extreme liquidity events, more traditional means of reducing liquidity risks may be warranted to protect interbank markets from

<sup>21</sup>For example, the Counterparty Risk Management Policy Group II (2005, p. 34).

these systemic risks (United Kingdom Financial Services Authority, 2007). For example, increased holdings of liquid assets would help to share the burden of liquidity disruptions with central banks and reduce the moral hazard that results from the expansion by central banks of acceptable collateral during crises.

Possible regulatory steps that could be considered include (1) raising minimum liquid asset requirements in the form of holdings of reliably liquid and collateralizable assets; (2) stricter limits on maturity mismatches in bank's asset/liability structures; and (3) tighter rules governing diversification of funding sources and the ability to survive a funding market disruption.

The Basel Committee is currently reviewing liquidity risk regulation and management, and has so far confined its considerations to qualitative issues (Box 3.6). As ever, care will be needed should this work be extended to a more rules-based approach. First, it would be difficult to define a single norm that applies well to banks with very different business models, such as predominantly wholesale- or retail-financed banks (Joint Forum, 2001). Moreover, if very costly liquidity requirements are imposed, supervisors will need to take into account the incentives for banks to circumvent them, including via off-balance-sheet entities and other counterparties, and the welfare loss from increasing the cost of financial intermediation. In addition, regulators will need to be careful to recognize that excessive stringency of norms can exacerbate crises by creating too strong an incentive to hoard liquidity in times of stress. These considerations point to bank supervisors formulating guidance more along the lines of Pillar 2 of the Basel framework to raise standards of liquidity risk management, rather than initially tightening minimum quantitative requirements for liquid asset holdings. Neither existing best practices for liquidity risk management promoted by the IIF, existing guidance from the Basel Committee, nor the work of the Joint Forum appear to have been widely applied to date, and supervisors will need to devise better ways to ensure that progress toward best practices is achieved.

### Monetary Authorities

While central bank actions have prevented wider damage to the financial system, significant and sometimes ad hoc changes to operational frameworks were required, suggesting that policymakers had not always been well prepared for the extraordinary events that took place. Central banks have begun to discuss necessary adjustments, not only with respect to crisis management arrangements, but also monetary policy frameworks and market operations more broadly. In their attempts to learn the lessons of the recent turmoil, central banks should actively explore the scope for convergence of practices, in particular in the areas of counterparty selection, eligible collateral, and the appropriate mix between short-term and longer-term refinancing operations. Against this backdrop, key lessons from recent events (as well as from earlier episodes of large-scale central bank interventions, such as the Bank of Japan's experience toward the end of the 1990s),<sup>22</sup> include the following:

- Standing facilities work well in normal circumstances, when their use is infrequent and very short-term, but they are not designed to cope with generalized market problems, especially when a stigma is attached to their use.
- In a crisis, it is expedient for the central bank to be able to operate with a wide range of counterparties and collateral that provides banks with broad access to liquidity and releases more liquid collateral for interbank usage, and that these be in place and tested before a crisis strikes. However, central banks face difficult trade-offs when widening the pool of counterparties and collateral that they deal with. First, widening the range of instruments can reduce the incentive for banks to hold, and if necessary, provide to the central bank, high-quality collateral. In particular, in stressful times, banks will naturally be inclined

<sup>22</sup>Apart from supporting our main conclusions with respect to collateral and counterparty eligibility, the Japanese experience highlights the importance of a comprehensive exit strategy that ensures a timely reactivation of interbank markets.

### Box 3.6. Liquidity Regulation and the Basel Process

The work of the Basel Committee on Banking Supervision in the area of supervision of bank liquidity has taken on greater importance in the context of recent market events.

Solvency and liquidity are complementary and mutually reinforcing supervisory concerns—illiquid banks can progress rapidly to insolvency, while banks perceived to be insolvent are denied funding liquidity. The committee is well known for its work establishing a regulatory capital framework (Basel I and II), and its work on liquidity has focused on developing high-level principles of good practice—an approach that the banking industry has also favored. This outcome resulted from the need for supervisors to coordinate their approaches with national central banks in their role as liquidity providers, as well as to coordinate with national approaches to deposit insurance and bank resolution, resulting in a wide range of practices for measuring, managing, and supervising liquidity risks among committee members. Moreover, the comfortable liquidity environment of the past decade and the committee's focus on finalizing capital requirements for credit, market, and operational risk within the Basel II framework, resulted in liquidity risk receiving less attention than other types of risk.

A 1992 Basel Committee paper, "A Framework for Measuring and Managing Liquidity," first assembled the practices followed by major international banks in one framework (BCBS, 1992). This was intended primarily as summary guidance for banks and was largely silent on supervisory standards. In 2000, this paper was significantly updated in "Sound Practices for Managing Liquidity in Banking Organizations," which laid much greater emphasis on liquidity management as a vital element of banks' overall risk management practices (BCBS, 2000). Its key elements were also incorporated through

a stand-alone principle in the 2006 revision of the Basel "Core Principles for Effective Banking Supervision"—the accepted minimum requirements for sound banking supervision (BCBS, 2006). In the same year, the Joint Forum representing banking, securities, and insurance standard setters also released a paper on funding liquidity risk management, "The Management of Liquidity Risk in Financial Groups," based on a survey of practices followed by major conglomerates (Joint Forum, 2006). While not aiming to identify best practices or make recommendations, it informed the continuing work of standard setters regarding liquidity management.

With work on Basel II largely completed, the committee established a Working Group on Liquidity in late 2006 to review liquidity supervision practices in member countries and others, as well as banks' liquidity management practices. The group also assessed the preliminary lessons and implications arising from market turmoil that began in mid-2007. These include issues related to stress testing, contingency funding plans, off-balance-sheet activity and contingent commitments, balance sheet management and internal transfer pricing, capital, and cross-border issues and exchange of information. As a result of its findings, discussed in "Liquidity Risk: Management and Supervisory Challenges" published in February of this year (BCBS, 2008), the working group has started a fundamental review of the committee's 2000 guidance and a consultative document is expected to be issued in 2008. While minimum quantitative standards for liquidity akin to Pillar 1 (minimum capital requirements) of the Basel II framework are not on the committee's agenda, its review of the 2000 guidance will seek to strengthen global standards for liquidity regulation, supervision, and risk management.

Note: This box was prepared by Aditya Narain.

to provide their lower-quality collateral, exposing the central bank to greater credit risk. Hence, it is important that the collateral pricing

policy be reviewed periodically to ensure that it provides banks with sufficient incentive to hold and post more liquid and better-

quality collateral, thereby limiting credit risk to the central bank and the emergence of “eligibility premiums.” Second, maintaining a wide group of counterparties may be administratively inefficient in normal times; but widening the pool at short notice may be operationally difficult to manage, and send a signal that certain institutions, with newly acceptable collateral, are receiving preferential treatment.

- Having in place operational procedures to address changes in banks’ demand for liquidity at different maturities can be a powerful tool to ease money market strains. However, altering the maturity profile of central bank operations has to be complemented with a communications strategy encompassing both entrance to and exit from the market, so as to not weaken monetary policy implementation and normal interbank market functioning.
- Preemptive planning is needed to ensure that central banks can effectively coordinate and communicate how emergency liquidity provision interacts with the broader macroeconomic policy mandate. In particular, central banks need to be able to explain what impact additional emergency liquidity will have on monetary conditions and the circumstances that would permit, and the mechanisms that would be used for, liquidity withdrawal.
- Coordination with international counterparts on emergency operations, liquidity arrangements for cross-border banking groups, and emergency foreign-currency swaps should be furthered, including preparing the operational requirements for managing currency liquidity across borders. The case could be considered for an international securities depository that would provide international banks with greater flexibility to post collateral across a range of currencies and central banks.

Defining the optimal approach to monetary policy implementation in light of recent events will take time, particularly when applying lessons from mature to emerging markets. Over the medium run, however, converging to best practices will allow central banks to avoid gaps in

the international management of systemic liquidity needs, communicate more easily with markets and the public, and more clearly distinguish financial stability concerns from monetary policy implementation. Communication alone, however, will not suffice to address the incentive problems resulting from a partial transfer of illiquidity tail risks to central banks. As central banks increase their readiness to address these problems, financial regulation will have to focus its attention on limiting the system’s inherent tendency to reduce liquidity buffers in the upswing.

Recent events have attested to the crucial role of central banks as ultimate providers of liquidity, highlighting the need to review both their role in national and international financial arrangements, and as guarantors of both macroeconomic and financial stability. There is a need to regularly examine the relationship between these twin responsibilities. This should involve a fresh look at required adjustments to the institutional framework for financial supervision and regulation. No matter what type of financial stability arrangements are in place in a country, the central bank needs to be provided with sufficient information about the liquidity and solvency risk profiles of individual, systemically important institutions to further the goal of assuring the smooth functioning of the payment system, as well as money and interbank markets.

### The Role of the International Monetary Fund

Lastly, the recent liquidity crisis offers some useful lessons to the IMF. In particular, it appears that the IMF could test systemic liquidity risk more stringently during Financial Sector Assessment Program (FSAP) assessments and bilateral surveillance. The IMF’s FSAPs already include a review of systemic liquidity management practices, including adherence to the relevant Basel banking supervision “core” principle for liquidity management (BCBS, 2006, Principle 13). In addition, where interbank data are available, a systemic liquidity stress test is conducted. However, there is room to increase the sophistication and extent of liquidity stress testing.

Similarly, there is room for the IMF to more actively promote best practices for financial crisis management and monetary policy emergency operations. This has become an increasing focus of IMF FSAP assessments, but greater efforts will be made to learn lessons from these exercises and apply them more effectively in the IMF's bilateral and multilateral policy advice.

## Conclusion

This chapter has explored the interrelationship between market and funding liquidity—two concepts of liquidity that have taken on new meaning since mid-2007. The relationship between market and funding risks has changed along with market practices for managing risk, and detrimental “liquidity spirals” may be more pervasive than before. The recent episode has raised important and very difficult issues about how “liquidity” is managed—both in private financial institutions and in the public sector. The chapter has attempted to shed some light on how, generally, funding liquidity risk is shared between the private and public sectors, and how the cost of insurance against liquidity events appears to have shifted from the private toward the public sector. The renewed focus on this balance of risks will likely bring forth additional analysis about how the incentives of both sides have influenced their decisions. Careful consideration will need to be given to these incentives in order to improve policies to reduce systemic liquidity risks in the years to come.

## Annex 3.1. Liquidity Dynamics Since Summer 2007

The recent period of stress in global financial markets raises important questions, two of which are examined empirically below: How were liquidity shocks transmitted across financial markets and national boundaries during the 2007 crisis? And to what extent, if any, did the policy interventions of the Fed and the ECB contribute to stabilizing term funding markets, particularly at one- and three-month maturities?

As discussed earlier, conceptually, a number of links are likely to have been established during the recent period of turbulence, either through increased market illiquidity, funding illiquidity, or solvency risks. This annex analyzes the relative strength of these linkages based on a simple reduced-form econometric model.<sup>23</sup> In particular, a parsimonious multivariate GARCH model is estimated to evaluate the transmission of liquidity shocks during the recent period of financial stress. This allows for the modeling of the heteroscedasticity exhibited by the data, in addition to interpreting the conditional variance as a time-varying risk measure.

The data chosen for the model are motivated by the following observations. During normal periods, market illiquidity shocks tend to be temporary, as they create opportunities for traders to profit and, in doing so, provide liquidity and contribute to the price-discovery process.<sup>24</sup> However, during periods of financial stress, several mechanisms may amplify and propagate liquidity shocks across financial markets, creating systemic risks. These mechanisms can operate through direct linkages between the balance sheets of financial institutions, but also indirectly through asset prices and spreads as described above.<sup>25</sup> Asset price movements are set in motion when financial institutions face marked-to-market price declines. As a consequence, they start to deleverage their positions and curtail lending. If the value of their assets is significantly affected, financial institutions can also see their creditworthiness deteriorate and risk of default increase. As a result, linkages can be established through the interaction of market and funding illiquidity shocks and default risks, creating systemic pressures.

After analyzing the events in U.S. financial markets, where the shocks originated, a GARCH

<sup>23</sup>For further details, see Frank, González-Hermosillo, and Hesse (forthcoming).

<sup>24</sup>These collective “traders” include hedge funds, proprietary trading desks, and market-makers.

<sup>25</sup>Models examining these connections include Adrian and Shin (2007), Cifuentes, Shin, and Ferrucci (2005), and Brunnermeier and Pedersen (forthcoming).

model is used to examine international linkages across advanced economies and key emerging markets. Finally, the role of central bank policy actions during the period of turbulence is assessed. The results suggest that the correlations between the variables under examination increased sharply and in somewhat unexpected ways, and that policy interventions had some success in stabilizing financial markets.

### U.S. Model

The model uses a system of five variables to summarize key linkages, across various U.S. financial markets, acting as proxies for overall market liquidity, funding liquidity, default risk, and attitudes toward risks. While the shocks originated in the subprime mortgage market, they were readily transmitted to the ABCP market. The turbulence in ABCP reflects the funding illiquidity experienced by SIVs and conduits resulting from concerns about the increasing market illiquidity risk of the underlying structured credit securities as they became difficult to value. The ABCP link is measured by the spread between three-month ABCP rates and U.S. Treasury bill yields (Figure 3.3).

As the problems with SIVs and conduit facilities spread, banks came under increasing pressure to fund those that they had sponsored. Uncertainties with respect to the magnitude of the problem for individual institutions and treasurers' concerns about future funding needs were quickly reflected in unsecured longer-term funding markets. As a proxy of these funding liquidity pressures, the second variable examined in the system is the spread between the three-month U.S. interbank LIBOR rate and the overnight index swap (Figure 3.3).

As turbulence in markets heightened, financial markets more generally showed signs of stress. Volatility increased, reflecting higher uncertainty, and many investors shifted their positions to the safest and most liquid asset classes.<sup>26</sup> As such, the third variable, the vari-

<sup>26</sup>Market participants often equate an increase in market volatility with a diminished risk appetite of investors.

ance of returns in the S&P 500 stock market index, proxies market volatility and uncertainty (Figure 3.4).<sup>27</sup> The fourth variable is the spread between the five-year on-the-run and off-the-run U.S. Treasury notes as a measure of overall market liquidity pressures (Figure 3.5).<sup>28</sup> Finally, the cost of insurance against default—credit default swap spreads—of several representative large complex financial institutions is used to proxy the default risk of financial institutions.<sup>29</sup> It also increased sharply during the crisis (Figure 3.4).

In sum, five variables in the system are assumed to capture the key links that created systemic risks in financial markets:<sup>30</sup>

<sup>27</sup>Market volatility is often proxied by the Chicago Board of Options Exchange Volatility Index (VIX), which measures the implied volatility priced into S&P 500 equity index options. This variable was not chosen because the model used to estimate the transmission, a multivariate GARCH model, is based on a volatility estimate, and so using VIX would represent examining the volatility of a volatility measure.

<sup>28</sup>The “on-the-run” Treasury note is usually the most recently issued of a particularly liquid maturity and is used for pricing other assets. An on-the-run note becomes “off-the-run” when a new note is issued in that maturity bracket. Other alternative measures of overall market liquidity were also examined, including the spread between the 10-year and the two-year on-the-run and off-the-run U.S. Treasury securities, and the spread between the 10-year U.S. Treasury bond and other less liquid maturities. Overall, the findings were broadly in line with the five-year, on-the-run spread. Fleming (2003) notes that the various measures are imperfect proxies of U.S. Treasury market liquidity, but that the five-year and the two-year note spreads showed the biggest increase during the 1998 Long-Term Capital Management crisis in response to a desire for investors to move to the most liquid assets. The high demand for two- and five-year Treasury notes for potential repurchases suggests this variable may capture some funding liquidity as well as market liquidity.

<sup>29</sup>This variable was created by taking the unweighted daily average of the five-year credit default swaps (*cont.*) for the following institutions: Morgan Stanley, Merrill Lynch, Goldman Sachs, Lehman Brothers, JPMorgan, Deutsche Bank, Bank of America, Citigroup, Barclays, Credit Suisse, UBS, and Bear Stearns.

<sup>30</sup>The data examined in this model clearly constitute a simplification of the dynamics that may occur during periods of stress. For example, in practice, the widening of the ABCP and LIBOR-OIS spreads could also potentially reflect an unobserved component that represents changes in the perceived credit risk of the collateral backing ABCP, and in the perceived credit risk of banks.

*abcp* = ABCP—U.S. Treasury bill (ABCP funding liquidity)  
*LIBOR* = LIBOR—OIS (bank funding liquidity)  
*five* = five-year on-the-run vs. off-the-run U.S. Treasury notes (market liquidity)  
*ret* = S&P 500 returns (volatility)  
*CDS* = credit default swap spreads for financials (solvency risk).

### **Empirical Results**

The data sample begins on January 3, 2006 and ends on December 24, 2007, although the final week of 2007 is omitted in order to avoid end-of-year effects in the strained interbank money markets.<sup>31</sup> The model was estimated using a DCC GARCH specification by Engle (2002), which allows the conditional variance and covariance to be time-varying risk measures.<sup>32</sup> By directly parameterizing the conditional correlations and accounting for their potential time variation, this model is best interpreted as a generalization of the Constant Conditional Correlation specification suggested by Bollerslev (1990).

The DCC GARCH model is estimated using first differenced data, as augmented Dickey-Fuller tests indicate that the ABCP, LIBOR and CDS spreads exhibit nonstationarity during the second half of 2007.

Prior to July 2007, there is evidence of only limited implied correlations between the variables in the system. During the crisis period,

correlations become more important and their magnitudes increase sharply. In particular, there is a more pronounced interaction between market and funding liquidity (Figure 3.13). In addition, solvency considerations, measured in terms of CDS spreads, also become significant, whereas they were relatively unconnected to the other variables before the subprime crisis, suggesting that concerns about solvency arose as liquidity difficulties increased, and indicating funding illiquidity as a source of difficulty. As the representative set of graphs in Figure 3.13 illustrates, a clear break in the time-varying correlation structure of the variables is observed at the end of July 2007, consistent with the onset of the financial turbulence.

### **Advanced Economies Model**

As described above, the initial U.S. subprime mortgage shock also affected financial intermediaries abroad, many of whom funded structured securities with ABCP. This was most clearly the case for Canadian financial intermediaries, but also for many entities in Europe. As such, a multivariate DCC GARCH model is used to examine the spillovers between U.S. and international money markets.

Three potential links are examined. The first one reflects the potential link between U.S. funding liquidity pressures, proxied by the three-month U.S. LIBOR rate over the OIS rate, and funding pressures in Canada, the euro area, and the United Kingdom, proxied by three-month LIBOR rates relative to the overnight index swaps in each zone. The second link addresses the potential relationship between U.S. ABCP and international interbank spreads. Finally, the third potential spillover is captured by the overall U.S. market liquidity measure, proxied by the spread between the five-year, on-the-run versus the five-year, off-the-run U.S. Treasury notes, and the LIBOR spreads in the various countries.

### **Empirical Results**

The correlations between the U.S. funding liquidity measures (ABCP and LIBOR spread)

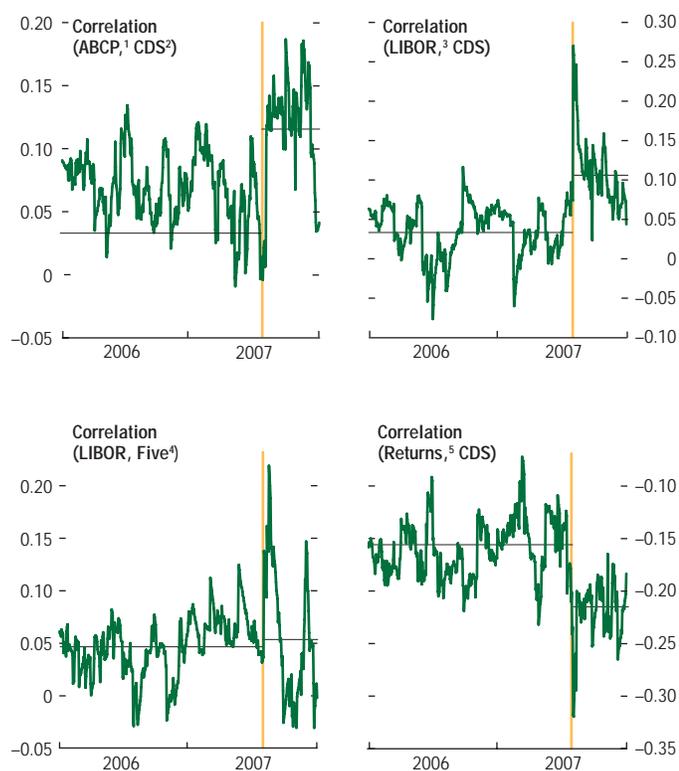
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Similarly, CDS prices and the credit premia implicit in LIBOR rates may also partly reflect additional compensation for market participants' risk appetite and overall uncertainty in the markets. Disentangling these components is difficult, since they are nonobservable and can be time-varying. Michaud and Upper (2008) find that credit risk measures have little explanatory power for the day-to-day fluctuations in the LIBOR-OIS spread. However, the Bank of England (2007) notes that credit concerns since October 2007 appear to account for a more significant portion of LIBOR spreads.

<sup>31</sup>The estimation was also conducted from 2003 onward, and the findings did not change appreciably, indicating that the low volatility in U.S. markets during 2006 does not bias the results.

<sup>32</sup>This model avoids the criticism that tests of contagion are biased when the heteroscedasticity of the returns is not modeled explicitly (Forbes and Rigobon, 2002).

**Figure 3.13. U.S. Model: Implied Correlations from Dynamic Conditional Correlation GARCH Specification**



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

Note: The horizontal lines represent the arithmetic average of the correlations before and after the break in late July 2007.

<sup>1</sup>Spread between yields on 90-day U.S. asset-backed commercial paper (ABCP) and on three-month U.S. Treasury bills.

<sup>2</sup>The unweighted daily average of the five-year credit default swaps (CDS) for the following institutions: Morgan Stanley, Merrill Lynch, Goldman Sachs, Lehman Brothers, JPMorgan, Deutsche Bank, Bank of America, Citigroup, Barclays, Credit Suisse, UBS, and Bear Stearns.

<sup>3</sup>Spread between yields on three-month U.S. LIBOR and on the three-month U.S. overnight index swap.

<sup>4</sup>Spread between yields on five-year off-the-run and on-the-run U.S. Treasury notes.

<sup>5</sup>S&P 500 stock market returns.

and the international LIBOR spreads in Canada, the euro area, and the United Kingdom, are all of relative small magnitude and fairly stable before the subprime crisis. Figure 3.14 shows some of the time-varying conditional correlations, for instance, between the U.S. LIBOR spread and those in the United Kingdom and euro area, as well as between the U.S. ABCP spread and the LIBOR spreads in the United Kingdom and Canada.

During the crisis period, the correlations between U.S. funding liquidity and international LIBOR spreads increase sharply. The elevated implied correlation between the U.S. ABCP spread and the Canadian LIBOR spread during the crisis period possibly reflects the transmission of the U.S. subprime mortgage and ABCP shock to Canadian financial institutions (Figure 3.14). The correlation between international spreads and U.S. LIBOR is more pronounced than the correlation between international spreads and the U.S. Treasury five-year, on-the-run spread. Overall, this is consistent with market participants' views that funding, more than market illiquidity, has been the important mode of transmission of shocks across countries. Finally, unlike the pre-crisis period, when there were limited interactions between the Canadian, euro area, and UK LIBOR spreads, those interactions become more important during the crisis period.

### Emerging Markets Model

The international model for advanced economies discussed above is extended to include some key emerging markets.<sup>33</sup> Specifically, two measures of U.S. funding liquidity (one for the interbank money market and the other for funding liquidity in the ABCP market), as well as the five-year, on-the-run spread measure of U.S. market liquidity, are linked to the bond spreads and stock market returns in Brazil, Mexico, and Russia. This is done across each of the two asset

<sup>33</sup>The computational demands of the multivariate DCC GARCH model restricts the number of countries that can be examined.

classes across countries in order to capture any potential differences between them. The sovereign bond spreads are measured by JPMorgan's Emerging Market Bond Index Plus (EMBI+) for each country, and the stock market returns are calculated from the respective local stock market indices in domestic currency.

### Empirical Results

During the subprime crisis, a heightened interaction between the U.S. funding liquidity measures and the stock markets is evident for all three markets (Figure 3.15).<sup>34</sup> Correlation changes are most pronounced between the U.S. LIBOR spreads and the Mexican stock market returns, as well as the U.S. ABCP spreads and the Mexican and Russian bond spreads. Similarly, it is found that the time-varying correlation between U.S. funding liquidity and the bond spreads in Brazil, Mexico, and Russia rises. It is also noteworthy that, for both the stock market and bond spreads models, the correlation magnitudes among the emerging countries examined here are higher than with the U.S. funding liquidity measures during the sample period. Co-movements among emerging countries have increased in recent years and became more pronounced during crises. The findings from introducing the U.S. market liquidity variable, the five-year, on-the-run spread, were inconclusive.<sup>35</sup>

### European Central Bank and Fed Interventions

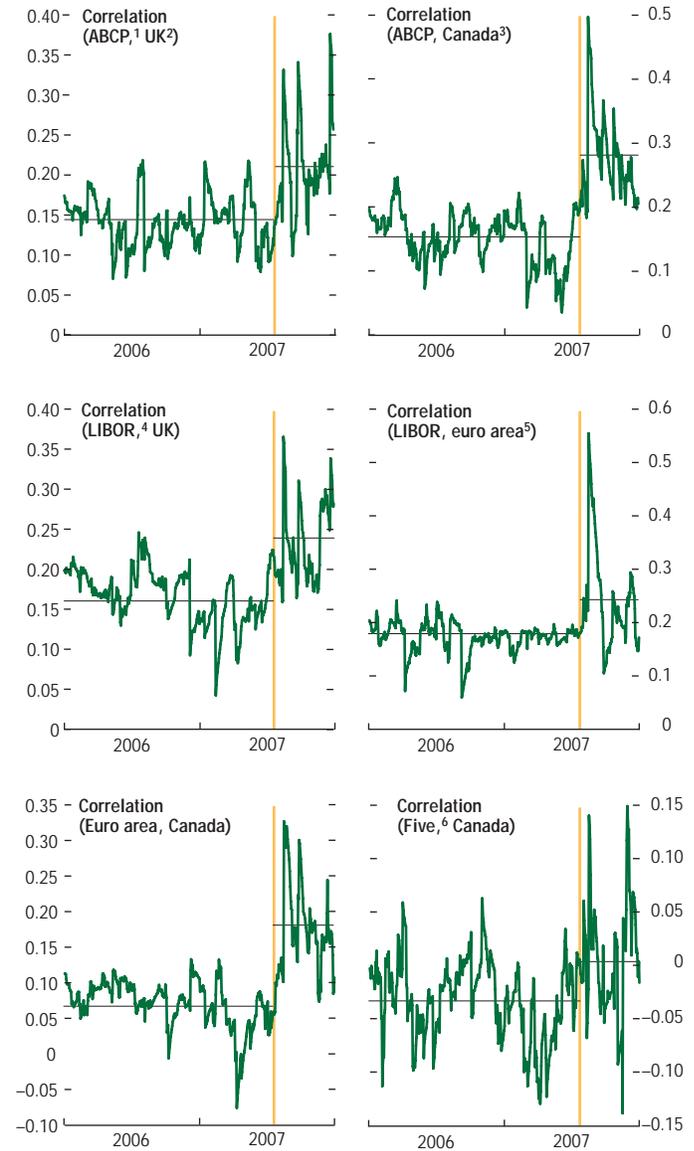
To assess the impact of the emergency response of central banks, two methods were used.<sup>36</sup> First, a univariate GARCH model is estimated for both the U.S. Fed and the ECB for a sample period ranging from July 26 to Decem-

<sup>34</sup>The other period of recent increased correlation between the various measures of U.S. funding and market liquidity shocks and emerging markets examined occurs on February 28, 2007, following a sharp correction in China's Shanghai stock market.

<sup>35</sup>Similarly inconclusive results were obtained from the U.S. two-year and 10-year on-the-run spreads.

<sup>36</sup>See also Frank, Hesse, and Klueh (forthcoming).

Figure 3.14. Advanced Economies Model: Implied Correlations from Dynamic Conditional Correlation GARCH Specification



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

Note: The horizontal lines represent the arithmetic average of the correlations before and after the break in late July 2007.

<sup>1</sup>Spread between yields on 90-day U.S. asset-backed commercial paper (ABCP) and three-month U.S. Treasury bills.

<sup>2</sup>Spread between yields on three-month pound sterling LIBOR and the UK three-month overnight index swap.

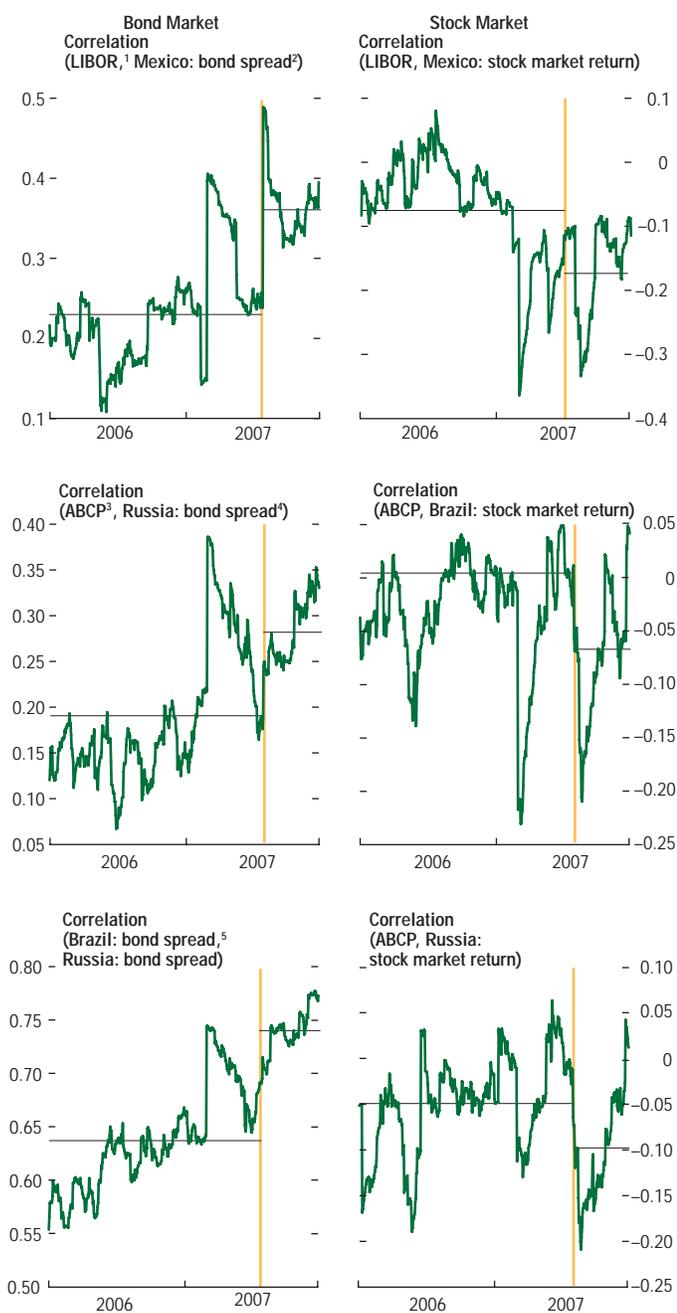
<sup>3</sup>Spread between yields on three-month Canadian dollar LIBOR and the Canadian dollar three-month overnight index swap.

<sup>4</sup>Spread between yields on three-month U.S. dollar LIBOR and the three-month U.S. overnight index swap.

<sup>5</sup>Spread between yields on three-month euro LIBOR and the euro area three-month overnight index swap.

<sup>6</sup>Spread between yields on five-year off-the-run and on-the-run U.S. Treasury notes.

**Figure 3.15. Emerging Markets Model: Implied Correlations from Dynamic Conditional Correlation GARCH Specification**



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

Note: The horizontal lines represent the arithmetic average of the correlations before and after the break in late July 2007.

<sup>1</sup>Spread between yields on three-month U.S. dollar LIBOR and on the three-month U.S. dollar overnight index swap.

<sup>2</sup>JPMorgan's EMBI+ Mexico sovereign spread.

<sup>3</sup>Spread between yields on 90-day U.S. asset-backed commercial paper (ABCP) and on three-month U.S. Treasury bills.

<sup>4</sup>JPMorgan's EMBI+ Russia sovereign spread.

<sup>5</sup>JPMorgan's EMBI+ Brazil sovereign spread.

ber 24, 2007.<sup>37</sup> Second, a three-state Markov regime-switching model (Hamilton and Susmel, 1994) for the volatility of term spreads is implemented, and is used to compare regime transitions with central bank intervention dates.<sup>38</sup>

To proxy the amount of “extra” liquidity injections used as intervention variables in the GARCH model, differences in operational frameworks among central banks have to be taken into account. Conceptually, the measures should aim at capturing injections over and above the neutral level needed to just fulfill reserve requirements. Also important are operations that provide extraordinary liquidity to deal with market stress and, more broadly, the surprise element of a particular intervention.

For the ECB, we first employ a variable quantifying liquidity injections through longer-term refinancing operations (LTROs) that had been carried out in addition to those implemented regularly on a monthly schedule. Second, for main refinancing operations (MROs), a variable based on the MRO allotment exceeding the ECB’s benchmark allotment is used.<sup>39</sup>

For the Fed, we use the difference between actual repurchase agreements outstanding and estimates of the amount of repurchase agreements that would have been necessary to achieve

<sup>37</sup>A GARCH framework is used to disentangle level and volatility effects of LIBOR spreads, as both can have an impact on financial institutions’ funding conditions. At the same time, it is worth mentioning that the results are only indicative, as our approach does not take into account that intervention amounts themselves are likely to be determined endogenously. In particular, central banks might react to an expected increase in money market stress by raising their respective interventions, which then occur jointly with a potentially strong increase in the observed spreads.

<sup>38</sup>To capture the fact that during a crisis central bank operations may encompass multiple objectives (steering very short-term interest rates *and* supporting the smooth functioning of markets more broadly), a range of dependent variables were considered, all based on changes in the spread between LIBOR and overnight interest rate swaps for different maturities and currencies.

<sup>39</sup>The benchmark allotment is the ECB’s projection of the liquidity provision needed to smoothly fulfill reserve requirements.

neutrality with respect to fulfilling banks' needs over a reserve maintenance period.<sup>40</sup>

The explanatory variables only proxy certain aspects of the responses of the ECB and the Fed. For example, the GARCH model cannot be expected to fully capture changes in the ECB's broader strategy of communication and liquidity provision through the maintenance period, factors that have been perceived to have contributed to the leveling off of euro LIBOR spreads between August and November 2007. Similarly, for the Fed, the choice of approach and sample period implies that the GARCH estimation takes into account neither TAF operations nor other operational adjustments. To address these shortcomings, the results from the GARCH model are complemented with a more heuristic approach based on a Markov regime-switching Autoregressive Conditional Heteroskedasticity (ARCH) specification. This model is used to determine the probability of being in a low-, medium-, or high-volatility state.<sup>41</sup> Changes in these probabilities are then compared with those of major central bank announcements or interventions.

Figures 3.11 and 3.12 and Table 3.1 summarize the results. As explained in the main text, the findings indicate that additional term lending, the joint central bank response announced on December 12, as well as the actual implementation of the TAF, were instrumental in reducing stress levels, conceptualized as a combination of spread levels and spread volatility.

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<sup>40</sup>The estimates were provided by Wrightson ICAP.

<sup>41</sup>Smoothed probabilities exceeding 0.5 indicate that the data-generating process is in that respective volatility regime.

**Table 3.1. Impact of Central Bank Interventions on LIBOR-OIS Spreads**

|  | Three-Month LIBOR-OIS Spreads |            |
|--|-------------------------------|------------|
|  | Level                         | Volatility |
| ECB supplementary LTRO (L1)                      | -0.54                         | -12.27***  |
| ECB supplementary LTRO (L2)                      | 0.10                          | -8.66*     |
| Fed repurchase agreements exceeding neutral      | -0.16**                       | -2.69***   |
| Fed repurchase agreements exceeding neutral (L1) | 0.33***                       | 1.18       |
| Fed repurchase agreements exceeding neutral (L2) | 0.06                          | -0.01      |

Source: IMF staff estimates.

Note: The table reports coefficient signs of intervention variables from a GARCH specification. \*\*\* indicates significance at the 1 percent level; \*\*(\*) indicates significance at the 5 (10) percent level. The model is computed using Bollerslev-Wooldridge robust standard errors. L1 and L2 refer to lag lengths. The sample is from July 26 to December 24, 2007. OIS = overnight index swap; ECB = European Central Bank; LTRO = long-term refinancing operation.

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## GLOSSARY

|                                      |   |
|--------------------------------------|---|
| Asset-backed commercial paper (ABCP) | Commercial paper collateralized by a pool of loans, leases, receivables, or structured credit products.   |
| Asset-backed security (ABS)          | A security that is collateralized by the cash flows from a pool of underlying assets, such as loans, leases, and receivables. Often, when the cash flows are collateralized by real estate, an ABS is called a mortgage-backed security.  |
| Asset-backed securities index (ABX)  | An index of credit default swaps referencing 20 bonds collateralized by subprime mortgages.   |
| Basel II                             | An accord providing a comprehensive revision of the Basel capital adequacy standards issued by the Basel Committee on Banking Supervision. Pillar I of the accord covers the minimum capital adequacy standards for banks, Pillar II focuses on enhancing the supervisory review process, and Pillar III encourages market discipline through increased disclosure of banks' financial condition.   |
| Call (put) option                    | A financial contract that gives the buyer the right, but not the obligation, to buy (sell) a financial instrument at a set price on or before a given date.   |
| Carry trade                          | A leveraged transaction in which borrowed funds are used to take a position in which the expected interest return exceeds the cost of the borrowed funds. The "cost of carry" or "carry" is the difference between the interest yield on the investment and the financing cost (e.g., in a "positive carry" the yield exceeds the financing cost).  |
| Collateralized debt obligation (CDO) | A structured credit security backed by a pool of securities, loans, or credit default swaps, where securitized interests in the security are divided into tranches with differing repayment and interest earning streams. The pool can be either managed within preset parameters or static. If the CDO is backed by other structured credit securities, it is called a structured finance CDO, and if it is backed solely by other CDOs, it is called a CDO-squared. |
| Collateralized loan obligation (CLO) | A collateralized debt obligation backed by whole commercial loans, revolving credit facilities, or letters of credit.   |
| Commercial paper                     | A private unsecured promissory note with a short maturity. It need not be registered with the U.S. Securities and Exchange Commission provided the maturity is within 270 days; typically, new issues refinance maturing ones.  |
| Conduit                              | A legal entity whose assets consist of various types of loans, receivables, and structured credit products. A conduit's liabilities are short-term commercial paper and are supported by a liquidity facility with 100 percent coverage.  |

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| Corporate governance           | The governing relationships between all the stakeholders in a company—including the shareholders, directors, and management—as defined by the corporate charter, bylaws, formal policy, and rule of law.   |
| Credit conversion factor (CCF) | The factor by which off-balance-sheet positions are converted to credit risk equivalents for risk-based capital purposes. The resulting amount is then weighted according to the appropriate Basel Accord risk weight.   |
| Credit default swap (CDS)      | A default-triggered credit derivative. Most CDS default settlements are “physical,” whereby the protection seller buys a defaulted reference asset from the protection buyer at its face value. “Cash” settlement involves a net payment to the protection buyer equal to the difference between the reference asset face value and the price of the defaulted asset.                    |
| Credit derivative              | A financial contract under which an agent buys or sells risk protection against the credit risk associated with a specific reference entity (or specific entities). For a periodic fee, the protection seller agrees to make a contingent payment to the buyer on the occurrence of a credit event (default in the case of a credit default swap).                                       |
| Credit-linked note (CLN)       | A security that is bundled with an embedded credit default swap and is intended to transfer a specific credit risk to investors. The CLN issuance proceeds are usually invested in liquid and highly rated securities to cover the principal repayment at maturity plus any interim conditional payments associated with the underlying credit default swap.                             |
| Credit spread                  | The spread between benchmark securities and other debt securities that are comparable in all respects except for credit quality (e.g., the difference between yields on U.S. treasuries and those on single-A-rated corporate bonds of a certain term to maturity).  |
| Derivatives                    | Financial contracts whose value derives from underlying securities prices, interest rates, foreign exchange rates, commodity prices, and market or other indices.  |
| EBITDA                         | Earnings before interest, taxes, depreciation, and amortization.   |
| Economic risk capital (ERC)    | An assessment of the amount of capital a financial institution requires to be able to absorb potential losses from its positions (including loans) over long time horizons with a given degree of certainty. ERC calculations make provision not just for market risk, but also for credit and operational risks, and may also take account of liquidity, legal, and reputational risks. |
| EMBIG                          | JPMorgan's Emerging Market Bond Index Global, which tracks the total returns for traded external debt instruments in 34 emerging market economies with weights roughly proportional to the market supply of debt.  |
| Emerging markets               | Developing countries' financial markets that are less than fully developed, but are nonetheless broadly accessible to foreign investors.   |

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| Hedge funds   | Investment pools, typically organized as private partnerships and often resident offshore for tax and regulatory purposes. These funds face few restrictions on their portfolios and transactions. Consequently, they are free to use a variety of investment techniques—including short positions, transactions in derivatives, and leverage—to attempt to raise returns and cushion risk.  |
| Hedging   | Offsetting an existing risk exposure by taking an opposite position in the same or a similar risk—for example, in related derivatives contracts.   |
| Home equity loan/home equity line of credit (HEL/HELOC) | Loans or lines of credit drawn against the equity in a home, calculated as the current market value less the value of the first mortgage. When originating a HEL or HELOC, the lending institution generally secures a second lien on the home, i.e., a claim that is subordinate to the first mortgage (if it exists).  |
| Implied volatility                                      | The expected volatility of a security's price as implied by the price of options or swaptions (options to enter into swaps) traded on that security. Implied volatility is computed as the expected standard deviation that must be imputed to investors to satisfy risk-neutral arbitrage conditions, and is calculated with the use of an option pricing model such as Black-Scholes. A rise in implied volatility suggests the market is willing to pay more to insure against the risk of higher volatility, and hence implied volatility is sometimes used as a measure of risk appetite (with higher risk appetite being associated with lower implied volatility). One of the most widely quoted measures of implied volatility is the VIX, an index of implied volatility on the S&P 500 index of U.S. stocks. |
| Institutional investor                                  | A bank, insurance company, pension fund, mutual fund, hedge fund, brokerage, or other financial group that takes investments from clients or invests on its own behalf.  |
| Interest rate swap                                      | An agreement between counterparties to exchange periodic interest payments on some predetermined principal amount. For example, one party will make fixed-rate, and receive variable-rate, interest payments.  |
| Intermediation  | The process of transferring funds from the ultimate source to the ultimate user. A financial institution, such as a bank, intermediates when it obtains money from depositors or other lenders and onlends to borrowers.   |
| Internal ratings based (IRB) approach                   | A methodology of the Basel Capital Accord that enables banks to use their internal models to generate estimates of risk parameters that are inputs into the calculation of their risk-based capital requirements.  |
| Investment-grade obligation                             | A bond or loan is considered investment grade if it is assigned a credit rating in the top four categories. S&P and Fitch classify investment-grade obligations as BBB– or higher, and Moody's classifies investment-grade obligations as Baa3 or higher.  |
| Large complex financial institution (LCFI)              | A major financial institution frequently operating in multiple sectors and often with an international scope.  |

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| Leverage                       | The proportion of debt to equity (also assets to equity and assets to capital). Leverage can be built up by borrowing (on-balance-sheet leverage, commonly measured by debt-to-equity ratios) or by using off-balance-sheet transactions. |
| Leveraged buyout (LBO)         | Acquisition of a company using a significant level of borrowing (through bonds or loans) to meet the cost of acquisition. Usually, the assets of the company being acquired are used as collateral for the loans.                         |
| Leveraged loans                | Bank loans that are rated below investment grade (BB+ and lower by S&P or Fitch, and Baa1 and lower by Moody's) to firms with a sizable debt-to-EBITDA ratio, or trade at wide spreads over LIBOR (i.e., more than 150 basis points).     |
| LIBOR                          | The London interbank offered rate is an index of the interest rates at which banks offer to lend unsecured funds to other banks in the London wholesale money market.   |
| Mark-to-market                 | The valuation of a position or portfolio by reference to the most recent price at which a financial instrument can be bought or sold in normal volumes.   |
| Maturity mismatch              | The difference in cash flows at different maturities when projected payment inflows and outflows are placed into maturity brackets.   |
| Mezzanine capital              | Unsecured, high-yield, subordinated debt, or preferred stock that represents a claim on a company's assets that is senior only to that of a company's shareholders.   |
| Mortgage-backed security (MBS) | A security that derives its cash flows from principal and interest payments on pooled mortgage loans. MBSs can be backed by residential mortgage loans or loans on commercial properties.   |
| Nonperforming loans            | Loans that are in default or close to being in default (i.e., typically past due for 90 days or more).  |
| Overnight index swap (OIS)     | An interest rate swap whereby the compounded overnight rate in the specified currency is exchanged for some fixed interest rate over a specified term.  |
| Primary market                 | The market in which a newly issued security is first offered for sale to investors.   |
| Private equity                 | Shares in privately held companies that are not listed on a public stock exchange.  |
| Private equity funds           | Pools of capital invested by private equity partnerships, typically involving the purchase of majority stakes in companies and/or entire business units to restructure the capital, management, and organization.                         |
| Put (call) option              | A financial contract that gives the buyer the right, but not the obligation, to sell (buy) a financial instrument at a set price on or before a given date.   |

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| Regulatory arbitrage                | Taking advantage of differences in regulatory treatment across countries or different financial sectors, as well as differences between the real (economic) risks and the regulatory risk, to reduce regulatory capital requirements.  |
| Repurchase agreement (repo)         | An agreement whereby the seller of securities agrees to buy them back at a specified time and price. The transaction is a means of borrowing cash collateralized by the securities “repo-ed” at an interest rate implied by the forward repurchase price.  |
| Risk aversion                       | The degree to which an investor who, when faced with two investments with the same expected return but different risk, prefers the one with the lower risk. That is, it measures an investor’s aversion to uncertain outcomes or payoffs.  |
| Risk premium                        | The extra expected return on an asset that investors demand in exchange for accepting the higher risk associated with the asset.   |
| Secondary markets                   | Markets in which securities are traded after they are initially offered/sold in the primary market.  |
| Securitization                      | The creation of securities from a pool of pre-existing assets and receivables that are placed under the legal control of investors through a special intermediary created for this purpose (a “special purpose vehicle” [SPV] or “special purpose entity” [SPE]). In the case of “synthetic” securitizations, the securities are created from a portfolio of derivative instruments. |
| Sovereign wealth fund (SWF)         | A special investment fund created/owned by a government to hold assets for long-term purposes; it is typically funded from reserves or other foreign currency sources, including commodity export revenues, and predominantly owns, or has significant ownership of, foreign currency claims on nonresidents.  |
| Spread                              | See “credit spread” above. Other definitions include (1) the gap between the bid and ask price of a financial instrument, and (2) the difference between the price at which an underwriter buys an issue from the issuer and the price at which the underwriter sells it to the public.  |
| Standing facility                   | A facility whereby a central bank’s specified counterparties can borrow from (or lend to) the central bank in excess of amounts supplied (or withdrawn) through routine open market operations. Such a facility is usually charged at a penal rate and collateralized.   |
| Structured credit product           | An instrument that pools and tranches credit risk exposure, including mortgage-backed securities and collateralized debt obligations.  |
| Structured investment vehicle (SIV) | A legal entity, whose assets consist of asset-backed securities and various types of loans and receivables. An SIV’s funding liabilities are usually tranches and include short- and medium-term debt; the solvency of the SIV is put at risk if the value of the assets of the SIV falls below the value of the maturing liabilities.   |

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| Subinvestment-grade obligation | An obligation rated below investment grade, sometimes referred to as “high-yield” or “junk.”   |
| Subprime mortgages             | Mortgages to borrowers with impaired or limited credit histories, who typically have low credit scores.                                      |
| Swap                           | An agreement between counterparties to exchange periodic interest payments based on different references on a predetermined notional amount. |
| Value-at-risk (VaR)            | An estimate of the loss, over a given horizon, that is statistically unlikely to be exceeded at a given probability level.                   |
| Yield curve                    | The relationship between the interest rates (or yields) and time to maturity for debt securities of equivalent credit risk.                  |



## SUMMING UP BY THE ACTING CHAIR

*The following remarks by the Acting Chair were made at the conclusion of the Executive Board's discussion of the Global Financial Stability Report on March 26, 2008.*

Executive Directors noted that global financial stability has deteriorated markedly since the issuance of the October 2007 *Global Financial Stability Report* (GFSR). They agreed with staff that what began as a fairly contained deterioration in portions of the U.S. subprime market has spilled over rapidly into severe dislocations in broader credit and funding markets that now pose risks to the macroeconomic outlook in the United States and globally. Directors considered that the immediate priorities for policymakers are to reduce uncertainty, mitigate risks to the global financial system, and restore confidence.

Directors welcomed the GFSR as providing a timely and in-depth assessment of the deepening crisis. They found particularly useful the report's focus on the origins and evolution of the crisis, the sources of the current vulnerabilities, and macro-financial linkages. They also welcomed the wealth of data presented to underpin the conclusions, as well as the clear recommendations for both the public and private sectors, which draw a useful distinction between short-term remedial actions and more fundamental medium-term reforms. Directors underscored that, in carrying forward these recommendations, careful attention should be paid to sequencing and prioritization, to country circumstances, and to adequate coordination among the relevant international and national agencies. They emphasized the role of the IMF in contributing to these efforts, working alongside national and international institutions and bodies, including regulatory and supervisory agencies, central banks, and private sector organizations as appropriate.

Directors generally supported the report's finding that markets and investors, the official sector, and monetary authorities collectively failed to appreciate the extent of leverage taken on by a wide range of financial institutions, and the associated risks of a disorderly unwinding. Private sector risk management, disclosure, financial sector supervision, and regulation all lagged behind the rapid innovation and shifts in business models, leaving scope for excessive risk-taking, weak underwriting, and maturity mismatches. In the recent period, these systemic concerns were exacerbated by a deterioration of credit quality, inadequate incentive structure, a drop in the valuations of structured credit products, and a lack of market liquidity accompanying a broad deleveraging in the financial system.

Against this background, Directors broadly concurred with the assessment presented in the global financial stability map, which shows that macroeconomic and credit risks have increased substantially. They agreed that the significant economic slowing in the United States, along with declines in real estate prices, is now a key driver that threatens to broaden the deterioration in the household mortgage market and to spread to consumer credit, as well as to corporate high-yield debt markets. Corporate debt markets appear particularly vulnerable, as the past period of unprecedented low-tier debt issuance with weak covenants and increased leverage can boost default rates in the period ahead.

Directors shared the staff's view that systemically important financial institutions and markets are facing severe strains. Continuing uncertainty over the size and spread of losses has elevated systemic risks, notwithstanding

the reported subprime-related losses to date. Potential losses arising from a broader deterioration in credit could be sizable, although some Directors argued that the effects of credit shocks could be smaller than estimated. Nonetheless, Directors generally considered that available estimates provide a valuable indicator of the sources of strains to bank capital and interbank funding markets. Directors therefore underscored the importance of ensuring that these large financial institutions continue to move quickly to repair their balance sheets by raising equity and medium-term funding, in order to boost confidence and to avoid further undermining the credit channel.

Directors noted that emerging markets and developing countries have been relatively resilient to global turmoil, reflecting policy improvements, high levels of official reserves, and terms of trade gains. That resilience could yet be tested by rising costs and tightening external funding conditions affecting the corporate and banking sectors or by a reversal of the recent commodity price boom. Directors recognized that a protracted weakening of growth in the advanced economies or a broadening of the problems in financial markets—such as a generalized increase in risk aversion—could also have an adverse impact on emerging markets, although these effects will vary depending on country circumstances. Particularly vulnerable are some emerging European countries that have experienced rapid credit growth financed externally by international bank and bond borrowings and those with high current account deficits.

Directors welcomed the staff's work on the macro-financial linkages and the feedback between the ongoing credit crisis and its impact on the real economy. Given the high risks of a global credit crunch, they considered that the potential economic impact of the present turmoil could be more pronounced than in previous credit cycles. Some Directors saw the Financial Sector Assessment Program (FSAP) exercise as a useful vehicle for enhancing the IMF's assessment of such linkages. Several Direc-

tors, while recognizing that many central banks regularly produce financial stability reports, saw merit in reflecting upon the scope for special financial stability reports issued by national authorities if they are seen as helpful in dispelling misperceptions, and filling any information gaps that add to stability risks. Directors also supported the IMF's work on developing new applications for stress tests and other risk assessment models to help identify and address vulnerabilities in individual countries as well as in a multilateral context.

Directors agreed that the immediate policy challenge is to restore counterparty confidence and reduce systemic threats and spillovers, and saw steps that focus on reducing uncertainty and strengthening confidence in mature market financial systems as the first priority. Areas for action relate to the disclosure of exposure and valuation methods, bank balance sheet repair (including raising capital), risk management, internal governance, contingency plans and early remedial actions, and strengthened supervision and regulation. Directors stressed that supervisors must be proactive in addressing weaknesses, acting promptly to require remedial action and to intervene. While recognizing that financial regulation needs to catch up with innovation, some Directors emphasized that actions to strengthen regulation should not stifle the creativity and dynamism of financial markets. A range of views was expressed on these issues, and Directors noted that specific measures would need to be geared to individual country circumstances.

Directors welcomed the detailed examination in Chapter 2 of the central role of complex structured finance products in the current crisis. It was recognized that a sound understanding of the issues surrounding the valuation and accounting of these products is important for comprehending the depth and extent of the present financial market instability. Directors generally agreed that the move toward fair value accounting for many types of financial instruments would continue, despite the apparent difficulties in implementing such valuations during

the current crisis, since fair value accounting gives the most comprehensive picture of a firm's financial health. However, it was recognized that investment decision rules based on fair value accounting outcomes could lead to self-fulfilling forced sales and falling prices when valuations fell below important thresholds (either self-imposed by financial institutions or by regulation). It was also recognized that supervisors would need to play a larger role in judging the reliability of various valuation methods, especially for illiquid or hard-to-value securities, and that, in the future, accounting standard setters would need to consider how accounting practices affect financial stability. It was suggested that the rating agencies should review the quality of their methodologies. Some Directors saw merit in a differentiated rating scale for structured finance products, in order to help signal that these instruments are more susceptible to shocks and have distinct risk profiles.

Directors noted that the analysis in Chapter 2 of the business funding model of structured financial products appropriately highlights the incentives that led to the heavy use of short-term wholesale funding to support longer-term illiquid, structured financial instruments. Directors acknowledged that many of the risk management systems at major financial institutions had not been able to gauge the risk of this new business model appropriately, in part because risks were not consolidated at a high enough level. Most Directors agreed with staff that a rigorous implementation of Basel II would provide less incentive to transfer risks off balance sheets, but others noted that, even with the improvements in Basel II, further work would be needed to see where adjustments to the capital adequacy framework could be beneficial. Directors generally considered that consolidation criteria and disclosures need to be re-examined, as many institutions have been able to avoid transparent revelation of their risks to investors and counterparties.

The widespread illiquidity during this episode of financial turmoil has been surprising to many observers, requiring unprecedented interven-

tion by major central banks. Directors welcomed the staff analysis of the interactions between market liquidity—the ability to buy and sell an asset with a small associated price change—and funding liquidity—the ability of a solvent institution to make its agreed upon payments in a timely fashion.

Directors generally welcomed the prompt and innovative actions of central banks to inject liquidity into the banking system to keep interbank markets functioning smoothly. They noted that most central banks had been flexible in their dealings with market participants, developing new operational procedures and, in some cases, new facilities, to help to alleviate the effects of the interbank illiquidity on the real economies. Directors recognized that, as challenges in maintaining adequate liquidity and normal market functioning will continue, central banks will need to remain vigilant to new problems as they arise. Some Directors pointed to potential moral hazard effects of excessive central bank activism. Some Directors indicated that, if central banks are prepared to accept a broader range of collateral, they would also need to pay greater attention to the credit risks that they are assuming.

Directors generally agreed that the recent episode of financial turmoil has highlighted the need for central banks to consider more carefully their roles regarding financial stability and monetary policy implementation—noting that these roles are becoming more intertwined. Several Directors saw merit in major central banks moving toward closer convergence of liquidity support practices as regards collateral policies and the different maturities for intervention that could be used during periods of stress. Some Directors emphasized that retaining flexibility for independent approaches would be important, in view of country-specific differences in interbank markets and in central bank operating procedures.

Directors noted that, while the authorities in individual countries are clearly moving to stem the effects of disorderly financial market conditions, the IMF should, in coordination

with other multilateral bodies such as the Financial Stability Forum (FSF), as well as national agencies, play a larger role in international fora to influence policy. Directors agreed that the IMF is uniquely placed for adding such a multilateral perspective to policy responses to the current crisis, including through the *World Economic Outlook* and the GFSR; for providing a forum for ongoing discussion and exchange of views, especially with regard to possible contingency actions; and for promoting consistency of national policies and assessing their spillovers in an increasingly integrated global economy. The IMF's broad membership and expertise in deal-

ing with financial crises make it a natural focal point for cross-country discussions. In this vein, several Directors looked forward to the consideration of the lessons from the financial crisis, including the implications for bilateral and multilateral surveillance, and of possible avenues for the IMF to be more pro-active and outspoken in its surveillance, while always remaining mindful of prudent communication. Several other suggestions were offered going forward, notably, to increase the frequency and comprehensiveness of the IMF's financial market updates and to further enhance its work on macro-financial linkages and on monitoring and early warning.

## STATISTICAL APPENDIX

**T**his statistical appendix presents data on financial developments in key financial centers and emerging markets. It is designed to complement the analysis in the text by providing additional data that describe key aspects of financial market developments. These data are derived from a number of sources external to the IMF, including banks, commercial data providers, and official sources, and are presented for information purposes only; the IMF does not, however, guarantee the accuracy of the data from external sources.

Presenting financial market data in one location and in a fixed set of tables and charts, in this and future issues of the GFSR, is intended to give the reader an overview of developments in global financial markets. Unless otherwise noted, the statistical appendix reflects information available up to January 24, 2008.

Mirroring the structure of the chapters of the report, the appendix presents data separately

for key financial centers and emerging market countries. Specifically, it is organized into three sections:

- Figures 1–14 and Tables 1–9 contain information on market developments in key financial centers. This includes data on global capital flows, and on markets for foreign exchange, bonds, equities, and derivatives as well as sectoral balance sheet data for the United States, Japan, and Europe.
- Figures 15 and 16, and Tables 10–21 present information on financial developments in emerging markets, including data on equity, foreign exchange, and bond markets, as well as data on emerging market financing flows.
- Tables 22–27 report key financial soundness indicators for selected countries, including bank profitability, asset quality, and capital adequacy.

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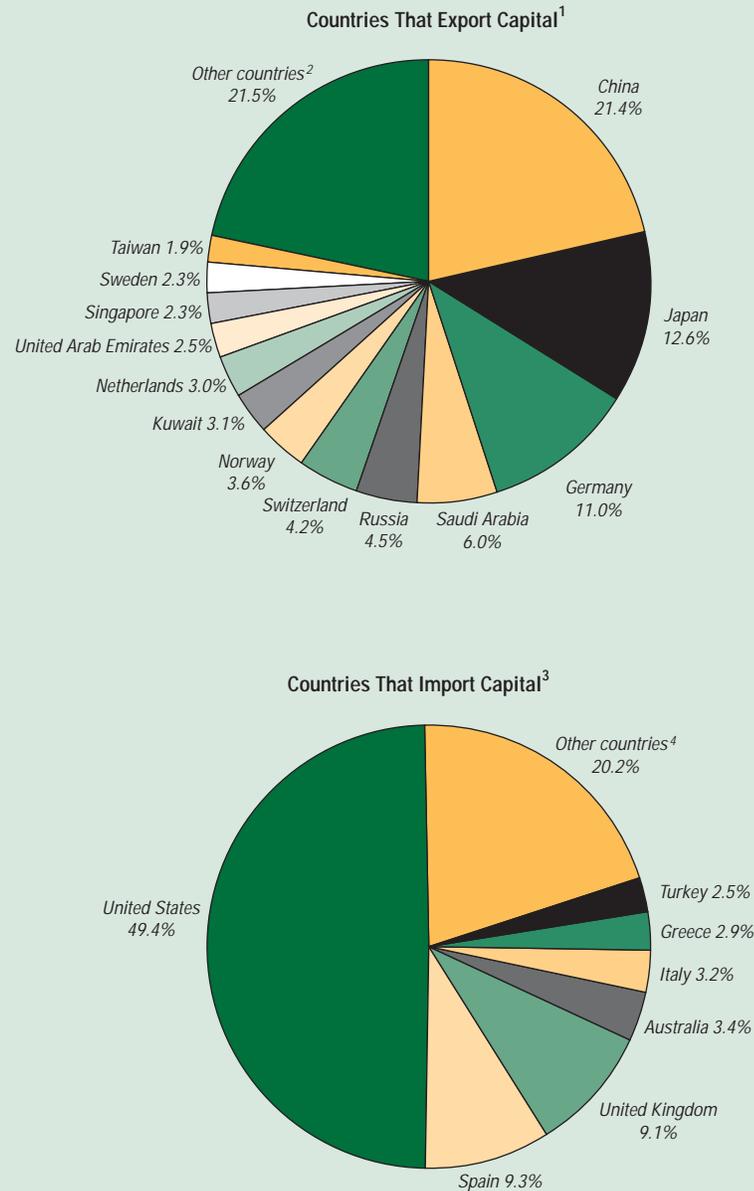
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Figure 1. Major Net Exporters and Importers of Capital in 2007



Source: IMF, *World Economic Outlook* database as of March 18, 2008.

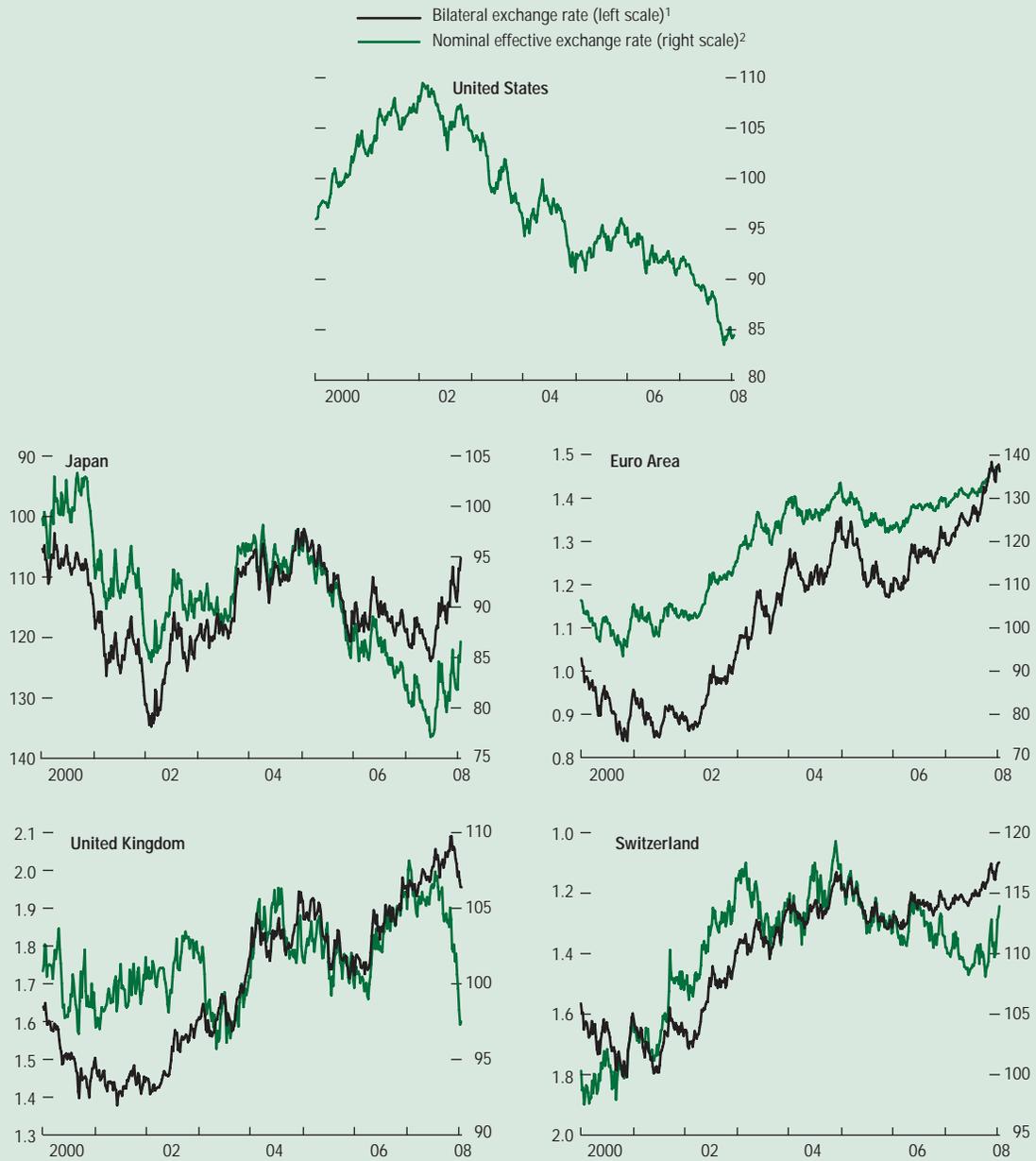
<sup>1</sup>As measured by countries' current account surplus (assuming errors and omissions are part of the capital and financial accounts).

<sup>2</sup>Other countries include all countries with shares of total surplus less than 1.9 percent.

<sup>3</sup>As measured by countries' current account deficit (assuming errors and omissions are part of the capital and financial accounts).

<sup>4</sup>Other countries include all countries with shares of total deficit less than 2.5 percent.

**Figure 2. Exchange Rates: Selected Major Industrial Countries**  
(Weekly data)



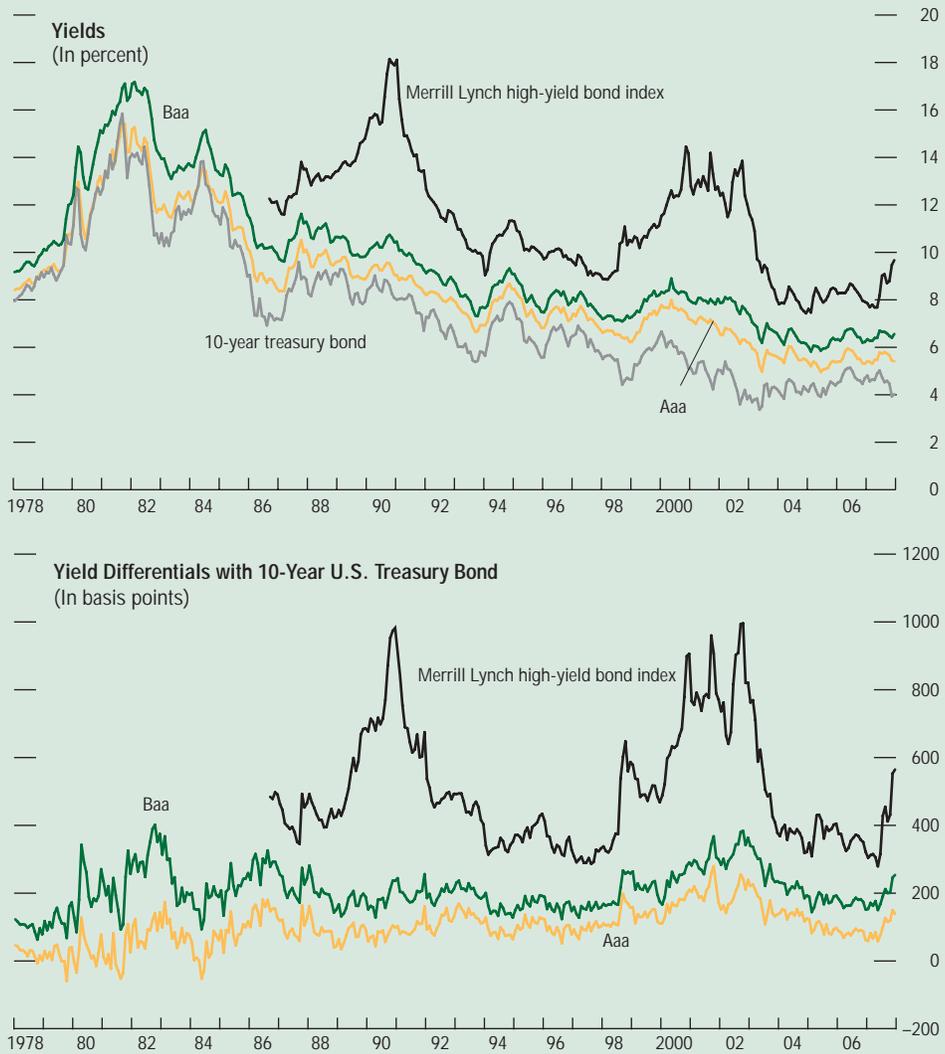
Sources: Bloomberg L.P.; and the IMF Global Data System.

Note: In each panel, the effective and bilateral exchange rates are scaled so that an upward movement implies an appreciation of the respective local currency.

<sup>1</sup>Local currency units per U.S. dollar except for the euro area and the United Kingdom, for which data are shown as U.S. dollars per local currency.

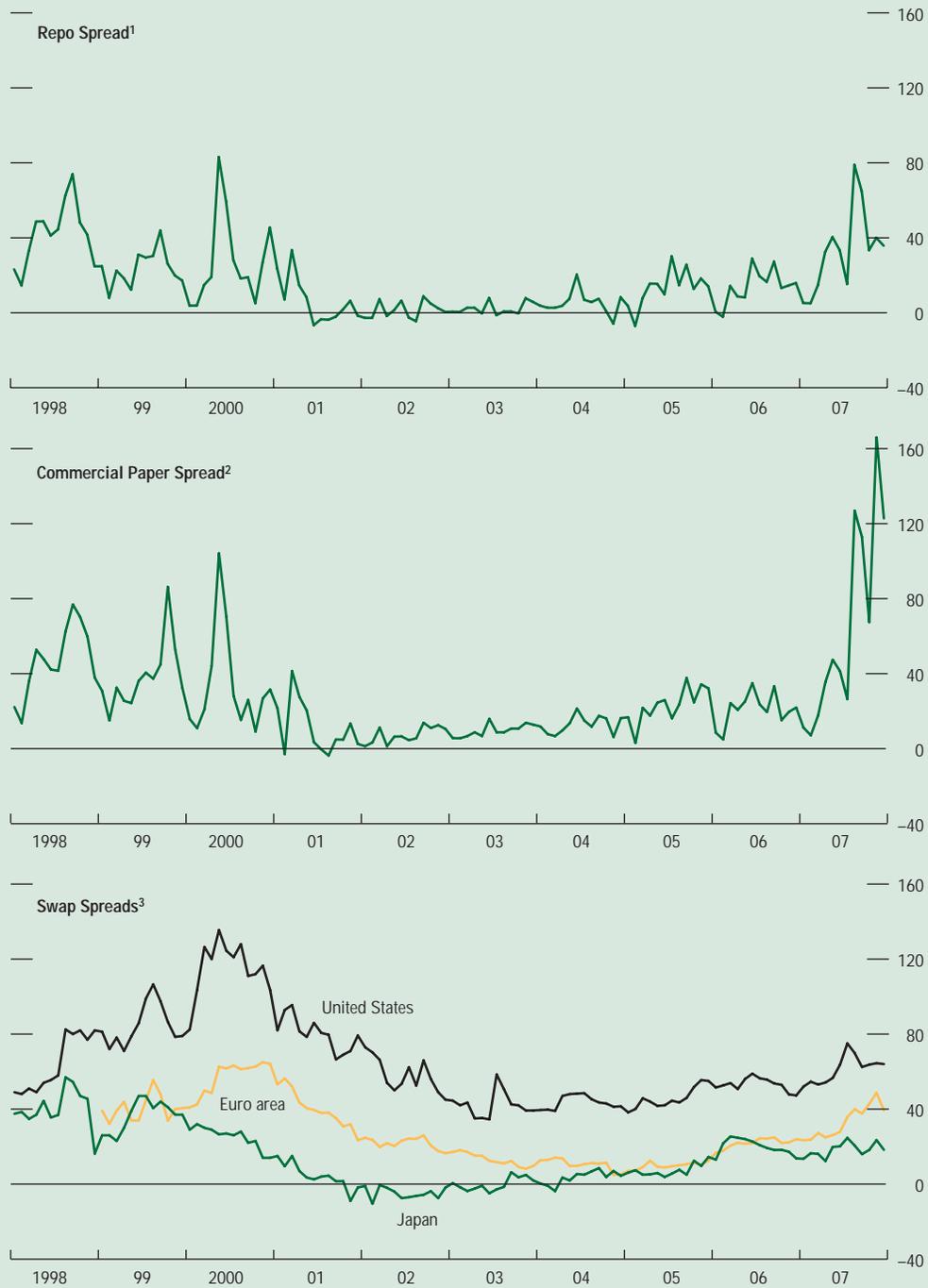
<sup>2</sup>2000 = 100; constructed using 1999–2001 trade weights.

**Figure 3. United States: Yields on Corporate and Treasury Bonds**  
*(Monthly data)*



Sources: Bloomberg L.P.; and Merrill Lynch.

**Figure 4. Selected Spreads**  
*(In basis points; monthly data)*



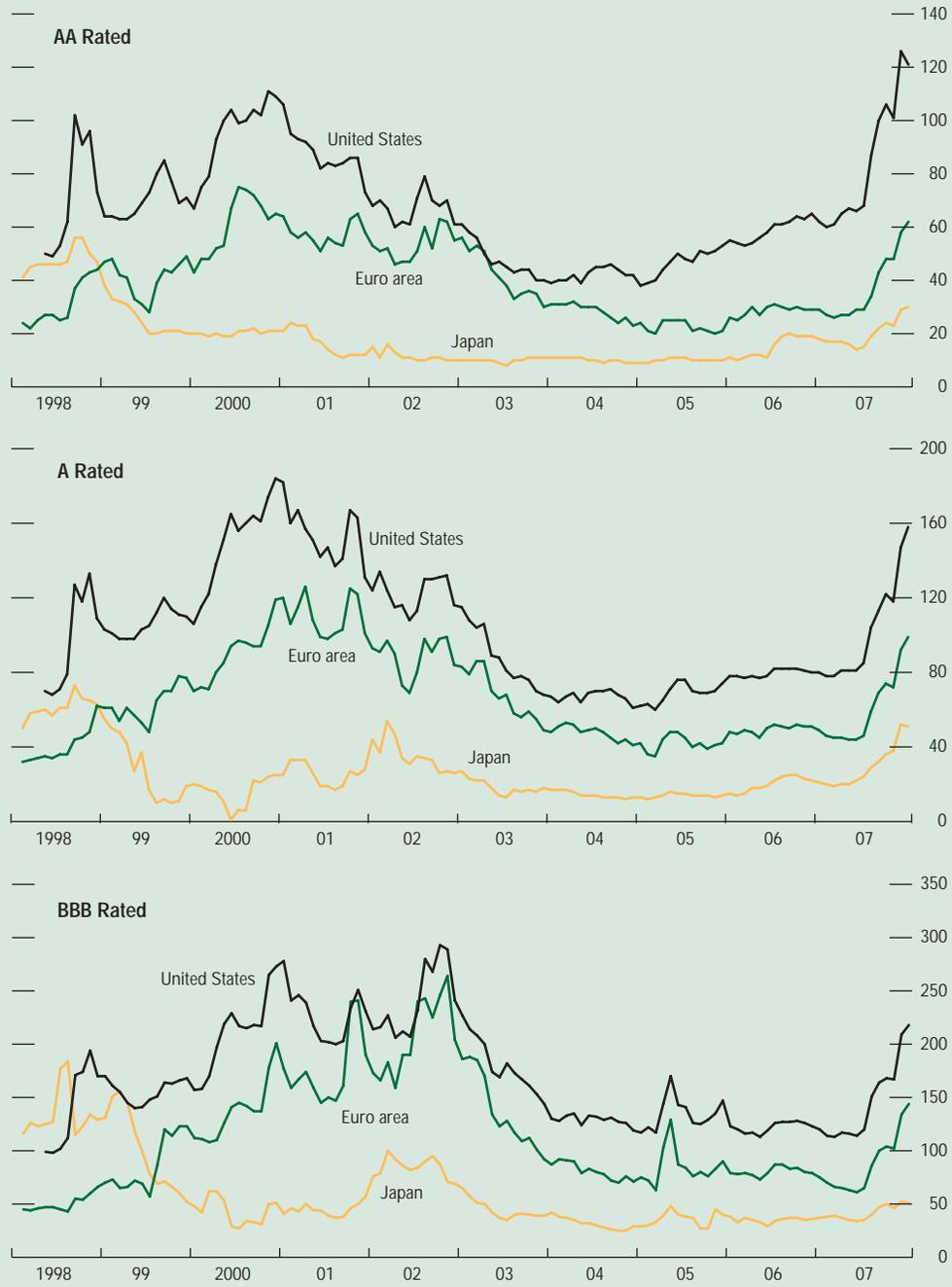
Sources: Bloomberg L.P.; and Merrill Lynch.

<sup>1</sup>Spread between yields on three-month U.S. treasury repo and on three-month U.S. treasury bill.

<sup>2</sup>Spread between yields on 90-day investment-grade commercial paper and on three-month U.S. treasury bill.

<sup>3</sup>Spread over 10-year government bond.

**Figure 5. Nonfinancial Corporate Credit Spreads**  
*(In basis points; monthly data)*

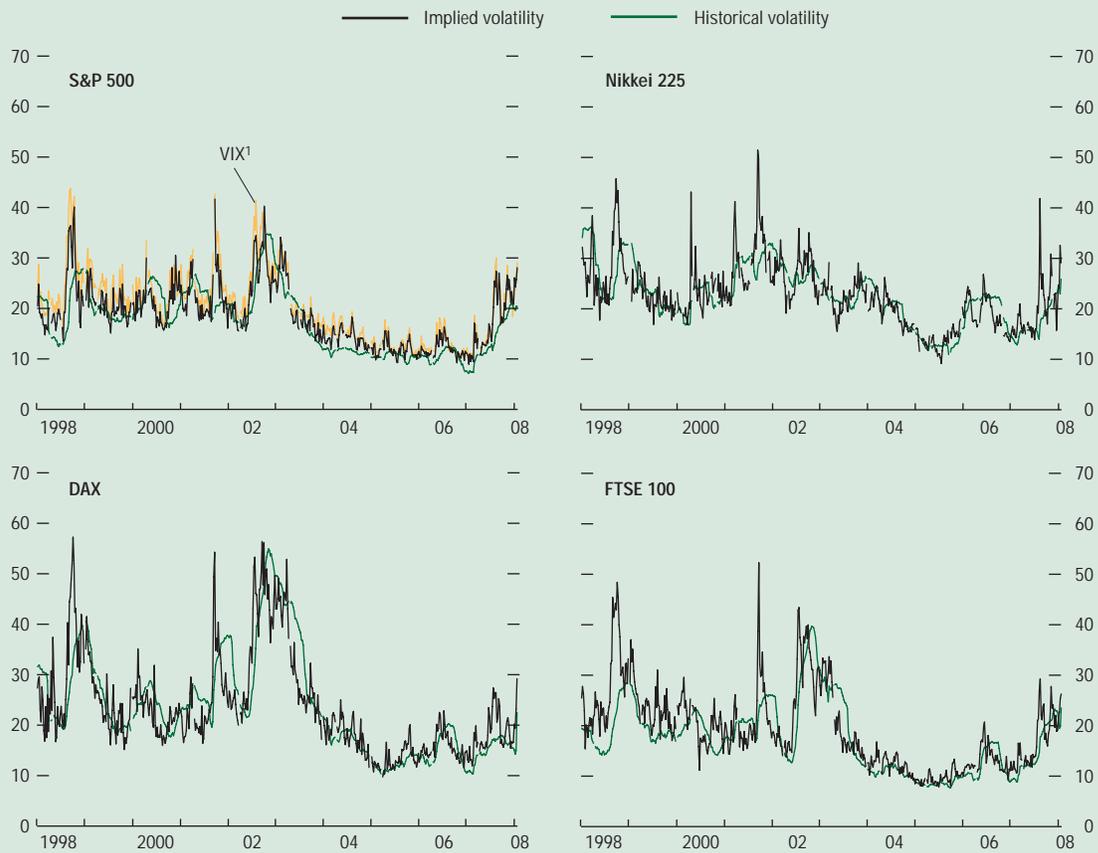


Source: Merrill Lynch.

**Figure 6. Equity Markets: Price Indices**  
*(January 1, 1990 = 100; weekly data)*



Source: Bloomberg L.P.

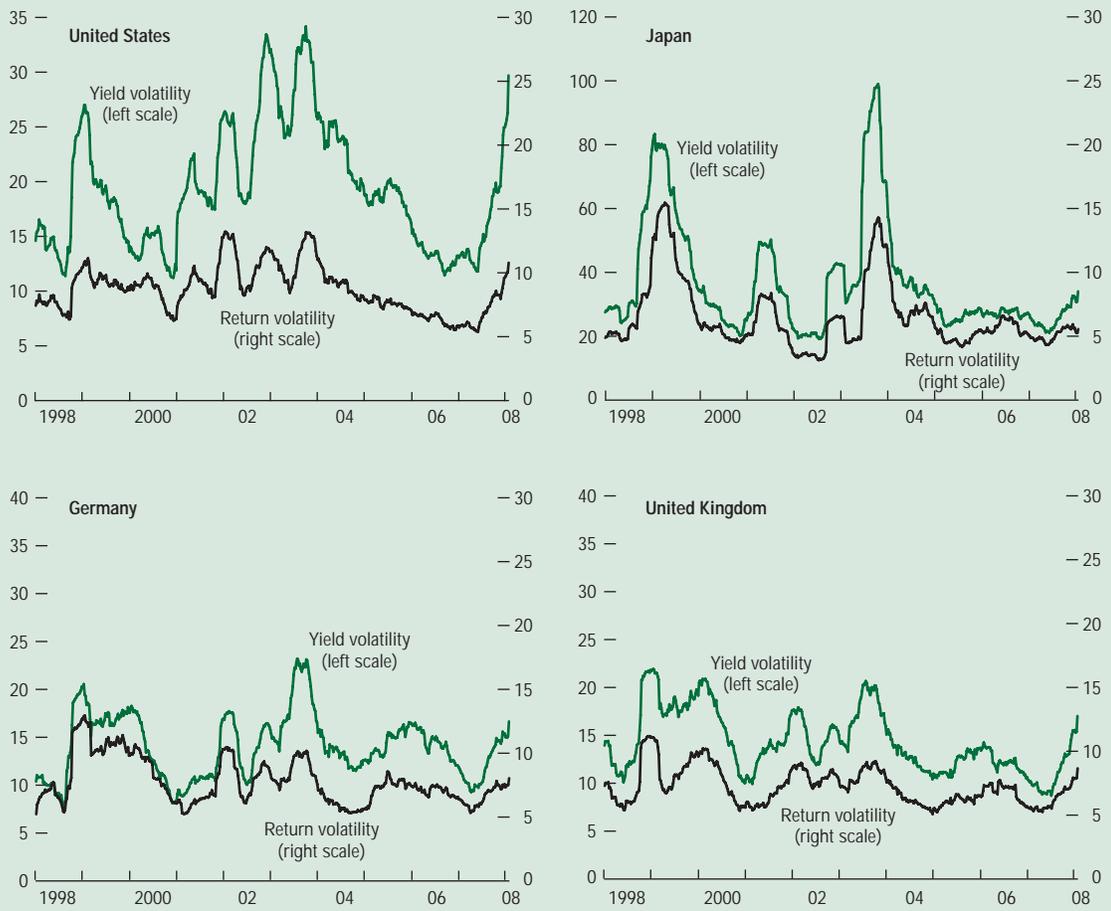
**Figure 7. Implied and Historical Volatility in Equity Markets***(Weekly data)*

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

Note: Implied volatility is a measure of the equity price variability implied by the market prices of call options on equity futures. Historical volatility is calculated as a rolling 100-day annualized standard deviation of equity price changes. Volatilities are expressed in percent rate of change.

<sup>1</sup>VIX is the Chicago Board Options Exchange volatility index. This index is calculated by taking a weighted average of implied volatility for the eight S&P 500 calls and puts.

**Figure 8. Historical Volatility of Government Bond Yields and Bond Returns for Selected Countries<sup>1</sup>**  
*(Weekly data)*



Sources: Bloomberg L.P.; and Datastream.

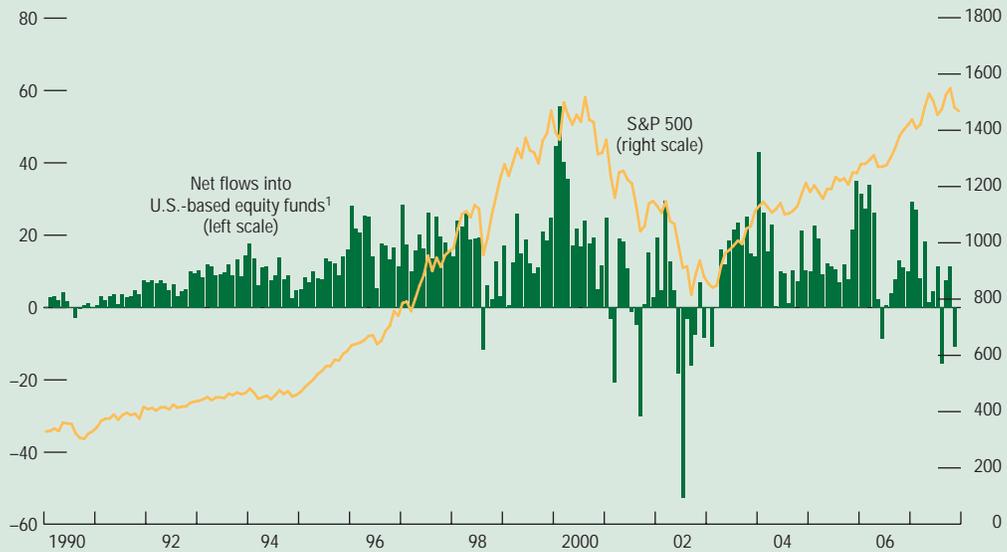
<sup>1</sup>Volatility calculated as a rolling 100-day annualized standard deviation of changes in yield and returns on 10-year government bonds. Returns are based on 10-plus-year government bond indices.

**Figure 9. Twelve-Month Forward Price/Earnings Ratios**



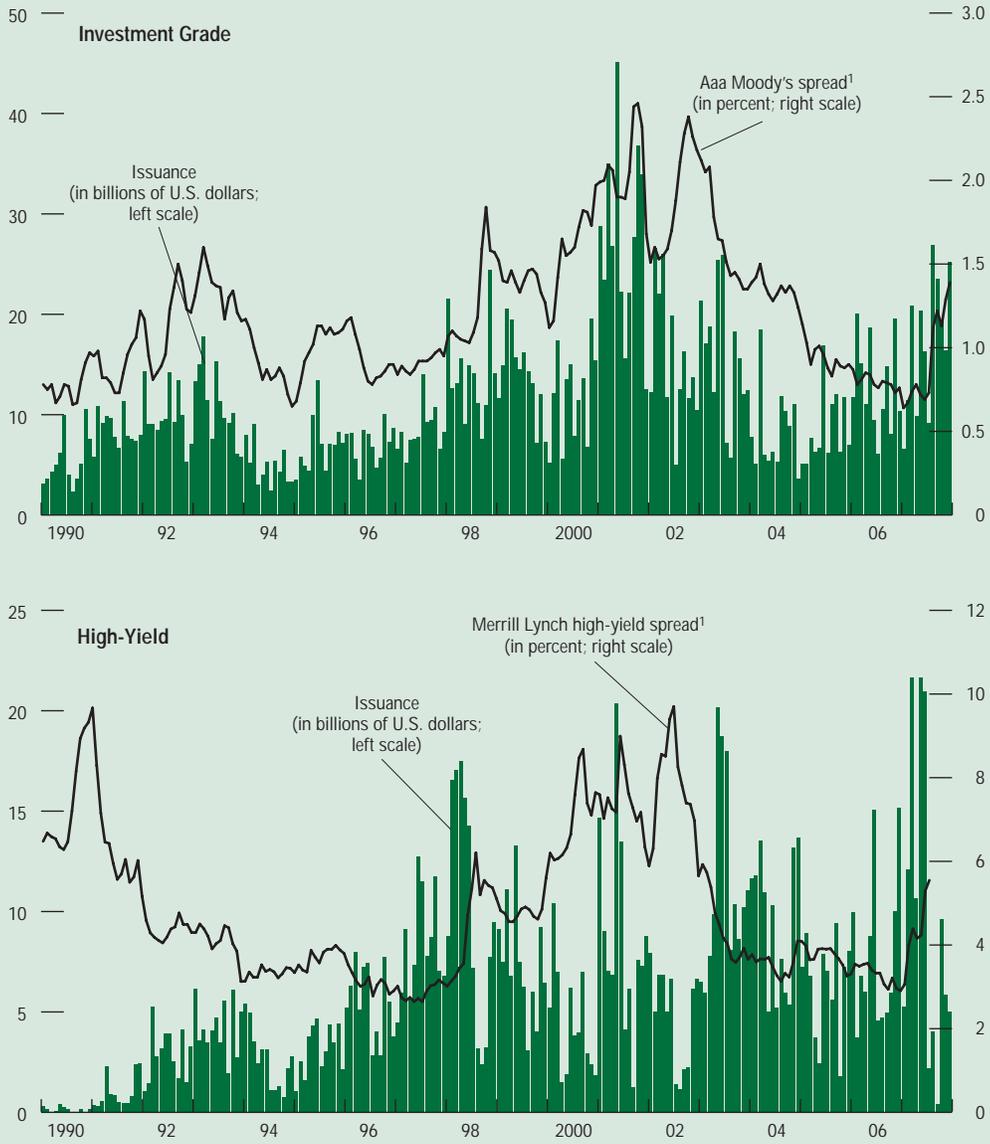
Source: I/B/E/S.

**Figure 10. Flows into U.S.-Based Equity Funds**



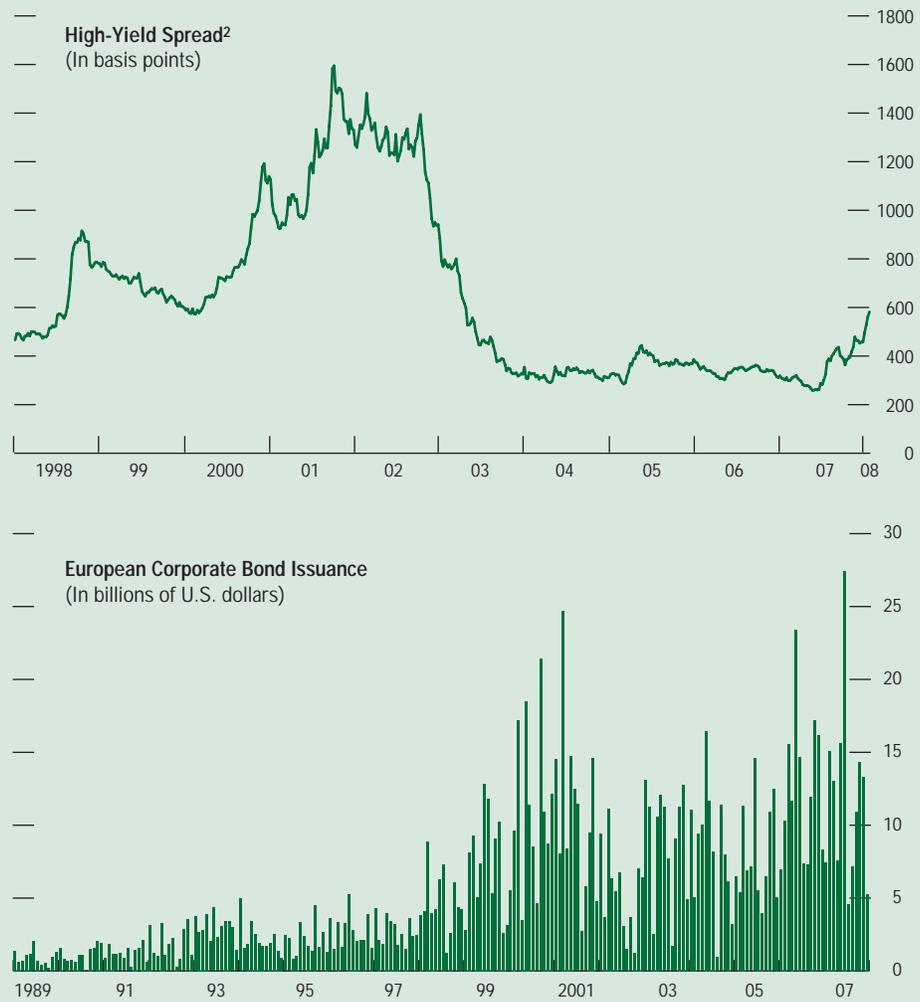
Sources: Investment Company Institute; and Datastream.  
<sup>1</sup>In billions of U.S. dollars.

**Figure 11. United States: Corporate Bond Market**



Sources: Board of Governors of the Federal Reserve System; and Bloomberg L.P.  
<sup>1</sup>Spread against yield on 10-year U.S. government bonds.

**Figure 12. Europe: Corporate Bond Market<sup>1</sup>**

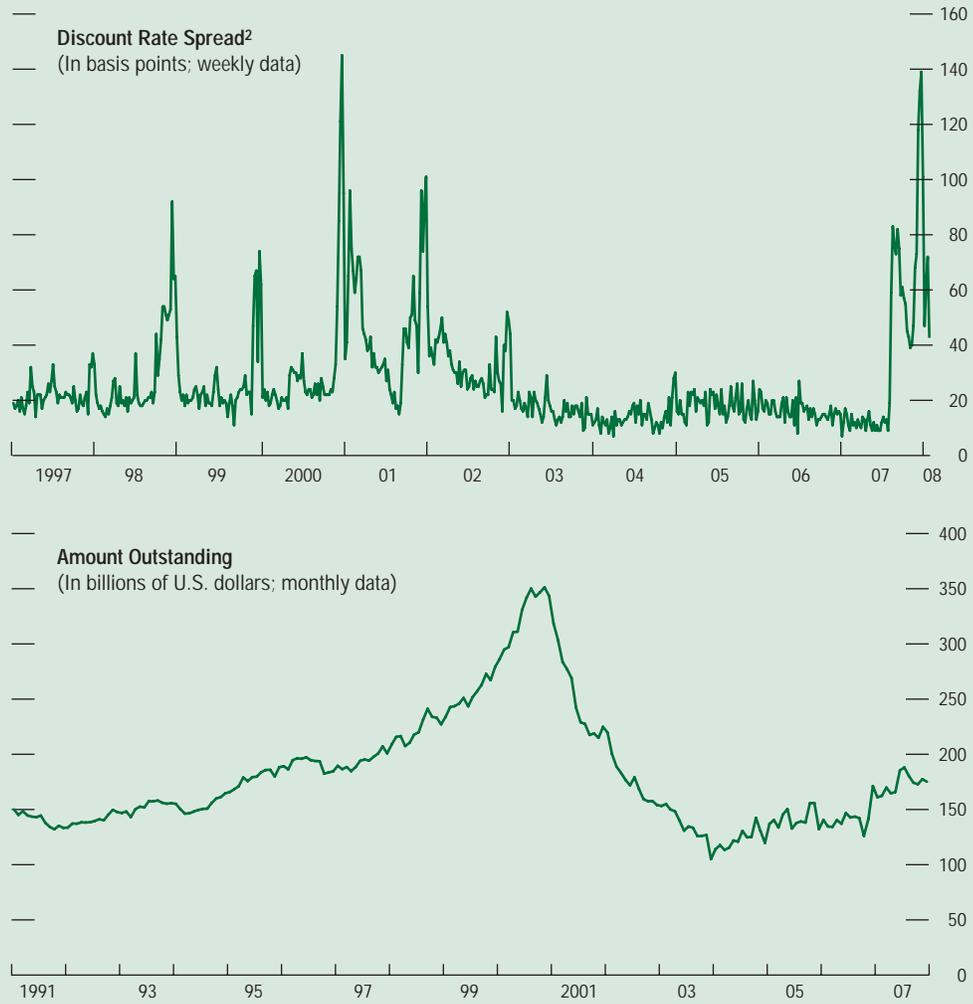


Sources: Bondware; and Datastream.

<sup>1</sup>Nonfinancial corporate bonds.

<sup>2</sup>Spread between yields on a Merrill Lynch High-Yield European Issuers Index bond and a 10-year German government benchmark bond.

**Figure 13. United States: Commercial Paper Market<sup>1</sup>**

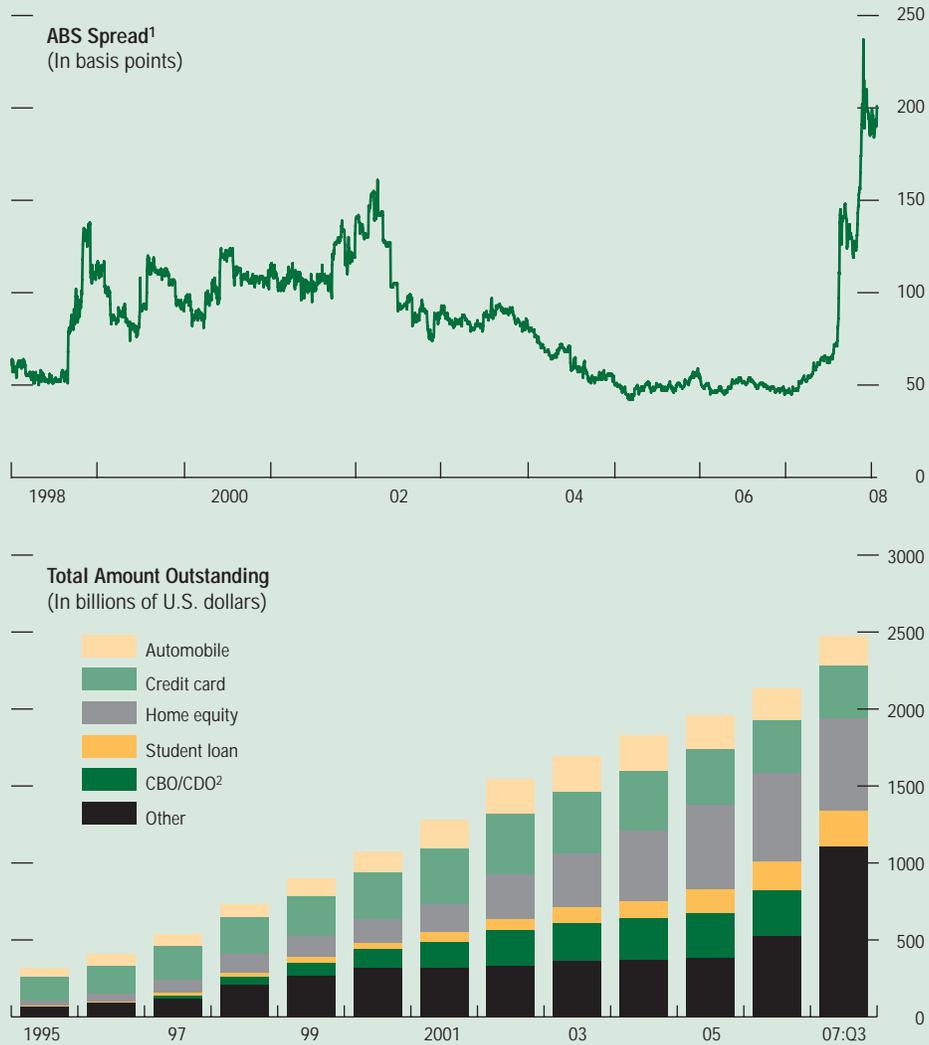


Source: Board of Governors of the Federal Reserve System.

<sup>1</sup>Nonfinancial commercial paper.

<sup>2</sup>Difference between 30-day A2/P2 and AA commercial paper.

**Figure 14. United States: Asset-Backed Securities**



Sources: Merrill Lynch; Datastream; and the Securities Industry and Financial Markets Association.

<sup>1</sup>Merrill Lynch AAA Asset-Backed Master Index (fixed rate) option-adjusted spread.

<sup>2</sup>Collateralized bond/debt obligations; for 2007 Q3, CBO/CDO amount outstanding is included in Other.

**Table 1. Global Capital Flows: Inflows and Outflows<sup>1</sup>***(In billions of U.S. dollars)*

|  | Inflows |       |        |        |         |       |       |       |         |         |         |
|--|---------|-------|--------|--------|---------|-------|-------|-------|---------|---------|---------|
|  | 1996    | 1997  | 1998   | 1999   | 2000    | 2001  | 2002  | 2003  | 2004    | 2005    | 2006    |
| <b>United States</b>   |         |       |        |        |         |       |       |       |         |         |         |
| Direct investment  | 86.5    | 105.6 | 179.0  | 289.4  | 321.3   | 167.0 | 84.4  | 63.8  | 145.8   | 109.0   | 180.6   |
| Portfolio investment   | 332.8   | 333.1 | 187.6  | 285.6  | 436.6   | 428.3 | 427.6 | 550.2 | 867.3   | 832.0   | 1,017.4 |
| Other investment   | 131.8   | 268.1 | 57.0   | 165.2  | 289.0   | 187.5 | 285.8 | 250.4 | 448.6   | 263.2   | 661.6   |
| Reserve assets   | n.a.    | n.a.  | n.a.   | n.a.   | n.a.    | n.a.  | n.a.  | n.a.  | n.a.    | n.a.    | n.a.    |
| Total capital flows  | 551.1   | 706.8 | 423.6  | 740.2  | 1,046.9 | 782.9 | 797.8 | 864.4 | 1,461.8 | 1,204.2 | 1,859.6 |
| <b>Canada</b>  |         |       |        |        |         |       |       |       |         |         |         |
| Direct investment  | 9.6     | 11.5  | 22.7   | 24.8   | 66.1    | 27.7  | 22.1  | 7.2   | -0.7    | 29.1    | 69.1    |
| Portfolio investment   | 13.7    | 11.7  | 16.6   | 2.7    | 10.3    | 24.2  | 11.9  | 14.1  | 42.0    | 7.9     | 28.7    |
| Other investment   | 15.7    | 28.0  | 5.4    | -10.8  | 0.8     | 7.8   | 5.1   | 12.3  | -3.9    | 27.0    | 28.2    |
| Reserve assets   | n.a.    | n.a.  | n.a.   | n.a.   | n.a.    | n.a.  | n.a.  | n.a.  | n.a.    | n.a.    | n.a.    |
| Total capital flows  | 39.1    | 51.2  | 44.8   | 16.6   | 77.2    | 59.7  | 39.0  | 33.6  | 37.4    | 64.1    | 126.0   |
| <b>Japan</b>   |         |       |        |        |         |       |       |       |         |         |         |
| Direct investment  | 0.2     | 3.2   | 3.3    | 12.3   | 8.2     | 6.2   | 9.1   | 6.2   | 7.8     | 3.2     | -6.8    |
| Portfolio investment   | 66.8    | 79.2  | 56.1   | 126.9  | 47.4    | 60.5  | -20.0 | 81.2  | 196.7   | 183.1   | 198.6   |
| Other investment   | 31.1    | 68.0  | -93.3  | -265.1 | -10.2   | -17.6 | 26.6  | 34.1  | 68.3    | 45.9    | -89.1   |
| Reserve assets   | n.a.    | n.a.  | n.a.   | n.a.   | n.a.    | n.a.  | n.a.  | n.a.  | n.a.    | n.a.    | n.a.    |
| Total capital flows  | 98.1    | 150.4 | -34.0  | -125.9 | 45.4    | 49.1  | 15.7  | 121.5 | 272.8   | 232.3   | 102.6   |
| <b>United Kingdom</b>  |         |       |        |        |         |       |       |       |         |         |         |
| Direct investment  | 27.4    | 37.5  | 74.7   | 89.3   | 122.2   | 53.8  | 25.5  | 27.6  | 77.9    | 195.6   | 139.7   |
| Portfolio investment   | 68.0    | 43.7  | 35.2   | 183.9  | 255.6   | 69.6  | 76.2  | 155.6 | 159.9   | 240.3   | 294.4   |
| Other investment   | 251.8   | 322.2 | 110.5  | 90.0   | 414.6   | 327.0 | 109.1 | 396.7 | 741.2   | 936.2   | 830.8   |
| Reserve assets   | n.a.    | n.a.  | n.a.   | n.a.   | n.a.    | n.a.  | n.a.  | n.a.  | n.a.    | n.a.    | n.a.    |
| Total capital flows  | 347.2   | 403.4 | 220.3  | 363.3  | 792.4   | 450.5 | 210.8 | 579.9 | 979.0   | 1,372.1 | 1,264.9 |
| <b>Euro area</b>   |         |       |        |        |         |       |       |       |         |         |         |
| Direct investment  | ...     | ...   | ...    | 216.3  | 416.3   | 199.8 | 185.0 | 153.2 | 121.4   | 186.3   | 247.5   |
| Portfolio investment   | ...     | ...   | ...    | 305.1  | 268.1   | 318.3 | 298.4 | 383.3 | 520.0   | 692.9   | 1,017.7 |
| Other investment   | ...     | ...   | ...    | 198.4  | 340.3   | 238.1 | 59.9  | 198.0 | 355.8   | 819.7   | 871.4   |
| Reserve assets   | n.a.    | n.a.  | n.a.   | n.a.   | n.a.    | n.a.  | n.a.  | n.a.  | n.a.    | n.a.    | n.a.    |
| Total capital flows  | ...     | ...   | ...    | 719.8  | 1,024.7 | 756.3 | 543.2 | 734.5 | 997.1   | 1,698.9 | 2,136.6 |
| <b>Emerging Markets and Developing Countries<sup>2</sup></b> |         |       |        |        |         |       |       |       |         |         |         |
| Direct investment  | 148.2   | 191.4 | 186.7  | 212.0  | 212.0   | 227.9 | 190.1 | 203.8 | 276.4   | 374.2   | 464.0   |
| Portfolio investment   | 174.2   | 146.3 | 37.9   | 105.1  | 94.8    | 13.6  | -14.2 | 85.0  | 126.8   | 188.3   | 211.9   |
| Other investment   | 92.6    | 143.4 | -117.7 | -81.5  | -4.5    | -56.9 | 5.4   | 126.0 | 209.2   | 194.5   | 379.6   |
| Reserve assets   | n.a.    | n.a.  | n.a.   | n.a.   | n.a.    | n.a.  | n.a.  | n.a.  | n.a.    | n.a.    | n.a.    |
| Total capital flows  | 415.0   | 481.1 | 107.0  | 235.6  | 302.3   | 184.7 | 181.3 | 414.8 | 612.4   | 757.0   | 1,055.6 |

Sources: IMF, *International Financial Statistics* and *World Economic Outlook* database as of March 18, 2008.<sup>1</sup>The total net capital flows are the sum of direct investment, portfolio investment, other investment flows, and reserve assets. "Other investment" includes bank loans and deposits.<sup>2</sup>This aggregate comprises the group of Other Emerging Market and Developing Countries defined in the *World Economic Outlook*, together with Hong Kong SAR, Israel, Korea, Singapore, and Taiwan Province of China.

| Outflows |        |        |        |        |        |        |        |          |          |          |
|----------|--------|--------|--------|--------|--------|--------|--------|----------|----------|----------|
| 1996     | 1997   | 1998   | 1999   | 2000   | 2001   | 2002   | 2003   | 2004     | 2005     | 2006     |
| -91.9    | -104.8 | -142.6 | -224.9 | -159.2 | -142.4 | -154.5 | -149.6 | -279.1   | 7.7      | -235.4   |
| -149.3   | -116.9 | -130.2 | -122.2 | -127.9 | -90.6  | -48.6  | -123.1 | -153.4   | -203.4   | -426.1   |
| -178.9   | -262.8 | -74.2  | -165.6 | -273.1 | -144.7 | -87.9  | -54.3  | -475.4   | -245.2   | -396.1   |
| 6.7      | -1.0   | -6.7   | 8.7    | -0.3   | -4.9   | -3.7   | 1.5    | 2.8      | 14.1     | 2.4      |
| -413.4   | -485.5 | -353.8 | -504.1 | -560.5 | -382.6 | -294.7 | -325.4 | -905.0   | -426.9   | -1,055.2 |
| -13.1    | -23.1  | -34.1  | -17.3  | -44.5  | -36.2  | -26.8  | -23.6  | -43.0    | -33.6    | -45.4    |
| -14.2    | -8.6   | -15.1  | -15.6  | -43.0  | -24.4  | -18.6  | -13.8  | -18.9    | -44.1    | -69.4    |
| -21.1    | -16.2  | 9.4    | 10.2   | -4.2   | -10.7  | -7.9   | -14.2  | -7.0     | -16.6    | -30.4    |
| -5.5     | 2.4    | -5.0   | -5.9   | -3.7   | -2.2   | 0.2    | 3.3    | 2.8      | -1.3     | -0.8     |
| -53.9    | -45.4  | -44.8  | -28.5  | -95.4  | -73.4  | -53.2  | -48.4  | -66.1    | -95.6    | -146.0   |
| -23.4    | -26.1  | -24.6  | -22.3  | -31.5  | -38.5  | -32.0  | -28.8  | -31.0    | -45.4    | -50.2    |
| -100.6   | -47.1  | -95.2  | -154.4 | -83.4  | -106.8 | -85.9  | -176.3 | -173.8   | -196.4   | -71.0    |
| 5.2      | -192.0 | 37.9   | 266.3  | -4.1   | 46.6   | 36.4   | 149.9  | -48.0    | -106.6   | -86.2    |
| -35.1    | -6.6   | 6.2    | -76.3  | -49.0  | -40.5  | -46.1  | -187.2 | -160.9   | -22.3    | -32.0    |
| -154.0   | -271.6 | -75.8  | 13.4   | -168.0 | -139.2 | -127.7 | -242.3 | -413.6   | -370.8   | -239.4   |
| -36.7    | -60.9  | -122.8 | -202.5 | -246.3 | -61.8  | -50.3  | -65.6  | -98.2    | -91.7    | -128.7   |
| -93.4    | -85.0  | -53.2  | -34.3  | -97.2  | -124.7 | 1.2    | -58.4  | -259.2   | -291.5   | -368.5   |
| -214.7   | -277.8 | -22.9  | -97.1  | -426.8 | -255.5 | -151.0 | -415.6 | -596.9   | -931.6   | -733.2   |
| 0.7      | 3.9    | 0.3    | 1.0    | -5.3   | 4.5    | 0.6    | 2.6    | -0.4     | -1.7     | 1.3      |
| -344.1   | -419.8 | -198.6 | -332.9 | -775.6 | -437.6 | -199.5 | -537.1 | -954.7   | -1,316.5 | -1,229.0 |
| ...      | ...    | ...    | -348.8 | -413.7 | -298.0 | -163.8 | -165.4 | -205.1   | -443.2   | -419.9   |
| ...      | ...    | ...    | -341.7 | -385.3 | -255.0 | -163.2 | -318.3 | -428.1   | -513.3   | -667.6   |
| ...      | ...    | ...    | -30.2  | -165.8 | -243.6 | -220.7 | -284.1 | -392.5   | -713.0   | -908.9   |
| ...      | ...    | ...    | 11.6   | 16.2   | 16.4   | -3.0   | 32.8   | 15.6     | 22.9     | -2.6     |
| ...      | ...    | ...    | -709.2 | -948.7 | -780.1 | -550.7 | -735.1 | -1,010.1 | -1,646.7 | -1,999.0 |
| -32.2    | -41.1  | -27.1  | -35.3  | -41.7  | -41.8  | -32.2  | -37.8  | -86.7    | -112.7   | -213.3   |
| -85.8    | -110.2 | -9.4   | -45.1  | -103.9 | -105.7 | -88.3  | -131.9 | -151.4   | -251.3   | -401.6   |
| -92.9    | -128.5 | 35.2   | -65.4  | -128.0 | 43.6   | 27.1   | -126.6 | -201.2   | -258.9   | -403.7   |
| -87.9    | -91.3  | -28.3  | -98.7  | -135.3 | -123.7 | -194.8 | -363.0 | -509.0   | -594.8   | -753.3   |
| -298.8   | -371.1 | -29.6  | -244.5 | -408.9 | -227.7 | -288.2 | -659.3 | -948.3   | -1,217.7 | -1,771.9 |

**Table 2. Global Capital Flows: Amounts Outstanding and Net Issues of International Debt Securities by Currency of Issue and Announced International Syndicated Credit Facilities by Nationality of Borrower**  
(In billions of U.S. dollars)

|  | 2002    | 2003     | 2004     | 2005     | 2006     | 2007     |          |          |
|--|---------|----------|----------|----------|----------|----------|----------|----------|
|  |         |          |          |          |          | Q1       | Q2       | Q3       |
| <b>Amounts outstanding of international debt securities by currency of issue</b>       |         |          |          |          |          |          |          |          |
| U.S. dollar  | 4,123.9 | 4,537.7  | 4,906.0  | 5,382.0  | 6,400.6  | 6,703.3  | 7,129.2  | 7,349.6  |
| Japanese yen   | 433.2   | 488.0    | 530.4    | 472.1    | 487.3    | 499.7    | 504.8    | 557.3    |
| Pound sterling   | 618.2   | 776.3    | 981.0    | 1,062.6  | 1,450.0  | 1,517.7  | 1,635.2  | 1,708.0  |
| Canadian dollar  | 51.6    | 79.5     | 112.6    | 146.7    | 178.0    | 197.1    | 232.6    | 253.8    |
| Swedish krona  | 11.1    | 15.8     | 20.9     | 23.2     | 34.3     | 35.1     | 40.5     | 43.8     |
| Swiss franc  | 159.2   | 195.6    | 227.9    | 208.6    | 253.8    | 263.9    | 273.5    | 285.6    |
| Euro   | 3,283.2 | 4,826.5  | 6,212.4  | 6,309.4  | 8,310.1  | 8,800.6  | 9,395.8  | 9,957.7  |
| Other  | 152.0   | 216.7    | 285.0    | 354.9    | 455.0    | 490.2    | 552.3    | 587.1    |
| Total  | 8,832.3 | 11,136.1 | 13,276.2 | 13,959.4 | 17,569.1 | 18,507.7 | 19,764.0 | 20,743.0 |
| <b>Net issues of international debt securities by currency of issue</b>                |         |          |          |          |          |          |          |          |
| U.S. dollar  | 423.5   | 413.8    | 368.2    | 476.0    | 1,018.6  | 302.6    | 426.0    | 220.4    |
| Japanese yen   | -17.5   | 3.7      | 26.9     | 3.9      | 19.4     | 7.0      | 28.2     | 17.6     |
| Pound sterling   | 52.4    | 84.5     | 133.2    | 197.6    | 223.2    | 71.2     | 80.4     | 48.0     |
| Canadian dollar  | 3.6     | 15.6     | 25.5     | 29.4     | 32.1     | 16.9     | 18.5     | 5.5      |
| Swedish krona  | 1.1     | 2.0      | 3.4      | 6.2      | 7.0      | 1.5      | 4.6      | 1.1      |
| Swiss franc  | 8.0     | 15.8     | 12.7     | 13.1     | 28.2     | 10.1     | 10.9     | -1.0     |
| Euro   | 492.0   | 779.0    | 918.4    | 986.4    | 1,205.7  | 390.8    | 470.4    | 89.6     |
| Other  | 30.7    | 38.0     | 52.2     | 87.3     | 79.3     | 29.3     | 44.7     | 15.2     |
| Total  | 993.8   | 1,352.3  | 1,540.5  | 1,799.9  | 2,613.7  | 829.5    | 1,083.5  | 396.3    |
| <b>Announced international syndicated credit facilities by nationality of borrower</b> |         |          |          |          |          |          |          |          |
| All countries  | 1,296.9 | 1,241.4  | 1,806.7  | 2,232.3  | 2,121.8  | 419.2    | 650.8    | 483.2    |
| Industrial countries   | 1,199.8 | 1,130.9  | 1,637.5  | 1,991.0  | 1,822.5  | 328.8    | 543.7    | 343.0    |
| Of which:  |         |          |          |          |          |          |          |          |
| United States  | 739.2   | 606.4    | 897.2    | 978.0    | 848.9    | 143.6    | 270.6    | 159.3    |
| Japan  | 19.5    | 18.2     | 27.5     | 19.3     | 42.8     | 22.0     | 10.7     | 9.3      |
| Germany  | 84.4    | 97.6     | 116.3    | 131.6    | 170.8    | 6.0      | 13.4     | 40.1     |
| France   | 64.2    | 65.2     | 151.1    | 170.9    | 118.0    | 32.5     | 34.6     | 20.5     |
| Italy  | 22.8    | 46.1     | 22.8     | 73.6     | 26.0     | 6.6      | 5.5      | 3.1      |
| United Kingdom   | 109.9   | 103.9    | 151.4    | 180.6    | 137.0    | 42.2     | 57.0     | 23.3     |
| Canada   | 34.9    | 30.2     | 38.7     | 71.3     | 72.6     | 10.6     | 30.5     | 19.5     |

Source: Bank for International Settlements.

**Table 3. Selected Indicators on the Size of the Capital Markets, 2006***(In billions of U.S. dollars unless noted otherwise)*

|  | GDP      | Total Reserves<br>Minus Gold <sup>1</sup> | Stock<br>Market<br>Capitalization | Debt Securities |          |          | Bank<br>Assets <sup>2</sup> | Bonds,<br>Equities, and<br>Bank Assets <sup>3</sup> | Bonds, Equities,<br>and Bank Assets <sup>2</sup><br><i>(In percent of GDP)</i> |
|--|----------|---|-----------------------------------|-----------------|----------|----------|-----------------------------|---|--|
|  |          |   |                                   | Public          | Private  | Total    |                             |   |  |
| World                                  | 48,434.4 | 5,091.5                                   | 50,826.6                          | 25,780.7        | 43,420.2 | 69,200.9 | 74,435.2                    | 194,462.7   | 401.5  |
| European Union                         | 13,658.0 | 252.7                                     | 13,068.8                          | 7,693.4         | 15,498.9 | 23,192.3 | 37,736.3                    | 73,983.7  | 541.7  |
| Euro area                              | 10,586.1 | 157.5                                     | 8,419.1                           | 6,580.6         | 12,180.4 | 18,761.1 | 26,719.2                    | 54,129.5  | 511.3  |
| North America                          | 14,470.0 | 89.8                                      | 21,269.7                          | 6,941.3         | 21,449.6 | 28,390.8 | 12,236.0                    | 61,896.6  | 427.8  |
| Canada                                 | 1,275.3  | 35.0                                      | 1,700.7                           | 706.9           | 633.8    | 1,340.7  | 2,033.1                     | 5,074.6   | 397.9  |
| United States                          | 13,194.7 | 54.9                                      | 19,569.0                          | 6,234.4         | 20,815.7 | 27,050.1 | 10,202.9                    | 56,822.0  | 430.6  |
| Japan                                  | 4,377.1  | 879.7                                     | 4,795.8                           | 6,750.6         | 1,973.1  | 8,723.7  | 6,590.0                     | 20,109.5  | 459.4  |
| <i>Memorandum items:</i>               |          |   |                                   |                 |          |          |                             |   |  |
| <i>EU countries</i>                    |          |   |                                   |                 |          |          |                             |   |  |
| Austria                                | 323.8    | 7.0                                       | 192.8                             | 189.4           | 335.0    | 524.4    | 455.6                       | 1,172.8   | 362.2  |
| Belgium                                | 398.1    | 8.8                                       | 335.1                             | 421.1           | 406.4    | 827.4    | 1,878.0                     | 3,040.6   | 763.7  |
| Denmark                                | 276.3    | 29.7                                      | 239.5                             | 95.9            | 484.4    | 580.3    | 804.9                       | 1,624.6   | 588.0  |
| Finland                                | 209.8    | 6.5                                       | 309.5                             | 122.1           | 102.5    | 224.5    | 243.8                       | 777.7   | 370.8  |
| France                                 | 2,252.1  | 42.7                                      | 2,312.8                           | 1,241.1         | 2,254.9  | 3,496.0  | 8,035.0                     | 13,843.9  | 614.7  |
| Germany                                | 2,915.9  | 41.7                                      | 1,637.6                           | 1,479.1         | 3,357.5  | 4,836.6  | 4,643.8                     | 11,118.1  | 381.3  |
| Greece                                 | 268.7    | 0.6                                       | 208.3                             | 364.3           | 97.5     | 461.8    | 359.8                       | 1,029.8   | 383.3  |
| Ireland                                | 219.4    | 0.7                                       | 163.3                             | 41.8            | 368.2    | 410.0    | 1,357.2                     | 1,930.5   | 880.0  |
| Italy                                  | 1,858.3  | 25.7                                      | 1,026.5                           | 1,759.0         | 1,732.0  | 3,491.0  | 3,443.8                     | 7,961.3   | 428.4  |
| Luxembourg                             | 42.5     | 0.2                                       | 79.5                              | 0.0             | 96.5     | 96.5     | 857.6                       | 1,033.6   | 2,431.5  |
| Netherlands                            | 670.9    | 10.8                                      | 725.1                             | 286.1           | 1,421.5  | 1,707.6  | 3,128.0                     | 5,560.7   | 828.8  |
| Portugal                               | 194.8    | 2.1                                       | 105.8                             | 155.9           | 201.1    | 357.1    | 216.8                       | 679.6   | 348.8  |
| Spain                                  | 1,231.7  | 10.8                                      | 1,322.9                           | 520.8           | 1,793.8  | 2,314.6  | 2,343.5                     | 5,981.0   | 485.6  |
| Sweden                                 | 393.6    | 24.8                                      | 615.9                             | 175.5           | 381.2    | 556.7    | 559.4                       | 1,731.9   | 440.0  |
| United Kingdom                         | 2,402.0  | 40.7                                      | 3,794.3                           | 841.5           | 2,452.8  | 3,294.3  | 9,409.2                     | 16,497.8  | 686.8  |
| Emerging market countries <sup>4</sup> | 14,262.9 | 3,657.5                                   | 11,692.4                          | 3,874.4         | 2,198.3  | 6,072.7  | 13,219.4                    | 30,984.4  | 217.2  |
| Of which:                              |          |   |                                   |                 |          |          |                             |   |  |
| Asia                                   | 6,271.4  | 2,271.6                                   | 6,857.0                           | 2,013.5         | 1,494.6  | 3,508.0  | 8,844.9                     | 19,210.0  | 306.3  |
| Latin America                          | 2,953.2  | 310.7                                     | 1,454.2                           | 1,100.2         | 474.8    | 1,575.0  | 1,550.7                     | 4,579.9   | 155.1  |
| Middle East                            | 1,327.8  | 247.1                                     | 657.4                             | 37.9            | 61.0     | 98.9     | 998.4                       | 1,754.8   | 132.2  |
| Africa                                 | 950.6    | 221.9                                     | 850.9                             | 83.3            | 57.4     | 140.7    | 611.6                       | 1,603.2   | 168.7  |
| Europe                                 | 2,759.9  | 606.2                                     | 1,872.8                           | 639.5           | 110.5    | 750.0    | 1,213.7                     | 3,836.6   | 139.0  |

Sources: World Federation of Exchanges; Bank for International Settlements; International Monetary Fund, *International Financial Statistics (IFS)* and *World Economic Outlook* database as of March 18, 2008; ©2003 Bureau van Dijk Electronic Publishing-Bankscope; and Standard & Poor's Emerging Markets Database.

<sup>1</sup>Data are from IFS.

<sup>2</sup>Assets of commercial banks.

<sup>3</sup>Sum of the stock market capitalization, debt securities, and bank assets.

<sup>4</sup>This aggregate comprises the group of Other Emerging Market and Developing Countries defined in the *World Economic Outlook*, together with Hong Kong SAR, Israel, Korea, Singapore, and Taiwan Province of China.

**Table 4. Global Over-the-Counter Derivatives Markets: Notional Amounts and Gross Market Values of Outstanding Contracts<sup>1</sup>**  
(In billions of U.S. dollars)

|                                    | Notional Amounts |                  |                  |                  |                  | Gross Market Values |                  |                  |                  |                  |
|------------------------------------|------------------|------------------|------------------|------------------|------------------|---------------------|------------------|------------------|------------------|------------------|
|                                    | End-June<br>2005 | End-Dec.<br>2005 | End-June<br>2006 | End-Dec.<br>2006 | End-June<br>2007 | End-June<br>2005    | End-Dec.<br>2005 | End-June<br>2006 | End-Dec.<br>2006 | End-June<br>2007 |
| <b>Total</b>                       | <b>281,493</b>   | <b>297,670</b>   | <b>369,507</b>   | <b>414,290</b>   | <b>516,407</b>   | <b>10,605</b>       | <b>9,749</b>     | <b>9,936</b>     | <b>9,682</b>     | <b>11,140</b>    |
| <b>Foreign exchange</b>            | <b>31,081</b>    | <b>31,364</b>    | <b>38,091</b>    | <b>40,239</b>    | <b>48,620</b>    | <b>1,141</b>        | <b>997</b>       | <b>1,134</b>     | <b>1,264</b>     | <b>1,343</b>     |
| Forwards and forex swaps           | 15,801           | 15,873           | 19,395           | 19,870           | 24,526           | 464                 | 406              | 435              | 468              | 492              |
| Currency swaps                     | 8,236            | 8,504            | 9,669            | 10,767           | 12,291           | 549                 | 453              | 533              | 599              | 617              |
| Options                            | 7,045            | 6,987            | 9,027            | 9,602            | 11,804           | 129                 | 138              | 166              | 196              | 235              |
| <b>Interest rate<sup>2</sup></b>   | <b>204,795</b>   | <b>211,970</b>   | <b>261,960</b>   | <b>291,115</b>   | <b>346,937</b>   | <b>6,699</b>        | <b>5,397</b>     | <b>5,435</b>     | <b>4,820</b>     | <b>6,057</b>     |
| Forward rate agreements            | 13,973           | 14,269           | 18,117           | 18,668           | 22,809           | 31                  | 22               | 25               | 32               | 43               |
| Swaps                              | 163,749          | 169,106          | 207,042          | 229,241          | 271,853          | 6,077               | 4,778            | 4,831            | 4,157            | 5,315            |
| Options                            | 27,072           | 28,596           | 36,800           | 43,206           | 52,275           | 592                 | 597              | 579              | 631              | 700              |
| <b>Equity-linked</b>               | <b>4,551</b>     | <b>5,793</b>     | <b>6,782</b>     | <b>7,488</b>     | <b>9,202</b>     | <b>382</b>          | <b>582</b>       | <b>671</b>       | <b>853</b>       | <b>1,116</b>     |
| Forwards and swaps                 | 1,086            | 1,177            | 1,430            | 1,767            | 2,599            | 88                  | 112              | 147              | 166              | 240              |
| Options                            | 3,464            | 4,617            | 5,351            | 5,720            | 6,603            | 294                 | 470              | 523              | 686              | 876              |
| <b>Commodity<sup>3</sup></b>       | <b>2,940</b>     | <b>5,434</b>     | <b>6,394</b>     | <b>7,115</b>     | <b>7,567</b>     | <b>376</b>          | <b>871</b>       | <b>718</b>       | <b>667</b>       | <b>670</b>       |
| Gold                               | 288              | 334              | 456              | 640              | 426              | 24                  | 51               | 77               | 56               | 47               |
| Other                              | 2,652            | 5,100            | 5,938            | 6,475            | 7,141            | 351                 | 820              | 641              | 611              | 623              |
| Forwards and swaps                 | 1,748            | 1,909            | 2,188            | 2,813            | 3,447            | ...                 | ...              | ...              | ...              | ...              |
| Options                            | 904              | 3,191            | 3,750            | 3,663            | 3,694            | ...                 | ...              | ...              | ...              | ...              |
| <b>Credit default swaps</b>        | <b>10,211</b>    | <b>13,908</b>    | <b>20,352</b>    | <b>28,650</b>    | <b>42,580</b>    | <b>188</b>          | <b>243</b>       | <b>294</b>       | <b>470</b>       | <b>721</b>       |
| Single-name instruments            | 7,310            | 10,432           | 13,873           | 17,879           | 24,239           | 136                 | 171              | 186              | 278              | 406              |
| Multi-name instruments             | 2,901            | 3,476            | 6,479            | 10,771           | 18,341           | 52                  | 71               | 109              | 192              | 315              |
| <b>Unallocated</b>                 | <b>27,915</b>    | <b>29,199</b>    | <b>35,928</b>    | <b>39,682</b>    | <b>61,501</b>    | <b>1,818</b>        | <b>1,659</b>     | <b>1,683</b>     | <b>1,608</b>     | <b>1,233</b>     |
| <i>Memorandum items:</i>           |                  |                  |                  |                  |                  |                     |                  |                  |                  |                  |
| Gross credit exposure <sup>4</sup> | n.a.             | n.a.             | n.a.             | n.a.             | n.a.             | 1,897               | 1,900            | 2,029            | 2,034            | 2,669            |
| Exchange-traded derivatives        | 31,081           | 31,364           | 38,091           | 40,239           | 48,620           | ...                 | ...              | ...              | ...              | ...              |

Source: Bank for International Settlements.

<sup>1</sup>All figures are adjusted for double-counting. Notional amounts outstanding have been adjusted by halving positions vis-à-vis other reporting dealers. Gross market values have been calculated as the sum of the total gross positive market value of contracts and the absolute value of the gross negative market value of contracts with non-reporting counterparties.

<sup>2</sup>Single-currency contracts only.

<sup>3</sup>Adjustments for double-counting are estimated.

<sup>4</sup>Gross market values after taking into account legally enforceable bilateral netting agreements.

**Table 5. Global Over-the-Counter Derivatives Markets: Notional Amounts and Gross Market Values of Outstanding Contracts by Counterparty, Remaining Maturity, and Currency<sup>1</sup>***(In billions of U.S. dollars)*

|                                   | Notional Amounts |                  |                  |                  |                  | Gross Market Values |                  |                  |                  |                  |
|-----------------------------------|------------------|------------------|------------------|------------------|------------------|---------------------|------------------|------------------|------------------|------------------|
|                                   | End-June<br>2005 | End-Dec.<br>2005 | End-June<br>2006 | End-Dec.<br>2006 | End-June<br>2007 | End-June<br>2005    | End-Dec.<br>2005 | End-June<br>2006 | End-Dec.<br>2006 | End-June<br>2007 |
| <b>Total</b>                      | <b>281,493</b>   | <b>297,670</b>   | <b>369,507</b>   | <b>414,290</b>   | <b>516,407</b>   | <b>10,605</b>       | <b>9,749</b>     | <b>9,936</b>     | <b>9,682</b>     | <b>11,140</b>    |
| <b>Foreign exchange</b>           | <b>31,081</b>    | <b>31,364</b>    | <b>38,091</b>    | <b>40,239</b>    | <b>48,620</b>    | <b>1,141</b>        | <b>997</b>       | <b>1,134</b>     | <b>1,264</b>     | <b>1,343</b>     |
| By counterparty                   |                  |                  |                  |                  |                  |                     |                  |                  |                  |                  |
| With other reporting dealers      | 12,179           | 12,161           | 15,278           | 15,503           | 19,158           | 377                 | 323              | 367              | 437              | 454              |
| With other financial institutions | 12,334           | 12,721           | 15,118           | 16,019           | 19,142           | 470                 | 412              | 471              | 521              | 557              |
| With nonfinancial customers       | 6,568            | 6,482            | 7,695            | 8,717            | 10,321           | 294                 | 261              | 296              | 307              | 333              |
| By remaining maturity             |                  |                  |                  |                  |                  |                     |                  |                  |                  |                  |
| Up to one year <sup>2</sup>       | 24,256           | 23,910           | 29,563           | 30,255           | 36,940           | ...                 | ...              | ...              | ...              | ...              |
| One to five years <sup>2</sup>    | 4,729            | 5,165            | 5,837            | 6,691            | 8,080            | ...                 | ...              | ...              | ...              | ...              |
| Over five years <sup>2</sup>      | 2,097            | 2,289            | 2,691            | 3,294            | 3,600            | ...                 | ...              | ...              | ...              | ...              |
| By major currency                 |                  |                  |                  |                  |                  |                     |                  |                  |                  |                  |
| U.S. dollar <sup>3</sup>          | 27,584           | 26,297           | 31,756           | 33,724           | 40,488           | 1,024               | 867              | 967              | 1,067            | 1,110            |
| Euro <sup>3</sup>                 | 12,404           | 12,857           | 15,340           | 16,036           | 18,280           | 512                 | 397              | 472              | 509              | 455              |
| Japanese yen <sup>3</sup>         | 6,907            | 7,578            | 9,504            | 9,459            | 10,579           | 220                 | 256              | 242              | 324              | 387              |
| Pound sterling <sup>3</sup>       | 4,273            | 4,424            | 5,217            | 6,135            | 7,769            | 150                 | 121              | 148              | 197              | 174              |
| Other <sup>3</sup>                | 10,993           | 11,572           | 14,365           | 15,124           | 20,125           | 377                 | 354              | 439              | 431              | 561              |
| <b>Interest rate<sup>4</sup></b>  | <b>204,795</b>   | <b>211,970</b>   | <b>261,960</b>   | <b>291,115</b>   | <b>346,937</b>   | <b>6,699</b>        | <b>5,397</b>     | <b>5,435</b>     | <b>4,820</b>     | <b>6,057</b>     |
| By counterparty                   |                  |                  |                  |                  |                  |                     |                  |                  |                  |                  |
| With other reporting dealers      | 87,049           | 91,541           | 114,465          | 127,140          | 148,318          | 2,598               | 2,096            | 2,215            | 1,969            | 2,371            |
| With other financial institutions | 92,092           | 95,320           | 114,865          | 125,654          | 153,328          | 3,265               | 2,625            | 2,515            | 2,223            | 2,946            |
| With nonfinancial customers       | 25,655           | 25,109           | 32,630           | 38,321           | 45,291           | 837                 | 676              | 705              | 628              | 740              |
| By remaining maturity             |                  |                  |                  |                  |                  |                     |                  |                  |                  |                  |
| Up to one year <sup>2</sup>       | 66,681           | 69,378           | 90,585           | 103,960          | 132,304          | ...                 | ...              | ...              | ...              | ...              |
| One to five years <sup>2</sup>    | 82,341           | 86,550           | 101,607          | 110,064          | 125,488          | ...                 | ...              | ...              | ...              | ...              |
| Over five years <sup>2</sup>      | 55,773           | 56,042           | 69,767           | 77,092           | 89,145           | ...                 | ...              | ...              | ...              | ...              |
| By major currency                 |                  |                  |                  |                  |                  |                     |                  |                  |                  |                  |
| U.S. dollar                       | 72,558           | 74,441           | 88,022           | 97,354           | 114,311          | 1,826               | 1,515            | 2,117            | 1,660            | 1,849            |
| Euro                              | 76,426           | 81,442           | 103,429          | 111,763          | 127,623          | 3,692               | 2,965            | 2,298            | 2,299            | 2,846            |
| Japanese yen                      | 25,224           | 25,605           | 32,146           | 37,757           | 47,750           | 454                 | 294              | 457              | 293              | 361              |
| Pound sterling                    | 16,621           | 15,060           | 19,066           | 22,234           | 27,673           | 372                 | 344              | 291              | 311              | 627              |
| Other                             | 13,966           | 15,422           | 19,296           | 22,008           | 29,581           | 356                 | 279              | 273              | 257              | 374              |
| <b>Equity-linked</b>              | <b>4,551</b>     | <b>5,793</b>     | <b>6,782</b>     | <b>7,488</b>     | <b>9,202</b>     | <b>382</b>          | <b>582</b>       | <b>671</b>       | <b>853</b>       | <b>1,116</b>     |
| <b>Commodity<sup>5</sup></b>      | <b>2,940</b>     | <b>5,434</b>     | <b>6,394</b>     | <b>7,115</b>     | <b>7,567</b>     | <b>376</b>          | <b>871</b>       | <b>718</b>       | <b>667</b>       | <b>670</b>       |
| <b>Credit default swaps</b>       | <b>10,211</b>    | <b>13,908</b>    | <b>20,352</b>    | <b>28,650</b>    | <b>42,580</b>    | <b>188</b>          | <b>243</b>       | <b>294</b>       | <b>470</b>       | <b>721</b>       |
| <b>Unallocated</b>                | <b>27,915</b>    | <b>29,199</b>    | <b>35,928</b>    | <b>39,682</b>    | <b>61,501</b>    | <b>1,818</b>        | <b>1,659</b>     | <b>1,683</b>     | <b>1,608</b>     | <b>1,233</b>     |

Source: Bank for International Settlements.

<sup>1</sup>All figures are adjusted for double-counting. Notional amounts outstanding have been adjusted by halving positions vis-à-vis other reporting dealers. Gross market values have been calculated as the sum of the total gross positive market value of contracts and the absolute value of the gross negative market value of contracts with non-reporting counterparties.

<sup>2</sup>Residual maturity.

<sup>3</sup>Counting both currency sides of each foreign exchange transaction means that the currency breakdown sums to twice the aggregate.

<sup>4</sup>Single-currency contracts only.

<sup>5</sup>Adjustments for double-counting are estimated.

**Table 6. Exchange-Traded Derivative Financial Instruments: Notional Principal Amounts Outstanding and Annual Turnover**

|   | 1995                                     | 1996            | 1997            | 1998            | 1999            | 2000            | 2001            |
|---|--|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|   | <i>(In billions of U.S. dollars)</i>     |                 |                 |                 |                 |                 |                 |
| <b>Notional principal amounts outstanding</b> |  |                 |                 |                 |                 |                 |                 |
| Interest rate futures                         | 5,876.2                                  | 5,979.0         | 7,586.7         | 8,031.4         | 7,924.8         | 7,907.8         | 9,269.5         |
| Interest rate options                         | 2,741.8                                  | 3,277.8         | 3,639.9         | 4,623.5         | 3,755.5         | 4,734.2         | 12,492.8        |
| Currency futures                              | 33.8                                     | 37.7            | 42.3            | 31.7            | 36.7            | 74.4            | 65.6            |
| Currency options                              | 120.4                                    | 133.4           | 118.6           | 49.2            | 22.4            | 21.4            | 27.4            |
| Stock market index futures                    | 172.2                                    | 195.9           | 210.9           | 291.6           | 346.9           | 377.5           | 344.2           |
| Stock market index options                    | 337.7                                    | 394.5           | 808.7           | 947.4           | 1,510.3         | 1,148.4         | 1,575.2         |
| <b>Total</b>                                  | <b>9,282.0</b>                           | <b>10,018.2</b> | <b>12,407.1</b> | <b>13,974.8</b> | <b>13,596.6</b> | <b>14,263.8</b> | <b>23,774.7</b> |
| North America                                 | 4,852.3                                  | 4,841.2         | 6,347.9         | 7,395.1         | 6,930.6         | 8,168.0         | 16,203.5        |
| Europe  | 2,241.2                                  | 2,828.0         | 3,587.3         | 4,397.1         | 4,008.5         | 4,197.9         | 6,141.6         |
| Asia-Pacific                                  | 1,990.1                                  | 2,154.0         | 2,235.7         | 1,882.5         | 2,407.8         | 1,611.8         | 1,318.4         |
| Other   | 198.4                                    | 195.0           | 236.2           | 300.1           | 249.7           | 286.2           | 111.2           |
|   | <i>(In millions of contracts traded)</i> |                 |                 |                 |                 |                 |                 |
| <b>Annual turnover</b>                        |  |                 |                 |                 |                 |                 |                 |
| Interest rate futures                         | 561.0                                    | 612.2           | 701.6           | 760.0           | 672.7           | 781.2           | 1,057.5         |
| Interest rate options                         | 225.5                                    | 151.1           | 116.8           | 129.7           | 118.0           | 107.7           | 199.6           |
| Currency futures                              | 99.6                                     | 73.7            | 73.6            | 54.5            | 37.1            | 43.5            | 49.0            |
| Currency options                              | 23.3                                     | 26.3            | 21.1            | 12.1            | 6.8             | 7.0             | 10.5            |
| Stock market index futures                    | 114.8                                    | 93.8            | 115.9           | 178.0           | 204.9           | 225.2           | 337.1           |
| Stock market index options                    | 187.3                                    | 172.3           | 178.2           | 195.0           | 322.5           | 481.5           | 1,148.2         |
| <b>Total</b>                                  | <b>1,211.5</b>                           | <b>1,129.4</b>  | <b>1,207.1</b>  | <b>1,329.3</b>  | <b>1,362.0</b>  | <b>1,646.0</b>  | <b>2,801.9</b>  |
| North America                                 | 455.0                                    | 428.3           | 463.5           | 530.0           | 462.8           | 461.3           | 675.6           |
| Europe  | 354.8                                    | 391.7           | 482.8           | 525.9           | 604.7           | 718.6           | 957.7           |
| Asia-Pacific                                  | 126.4                                    | 115.9           | 126.9           | 170.9           | 207.7           | 331.3           | 985.1           |
| Other   | 275.5                                    | 193.4           | 134.0           | 102.5           | 86.8            | 134.9           | 183.4           |

Source: Bank for International Settlements.

## KEY FINANCIAL CENTERS

| 2002                                     | 2003     | 2004     | 2005     | 2006     | 2007     |          |          |
|--|----------|----------|----------|----------|----------|----------|----------|
|  |          |          |          |          | Q1       | Q2       | Q3       |
| <i>(In billions of U.S. dollars)</i>     |          |          |          |          |          |          |          |
| 9,955.6                                  | 13,123.7 | 18,164.9 | 20,708.8 | 24,476.2 | 28,739.3 | 30,147.8 | 27,178.6 |
| 11,759.5                                 | 20,793.7 | 24,604.1 | 31,588.3 | 38,116.5 | 48,485.5 | 55,987.1 | 56,453.8 |
| 47.0                                     | 79.9     | 103.5    | 107.6    | 161.4    | 153.9    | 201.8    | 189.1    |
| 27.4                                     | 37.9     | 60.7     | 66.1     | 78.6     | 82.9     | 101.2    | 120.9    |
| 365.7                                    | 549.3    | 635.2    | 784.0    | 1,045.3  | 1,185.1  | 1,327.2  | 1,270.8  |
| 1,701.2                                  | 2,203.0  | 3,024.9  | 4,533.7  | 6,565.3  | 8,047.0  | 8,918.4  | 9,670.1  |
| 23,856.3                                 | 36,787.4 | 46,593.3 | 57,788.4 | 70,443.4 | 86,693.6 | 96,683.6 | 94,883.4 |
| 13,720.2                                 | 19,504.4 | 27,608.9 | 36,385.2 | 42,551.4 | 52,446.4 | 57,932.6 | 52,332.7 |
| 8,801.0                                  | 15,406.6 | 16,308.2 | 17,973.2 | 23,216.8 | 28,827.8 | 32,278.0 | 36,533.0 |
| 1,206.0                                  | 1,659.9  | 2,426.9  | 3,004.5  | 4,049.6  | 4,714.4  | 5,649.2  | 5,093.0  |
| 129.1                                    | 216.5    | 249.3    | 425.5    | 625.6    | 705.0    | 823.7    | 924.6    |
| <i>(In millions of contracts traded)</i> |          |          |          |          |          |          |          |
| 1,152.1                                  | 1,576.8  | 1,902.6  | 2,110.4  | 2,621.2  | 736.8    | 779.9    | 852.1    |
| 240.3                                    | 302.3    | 361.0    | 430.8    | 566.7    | 151.4    | 156.3    | 210.5    |
| 42.6                                     | 58.8     | 83.7     | 143.0    | 231.1    | 76.1     | 74.9     | 109.9    |
| 16.1                                     | 14.3     | 13.0     | 19.4     | 24.3     | 7.7      | 11.0     | 12.7     |
| 530.3                                    | 725.6    | 804.4    | 918.7    | 1,233.6  | 413.0    | 430.2    | 560.4    |
| 2,235.5                                  | 3,233.9  | 2,980.1  | 3,139.8  | 3,177.5  | 946.2    | 986.1    | 1,020.9  |
| 4,216.8                                  | 5,911.6  | 6,144.8  | 6,762.0  | 7,854.4  | 2,331.2  | 2,438.5  | 2,766.6  |
| 912.2                                    | 1,279.8  | 1,633.6  | 1,926.8  | 2,541.8  | 704.5    | 748.8    | 913.8    |
| 1,074.8                                  | 1,346.3  | 1,412.6  | 1,592.8  | 1,947.3  | 609.3    | 595.9    | 729.4    |
| 2,073.1                                  | 3,111.6  | 2,847.6  | 2,932.4  | 2,957.1  | 882.9    | 935.7    | 966.3    |
| 156.7                                    | 174.0    | 251.0    | 310.0    | 408.2    | 134.5    | 158.0    | 157.1    |

**Table 7. United States: Sectoral Balance Sheets***(In percent)*

|   | 2001  | 2002  | 2003  | 2004  | 2005  | 2006  |
|---|-------|-------|-------|-------|-------|-------|
| <b>Corporate sector</b>                       |       |       |       |       |       |       |
| Debt/net worth                                | 50.8  | 49.6  | 47.7  | 44.5  | 42.1  | 40.4  |
| Short-term debt/total debt                    | 33.3  | 30.0  | 26.7  | 26.5  | 27.1  | 26.9  |
| Interest burden <sup>1</sup>                  | 17.7  | 14.4  | 11.8  | 8.6   | 6.8   | 6.3   |
| <b>Household sector</b>                       |       |       |       |       |       |       |
| Net worth/assets                              | 83.4  | 81.5  | 81.7  | 81.3  | 81.1  | 80.7  |
| Equity/total assets                           | 27.2  | 21.1  | 24.3  | 24.4  | 23.8  | 24.3  |
| Equity/financial assets                       | 41.9  | 34.6  | 38.9  | 39.3  | 38.9  | 39.5  |
| Net worth/disposable personal income          | 539.6 | 495.8 | 539.3 | 554.8 | 572.6 | 582.8 |
| Home mortgage debt/total assets               | 11.0  | 12.7  | 12.8  | 13.3  | 13.8  | 14.1  |
| Consumer credit/total assets                  | 3.9   | 4.2   | 3.9   | 3.7   | 3.6   | 3.5   |
| Total debt/financial assets                   | 25.6  | 30.3  | 29.3  | 30.1  | 31.0  | 31.3  |
| Debt-service burden <sup>2</sup>              | 13.2  | 13.4  | 13.6  | 13.6  | 14.0  | 14.3  |
| <b>Banking sector<sup>3</sup></b>             |       |       |       |       |       |       |
| Credit quality                                |       |       |       |       |       |       |
| Nonperforming loans <sup>4</sup> /total loans | 1.4   | 1.5   | 1.2   | 0.9   | 0.8   | 0.8   |
| Net loan losses/average total loans           | 1.0   | 1.1   | 0.9   | 0.7   | 0.6   | 0.4   |
| Loan-loss reserve/total loans                 | 1.9   | 1.9   | 1.8   | 1.5   | 1.3   | 1.2   |
| Net charge-offs/total loans                   | 1.0   | 1.1   | 0.9   | 0.6   | 0.6   | 0.4   |
| Capital ratios                                |       |       |       |       |       |       |
| Total risk-based capital                      | 12.7  | 12.8  | 12.8  | 12.6  | 12.3  | 12.4  |
| Tier 1 risk-based capital                     | 9.9   | 10.0  | 10.1  | 10.0  | 9.9   | 9.8   |
| Equity capital/total assets                   | 9.0   | 9.2   | 9.2   | 10.1  | 10.3  | 10.2  |
| Core capital (leverage ratio)                 | 7.8   | 7.8   | 7.9   | 7.8   | 7.9   | 7.9   |
| Profitability measures                        |       |       |       |       |       |       |
| Return on average assets (ROA)                | 1.2   | 1.3   | 1.4   | 1.3   | 1.3   | 1.4   |
| Return on average equity (ROE)                | 13.2  | 14.5  | 15.3  | 13.7  | 13.3  | 13.5  |
| Net interest margin                           | 3.9   | 4.1   | 3.8   | 3.6   | 3.6   | 3.4   |
| Efficiency ratio <sup>5</sup>                 | 57.7  | 55.8  | 56.5  | 58.0  | 57.2  | 56.3  |

Sources: Board of Governors of the Federal Reserve System, *Flow of Funds*; Department of Commerce, Bureau of Economic Analysis; Federal Deposit Insurance Corporation; and Federal Reserve Bank of St. Louis.

<sup>1</sup>Ratio of net interest payments to pre-tax income.

<sup>2</sup>Ratio of debt payments to disposable personal income.

<sup>3</sup>FDIC-insured commercial banks.

<sup>4</sup>Loans past due 90+ days and nonaccrual.

<sup>5</sup>Noninterest expense less amortization of intangible assets as a percent of net interest income plus noninterest income.

**Table 8. Japan: Sectoral Balance Sheets<sup>1</sup>***(In percent)*

|   | FY2001  | FY2002  | FY2003  | FY2004 | FY2005 | FY2006 | FY2007 |
|---|---------|---------|---------|--------|--------|--------|--------|
| <b>Corporate sector</b>                       |         |         |         |        |        |        |        |
| Debt/shareholders' equity (book value)        | 156.0   | 146.1   | 121.3   | 121.5  | 101.7  | 98.2   | 101.7  |
| Short-term debt/total debt                    | 36.8    | 39.0    | 37.8    | 36.8   | 36.4   | 35.3   | 33.1   |
| Interest burden <sup>2</sup>                  | 32.3    | 27.8    | 22.0    | 18.4   | 15.6   | 15.2   | 16.0   |
| Debt/operating profits                        | 1,480.0 | 1,370.0 | 1,079.2 | 965.9  | 839.9  | 820.4  | 835.2  |
| <i>Memorandum item:</i>                       |         |         |         |        |        |        |        |
| Total debt/GDP <sup>3</sup>                   | 102.0   | 100.9   | 90.9    | 96.4   | 85.6   | 89.6   | 81.0   |
| <b>Household sector</b>                       |         |         |         |        |        |        |        |
| Net worth/assets                              | 84.5    | 84.4    | 84.5    | 84.6   | 85.0   | ...    | ...    |
| Equity  | 3.6     | 3.5     | 4.9     | 5.7    | 8.8    | ...    | ...    |
| Real estate                                   | 35.7    | 34.6    | 32.9    | 31.4   | 29.7   | ...    | ...    |
| Net worth/net disposable income               | 744.9   | 725.2   | 728.5   | 723.0  | 742.4  | ...    | ...    |
| Interest burden <sup>4</sup>                  | 5.2     | 5.1     | 4.9     | 4.8    | 4.6    | 4.7    | ...    |
| <i>Memorandum items:</i>                      |         |         |         |        |        |        |        |
| Debt/equity                                   | 427.2   | 448.2   | 317.6   | 268.4  | 169.4  | ...    | ...    |
| Debt/real estate                              | 43.2    | 45.1    | 47.0    | 49.0   | 50.3   | ...    | ...    |
| Debt/net disposable income                    | 136.1   | 134.2   | 133.2   | 131.5  | 130.5  | ...    | ...    |
| Debt/net worth                                | 18.3    | 18.5    | 18.3    | 18.2   | 17.6   | ...    | ...    |
| Equity/net worth                              | 4.3     | 4.1     | 5.8     | 6.8    | 10.4   | ...    | ...    |
| Real estate/net worth                         | 42.3    | 41.0    | 38.9    | 37.1   | 35.0   | ...    | ...    |
| Total debt/GDP <sup>3</sup>                   | 80.2    | 79.4    | 77.5    | 76.1   | 75.6   | ...    | ...    |
| <b>Banking sector<sup>5</sup></b>             |         |         |         |        |        |        |        |
| Credit quality                                |         |         |         |        |        |        |        |
| Nonperforming loans <sup>6</sup> /total loans | 8.4     | 7.4     | 5.8     | 4.0    | 2.9    | 2.5    | 2.5    |
| Capital ratio                                 |         |         |         |        |        |        |        |
| Stockholders' equity/assets                   | 3.9     | 3.3     | 3.9     | 4.2    | 4.9    | 5.3    | 5.1    |
| Profitability measures                        |         |         |         |        |        |        |        |
| Return on equity (ROE) <sup>7</sup>           | -14.3   | -19.5   | -2.7    | 4.1    | 11.3   | 8.5    | 6.3    |

Sources: Ministry of Finance, *Financial Statements of Corporations by Industries*; Cabinet Office, Economic and Social Research Institute, *Annual Report on National Accounts*; Japanese Bankers Association, *Financial Statements of All Banks*; and Financial Services Agency, *The Status of Nonperforming Loans*.

<sup>1</sup>Data are fiscal year beginning April 1. Stock data on households are only available through FY2005. Data in FY2007 are those of the first half of 2007.

<sup>2</sup>Interest payments as a percent of operating profits.

<sup>3</sup>Revised due to the change in GDP figures.

<sup>4</sup>Interest payments as a percent of disposable income.

<sup>5</sup>Data refer to end-September 2007.

<sup>6</sup>Nonperforming loans are based on figures reported under the Financial Reconstruction Law.

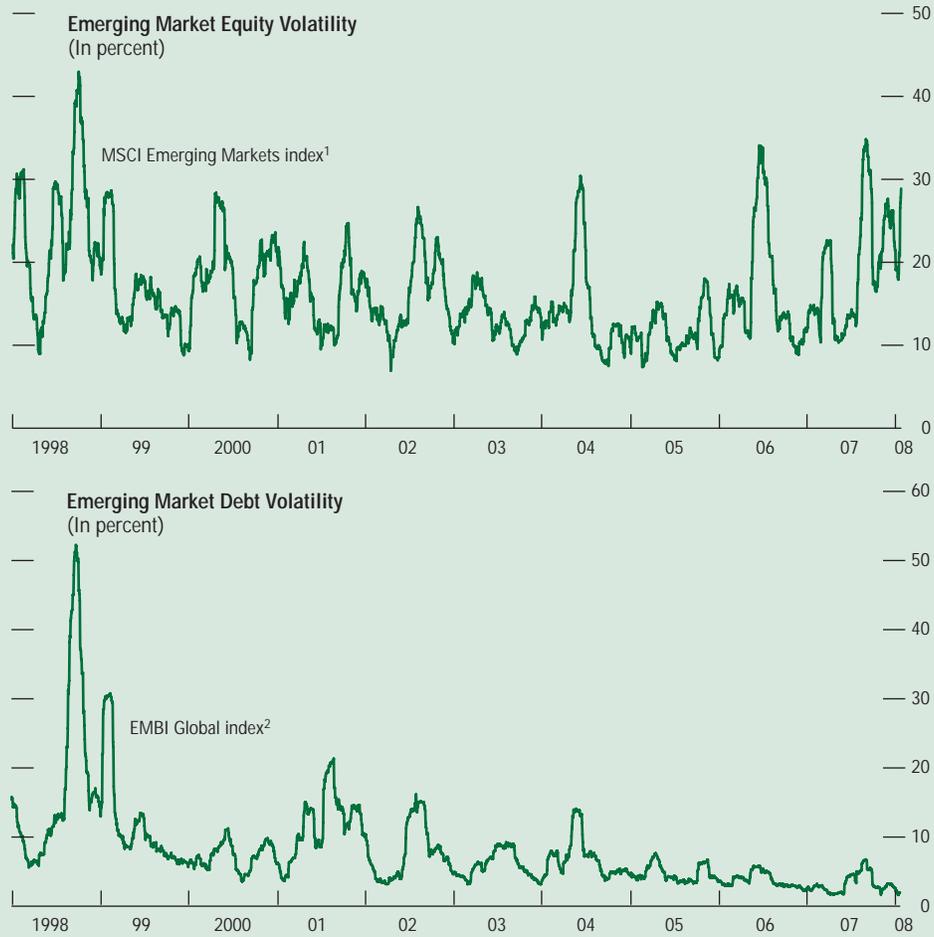
<sup>7</sup>Net income as a percentage of stockholders' equity (no adjustment for preferred stocks, etc.).

**Table 9. Europe: Sectoral Balance Sheets<sup>1</sup>***(In percent)*

|                                       | 2000  | 2001  | 2002  | 2003  | 2004  | 2005  | 2006  |
|---------------------------------------|-------|-------|-------|-------|-------|-------|-------|
| <b>Corporate sector</b>               |       |       |       |       |       |       |       |
| Debt/equity <sup>2</sup>              | 68.0  | 72.5  | 75.9  | 73.1  | 71.7  | 73.8  | 77.3  |
| Short-term debt/total debt            | 37.4  | 36.8  | 35.2  | 35.1  | 35.0  | 37.1  | 39.0  |
| Interest burden <sup>3</sup>          | 18.3  | 19.4  | 18.4  | 17.1  | 17.4  | 18.1  | 19.8  |
| Debt/operating profits                | 315.7 | 321.6 | 338.7 | 327.9 | 326.2 | 348.3 | 381.2 |
| <i>Memorandum items:</i>              |       |       |       |       |       |       |       |
| Financial assets/equity               | 1.5   | 1.5   | 1.4   | 1.4   | 1.4   | 1.5   | 1.5   |
| Liquid assets/short-term debt         | 73.6  | 76.6  | 77.0  | 83.3  | 91.0  | 95.6  | 93.7  |
| <b>Household sector</b>               |       |       |       |       |       |       |       |
| Net worth/assets                      | 84.5  | 83.9  | 83.9  | 84.0  | 84.1  | 84.6  | 84.9  |
| Equity/net worth                      | 15.5  | 13.5  | 10.8  | 11.4  | 11.4  | 12.0  | 11.9  |
| Equity/net financial assets           | 39.8  | 36.5  | 31.8  | 33.1  | 33.3  | 34.1  | 33.8  |
| Interest burden <sup>4</sup>          | 6.5   | 6.2   | 6.1   | 6.0   | 5.7   | 5.7   | 5.8   |
| <i>Memorandum items:</i>              |       |       |       |       |       |       |       |
| Nonfinancial assets/net worth         | 59.7  | 61.7  | 65.7  | 65.6  | 65.9  | 64.6  | 64.7  |
| Debt/net financial assets             | 46.1  | 48.4  | 53.3  | 51.6  | 51.6  | 47.6  | 47.0  |
| Debt/income                           | 94.6  | 94.8  | 98.2  | 100.8 | 105.6 | 106.9 | 110.6 |
| <b>Banking sector<sup>5</sup></b>     |       |       |       |       |       |       |       |
| Credit quality                        |       |       |       |       |       |       |       |
| Nonperforming loans/total loans       | 3.0   | 2.9   | 2.5   | 2.3   | 2.4   | 2.2   | 2.2   |
| Loan-loss reserve/nonperforming loans | 82.1  | 80.8  | 81.5  | 73.0  | 67.8  | 74.6  | 67.8  |
| Loan-loss reserve/total loans         | 2.5   | 2.4   | 2.4   | 2.4   | 1.9   | 1.6   | 1.5   |
| Capital ratios                        |       |       |       |       |       |       |       |
| Equity capital/total assets           | 4.3   | 3.3   | 3.1   | 2.9   | 3.5   | 3.5   | 3.5   |
| Capital funds/liabilities             | 6.9   | 6.8   | 5.4   | 5.0   | 5.7   | 5.6   | 5.7   |
| Profitability measures                |       |       |       |       |       |       |       |
| Return on assets (after tax)          | 0.8   | 0.5   | 0.4   | 0.5   | 0.5   | 0.5   | 0.6   |
| Return on equity (after tax)          | 18.3  | 11.2  | 9.0   | 11.3  | 13.7  | 15.0  | 16.7  |
| Net interest margin                   | 1.5   | 1.4   | 1.6   | 1.5   | 1.1   | 1.0   | 0.9   |
| Efficiency ratio <sup>6</sup>         | 66.4  | 68.2  | 69.0  | 73.1  | 64.3  | 62.6  | 60.2  |

Sources: ©2003 Bureau van Dijk Electronic Publishing-Bankscope; and IMF staff estimates.

<sup>1</sup>GDP-weighted average for France, Germany, and the United Kingdom, unless otherwise noted.<sup>2</sup>Corporate equity adjusted for changes in asset valuation.<sup>3</sup>Interest payments as a percent of gross operating profits.<sup>4</sup>Interest payments as percent of disposable income.<sup>5</sup>Fifty largest European banks. Data availability may restrict coverage to less than 50 banks for specific indicators.<sup>6</sup>Cost-to-income ratio.

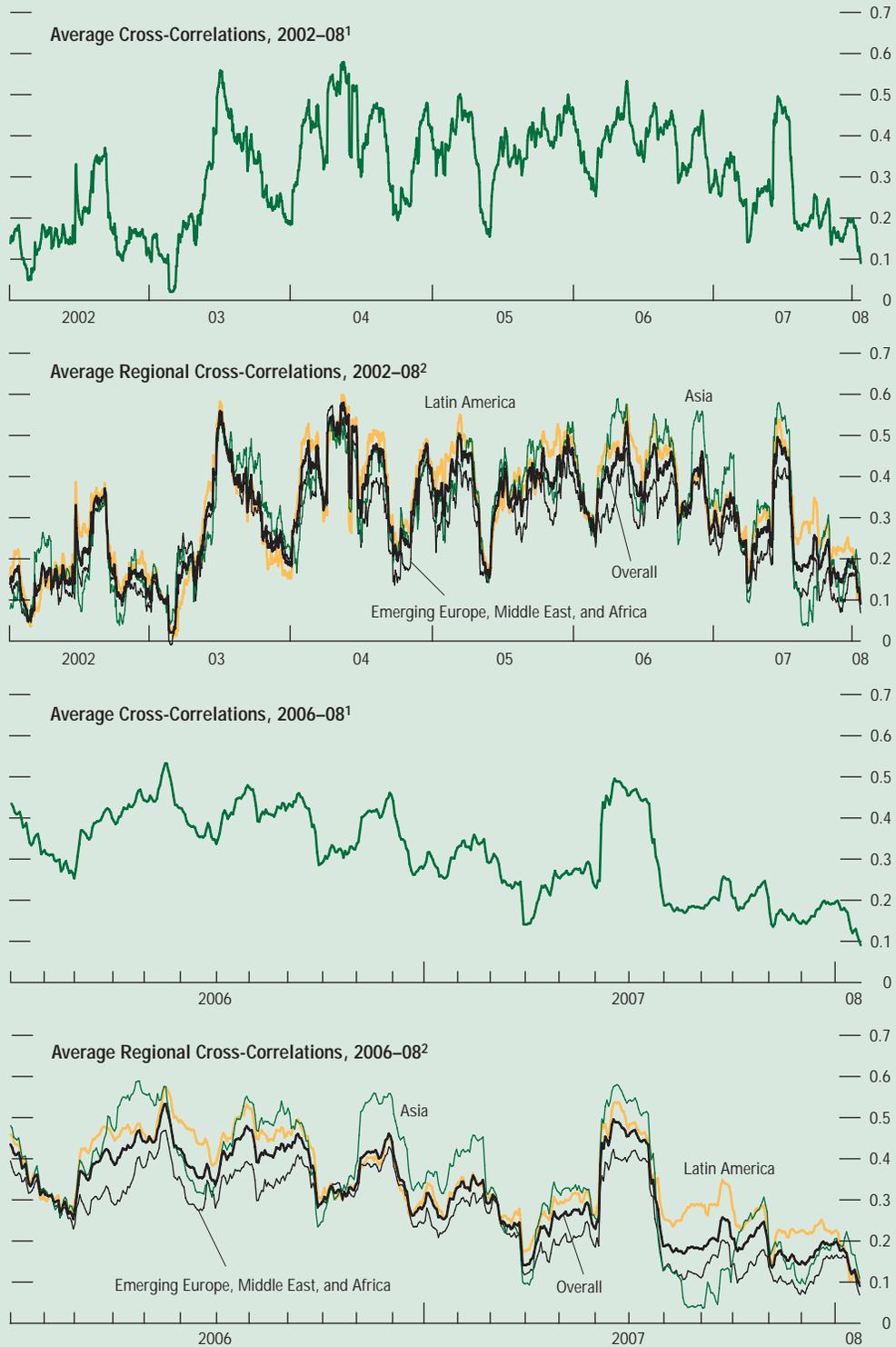
**Figure 15. Emerging Market Volatility Measures**

Sources: For "Emerging Market Equity Volatility," Morgan Stanley Capital International (MSCI); and IMF staff estimates. For "Emerging Market Debt Volatility," JPMorgan Chase & Co.; and IMF staff estimates.

<sup>1</sup>Data utilize the MSCI Emerging Markets index in U.S. dollars to calculate 30-day rolling volatilities.

<sup>2</sup>Data utilize the EMBI Global total return index in U.S. dollars to calculate 30-day rolling volatilities.

**Figure 16. Emerging Market Debt Cross-Correlation Measures**



Sources: JPMorgan Chase & Co.; and IMF staff estimates.

<sup>1</sup>Thirty-day moving simple average across all pair-wise return correlations of 20 constituents included in the EMBI Global.

<sup>2</sup>Simple average of all pair-wise correlations of all markets in a given region with all other bond markets, regardless of region.

Table 10. Equity Market Indices

|  | 2007 End of Period |                |                |                | End of Period  |                |                |                |                | 12-Month High  | 12-Month Low   | All-Time High <sup>1</sup> | All-Time Low <sup>1</sup> |
|--|--------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------------------|---------------------------|
|  | Q1                 | Q2             | Q3             | Q4             | 2003           | 2004           | 2005           | 2006           | 2007           |                |                |                            |                           |
| <b>World</b>                             | <b>1,514.2</b>     | <b>1,602.4</b> | <b>1,633.6</b> | <b>1,588.8</b> | <b>1,036.3</b> | <b>1,169.3</b> | <b>1,257.8</b> | <b>1,483.6</b> | <b>1,588.8</b> | <b>1,630.1</b> | <b>1,261.0</b> | <b>1,682.4</b>             | <b>423.1</b>              |
| <b>Emerging Markets</b>                  | <b>929.0</b>       | <b>1,059.7</b> | <b>1,204.9</b> | <b>1,245.6</b> | <b>442.8</b>   | <b>542.2</b>   | <b>706.5</b>   | <b>912.7</b>   | <b>1,245.6</b> | <b>1,067.0</b> | <b>710.3</b>   | <b>1,338.5</b>             | <b>175.3</b>              |
| <b>Latin America</b>                     | <b>3,163.2</b>     | <b>3,754.2</b> | <b>4,139.6</b> | <b>4,400.4</b> | <b>1,100.9</b> | <b>1,483.6</b> | <b>2,150.0</b> | <b>2,995.7</b> | <b>4,400.4</b> | <b>3,838.6</b> | <b>2,237.7</b> | <b>4,619.6</b>             | <b>185.6</b>              |
| Argentina                                | 3,014.6            | 3,188.6        | 3,284.1        | 2,918.8        | 933.6          | 1,163.0        | 1,857.1        | 3,084.1        | 2,918.8        | 3,342.8        | 2,227.6        | 3,407.4                    | 152.6                     |
| Brazil                                   | 2,325.9            | 2,857.3        | 3,430.6        | 3,867.2        | 802.0          | 1,046.6        | 1,569.4        | 2,205.4        | 3,867.2        | 2,921.6        | 1,673.8        | 3,973.6                    | 84.1                      |
| Chile                                    | 1,592.6            | 1,891.2        | 1,840.5        | 1,802.8        | 800.6          | 997.3          | 1,180.7        | 1,492.4        | 1,802.8        | 1,891.2        | 1,111.7        | 2,057.9                    | 183.0                     |
| Colombia                                 | 516.9              | 604.2          | 598.1          | 619.3          | 108.6          | 245.0          | 495.7          | 549.8          | 619.3          | 627.4          | 385.9          | 667.8                      | 41.2                      |
| Mexico                                   | 5,802.9            | 6,497.0        | 6,192.4        | 5,992.1        | 1,873.1        | 2,715.6        | 3,943.6        | 5,483.3        | 5,992.1        | 6,764.2        | 3,877.5        | 6,775.7                    | 308.9                     |
| Peru                                     | 828.2              | 1,089.4        | 1,320.0        | 1,248.7        | 344.1          | 343.4          | 441.3          | 671.4          | 1,248.7        | 1,091.6        | 522.2          | 1,488.3                    | 73.5                      |
| Venezuela                                | 154.3              | 178.6          | 161.6          | 163.4          | 103.8          | 151.0          | 107.4          | 174.1          | 163.4          | 202.5          | 103.9          | 278.4                      | 56.1                      |
| <b>Asia</b>                              | <b>370.1</b>       | <b>435.6</b>   | <b>513.4</b>   | <b>513.7</b>   | <b>206.4</b>   | <b>231.6</b>   | <b>286.2</b>   | <b>371.5</b>   | <b>513.7</b>   | <b>440.6</b>   | <b>286.6</b>   | <b>571.9</b>               | <b>104.1</b>              |
| China                                    | 51.3               | 63.2           | 88.6           | 85.5           | 25.5           | 25.3           | 29.3           | 52.3           | 85.5           | 64.1           | 34.8           | 136.9                      | 12.9                      |
| India                                    | 530.6              | 598.6          | 701.9          | 855.1          | 246.2          | 273.1          | 382.9          | 560.8          | 855.1          | 598.6          | 402.8          | 855.1                      | 77.7                      |
| Indonesia                                | 2,433.2            | 2,757.2        | 3,197.4        | 3,857.1        | 831.1          | 1,324.0        | 1,579.8        | 2,449.0        | 3,857.1        | 2,761.5        | 1,755.7        | 4,005.6                    | 280.0                     |
| Korea                                    | 404.8              | 469.6          | 529.8          | 516.9          | 246.0          | 256.4          | 386.3          | 395.2          | 516.9          | 489.4          | 346.3          | 562.7                      | 59.5                      |
| Malaysia                                 | 471.7              | 508.1          | 501.4          | 542.4          | 300.4          | 335.9          | 329.0          | 408.8          | 542.4          | 523.5          | 332.7          | 542.6                      | 88.3                      |
| Pakistan                                 | 381.2              | 462.6          | 432.6          | 447.6          | 188.2          | 211.7          | 333.3          | 333.7          | 447.6          | 462.6          | 322.0          | 482.9                      | 54.4                      |
| Philippines                              | 660.3              | 762.0          | 733.0          | 721.0          | 303.7          | 381.1          | 431.9          | 620.2          | 721.0          | 780.7          | 444.7          | 917.3                      | 132.6                     |
| Taiwan Province of China                 | 312.8              | 352.2          | 363.9          | 334.0          | 259.1          | 257.7          | 275.8          | 318.3          | 334.0          | 355.2          | 258.5          | 483.5                      | 103.9                     |
| Thailand                                 | 272.9              | 312.8          | 347.9          | 361.0          | 280.5          | 263.9          | 292.0          | 274.9          | 361.0          | 315.4          | 246.4          | 669.4                      | 72.0                      |
| <b>Europe, Middle East, &amp; Africa</b> | <b>376.1</b>       | <b>391.4</b>   | <b>421.6</b>   | <b>458.2</b>   | <b>163.9</b>   | <b>222.7</b>   | <b>300.3</b>   | <b>364.4</b>   | <b>458.2</b>   | <b>396.9</b>   | <b>291.3</b>   | <b>473.8</b>               | <b>80.8</b>               |
| Czech Republic                           | 436.6              | 490.2          | 499.1          | 539.5          | 152.9          | 234.8          | 371.5          | 408.3          | 539.5          | 490.2          | 337.7          | 552.3                      | 62.8                      |
| Egypt                                    | 1,431.5            | 1,553.6        | 1,698.0        | 2,077.9        | 234.6          | 505.3          | 1,215.7        | 1,389.3        | 2,077.9        | 1,588.2        | 967.9          | 2,077.9                    | 89.9                      |
| Hungary                                  | 1,594.7            | 1,965.5        | 1,892.5        | 1,738.1        | 646.9          | 1,057.0        | 1,447.0        | 1,690.0        | 1,738.1        | 2,008.1        | 1,396.0        | 2,050.8                    | 77.1                      |
| Israel                                   | 213.1              | 232.9          | 250.9          | 264.0          | 141.4          | 167.4          | 209.3          | 194.4          | 264.0          | 242.1          | 165.7          | 267.3                      | 67.6                      |
| Jordan                                   | 481.5              | 445.6          | 427.8          | 531.4          | 238.3          | 379.2          | 650.6          | 439.6          | 531.4          | 515.3          | 422.7          | 760.7                      | 103.1                     |
| Morocco                                  | 424.4              | 418.6          | 455.3          | 453.9          | 171.4          | 189.1          | 231.3          | 342.9          | 453.9          | 461.7          | 294.5          | 478.5                      | 99.6                      |
| Poland                                   | 2,451.5            | 2,594.7        | 2,480.6        | 2,341.6        | 1,118.3        | 1,419.3        | 1,867.4        | 2,253.2        | 2,341.6        | 2,627.4        | 1,933.3        | 2,690.3                    | 99.6                      |
| Russia                                   | 1,212.7            | 1,202.4        | 1,310.1        | 1,536.4        | 461.1          | 479.9          | 813.4          | 1,250.3        | 1,536.4        | 1,252.3        | 993.9          | 1,572.3                    | 30.6                      |
| South Africa                             | 699.5              | 695.4          | 714.3          | 713.1          | 296.8          | 352.4          | 492.0          | 641.3          | 713.1          | 742.7          | 516.9          | 770.5                      | 99.7                      |
| Turkey                                   | 686,668            | 731,869        | 844,484        | 864,616        | 319,808        | 425,008        | 645,739        | 614,409        | 864,616        | 755,480        | 509,075        | 916,239                    | 426                       |
| <b>Sectors</b>                           |                    |                |                |                |                |                |                |                |                |                |                |                            |                           |
| Energy                                   | 723.4              | 807.1          | 958.7          | 1,154.2        | 287.4          | 349.0          | 548.6          | 760.0          | 1,154.2        | 807.1          | 619.3          | 1,169.1                    | 81.7                      |
| Materials                                | 496.6              | 559.8          | 687.8          | 657.9          | 50.1           | 265.0          | 325.4          | 442.1          | 657.9          | 572.5          | 362.5          | 731.0                      | 98.5                      |
| Industrials                              | 229.1              | 294.4          | 353.0          | 351.1          | 98.9           | 128.0          | 156.1          | 210.7          | 351.1          | 294.4          | 158.5          | 403.8                      | 52.6                      |
| Consumer discretionary                   | 441.2              | 479.7          | 498.1          | 490.9          | 233.8          | 292.3          | 381.1          | 422.6          | 490.9          | 484.0          | 327.6          | 527.8                      | 74.1                      |
| Consumer staple                          | 269.3              | 301.1          | 317.6          | 330.2          | 118.6          | 147.0          | 197.0          | 266.2          | 330.2          | 309.8          | 206.0          | 343.1                      | 80.4                      |
| Health care                              | 382.2              | 420.8          | 435.3          | 458.8          | 272.5          | 290.8          | 393.3          | 356.3          | 458.8          | 420.8          | 308.8          | 464.4                      | 83.3                      |
| Financials                               | 330.6              | 372.4          | 419.7          | 424.0          | 138.8          | 187.9          | 240.6          | 328.8          | 424.0          | 376.8          | 237.2          | 473.0                      | 74.6                      |
| Information technology                   | 220.0              | 243.4          | 248.6          | 231.5          | 149.6          | 161.5          | 209.1          | 231.8          | 231.5          | 247.0          | 187.8          | 300.0                      | 73.1                      |
| Telecommunications                       | 226.6              | 259.9          | 299.9          | 328.0          | 100.8          | 131.6          | 158.9          | 218.0          | 328.0          | 260.7          | 152.8          | 343.2                      | 62.9                      |
| Utilities                                | 288.0              | 342.8          | 363.4          | 379.2          | 127.2          | 149.8          | 197.0          | 282.1          | 379.2          | 342.8          | 206.8          | 389.1                      | 63.1                      |

Table 10 (continued)

|  | Period on Period Percent Change |             |             |             |               |             |             |             |             |
|--|---------------------------------|-------------|-------------|-------------|---------------|-------------|-------------|-------------|-------------|
|  | 2007 End of period              |             |             |             | End of period |             |             |             |             |
|  | Q1                              | Q2          | Q3          | Q4          | 2003          | 2004        | 2005        | 2006        | 2007        |
| <b>World</b>                                 | <b>24.0</b>                     | <b>5.8</b>  | <b>1.9</b>  | <b>-2.7</b> | <b>30.8</b>   | <b>12.8</b> | <b>7.6</b>  | <b>18.0</b> | <b>-2.7</b> |
| <b>Emerging Markets</b>                      | <b>1.8</b>                      | <b>14.1</b> | <b>13.7</b> | <b>3.4</b>  | <b>51.6</b>   | <b>22.4</b> | <b>30.3</b> | <b>29.2</b> | <b>3.4</b>  |
| <b>Latin America</b>                         | <b>5.6</b>                      | <b>18.7</b> | <b>10.3</b> | <b>6.3</b>  | <b>67.1</b>   | <b>34.8</b> | <b>44.9</b> | <b>39.3</b> | <b>6.3</b>  |
| Argentina                                    | -2.3                            | 5.8         | 3.0         | -11.1       | 98.5          | 24.6        | 59.7        | 66.1        | -11.1       |
| Brazil                                       | 5.5                             | 22.8        | 20.1        | 12.7        | 102.9         | 30.5        | 50.0        | 40.5        | 12.7        |
| Chile  | 6.7                             | 18.8        | -2.7        | -2.0        | 79.7          | 24.6        | 18.4        | 26.4        | -2.0        |
| Colombia                                     | -6.0                            | 16.9        | -1.0        | 3.5         | 59.0          | 125.7       | 102.3       | 10.9        | 3.5         |
| Mexico                                       | 5.8                             | 12.0        | -4.7        | -3.2        | 29.8          | 45.0        | 45.2        | 39.0        | -3.2        |
| Peru   | 23.4                            | 31.5        | 21.2        | -5.4        | 88.4          | -0.2        | 28.5        | 52.1        | -5.4        |
| Venezuela                                    | -11.4                           | 15.8        | -9.5        | 1.1         | 33.6          | 45.4        | -28.9       | 62.2        | 1.1         |
| <b>Asia</b>                                  | <b>-0.4</b>                     | <b>17.7</b> | <b>17.8</b> | <b>0.1</b>  | <b>47.1</b>   | <b>12.2</b> | <b>23.5</b> | <b>29.8</b> | <b>0.1</b>  |
| China  | -1.8                            | 23.0        | 40.2        | -3.4        | 80.3          | -0.7        | 15.6        | 78.7        | -3.4        |
| India  | -5.4                            | 12.8        | 17.3        | 21.8        | 65.5          | 11.0        | 40.2        | 46.5        | 21.8        |
| Indonesia                                    | -0.6                            | 13.3        | 16.0        | 20.6        | 60.0          | 59.3        | 19.3        | 55.0        | 20.6        |
| Korea  | 2.4                             | 16.0        | 12.8        | -2.4        | 33.2          | 4.2         | 50.6        | 2.3         | -2.4        |
| Malaysia                                     | 15.4                            | 7.7         | -1.3        | 8.2         | 23.1          | 11.8        | -2.1        | 24.2        | 8.2         |
| Pakistan                                     | 14.2                            | 21.3        | -6.5        | 3.5         | 28.9          | 12.5        | 57.5        | 0.1         | 3.5         |
| Philippines                                  | 6.5                             | 15.4        | -3.8        | -1.6        | 44.5          | 25.5        | 13.3        | 43.6        | -1.6        |
| Taiwan Province of China                     | -1.7                            | 12.6        | 3.3         | -8.2        | 36.7          | -0.6        | 7.0         | 15.4        | -8.2        |
| Thailand                                     | -0.7                            | 14.6        | 11.2        | 3.7         | 115.4         | -5.9        | 10.6        | -5.9        | 3.7         |
| <b>Europe, Middle East,<br/>&amp; Africa</b> | <b>3.2</b>                      | <b>4.1</b>  | <b>7.7</b>  | <b>8.7</b>  | <b>51.2</b>   | <b>35.8</b> | <b>34.9</b> | <b>21.3</b> | <b>8.7</b>  |
| Czech Republic                               | 6.9                             | 12.3        | 1.8         | 8.1         | 31.6          | 53.6        | 58.2        | 9.9         | 8.1         |
| Egypt  | 3.0                             | 8.5         | 9.3         | 22.4        | 140.8         | 115.4       | 140.6       | 14.3        | 22.4        |
| Hungary                                      | -5.6                            | 23.3        | -3.7        | -8.2        | 20.8          | 63.4        | 36.9        | 16.8        | -8.2        |
| Israel                                       | 9.7                             | 9.3         | 7.8         | 5.2         | 55.7          | 18.4        | 25.0        | -7.1        | 5.2         |
| Jordan                                       | 9.5                             | -7.4        | -4.0        | 24.2        | 55.3          | 59.1        | 71.6        | -32.4       | 24.2        |
| Morocco                                      | 23.8                            | -1.4        | 8.8         | -0.3        | 23.8          | 10.4        | 22.3        | 48.3        | -0.3        |
| Poland                                       | 8.8                             | 5.8         | -4.4        | -5.6        | 29.9          | 26.9        | 31.6        | 20.7        | -5.6        |
| Russia                                       | -3.0                            | -0.8        | 9.0         | 17.3        | 70.3          | 4.1         | 69.5        | 53.7        | 17.3        |
| South Africa                                 | 9.1                             | -0.6        | 2.7         | -0.2        | 8.8           | 18.7        | 39.6        | 30.3        | -0.2        |
| Turkey                                       | 11.8                            | 6.6         | 15.4        | 2.4         | 88.2          | 32.9        | 51.9        | -4.9        | 2.4         |
| <b>Sectors</b>                               |                                 |             |             |             |               |             |             |             |             |
| Energy                                       | -4.8                            | 11.6        | 18.8        | 20.4        | 76.2          | 21.4        | 57.2        | 38.5        | 20.4        |
| Materials                                    | 12.3                            | 12.7        | 22.9        | -4.4        | 36.8          | 6.0         | 22.8        | 35.9        | -4.4        |
| Industrials                                  | 8.7                             | 28.5        | 19.9        | -0.5        | 60.1          | 29.5        | 22.0        | 35.0        | -0.5        |
| Consumer discretionary                       | 4.4                             | 8.7         | 3.8         | -1.4        | 68.4          | 25.0        | 30.4        | 10.9        | -1.4        |
| Consumer staple                              | 1.2                             | 11.8        | 5.5         | 4.0         | 34.4          | 24.0        | 34.0        | 35.1        | 4.0         |
| Health care                                  | 7.3                             | 10.1        | 3.4         | 5.4         | 60.5          | 6.7         | 35.2        | -9.4        | 5.4         |
| Financials                                   | 0.5                             | 12.6        | 12.7        | 1.0         | 40.7          | 35.4        | 28.1        | 36.7        | 1.0         |
| Information technology                       | -5.1                            | 10.6        | 2.1         | -6.9        | 43.9          | 8.0         | 29.5        | 10.9        | -6.9        |
| Telecommunications                           | 3.9                             | 14.7        | 15.4        | 9.4         | 38.7          | 30.5        | 20.8        | 37.2        | 9.4         |
| Utilities                                    | 2.1                             | 19.0        | 6.0         | 4.3         | 75.7          | 17.8        | 31.5        | 43.2        | 4.3         |

Table 10 (concluded)

|  | 2007 End of Period |          |          |          | End of Period |         |         |          |          | 12-<br>Month<br>High | 12-<br>Month<br>Low | All-<br>Time<br>High <sup>1</sup> | All-<br>Time<br>Low <sup>1</sup> |
|--|--------------------|----------|----------|----------|---------------|---------|---------|----------|----------|----------------------|---------------------|-----------------------------------|----------------------------------|
|  | Q1                 | Q2       | Q3       | Q4       | 2003          | 2004    | 2005    | 2006     | 2007     |                      |                     |                                   |                                  |
| <b>Developed Markets</b>               |                    |          |          |          |               |         |         |          |          |                      |                     |                                   |                                  |
| Australia                              | 1,200.5            | 1,254.1  | 1,325.4  | 1,273.7  | 655.5         | 797.9   | 959.6   | 1,135.1  | 1,273.7  | 1,279.1              | 986.5               | 1,374.4                           | 250.2                            |
| Austria                                | 331.6              | 339.7    | 295.0    | 287.7    | 118.0         | 185.3   | 262.7   | 316.6    | 287.7    | 348.9                | 256.1               | 348.9                             | 79.7                             |
| Belgium                                | 116.3              | 117.4    | 105.6    | 96.5     | 60.1          | 77.9    | 94.8    | 113.0    | 96.5     | 121.0                | 92.9                | 121.0                             | 35.4                             |
| Canada                                 | 1,659.0            | 1,750.7  | 1,784.1  | 1,761.7  | 1,019.7       | 1,139.3 | 1,406.8 | 1,628.3  | 1,761.7  | 1,786.3              | 1,426.2             | 1,863.1                           | 338.3                            |
| Denmark                                | 3,884.7            | 4,066.3  | 4,214.0  | 4,104.8  | 1,772.7       | 2,115.9 | 2,994.0 | 3,662.6  | 4,104.8  | 4,198.4              | 2,898.5             | 4,353.7                           | 556.5                            |
| Finland                                | 151.6              | 170.6    | 192.9    | 183.5    | 97.4          | 93.9    | 123.4   | 140.3    | 183.5    | 176.3                | 121.6               | 383.1                             | 22.9                             |
| France                                 | 149.8              | 159.3    | 150.5    | 147.1    | 93.2          | 100.6   | 124.9   | 147.1    | 147.1    | 162.9                | 125.1               | 178.6                             | 42.9                             |
| Germany                                | 123.5              | 138.8    | 136.7    | 139.7    | 74.6          | 79.2    | 98.2    | 116.9    | 139.7    | 140.3                | 95.3                | 163.6                             | 41.4                             |
| Greece                                 | 133.2              | 136.7    | 144.2    | 148.4    | 63.6          | 83.3    | 108.1   | 127.3    | 148.4    | 142.4                | 103.5               | 197.2                             | 38.2                             |
| Hong Kong SAR                          | 10,223.1           | 10,681.2 | 13,076.5 | 13,994.0 | 6,341.3       | 7,668.5 | 8,016.2 | 10,152.8 | 13,994.0 | 10,784.7             | 8,240.0             | 14,780.4                          | 1,995.5                          |
| Ireland                                | 117.3              | 119.0    | 98.7     | 84.8     | 65.9          | 85.2    | 93.5    | 120.3    | 84.8     | 126.8                | 93.2                | 126.8                             | 40.5                             |
| Italy                                  | 121.3              | 121.4    | 115.7    | 112.4    | 78.1          | 93.2    | 106.0   | 121.4    | 112.4    | 128.7                | 104.2               | 132.1                             | 39.5                             |
| Japan                                  | 1,081.6            | 1,123.3  | 1,031.5  | 940.1    | 637.3         | 699.1   | 999.3   | 1,060.2  | 940.1    | 1,146.6              | 912.5               | 1,655.3                           | 462.1                            |
| Netherlands                            | 107.7              | 113.5    | 112.5    | 107.3    | 68.4          | 69.3    | 88.3    | 101.3    | 107.3    | 115.0                | 85.5                | 134.9                             | 38.5                             |
| New Zealand                            | 136.0              | 141.0    | 140.4    | 131.7    | 107.6         | 127.0   | 130.0   | 138.2    | 131.7    | 145.2                | 117.3               | 145.8                             | 56.7                             |
| Norway                                 | 3,094.2            | 3,368.7  | 3,327.3  | 3,305.9  | 1,240.9       | 1,690.3 | 2,267.7 | 2,951.8  | 3,305.9  | 3,368.7              | 2,330.6             | 3,501.4                           | 455.9                            |
| Portugal                               | 109.2              | 123.9    | 110.4    | 115.1    | 66.1          | 74.7    | 82.2    | 105.5    | 115.1    | 124.4                | 88.8                | 128.0                             | 35.2                             |
| Singapore                              | 1,850.2            | 2,033.2  | 2,118.9  | 1,971.8  | 1,005.1       | 1,148.1 | 1,295.4 | 1,696.1  | 1,971.8  | 2,089.9              | 1,282.4             | 2,216.4                           | 508.2                            |
| Spain                                  | 162.8              | 166.2    | 164.5    | 172.2    | 89.6          | 104.3   | 122.1   | 158.2    | 172.2    | 173.0                | 124.9               | 180.3                             | 27.4                             |
| Sweden                                 | 9,624.1            | 10,011.1 | 9,669.8  | 8,429.2  | 4,675.2       | 5,785.4 | 7,489.8 | 9,047.5  | 8,429.2  | 10,338.8             | 6,914.6             | 12,250.4                          | 787.2                            |
| Switzerland                            | 1,183.9            | 1,215.0  | 1,175.3  | 1,117.0  | 714.3         | 747.1   | 994.6   | 1,159.5  | 1,117.0  | 1,256.8              | 978.4               | 1,256.8                           | 158.1                            |
| United Kingdom                         | 1,897.2            | 1,978.1  | 1,934.2  | 1,920.8  | 1,348.7       | 1,453.0 | 1,685.3 | 1,865.6  | 1,920.8  | 2,016.6              | 1,692.4             | 2,016.6                           | 585.4                            |
| United States                          | 1,344.0            | 1,420.3  | 1,443.6  | 1,390.9  | 1,045.4       | 1,137.4 | 1,180.6 | 1,336.3  | 1,390.9  | 1,454.5              | 1,162.9             | 1,493.0                           | 273.7                            |
| <i>Period on Period Percent Change</i> |                    |          |          |          |               |         |         |          |          |                      |                     |                                   |                                  |
| <b>Developed Markets</b>               |                    |          |          |          |               |         |         |          |          |                      |                     |                                   |                                  |
| Australia                              | 5.8                | 4.5      | 5.4      | -4.1     | 8.5           | 21.7    | 20.3    | 18.3     | -4.1     | ...                  | ...                 | ...                               | ...                              |
| Austria                                | 4.7                | 2.5      | -15.2    | -2.5     | 28.5          | 57.0    | 41.7    | 20.5     | -2.5     | ...                  | ...                 | ...                               | ...                              |
| Belgium                                | 2.9                | 1.0      | -11.2    | -9.4     | 8.7           | 29.5    | 21.7    | 19.2     | -9.4     | ...                  | ...                 | ...                               | ...                              |
| Canada                                 | 1.9                | 5.5      | 1.9      | -1.3     | 24.6          | 11.7    | 23.5    | 15.7     | -1.3     | ...                  | ...                 | ...                               | ...                              |
| Denmark                                | 6.1                | 4.7      | 3.5      | -2.7     | 22.4          | 19.4    | 41.5    | 22.3     | -2.7     | ...                  | ...                 | ...                               | ...                              |
| Finland                                | 8.0                | 12.6     | 11.5     | -5.1     | -2.9          | -3.6    | 31.4    | 13.7     | -5.1     | ...                  | ...                 | ...                               | ...                              |
| France                                 | 1.8                | 6.4      | -5.9     | -2.3     | 14.6          | 7.9     | 24.2    | 17.8     | -2.3     | ...                  | ...                 | ...                               | ...                              |
| Germany                                | 5.6                | 12.5     | -1.6     | 2.2      | 33.2          | 6.1     | 24.1    | 19.0     | 2.2      | ...                  | ...                 | ...                               | ...                              |
| Greece                                 | 4.6                | 2.7      | 5.2      | 2.8      | 35.8          | 31.1    | 29.8    | 17.7     | 2.8      | ...                  | ...                 | ...                               | ...                              |
| Hong Kong SAR                          | 0.7                | 4.5      | 18.3     | 6.6      | 31.9          | 20.9    | 4.5     | 26.7     | 6.6      | ...                  | ...                 | ...                               | ...                              |
| Ireland                                | -2.5               | 1.5      | -20.6    | -16.4    | 16.0          | 29.2    | 9.8     | 28.7     | -16.4    | ...                  | ...                 | ...                               | ...                              |
| Italy                                  | -0.1               | 0.0      | -5.0     | -2.9     | 12.2          | 19.3    | 13.8    | 14.6     | -2.9     | ...                  | ...                 | ...                               | ...                              |
| Japan                                  | 2.0                | 3.9      | -8.9     | -9.7     | 21.6          | 9.7     | 42.9    | 6.1      | -9.7     | ...                  | ...                 | ...                               | ...                              |
| Netherlands                            | 6.4                | 5.3      | -0.9     | -4.8     | 3.6           | 1.3     | 27.5    | 14.7     | -4.8     | ...                  | ...                 | ...                               | ...                              |
| New Zealand                            | -1.5               | 3.7      | -0.5     | -6.6     | 19.6          | 18.0    | 2.4     | 6.3      | -6.6     | ...                  | ...                 | ...                               | ...                              |
| Norway                                 | 4.8                | 8.9      | -1.2     | -0.6     | 38.1          | 36.2    | 34.2    | 30.2     | -0.6     | ...                  | ...                 | ...                               | ...                              |
| Portugal                               | 3.6                | 13.4     | -12.2    | 4.1      | 15.9          | 13.1    | 10.0    | 28.3     | 4.1      | ...                  | ...                 | ...                               | ...                              |
| Singapore                              | 9.1                | 9.9      | 4.0      | -7.5     | 31.4          | 14.2    | 12.8    | 30.9     | -7.5     | ...                  | ...                 | ...                               | ...                              |
| Spain                                  | 2.9                | 2.1      | -1.0     | 4.4      | 28.3          | 16.4    | 17.0    | 29.5     | 4.4      | ...                  | ...                 | ...                               | ...                              |
| Sweden                                 | 6.4                | 4.0      | -3.5     | -14.7    | 32.9          | 23.7    | 29.5    | 20.8     | -14.7    | ...                  | ...                 | ...                               | ...                              |
| Switzerland                            | 2.1                | 2.6      | -3.4     | -5.2     | 18.4          | 4.6     | 33.1    | 16.6     | -5.2     | ...                  | ...                 | ...                               | ...                              |
| United Kingdom                         | 1.7                | 4.3      | -2.3     | -0.7     | 14.4          | 7.7     | 16.0    | 10.7     | -0.7     | ...                  | ...                 | ...                               | ...                              |
| United States                          | 0.6                | 5.7      | 1.6      | -3.8     | 26.8          | 8.8     | 3.8     | 13.2     | -3.8     | ...                  | ...                 | ...                               | ...                              |

Source: Data are provided by Morgan Stanley Capital International. Regional and sectoral compositions conform to Morgan Stanley Capital International definitions.

<sup>1</sup>From 1990 or initiation of the index.

**Table 11. Foreign Exchange Rates**

(Units per U.S. dollar)

|  | 2007 End of Period |          |          |          | End of Period |          |          |          |          | 12-<br>Month<br>High <sup>1</sup> | 12-<br>Month<br>Low <sup>1</sup> | All-<br>Time<br>High <sup>1</sup> | All-<br>Time<br>Low <sup>1</sup> |
|--|--------------------|----------|----------|----------|---------------|----------|----------|----------|----------|-----------------------------------|----------------------------------|-----------------------------------|----------------------------------|
|  | Q1                 | Q2       | Q3       | Q4       | 2003          | 2004     | 2005     | 2006     | 2007     |                                   |                                  |                                   |                                  |
| <b>Emerging Markets</b>                      |                    |          |          |          |               |          |          |          |          |                                   |                                  |                                   |                                  |
| <b>Latin America</b>                         |                    |          |          |          |               |          |          |          |          |                                   |                                  |                                   |                                  |
| Argentina                                    | 3.10               | 3.09     | 3.15     | 3.15     | 2.93          | 2.97     | 3.03     | 3.06     | 3.15     | 3.05                              | 3.11                             | 0.98                              | 3.86                             |
| Brazil                                       | 2.06               | 1.93     | 1.83     | 1.78     | 2.89          | 2.66     | 2.34     | 2.14     | 1.78     | 1.90                              | 2.22                             | 0.00                              | 3.95                             |
| Chile  | 539.27             | 527.55   | 510.47   | 497.95   | 592.75        | 555.75   | 512.00   | 533.38   | 497.95   | 517.03                            | 549.35                           | 295.18                            | 759.75                           |
| Colombia                                     | 2,202.67           | 1,975.45 | 2,024.50 | 2,018.00 | 2,780.00      | 2,354.75 | 2,286.50 | 2,240.00 | 2,018.00 | 1,871.75                          | 2,421.11                         | 689.21                            | 2,980.00                         |
| Mexico                                       | 11.04              | 10.81    | 10.94    | 10.91    | 11.23         | 11.15    | 10.63    | 10.82    | 10.91    | 10.72                             | 11.21                            | 2.68                              | 11.67                            |
| Peru   | 3.18               | 3.17     | 3.08     | 3.00     | 3.46          | 3.28     | 3.42     | 3.20     | 3.00     | 3.16                              | 3.25                             | 1.28                              | 3.65                             |
| Venezuela                                    | 2,147.30           | 2,147.30 | 2,147.30 | 2,147.30 | 1,598.00      | 1,918.00 | 2,147.30 | 2,147.30 | 2,147.30 | 2,147.30                          | 2,147.30                         | 45.00                             | 2,147.50                         |
| <b>Asia</b>                                  |                    |          |          |          |               |          |          |          |          |                                   |                                  |                                   |                                  |
| China  | 7.73               | 7.61     | 7.51     | 7.30     | 8.28          | 8.28     | 8.07     | 7.81     | 7.30     | 7.61                              | 7.94                             | 4.73                              | 8.73                             |
| India  | 43.47              | 40.70    | 39.77    | 39.42    | 45.63         | 43.46    | 45.05    | 44.26    | 39.42    | 40.49                             | 46.08                            | 16.92                             | 49.05                            |
| Indonesia                                    | 9,121.00           | 9,025.00 | 9,105.00 | 9,400.00 | 8,420.00      | 9,270.00 | 9,830.00 | 8,994.00 | 9,400.00 | 8,670.00                          | 9,250.00                         | 1,977.00                          | 16,650.00                        |
| Korea  | 940.60             | 923.60   | 915.25   | 936.05   | 1,192.10      | 1,035.10 | 1,010.00 | 930.00   | 936.05   | 913.90                            | 963.85                           | 683.50                            | 1,962.50                         |
| Malaysia                                     | 3.46               | 3.45     | 3.41     | 3.31     | 3.80          | 3.80     | 3.78     | 3.53     | 3.31     | 3.38                              | 3.70                             | 2.44                              | 4.71                             |
| Pakistan                                     | 60.74              | 60.47    | 60.71    | 61.63    | 57.25         | 59.43    | 59.79    | 60.88    | 61.63    | 60.47                             | 61.00                            | 21.18                             | 64.35                            |
| Philippines                                  | 48.27              | 46.20    | 44.95    | 41.23    | 55.54         | 56.23    | 53.09    | 49.01    | 41.23    | 45.64                             | 50.36                            | 23.10                             | 56.46                            |
| Taiwan Province of China                     | 33.06              | 32.85    | 32.67    | 32.43    | 33.96         | 31.74    | 32.83    | 32.59    | 32.43    | 32.29                             | 33.44                            | 24.48                             | 35.19                            |
| Thailand                                     | 32.40              | 31.70    | 31.88    | 29.80    | 39.62         | 38.92    | 41.03    | 35.45    | 29.80    | 31.44                             | 37.77                            | 23.15                             | 55.50                            |
| <b>Europe, Middle East,<br/>&amp; Africa</b> |                    |          |          |          |               |          |          |          |          |                                   |                                  |                                   |                                  |
| Czech Republic                               | 20.97              | 21.24    | 19.32    | 18.20    | 25.71         | 22.42    | 24.55    | 20.83    | 18.20    | 20.55                             | 22.60                            | 17.71                             | 42.17                            |
| Egypt  | 5.70               | 5.69     | 5.59     | 5.53     | 6.17          | 6.09     | 5.74     | 5.71     | 5.53     | 5.68                              | 5.74                             | 3.29                              | 6.25                             |
| Hungary                                      | 185.64             | 182.21   | 175.93   | 173.42   | 208.70        | 181.02   | 212.97   | 190.29   | 173.42   | 179.95                            | 217.00                           | 90.20                             | 317.56                           |
| Israel                                       | 4.16               | 4.25     | 4.02     | 3.86     | 4.39          | 4.32     | 4.61     | 4.22     | 3.86     | 3.94                              | 4.35                             | 1.96                              | 5.01                             |
| Jordan                                       | 0.71               | 0.71     | 0.71     | 0.71     | 0.71          | 0.71     | 0.71     | 0.71     | 0.71     | 0.71                              | 0.71                             | 0.64                              | 0.72                             |
| Morocco                                      | 11.40              | 10.60    | 10.61    | 10.43    | 10.08         | 11.09    | 11.94    | 11.70    | 10.43    | 10.60                             | 11.83                            | 7.75                              | 12.06                            |
| Poland                                       | 2.89               | 2.78     | 2.64     | 2.47     | 3.73          | 3.01     | 3.25     | 2.90     | 2.47     | 2.75                              | 3.14                             | 1.72                              | 4.71                             |
| Russia                                       | 25.99              | 25.74    | 24.86    | 24.63    | 29.24         | 27.72    | 28.74    | 26.33    | 24.63    | 25.68                             | 26.98                            | 0.98                              | 31.96                            |
| South Africa                                 | 7.26               | 7.04     | 6.87     | 6.86     | 6.68          | 5.67     | 6.33     | 7.01     | 6.86     | 6.89                              | 7.88                             | 2.50                              | 12.45                            |
| Turkey                                       | 1.39               | 1.31     | 1.21     | 1.17     | 1.41          | 1.34     | 1.35     | 1.42     | 1.17     | 1.30                              | 1.53                             | 0.00                              | 1.77                             |
| <b>Developed Markets</b>                     |                    |          |          |          |               |          |          |          |          |                                   |                                  |                                   |                                  |
| Australia <sup>2</sup>                       | 0.81               | 0.85     | 0.89     | 0.88     | 0.75          | 0.78     | 0.73     | 0.79     | 0.88     | 0.74                              | 0.85                             | 0.93                              | 0.48                             |
| Canada                                       | 1.15               | 1.07     | 0.99     | 1.00     | 1.30          | 1.20     | 1.16     | 1.17     | 1.00     | 1.06                              | 1.18                             | 0.92                              | 1.61                             |
| Denmark                                      | 5.58               | 5.50     | 5.23     | 5.11     | 5.91          | 5.49     | 6.30     | 5.65     | 5.11     | 5.46                              | 5.96                             | 5.01                              | 9.00                             |
| Euro area <sup>2</sup>                       | 1.34               | 1.35     | 1.37     | 1.34     | 1.26          | 1.36     | 1.18     | 1.32     | 1.34     | 1.43                              | 1.56                             | 1.31                              | 2.37                             |
| Hong Kong SAR                                | 7.81               | 7.82     | 7.77     | 7.80     | 7.76          | 7.77     | 7.75     | 7.78     | 7.80     | 7.77                              | 7.82                             | 7.70                              | 7.83                             |
| Japan  | 117.83             | 123.18   | 114.80   | 111.71   | 107.22        | 102.63   | 117.75   | 119.07   | 111.71   | 114.90                            | 123.90                           | 80.63                             | 159.90                           |
| New Zealand <sup>2</sup>                     | 0.71               | 0.77     | 0.76     | 0.77     | 0.66          | 0.72     | 0.68     | 0.70     | 0.77     | 0.65                              | 0.77                             | 0.81                              | 0.39                             |
| Norway                                       | 6.08               | 5.89     | 5.39     | 5.44     | 6.67          | 6.08     | 6.74     | 6.24     | 5.44     | 5.89                              | 6.78                             | 5.27                              | 9.58                             |
| Singapore                                    | 1.52               | 1.53     | 1.49     | 1.44     | 1.70          | 1.63     | 1.66     | 1.53     | 1.44     | 1.51                              | 1.59                             | 1.39                              | 1.91                             |
| Sweden                                       | 6.98               | 6.83     | 6.44     | 6.47     | 7.19          | 6.66     | 7.94     | 6.85     | 6.47     | 6.69                              | 7.41                             | 5.09                              | 11.03                            |
| Switzerland                                  | 1.22               | 1.22     | 1.16     | 1.13     | 1.24          | 1.14     | 1.31     | 1.22     | 1.13     | 1.19                              | 1.27                             | 1.10                              | 1.82                             |
| United Kingdom <sup>2</sup>                  | 1.97               | 2.01     | 2.05     | 1.98     | 1.79          | 1.92     | 1.72     | 1.96     | 1.98     | 1.85                              | 2.01                             | 2.11                              | 1.37                             |

Table 11 (concluded)

|  | Period on Period Percent Change |      |      |      |               |       |       |      |      |
|--|---------------------------------|------|------|------|---------------|-------|-------|------|------|
|  | 2007 End of period              |      |      |      | End of period |       |       |      |      |
|  | Q1                              | Q2   | Q3   | Q4   | 2003          | 2004  | 2005  | 2006 | 2007 |
| <b>Emerging Markets</b>                  |                                 |      |      |      |               |       |       |      |      |
| <b>Latin America</b>                     |                                 |      |      |      |               |       |       |      |      |
| Argentina                                | -1.2                            | 0.3  | -1.9 | 0.0  | 14.7          | -1.4  | -1.9  | -1.0 | -2.8 |
| Brazil                                   | 3.7                             | 6.7  | 5.2  | 3.0  | 22.4          | 8.9   | 13.7  | 9.4  | 20.0 |
| Chile                                    | -1.1                            | 2.2  | 3.3  | 2.5  | 21.5          | 6.7   | 8.5   | -4.0 | 7.1  |
| Colombia                                 | 1.7                             | 11.5 | -2.4 | 0.3  | 3.1           | 18.1  | 3.0   | 2.1  | 11.0 |
| Mexico                                   | -2.0                            | 2.2  | -1.2 | 0.2  | -7.6          | 0.7   | 4.8   | -1.7 | -0.8 |
| Peru                                     | 0.4                             | 0.5  | 2.6  | 2.9  | 1.5           | 5.6   | -4.1  | 7.1  | 6.6  |
| Venezuela                                | 0.0                             | 0.0  | 0.0  | 0.0  | -13.1         | -16.7 | -10.7 | 0.0  | 0.0  |
| <b>Asia</b>                              |                                 |      |      |      |               |       |       |      |      |
| China                                    | 1.0                             | 1.5  | 1.4  | 2.9  | 0.0           | 0.0   | 2.6   | 3.4  | 7.0  |
| India                                    | 1.8                             | 6.8  | 2.3  | 0.9  | 5.2           | 5.0   | -3.5  | 1.8  | 12.3 |
| Indonesia                                | -1.4                            | 1.1  | -0.9 | -3.1 | 6.3           | -9.2  | -5.7  | 9.3  | -4.3 |
| Korea                                    | -1.1                            | 1.8  | 0.9  | -2.2 | -0.5          | 15.2  | 2.5   | 8.6  | -0.6 |
| Malaysia                                 | 2.0                             | 0.1  | 1.3  | 3.0  | 0.0           | 0.0   | 0.5   | 7.1  | 6.7  |
| Pakistan                                 | 0.2                             | 0.4  | -0.4 | -1.5 | 1.7           | -3.7  | -0.6  | -1.8 | -1.2 |
| Philippines                              | 1.5                             | 4.5  | 2.8  | 9.0  | -3.5          | -1.2  | 5.9   | 8.3  | 18.9 |
| Taiwan Province of China                 | -1.4                            | 0.6  | 0.6  | 0.7  | 2.0           | 7.0   | -3.3  | 0.7  | 0.5  |
| Thailand                                 | 9.4                             | 2.2  | -0.6 | 7.0  | 8.8           | 1.8   | -5.1  | 15.7 | 19.0 |
| <b>Europe, Middle East, &amp; Africa</b> |                                 |      |      |      |               |       |       |      |      |
| Czech Republic                           | -0.7                            | -1.3 | 9.9  | 6.1  | 16.9          | 14.7  | -8.7  | 17.9 | 14.4 |
| Egypt                                    | 0.3                             | 0.1  | 1.9  | 1.0  | -25.1         | 1.3   | 6.1   | 0.5  | 3.2  |
| Hungary                                  | 2.5                             | 1.9  | 3.6  | 1.4  | 7.6           | 15.3  | -15.0 | 11.9 | 9.7  |
| Israel                                   | 1.4                             | -2.2 | 5.8  | 4.2  | 8.0           | 1.6   | -6.1  | 9.2  | 9.3  |
| Jordan                                   | 0.0                             | 0.1  | 0.1  | -0.1 | 0.1           | 0.0   | 0.1   | -0.1 | 0.0  |
| Morocco                                  | 2.7                             | 7.5  | -0.1 | 1.8  | -2.7          | -9.2  | -7.1  | 2.0  | 12.3 |
| Poland                                   | 0.3                             | 4.0  | 5.3  | 7.0  | 2.6           | 24.0  | -7.2  | 11.8 | 17.5 |
| Russia                                   | 1.3                             | 1.0  | 3.6  | 0.9  | 9.3           | 5.5   | -3.6  | 9.2  | 6.9  |
| South Africa                             | -3.4                            | 3.0  | 2.5  | 0.1  | 28.2          | 18.0  | -10.5 | -9.7 | 2.1  |
| Turkey                                   | 2.0                             | 5.8  | 8.8  | 3.1  | 17.7          | 4.7   | -0.6  | -4.7 | 21.1 |
| <b>Developed Markets</b>                 |                                 |      |      |      |               |       |       |      |      |
| Australia                                | 2.5                             | 5.0  | 4.5  | -1.4 | 33.9          | 3.8   | -6.1  | 7.6  | 11.0 |
| Canada                                   | 1.0                             | 8.3  | 7.4  | -0.6 | 21.2          | 7.9   | 3.4   | -0.3 | 16.8 |
| Denmark                                  | 1.3                             | 1.5  | 5.2  | 2.2  | 19.8          | 7.8   | -12.9 | 11.5 | 10.5 |
| Euro area                                | 1.2                             | 1.4  | 1.2  | -2.2 | 20.0          | 7.6   | -12.6 | 11.4 | 1.6  |
| Hong Kong SAR                            | -0.5                            | -0.1 | 0.6  | -0.3 | 0.4           | -0.1  | 0.2   | -0.3 | -0.3 |
| Japan                                    | 1.1                             | -4.3 | 7.3  | 2.8  | 10.8          | 4.5   | -12.8 | -1.1 | 6.6  |
| New Zealand                              | 1.5                             | 8.1  | -1.9 | 1.1  | 25.0          | 9.5   | -4.8  | 3.0  | 8.8  |
| Norway                                   | 2.5                             | 3.2  | 9.4  | -0.9 | 4.1           | 9.6   | -9.8  | 8.1  | 14.7 |
| Singapore                                | 1.1                             | -0.9 | 3.0  | 3.1  | 2.1           | 4.2   | -1.9  | 8.4  | 6.5  |
| Sweden                                   | -1.9                            | 2.2  | 6.1  | -0.5 | 20.9          | 8.0   | -16.2 | 15.9 | 5.9  |
| Switzerland                              | 0.3                             | -0.5 | 4.9  | 2.7  | 11.7          | 8.7   | -13.2 | 7.7  | 7.5  |
| United Kingdom                           | 0.5                             | 2.1  | 1.9  | -3.0 | 10.9          | 7.4   | -10.2 | 13.7 | 1.3  |

Source: Bloomberg L.P.

<sup>1</sup>High value indicates value of greatest appreciation against the U.S. dollar; low value indicates value of greatest depreciation against the U.S. dollar. "All-Time" refers to the period since 1990 or initiation of the currency.

<sup>2</sup>U.S. dollars per unit.

**Table 12. Emerging Market Bond Index: EMBI Global Total Returns Index**

|  | 2007 End of Period |            |            |            | End of Period |            |            |            |            | 12-Month High | 12-Month Low | All-Time High | All-Time Low |
|--|--------------------|------------|------------|------------|---------------|------------|------------|------------|------------|---------------|--------------|---------------|--------------|
|  | Q1                 | Q2         | Q3         | Q4         | 2003          | 2004       | 2005       | 2006       | 2007       |               |              |               |              |
| <b>EMBI Global</b>                       | <b>394</b>         | <b>388</b> | <b>398</b> | <b>409</b> | <b>283</b>    | <b>316</b> | <b>350</b> | <b>384</b> | <b>409</b> | <b>398</b>    | <b>348</b>   | <b>409</b>    | <b>63</b>    |
| <b>Latin America</b>                     |                    |            |            |            |               |            |            |            |            |               |              |               |              |
| Argentina                                | 130                | 108        | 105        | 112        | 67            | 81         | 83         | 126        | 112        | 131           | 91           | 194           | 47           |
| Brazil                                   | 603                | 598        | 622        | 633        | 390           | 446        | 505        | 580        | 633        | 617           | 515          | 635           | 68           |
| Chile                                    | 188                | 187        | 190        | 197        | 162           | 172        | 177        | 185        | 197        | 190           | 175          | 198           | 98           |
| Colombia                                 | 291                | 296        | 300        | 309        | 201           | 228        | 256        | 283        | 309        | 299           | 252          | 311           | 70           |
| Dominican Republic                       | 189                | 191        | 190        | 198        | 99            | 126        | 156        | 184        | 198        | 195           | 162          | 198           | 83           |
| Ecuador                                  | 696                | 668        | 761        | 811        | 464           | 562        | 636        | 561        | 811        | 750           | 522          | 813           | 61           |
| El Salvador                              | 156                | 157        | 159        | 165        | 110           | 123        | 134        | 152        | 165        | 160           | 133          | 165           | 95           |
| Mexico                                   | 359                | 358        | 369        | 377        | 284           | 308        | 333        | 353        | 377        | 366           | 324          | 377           | 58           |
| Panama                                   | 648                | 650        | 666        | 691        | 452           | 511        | 567        | 637        | 691        | 664           | 559          | 692           | 56           |
| Peru                                     | 603                | 599        | 620        | 633        | 431           | 485        | 514        | 591        | 633        | 616           | 527          | 633           | 52           |
| Uruguay                                  | 181                | 182        | 182        | 188        | 97            | 129        | 151        | 177        | 188        | 188           | 146          | 190           | 38           |
| Venezuela                                | 635                | 570        | 574        | 563        | 393           | 484        | 562        | 634        | 563        | 638           | 570          | 638           | 59           |
| <b>Asia</b>                              |                    |            |            |            |               |            |            |            |            |               |              |               |              |
| China                                    | 276                | 274        | 281        | 289        | 241           | 253        | 260        | 271        | 289        | 278           | 255          | 292           | 98           |
| Indonesia                                | 155                | 154        | 157        | 159        | ...           | 121        | 133        | 154        | 159        | 158           | 135          | 161           | 98           |
| Malaysia                                 | 227                | 226        | 232        | 240        | 194           | 207        | 215        | 224        | 240        | 229           | 208          | 242           | 64           |
| Philippines                              | 398                | 397        | 409        | 425        | 261           | 280        | 337        | 394        | 425        | 406           | 342          | 425           | 81           |
| Vietnam                                  | 113                | 111        | 114        | 117        | ...           | ...        | 101        | 112        | 117        | 114           | 99           | 119           | 98           |
| <b>Europe, Middle East, &amp; Africa</b> |                    |            |            |            |               |            |            |            |            |               |              |               |              |
| Bulgaria                                 | 688                | 682        | 703        | 713        | 578           | 630        | 643        | 676        | 713        | 697           | 622          | 724           | 80           |
| Côte d'Ivoire                            | 99                 | 127        | 131        | 131        | 58            | 65         | 79         | 84         | 131        | 135           | 84           | 135           | 29           |
| Egypt                                    | 164                | 165        | 168        | 171        | 140           | 150        | 155        | 161        | 171        | 165           | 151          | 171           | 87           |
| Hungary                                  | 156                | 154        | 160        | 168        | 142           | 144        | 148        | 153        | 168        | 157           | 142          | 168           | 97           |
| Iraq                                     | 105                | 101        | 101        | 115        | ...           | ...        | ...        | 102        | 115        | 106           | 98           | 115           | 91           |
| Lebanon                                  | 225                | 226        | 225        | 236        | 177           | 195        | 212        | 215        | 236        | 226           | 202          | 236           | 99           |
| Pakistan                                 | 124                | 124        | 118        | 111        | 160           | 107        | 112        | 123        | 111        | 125           | 110          | 160           | 91           |
| Poland                                   | 346                | 342        | 355        | 373        | 290           | 312        | 327        | 340        | 373        | 348           | 318          | 373           | 71           |
| Russia                                   | 577                | 569        | 585        | 607        | 426           | 475        | 538        | 568        | 607        | 582           | 522          | 607           | 26           |
| Serbia <sup>1</sup>                      | 120                | 121        | 122        | 121        | ...           | ...        | 108        | 117        | 121        | 122           | 102          | 125           | 99           |
| South Africa                             | 359                | 357        | 366        | 373        | 297           | 323        | 337        | 349        | 373        | 363           | 327          | 376           | 99           |
| Tunisia                                  | 152                | 152        | 157        | 160        | 127           | 138        | 143        | 149        | 160        | 154           | 139          | 161           | 98           |
| Turkey                                   | 363                | 367        | 377        | 392        | 279           | 307        | 336        | 356        | 392        | 371           | 316          | 392           | 91           |
| Ukraine                                  | 364                | 365        | 369        | 372        | 289           | 310        | 334        | 353        | 372        | 369           | 324          | 374           | 100          |
| <b>Latin America</b>                     | <b>364</b>         | <b>356</b> | <b>366</b> | <b>372</b> | <b>252</b>    | <b>285</b> | <b>316</b> | <b>354</b> | <b>372</b> | <b>369</b>    | <b>318</b>   | <b>376</b>    | <b>62</b>    |
| <b>Non-Latin America</b>                 | <b>451</b>         | <b>450</b> | <b>460</b> | <b>476</b> | <b>342</b>    | <b>374</b> | <b>413</b> | <b>443</b> | <b>476</b> | <b>456</b>    | <b>404</b>   | <b>476</b>    | <b>72</b>    |

Table 12 (concluded)

|  | Period on Period Percent Change |             |            |            |               |             |             |             |            |
|--|---------------------------------|-------------|------------|------------|---------------|-------------|-------------|-------------|------------|
|  | 2007 End of period              |             |            |            | End of period |             |             |             |            |
|  | Q1                              | Q2          | Q3         | Q4         | 2003          | 2004        | 2005        | 2006        | 2007       |
| <b>EMBI Global</b>                           | <b>2.4</b>                      | <b>-1.4</b> | <b>2.6</b> | <b>2.6</b> | <b>25.7</b>   | <b>11.7</b> | <b>10.7</b> | <b>9.9</b>  | <b>2.6</b> |
| <b>Latin America</b>                         |                                 |             |            |            |               |             |             |             |            |
| Argentina                                    | 3.7                             | -17.0       | -2.6       | 6.0        | 19.1          | 19.8        | 2.7         | 51.3        | 6.0        |
| Brazil                                       | 4.0                             | -0.9        | 4.1        | 1.7        | 69.8          | 14.3        | 13.2        | 14.8        | 1.7        |
| Chile  | 1.8                             | -0.6        | 1.7        | 3.5        | 8.3           | 6.0         | 3.2         | 4.1         | 3.5        |
| Colombia                                     | 2.5                             | 1.7         | 1.5        | 3.0        | 19.4          | 13.2        | 12.4        | 10.7        | 3.0        |
| Dominican Republic                           | 2.6                             | 1.3         | -0.7       | 4.0        | -15.3         | 27.2        | 24.1        | 18.0        | 4.0        |
| Ecuador                                      | 24.1                            | -4.1        | 14.0       | 6.5        | 101.5         | 21.1        | 13.2        | -11.8       | 6.5        |
| El Salvador                                  | 2.3                             | 0.8         | 1.1        | 3.6        | 11.9          | 11.5        | 8.8         | 14.1        | 3.6        |
| Mexico                                       | 1.9                             | -0.4        | 3.1        | 2.1        | 11.6          | 8.6         | 8.1         | 6.0         | 2.1        |
| Panama                                       | 1.7                             | 0.4         | 2.5        | 3.7        | 14.4          | 13.0        | 11.1        | 12.3        | 3.7        |
| Peru   | 2.0                             | -0.5        | 3.4        | 2.1        | 26.6          | 12.6        | 6.0         | 14.8        | 2.1        |
| Uruguay                                      | 2.3                             | 0.9         | 0.0        | 3.2        | 55.6          | 34.0        | 16.3        | 17.3        | 3.2        |
| Venezuela                                    | 0.3                             | -10.4       | 0.7        | -1.9       | 39.9          | 23.2        | 16.1        | 12.8        | -1.9       |
| <b>Asia</b>                                  |                                 |             |            |            |               |             |             |             |            |
| China  | 1.8                             | -0.5        | 2.4        | 2.9        | 4.5           | 5.1         | 3.0         | 4.1         | 2.9        |
| Indonesia                                    | 0.8                             | -0.8        | 1.9        | 1.0        | ...           | ...         | 9.7         | 15.9        | 1.0        |
| Malaysia                                     | 1.5                             | -0.5        | 2.4        | 3.9        | 10.7          | 6.6         | 3.7         | 4.3         | 3.9        |
| Philippines                                  | 1.1                             | -0.2        | 3.0        | 3.9        | 13.4          | 7.1         | 20.6        | 16.8        | 3.9        |
| Vietnam                                      | 0.7                             | -1.6        | 3.0        | 2.4        | ...           | ...         | ...         | 10.6        | 2.4        |
| <b>Europe, Middle East,<br/>&amp; Africa</b> |                                 |             |            |            |               |             |             |             |            |
| Bulgaria                                     | 1.8                             | -0.9        | 3.0        | 1.6        | 10.2          | 8.9         | 2.1         | 5.1         | 1.6        |
| Côte d'Ivoire                                | 17.8                            | 28.3        | 2.9        | 0.0        | 34.8          | 12.9        | 20.0        | 7.1         | 0.0        |
| Egypt  | 1.9                             | 0.5         | 1.8        | 1.5        | 14.4          | 6.8         | 3.8         | 3.8         | 1.5        |
| Hungary                                      | 1.7                             | -1.4        | 3.9        | 4.9        | 3.7           | 1.2         | 2.8         | 3.7         | 4.9        |
| Iraq   | 2.6                             | -3.8        | 0.4        | 13.5       | ...           | ...         | ...         | ...         | 13.5       |
| Lebanon                                      | 4.8                             | 0.2         | -0.3       | 5.0        | 19.5          | 9.9         | 8.7         | 1.6         | 5.0        |
| Pakistan                                     | 0.7                             | -0.1        | -5.1       | -5.8       | -0.2          | -33.3       | 4.5         | 10.3        | -5.8       |
| Poland                                       | 1.8                             | -1.1        | 3.9        | 5.0        | 3.7           | 7.5         | 5.0         | 3.8         | 5.0        |
| Russia                                       | 1.6                             | -1.4        | 2.9        | 3.7        | 22.4          | 11.5        | 13.3        | 5.5         | 3.7        |
| Serbia <sup>1</sup>                          | 2.6                             | 1.2         | 0.7        | -0.9       | ...           | ...         | ...         | 8.3         | -0.9       |
| South Africa                                 | 2.6                             | -0.6        | 2.8        | 1.8        | 9.6           | 8.8         | 4.3         | 3.7         | 1.8        |
| Tunisia                                      | 2.5                             | -0.1        | 2.8        | 2.4        | 13.3          | 8.7         | 3.7         | 3.8         | 2.4        |
| Turkey                                       | 2.0                             | 1.1         | 2.6        | 4.1        | 30.8          | 10.0        | 9.5         | 6.1         | 4.1        |
| Ukraine                                      | 2.9                             | 0.3         | 1.2        | 0.7        | 19.8          | 7.2         | 7.7         | 5.9         | 0.7        |
| <b>Latin America</b>                         | <b>2.9</b>                      | <b>-2.3</b> | <b>2.7</b> | <b>1.9</b> | <b>33.0</b>   | <b>13.4</b> | <b>10.9</b> | <b>11.9</b> | <b>1.9</b> |
| <b>Non-Latin America</b>                     | <b>1.8</b>                      | <b>-0.4</b> | <b>2.4</b> | <b>3.4</b> | <b>17.7</b>   | <b>9.2</b>  | <b>10.6</b> | <b>7.2</b>  | <b>3.4</b> |

Source: JPMorgan Chase &amp; Co.

<sup>1</sup>Data prior to 2006 refer to Serbia and Montenegro.

**Table 13. Emerging Market Bond Index: EMBI Global Yield Spreads**

(In basis points)

|  | 2007 End of Period |            |            |            | End of Period |            |            |            |            | 12-Month High | 12-Month Low | All-Time High | All-Time Low |
|--|--------------------|------------|------------|------------|---------------|------------|------------|------------|------------|---------------|--------------|---------------|--------------|
|  | Q1                 | Q2         | Q3         | Q4         | 2003          | 2004       | 2005       | 2006       | 2007       |               |              |               |              |
| <b>EMBI Global</b>                       | <b>170</b>         | <b>181</b> | <b>214</b> | <b>255</b> | <b>403</b>    | <b>347</b> | <b>237</b> | <b>171</b> | <b>255</b> | <b>217</b>    | <b>151</b>   | <b>1631</b>   | <b>151</b>   |
| <b>Latin America</b>                     |                    |            |            |            |               |            |            |            |            |               |              |               |              |
| Argentina                                | 204                | 325        | 398        | 410        | 5,485         | 4,527      | 504        | 216        | 410        | 385           | 185          | 7,222         | 185          |
| Brazil                                   | 167                | 160        | 172        | 220        | 459           | 376        | 308        | 190        | 220        | 253           | 138          | 2,451         | 138          |
| Chile                                    | 85                 | 83         | 124        | 151        | 90            | 64         | 80         | 84         | 151        | 90            | 77           | 260           | 52           |
| Colombia                                 | 157                | 119        | 166        | 195        | 427           | 332        | 244        | 161        | 195        | 251           | 95           | 1,076         | 95           |
| Dominican Republic                       | 189                | 157        | 252        | 281        | 1,141         | 824        | 378        | 196        | 281        | 299           | 122          | 1,750         | 122          |
| Ecuador                                  | 650                | 711        | 616        | 614        | 799           | 690        | 661        | 920        | 614        | 1,048         | 458          | 4,764         | 436          |
| El Salvador                              | 156                | 127        | 175        | 199        | 284           | 245        | 239        | 159        | 199        | 225           | 99           | 434           | 99           |
| Mexico                                   | 116                | 111        | 131        | 172        | 201           | 174        | 143        | 115        | 172        | 145           | 89           | 1,149         | 89           |
| Panama                                   | 152                | 130        | 159        | 184        | 324           | 274        | 239        | 146        | 184        | 211           | 114          | 769           | 114          |
| Peru                                     | 129                | 117        | 137        | 178        | 325           | 239        | 257        | 118        | 178        | 206           | 95           | 1,061         | 95           |
| Uruguay                                  | 184                | 157        | 212        | 243        | 636           | 388        | 298        | 185        | 243        | 306           | 133          | 1,982         | 133          |
| Venezuela                                | 207                | 354        | 419        | 523        | 586           | 403        | 313        | 183        | 523        | 354           | 181          | 2,658         | 161          |
| <b>Asia</b>                              |                    |            |            |            |               |            |            |            |            |               |              |               |              |
| China                                    | 53                 | 54         | 88         | 120        | 58            | 57         | 68         | 51         | 120        | 67            | 48           | 364           | 39           |
| Indonesia                                | 171                | 165        | 217        | 275        | ...           | 244        | 269        | 153        | 275        | 232           | 136          | 433           | 136          |
| Malaysia                                 | 73                 | 75         | 108        | 119        | 100           | 78         | 82         | 66         | 119        | 99            | 65           | 1,141         | 65           |
| Philippines                              | 167                | 155        | 184        | 207        | 415           | 457        | 302        | 155        | 207        | 263           | 132          | 993           | 132          |
| Vietnam                                  | 108                | 122        | 156        | 203        | ...           | ...        | 190        | 95         | 203        | 182           | 89           | 246           | 89           |
| <b>Europe, Middle East, &amp; Africa</b> |                    |            |            |            |               |            |            |            |            |               |              |               |              |
| Bulgaria                                 | 67                 | 68         | 90         | 153        | 177           | 77         | 90         | 66         | 153        | 101           | 42           | 1,679         | 42           |
| Côte d'Ivoire                            | 3,050              | 2,483      | 2,309      | 2,468      | 3,013         | 3,121      | 3,070      | 3,325      | 2,468      | 3,426         | 2,292        | 3,609         | 582          |
| Egypt                                    | 53                 | 51         | 103        | 178        | 131           | 101        | 58         | 52         | 178        | 123           | 34           | 646           | 20           |
| Hungary                                  | 63                 | 71         | 80         | 84         | 28            | 32         | 74         | 58         | 84         | 88            | 55           | 196           | -29          |
| Iraq                                     | 537                | 570        | 639        | 569        | ...           | ...        | ...        | 526        | 569        | 575           | 433          | 730           | 376          |
| Lebanon                                  | 364                | 371        | 491        | 493        | 421           | 334        | 246        | 395        | 493        | 419           | 182          | 1,082         | 111          |
| Pakistan                                 | 181                | 214        | 386        | 535        | ...           | 233        | 198        | 154        | 535        | 265           | 133          | 2,225         | 122          |
| Poland                                   | 53                 | 61         | 69         | 67         | 76            | 69         | 62         | 47         | 67         | 77            | 42           | 410           | 17           |
| Russia                                   | 102                | 106        | 133        | 157        | 257           | 213        | 118        | 99         | 157        | 125           | 87           | 7,063         | 87           |
| Serbia <sup>1</sup>                      | 183                | 152        | 206        | 304        | ...           | ...        | 238        | 186        | 304        | 285           | 134          | 322           | 134          |
| South Africa                             | 73                 | 87         | 115        | 164        | 152           | 102        | 87         | 84         | 164        | 120           | 50           | 757           | 50           |
| Tunisia                                  | 79                 | 73         | 105        | 140        | 146           | 91         | 81         | 83         | 140        | 122           | 55           | 394           | 48           |
| Turkey                                   | 216                | 189        | 220        | 239        | 309           | 264        | 223        | 207        | 239        | 292           | 175          | 1,196         | 168          |
| Ukraine                                  | 164                | 156        | 217        | 303        | 258           | 255        | 184        | 172        | 303        | 257           | 125          | 2,314         | 125          |
| <b>Latin America</b>                     | <b>173</b>         | <b>196</b> | <b>227</b> | <b>275</b> | <b>518</b>    | <b>415</b> | <b>272</b> | <b>180</b> | <b>275</b> | <b>232</b>    | <b>157</b>   | <b>1,532</b>  | <b>157</b>   |
| <b>Non-Latin America</b>                 | <b>166</b>         | <b>160</b> | <b>196</b> | <b>227</b> | <b>248</b>    | <b>239</b> | <b>179</b> | <b>159</b> | <b>227</b> | <b>202</b>    | <b>142</b>   | <b>1,812</b>  | <b>142</b>   |

Table 13 (concluded)

|  | Period on Period Spread Change |           |           |           |               |             |             |            |           |
|--|--------------------------------|-----------|-----------|-----------|---------------|-------------|-------------|------------|-----------|
|  | 2007 End of period             |           |           |           | End of period |             |             |            |           |
|  | Q1                             | Q2        | Q3        | Q4        | 2003          | 2004        | 2005        | 2006       | 2007      |
| <b>EMBI Global</b>                           | <b>-1</b>                      | <b>11</b> | <b>18</b> | <b>19</b> | <b>-322</b>   | <b>-56</b>  | <b>-110</b> | <b>-66</b> | <b>19</b> |
| <b>Latin America</b>                         |                                |           |           |           |               |             |             |            |           |
| Argentina                                    | -12                            | 121       | 22        | 3         | -857          | -958        | -4,023      | -288       | 3         |
| Brazil                                       | -23                            | -7        | 8         | 28        | -1,001        | -83         | -68         | -118       | 28        |
| Chile  | 1                              | -2        | 49        | 22        | -86           | -26         | 16          | 4          | 22        |
| Colombia                                     | -4                             | -38       | 39        | 17        | -206          | -95         | -88         | -83        | 17        |
| Dominican Republic                           | -7                             | -32       | 61        | 12        | 642           | -317        | -446        | -182       | 12        |
| Ecuador                                      | -270                           | 61        | -13       | 0         | -1,002        | -109        | -29         | 259        | 0         |
| El Salvador                                  | -3                             | -29       | 38        | 14        | -127          | -39         | -6          | -80        | 14        |
| Mexico                                       | 1                              | -5        | 18        | 31        | -128          | -27         | -31         | -28        | 31        |
| Panama                                       | 6                              | -22       | 22        | 16        | -122          | -50         | -35         | -93        | 16        |
| Peru   | 11                             | -12       | 17        | 30        | -284          | -86         | 18          | -139       | 30        |
| Uruguay                                      | -1                             | -27       | 35        | 15        | -592          | -248        | -90         | -113       | 15        |
| Venezuela                                    | 24                             | 147       | 18        | 25        | -545          | -183        | -90         | -130       | 25        |
| <b>Asia</b>                                  |                                |           |           |           |               |             |             |            |           |
| China  | 2                              | 1         | 63        | 36        | -26           | -1          | 11          | -17        | 36        |
| Indonesia                                    | 18                             | -6        | 32        | 27        | ...           | ...         | 25          | -116       | 27        |
| Malaysia                                     | 7                              | 2         | 44        | 10        | -112          | -22         | 4           | -16        | 10        |
| Philippines                                  | 12                             | -12       | 19        | 13        | -107          | 42          | -155        | -147       | 13        |
| Vietnam                                      | 13                             | 14        | 28        | 30        | ...           | ...         | ...         | -95        | 30        |
| <b>Europe, Middle East,<br/>&amp; Africa</b> |                                |           |           |           |               |             |             |            |           |
| Bulgaria                                     | 1                              | 1         | 32        | 70        | -114          | -100        | 13          | -24        | 70        |
| Côte d'Ivoire                                | -275                           | -567      | -7        | 7         | -182          | 108         | -51         | 255        | 7         |
| Egypt  | 1                              | -2        | 102       | 73        | -194          | -30         | -43         | -6         | 73        |
| Hungary                                      | 5                              | 8         | 13        | 5         | -24           | 4           | 42          | -16        | 5         |
| Iraq   | 11                             | 33        | 12        | -11       | ...           | ...         | ...         | ...        | -11       |
| Lebanon                                      | -31                            | 7         | 32        | 0         | -355          | -87         | -88         | 149        | 25        |
| Pakistan                                     | 27                             | 33        | 80        | 39        | -271          | 233         | -35         | -44        | 39        |
| Poland                                       | 6                              | 8         | 13        | -3        | -109          | -7          | -7          | -15        | -3        |
| Russia                                       | 3                              | 4         | 25        | 18        | -221          | -44         | -95         | -19        | 18        |
| Serbia <sup>1</sup>                          | -3                             | -31       | 36        | 48        | ...           | ...         | ...         | -52        | 48        |
| South Africa                                 | -11                            | 14        | 32        | 43        | -98           | -50         | -15         | -3         | 43        |
| Tunisia                                      | -4                             | -6        | 44        | 33        | -127          | -55         | -10         | 2          | 33        |
| Turkey                                       | 9                              | -27       | 16        | 9         | -387          | -45         | -41         | -16        | 9         |
| Ukraine                                      | -8                             | -8        | 39        | 40        | -413          | -3          | -71         | -12        | 40        |
| <b>Latin America</b>                         | <b>-7</b>                      | <b>23</b> | <b>16</b> | <b>21</b> | <b>-463</b>   | <b>-103</b> | <b>-143</b> | <b>-92</b> | <b>21</b> |
| <b>Non-Latin America</b>                     | <b>7</b>                       | <b>-6</b> | <b>23</b> | <b>16</b> | <b>-196</b>   | <b>-9</b>   | <b>-60</b>  | <b>-20</b> | <b>16</b> |

Source: JPMorgan Chase &amp; Co.

<sup>1</sup>Data prior to 2006 refer to Serbia and Montenegro.

**Table 14. Emerging Market External Financing: Total Bonds, Equities, and Loans**

(In millions of U.S. dollars)

|                          | 2002             | 2003             | 2004             | 2005             | 2006             | 2007             | 2007             |                  |                  |                  |
|--------------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
|                          |                  |                  |                  |                  |                  |                  | Q1               | Q2               | Q3               | Q4               |
| <b>Total</b>             | <b>163,953.0</b> | <b>225,818.6</b> | <b>329,666.2</b> | <b>461,811.5</b> | <b>553,423.0</b> | <b>661,487.5</b> | <b>153,347.0</b> | <b>199,941.1</b> | <b>164,350.5</b> | <b>150,772.3</b> |
| <b>Africa</b>            | <b>6,557.9</b>   | <b>11,215.5</b>  | <b>11,815.2</b>  | <b>12,198.2</b>  | <b>15,848.5</b>  | <b>29,146.9</b>  | <b>8,605.9</b>   | <b>10,669.1</b>  | <b>6,157.5</b>   | <b>10,637.7</b>  |
| Algeria                  | 150.0            | 40.0             | 307.9            | 489.3            | 2.0              | 411.0            | 1,507.0          | 569.5            | 1,923.7          | 3,334.2          |
| Angola                   | 350.0            | 1,542.0          | 2,900.0          | 3,122.7          | 91.9             | 74.6             | 74.6             | ...              | ...              | ...              |
| Botswana                 | ...              | ...              | 28.4             | ...              | ...              | ...              | ...              | ...              | ...              | ...              |
| Burkina Faso             | ...              | ...              | ...              | 11.0             | ...              | 14.5             | 14.5             | ...              | ...              | ...              |
| Cameroon                 | ...              | ...              | 48.0             | 30.0             | ...              | ...              | ...              | ...              | ...              | ...              |
| Cape Verde               | ...              | ...              | ...              | ...              | ...              | 13.0             | 13.0             | ...              | ...              | ...              |
| Côte d'Ivoire            | ...              | ...              | 100.0            | ...              | ...              | ...              | ...              | ...              | ...              | ...              |
| Djibouti                 | ...              | ...              | 40.0             | ...              | ...              | ...              | ...              | ...              | ...              | ...              |
| Ethiopia                 | ...              | ...              | 40.0             | ...              | ...              | ...              | ...              | ...              | ...              | ...              |
| Gabon                    | ...              | ...              | 22.0             | ...              | 34.4             | 1,000.0          | ...              | ...              | ...              | 1,000.0          |
| Ghana                    | 420.0            | 650.0            | 850.0            | 706.5            | 860.0            | 1,454.5          | ...              | 150.0            | 964.0            | 340.5            |
| Kenya                    | ...              | 134.0            | 135.1            | 64.0             | 330.1            | 10.0             | ...              | 10.0             | ...              | ...              |
| Lesotho                  | ...              | ...              | ...              | ...              | ...              | 19.7             | ...              | ...              | 19.7             | ...              |
| Malawi                   | ...              | ...              | 4.8              | ...              | ...              | ...              | ...              | ...              | ...              | ...              |
| Mali                     | 150.4            | 287.6            | 288.9            | ...              | ...              | 180.9            | 149.9            | ...              | 31.0             | ...              |
| Mauritius                | ...              | ...              | ...              | 99.3             | 180.0            | ...              | ...              | ...              | ...              | ...              |
| Morocco                  | ...              | 474.7            | 2.6              | 1.9              | 178.4            | 1,209.3          | 16.1             | 673.3            | 238.1            | 281.8            |
| Mozambique               | ...              | 35.5             | 422.4            | ...              | 38.8             | 800.0            | ...              | ...              | ...              | 800.0            |
| Namibia                  | ...              | 35.0             | ...              | 50.0             | 100.0            | ...              | ...              | ...              | ...              | ...              |
| Niger                    | ...              | 27.0             | ...              | ...              | ...              | 1,317.8          | 525.0            | 100.0            | 592.8            | 100.0            |
| Nigeria                  | 1,000.0          | 762.0            | 875.0            | 874.0            | 640.0            | 3,666.5          | 1,588.7          | 427.3            | 50.5             | 1,600.0          |
| Senegal                  | 40.0             | ...              | 10.0             | ...              | 31.6             | ...              | ...              | ...              | ...              | ...              |
| South Africa             | 3,697.5          | 6,712.5          | 5,134.7          | 6,026.6          | 12,744.0         | 18,478.2         | 4,717.2          | 8,529.0          | 2,085.8          | 3,146.2          |
| Sudan                    | ...              | ...              | 31.0             | ...              | ...              | ...              | ...              | ...              | ...              | ...              |
| Tanzania                 | ...              | ...              | ...              | 136.0            | ...              | ...              | ...              | ...              | ...              | ...              |
| Tunisia                  | 750.0            | 485.2            | 574.5            | 582.1            | 24.7             | 401.9            | ...              | 150.0            | 251.9            | ...              |
| Uganda                   | ...              | ...              | ...              | ...              | 12.6             | ...              | ...              | ...              | ...              | ...              |
| Zambia                   | ...              | 30.0             | ...              | ...              | 505.0            | 95.0             | ...              | 60.0             | ...              | 35.0             |
| Zimbabwe                 | ...              | ...              | ...              | 4.8              | 75.1             | ...              | ...              | ...              | ...              | ...              |
| <b>Asia</b>              | <b>83,260.7</b>  | <b>111,938.6</b> | <b>158,532.1</b> | <b>193,755.9</b> | <b>232,811.2</b> | <b>272,719.3</b> | <b>51,769.5</b>  | <b>90,885.6</b>  | <b>62,791.9</b>  | <b>67,272.4</b>  |
| Bangladesh               | ...              | 10.0             | 176.8            | ...              | 83.6             | 17.6             | ...              | ...              | 17.6             | ...              |
| Brunei Darussalam        | 129.0            | ...              | ...              | ...              | ...              | ...              | ...              | ...              | ...              | ...              |
| China                    | 11,023.0         | 18,397.0         | 26,750.0         | 41,453.3         | 53,220.3         | 60,241.6         | 7,236.2          | 22,405.1         | 14,789.1         | 15,811.2         |
| Hong Kong SAR            | 15,137.6         | 14,706.4         | 21,166.1         | 22,193.0         | 29,628.0         | 32,024.2         | 6,727.1          | 8,238.5          | 8,819.3          | 8,239.3          |
| India                    | 1,663.8          | 4,305.3          | 15,034.0         | 23,326.8         | 30,924.6         | 54,509.4         | 9,828.6          | 17,666.0         | 17,268.3         | 9,746.4          |
| Indonesia                | 1,118.7          | 5,175.1          | 3,801.2          | 5,543.0          | 8,422.5          | 7,397.3          | 2,108.0          | 1,393.2          | 1,998.6          | 1,897.6          |
| Korea                    | 18,084.7         | 18,692.5         | 28,736.4         | 44,350.0         | 40,769.9         | 50,971.6         | 11,968.1         | 18,274.5         | 4,984.7          | 15,744.4         |
| Lao P.D.R.               | 101.4            | ...              | 210.0            | 1,000.0          | ...              | ...              | ...              | ...              | ...              | ...              |
| Macao SAR                | ...              | ...              | 382.0            | 729.0            | 2,376.2          | 4,208.1          | 1,805.1          | ...              | ...              | 2,403.0          |
| Malaysia                 | 5,832.6          | 6,047.4          | 7,339.8          | 7,336.5          | 8,779.0          | 7,225.9          | 1,596.3          | 2,128.9          | 801.5            | 2,699.2          |
| Marshall Islands         | 34.7             | ...              | ...              | 24.0             | 170.0            | 762.2            | 394.2            | ...              | 118.0            | 250.0            |
| Mongolia                 | ...              | ...              | ...              | 30.0             | 6.0              | 10.0             | ...              | ...              | ...              | 10.0             |
| Pakistan                 | 388.8            | 983.8            | 970.0            | 739.2            | 3,260.0          | 1,745.1          | ...              | 1,557.2          | 50.0             | 137.9            |
| Papua New Guinea         | ...              | 153.7            | ...              | ...              | ...              | 195.2            | ...              | ...              | ...              | 195.2            |
| Philippines              | 6,345.5          | 6,301.1          | 6,331.7          | 5,990.4          | 5,958.5          | 5,535.3          | 2,085.9          | 347.9            | 3,038.1          | 63.5             |
| Singapore                | 4,258.2          | 8,016.0          | 9,921.9          | 12,158.5         | 19,267.1         | 19,429.2         | 4,090.1          | 7,023.9          | 4,081.8          | 4,233.4          |
| Sri Lanka                | ...              | 186.0            | 135.0            | 383.0            | 129.8            | 755.0            | ...              | 210.0            | ...              | 545.0            |
| Taiwan Province of China | 16,029.7         | 25,197.7         | 33,321.8         | 21,306.4         | 24,166.4         | 24,483.7         | 3,143.8          | 10,642.3         | 5,542.8          | 5,154.8          |
| Thailand                 | 2,720.5          | 3,369.7          | 4,141.3          | 6,224.1          | 4,874.6          | 1,675.0          | ...              | 835.0            | 840.0            | ...              |
| Vietnam                  | 392.5            | 397.0            | 114.0            | 968.8            | 774.7            | 1,532.9          | 786.1            | 163.0            | 442.1            | 141.7            |
| <b>Europe</b>            | <b>29,728.8</b>  | <b>44,987.9</b>  | <b>70,641.1</b>  | <b>103,235.1</b> | <b>131,391.9</b> | <b>149,165.6</b> | <b>39,176.7</b>  | <b>50,357.8</b>  | <b>29,601.1</b>  | <b>30,030.0</b>  |
| Belarus                  | ...              | ...              | 21.4             | 32.0             | 336.1            | 283.5            | 27.0             | 35.0             | 145.5            | 76.0             |
| Bulgaria                 | 1,260.8          | 443.4            | 1,099.9          | 1,012.2          | 1,727.8          | 1,764.6          | 49.2             | 435.3            | 966.2            | 313.9            |
| Croatia                  | 1,622.4          | 2,969.1          | 2,734.1          | 1,263.7          | 1,895.3          | 2,632.5          | ...              | 337.7            | 754.5            | 1,540.3          |
| Cyprus                   | 547.9            | 648.2            | 1,174.0          | 1,453.8          | 3,848.8          | 4,929.3          | 28.0             | 4,329.1          | 433.5            | 138.8            |
| Czech Republic           | 519.3            | 1,805.1          | 4,058.2          | 3,980.4          | 2,182.3          | 3,671.1          | 476.2            | 1,748.2          | 507.6            | 939.1            |
| Estonia                  | 480.9            | 450.5            | 1,187.7          | 693.5            | 470.9            | 206.9            | ...              | 123.9            | 45.1             | 38.0             |
| Faroe Islands            | ...              | ...              | ...              | 85.3             | 206.2            | 206.1            | 206.1            | ...              | ...              | ...              |
| Gibraltar                | ...              | ...              | ...              | 2,168.9          | 2,371.7          | 94.1             | 94.1             | ...              | ...              | ...              |

Table 14 (concluded)

|                                       | 2002            | 2003            | 2004            | 2005            | 2006             | 2007             | 2007            |                 |                 |                 |  |
|---------------------------------------|-----------------|-----------------|-----------------|-----------------|------------------|------------------|-----------------|-----------------|-----------------|-----------------|--|
|                                       |                 |                 |                 |                 |                  |                  | Q1              | Q2              | Q3              | Q4              |  |
| <b>Europe (continued)</b>             |                 |                 |                 |                 |                  |                  |                 |                 |                 |                 |  |
| Hungary                               | 1,310.6         | 4,557.4         | 10,009.1        | 9,281.7         | 7,965.1          | 5,235.5          | 2,754.5         | 1,135.6         | 621.5           | 723.9           |  |
| Latvia                                | 74.6            | 70.7            | 889.3           | 518.5           | 1,453.1          | 1,614.7          | 111.7           | 897.0           | 550.1           | 55.8            |  |
| Lithuania                             | 364.3           | 431.7           | 990.6           | 1,222.0         | 1,292.1          | 1,198.9          | ...             | 277.2           | ...             | 921.7           |  |
| Macedonia, FYR                        | ...             | 47.6            | 66.0            | ...             | ...              | 14.4             | ...             | ...             | ...             | 14.4            |  |
| Malta                                 | ...             | 114.8           | 242.7           | ...             | 256.0            | ...              | ...             | ...             | ...             | ...             |  |
| Moldova                               | ...             | ...             | 7.0             | 13.1            | ...              | ...              | ...             | ...             | ...             | ...             |  |
| Montenegro                            | ...             | 13.4            | ...             | ...             | 0.8              | 21.4             | ...             | ...             | ...             | 21.4            |  |
| Poland                                | 6,029.9         | 8,578.6         | 5,117.3         | 16,047.3        | 7,395.3          | 6,927.7          | 2,847.8         | 2,259.7         | 1,277.2         | 542.9           |  |
| Romania                               | 1,448.0         | 1,771.7         | 1,116.7         | 2,613.0         | 747.2            | 885.2            | 58.3            | 155.0           | ...             | 671.8           |  |
| Russia                                | 8,452.0         | 10,864.4        | 22,025.6        | 36,826.5        | 64,264.8         | 76,349.7         | 18,640.7        | 26,800.6        | 11,683.0        | 19,225.5        |  |
| Serbia                                | ...             | ...             | 195.3           | 1,300.2         | 60.2             | 403.4            | 24.1            | 176.5           | 202.8           | ...             |  |
| Slovak Republic                       | 234.2           | 962.6           | 1,329.0         | 622.7           | 1,217.1          | 1,352.5          | ...             | 1,352.5         | ...             | ...             |  |
| Slovenia                              | 378.0           | 430.3           | 1,320.9         | 1,887.5         | 1,837.8          | 4,534.5          | 2,629.6         | 431.4           | ...             | 1,473.5         |  |
| Turkey                                | 6,492.0         | 9,415.5         | 14,439.0        | 19,023.2        | 26,483.8         | 29,368.1         | 9,792.9         | 7,183.1         | 11,457.1        | 934.9           |  |
| Ukraine                               | 514.0           | 1,413.0         | 2,617.1         | 3,189.7         | 5,379.7          | 7,471.7          | 1,436.4         | 2,680.0         | 957.0           | 2,398.2         |  |
| <b>Middle East &amp; Central Asia</b> | <b>12,394.9</b> | <b>11,661.6</b> | <b>32,852.4</b> | <b>67,333.0</b> | <b>102,320.5</b> | <b>93,451.0</b>  | <b>19,024.9</b> | <b>26,801.1</b> | <b>20,903.8</b> | <b>26,721.2</b> |  |
| Armenia                               | ...             | ...             | ...             | 1.3             | 30.0             | 19.1             | ...             | 19.1            | ...             | ...             |  |
| Azerbaijan                            | ...             | ...             | 1,217.2         | 400.2           | 183.8            | 312.7            | 5.0             | 264.0           | 38.7            | 5.0             |  |
| Bahrain                               | 922.6           | 2,376.6         | 1,515.0         | 2,916.9         | 4,487.1          | 5,866.8          | ...             | 5,106.8         | 760.0           | ...             |  |
| Egypt                                 | 670.0           | 155.0           | 1,465.0         | 3,551.5         | 4,153.7          | 5,643.1          | 1,691.5         | ...             | 2,959.5         | 992.1           |  |
| Georgia                               | ...             | 6.0             | ...             | 11.1            | 61.0             | 131.6            | ...             | ...             | 89.0            | 42.6            |  |
| Iran, I.R. of                         | 2,828.8         | 952.3           | 2,419.4         | 1,928.8         | 142.5            | ...              | 25.8            | ...             | ...             | ...             |  |
| Iraq                                  | ...             | ...             | ...             | 107.8           | 2,877.0          | ...              | ...             | ...             | ...             | ...             |  |
| Israel                                | 344.4           | 830.6           | 3,514.0         | 4,103.0         | 4,642.4          | 2,611.9          | 543.6           | 369.3           | 769.7           | 903.5           |  |
| Jordan                                | 80.9            | ...             | 199.4           | ...             | 60.0             | 725.0            | 180.0           | ...             | 545.0           | ...             |  |
| Kazakhstan                            | 1,023.5         | 1,801.3         | 6,376.2         | 6,650.9         | 16,050.6         | 17,348.2         | 5,030.4         | 5,025.3         | 2,491.3         | 4,801.3         |  |
| Kuwait                                | 750.0           | 365.0           | 1,788.2         | 4,445.0         | 4,744.3          | 1,819.9          | 75.0            | 837.5           | 504.4           | 403.0           |  |
| Kyrgyz Republic                       | 95.0            | ...             | ...             | 2.0             | ...              | ...              | ...             | ...             | ...             | ...             |  |
| Lebanon                               | 990.0           | 160.0           | 5,383.0         | 1,780.0         | 5,818.1          | 2,420.0          | 1,120.0         | 400.0           | 500.0           | 400.0           |  |
| Libya                                 | ...             | ...             | ...             | ...             | ...              | 38.0             | ...             | ...             | 38.0            | ...             |  |
| Oman                                  | 2,417.0         | 907.8           | 1,328.6         | 3,320.7         | 3,430.2          | 2,367.1          | ...             | 782.4           | 1,584.7         | ...             |  |
| Qatar                                 | 1,571.7         | 880.8           | 2,042.7         | 10,768.5        | 11,426.4         | 11,228.4         | ...             | 650.0           | 5,678.4         | 4,900.0         |  |
| Saudi Arabia                          | 300.0           | 839.5           | 2,829.6         | 12,633.5        | 9,572.4          | 6,827.0          | 1,155.1         | 4,821.3         | 70.0            | 780.6           |  |
| Tajikistan                            | ...             | ...             | 5.2             | 1.2             | ...              | 2.0              | ...             | ...             | ...             | 2.0             |  |
| United Arab Emirates                  | 370.0           | 2,348.1         | 2,741.0         | 14,706.9        | 34,636.2         | 36,090.3         | 9,198.6         | 8,525.5         | 4,875.1         | 13,491.1        |  |
| Uzbekistan                            | 31.0            | 38.7            | 28.0            | 3.6             | 4.9              | ...              | ...             | ...             | ...             | ...             |  |
| <b>Latin America</b>                  | <b>32,010.7</b> | <b>46,014.9</b> | <b>55,825.4</b> | <b>85,289.2</b> | <b>71,050.9</b>  | <b>117,004.7</b> | <b>34,769.9</b> | <b>21,227.6</b> | <b>44,896.3</b> | <b>16,111.0</b> |  |
| Argentina                             | 824.2           | 100.0           | 1,615.4         | 20,771.2        | 3,125.9          | 9,474.8          | 458.1           | 3,302.8         | 5,548.9         | 165.0           |  |
| Bolivia                               | 90.0            | 30.0            | ...             | 54.0            | ...              | ...              | ...             | ...             | ...             | ...             |  |
| Brazil                                | 9,828.9         | 13,780.5        | 16,347.1        | 27,050.6        | 29,758.8         | 63,476.6         | 14,430.1        | 12,614.8        | 25,615.4        | 10,816.4        |  |
| Chile                                 | 3,643.2         | 7,379.4         | 8,117.7         | 6,733.3         | 5,944.0          | 2,949.7          | 490.0           | 541.8           | 1,722.2         | 195.7           |  |
| Colombia                              | 1,880.0         | 1,765.0         | 1,626.8         | 3,059.8         | 4,981.0          | 6,847.9          | ...             | 1,456.8         | 4,712.1         | 679.0           |  |
| Costa Rica                            | 250.0           | 490.0           | 334.2           | 91.7            | 1.7              | 30.5             | ...             | ...             | ...             | 30.5            |  |
| Cuba                                  | ...             | ...             | 69.8            | 1.9             | ...              | ...              | ...             | ...             | ...             | ...             |  |
| Dominican Republic                    | 423.3           | 670.4           | 140.5           | 284.4           | 779.8            | 657.9            | 458.3           | 199.6           | ...             | ...             |  |
| Ecuador                               | 910.0           | ...             | ...             | 759.0           | 19.1             | 104.0            | ...             | ...             | 89.0            | 15.0            |  |
| El Salvador                           | 1,810.0         | 481.0           | 340.2           | 454.5           | 1,326.6          | ...              | ...             | ...             | ...             | ...             |  |
| Grenada                               | 100.0           | ...             | ...             | ...             | ...              | ...              | ...             | ...             | ...             | ...             |  |
| Guadeloupe                            | 17.4            | ...             | ...             | ...             | ...              | ...              | ...             | ...             | ...             | ...             |  |
| Guatemala                             | 44.0            | 300.0           | 439.3           | 365.0           | ...              | 15.0             | 15.0            | ...             | ...             | ...             |  |
| Haiti                                 | ...             | ...             | ...             | ...             | 134.0            | ...              | ...             | ...             | ...             | ...             |  |
| Honduras                              | ...             | ...             | 119.0           | 4.6             | ...              | ...              | ...             | ...             | ...             | ...             |  |
| Jamaica                               | 300.0           | 49.6            | 903.2           | 1,466.6         | 1,076.1          | 1,275.0          | 1,000.0         | 125.0           | ...             | 150.0           |  |
| Mexico                                | 9,213.7         | 15,785.7        | 19,805.5        | 14,330.5        | 16,952.6         | 15,817.7         | 7,158.7         | 1,715.6         | 4,727.0         | 2,216.3         |  |
| Nicaragua                             | ...             | ...             | 22.0            | ...             | ...              | ...              | ...             | ...             | ...             | ...             |  |
| Peru                                  | 2,063.0         | 1,445.0         | 1,395.7         | 2,586.0         | 1,264.9          | 5,413.6          | 2,120.0         | 228.8           | 2,471.6         | 593.1           |  |
| St. Lucia                             | ...             | 20.0            | ...             | ...             | ...              | ...              | ...             | ...             | ...             | ...             |  |
| Trinidad and Tobago                   | 213.0           | 46.0            | 415.0           | 100.0           | 2,610.4          | 955.4            | ...             | 955.4           | ...             | ...             |  |
| Uruguay                               | 400.0           | ...             | ...             | 1,061.3         | 2,700.0          | 1,146.7          | 1,049.7         | 87.0            | 10.0            | ...             |  |
| Venezuela                             | ...             | 3,672.5         | 4,134.0         | 6,114.6         | 376.1            | 8,840.0          | 7,590.0         | ...             | ...             | 1,250.0         |  |

Source: Data provided by the Bond, Equity and Loan database of the International Monetary Fund sourced from Dealogic.

**Table 15. Emerging Market External Financing: Bond Issuance**  
(In millions of U.S. dollars)

|                                       | 2002            | 2003             | 2004             | 2005             | 2006             | 2007             | 2007            |                 |                 |                 |
|---------------------------------------|-----------------|------------------|------------------|------------------|------------------|------------------|-----------------|-----------------|-----------------|-----------------|
|                                       |                 |                  |                  |                  |                  |                  | Q1              | Q2              | Q3              | Q4              |
| <b>Total</b>                          | <b>64,951.9</b> | <b>100,497.6</b> | <b>135,568.8</b> | <b>186,630.4</b> | <b>179,922.6</b> | <b>207,877.2</b> | <b>69,607.5</b> | <b>79,630.5</b> | <b>27,375.4</b> | <b>31,263.8</b> |
| <b>Africa</b>                         | <b>2,161.1</b>  | <b>4,357.8</b>   | <b>2,236.7</b>   | <b>3,192.5</b>   | <b>6,383.1</b>   | <b>13,222.3</b>  | <b>2,861.4</b>  | <b>6,640.0</b>  | <b>2,327.0</b>  | <b>1,393.8</b>  |
| Gabon                                 | ...             | ...              | ...              | ...              | ...              | 1,000.0          | ...             | ...             | ...             | 1,000.0         |
| Ghana                                 | ...             | ...              | ...              | ...              | ...              | 950.0            | ...             | ...             | 750.0           | 200.0           |
| Morocco                               | ...             | 464.9            | ...              | ...              | ...              | 670.7            | ...             | 670.7           | ...             | ...             |
| Niger                                 | ...             | ...              | ...              | ...              | ...              | 525.0            | 525.0           | ...             | ...             | ...             |
| South Africa                          | 1,511.1         | 3,535.9          | 1,692.2          | 2,701.6          | 6,383.1          | 9,824.6          | 2,336.4         | 5,969.3         | 1,325.1         | 193.8           |
| Tunisia                               | 650.0           | 357.0            | 544.5            | 490.9            | ...              | 251.9            | ...             | ...             | 251.9           | ...             |
| <b>Asia</b>                           | <b>24,207.0</b> | <b>37,035.7</b>  | <b>52,067.4</b>  | <b>53,699.3</b>  | <b>54,943.1</b>  | <b>68,308.1</b>  | <b>18,212.8</b> | <b>27,891.1</b> | <b>10,275.8</b> | <b>11,928.3</b> |
| China                                 | 340.0           | 2,039.2          | 4,888.1          | 3,953.9          | 3,184.4          | 6,489.4          | 1,084.1         | 3,015.7         | 1,405.3         | 984.3           |
| Hong Kong SAR                         | 1,923.3         | 2,160.6          | 3,725.3          | 6,457.9          | 4,979.6          | 8,317.4          | 1,922.7         | 4,902.7         | 843.7           | 648.4           |
| India                                 | 153.0           | 450.0            | 5,609.1          | 5,647.7          | 6,785.5          | 13,688.3         | 5,155.8         | 3,666.0         | 3,795.5         | 1,071.1         |
| Indonesia                             | 275.0           | 609.0            | 1,363.5          | 3,217.7          | 2,000.0          | 2,200.0          | 1,500.0         | 550.0           | 150.0           | ...             |
| Korea                                 | 9,071.5         | 11,880.1         | 17,529.2         | 19,426.9         | 20,422.2         | 25,376.5         | 5,131.5         | 10,974.9        | 2,474.2         | 6,796.0         |
| Malaysia                              | 1,280.0         | 1,142.5          | 1,414.5          | 2,303.1          | 3,510.5          | 1,936.7          | 289.4           | 725.0           | 255.4           | 666.9           |
| Pakistan                              | ...             | ...              | 500.0            | ...              | 1,050.0          | 750.0            | ...             | 750.0           | ...             | ...             |
| Philippines                           | 4,773.8         | 4,449.6          | 4,449.1          | 3,900.0          | 4,619.0          | 1,300.0          | 1,300.0         | ...             | ...             | ...             |
| Singapore                             | 696.5           | 4,493.6          | 3,828.9          | 3,203.2          | 5,033.0          | 5,919.3          | 1,479.4         | 2,365.7         | 812.5           | 1,261.7         |
| Sri Lanka                             | ...             | ...              | 100.0            | ...              | ...              | 500.0            | ...             | ...             | ...             | 500.0           |
| Taiwan Province of China              | 5,645.8         | 9,511.0          | 7,259.7          | 2,596.4          | 2,180.0          | 1,064.2          | 350.0           | 400.0           | 314.2           | ...             |
| Thailand                              | 48.0            | 300.0            | 1,400.0          | 2,242.6          | 1,179.0          | 766.2            | ...             | 541.2           | 225.0           | ...             |
| Vietnam                               | ...             | ...              | ...              | 750.0            | ...              | ...              | ...             | ...             | ...             | ...             |
| <b>Europe</b>                         | <b>14,933.0</b> | <b>23,348.1</b>  | <b>33,744.3</b>  | <b>52,199.0</b>  | <b>51,442.2</b>  | <b>57,915.8</b>  | <b>21,595.9</b> | <b>21,909.5</b> | <b>4,903.6</b>  | <b>9,506.9</b>  |
| Bulgaria                              | 1,247.8         | 62.1             | 10.0             | 385.4            | 221.4            | ...              | ...             | ...             | ...             | ...             |
| Croatia                               | 847.5           | 983.6            | 1,651.0          | ...              | 383.5            | 744.9            | ...             | 337.7           | 407.1           | ...             |
| Cyprus                                | 479.8           | 648.2            | 1,174.0          | 1,133.1          | 1,701.4          | 2,929.1          | ...             | 2,929.1         | ...             | ...             |
| Czech Republic                        | 428.4           | 337.7            | 2,538.6          | 1,324.5          | 908.3            | 1,725.8          | ...             | 798.0           | 68.9            | 858.9           |
| Estonia                               | 292.6           | 323.3            | 964.8            | 427.3            | ...              | 38.0             | ...             | ...             | ...             | 38.0            |
| Hungary                               | 70.5            | 2,447.5          | 5,751.0          | 7,340.3          | 7,537.3          | 4,081.0          | 2,676.7         | 680.5           | ...             | 723.9           |
| Latvia                                | ...             | ...              | 536.1            | 125.4            | 261.8            | ...              | ...             | ...             | ...             | ...             |
| Lithuania                             | 355.6           | 431.7            | 815.7            | 780.6            | 1,241.7          | 1,088.0          | ...             | 237.0           | ...             | 851.0           |
| Poland                                | 2,679.9         | 5,220.3          | 3,526.5          | 11,812.8         | 4,632.4          | 4,110.1          | 1,946.2         | 1,720.5         | ...             | 443.4           |
| Romania                               | 1,062.2         | 813.6            | ...              | 1,199.0          | ...              | ...              | ...             | ...             | ...             | ...             |
| Russia                                | 3,430.0         | 4,455.0          | 7,129.9          | 15,436.7         | 21,011.9         | 29,574.9         | 10,093.2        | 11,654.2        | 2,327.5         | 5,500.1         |
| Serbia                                | ...             | ...              | ...              | 1,080.0          | ...              | ...              | ...             | ...             | ...             | ...             |
| Slovak Republic                       | 143.1           | 861.3            | 1,198.8          | ...              | 1,217.1          | 1,352.5          | ...             | 1,352.5         | ...             | ...             |
| Slovenia                              | 30.2            | ...              | 66.3             | 156.7            | ...              | 1,611.5          | 1,469.9         | ...             | ...             | 141.6           |
| Turkey                                | 3,366.3         | 5,453.8          | 6,066.5          | 8,898.6          | 9,210.4          | 6,725.0          | 4,175.0         | 1,100.0         | 1,450.0         | ...             |
| Ukraine                               | 499.0           | 1,310.0          | 2,315.0          | 2,098.4          | 3,115.1          | 3,935.0          | 1,235.0         | 1,100.0         | 650.0           | 950.0           |
| <b>Middle East &amp; Central Asia</b> | <b>4,473.2</b>  | <b>3,531.6</b>   | <b>14,380.0</b>  | <b>17,257.3</b>  | <b>35,814.9</b>  | <b>29,127.9</b>  | <b>9,773.9</b>  | <b>12,388.7</b> | <b>3,489.4</b>  | <b>3,475.8</b>  |
| Azerbaijan                            | ...             | ...              | ...              | ...              | 5.0              | 100.0            | ...             | 100.0           | ...             | ...             |
| Bahrain                               | 582.6           | 1,326.6          | 292.0            | 1,299.7          | 1,620.0          | 1,770.8          | ...             | 1,570.8         | 200.0           | ...             |
| Egypt                                 | ...             | ...              | ...              | 1,250.0          | ...              | 1,805.1          | 750.0           | ...             | 1,055.1         | ...             |
| Iran, I.R. of                         | 986.3           | ...              | ...              | ...              | ...              | ...              | 25.8            | ...             | ...             | ...             |
| Iraq                                  | ...             | ...              | ...              | ...              | 2,700.0          | ...              | ...             | ...             | ...             | ...             |
| Israel                                | 344.4           | 750.0            | 2,520.0          | 905.1            | 2,892.5          | 25.8             | ...             | ...             | ...             | ...             |
| Jordan                                | 80.9            | ...              | 145.0            | ...              | ...              | ...              | ...             | ...             | ...             | ...             |

Table 15 (concluded)

|                                       | 2002            | 2003            | 2004            | 2005            | 2006            | 2007            | 2007            |                 |                |                |  |
|---------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|----------------|----------------|--|
|                                       |                 |                 |                 |                 |                 |                 | Q1              | Q2              | Q3             | Q4             |  |
| <b>Middle East &amp; Central Asia</b> |                 |                 |                 |                 |                 |                 |                 |                 |                |                |  |
| <i>(continued)</i>                    |                 |                 |                 |                 |                 |                 |                 |                 |                |                |  |
| Kazakhstan                            | 509.0           | 825.0           | 3,225.0         | 2,850.0         | 6,800.5         | 9,329.2         | 4,893.5         | 3,375.8         | 310.0          | 750.0          |  |
| Kuwait                                | 750.0           | 200.0           | 500.0           | 500.0           | 534.7           | 475.0           | ...             | 100.0           | 375.0          | ...            |  |
| Lebanon                               | 990.0           | 160.0           | 5,383.0         | 1,780.0         | 5,519.7         | 2,300.0         | 1,000.0         | 400.0           | 500.0          | 400.0          |  |
| Oman                                  | ...             | ...             | 250.0           | ...             | 25.0            | ...             | ...             | ...             | ...            | ...            |  |
| Qatar                                 | ...             | ...             | 665.0           | 2,250.0         | 3,040.0         | ...             | ...             | ...             | ...            | ...            |  |
| Saudi Arabia                          | ...             | 270.0           | ...             | 1,300.0         | 2,913.1         | ...             | ...             | ...             | ...            | ...            |  |
| United Arab Emirates                  | 230.0           | ...             | 1,400.0         | 5,122.4         | 9,764.4         | 13,321.9        | 3,104.7         | 6,842.1         | 1,049.3        | 2,325.8        |  |
| <b>Latin America</b>                  | <b>19,177.6</b> | <b>32,224.4</b> | <b>33,140.4</b> | <b>60,282.3</b> | <b>31,339.3</b> | <b>39,303.2</b> | <b>17,163.4</b> | <b>10,801.1</b> | <b>6,379.6</b> | <b>4,959.0</b> |  |
| Argentina                             | ...             | 100.0           | 1,115.4         | 19,092.6        | 1,745.5         | 3,500.9         | 300.0           | 2,655.9         | 445.0          | 100.0          |  |
| Brazil                                | 6,809.5         | 11,718.8        | 9,573.2         | 17,683.2        | 12,349.7        | 10,613.7        | 4,215.2         | 4,417.8         | 400.8          | 1,580.0        |  |
| Chile                                 | 1,728.9         | 2,900.0         | 2,350.0         | 900.0           | 1,100.0         | 250.0           | 250.0           | ...             | ...            | ...            |  |
| Colombia                              | 1,000.0         | 1,765.0         | 1,543.8         | 2,432.1         | 3,176.6         | 3,134.3         | ...             | 1,404.4         | 1,050.9        | 679.0          |  |
| Costa Rica                            | 250.0           | 490.0           | 310.0           | ...             | ...             | ...             | ...             | ...             | ...            | ...            |  |
| Dominican Republic                    | ...             | 600.0           | ...             | 196.6           | 550.0           | 430.0           | 255.0           | 175.0           | ...            | ...            |  |
| Ecuador                               | ...             | ...             | ...             | 650.0           | ...             | ...             | ...             | ...             | ...            | ...            |  |
| El Salvador                           | 1,745.0         | 348.5           | 286.5           | 375.0           | 625.0           | ...             | ...             | ...             | ...            | ...            |  |
| Grenada                               | 100.0           | ...             | ...             | ...             | ...             | ...             | ...             | ...             | ...            | ...            |  |
| Guatemala                             | ...             | 300.0           | 380.0           | 200.0           | ...             | ...             | ...             | ...             | ...            | ...            |  |
| Jamaica                               | 300.0           | ...             | 806.9           | 1,050.0         | 880.0           | 625.0           | 350.0           | 125.0           | ...            | 150.0          |  |
| Mexico                                | 4,914.1         | 9,082.1         | 11,369.0        | 8,455.7         | 7,109.4         | 6,469.5         | 1,919.3         | 1,036.0         | 2,314.3        | 1,200.0        |  |
| Peru                                  | 1,930.0         | 1,250.0         | 1,305.7         | 2,157.1         | 220.0           | 4,288.7         | 2,120.0         | ...             | 2,168.7        | ...            |  |
| Trinidad and Tobago                   | ...             | ...             | 100.0           | 100.0           | 883.1           | 900.0           | ...             | 900.0           | ...            | ...            |  |
| Uruguay                               | 400.0           | ...             | ...             | 1,061.3         | 2,700.0         | 341.0           | 254.0           | 87.0            | ...            | ...            |  |
| Venezuela                             | ...             | 3,670.0         | 4,000.0         | 5,928.7         | ...             | 8,750.0         | 7,500.0         | ...             | ...            | 1,250.0        |  |

Source: Data provided by the Bond, Equity and Loan database of the International Monetary Fund sourced from Dealogic.

**Table 16. Emerging Market External Finance: Equity Issuance**

(In millions of U.S. dollars)

|                                       | 2002            | 2003            | 2004            | 2005            | 2006             | 2007             | 2007            |                 |                 |                 |
|---------------------------------------|-----------------|-----------------|-----------------|-----------------|------------------|------------------|-----------------|-----------------|-----------------|-----------------|
|                                       |                 |                 |                 |                 |                  |                  | Q1              | Q2              | Q3              | Q4              |
| <b>Total</b>                          | <b>16,474.3</b> | <b>27,724.0</b> | <b>45,759.3</b> | <b>85,496.0</b> | <b>121,360.0</b> | <b>170,744.1</b> | <b>24,921.0</b> | <b>55,383.6</b> | <b>38,102.3</b> | <b>59,260.6</b> |
| <b>Africa</b>                         | <b>159.7</b>    | <b>720.2</b>    | <b>1,855.7</b>  | <b>929.4</b>    | <b>2,389.4</b>   | <b>6,923.4</b>   | <b>3,013.9</b>  | <b>1,139.0</b>  | <b>3,025.4</b>  | <b>6,668.4</b>  |
| Algeria                               | ...             | ...             | ...             | ...             | 2.0              | ...              | 1,507.0         | 569.5           | 1,512.7         | 3,334.2         |
| Côte d'Ivoire                         | ...             | ...             | 100.0           | ...             | ...              | ...              | ...             | ...             | ...             | ...             |
| Morocco                               | ...             | ...             | ...             | ...             | 153.0            | 538.5            | 16.1            | 2.5             | 238.1           | 281.8           |
| Niger                                 | ...             | ...             | ...             | ...             | ...              | 792.8            | ...             | 100.0           | 592.8           | 100.0           |
| South Africa                          | 159.7           | 720.2           | 1,724.7         | 924.7           | 2,159.2          | 5,592.1          | 1,490.8         | 467.0           | 681.9           | 2,952.4         |
| Sudan                                 | ...             | ...             | 31.0            | ...             | ...              | ...              | ...             | ...             | ...             | ...             |
| Zimbabwe                              | ...             | ...             | ...             | 4.8             | 75.1             | ...              | ...             | ...             | ...             | ...             |
| <b>Asia</b>                           | <b>12,637.9</b> | <b>24,350.8</b> | <b>35,429.0</b> | <b>58,049.5</b> | <b>77,456.2</b>  | <b>84,573.7</b>  | <b>10,738.5</b> | <b>30,163.2</b> | <b>17,852.2</b> | <b>25,819.7</b> |
| China                                 | 2,475.0         | 6,501.4         | 14,326.2        | 25,741.4        | 41,623.6         | 36,972.6         | 3,745.1         | 13,959.1        | 6,000.6         | 13,267.8        |
| Hong Kong SAR                         | 2,880.6         | 3,059.2         | 5,171.0         | 4,440.9         | 8,601.5          | 12,338.6         | 1,681.4         | 1,409.6         | 5,043.7         | 4,203.9         |
| India                                 | 348.1           | 1,299.7         | 4,347.1         | 6,708.4         | 8,257.9          | 15,382.3         | 1,816.5         | 6,684.5         | 3,682.0         | 3,199.3         |
| Indonesia                             | 281.0           | 1,096.7         | 535.2           | 1,283.5         | 665.9            | 2,090.2          | ...             | 380.8           | 901.8           | 807.6           |
| Korea                                 | 1,553.7         | 1,222.6         | 3,223.3         | 7,814.9         | 7,329.8          | 3,503.2          | 1,246.0         | 1,969.1         | ...             | 288.1           |
| Macao SAR                             | ...             | ...             | ...             | ...             | 0.3              | ...              | ...             | ...             | ...             | ...             |
| Malaysia                              | 888.4           | 618.2           | 887.2           | 735.2           | 217.3            | 1,097.5          | 489.2           | ...             | ...             | 608.3           |
| Pakistan                              | ...             | ...             | ...             | ...             | 922.2            | 650.2            | ...             | 650.2           | ...             | ...             |
| Papua New Guinea                      | ...             | 153.7           | ...             | ...             | ...              | 195.2            | ...             | ...             | ...             | 195.2           |
| Philippines                           | ...             | ...             | 18.0            | 535.8           | 436.7            | 1,143.2          | 248.7           | 197.9           | 683.1           | 13.5            |
| Singapore                             | 940.9           | 1,168.7         | 2,472.7         | 2,651.5         | 3,666.7          | 4,065.5          | 822.4           | 1,264.1         | 875.1           | 1,103.9         |
| Sri Lanka                             | ...             | ...             | ...             | 55.5            | ...              | ...              | ...             | ...             | ...             | ...             |
| Taiwan Province of China              | 3,213.9         | 8,219.0         | 3,350.0         | 7,602.6         | 3,644.5          | 6,120.8          | 218.6           | 3,647.9         | 263.8           | 1,990.5         |
| Thailand                              | 56.3            | 1,011.6         | 1,098.4         | 479.7           | 1,772.4          | ...              | ...             | ...             | ...             | ...             |
| Vietnam                               | ...             | ...             | ...             | ...             | 317.3            | 1,014.5          | 470.7           | ...             | 402.1           | 141.7           |
| <b>Europe</b>                         | <b>1,681.7</b>  | <b>1,809.0</b>  | <b>5,287.3</b>  | <b>10,276.1</b> | <b>21,207.5</b>  | <b>30,746.2</b>  | <b>5,308.8</b>  | <b>14,942.6</b> | <b>2,177.2</b>  | <b>8,317.6</b>  |
| Bulgaria                              | ...             | ...             | ...             | ...             | 85.7             | ...              | ...             | ...             | ...             | ...             |
| Croatia                               | ...             | ...             | ...             | ...             | 220.0            | 1,377.6          | ...             | ...             | ...             | 1,377.6         |
| Cyprus                                | ...             | ...             | ...             | 320.7           | 1,181.7          | 1,571.9          | ...             | 1,400.0         | 33.1            | 138.8           |
| Czech Republic                        | ...             | 824.6           | 174.4           | 295.1           | 287.3            | 129.5            | ...             | ...             | 49.3            | 80.2            |
| Estonia                               | 41.3            | ...             | ...             | 266.2           | 21.5             | 123.9            | ...             | 123.9           | ...             | ...             |
| Gibraltar                             | ...             | ...             | ...             | 2,168.9         | 437.5            | 94.1             | 94.1            | ...             | ...             | ...             |
| Hungary                               | ...             | 13.2            | 884.7           | ...             | ...              | 353.6            | ...             | ...             | 353.6           | ...             |
| Latvia                                | 22.7            | ...             | ...             | ...             | ...              | ...              | ...             | ...             | ...             | ...             |
| Lithuania                             | ...             | ...             | ...             | 51.2            | ...              | ...              | ...             | ...             | ...             | ...             |
| Poland                                | 245.4           | 602.6           | 841.4           | 944.0           | 712.6            | 339.5            | 240.0           | ...             | ...             | 99.5            |
| Romania                               | ...             | ...             | ...             | ...             | 172.5            | ...              | ...             | ...             | ...             | ...             |
| Russia                                | 1,301.0         | 368.7           | 2,480.1         | 6,210.0         | 18,057.5         | 23,746.7         | 4,974.7         | 11,736.4        | 1,023.7         | 6,011.9         |
| Slovenia                              | ...             | ...             | ...             | ...             | ...              | 231.4            | ...             | ...             | ...             | 231.4           |
| Turkey                                | 71.4            | ...             | 906.5           | ...             | 6.0              | 2,357.8          | ...             | 1,682.3         | 675.4           | ...             |
| Ukraine                               | ...             | ...             | ...             | 19.9            | 25.3             | 420.4            | ...             | ...             | 42.0            | 378.3           |
| <b>Middle East &amp; Central Asia</b> | <b>...</b>      | <b>16.6</b>     | <b>1,129.2</b>  | <b>10,445.7</b> | <b>7,390.5</b>   | <b>10,642.3</b>  | <b>737.6</b>    | <b>593.5</b>    | <b>1,364.9</b>  | <b>7,946.3</b>  |
| Bahrain                               | ...             | ...             | ...             | 87.2            | 581.8            | ...              | ...             | ...             | ...             | ...             |
| Egypt                                 | ...             | ...             | 141.0           | 812.2           | 257.8            | 761.8            | ...             | ...             | 169.8           | 592.1           |
| Israel                                | ...             | 16.6            | 624.0           | 1,157.5         | 653.1            | 1,130.9          | 543.6           | 201.3           | 334.7           | 51.4            |
| Kazakhstan                            | ...             | ...             | ...             | ...             | 3,953.8          | 3,916.2          | 120.0           | 50.0            | 704.0           | 3,042.3         |
| Kuwait                                | ...             | ...             | 260.7           | ...             | ...              | ...              | ...             | ...             | ...             | ...             |
| Lebanon                               | ...             | ...             | ...             | ...             | 248.4            | ...              | ...             | ...             | ...             | ...             |
| Oman                                  | ...             | ...             | 23.6            | 148.4           | ...              | 156.4            | ...             | ...             | 156.4           | ...             |
| Qatar                                 | ...             | ...             | ...             | ...             | 1,133.2          | ...              | ...             | ...             | ...             | ...             |
| Saudi Arabia                          | ...             | ...             | 80.0            | 7,342.5         | 457.7            | 458.1            | 74.1            | 342.3           | ...             | 41.8            |
| United Arab Emirates                  | ...             | ...             | ...             | 898.0           | 104.7            | 4,218.9          | ...             | ...             | ...             | 4,218.9         |
| <b>Latin America</b>                  | <b>1,995.0</b>  | <b>827.4</b>    | <b>2,058.2</b>  | <b>5,795.2</b>  | <b>12,916.4</b>  | <b>37,858.5</b>  | <b>5,122.1</b>  | <b>8,545.3</b>  | <b>13,682.7</b> | <b>10,508.5</b> |
| Argentina                             | ...             | ...             | ...             | ...             | 769.4            | 1,097.9          | 158.1           | 306.9           | 573.9           | 59.1            |
| Brazil                                | 1,148.5         | 287.4           | 1,651.0         | 3,433.1         | 9,670.8          | 30,326.0         | 4,839.0         | 7,180.8         | 9,116.9         | 9,189.4         |
| Chile                                 | ...             | ...             | 266.4           | 522.7           | 677.1            | 427.2            | ...             | 126.8           | 104.7           | 195.7           |
| Colombia                              | ...             | ...             | ...             | ...             | ...              | 3,563.6          | ...             | 52.4            | 3,511.3         | ...             |
| Mexico                                | 846.6           | 540.0           | 140.8           | 1,839.3         | 1,222.3          | 2,026.7          | 125.0           | 649.6           | 320.8           | 931.3           |
| Peru                                  | ...             | ...             | ...             | ...             | 576.9            | 417.0            | ...             | 228.8           | 55.1            | 133.1           |

Source: Data provided by the Bond, Equity and Loan database of the International Monetary Fund sourced from Dealogic.

**Table 17. Emerging Market External Financing: Loan Syndication***(In millions of U.S. dollars)*

|                          | 2002            | 2003            | 2004             | 2005             | 2006             | 2007             | 2007            |                 |                 |                 |
|--------------------------|-----------------|-----------------|------------------|------------------|------------------|------------------|-----------------|-----------------|-----------------|-----------------|
|                          |                 |                 |                  |                  |                  |                  | Q1              | Q2              | Q3              | Q4              |
| <b>Total</b>             | <b>82,526.8</b> | <b>97,597.0</b> | <b>148,338.1</b> | <b>189,685.1</b> | <b>252,140.3</b> | <b>282,866.2</b> | <b>58,818.5</b> | <b>64,927.0</b> | <b>98,872.7</b> | <b>60,247.9</b> |
| <b>Africa</b>            | <b>4,237.2</b>  | <b>6,137.5</b>  | <b>7,722.8</b>   | <b>8,076.3</b>   | <b>7,076.0</b>   | <b>9,001.2</b>   | <b>2,730.6</b>  | <b>2,890.1</b>  | <b>805.0</b>    | <b>2,575.5</b>  |
| Algeria                  | 150.0           | 40.0            | 307.9            | 489.3            | ...              | 411.0            | ...             | ...             | 411.0           | ...             |
| Angola                   | 350.0           | 1,542.0         | 2,900.0          | 3,122.7          | 91.9             | 74.6             | 74.6            | ...             | ...             | ...             |
| Botswana                 | ...             | ...             | 28.4             | ...              | ...              | ...              | ...             | ...             | ...             | ...             |
| Burkina Faso             | ...             | ...             | ...              | 11.0             | ...              | 14.5             | 14.5            | ...             | ...             | ...             |
| Cameroon                 | ...             | ...             | 48.0             | 30.0             | ...              | ...              | ...             | ...             | ...             | ...             |
| Cape Verde               | ...             | ...             | ...              | ...              | ...              | 13.0             | 13.0            | ...             | ...             | ...             |
| Djibouti                 | ...             | ...             | 40.0             | ...              | ...              | ...              | ...             | ...             | ...             | ...             |
| Ethiopia                 | ...             | ...             | 40.0             | ...              | ...              | ...              | ...             | ...             | ...             | ...             |
| Gabon                    | ...             | ...             | 22.0             | ...              | 34.4             | ...              | ...             | ...             | ...             | ...             |
| Ghana                    | 420.0           | 650.0           | 850.0            | 706.5            | 860.0            | 504.5            | ...             | 150.0           | 214.0           | 140.5           |
| Kenya                    | ...             | 134.0           | 135.1            | 64.0             | 330.1            | 10.0             | ...             | 10.0            | ...             | ...             |
| Lesotho                  | ...             | ...             | ...              | ...              | ...              | 19.7             | ...             | ...             | 19.7            | ...             |
| Malawi                   | ...             | ...             | 4.8              | ...              | ...              | ...              | ...             | ...             | ...             | ...             |
| Mali                     | 150.4           | 287.6           | 288.9            | ...              | ...              | 180.9            | 149.9           | ...             | 31.0            | ...             |
| Mauritius                | ...             | ...             | ...              | 99.3             | 180.0            | ...              | ...             | ...             | ...             | ...             |
| Morocco                  | ...             | 9.8             | 2.6              | 1.9              | 25.4             | ...              | ...             | ...             | ...             | ...             |
| Mozambique               | ...             | 35.5            | 422.4            | ...              | 38.8             | 800.0            | ...             | ...             | ...             | 800.0           |
| Namibia                  | ...             | 35.0            | ...              | 50.0             | 100.0            | ...              | ...             | ...             | ...             | ...             |
| Niger                    | ...             | 27.0            | ...              | ...              | ...              | ...              | ...             | ...             | ...             | ...             |
| Nigeria                  | 1,000.0         | 762.0           | 875.0            | 874.0            | 640.0            | 3,666.5          | 1,588.7         | 427.3           | 50.5            | 1,600.0         |
| Senegal                  | 40.0            | ...             | 10.0             | ...              | 31.6             | ...              | ...             | ...             | ...             | ...             |
| Seychelles               | ...             | ...             | ...              | ...              | ...              | ...              | ...             | ...             | ...             | ...             |
| South Africa             | 2,026.7         | 2,456.4         | 1,717.8          | 2,400.3          | 4,201.6          | 3,061.6          | 890.0           | 2,092.8         | 78.8            | ...             |
| Tanzania                 | ...             | ...             | ...              | 136.0            | ...              | ...              | ...             | ...             | ...             | ...             |
| Tunisia                  | 100.0           | 128.2           | 30.0             | 91.2             | 24.7             | 150.0            | ...             | 150.0           | ...             | ...             |
| Uganda                   | ...             | ...             | ...              | ...              | 12.6             | ...              | ...             | ...             | ...             | ...             |
| Zambia                   | ...             | 30.0            | ...              | ...              | 505.0            | 95.0             | ...             | 60.0            | ...             | 35.0            |
| <b>Asia</b>              | <b>46,415.8</b> | <b>50,552.1</b> | <b>71,035.7</b>  | <b>82,007.0</b>  | <b>100,411.9</b> | <b>119,837.6</b> | <b>22,818.1</b> | <b>32,831.2</b> | <b>34,663.9</b> | <b>29,524.4</b> |
| Bangladesh               | ...             | 10.0            | 176.8            | ...              | 83.6             | 17.6             | ...             | ...             | 17.6            | ...             |
| Brunei Darussalam        | 129.0           | ...             | ...              | ...              | ...              | ...              | ...             | ...             | ...             | ...             |
| China                    | 8,208.1         | 9,856.4         | 7,535.7          | 11,757.9         | 8,412.3          | 16,779.6         | 2,407.0         | 5,430.4         | 7,383.2         | 1,559.0         |
| Hong Kong SAR            | 10,333.7        | 9,486.7         | 12,269.8         | 11,294.2         | 16,046.8         | 11,368.2         | 3,123.0         | 1,926.2         | 2,931.9         | 3,387.1         |
| India                    | 1,162.7         | 2,555.5         | 5,077.8          | 10,970.7         | 15,881.2         | 25,438.7         | 2,856.3         | 7,315.6         | 9,790.9         | 5,476.0         |
| Indonesia                | 562.7           | 3,469.4         | 1,902.4          | 1,041.8          | 5,756.5          | 3,107.2          | 608.0           | 462.4           | 946.8           | 1,090.0         |
| Korea                    | 7,459.6         | 5,589.7         | 7,983.9          | 17,108.2         | 13,017.9         | 22,091.9         | 5,590.6         | 5,330.5         | 2,510.5         | 8,660.3         |
| Lao P.D.R.               | 101.4           | ...             | 210.0            | 1,000.0          | ...              | ...              | ...             | ...             | ...             | ...             |
| Macao SAR                | ...             | ...             | 382.0            | 729.0            | 2,375.9          | 4,208.1          | 1,805.1         | ...             | ...             | 2,403.0         |
| Malaysia                 | 3,664.2         | 4,286.8         | 5,038.1          | 4,298.2          | 5,051.2          | 4,191.8          | 817.8           | 1,403.9         | 546.0           | 1,424.0         |
| Marshall Islands         | 34.7            | ...             | ...              | 24.0             | 170.0            | 762.2            | 394.2           | ...             | 118.0           | 250.0           |
| Mongolia                 | ...             | ...             | ...              | 30.0             | 6.0              | 10.0             | ...             | ...             | ...             | 10.0            |
| Pakistan                 | 388.8           | 983.8           | 470.0            | 739.2            | 1,287.8          | 344.9            | ...             | 157.0           | 50.0            | 137.9           |
| Philippines              | 1,571.7         | 1,851.4         | 1,864.7          | 1,554.6          | 902.9            | 3,092.2          | 537.2           | 150.0           | 2,355.0         | 50.0            |
| Singapore                | 2,620.7         | 2,353.8         | 3,620.4          | 6,303.7          | 10,567.4         | 9,444.4          | 1,788.3         | 3,394.1         | 2,394.2         | 1,867.8         |
| Sri Lanka                | ...             | 186.0           | 35.0             | 327.5            | 129.8            | 255.0            | ...             | 210.0           | ...             | 45.0            |
| Taiwan Province of China | 7,170.0         | 7,467.6         | 22,712.1         | 11,107.4         | 18,341.9         | 17,298.7         | 2,575.2         | 6,594.4         | 4,964.8         | 3,164.3         |
| Thailand                 | 2,616.2         | 2,058.1         | 1,642.9          | 3,501.8          | 1,923.3          | 908.8            | ...             | 293.8           | 615.0           | ...             |
| Vietnam                  | 392.5           | 397.0           | 114.0            | 218.8            | 457.4            | 518.5            | 315.5           | 163.0           | 40.0            | ...             |
| <b>Europe</b>            | <b>13,114.1</b> | <b>19,830.8</b> | <b>31,609.5</b>  | <b>40,760.0</b>  | <b>58,742.1</b>  | <b>60,503.5</b>  | <b>12,272.0</b> | <b>13,505.7</b> | <b>22,520.3</b> | <b>12,205.5</b> |
| Belarus                  | ...             | ...             | 21.4             | 32.0             | 336.1            | 283.5            | 27.0            | 35.0            | 145.5           | 76.0            |
| Bulgaria                 | 13.0            | 381.3           | 1,089.9          | 626.8            | 1,420.6          | 1,764.6          | 49.2            | 435.3           | 966.2           | 313.9           |
| Croatia                  | 774.9           | 1,985.5         | 1,083.1          | 1,263.7          | 1,291.9          | 510.1            | ...             | ...             | 347.4           | 162.7           |
| Cyprus                   | 68.1            | ...             | ...              | ...              | 965.7            | 428.3            | 28.0            | ...             | 400.3           | ...             |
| Czech Republic           | 90.8            | 642.9           | 1,345.1          | 2,360.8          | 986.8            | 1,815.8          | 476.2           | 950.2           | 389.4           | ...             |
| Estonia                  | 147.1           | 127.1           | 222.9            | ...              | 449.4            | 45.1             | ...             | ...             | 45.1            | ...             |
| Faroe Islands            | ...             | ...             | ...              | 85.3             | 206.2            | 206.1            | 206.1           | ...             | ...             | ...             |
| Gibraltar                | ...             | ...             | ...              | ...              | 1,934.2          | ...              | ...             | ...             | ...             | ...             |
| Hungary                  | 1,240.0         | 2,096.7         | 3,373.4          | 1,941.4          | 427.8            | 800.9            | 77.8            | 455.1           | 267.9           | ...             |
| Latvia                   | 51.9            | 70.7            | 353.2            | 393.0            | 1,191.3          | 1,614.7          | 111.7           | 897.0           | 550.1           | 55.8            |

Table 17 (concluded)

|                                       | 2002            | 2003            | 2004            | 2005            | 2006            | 2007            | 2007            |                 |                 |                 |                 |
|---------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|                                       |                 |                 |                 |                 |                 |                 | Q1              | Q2              | Q3              | Q4              |                 |
| <b>Europe (continued)</b>             |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |
| Lithuania                             | 8.8             | ...             | 174.8           | 390.2           | 50.4            | 110.9           | ...             | 40.2            | ...             | ...             | 70.7            |
| Macedonia, FYR                        | ...             | 47.6            | 66.0            | ...             | ...             | 14.4            | ...             | ...             | ...             | ...             | 14.4            |
| Malta                                 | ...             | 114.8           | 242.7           | ...             | 256.0           | ...             | ...             | ...             | ...             | ...             | ...             |
| Moldova                               | ...             | ...             | 7.0             | 13.1            | ...             | ...             | ...             | ...             | ...             | ...             | ...             |
| Montenegro                            | ...             | 13.4            | ...             | ...             | 0.8             | 21.4            | ...             | ...             | ...             | ...             | 21.4            |
| Poland                                | 3,104.6         | 2,755.7         | 749.4           | 3,290.4         | 2,050.2         | 2,478.0         | 661.7           | 539.2           | 1,277.2         | ...             | ...             |
| Romania                               | 385.9           | 958.1           | 1,116.7         | 1,414.0         | 574.7           | 885.2           | 58.3            | 155.0           | ...             | ...             | 671.8           |
| Russia                                | 3,721.0         | 6,040.8         | 12,415.5        | 15,179.7        | 25,195.4        | 23,028.1        | 3,572.8         | 3,410.0         | 8,331.8         | 8,331.8         | 7,713.5         |
| Serbia                                | ...             | ...             | 195.3           | 220.2           | 60.2            | 403.4           | 24.1            | 176.5           | 202.8           | ...             | ...             |
| Slovak Republic                       | 91.1            | 101.3           | 130.3           | 622.7           | ...             | ...             | ...             | ...             | ...             | ...             | ...             |
| Slovenia                              | 347.7           | 430.3           | 1,254.6         | 1,730.8         | 1,837.8         | 2,691.6         | 1,159.7         | 431.4           | ...             | ...             | 1,100.5         |
| Turkey                                | 3,054.3         | 3,961.7         | 7,466.0         | 10,124.6        | 17,267.4        | 20,285.4        | 5,617.9         | 4,400.8         | 9,331.7         | 9,331.7         | 934.9           |
| Ukraine                               | 15.0            | 103.0           | 302.1           | 1,071.4         | 2,239.3         | 3,116.3         | 201.4           | 1,580.0         | 265.0           | 265.0           | 1,069.9         |
| <b>Middle East &amp; Central Asia</b> | <b>7,921.7</b>  | <b>8,113.5</b>  | <b>17,343.2</b> | <b>39,630.0</b> | <b>59,115.2</b> | <b>53,680.8</b> | <b>8,513.3</b>  | <b>13,818.8</b> | <b>16,049.6</b> | <b>16,049.6</b> | <b>15,299.1</b> |
| Armenia                               | ...             | ...             | ...             | 1.3             | 30.0            | 19.1            | ...             | 19.1            | ...             | ...             | ...             |
| Azerbaijan                            | ...             | ...             | 1,217.2         | 400.2           | 178.8           | 212.7           | 5.0             | 164.0           | 38.7            | 38.7            | 5.0             |
| Bahrain                               | 340.0           | 1,050.0         | 1,223.0         | 1,530.0         | 2,285.2         | 4,096.0         | ...             | 3,536.0         | 560.0           | 560.0           | ...             |
| Egypt                                 | 670.0           | 155.0           | 1,324.0         | 1,489.3         | 3,895.9         | 3,076.1         | 941.5           | ...             | 1,734.6         | 1,734.6         | 400.0           |
| Georgia                               | ...             | 6.0             | ...             | 11.1            | 61.0            | 131.6           | ...             | ...             | 89.0            | 89.0            | 42.6            |
| Iran, I.R. of                         | 1,842.5         | 952.3           | 2,419.4         | 1,928.8         | 142.5           | ...             | ...             | ...             | ...             | ...             | ...             |
| Iraq                                  | ...             | ...             | ...             | 107.8           | 177.0           | ...             | ...             | ...             | ...             | ...             | ...             |
| Israel                                | ...             | 64.0            | 370.0           | 2,040.4         | 1,096.8         | 1,455.2         | ...             | 168.0           | 435.0           | 435.0           | 852.2           |
| Jordan                                | ...             | ...             | 54.4            | ...             | 60.0            | 725.0           | 180.0           | ...             | 545.0           | 545.0           | ...             |
| Kazakhstan                            | 514.5           | 976.3           | 3,151.2         | 3,800.9         | 5,296.4         | 4,102.7         | 16.9            | 1,599.5         | 1,477.3         | 1,477.3         | 1,009.0         |
| Kuwait                                | ...             | 165.0           | 1,027.5         | 3,945.0         | 4,209.6         | 1,344.9         | 75.0            | 737.5           | 129.4           | 129.4           | 403.0           |
| Kyrgyz Republic                       | 95.0            | ...             | ...             | 2.0             | ...             | ...             | ...             | ...             | ...             | ...             | ...             |
| Lebanon                               | ...             | ...             | ...             | ...             | 50.0            | 120.0           | 120.0           | ...             | ...             | ...             | ...             |
| Libya                                 | ...             | ...             | ...             | ...             | ...             | 38.0            | ...             | ...             | 38.0            | 38.0            | ...             |
| Oman                                  | 2,417.0         | 907.8           | 1,055.0         | 3,172.2         | 3,405.2         | 2,210.7         | ...             | 782.4           | 1,428.3         | 1,428.3         | ...             |
| Qatar                                 | 1,571.7         | 880.8           | 1,377.7         | 8,518.5         | 7,253.1         | 11,228.4        | ...             | 650.0           | 5,678.4         | 5,678.4         | 4,900.0         |
| Saudi Arabia                          | 300.0           | 569.5           | 2,749.6         | 3,991.0         | 6,201.7         | 6,368.8         | 1,081.0         | 4,479.0         | 70.0            | 70.0            | 738.9           |
| Tajikistan                            | ...             | ...             | 5.2             | 1.2             | ...             | 2.0             | ...             | ...             | ...             | ...             | 2.0             |
| United Arab Emirates                  | 140.0           | 2,348.1         | 1,341.0         | 8,686.6         | 24,767.1        | 18,549.5        | 6,093.9         | 1,683.3         | 3,825.9         | 3,825.9         | 6,946.5         |
| Uzbekistan                            | 31.0            | 38.7            | 28.0            | 3.6             | 4.9             | ...             | ...             | ...             | ...             | ...             | ...             |
| <b>Latin America</b>                  | <b>10,838.1</b> | <b>12,963.1</b> | <b>20,626.9</b> | <b>19,211.7</b> | <b>26,795.2</b> | <b>39,843.1</b> | <b>12,484.4</b> | <b>1,881.2</b>  | <b>24,834.0</b> | <b>24,834.0</b> | <b>643.5</b>    |
| Argentina                             | 824.2           | ...             | 500.0           | 1,678.6         | 611.0           | 4,876.0         | ...             | 340.0           | 4,530.0         | 4,530.0         | 6.0             |
| Bolivia                               | 90.0            | 30.0            | ...             | 54.0            | ...             | ...             | ...             | ...             | ...             | ...             | ...             |
| Brazil                                | 1,870.9         | 1,774.3         | 5,122.9         | 5,934.3         | 7,738.3         | 22,536.9        | 5,376.0         | 1,016.2         | 16,097.7        | 16,097.7        | 47.0            |
| Chile                                 | 1,914.3         | 4,479.4         | 5,501.3         | 5,310.6         | 4,166.9         | 2,272.5         | 240.0           | 415.0           | 1,617.5         | 1,617.5         | ...             |
| Colombia                              | 880.0           | ...             | 83.0            | 627.8           | 1,804.4         | 150.0           | ...             | ...             | 150.0           | 150.0           | ...             |
| Costa Rica                            | ...             | ...             | 24.2            | 91.7            | 1.7             | 30.5            | ...             | ...             | ...             | ...             | 30.5            |
| Cuba                                  | ...             | ...             | 69.8            | 1.9             | ...             | ...             | ...             | ...             | ...             | ...             | ...             |
| Dominican Republic                    | 423.3           | 70.4            | 140.5           | 87.8            | 229.8           | 227.9           | 203.3           | 24.6            | ...             | ...             | ...             |
| Ecuador                               | 910.0           | ...             | ...             | 109.0           | 19.1            | 104.0           | ...             | ...             | 89.0            | 89.0            | 15.0            |
| El Salvador                           | 65.0            | 132.5           | 53.8            | 79.5            | 701.6           | ...             | ...             | ...             | ...             | ...             | ...             |
| Guadeloupe                            | 17.4            | ...             | ...             | ...             | ...             | ...             | ...             | ...             | ...             | ...             | ...             |
| Guatemala                             | 44.0            | ...             | 59.3            | 165.0           | ...             | 15.0            | 15.0            | ...             | ...             | ...             | ...             |
| Haiti                                 | ...             | ...             | ...             | ...             | 134.0           | ...             | ...             | ...             | ...             | ...             | ...             |
| Honduras                              | ...             | ...             | 119.0           | 4.6             | ...             | ...             | ...             | ...             | ...             | ...             | ...             |
| Jamaica                               | ...             | 49.6            | 96.3            | 416.6           | 196.1           | 650.0           | 650.0           | ...             | ...             | ...             | ...             |
| Mexico                                | 3,453.0         | 6,163.6         | 8,295.7         | 4,035.4         | 8,620.9         | 7,321.4         | 5,114.4         | 30.0            | 2,092.0         | 2,092.0         | 85.0            |
| Nicaragua                             | ...             | ...             | 22.0            | ...             | ...             | ...             | ...             | ...             | ...             | ...             | ...             |
| Peru                                  | 133.0           | 195.0           | 90.0            | 429.0           | 468.0           | 707.9           | ...             | ...             | 247.9           | 247.9           | 460.0           |
| St. Lucia                             | ...             | 20.0            | ...             | ...             | ...             | ...             | ...             | ...             | ...             | ...             | ...             |
| Trinidad and Tobago                   | 213.0           | 46.0            | 315.0           | ...             | 1,727.3         | 55.4            | ...             | 55.4            | ...             | ...             | ...             |
| Uruguay                               | ...             | ...             | ...             | ...             | ...             | 805.7           | 795.7           | ...             | 10.0            | 10.0            | ...             |
| Venezuela                             | ...             | 2.5             | 134.0           | 186.0           | 376.1           | 90.0            | 90.0            | ...             | ...             | ...             | ...             |

Source: Data provided by the Bond, Equity and Loan database of the International Monetary Fund sourced from Dealogic.

Note: The currency composition of loan issuance has been expanded to all currencies from the hard currency filter in previous editions.

Table 18. Equity Valuation Measures: Dividend-Yield Ratios

|                                  | 2003        | 2004        | 2005        | 2006        | 2007        | 2007        |             |             |             |
|----------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
|                                  |             |             |             |             |             | Q1          | Q2          | Q3          | Q4          |
| <b>Composite</b>                 | <b>2.28</b> | <b>2.29</b> | <b>2.28</b> | <b>2.14</b> | <b>1.56</b> | <b>2.21</b> | <b>1.99</b> | <b>1.81</b> | <b>1.56</b> |
| <b>Asia</b>                      | <b>1.97</b> | <b>2.20</b> | <b>2.42</b> | <b>1.88</b> | <b>1.32</b> | <b>1.93</b> | <b>1.71</b> | <b>1.60</b> | <b>1.32</b> |
| <b>Europe/Middle East/Africa</b> | <b>2.41</b> | <b>2.00</b> | <b>1.76</b> | <b>2.36</b> | <b>1.82</b> | <b>2.57</b> | <b>2.41</b> | <b>2.09</b> | <b>1.82</b> |
| <b>Latin America</b>             | <b>3.26</b> | <b>3.24</b> | <b>3.07</b> | <b>2.56</b> | <b>1.99</b> | <b>2.39</b> | <b>2.16</b> | <b>2.11</b> | <b>1.99</b> |
| Argentina                        | 1.37        | 0.98        | 1.20        | 1.21        | 1.20        | 1.12        | 1.39        | 1.36        | 1.20        |
| Bahrain                          | 2.27        | 1.19        | 1.77        | 4.16        | 3.80        | 4.90        | 4.20        | 3.97        | 3.80        |
| Brazil                           | 4.23        | 4.24        | 3.98        | 3.38        | 2.00        | 3.22        | 2.82        | 2.62        | 2.00        |
| Chile                            | 2.95        | 4.62        | 2.99        | 2.07        | 2.40        | 1.84        | 2.19        | 2.33        | 2.40        |
| China                            | 2.31        | 1.82        | 2.56        | 1.29        | 0.70        | 1.16        | 1.07        | 0.90        | 0.70        |
| Colombia                         | 5.89        | 5.44        | 1.38        | 1.96        | 1.89        | 2.13        | 2.14        | 2.09        | 1.89        |
| Czech Republic                   | 5.04        | 4.19        | 1.42        | 3.71        | 2.67        | 3.55        | 2.78        | 2.88        | 2.67        |
| Egypt                            | 4.94        | 1.45        | 1.54        | 2.29        | 1.76        | 2.16        | 2.38        | 2.18        | 1.76        |
| Hungary                          | 0.91        | 1.73        | 2.05        | 1.83        | 3.04        | 2.54        | 2.41        | 2.49        | 3.04        |
| India                            | 1.74        | 1.70        | 1.25        | 1.07        | 0.71        | 1.35        | 1.10        | 0.94        | 0.71        |
| Indonesia                        | 3.42        | 3.35        | 2.74        | 2.18        | 1.87        | 2.21        | 2.30        | 2.00        | 1.87        |
| Israel                           | 1.20        | 1.83        | 1.58        | 2.55        | 2.64        | 2.92        | 2.47        | 2.64        | 2.64        |
| Jordan                           | 2.40        | 1.49        | 2.19        | 1.06        | 1.48        | 1.02        | 1.91        | 1.93        | 1.48        |
| Korea                            | 2.08        | 2.25        | 1.70        | 1.49        | 1.30        | 1.81        | 1.53        | 1.40        | 1.30        |
| Kuwait                           | ...         | ...         | ...         | 2.97        | 3.01        | 3.86        | 3.21        | 3.07        | 3.01        |
| Malaysia                         | 3.02        | 3.50        | 4.33        | 3.72        | 3.38        | 3.29        | 3.67        | 4.10        | 3.38        |
| Mexico                           | 2.12        | 1.85        | 2.18        | 1.24        | 2.20        | 1.15        | 1.21        | 1.38        | 2.20        |
| Morocco                          | 4.65        | 2.71        | 3.61        | 2.22        | 1.85        | 1.79        | 1.84        | 2.05        | 1.85        |
| Nigeria                          | 4.11        | 3.70        | 3.14        | 2.29        | 1.47        | 1.86        | 1.78        | 2.00        | 1.47        |
| Oman                             | 5.38        | 3.32        | 2.15        | 4.64        | 3.25        | 5.76        | 4.22        | 3.75        | 3.25        |
| Pakistan                         | 7.47        | 6.98        | 2.50        | 3.96        | 3.25        | 3.65        | 2.84        | 3.10        | 3.25        |
| Peru                             | 2.83        | 3.10        | 3.45        | 3.83        | 3.65        | 3.41        | 3.02        | 2.80        | 3.65        |
| Philippines                      | 2.12        | 1.79        | 2.63        | 2.00        | 2.28        | 2.26        | 2.13        | 2.54        | 2.28        |
| Poland                           | 1.43        | 1.20        | 2.48        | 3.36        | 2.66        | 2.99        | 3.99        | 2.96        | 2.66        |
| Qatar                            | ...         | ...         | ...         | 1.69        | 2.31        | 3.64        | 3.21        | 2.88        | 2.31        |
| Russia                           | 1.78        | 1.21        | 1.07        | 1.83        | 0.53        | 1.90        | 1.50        | 0.61        | 0.53        |
| Saudi Arabia                     | 2.58        | 2.05        | 1.25        | 2.65        | 2.18        | 2.91        | 3.01        | 3.01        | 2.18        |
| South Africa                     | 3.96        | 3.09        | 3.09        | 2.77        | 3.33        | 2.84        | 2.80        | 2.98        | 3.33        |
| Sri Lanka                        | 3.64        | 4.67        | 2.47        | 1.77        | 2.28        | 1.79        | 1.91        | 2.54        | 2.28        |
| Taiwan Province of China         | 1.47        | 2.67        | 3.39        | 3.06        | 3.03        | 3.11        | 2.85        | 3.34        | 3.03        |
| Thailand                         | 1.64        | 2.24        | 3.05        | 4.51        | 3.81        | 3.59        | 3.61        | 3.34        | 3.81        |
| Turkey                           | 1.15        | 2.97        | 1.81        | 2.19        | 1.96        | 2.10        | 2.43        | 2.13        | 1.96        |
| United Arab Emirates             | ...         | ...         | ...         | 2.12        | 1.27        | 2.39        | 2.05        | 1.97        | 1.27        |
| Venezuela                        | 9.86        | 12.28       | 6.27        | 5.71        | ...         | ...         | ...         | ...         | ...         |

Source: Standard &amp; Poor's Emerging Market Database.

**Table 19. Equity Valuation Measures: Price-to-Book Ratios**

|                                  | 2003        | 2004        | 2005        | 2006        | 2007        | 2007        |             |             |             |
|----------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
|                                  |             |             |             |             |             | Q1          | Q2          | Q3          | Q4          |
| <b>Composite</b>                 | <b>1.96</b> | <b>1.86</b> | <b>2.65</b> | <b>2.73</b> | <b>3.67</b> | <b>2.83</b> | <b>3.13</b> | <b>3.47</b> | <b>3.67</b> |
| <b>Asia</b>                      | <b>2.06</b> | <b>1.78</b> | <b>2.11</b> | <b>2.43</b> | <b>3.69</b> | <b>2.53</b> | <b>3.01</b> | <b>3.51</b> | <b>3.69</b> |
| <b>Europe/Middle East/Africa</b> | <b>1.86</b> | <b>2.21</b> | <b>3.91</b> | <b>3.26</b> | <b>3.91</b> | <b>3.34</b> | <b>3.46</b> | <b>3.55</b> | <b>3.91</b> |
| <b>Latin America</b>             | <b>1.83</b> | <b>1.58</b> | <b>2.30</b> | <b>2.91</b> | <b>3.27</b> | <b>3.06</b> | <b>3.00</b> | <b>3.20</b> | <b>3.27</b> |
| Argentina                        | 1.99        | 2.16        | 2.50        | 4.09        | 3.23        | 4.03        | 3.43        | 3.57        | 3.23        |
| Bahrain                          | 2.02        | 2.02        | 2.73        | 2.23        | 3.56        | 2.19        | 2.55        | 2.69        | 3.56        |
| Brazil                           | 1.79        | 1.93        | 2.16        | 2.68        | 3.30        | 2.74        | 2.71        | 3.08        | 3.30        |
| Chile                            | 1.87        | 0.55        | 1.93        | 2.43        | 2.54        | 2.64        | 2.74        | 2.62        | 2.54        |
| China                            | 2.55        | 2.03        | 1.81        | 3.12        | 6.26        | 3.41        | 4.39        | 6.24        | 6.26        |
| Colombia                         | 0.94        | 1.58        | 2.41        | 1.78        | 1.82        | 1.68        | 1.69        | 1.70        | 1.82        |
| Czech Republic                   | 0.99        | 1.58        | 2.35        | 2.39        | 3.12        | 2.50        | 2.81        | 2.91        | 3.12        |
| Egypt                            | 2.08        | 4.38        | 9.08        | 5.85        | 8.60        | 6.01        | 6.57        | 7.16        | 8.60        |
| Hungary                          | 2.00        | 2.78        | 3.08        | 3.08        | 3.24        | 2.93        | 3.60        | 3.48        | 3.24        |
| India                            | 3.50        | 3.31        | 5.15        | 4.89        | 7.90        | 4.50        | 5.26        | 6.23        | 7.90        |
| Indonesia                        | 1.62        | 2.75        | 2.50        | 3.35        | 5.57        | 3.31        | 3.92        | 4.47        | 5.57        |
| Israel                           | 2.61        | 2.58        | 3.00        | 3.48        | 4.37        | 3.76        | 4.18        | 4.25        | 4.37        |
| Jordan                           | 2.08        | 2.99        | 6.24        | 3.30        | 4.39        | 3.71        | 3.32        | 3.27        | 4.39        |
| Korea                            | 1.57        | 1.25        | 1.95        | 1.74        | 2.18        | 1.78        | 2.09        | 2.21        | 2.18        |
| Kuwait                           | ...         | ...         | 4.64        | 4.52        | 6.37        | 5.12        | 6.27        | 6.65        | 6.37        |
| Malaysia                         | 1.71        | 1.93        | 1.67        | 2.08        | 2.51        | 2.45        | 2.38        | 2.35        | 2.51        |
| Mexico                           | 2.02        | 2.51        | 2.88        | 3.84        | 3.58        | 4.25        | 4.00        | 3.87        | 3.58        |
| Morocco                          | 1.70        | 2.06        | 2.92        | 3.11        | 4.34        | 3.99        | 4.08        | 4.41        | 4.34        |
| Nigeria                          | 2.52        | 3.19        | 5.36        | 5.22        | 11.98       | 7.15        | 8.84        | 9.56        | 11.98       |
| Oman                             | 1.50        | 1.80        | 2.28        | 2.19        | 4.01        | 2.21        | 2.54        | 2.86        | 4.01        |
| Pakistan                         | 2.25        | 2.63        | 3.51        | 3.17        | 4.66        | 3.60        | 4.61        | 4.39        | 4.66        |
| Peru                             | 1.80        | 1.56        | 2.17        | 3.47        | 5.95        | 4.55        | 6.22        | 6.60        | 5.95        |
| Philippines                      | 1.06        | 1.35        | 1.73        | 1.92        | 2.76        | 2.05        | 2.69        | 2.65        | 2.76        |
| Poland                           | 1.76        | 2.04        | 2.53        | 2.52        | 2.84        | 2.76        | 3.03        | 2.85        | 2.84        |
| Qatar                            | ...         | ...         | 8.80        | 2.73        | 3.79        | 2.36        | 2.84        | 3.12        | 3.79        |
| Russia                           | 1.18        | 1.18        | 2.19        | 2.53        | 2.82        | 2.44        | 2.44        | 2.48        | 2.82        |
| Saudi Arabia                     | 3.56        | 6.50        | 14.54       | 7.57        | 9.95        | 7.45        | 6.50        | 7.25        | 9.95        |
| South Africa                     | 2.06        | 2.52        | 2.98        | 3.80        | 4.38        | 4.18        | 4.16        | 4.21        | 4.38        |
| Sri Lanka                        | 1.63        | 1.93        | 2.56        | 2.41        | 1.85        | 2.60        | 1.79        | 1.69        | 1.85        |
| Taiwan Province of China         | 2.18        | 1.94        | 1.93        | 2.36        | 2.56        | 2.37        | 2.69        | 2.79        | 2.56        |
| Thailand                         | 2.84        | 2.03        | 2.06        | 1.85        | 2.46        | 1.86        | 2.15        | 2.37        | 2.46        |
| Turkey                           | 2.64        | 1.74        | 2.13        | 1.95        | 2.78        | 2.14        | 2.30        | 2.64        | 2.78        |
| United Arab Emirates             | ...         | ...         | 9.98        | 3.07        | 4.69        | 2.89        | 3.55        | 3.40        | 4.69        |
| Venezuela                        | 1.10        | 1.18        | 0.72        | 2.59        | ...         | ...         | ...         | ...         | ...         |

Source: Standard &amp; Poor's Emerging Market Database.

Table 20. Equity Valuation Measures: Price/Earnings Ratios

|                                  | 2003        | 2004        | 2005        | 2006        | 2007        | 2007        |             |             |             |
|----------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
|                                  |             |             |             |             |             | Q1          | Q2          | Q3          | Q4          |
| <b>Composite</b>                 | <b>21.7</b> | <b>16.5</b> | <b>18.9</b> | <b>17.7</b> | <b>23.4</b> | <b>18.2</b> | <b>19.8</b> | <b>22.0</b> | <b>23.4</b> |
| <b>Asia</b>                      | <b>30.3</b> | <b>16.8</b> | <b>17.9</b> | <b>18.0</b> | <b>26.9</b> | <b>18.3</b> | <b>21.4</b> | <b>25.3</b> | <b>26.9</b> |
| <b>Europe/Middle East/Africa</b> | <b>18.0</b> | <b>18.6</b> | <b>25.2</b> | <b>18.7</b> | <b>22.6</b> | <b>19.2</b> | <b>19.9</b> | <b>20.3</b> | <b>22.6</b> |
| <b>Latin America</b>             | <b>13.3</b> | <b>12.8</b> | <b>12.2</b> | <b>15.2</b> | <b>17.2</b> | <b>16.0</b> | <b>16.0</b> | <b>17.0</b> | <b>17.2</b> |
| Argentina                        | 21.1        | 27.7        | 11.1        | 18.0        | 13.6        | 17.8        | 14.5        | 15.2        | 13.6        |
| Bahrain                          | 21.3        | 21.5        | 31.7        | 14.3        | 20.3        | 14.0        | 16.3        | 17.2        | 20.3        |
| Brazil                           | 10.0        | 10.6        | 10.7        | 12.7        | 16.6        | 13.0        | 13.6        | 15.5        | 16.6        |
| Chile                            | 24.8        | 17.2        | 15.7        | 24.2        | 22.3        | 26.2        | 24.2        | 23.1        | 22.3        |
| China                            | 28.6        | 19.1        | 13.9        | 24.6        | 50.5        | 26.9        | 34.6        | 49.2        | 50.5        |
| Colombia                         | 13.0        | 19.2        | 28.8        | 21.9        | 21.8        | 20.8        | 20.7        | 20.9        | 21.8        |
| Czech Republic                   | 10.8        | 25.0        | 21.1        | 20.0        | 26.5        | 20.9        | 23.6        | 24.4        | 26.5        |
| Egypt                            | 11.7        | 21.8        | 30.9        | 20.2        | 30.2        | 20.7        | 22.7        | 24.7        | 30.2        |
| Hungary                          | 12.3        | 16.6        | 13.5        | 13.4        | 14.0        | 12.7        | 15.6        | 15.1        | 14.0        |
| India                            | 20.9        | 18.1        | 19.4        | 20.1        | 31.6        | 17.8        | 20.9        | 25.1        | 31.6        |
| Indonesia                        | 39.5        | 13.3        | 12.6        | 20.1        | 31.7        | 19.9        | 23.0        | 26.1        | 31.7        |
| Israel                           | 75.6        | 39.7        | 20.0        | 25.3        | 31.5        | 27.3        | 30.5        | 31.0        | 31.5        |
| Jordan                           | 20.7        | 30.4        | 57.1        | 20.8        | 28.0        | 23.4        | 21.0        | 20.7        | 28.0        |
| Korea                            | 30.2        | 13.5        | 20.8        | 12.8        | 16.4        | 13.1        | 15.2        | 16.7        | 16.4        |
| Kuwait                           | ...         | ...         | 21.5        | 21.1        | 29.7        | 23.9        | 29.3        | 31.1        | 29.7        |
| Malaysia                         | 30.1        | 22.4        | 15.0        | 21.7        | 20.1        | 25.5        | 21.0        | 19.4        | 20.1        |
| Mexico                           | 17.6        | 15.9        | 14.2        | 18.6        | 17.2        | 21.4        | 20.2        | 19.5        | 17.2        |
| Morocco                          | 25.2        | 24.6        | 22.4        | 22.5        | 30.4        | 28.8        | 29.5        | 31.9        | 30.4        |
| Nigeria                          | 18.5        | 23.5        | 20.7        | 24.1        | 58.4        | 32.9        | 40.7        | 44.1        | 58.4        |
| Oman                             | 15.2        | 14.2        | 15.8        | 13.1        | 23.1        | 13.2        | 15.1        | 17.0        | 23.1        |
| Pakistan                         | 9.5         | 9.9         | 13.1        | 10.8        | 15.3        | 12.3        | 15.7        | 15.0        | 15.3        |
| Peru                             | 13.7        | 10.7        | 12.0        | 15.7        | 20.9        | 20.7        | 21.3        | 22.4        | 20.9        |
| Philippines                      | 21.1        | 14.6        | 15.7        | 14.4        | 17.7        | 15.5        | 17.7        | 17.6        | 17.7        |
| Poland                           | -353.0      | 39.9        | 11.7        | 13.9        | 15.6        | 15.3        | 16.7        | 15.8        | 15.6        |
| Qatar                            | ...         | ...         | 48.7        | 15.9        | 21.7        | 13.6        | 16.5        | 18.0        | 21.7        |
| Russia                           | 19.9        | 10.8        | 24.1        | 16.6        | 18.4        | 16.0        | 16.0        | 15.8        | 18.4        |
| Saudi Arabia                     | 27.2        | 50.6        | 104.8       | 52.0        | 70.1        | 51.2        | 44.7        | 49.8        | 70.1        |
| South Africa                     | 11.5        | 16.2        | 12.8        | 16.6        | 18.7        | 18.2        | 18.2        | 18.3        | 18.7        |
| Sri Lanka                        | 15.0        | 18.1        | 23.6        | 15.4        | 12.1        | 16.6        | 11.9        | 11.2        | 12.1        |
| Taiwan Province of China         | 55.7        | 21.2        | 21.9        | 25.6        | 27.9        | 25.4        | 28.6        | 29.7        | 27.9        |
| Thailand                         | 16.6        | 12.8        | 10.0        | 8.7         | 11.7        | 8.7         | 10.1        | 11.1        | 11.7        |
| Turkey                           | 14.9        | 12.5        | 16.2        | 17.2        | 25.2        | 19.8        | 21.3        | 24.4        | 25.2        |
| United Arab Emirates             | ...         | ...         | 54.7        | 13.4        | 19.7        | 12.6        | 15.5        | 14.8        | 19.7        |
| Venezuela                        | 14.4        | 6.0         | 5.1         | 13.1        | ...         | ...         | ...         | ...         | ...         |

Source: Standard &amp; Poor's Emerging Market Database.

**Table 21. Emerging Markets: Mutual Fund Flows***(In millions of U.S. dollars)*

|                           | 2001   | 2002   | 2003  | 2004   | 2005   | 2006   | 2007   | 2007   |        |        |        |
|---------------------------|--------|--------|-------|--------|--------|--------|--------|--------|--------|--------|--------|
|                           |        |        |       |        |        |        |        | Q1     | Q2     | Q3     | Q4     |
| Bonds                     | -444   | 606    | 3,153 | 1,947  | 5,729  | 6,233  | 4,295  | 2,534  | 2,003  | -1,185 | 943    |
| Equities                  | -1,781 | -1,512 | 8,500 | 2,784  | 21,706 | 22,441 | 40,827 | -1,674 | 3,815  | 16,637 | 22,049 |
| Global                    | -67    | -2,082 | 2,119 | -5,348 | 3,148  | 4,209  | 15,223 | -758   | 1,454  | 2,623  | 11,904 |
| Asia                      | -768   | 817    | 5,148 | 5,609  | 6,952  | 16,790 | 16,405 | 1,159  | -2,487 | 11,064 | 6,668  |
| Latin America             | -619   | -312   | 376   | 338    | 4,020  | 3,319  | 10,153 | -239   | 5,174  | 3,274  | 1,944  |
| Europe/Middle East/Africa | -327   | 65     | 857   | 2,185  | 7,587  | -1,877 | -953   | -1,836 | -326   | -324   | 1,533  |

Source: Emerging Portfolio Fund Research, Inc.

**Table 22. Bank Regulatory Capital to Risk-Weighted Assets***(In percent)*

|                                 | 2002  | 2003 | 2004 | 2005 | 2006 | 2007 | Latest    |
|---------------------------------|-------|------|------|------|------|------|-----------|
| <b>Latin America</b>            |       |      |      |      |      |      |           |
| Argentina                       | ...   | ...  | ...  | ...  | ...  | ...  |           |
| Bolivia                         | 16.1  | 15.3 | 14.9 | 14.7 | 13.3 | 12.6 | December  |
| Brazil                          | 16.6  | 18.8 | 18.6 | 17.9 | 18.9 | 18.4 | September |
| Chile                           | 14.0  | 14.1 | 13.6 | 13.0 | 12.5 | 12.0 | November  |
| Colombia                        | 12.2  | 13.0 | 14.2 | 14.7 | 13.1 | 13.2 | November  |
| Costa Rica <sup>1</sup>         | 15.8  | 16.5 | 18.1 | 15.9 | 15.3 | 13.6 | November  |
| Dominican Republic <sup>2</sup> | 12.2  | 11.6 | 13.9 | 13.0 | 12.3 | 12.2 | September |
| Ecuador                         | 14.4  | 14.9 | 14.5 | 14.4 | 14.8 | 15.7 | November  |
| El Salvador                     | 12.2  | 12.8 | 13.4 | 13.5 | 13.8 | 14.0 | June      |
| Guatemala                       | 14.9  | 15.6 | 14.5 | 13.7 | 13.6 | 13.8 | November  |
| Mexico <sup>3</sup>             | 15.7  | 14.4 | 14.1 | 14.5 | 16.3 | 15.9 | September |
| Panama                          | 17.1  | 17.6 | 17.8 | 16.3 | 17.2 | 16.8 | September |
| Paraguay                        | 17.9  | 20.9 | 20.5 | 20.4 | 20.1 | 19.6 | August    |
| Peru                            | 12.5  | 13.3 | 14.0 | 12.0 | 12.5 | 12.1 | November  |
| Uruguay <sup>4</sup>            | -20.1 | 18.1 | 21.7 | 22.7 | 16.9 | 17.8 | December  |
| Venezuela                       | 20.5  | 25.1 | 19.2 | 15.5 | 14.3 | 12.1 | November  |
| <b>Emerging Europe</b>          |       |      |      |      |      |      |           |
| Albania                         | ...   | 28.5 | 21.6 | 18.6 | 18.1 | 17.5 | September |
| Belarus                         | 24.2  | 26.0 | 25.2 | 26.7 | 24.4 | 19.1 | November  |
| Bosnia and Herzegovina          | 20.5  | 20.3 | 18.7 | 17.8 | 17.7 | 16.7 | September |
| Bulgaria                        | 25.2  | 22.0 | 16.1 | 15.2 | 14.5 | 13.9 | September |
| Croatia                         | 17.4  | 16.5 | 16.0 | 15.2 | 13.6 | 16.1 | September |
| Czech Republic                  | 14.3  | 14.5 | 12.6 | 11.9 | 11.4 | 11.9 | September |
| Estonia                         | 15.3  | 14.5 | 13.4 | 11.7 | 13.2 | 14.8 | December  |
| Hungary                         | 13.0  | 11.8 | 12.4 | 11.6 | 11.0 | 11.3 | June      |
| Israel                          | 9.9   | 10.3 | 10.8 | 10.7 | 10.8 | 11.1 | June      |
| Latvia                          | 13.1  | 11.7 | 11.7 | 10.1 | 10.2 | 11.0 | September |
| Lithuania <sup>5</sup>          | 14.8  | 13.3 | 12.4 | 10.3 | 10.7 | 11.3 | September |
| Macedonia, FYR                  | 28.1  | 25.8 | 23.0 | 21.3 | 18.3 | 17.2 | September |
| Moldova                         | 36.0  | 32.0 | 31.0 | 27.0 | 28.0 | 29.5 | November  |
| Montenegro                      | ...   | ...  | 31.3 | 27.8 | 21.3 | 18.7 | June      |
| Poland                          | 13.8  | 13.7 | 15.5 | 14.5 | 13.2 | 11.8 | September |
| Romania <sup>6</sup>            | 25.0  | 21.1 | 20.6 | 21.1 | 18.1 | 14.0 | September |
| Russia                          | 19.1  | 19.1 | 17.0 | 16.0 | 14.9 | 16.8 | June      |
| Serbia                          | 25.6  | 31.1 | 27.9 | 26.0 | 24.7 | 25.9 | June      |
| Slovak Republic                 | 21.3  | 22.4 | 18.7 | 14.8 | 13.0 | 13.5 | June      |
| Slovenia                        | 11.9  | 11.5 | 11.8 | 10.6 | 11.8 | ...  | December  |
| Turkey <sup>7</sup>             | 24.4  | 29.5 | 27.4 | 22.8 | 21.1 | 19.5 | September |
| Ukraine                         | 18.0  | 15.2 | 16.8 | 15.0 | 14.2 | 13.9 | December  |
| <b>Western Europe</b>           |       |      |      |      |      |      |           |
| Austria <sup>8</sup>            | 13.3  | 14.5 | 12.4 | 11.8 | 11.8 | 12.7 | June      |
| Belgium                         | 13.2  | 12.9 | 12.9 | 11.5 | 11.9 | 11.9 | September |
| Denmark                         | 13.5  | 13.9 | 13.4 | 13.2 | 13.8 | ...  | December  |
| Finland <sup>6</sup>            | 11.7  | 18.7 | 19.1 | 17.2 | 15.1 | 15.1 | June      |
| France                          | 11.5  | 11.9 | 11.5 | 11.4 | 10.9 | ...  | December  |
| Germany                         | 12.7  | 13.4 | 13.2 | 12.2 | 12.5 | ...  | December  |
| Greece                          | 10.5  | 12.0 | 12.8 | 13.2 | 12.2 | 11.4 | September |
| Iceland                         | 12.2  | 12.3 | 12.8 | 12.8 | 15.1 | ...  | December  |
| Ireland <sup>9</sup>            | 12.3  | 13.9 | 12.6 | 12.0 | 10.9 | ...  | December  |
| Italy <sup>10</sup>             | 11.2  | 11.4 | 11.6 | 10.6 | 10.7 | 10.9 | June      |
| Luxembourg                      | 15.0  | 17.1 | 17.5 | 16.3 | 14.8 | ...  | December  |
| Malta                           | ...   | ...  | 21.4 | 20.4 | 22.0 | ...  | December  |
| Netherlands                     | 12.0  | 12.3 | 12.3 | 12.6 | 11.9 | 11.8 | September |
| Norway                          | 12.2  | 12.4 | 12.2 | 11.9 | 11.2 | 11.2 | September |
| Portugal <sup>11</sup>          | 9.8   | 10.0 | 10.4 | 11.3 | 10.9 | ...  | December  |
| Spain                           | 12.5  | 12.6 | 12.3 | 12.2 | 11.9 | ...  | December  |
| Sweden <sup>12</sup>            | 10.4  | 9.9  | 10.1 | 10.1 | 10.0 | 10.8 | September |
| Switzerland                     | 12.6  | 12.4 | 12.6 | 12.4 | 13.4 | ...  | December  |
| United Kingdom                  | 13.1  | 13.0 | 12.7 | 12.8 | 12.9 | ...  | December  |
| <b>Asia</b>                     |       |      |      |      |      |      |           |
| Bangladesh                      | 7.5   | 8.4  | 8.8  | 7.3  | 8.3  | 10.0 | December  |
| China                           | -12.1 | -5.9 | -4.7 | 2.5  | 4.9  | 7.7  | June      |

Table 22 (concluded)

|                                       | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | Latest    |
|---------------------------------------|------|------|------|------|------|------|-----------|
| <b>Asia (continued)</b>               |      |      |      |      |      |      |           |
| Hong Kong SAR                         | 15.7 | 15.3 | 15.4 | 14.9 | 15.2 | 13.4 | June      |
| India                                 | 12.0 | 12.7 | 12.9 | 12.8 | 12.3 | 12.6 | June      |
| Indonesia                             | 20.1 | 22.3 | 19.4 | 19.3 | 21.3 | 21.3 | September |
| Korea                                 | 11.2 | 11.1 | 12.1 | 13.0 | 12.8 | 12.7 | September |
| Malaysia                              | 13.2 | 13.8 | 14.4 | 13.7 | 13.5 | 13.2 | November  |
| Philippines                           | 16.9 | 17.5 | 18.4 | 17.8 | 17.7 | 18.8 | March     |
| Singapore                             | 16.9 | 17.9 | 16.2 | 15.8 | 15.4 | 14.0 | September |
| Thailand                              | 13.0 | 13.4 | 12.4 | 13.2 | 13.6 | 14.6 | September |
| <b>Middle East &amp; Central Asia</b> |      |      |      |      |      |      |           |
| Armenia                               | 30.5 | 33.8 | 32.3 | 33.7 | 34.9 | 31.4 | September |
| Egypt                                 | 11.0 | 11.1 | 11.4 | 13.8 | 15.1 | ...  | December  |
| Georgia                               | 21.9 | 20.3 | 18.8 | 17.5 | 20.6 | 15.7 | November  |
| Jordan                                | 16.6 | 15.9 | 17.8 | 17.6 | 21.4 | 18.8 | June      |
| Kazakhstan                            | 17.2 | 16.9 | 15.9 | 15.1 | 14.9 | 14.2 | December  |
| Kuwait                                | 19.7 | 18.4 | 17.3 | 21.3 | 21.8 | 20.4 | December  |
| Lebanon                               | 19.4 | 22.3 | 22.2 | 22.9 | 25.0 | ...  | December  |
| Morocco                               | 12.2 | 9.6  | 10.5 | 11.5 | 12.3 | 12.3 | June      |
| Oman                                  | 17.1 | 17.6 | 17.6 | 18.1 | 17.2 | 13.4 | September |
| Pakistan                              | 8.8  | 8.5  | 10.5 | 11.3 | 12.7 | 13.3 | June      |
| Saudi Arabia                          | 21.3 | 19.4 | 17.8 | 17.8 | 21.9 | 21.8 | March     |
| Tunisia                               | 9.8  | 9.3  | 11.6 | 12.4 | 11.8 | ...  | December  |
| United Arab Emirates                  | 19.0 | 18.6 | 16.9 | 17.4 | 16.6 | 14.2 | September |
| <b>Sub-Saharan Africa</b>             |      |      |      |      |      |      |           |
| Gabon                                 | 17.2 | 19.9 | 22.3 | 19.8 | 17.8 | 17.2 | June      |
| Ghana                                 | 13.4 | 9.3  | 13.7 | 16.2 | 15.8 | ...  | December  |
| Kenya                                 | ...  | 17.3 | 16.6 | 16.4 | 16.5 | 16.7 | August    |
| Lesotho                               | ...  | ...  | 22.0 | 22.0 | 19.0 | 20.0 | March     |
| Mozambique                            | 14.0 | 17.0 | 18.7 | 16.0 | 12.5 | 17.1 | September |
| Namibia                               | 14.1 | 14.8 | 15.4 | 14.6 | 14.2 | 14.8 | September |
| Nigeria                               | 18.1 | 17.8 | 14.7 | 17.8 | 22.6 | 18.6 | June      |
| Rwanda                                | 12.5 | 14.6 | 18.3 | 14.7 | ...  | ...  | December  |
| Senegal                               | 15.5 | 11.7 | 11.5 | 10.8 | 12.9 | 13.0 | March     |
| Sierra Leone <sup>13</sup>            | 32.5 | 27.3 | 25.1 | 26.4 | 36.0 | ...  | December  |
| South Africa                          | 12.6 | 12.4 | 14.0 | 12.7 | 12.3 | 12.2 | June      |
| Swaziland                             | ...  | 14.0 | 14.0 | 15.0 | 20.0 | 23.0 | June      |
| Uganda                                | 20.7 | 16.9 | 20.5 | 18.3 | 18.0 | 20.1 | June      |
| <b>Other</b>                          |      |      |      |      |      |      |           |
| Australia                             | 9.6  | 10.0 | 10.4 | 10.4 | 10.4 | 10.3 | September |
| Canada                                | 12.4 | 13.4 | 13.3 | 12.9 | 12.5 | 12.1 | September |
| Japan <sup>14</sup>                   | 9.4  | 11.1 | 11.6 | 12.2 | 13.1 | 12.9 | September |
| United States                         | 13.0 | 13.0 | 13.2 | 12.9 | 13.0 | 12.8 | September |

Sources: National authorities; and IMF staff estimates.

Note: Due to differences in national accounting, taxation, and supervisory regimes, FSI data are not strictly comparable across countries.

<sup>1</sup>Banking sector excludes offshore banks.

<sup>2</sup>The data exclude restructured or intervened banks.

<sup>3</sup>Commercial banks.

<sup>4</sup>In 2006, the Uruguay Central Bank changed the methodology for calculating the regulatory capital ratio, changing the weights and adding a factor to the denominator to account for market risk. Regulatory capital ratios are smaller in 2006 and 2007, compared to previous years, due to this calculation. The data exclude the state mortgage bank.

<sup>5</sup>Data exclude foreign bank branches.

<sup>6</sup>Break in the data series starting in 2003.

<sup>7</sup>Break in the data series in 2007.

<sup>8</sup>Starting in 2004 data reported on a consolidated basis.

<sup>9</sup>Domestic banks.

<sup>10</sup>Consolidated reports for banking groups and individual reports for banks not belonging to groups.

<sup>11</sup>For 2005 and 2006 the figures are for the sample of institutions that are already complying with IAS, accounting as of December 2004 for about 87 percent of the usual aggregate considered.

<sup>12</sup>Data for the four large banking groups.

<sup>13</sup>2006 figure unadjusted; not directly comparable with previous years.

<sup>14</sup>For the end of the fiscal year, i.e., March of the following calendar year; for major banks.

**Table 23. Bank Capital to Assets**  
(In percent)

|                                 | 2002  | 2003 | 2004 | 2005 | 2006 | 2007 | Latest    |
|---------------------------------|-------|------|------|------|------|------|-----------|
| <b>Latin America</b>            |       |      |      |      |      |      |           |
| Argentina                       | ...   | 11.9 | 11.8 | 13.0 | 13.6 | 13.6 | October   |
| Bolivia                         | 11.9  | 12.1 | 11.5 | 11.3 | 10.0 | 9.6  | December  |
| Brazil                          | 9.2   | 9.6  | 10.1 | 9.8  | 9.9  | 9.8  | September |
| Chile                           | 7.2   | 7.3  | 7.0  | 6.9  | 6.8  | 6.6  | November  |
| Colombia                        | 11.0  | 11.6 | 12.1 | 12.3 | 12.0 | 11.8 | November  |
| Costa Rica <sup>1</sup>         | 10.7  | 11.3 | 9.9  | 10.5 | 11.2 | 11.3 | September |
| Dominican Republic <sup>2</sup> | 13.0  | 8.4  | 9.4  | 9.7  | 10.1 | 9.7  | September |
| Ecuador <sup>3</sup>            | 8.9   | 8.8  | 8.5  | 8.4  | 8.7  | 9.0  | November  |
| El Salvador                     | 8.5   | 9.4  | 9.7  | 10.1 | 10.7 | 10.5 | June      |
| Guatemala                       | 8.9   | 9.0  | 8.9  | 8.5  | 8.2  | 9.1  | November  |
| Mexico <sup>4</sup>             | 9.6   | 10.0 | 10.2 | 11.5 | 13.2 | ...  | December  |
| Panama <sup>5</sup>             | 10.2  | 12.2 | 13.2 | 12.8 | 11.3 | 12.8 | November  |
| Paraguay                        | 10.9  | 9.5  | 10.5 | 11.0 | 12.5 | 11.6 | August    |
| Peru                            | 10.1  | 9.3  | 9.8  | 7.7  | 9.5  | 8.7  | November  |
| Uruguay <sup>6</sup>            | -10.0 | 7.2  | 8.3  | 8.6  | 9.8  | 10.5 | December  |
| Venezuela                       | 15.9  | 14.3 | 12.5 | 11.1 | 9.8  | 8.3  | December  |
| <b>Emerging Europe</b>          |       |      |      |      |      |      |           |
| Albania                         | ...   | 4.7  | 4.8  | 5.4  | 5.9  | 6.9  | September |
| Belarus                         | 18.7  | 20.4 | 20.1 | 19.8 | 17.8 | 15.0 | November  |
| Bosnia and Herzegovina          | 19.1  | 17.0 | 15.7 | 14.4 | 13.8 | 13.1 | September |
| Bulgaria                        | 13.3  | 13.1 | 11.0 | 10.5 | 10.4 | 9.9  | September |
| Croatia                         | 9.5   | 8.9  | 8.6  | 9.0  | 10.3 | 12.0 | September |
| Czech Republic <sup>7</sup>     | 5.2   | 5.7  | 5.6  | 5.7  | 6.2  | 6.0  | September |
| Estonia                         | 12.1  | 11.3 | 9.8  | 8.6  | 8.4  | 8.7  | September |
| Hungary                         | 8.7   | 8.3  | 8.5  | 8.2  | 8.3  | 8.9  | June      |
| Israel                          | 4.9   | 5.3  | 5.5  | 5.6  | 5.9  | 6.0  | March     |
| Latvia                          | 8.7   | 8.4  | 8.0  | 7.6  | 7.6  | 7.4  | March     |
| Lithuania <sup>8</sup>          | 10.5  | 9.8  | 8.7  | 7.2  | 7.1  | 7.6  | September |
| Macedonia, FYR                  | ...   | ...  | ...  | ...  | ...  | ...  | ...       |
| Moldova                         | 22.9  | 21.1 | 19.3 | 16.7 | 17.3 | 17.3 | December  |
| Montenegro                      | ...   | ...  | 20.4 | 15.3 | 10.4 | 9.5  | June      |
| Poland                          | 8.7   | 8.3  | 8.0  | 7.8  | 7.6  | 7.4  | September |
| Romania <sup>9</sup>            | 11.6  | 10.9 | 8.9  | 9.2  | 8.6  | 7.9  | September |
| Russia                          | 14.0  | 14.6 | 13.3 | 12.7 | 12.1 | 13.6 | June      |
| Serbia                          | 18.3  | 22.5 | 18.8 | 16.0 | 15.6 | 15.9 | June      |
| Slovak Republic                 | 7.7   | 8.9  | 7.7  | 9.7  | 8.0  | ...  | December  |
| Slovenia                        | 8.3   | 8.3  | 8.1  | 8.4  | 8.4  | ...  | December  |
| Turkey <sup>10</sup>            | 11.5  | 13.7 | 14.4 | 12.9 | 11.3 | 13.2 | September |
| Ukraine                         | 14.7  | 12.3 | 13.8 | 12.4 | 13.3 | 12.5 | December  |
| <b>Western Europe</b>           |       |      |      |      |      |      |           |
| Austria                         | 4.7   | 4.9  | 4.9  | 4.8  | 5.2  | 6.0  | June      |
| Belgium                         | 3.0   | 3.1  | 3.1  | 2.7  | 3.3  | 3.2  | September |
| Denmark                         | 5.7   | 5.9  | 5.7  | 5.7  | 6.2  | ...  | December  |
| Finland                         | 5.6   | 9.7  | 8.7  | 8.8  | 9.2  | ...  | December  |
| France                          | 6.8   | 6.9  | 6.6  | 5.8  | 6.0  | 5.3  | November  |
| Germany                         | 4.1   | 4.2  | 4.0  | 4.1  | 4.3  | ...  | December  |
| Greece <sup>11</sup>            | 6.9   | 6.9  | 5.3  | 5.9  | 6.7  | 6.2  | June      |
| Iceland <sup>12</sup>           | 7.2   | 7.1  | 7.1  | 7.4  | 7.8  | ...  | December  |
| Ireland                         | 5.5   | 5.2  | 4.9  | 4.7  | 4.3  | ...  | December  |
| Italy                           | 7.1   | 7.0  | 6.9  | 7.4  | 6.8  | 7.6  | November  |
| Luxembourg                      | 4.6   | 4.8  | 4.8  | 4.5  | 4.6  | ...  | December  |
| Malta                           | ...   | ...  | 7.9  | 6.8  | 8.6  | ...  | December  |
| Netherlands                     | 4.7   | 4.3  | 3.9  | 4.2  | 3.0  | 2.8  | September |
| Norway                          | 6.2   | 5.9  | 5.9  | 5.2  | 5.0  | ...  | September |
| Portugal <sup>13,14</sup>       | 5.6   | 5.8  | 6.2  | 5.8  | 6.4  | ...  | December  |
| Spain                           | 8.2   | 7.8  | 8.3  | 7.6  | 7.2  | 7.1  | November  |
| Sweden <sup>15</sup>            | 5.2   | 5.0  | 4.8  | 4.8  | 4.9  | 4.8  | September |
| Switzerland                     | 5.5   | 5.7  | 5.3  | 5.1  | 4.9  | ...  | December  |
| United Kingdom                  | 9.9   | 9.8  | 9.6  | 9.1  | 8.9  | ...  | December  |
| <b>Asia</b>                     |       |      |      |      |      |      |           |
| Bangladesh                      | 4.1   | 3.2  | 2.7  | 2.6  | 4.0  | 10.9 | June      |
| China <sup>16</sup>             | ...   | 4.9  | 4.9  | 4.4  | 5.1  | 5.5  | September |

**Table 23 (concluded)**

|                                       | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | Latest    |
|---------------------------------------|------|------|------|------|------|------|-----------|
| <b>Asia (continued)</b>               |      |      |      |      |      |      |           |
| Hong Kong SAR                         | 10.1 | 10.6 | 10.8 | 11.8 | 11.2 | 12.0 | November  |
| India                                 | 5.5  | 5.7  | 5.9  | 6.4  | 6.6  | 6.4  | March     |
| Indonesia                             | 8.8  | 9.6  | 10.8 | 10.2 | 10.7 | 10.0 | November  |
| Korea <sup>17</sup>                   | 7.2  | 7.0  | 8.0  | 9.3  | 9.2  | 9.3  | September |
| Malaysia                              | 8.7  | 8.5  | 8.2  | 7.7  | 7.6  | 7.5  | November  |
| Philippines                           | 13.4 | 13.1 | 12.6 | 12.0 | 11.7 | 11.4 | June      |
| Singapore                             | 10.7 | 10.7 | 9.6  | 9.6  | 9.6  | 9.3  | September |
| Thailand                              | 6.1  | 7.4  | 8.0  | 8.9  | 8.9  | 9.0  | September |
| <b>Middle East &amp; Central Asia</b> |      |      |      |      |      |      |           |
| Armenia                               | 18.4 | 18.1 | 17.8 | 21.5 | 22.9 | 22.3 | September |
| Egypt                                 | ...  | 4.9  | 5.4  | 5.4  | 5.5  | ...  | December  |
| Georgia                               | 28.3 | 26.2 | 21.9 | 18.8 | 21.2 | 19.4 | October   |
| Jordan                                | 6.2  | 6.4  | 7.2  | 8.2  | 10.7 | ...  | December  |
| Kazakhstan                            | 9.0  | 9.0  | 8.0  | 8.0  | 8.9  | 11.0 | November  |
| Kuwait                                | 10.3 | 10.7 | 12.1 | 12.7 | 11.7 | 12.0 | September |
| Lebanon                               | 6.3  | 6.9  | 6.8  | 7.5  | 8.4  | 9.4  | February  |
| Morocco                               | 8.5  | 7.6  | 7.6  | 7.7  | 7.4  | 7.1  | June      |
| Oman                                  | 12.8 | 12.6 | 12.9 | 13.7 | 13.2 | ...  | June      |
| Pakistan                              | 4.8  | 5.5  | 6.7  | 7.9  | 9.4  | 9.9  | June      |
| Saudi Arabia                          | 9.3  | 8.8  | 8.0  | 8.8  | 9.3  | ...  | December  |
| Tunisia                               | 7.7  | 7.6  | 7.5  | 7.7  | ...  | ...  | December  |
| United Arab Emirates                  | 11.8 | 11.4 | 11.1 | 11.9 | 12.6 | ...  | December  |
| <b>Sub-Saharan Africa</b>             |      |      |      |      |      |      |           |
| Gabon                                 | 12.4 | 13.1 | 13.2 | 11.1 | 10.2 | 10.6 | June      |
| Ghana                                 | 12.0 | 12.0 | 12.5 | 13.0 | 11.9 | 11.8 | February  |
| Kenya                                 | ...  | 11.8 | 11.9 | 12.1 | 12.4 | 12.6 | August    |
| Lesotho                               | 18.1 | 17.0 | 16.9 | 14.6 | ...  | ...  | December  |
| Mozambique                            | 9.4  | 9.0  | 9.5  | 8.0  | 6.1  | 7.1  | September |
| Namibia                               | 7.5  | 8.3  | 8.8  | 7.8  | 7.5  | 7.3  | September |
| Nigeria                               | 10.7 | 9.6  | 9.9  | 12.4 | 14.7 | 13.3 | June      |
| Rwanda                                | 8.1  | 8.9  | 10.1 | 9.4  | 9.2  | ...  | April     |
| Senegal                               | 10.3 | 7.8  | 7.7  | 7.6  | 8.3  | 7.9  | March     |
| Sierra Leone                          | 21.4 | 21.1 | 22.5 | 20.0 | 19.1 | 19.3 | November  |
| South Africa                          | 9.3  | 8.0  | 8.2  | 7.9  | 7.9  | 7.5  | October   |
| Swaziland                             | 11.7 | 13.7 | 22.4 | 22.9 | ...  | ...  | December  |
| Uganda                                | 9.6  | 9.0  | 10.5 | 8.4  | 10.0 | 10.8 | September |
| <b>Other</b>                          |      |      |      |      |      |      |           |
| Australia <sup>18</sup>               | 5.3  | 5.2  | 5.1  | 5.2  | 4.9  | 4.7  | September |
| Canada                                | 4.6  | 4.7  | 4.4  | 4.4  | 5.7  | 5.1  | September |
| Japan <sup>19</sup>                   | 3.3  | 3.9  | 4.2  | 4.9  | 5.3  | 5.0  | September |
| United States                         | 9.2  | 9.2  | 10.3 | 10.3 | 10.5 | 10.5 | September |

Sources: National authorities; and IMF staff estimates.

Note: Due to differences in national accounting, taxation, and supervisory regimes, FSI data are not strictly comparable across countries.

<sup>1</sup>Banking sector excludes offshore banks.

<sup>2</sup>The data exclude restructured or intervened banks.

<sup>3</sup>Total assets include contingencies.

<sup>4</sup>All deposit takers.

<sup>5</sup>General licensed banks.

<sup>6</sup>The data exclude the state mortgage bank.

<sup>7</sup>Total own funds.

<sup>8</sup>Capital is defined as bank shareholders' equity and foreign bank branches funds received from the head office.

<sup>9</sup>Break in the data series starting in 2003.

<sup>10</sup>Break in the data series in 2007.

<sup>11</sup>Data on a nonconsolidated basis. From 2004 in accordance with IFRS.

<sup>12</sup>Commercial banks and six largest savings banks (five largest savings banks from 2006 due to a merger of two banks).

<sup>13</sup>For 2005 and 2006 the figures are for the sample of institutions that are already complying with IAS, accounting as of December 2004 for about 87 percent of the usual aggregate considered.

<sup>14</sup>On accounting basis, consolidated.

<sup>15</sup>Data for the four large banking groups.

<sup>16</sup>Banking institutions (policy banks, state-owned commercial banks, joint stock commercial banks, city commercial banks, rural commercial banks, urban credit cooperatives, rural credit cooperatives, postal savings, foreign banks, and nonbank financial institutions).

<sup>17</sup>Core capital ratio.

<sup>18</sup>Tier 1 capital to total assets.

<sup>19</sup>For the end of the fiscal year, i.e., March of the following calendar year; all banks.

**Table 24. Bank Nonperforming Loans to Total Loans***(In percent)*

|                                 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | Latest    |
|---------------------------------|------|------|------|------|------|------|-----------|
| <b>Latin America</b>            |      |      |      |      |      |      |           |
| Argentina                       | 18.1 | 17.7 | 10.7 | 5.2  | 3.4  | 2.9  | October   |
| Bolivia                         | 17.7 | 16.7 | 14.0 | 11.3 | 8.7  | 5.6  | December  |
| Brazil                          | 4.5  | 4.9  | 3.5  | 4.2  | 4.1  | 3.1  | September |
| Chile                           | 1.8  | 1.6  | 1.2  | 0.9  | 0.8  | 0.8  | December  |
| Colombia                        | 8.7  | 6.8  | 3.3  | 2.7  | 2.6  | 3.4  | November  |
| Costa Rica <sup>1</sup>         | 3.2  | 1.7  | 2.0  | 1.5  | 1.5  | 1.3  | September |
| Dominican Republic <sup>2</sup> | 3.8  | 6.5  | 5.8  | 5.8  | 4.6  | 4.7  | September |
| Ecuador                         | 8.4  | 7.9  | 6.4  | 4.9  | 3.3  | 3.4  | November  |
| El Salvador <sup>3</sup>        | 3.5  | 2.8  | 2.4  | 2.0  | 2.0  | 2.1  | June      |
| Guatemala                       | 7.9  | 6.5  | 7.1  | 4.2  | 4.6  | 1.9  | November  |
| Mexico <sup>4</sup>             | 3.7  | 2.8  | 2.2  | 1.8  | 2.1  | 2.5  | September |
| Panama <sup>5</sup>             | 3.5  | 2.5  | 1.8  | 1.8  | 1.5  | 1.6  | September |
| Paraguay                        | 19.7 | 20.6 | 10.8 | 6.6  | 3.3  | 2.4  | August    |
| Peru                            | 7.6  | 5.8  | 3.7  | 2.1  | 1.6  | 1.4  | November  |
| Uruguay <sup>6</sup>            | 33.9 | 14.3 | 4.7  | 3.6  | 1.9  | 1.1  | December  |
| Venezuela                       | 9.2  | 7.7  | 2.8  | 1.2  | 1.1  | 1.2  | December  |
| <b>Emerging Europe</b>          |      |      |      |      |      |      |           |
| Albania                         | ...  | 4.6  | 4.2  | 2.3  | 3.1  | 3.4  | September |
| Belarus                         | 9.0  | 3.7  | 2.8  | 1.9  | 1.2  | 1.5  | November  |
| Bosnia and Herzegovina          | 11.0 | 8.4  | 6.1  | 5.3  | 4.0  | 3.2  | September |
| Bulgaria                        | 2.6  | 3.2  | 2.0  | 2.2  | 2.2  | 2.2  | September |
| Croatia                         | 10.2 | 8.9  | 7.5  | 6.2  | 5.2  | 4.9  | September |
| Czech Republic                  | 8.1  | 4.9  | 4.1  | 4.3  | 3.6  | 3.0  | September |
| Estonia                         | 0.8  | 0.4  | 0.3  | 0.2  | 0.2  | 0.7  | December  |
| Hungary                         | 2.9  | 2.6  | 2.7  | 2.5  | 2.5  | 2.5  | June      |
| Israel                          | 2.4  | 2.6  | 2.5  | 2.3  | 1.9  | 1.8  | June      |
| Latvia                          | 2.0  | 1.4  | 1.1  | 0.7  | 0.4  | 0.4  | September |
| Lithuania <sup>7</sup>          | 5.3  | 2.4  | 2.2  | 0.6  | 1.0  | 0.9  | September |
| Macedonia, FYR <sup>8</sup>     | 23.1 | 22.1 | 17.0 | 15.0 | 11.2 | 9.1  | September |
| Moldova                         | 8.0  | 6.0  | 7.0  | 5.0  | 4.0  | 4.0  | December  |
| Montenegro                      | ...  | ...  | 5.2  | 5.3  | 2.9  | 2.0  | June      |
| Poland                          | 21.1 | 10.4 | 9.2  | 7.7  | 3.6  | 3.1  | September |
| Romania                         | ...  | 8.3  | 8.1  | 8.3  | 8.4  | 9.1  | September |
| Russia                          | 5.6  | 5.0  | 3.8  | 3.2  | 2.6  | 2.6  | June      |
| Serbia <sup>9</sup>             | 21.6 | 24.1 | 22.2 | 23.8 | 23.1 | 21.4 | June      |
| Slovak Republic                 | 7.9  | 3.7  | 2.6  | 5.0  | 3.7  | 3.1  | June      |
| Slovenia                        | 3.9  | 3.7  | 3.0  | 2.5  | 2.5  | ...  | December  |
| Turkey <sup>10</sup>            | 12.7 | 8.9  | 5.0  | 3.9  | 3.2  | 3.6  | September |
| Ukraine <sup>11</sup>           | 21.9 | 28.3 | 30.0 | 19.6 | 17.8 | 13.2 | December  |
| <b>Western Europe</b>           |      |      |      |      |      |      |           |
| Austria                         | 3.0  | 3.0  | 2.7  | 2.6  | 2.1  | ...  | December  |
| Belgium                         | 3.0  | 2.6  | 2.3  | 2.0  | 1.7  | 1.6  | September |
| Denmark <sup>12</sup>           | 1.7  | 1.5  | 1.1  | 0.8  | 0.6  | ...  | December  |
| Finland <sup>13</sup>           | 0.5  | 0.5  | 0.4  | 0.3  | 0.3  | 0.3  | June      |
| France <sup>14</sup>            | 5.0  | 4.8  | 4.2  | 3.5  | 3.0  | 2.8  | June      |
| Germany                         | 5.0  | 5.2  | 4.9  | 4.0  | 3.4  | ...  | December  |
| Greece                          | 7.4  | 7.0  | 7.0  | 6.3  | 5.4  | 5.1  | June      |
| Iceland <sup>15</sup>           | 2.6  | 2.1  | 0.9  | 1.1  | 0.8  | ...  | December  |
| Ireland                         | 1.0  | 0.9  | 0.8  | 0.7  | 0.7  | ...  | December  |
| Italy <sup>16</sup>             | 6.5  | 6.7  | 6.6  | 6.2  | 5.3  | ...  | December  |

Table 24 (continued)

|                                       | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | Latest    |
|---------------------------------------|------|------|------|------|------|------|-----------|
| <b>Western Europe (continued)</b>     |      |      |      |      |      |      |           |
| Luxembourg                            | 0.4  | 0.3  | 0.3  | 0.2  | 0.2  | ...  | June      |
| Malta                                 | ...  | ...  | 6.5  | 3.9  | 2.8  | ...  | December  |
| Netherlands <sup>17</sup>             | 2.4  | 2.0  | 1.5  | 1.2  | 1.3  | ...  | December  |
| Norway                                | 2.0  | 1.7  | 1.1  | 0.8  | 0.6  | 0.6  | September |
| Portugal <sup>18,19</sup>             | 2.3  | 2.4  | 2.0  | 1.5  | 1.3  | ...  | December  |
| Spain <sup>20</sup>                   | 1.1  | 1.0  | 0.8  | 0.8  | 0.7  | 0.9  | November  |
| Sweden <sup>21</sup>                  | 1.4  | 1.2  | 0.9  | 0.7  | 0.6  | 0.5  | September |
| Switzerland                           | 1.8  | 1.3  | 0.9  | 0.5  | 0.3  | ...  | December  |
| United Kingdom                        | 2.6  | 2.5  | 1.9  | 1.0  | 0.9  | ...  | December  |
| <b>Asia</b>                           |      |      |      |      |      |      |           |
| Bangladesh                            | 28.1 | 22.1 | 17.6 | 13.6 | 13.2 | 14.0 | September |
| China <sup>22</sup>                   | 26.0 | 20.4 | 12.8 | 9.8  | 7.5  | 6.6  | September |
| Hong Kong SAR                         | 5.0  | 3.9  | 2.3  | 1.4  | 1.3  | 0.9  | June      |
| India                                 | 10.4 | 8.8  | 7.2  | 5.2  | 3.3  | 2.8  | June      |
| Indonesia <sup>23</sup>               | 24.0 | 19.4 | 14.3 | 14.8 | 13.2 | 10.9 | September |
| Korea                                 | 2.4  | 2.6  | 1.9  | 1.2  | 0.8  | 0.8  | September |
| Malaysia                              | 15.9 | 13.9 | 11.7 | 9.6  | 8.5  | 6.6  | November  |
| Philippines                           | 14.6 | 13.8 | 12.5 | 8.6  | 6.1  | 5.7  | June      |
| Singapore                             | 7.7  | 6.7  | 5.0  | 3.8  | 2.8  | 1.8  | September |
| Thailand                              | 16.5 | 13.5 | 11.9 | 9.1  | 8.1  | 8.6  | September |
| <b>Middle East &amp; Central Asia</b> |      |      |      |      |      |      |           |
| Armenia                               | 9.9  | 5.4  | 2.1  | 1.9  | 2.5  | 2.9  | September |
| Egypt                                 | 20.2 | 24.2 | 23.6 | 24.8 | 24.7 | ...  | December  |
| Georgia                               | 7.9  | 7.5  | 6.2  | 3.8  | 2.5  | 2.6  | November  |
| Jordan                                | 17.1 | 15.5 | 10.3 | 6.6  | 4.3  | 4.2  | June      |
| Kazakhstan                            | ...  | 8.4  | 5.7  | 5.3  | 4.8  | 10.5 | November  |
| Kuwait                                | 7.8  | 6.1  | 5.3  | 5.0  | 3.9  | 3.2  | September |
| Lebanon                               | 12.4 | 12.8 | 17.7 | 16.1 | 13.5 | 12.9 | August    |
| Morocco                               | 17.2 | 18.7 | 19.4 | 15.7 | 10.9 | 9.5  | June      |
| Oman                                  | 8.8  | 12.5 | 9.9  | 6.5  | 4.6  | 3.2  | September |
| Pakistan                              | 21.8 | 17.0 | 11.6 | 8.3  | 6.9  | 7.1  | June      |
| Saudi Arabia                          | 8.8  | 5.4  | 2.8  | 1.9  | 2.0  | ...  | December  |
| Tunisia                               | 21.4 | 24.2 | 23.6 | 20.9 | 19.2 | ...  | December  |
| United Arab Emirates                  | 15.3 | 14.3 | 12.5 | 8.3  | 6.3  | ...  | December  |
| <b>Sub-Saharan Africa</b>             |      |      |      |      |      |      |           |
| Gabon                                 | 12.8 | 15.5 | 18.0 | 16.0 | 12.2 | 7.7  | June      |
| Ghana                                 | 22.7 | 18.3 | 16.1 | 13.0 | 7.9  | ...  | December  |
| Kenya <sup>24</sup>                   | ...  | 34.9 | 29.3 | 25.6 | 21.3 | 14.7 | August    |
| Lesotho                               | ...  | ...  | 1.0  | 2.0  | 2.0  | 3.0  | March     |
| Mozambique                            | 22.0 | 14.4 | 6.4  | 3.8  | 3.3  | 4.6  | September |
| Namibia                               | 3.5  | 3.9  | 2.4  | 2.3  | 2.6  | 2.9  | September |
| Nigeria                               | 21.4 | 20.5 | 21.6 | 18.1 | 8.8  | 7.7  | June      |
| Rwanda                                | 57.0 | 52.0 | 27.0 | 27.2 | ...  | ...  | December  |
| Senegal                               | 18.5 | 13.3 | 12.6 | 11.9 | 16.8 | 16.7 | March     |
| Sierra Leone <sup>25</sup>            | 11.0 | 7.4  | 12.1 | 20.9 | 27.1 | ...  | December  |

Table 24 (concluded)

|                                       | 2002  | 2003 | 2004 | 2005 | 2006 | 2007 | Latest    |
|---------------------------------------|-------|------|------|------|------|------|-----------|
| <b>Sub-Saharan Africa (continued)</b> |       |      |      |      |      |      |           |
| South Africa                          | 2.9   | 2.4  | 1.8  | 1.5  | 1.1  | 1.2  | June      |
| Swaziland                             | . . . | 2.0  | 3.0  | 2.0  | 4.0  | 4.0  | June      |
| Uganda                                | 3.0   | 7.2  | 2.2  | 2.3  | 2.9  | 3.4  | June      |
| <b>Other</b>                          |       |      |      |      |      |      |           |
| Australia <sup>26</sup>               | 0.4   | 0.3  | 0.2  | 0.2  | 0.2  | 0.2  | September |
| Canada                                | 1.6   | 1.2  | 0.7  | 0.5  | 0.4  | 0.4  | September |
| Japan <sup>27</sup>                   | 7.2   | 5.2  | 2.9  | 1.8  | 1.5  | 1.5  | September |
| United States                         | 1.4   | 1.1  | 0.8  | 0.7  | 0.8  | 1.1  | September |

Sources: National authorities; and IMF staff estimates.

Note: Due to differences in national accounting, taxation, and supervisory regimes, FSI data are not strictly comparable across countries.

<sup>1</sup>Banking sector excludes offshore banks.

<sup>2</sup>The data exclude restructured or intervened banks.

<sup>3</sup>Official definition based upon past-due loans.

<sup>4</sup>Commercial banks.

<sup>5</sup>General licensed banks.

<sup>6</sup>The data exclude the state mortgage bank.

<sup>7</sup>From end-2005 nonperforming loans are loans with payments overdue more than 60 days. Until 2004 they are defined as loans in "substandard," "doubtful," and "loss" loan categories.

<sup>8</sup>Includes only loans to the nonfinancial sector.

<sup>9</sup>Assets classified in risk categories C, D, and E. The figures are net of provisions, for both the numerator and the denominator.

<sup>10</sup>Break in the data series in 2007.

<sup>11</sup>The increase in nonperforming loans in 2003 reflects a revision in the official definition.

<sup>12</sup>Accumulated impairment losses as a percentage of loans, guarantees, and impairment losses.

<sup>13</sup>Net of provisions.

<sup>14</sup>Gross doubtful debts. A break in the data series in 2006.

<sup>15</sup>Commercial banks and six largest savings banks. 2005 and 2006 figures are for the largest banks.

<sup>16</sup>Banking groups. For the 2002–04 period, nonperforming loans include only substandard loans and bad debts. For the 2005–06 period, the aggregate includes also loans overdue for more than 180 days.

<sup>17</sup>Break in the data series in 2006, data for large banks.

<sup>18</sup>For 2005 and 2006 the figures are for the sample of institutions that are already complying with IAS, accounting as of December 2004 for about 87 percent of the usual aggregate considered.

<sup>19</sup>On a consolidated basis. Nonperforming loans are defined as credit to customers overdue.

<sup>20</sup>Doubtful exposures to other resident sectors over total lending to other resident sectors.

<sup>21</sup>Data for the four large banking groups.

<sup>22</sup>Major commercial banks (state-owned commercial banks and joint stock commercial banks).

<sup>23</sup>Compromised assets ratio; includes reported nonperforming loans, restructured loans, and foreclosed assets for the 16 largest banks. Not directly comparable to the other indicators in the table. Starting from 2005 the ratio is based on financial information for the 15 largest banks as of December 2005.

<sup>24</sup>The ratio uses gross nonperforming loans and gross total loans.

<sup>25</sup>Break in the data series in 2006.

<sup>26</sup>Figures exclude loans in arrears that are covered by collateral.

<sup>27</sup>For the end of the fiscal year, i.e., March of the following calendar year; for major banks.

**Table 25. Bank Provisions to Nonperforming Loans***(In percent)*

|                                 | 2002  | 2003  | 2004  | 2005  | 2006  | 2007  | Latest    |
|---------------------------------|-------|-------|-------|-------|-------|-------|-----------|
| <b>Latin America</b>            |       |       |       |       |       |       |           |
| Argentina                       | 73.8  | 79.2  | 102.9 | 125.1 | 130.3 | 130.3 | October   |
| Bolivia                         | 63.7  | 74.0  | 84.3  | 81.1  | 90.7  | 92.6  | December  |
| Brazil                          | 155.9 | 144.7 | 177.5 | 151.8 | 152.8 | 182.4 | September |
| Chile                           | 128.1 | 130.9 | 165.5 | 177.6 | 198.5 | 210.7 | December  |
| Colombia                        | 86.7  | 98.1  | 149.7 | 166.9 | 153.6 | 124.3 | November  |
| Costa Rica <sup>1</sup>         | 102.6 | 145.9 | 122.6 | 153.0 | 162.2 | 142.4 | November  |
| Dominican Republic <sup>2</sup> | 79.4  | 65.6  | 112.9 | 123.5 | 142.0 | 128.6 | September |
| Ecuador                         | 131.4 | 127.3 | 119.0 | 143.7 | 182.7 | 176.9 | November  |
| El Salvador                     | 115.1 | 129.8 | 132.3 | 126.7 | 116.4 | 121.1 | June      |
| Guatemala                       | ...   | ...   | ...   | 43.2  | 39.6  | 100.0 | November  |
| Mexico                          | 138.1 | 167.1 | 201.8 | 232.1 | 207.4 | 194.7 | March     |
| Panama <sup>3</sup>             | 132.1 | 150.3 | 149.4 | 116.2 | 128.5 | 119.1 | September |
| Paraguay                        | 46.6  | 54.8  | 54.6  | 57.7  | 59.1  | 59.9  | August    |
| Peru                            | 69.1  | 67.1  | 68.7  | 80.3  | 100.3 | 126.1 | November  |
| Uruguay <sup>4</sup>            | 58.3  | 91.4  | 106.8 | 118.8 | 218.6 | 93.3  | December  |
| Venezuela                       | 97.9  | 103.7 | 130.2 | 196.3 | 229.1 | 175.7 | December  |
| <b>Emerging Europe</b>          |       |       |       |       |       |       |           |
| Albania                         | ...   | ...   | ...   | ...   | ...   | ...   |           |
| Belarus                         | 15.8  | 29.9  | 32.4  | 48.4  | 51.3  | 58.9  | November  |
| Bosnia and Herzegovina          | ...   | ...   | ...   | ...   | ...   | ...   |           |
| Bulgaria <sup>5</sup>           | 59.6  | 50.0  | 48.5  | 45.3  | 47.6  | ...   | September |
| Croatia                         | 68.0  | 60.6  | 62.3  | 60.0  | 61.5  | 58.9  | September |
| Czech Republic <sup>6</sup>     | 77.5  | 76.7  | 69.4  | 63.2  | 58.5  | 56.4  | September |
| Estonia                         | 130.6 | 214.5 | 276.9 | 215.0 | 153.6 | ...   | November  |
| Hungary                         | 50.8  | 47.3  | 51.3  | 54.4  | 53.9  | 55.9  | June      |
| Israel                          | ...   | ...   | ...   | ...   | ...   | ...   |           |
| Latvia                          | 78.3  | 89.4  | 99.1  | 98.8  | 116.6 | 125.9 | September |
| Lithuania                       | ...   | ...   | ...   | ...   | ...   | ...   |           |
| Macedonia, FYR                  | ...   | ...   | ...   | ...   | ...   | ...   |           |
| Moldova                         | 78.9  | 92.3  | 84.1  | 95.6  | 128.8 | 105.3 | December  |
| Montenegro                      | ...   | ...   | 77.3  | 67.4  | 78.8  | 104.1 | June      |
| Poland                          | 56.3  | 53.4  | 61.3  | 61.6  | 57.8  | ...   | September |
| Romania <sup>7</sup>            | ...   | 33.5  | 34.3  | 31.4  | 32.0  | 36.9  | September |
| Russia <sup>8</sup>             | 112.5 | 118.0 | 139.5 | 156.3 | 159.3 | ...   | September |
| Serbia                          | ...   | 54.0  | 58.9  | 47.8  | ...   | ...   | September |
| Slovak Republic                 | 82.5  | 85.8  | 86.4  | 85.1  | 105.9 | 98.6  | June      |
| Slovenia                        | 80.5  | 81.0  | 80.1  | 80.6  | 84.3  | ...   | December  |
| Turkey <sup>9</sup>             | 64.2  | 88.6  | 88.1  | 89.8  | 90.8  | 89.1  | September |
| Ukraine                         | 37.0  | 22.3  | 21.1  | 25.0  | 23.1  | 26.3  | December  |
| <b>Western Europe</b>           |       |       |       |       |       |       |           |
| Austria <sup>10</sup>           | 65.8  | 68.0  | 70.8  | 71.5  | 75.3  | ...   | December  |
| Belgium                         | 51.8  | 52.8  | 54.2  | 51.6  | 50.8  | 45.0  | September |
| Denmark                         | 66.5  | 63.0  | 66.0  | 75.7  | ...   | ...   | December  |
| Finland                         | 66.8  | 77.7  | 78.5  | 85.8  | ...   | ...   | December  |
| France <sup>11</sup>            | 60.4  | 59.6  | 61.3  | 63.8  | 62.9  | ...   | December  |
| Germany                         | ...   | ...   | ...   | ...   | ...   | ...   |           |
| Greece                          | 46.9  | 49.9  | 51.4  | 61.9  | 60.9  | ...   | June      |
| Iceland <sup>12</sup>           | 66.8  | 77.5  | 80.9  | 112.9 | ...   | ...   | December  |
| Ireland                         | 105.0 | 90.0  | 70.0  | 50.0  | ...   | ...   | December  |
| Italy <sup>13</sup>             | ...   | ...   | ...   | ...   | 46.0  | ...   | December  |

Table 25 (continued)

|                                       | 2002  | 2003  | 2004  | 2005  | 2006  | 2007  | Latest    |
|---------------------------------------|-------|-------|-------|-------|-------|-------|-----------|
| <b>Western Europe (continued)</b>     |       |       |       |       |       |       |           |
| Luxembourg                            | ...   | ...   | ...   | ...   | ...   | ...   |           |
| Malta                                 | ...   | ...   | ...   | ...   | ...   | ...   |           |
| Netherlands <sup>12</sup>             | 64.8  | 73.8  | 69.2  | 65.5  | 56.0  | ...   | December  |
| Norway <sup>12</sup>                  | 62.8  | 59.0  | 66.1  | 52.5  | 52.9  | ...   | December  |
| Portugal <sup>14,15</sup>             | 62.8  | 73.0  | 83.4  | 79.0  | 80.0  | ...   | December  |
| Spain <sup>16</sup>                   | 197.2 | 245.4 | 219.6 | 251.8 | 273.3 | ...   | December  |
| Sweden <sup>17</sup>                  | 71.5  | 73.9  | 78.9  | 84.7  | 78.5  | 79.5  | September |
| Switzerland                           | 89.4  | 89.9  | 90.9  | 116.0 | 122.6 | ...   | December  |
| United Kingdom <sup>12</sup>          | 72.8  | 69.8  | 61.5  | 54.0  | 54.6  | ...   | December  |
| <b>Asia</b>                           |       |       |       |       |       |       |           |
| Bangladesh                            | ...   | 18.3  | 18.9  | 25.3  | 26.3  | 42.3  | September |
| China <sup>18</sup>                   | ...   | ...   | ...   | ...   | ...   | 37.5  | June      |
| Hong Kong SAR                         | ...   | ...   | ...   | ...   | ...   | ...   |           |
| India                                 | ...   | 46.4  | 56.6  | 60.3  | 58.9  | ...   | March     |
| Indonesia                             | 130.0 | 146.5 | 158.7 | 82.2  | 99.7  | 103.8 | September |
| Korea                                 | 89.6  | 84.0  | 104.5 | 131.4 | 175.2 | 180.0 | September |
| Malaysia                              | 38.1  | 38.9  | 41.0  | 45.4  | 50.7  | 62.6  | November  |
| Philippines                           | 50.2  | 51.5  | 58.0  | 73.8  | 75.0  | 75.1  | June      |
| Singapore                             | 61.2  | 64.9  | 73.6  | 78.7  | 89.5  | 105.9 | September |
| Thailand                              | 62.9  | 72.8  | 79.8  | 83.7  | 82.7  | 80.1  | September |
| <b>Middle East &amp; Central Asia</b> |       |       |       |       |       |       |           |
| Armenia                               | 32.1  | 34.3  | 77.0  | 70.7  | 64.3  | 53.8  | September |
| Egypt                                 | 62.3  | 57.0  | 60.2  | 61.5  | 68.2  | ...   | December  |
| Georgia                               | 45.2  | 48.1  | 64.2  | 55.6  | 50.9  | 54.4  | October   |
| Jordan <sup>19</sup>                  | 50.6  | 51.9  | 63.8  | 78.4  | 80.0  | 70.0  | June      |
| Kazakhstan                            | ...   | ...   | ...   | ...   | ...   | ...   |           |
| Kuwait                                | 64.3  | 77.7  | 82.5  | 107.2 | 100.6 | 92.0  | September |
| Lebanon                               | ...   | ...   | 57.3  | 63.3  | 72.0  | 73.0  | February  |
| Morocco                               | 54.7  | 54.9  | 59.3  | 67.1  | 71.2  | 73.4  | June      |
| Oman                                  | 75.6  | 59.8  | 75.3  | 72.7  | 102.8 | 112.8 | September |
| Pakistan                              | 60.6  | 63.9  | 70.4  | 76.7  | 77.8  | 74.3  | June      |
| Saudi Arabia                          | 110.4 | 136.0 | 164.0 | 178.0 | ...   | ...   | December  |
| Tunisia                               | 43.9  | 43.1  | 45.8  | 46.4  | 49.2  | ...   | December  |
| United Arab Emirates                  | 87.5  | 88.5  | 94.6  | 95.7  | 98.2  | ...   | December  |
| <b>Sub-Saharan Africa</b>             |       |       |       |       |       |       |           |
| Gabon                                 | 41.7  | 53.9  | 53.6  | 55.5  | 57.4  | 62.3  | June      |
| Ghana                                 | ...   | ...   | ...   | ...   | ...   | ...   |           |
| Kenya                                 | 73.8  | 79.2  | 102.9 | 115.6 | 115.6 | ...   | September |
| Lesotho                               | ...   | ...   | ...   | ...   | ...   | ...   |           |
| Mozambique                            | ...   | ...   | ...   | ...   | ...   | ...   |           |
| Namibia                               | ...   | ...   | ...   | ...   | ...   | ...   |           |
| Nigeria                               | ...   | 76.4  | 96.2  | 81.0  | 59.5  | ...   | December  |
| Rwanda                                | ...   | 58.4  | 60.2  | 56.7  | ...   | ...   | December  |
| Senegal                               | 70.5  | 75.3  | 75.7  | 75.4  | 52.0  | 43.9  | March     |
| Sierra Leone <sup>20</sup>            | 84.2  | 65.0  | 56.6  | 44.2  | 38.8  | ...   | December  |

**Table 25 (concluded)**

|                                       | 2002  | 2003  | 2004  | 2005  | 2006  | 2007  | Latest    |
|---------------------------------------|-------|-------|-------|-------|-------|-------|-----------|
| <b>Sub-Saharan Africa (continued)</b> |       |       |       |       |       |       |           |
| South Africa                          | 46.0  | 54.2  | 61.3  | 64.3  | ...   | ...   | December  |
| Swaziland                             | ...   | ...   | ...   | ...   | ...   | ...   |           |
| Uganda                                | 81.5  | 76.5  | 97.8  | 103.8 | 74.4  | 69.3  | June      |
| <b>Other</b>                          |       |       |       |       |       |       |           |
| Australia                             | 106.2 | 131.8 | 182.9 | 203.0 | 205.2 | 188.9 | September |
| Canada                                | 41.1  | 43.5  | 47.7  | 49.3  | 55.3  | 44.9  | September |
| Japan <sup>21</sup>                   | 24.5  | 25.5  | 29.9  | 31.2  | 28.1  | 28.8  | March     |
| United States                         | 123.7 | 140.4 | 168.1 | 155.0 | 137.2 | 104.8 | September |

Sources: National authorities; and IMF staff estimates.

Note: Due to differences in national accounting, taxation, and supervisory regimes, FSI data are not strictly comparable across countries.

<sup>1</sup>Banking sector excludes offshore banks.

<sup>2</sup>The data exclude restructured or intervened banks.

<sup>3</sup>General licensed banks.

<sup>4</sup>The data exclude the state mortgage bank.

<sup>5</sup>Provisions to nonstandard loans.

<sup>6</sup>Allowances for individually assessed financial assets divided by receivables on investment portfolio classified as "substandard," "doubtful," and "loss."

<sup>7</sup>Nonperforming loans reflect unadjusted exposure to loans classified as "loss," "doubtful," and "substandard." The steady level of nonperforming loans in the face of growing credit partly reflects Romania's relatively conservative classification and provisioning requirements. Provisioning requirements, net of collateral, are 100% for loss, 50% for doubtful.

<sup>8</sup>Change in definition in 2004; not strictly comparable with previous years.

<sup>9</sup>Break in the data series in 2007.

<sup>10</sup>2006 data cover two of the large banks only; not strictly comparable with previous years.

<sup>11</sup>Coverage of doubtful loans to customers by provisions.

<sup>12</sup>Data for large banking groups.

<sup>13</sup>Banking groups.

<sup>14</sup>For 2005 and 2006 the figures are for the sample of institutions that are already complying with IAS, accounting as of December 2004 for about 87 percent of the usual aggregate considered.

<sup>15</sup>On a consolidated basis. Nonperforming loans are defined as credit to customers overdue.

<sup>16</sup>Allowances and provisions to doubtful exposures.

<sup>17</sup>Data for the four large banking groups.

<sup>18</sup>Major commercial banks.

<sup>19</sup>Provisions to classified loans net of interest in suspense.

<sup>20</sup>Break in the data series in 2006.

<sup>21</sup>For the end of the fiscal year, i.e., March of the following calendar year; coverage of nonperforming loans by provisions for all banks.

**Table 26. Bank Return on Assets***(In percent)*

|                                 | 2002  | 2003 | 2004 | 2005 | 2006 | 2007 | Latest    |
|---------------------------------|-------|------|------|------|------|------|-----------|
| <b>Latin America</b>            |       |      |      |      |      |      |           |
| Argentina                       | -8.9  | -3.0 | -0.5 | 0.9  | 1.9  | 1.3  | October   |
| Bolivia                         | 0.1   | 0.3  | -0.1 | 0.7  | 1.3  | 1.9  | December  |
| Brazil <sup>1</sup>             | 2.1   | 1.5  | 1.9  | 2.5  | 2.5  | 2.7  | September |
| Chile                           | 1.1   | 1.3  | 1.2  | 1.3  | 1.3  | 1.1  | December  |
| Colombia                        | 1.1   | 1.9  | 2.7  | 2.7  | 2.5  | 2.4  | November  |
| Costa Rica <sup>1,2</sup>       | 1.6   | 1.9  | 1.7  | 2.1  | 2.0  | 2.6  | September |
| Dominican Republic <sup>3</sup> | 3.1   | 2.1  | 2.3  | 2.1  | 2.2  | 2.2  | September |
| Ecuador                         | 1.2   | 1.1  | 1.2  | 1.3  | 1.6  | 1.6  | November  |
| El Salvador                     | 1.1   | 1.1  | 1.0  | 1.2  | 1.5  | 1.3  | June      |
| Guatemala                       | 0.8   | 1.1  | 1.3  | 1.6  | 1.2  | 1.8  | November  |
| Mexico <sup>1,4</sup>           | 0.7   | 1.6  | 1.8  | 2.7  | 3.1  | 2.8  | September |
| Panama <sup>1,5</sup>           | 0.5   | 2.1  | 2.3  | 2.1  | 1.7  | 2.0  | September |
| Paraguay <sup>1</sup>           | 1.0   | 0.4  | 1.7  | 2.1  | 3.0  | 3.5  | August    |
| Peru                            | 0.8   | 1.1  | 1.2  | 2.2  | 2.2  | 2.5  | November  |
| Uruguay <sup>6</sup>            | -25.3 | -1.1 | -0.1 | 0.7  | 1.2  | 2.8  | December  |
| Venezuela                       | 5.3   | 6.2  | 5.9  | 3.7  | 3.0  | 2.4  | September |
| <b>Emerging Europe</b>          |       |      |      |      |      |      |           |
| Albania                         | ...   | 1.2  | 1.3  | 1.4  | 1.4  | 1.6  | September |
| Belarus                         | 1.0   | 1.5  | 1.5  | 1.3  | 1.7  | 1.7  | November  |
| Bosnia and Herzegovina          | -0.3  | 0.4  | 0.7  | 0.7  | 0.9  | 0.9  | September |
| Bulgaria                        | 2.1   | 2.4  | 2.1  | 2.1  | 2.2  | 2.5  | September |
| Croatia                         | 1.6   | 1.6  | 1.7  | 1.6  | 1.5  | 1.6  | September |
| Czech Republic                  | 1.2   | 1.2  | 1.3  | 1.4  | 1.2  | 1.3  | September |
| Estonia <sup>1</sup>            | 1.6   | 1.7  | 2.1  | 2.0  | 1.7  | 2.7  | September |
| Hungary                         | 1.4   | 1.5  | 2.0  | 2.0  | 1.8  | 1.8  | June      |
| Israel                          | 0.3   | 0.7  | 1.0  | 1.1  | 1.0  | 1.2  | June      |
| Latvia                          | 1.5   | 1.4  | 1.7  | 2.1  | 2.1  | 2.0  | September |
| Lithuania <sup>7</sup>          | 0.9   | 1.2  | 1.3  | 1.1  | 1.5  | 2.0  | September |
| Macedonia, FYR <sup>8</sup>     | 0.4   | 0.5  | 0.6  | 1.2  | 1.8  | 2.0  | September |
| Moldova                         | 4.0   | 4.0  | 4.0  | 3.0  | 3.0  | 4.0  | November  |
| Montenegro                      | ...   | ...  | -0.3 | 0.8  | 1.1  | 1.4  | June      |
| Poland                          | 0.5   | 0.5  | 1.4  | 1.6  | 1.7  | 1.8  | September |
| Romania <sup>9</sup>            | 2.6   | 2.2  | 2.0  | 1.6  | 1.3  | 1.4  | September |
| Russia                          | 2.6   | 2.6  | 2.9  | 3.2  | 3.2  | 2.8  | June      |
| Serbia                          | -8.4  | -0.3 | -1.2 | 1.1  | 1.7  | 2.1  | June      |
| Slovak Republic                 | 1.2   | 1.2  | 1.2  | 1.2  | 1.3  | 0.7  | June      |
| Slovenia <sup>10</sup>          | 1.1   | 1.0  | 1.1  | 1.0  | 1.3  | ...  | December  |
| Turkey <sup>11</sup>            | 1.2   | 2.4  | 2.3  | 1.6  | 2.4  | 3.1  | September |
| Ukraine                         | 1.2   | 1.0  | 1.1  | 1.3  | 1.6  | 1.5  | December  |
| <b>Western Europe</b>           |       |      |      |      |      |      |           |
| Austria <sup>12</sup>           | 0.2   | 0.3  | 0.6  | 0.6  | 0.7  | 0.8  | June      |
| Belgium <sup>13</sup>           | 0.5   | 0.5  | 0.6  | 0.7  | 0.7  | 0.7  | September |
| Denmark                         | 0.7   | 0.9  | 0.9  | 1.0  | 1.0  | ...  | December  |
| Finland                         | 0.6   | 0.7  | 0.8  | 0.9  | 1.0  | ...  | December  |
| France                          | 0.5   | 0.4  | 0.5  | 0.6  | 0.7  | ...  | December  |
| Germany                         | 0.1   | -0.1 | 0.1  | 0.3  | 0.3  | ...  | December  |
| Greece                          | 0.5   | 0.6  | 0.4  | 0.9  | 0.8  | 1.3  | June      |
| Iceland                         | 1.1   | 1.3  | 1.8  | 2.3  | 2.6  | ...  | December  |
| Ireland <sup>1</sup>            | 1.0   | 0.9  | 1.1  | 0.8  | 0.8  | ...  | December  |
| Italy                           | 0.5   | 0.5  | 0.6  | 0.7  | 0.8  | ...  | December  |

Table 26 (continued)

|                                       | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | Latest    |
|---------------------------------------|------|------|------|------|------|------|-----------|
| <b>Western Europe (continued)</b>     |      |      |      |      |      |      |           |
| Luxembourg                            | 0.7  | 0.6  | 0.7  | 0.7  | 0.9  | ...  | December  |
| Malta                                 | ...  | ...  | 1.3  | 1.4  | 1.1  | ...  | December  |
| Netherlands                           | 0.5  | 0.5  | 0.4  | 0.4  | 0.4  | 0.3  | September |
| Norway                                | 0.4  | 0.6  | 0.9  | 0.9  | 0.8  | ...  | December  |
| Portugal <sup>14</sup>                | 0.7  | 0.8  | 0.8  | 0.8  | 1.0  | ...  | December  |
| Spain                                 | 0.9  | 0.9  | 0.9  | 0.9  | 1.0  | ...  | December  |
| Sweden <sup>15</sup>                  | 0.4  | 0.5  | 0.6  | 0.7  | 0.7  | 0.7  | September |
| Switzerland <sup>13</sup>             | 0.5  | 0.7  | 0.8  | 0.9  | 0.9  | ...  | December  |
| United Kingdom <sup>1</sup>           | 0.4  | 0.6  | 0.7  | 0.8  | 0.5  | ...  | December  |
| <b>Asia</b>                           |      |      |      |      |      |      |           |
| Bangladesh                            | 0.5  | 0.5  | 0.7  | 0.6  | 0.8  | 0.8  | June      |
| China <sup>16</sup>                   | 0.1  | 0.3  | 0.5  | 0.6  | 0.7  | 1.0  | June      |
| Hong Kong SAR <sup>17</sup>           | 2.1  | 1.9  | 1.7  | 1.7  | 1.7  | 1.9  | June      |
| India                                 | 0.8  | 1.0  | 1.1  | 0.9  | 0.6  | 0.9  | June      |
| Indonesia <sup>1</sup>                | 1.4  | 2.6  | 3.5  | 2.5  | 2.6  | 2.8  | September |
| Korea <sup>18</sup>                   | 0.6  | 0.2  | 0.9  | 1.3  | 1.1  | 1.0  | September |
| Malaysia <sup>1</sup>                 | 1.3  | 1.3  | 1.4  | 1.4  | 1.3  | 1.4  | October   |
| Philippines                           | 0.8  | 1.1  | 0.9  | 1.1  | 1.3  | 1.3  | June      |
| Singapore                             | 0.8  | 1.0  | 1.2  | 1.2  | 1.4  | 1.4  | September |
| Thailand                              | 0.2  | 0.6  | 1.2  | 1.4  | 0.8  | 0.3  | September |
| <b>Middle East &amp; Central Asia</b> |      |      |      |      |      |      |           |
| Armenia                               | -6.4 | 2.7  | 3.2  | 3.1  | 3.6  | 3.8  | September |
| Egypt                                 | 0.5  | 0.5  | 0.6  | 0.5  | 0.9  | 0.8  | September |
| Georgia                               | 4.3  | 3.9  | 1.9  | 3.0  | 2.7  | 2.2  | October   |
| Jordan                                | 0.6  | 0.7  | 1.1  | 2.0  | 1.7  | ...  | December  |
| Kazakhstan <sup>1</sup>               | 2.0  | 2.0  | 1.4  | 1.8  | 1.4  | 2.2  | November  |
| Kuwait                                | 1.8  | 2.0  | 2.5  | 3.0  | 3.2  | 3.4  | September |
| Lebanon                               | 0.6  | 0.7  | 0.7  | 0.7  | 0.9  | 0.6  | February  |
| Morocco                               | 0.3  | -0.2 | 0.8  | 0.5  | 1.3  | 1.6  | June      |
| Oman                                  | 1.5  | 0.3  | 1.9  | 2.7  | 2.7  | ...  | December  |
| Pakistan <sup>1</sup>                 | 0.9  | 1.8  | 1.9  | 2.8  | 3.1  | 3.0  | June      |
| Saudi Arabia                          | 2.3  | 2.3  | 2.5  | 3.7  | 4.3  | ...  | December  |
| Tunisia                               | 0.7  | 0.6  | 0.4  | 0.6  | 0.2  | ...  | June      |
| United Arab Emirates                  | 2.2  | 2.3  | 2.1  | 2.7  | 2.3  | 2.3  | September |
| <b>Sub-Saharan Africa</b>             |      |      |      |      |      |      |           |
| Gabon                                 | 2.8  | 2.7  | 1.5  | 2.7  | 2.5  | ...  | December  |
| Ghana                                 | 6.8  | 6.2  | 5.8  | 4.6  | 4.3  | ...  | December  |
| Kenya <sup>19</sup>                   | -8.9 | -2.9 | -0.5 | 1.0  | 2.8  | 3.2  | August    |
| Lesotho                               | ...  | ...  | 3.0  | 2.0  | 2.0  | 1.0  | March     |
| Mozambique                            | 1.6  | 1.2  | 1.4  | 1.8  | 3.5  | 2.8  | September |
| Namibia                               | 4.5  | 3.6  | 2.1  | 3.5  | 1.5  | 3.1  | December  |
| Nigeria                               | 2.4  | 1.7  | 3.1  | 0.9  | 1.6  | 1.8  | June      |
| Rwanda                                | -5.0 | 1.4  | 2.2  | 1.5  | ...  | ...  | December  |
| Senegal                               | 1.8  | 1.8  | 1.8  | 1.6  | ...  | ...  | December  |
| Sierra Leone <sup>19</sup>            | 10.0 | 10.5 | 9.7  | 7.9  | 5.8  | ...  | December  |

Table 26 (concluded)

|                                       | 2002  | 2003 | 2004 | 2005 | 2006 | 2007 | Latest    |
|---------------------------------------|-------|------|------|------|------|------|-----------|
| <b>Sub-Saharan Africa (continued)</b> |       |      |      |      |      |      |           |
| South Africa                          | 0.4   | 0.8  | 1.3  | 1.2  | 1.4  | 1.4  | June      |
| Swaziland                             | . . . | 4.0  | 3.0  | 3.0  | 6.0  | 3.0  | June      |
| Uganda                                | 2.7   | 4.5  | 4.3  | 3.6  | 3.4  | 3.9  | June      |
| <b>Other</b>                          |       |      |      |      |      |      |           |
| Australia <sup>13,19</sup>            | 1.4   | 1.6  | 1.5  | 1.8  | 1.6  | 1.6  | June      |
| Canada                                | 0.4   | 0.7  | 0.8  | 0.7  | 1.0  | 0.6  | September |
| Japan <sup>20</sup>                   | -0.7  | -0.1 | 0.2  | 0.5  | 0.4  | 0.2  | September |
| United States                         | 1.3   | 1.4  | 1.3  | 1.3  | 1.3  | 1.1  | September |

Sources: National authorities; and IMF staff estimates.

Note: Due to differences in national accounting, taxation, and supervisory regimes, FSI data are not strictly comparable across countries.

<sup>1</sup>Before tax.

<sup>2</sup>Banking sector excludes offshore banks.

<sup>3</sup>The data exclude restructured or intervened banks.

<sup>4</sup>Commercial banks.

<sup>5</sup>General licensed banks.

<sup>6</sup>The data exclude the state mortgage bank.

<sup>7</sup>Net income before extraordinary items and taxes to average total assets.

<sup>8</sup>Adjusted for unallocated provisions for potential loan losses.

<sup>9</sup>Break in the data series starting in 2003.

<sup>10</sup>Before extraordinary items and taxes.

<sup>11</sup>Break in the data series in 2007.

<sup>12</sup>Starting in 2004 data reported on a consolidated basis.

<sup>13</sup>Gross profits.

<sup>14</sup>For 2005 and 2006 the figures are for the sample of institutions that are already complying with IAS, accounting as of December 2004 for about 87 percent of the usual aggregate considered.

<sup>15</sup>Data for the four large banking groups. The data refer to a four-quarter moving average for the assets. The profit is accumulated over four quarters and adjusted.

<sup>16</sup>2007 figure is net income to end-of-period assets.

<sup>17</sup>Net interest margin, not comparable with the other indicators in the table.

<sup>18</sup>Excludes earnings from sale of equity stakes.

<sup>19</sup>Break in the data series in 2006.

<sup>20</sup>For the end of the fiscal year, i.e., March of the following calendar year; all banks. The denominator of the ratio uses end-period total assets.

**Table 27. Bank Return on Equity***(In percent)*

|                                 | 2002  | 2003  | 2004 | 2005 | 2006 | 2007 | Latest    |
|---------------------------------|-------|-------|------|------|------|------|-----------|
| <b>Latin America</b>            |       |       |      |      |      |      |           |
| Argentina                       | -59.2 | -22.7 | -4.2 | 7.0  | 14.3 | 9.7  | October   |
| Bolivia                         | 0.7   | 2.8   | -1.2 | 6.4  | 13.3 | 21.2 | December  |
| Brazil <sup>1</sup>             | 22.1  | 16.3  | 19.3 | 25.2 | 25.2 | 27.8 | September |
| Chile                           | 14.4  | 16.7  | 16.7 | 17.9 | 18.6 | 16.2 | December  |
| Colombia                        | 9.6   | 17.1  | 23.0 | 22.1 | 20.2 | 19.8 | November  |
| Costa Rica <sup>1,2</sup>       | 14.5  | 17.2  | 16.7 | 20.1 | 18.7 | 15.9 | September |
| Dominican Republic <sup>3</sup> | 25.9  | 20.6  | 25.4 | 22.4 | 21.7 | 22.1 | September |
| Ecuador                         | 15.4  | 14.7  | 16.5 | 18.5 | 23.1 | 21.9 | November  |
| El Salvador                     | 12.2  | 11.5  | 10.9 | 11.8 | 14.6 | 12.5 | June      |
| Guatemala                       | 8.5   | 12.2  | 14.0 | 19.1 | 15.1 | 19.4 | November  |
| Mexico <sup>1,4</sup>           | 7.9   | 16.1  | 17.2 | 24.4 | 26.2 | 20.2 | September |
| Panama <sup>5</sup>             | ...   | 16.9  | 16.7 | 15.7 | 19.2 | 18.5 | September |
| Paraguay <sup>1</sup>           | 9.0   | 4.5   | 18.3 | 22.6 | 31.7 | 37.7 | August    |
| Peru                            | 8.3   | 10.7  | 11.6 | 22.2 | 23.9 | 28.0 | November  |
| Uruguay <sup>6</sup>            | -70.0 | -15.3 | -0.9 | 7.6  | 12.7 | 27.7 | December  |
| Venezuela                       | 35.6  | 44.0  | 45.2 | 32.2 | 31.6 | 32.4 | December  |
| <b>Emerging Europe</b>          |       |       |      |      |      |      |           |
| Albania                         | ...   | 19.5  | 21.1 | 22.2 | 20.2 | 21.0 | September |
| Belarus                         | 6.5   | 8.4   | 7.8  | 6.8  | 9.6  | 10.8 | November  |
| Bosnia and Herzegovina          | 2.5   | 3.4   | 5.8  | 6.2  | 8.5  | 8.9  | September |
| Bulgaria                        | 14.9  | 22.7  | 20.6 | 22.1 | 24.4 | 25.4 | September |
| Croatia                         | 13.7  | 14.1  | 16.1 | 15.1 | 13.0 | 11.8 | September |
| Czech Republic                  | 27.4  | 23.8  | 23.3 | 25.2 | 22.5 | 23.1 | September |
| Estonia                         | 14.7  | 14.1  | 20.0 | 21.0 | 19.8 | 31.0 | September |
| Hungary                         | 16.2  | 19.3  | 25.3 | 24.7 | 24.0 | 22.9 | June      |
| Israel                          | 6.1   | 14.1  | 17.9 | 19.4 | 17.6 | 19.7 | March     |
| Latvia                          | 16.4  | 16.7  | 21.4 | 27.1 | 25.6 | 24.2 | September |
| Lithuania <sup>7</sup>          | 9.1   | 11.8  | 13.5 | 13.8 | 21.4 | 26.8 | September |
| Macedonia, FYR <sup>8</sup>     | 2.0   | 2.3   | 3.1  | 7.5  | 12.3 | 15.8 | September |
| Moldova                         | 17.0  | 20.0  | 18.0 | 15.0 | 21.0 | 24.9 | November  |
| Montenegro                      | ...   | ...   | -1.4 | 5.3  | 6.8  | 11.6 | June      |
| Poland                          | 5.2   | 5.4   | 17.1 | 21.9 | 21.0 | 25.6 | June      |
| Romania                         | 18.3  | 15.6  | 15.6 | 12.7 | 10.3 | 11.5 | September |
| Russia                          | 18.0  | 17.8  | 20.3 | 24.2 | 26.3 | 21.1 | June      |
| Serbia                          | -60.6 | -1.2  | -5.3 | 6.7  | 10.0 | 12.8 | June      |
| Slovak Republic <sup>9</sup>    | 11.5  | 10.8  | 11.9 | 16.9 | 16.6 | 9.7  | June      |
| Slovenia <sup>10</sup>          | 12.6  | 11.9  | 12.5 | 13.8 | 15.1 | ...  | December  |
| Turkey <sup>11</sup>            | 10.6  | 18.8  | 16.7 | 11.9 | 21.5 | 24.4 | September |
| Ukraine                         | 8.0   | 7.6   | 8.4  | 10.4 | 13.5 | 12.7 | December  |
| <b>Western Europe</b>           |       |       |      |      |      |      |           |
| Austria <sup>12</sup>           | 5.2   | 7.0   | 14.8 | 14.8 | 16.9 | 18.3 | June      |
| Belgium                         | 11.8  | 13.6  | 15.8 | 18.5 | 22.4 | 23.4 | September |
| Denmark                         | 12.1  | 15.4  | 13.7 | 16.3 | 17.1 | ...  | December  |
| Finland                         | 10.7  | 11.3  | 12.4 | 10.1 | 11.1 | 15.6 | June      |
| France                          | 9.1   | 8.5   | 10.6 | 11.8 | 15.6 | ...  | December  |
| Germany                         | 2.9   | -1.5  | 1.9  | 9.2  | 7.5  | ...  | December  |
| Greece                          | 6.8   | 8.9   | 6.4  | 15.9 | 12.8 | 20.1 | June      |
| Iceland <sup>14</sup>           | 18.1  | 22.1  | 30.9 | 41.7 | 39.1 | ...  | December  |
| Ireland <sup>1</sup>            | 18.0  | 17.8  | 20.7 | 19.6 | 19.1 | ...  | December  |
| Italy                           | 7.1   | 7.4   | 9.3  | 9.7  | 11.5 | ...  | December  |

Table 27 (continued)

|                                       | 2002   | 2003  | 2004 | 2005 | 2006 | 2007 | Latest    |
|---------------------------------------|--------|-------|------|------|------|------|-----------|
| <b>Western Europe (continued)</b>     |        |       |      |      |      |      |           |
| Luxembourg                            | 36.4   | 34.9  | 39.8 | 37.8 | 55.6 | ...  | December  |
| Malta                                 | ...    | ...   | 16.6 | 20.8 | 12.6 | ...  | December  |
| Netherlands                           | 10.9   | 14.0  | 16.0 | 16.0 | 11.9 | ...  | September |
| Norway                                | 6.2    | 9.6   | 14.6 | 18.0 | 15.7 | ...  | December  |
| Portugal <sup>15</sup>                | 11.7   | 13.9  | 12.8 | 14.5 | 15.6 | ...  | December  |
| Spain                                 | 12.1   | 13.2  | 14.1 | 16.9 | 19.9 | ...  | December  |
| Sweden <sup>16</sup>                  | 10.0   | 12.3  | 14.6 | 17.4 | 18.6 | 18.0 | September |
| Switzerland <sup>13</sup>             | 8.9    | 11.7  | 14.3 | 18.0 | 17.7 | ...  | December  |
| United Kingdom <sup>1</sup>           | 6.1    | 8.6   | 10.9 | 11.8 | 8.9  | ...  | December  |
| <b>Asia</b>                           |        |       |      |      |      |      |           |
| Bangladesh                            | 11.6   | 9.8   | 13.0 | 12.4 | 14.1 | 11.9 | June      |
| China <sup>17</sup>                   | ...    | ...   | 13.7 | 15.1 | 14.8 | 19.9 | June      |
| Hong Kong SAR <sup>18</sup>           | 17.2   | 17.8  | 20.3 | 19.1 | ...  | ...  | December  |
| India                                 | 15.3   | 18.8  | 20.8 | 13.3 | 12.7 | ...  | March     |
| Indonesia                             | ...    | ...   | 22.9 | 16.5 | 16.4 | 18.2 | September |
| Korea                                 | 10.9   | 3.4   | 15.2 | 18.4 | 14.6 | ...  | December  |
| Malaysia <sup>1</sup>                 | 16.7   | 17.1  | 16.6 | 14.1 | ...  | ...  | December  |
| Philippines                           | 5.8    | 8.5   | 7.1  | 8.7  | 10.6 | 11.6 | June      |
| Singapore                             | 7.6    | 8.7   | 11.6 | 11.2 | 13.7 | 13.4 | September |
| Thailand                              | 3.5    | 10.3  | 16.8 | 14.2 | 8.8  | 7.3  | September |
| <b>Middle East &amp; Central Asia</b> |        |       |      |      |      |      |           |
| Armenia                               | -113.4 | 14.4  | 18.4 | 15.5 | 15.9 | 16.7 | September |
| Egypt                                 | 8.9    | 9.8   | 10.6 | 9.6  | 17.4 | 14.3 | September |
| Georgia                               | 15.3   | 15.0  | 7.9  | 15.0 | 15.7 | 11.6 | October   |
| Jordan                                | 9.7    | 10.9  | 15.2 | 24.3 | 15.9 | ...  | December  |
| Kazakhstan                            | 13.8   | 14.2  | 11.2 | 14.1 | 10.9 | 18.1 | November  |
| Kuwait                                | 17.4   | 18.6  | 20.9 | 22.9 | 27.1 | 28.1 | September |
| Lebanon                               | 9.4    | 10.9  | 9.3  | 11.0 | 10.6 | 9.8  | February  |
| Morocco                               | 1.9    | -2.1  | 10.9 | 6.3  | 17.4 | 21.6 | June      |
| Oman                                  | 11.0   | 1.7   | 12.9 | 16.6 | 18.1 | ...  | December  |
| Pakistan                              | 21.1   | 35.4  | 30.5 | 38.2 | 35.1 | 31.0 | June      |
| Saudi Arabia                          | 21.0   | 22.7  | 24.3 | 28.5 | 30.5 | ...  | December  |
| Tunisia                               | 7.6    | 7.3   | 5.1  | 6.9  | 9.1  | ...  | June      |
| United Arab Emirates                  | 15.6   | 16.4  | 18.6 | 22.5 | 18.0 | 21.4 | September |
| <b>Sub-Saharan Africa</b>             |        |       |      |      |      |      |           |
| Gabon                                 | 23.0   | 21.1  | 11.1 | 22.1 | 23.3 | ...  | December  |
| Ghana                                 | 36.9   | 32.7  | 33.7 | 23.6 | 24.2 | ...  | December  |
| Kenya <sup>19</sup>                   | -59.2  | -22.7 | -4.2 | 3.1  | 28.6 | 32.4 | August    |
| Lesotho                               | ...    | ...   | 27.0 | 15.0 | 27.0 | 8.0  | March     |
| Mozambique                            | 22.1   | 16.3  | 18.7 | 27.4 | 55.4 | 36.4 | September |
| Namibia                               | 59.8   | 43.2  | 24.2 | 45.6 | 19.9 | 43.0 | September |
| Nigeria                               | 28.1   | 19.8  | 27.4 | 7.1  | 10.4 | 13.8 | June      |
| Rwanda                                | -125.3 | 31.1  | 21.6 | 16.5 | ...  | ...  | December  |
| Senegal                               | 21.1   | 22.1  | 17.6 | 15.8 | ...  | ...  | December  |
| Sierra Leone <sup>19</sup>            | ...    | 67.1  | 73.2 | 52.5 | 21.1 | ...  | December  |

**Table 27 (concluded)**

|                                       | 2002  | 2003 | 2004 | 2005 | 2006 | 2007 | Latest    |
|---------------------------------------|-------|------|------|------|------|------|-----------|
| <b>Sub-Saharan Africa (continued)</b> |       |      |      |      |      |      |           |
| South Africa                          | 5.4   | 11.6 | 16.2 | 15.2 | 18.3 | 18.4 | June      |
| Swaziland                             | ...   | 29.0 | 20.0 | 20.0 | 52.0 | 26.0 | June      |
| Uganda                                | 24.4  | 38.1 | 37.6 | 28.6 | 25.7 | ...  | December  |
| <b>Other</b>                          |       |      |      |      |      |      |           |
| Australia <sup>13</sup>               | 20.2  | 24.2 | 22.8 | 25.3 | 27.0 | 28.1 | June      |
| Canada                                | 9.3   | 14.7 | 16.7 | 14.9 | 20.9 | 12.5 | September |
| Japan <sup>20</sup>                   | -19.5 | -2.7 | 4.1  | 11.3 | 8.5  | 3.2  | September |
| United States                         | 14.1  | 15.0 | 13.2 | 12.7 | 12.3 | 10.5 | September |

Sources: National authorities; and IMF staff estimates.

Note: Due to differences in national accounting, taxation, and supervisory regimes, FSI data are not strictly comparable across countries.

<sup>1</sup>Before tax.

<sup>2</sup>Banking sector excludes offshore banks.

<sup>3</sup>The data exclude restructured or intervened banks.

<sup>4</sup>Commercial banks.

<sup>5</sup>General licensed banks.

<sup>6</sup>The data exclude the state mortgage bank.

<sup>7</sup>Capital is defined as bank shareholders' equity and foreign bank branches funds received from the head office. Net income before extraordinary items and taxes.

<sup>8</sup>Adjusted for unallocated provisions for potential loan losses.

<sup>9</sup>2007 data do not include branches.

<sup>10</sup>Before extraordinary items and taxes.

<sup>11</sup>Break in the data series in 2007.

<sup>12</sup>Starting in 2004 data reported on a consolidated basis.

<sup>13</sup>Gross profits.

<sup>14</sup>Commercial banks and six largest savings banks (five largest savings banks from 2006 due to a merger of two banks).

<sup>15</sup>For 2005 and 2006 the figures are for the sample of institutions that are already complying with IAS, accounting as of December 2004 for about 87 percent of the usual aggregate considered.

<sup>16</sup>Data for the four large banking groups.

<sup>17</sup>2007 figure is net income to end-of-period equity.

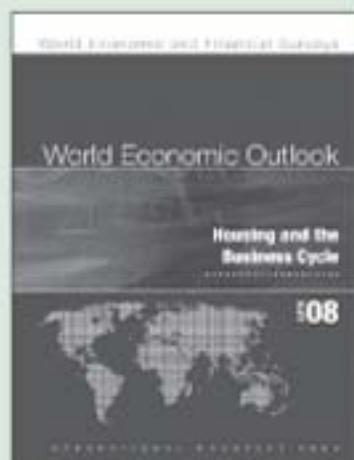
<sup>18</sup>2005 figure on a domestic consolidation basis; not strictly comparable with previous years.

<sup>19</sup>Break in the data series in 2006.

<sup>20</sup>For the end of the fiscal year, i.e., March of the following calendar year; all banks. The denominator of the ratio uses end-period data.

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