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Global Financial Stability Report

Financial Stress and Deleveraging

Macrofinancial Implications and Policy

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CONTENTS

Figures

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. . . 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 ¼ 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 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 Jan Brockmeijer, Deputy Director; 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.

Primary contributors to this report also include Sergei Antoshin, Elie Canetti, Sean Craig, Phil de Imus, Kristian Hartelius, Heiko Hesse, Andy Jobst, John Kiff, Rebecca McCaughrin, Paul Mills, Ken Miyajima, Christopher Morris, Alicia Novoa, Mustafa Saiyid, Jodi Scarlata, Miguel Segoviano, Seiichi Shimizu, Juan Solé, Mark Stone, Tao Sun, Rupert Thorne, and Christopher Walker. Other contributors include Ana Carvajal, Antonio Garcia-Pascual, Geoff Heenan, Xiongtao Huang, Michael Moore, Aditya Narain, Silvia Ramirez, and André Santos. Kenneth Sullivan provided consultancy support and Vance Martin provided empirical support. Martin Edmonds, Oksana Khadarina, Yoon Sook Kim, Alin Miresteam, Jean Salvati, Xiaobo Shao, Narayan Suryakumar, and Kalin Tintchev provided analytical support. Caroline Bagworth, Shannon Bui, Christy Gray, and Aster Teklemariam were responsible for word processing. David Einhorn of the External Relations Department edited the manuscript and coordinated production of the publication.

This particular issue draws, in part, on a series of discussions with accountancies, banks, securities firms, asset management companies, hedge funds, auditors, standard setters, 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 September 25, 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 September 15, 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

With financial markets worldwide facing growing turmoil, internationally coherent and decisive policy measures will be required to restore confidence in the global financial system. Failure to do so could usher in a period in which the ongoing deleveraging process becomes increasingly disorderly and costly for the real economy. In any case, the process of restoring an orderly system will be challenging, as a significant deleveraging is both necessary and inevitable. It is against this challenging and still evolving backdrop that the Global Financial Stability Report (GFSR) *frames the recent events to suggest potential policy measures that could be helpful in the current circumstances.*

Confidence in global financial institutions and markets has been badly shaken. Threats to systemic stability became manifest in September with the collapse or near-collapse of several key institutions. The October 2008 *World Economic Outlook* notes that the strains afflicting the global financial system are expected to deepen the downturn in global growth and restrain the recovery. Moreover, the risk of a more severe adverse feedback loop between the financial system and the broader economy represents a critical threat. The combination of mounting losses, falling asset prices, and a deepening economic downturn, has caused serious doubts about the viability of a widening swath of the financial system. The ongoing deleveraging process outlined in the April 2008 GFSR has accelerated and become disorderly—marked by a rapid decline in financial institutions' share prices, higher costs of funding and credit default protection, and depressed asset prices. One result has been sudden failures of institutions as markets have become unwilling (or unable) to provide capital and funding or absorb assets. Piecemeal interventions to address the attendant liquidity strains and resolve the troubled institutions did not succeed in restoring market confidence, as they have not addressed the widespread nature of the underlying problems. The intensifying worries about counterparty risks have created a near lock-up of global money markets. Chapter 1 provides the basis for a more comprehensive policy approach—as is now being considered in some countries. It evaluates how far the deleveraging process has progressed and how much lies ahead. It also suggests a comprehensive set of measures that could arrest the currently destructive process.

Restoration of financial stability would now benefit from a publicly-stated collective commitment by the authorities of the affected countries to address the issue in a consistent and coherent manner. While the precise measures will inevitably differ across countries, experience from earlier crises indicates that five principles could serve to guide the scope and design of measures that could form the basis for a restoration of confidence in these exceptional circumstances. These include:

(1) Employ measures that are comprehensive, timely, and clearly communicated. They should encompass the principal challenges arising from the strains of deleveraging: namely, *improving funding* availability, cost, and maturity to stabilize balance sheets; *injecting capital* to support viable institutions with sound underpinnings that are currently unable to provide adequate credit; and

buttressing troubled assets by using public sector balance sheets to promote orderly deleveraging. In applying existing or new regulations, authorities should avoid exacerbating procyclical effects. The objectives of the measures should be clear and operational procedures transparent.

(2) Aim for a consistent and coherent set of policies across countries to stabilize the global financial system in order to maximize impact while avoiding adverse effects on other countries.

(3) Ensure rapid response on the basis of early detection of strains. This requires a high degree of coordination within each country, and in many cases across borders, and a framework that allows for decisive action by potentially different sets of authorities.

(4) Assure that emergency government interventions are temporary and taxpayer interests are protected. Accountability of government actions is important for all stakeholders and the conditions for support should include private participation in downside risks and taxpayer participation in upside benefits. Intervention mechanisms should minimize moral hazard, while recognizing the exigency of the situation and the evident need for public support.

(5) Pursue the medium-term objective of a more sound, competitive, and efficient financial system. Achieving this objective requires both an orderly resolution of nonviable financial institutions and a strengthening of the international macrofinancial stability framework to help improve supervision and regulation at the domestic and global levels, as well as mechanisms to improve the effectiveness of market discipline. Funding and securitization markets critical to pricing and intermediating credit should be strengthened, including by reducing counterparty risks through centralized clearing organizations.

While satisfying these guiding principles, concrete actions are needed to tackle three interrelated areas associated with deleveraging: insufficient capital, falling and uncertain asset valuations, and dysfunctional funding markets. Arresting the spiraling interaction between these three elements is essential if there is to be a more orderly deleveraging process.

Capital. To keep private sector credit growing, even modestly, while strengthening bank capital ratios, the GFSR estimates some $675 billion in capital would be needed by the major global banks over the next several years. Several measures could be considered:

- With many financial institutions finding it much more difficult to raise private capital at the present time, the authorities may need to inject capital into viable institutions. While there are many ways to accomplish this, it is preferable that the scheme provide some upside for the taxpayer, coupled with incentives for existing and new private shareholders to provide new capital.
- Though politically difficult, orderly resolution of nonviable banks would demonstrate a commitment to a competitive and well-capitalized banking system.

Assets. As private sector balance sheets shed assets to reduce leverage, the use of public sector balance sheets can help prevent "fire-sale" liquidations that threaten to reduce bank capital.

- Countries whose banks have large exposures to securitized or problem assets could consider mechanisms for the government to purchase or provide long-term funding for such assets. This should create greater certainty about balance sheet health. Setting up an asset management company provides a framework of legal clarity and accountability for the process.
- Allowing for a greater degree of judgment in the application of mark-to-market rules may avoid accelerating capital needs by reducing the pressure to value securities at low "fire-sale" prices. Such judgment would require close supervision and should be accompanied by appropriate disclosure in order to avoid undermining confidence in balance sheets of existing institutions.

Funding. Financial institutions that rely on wholesale funding, especially in cross-border markets, have faced severe and mounting refi-

nance risks. Central banks therefore are exploring more ways to extend term financing to meet funding needs of institutions. The measures described above to boost capital and underpin asset valuations, as well as those already undertaken to provide liquidity, should provide essential support for the markets to function properly and confidence to be reestablished. Continued progress on reducing counterparty risks, including centralized clearing and settlement arrangements, will also help. But experience in past crises indicates that in some circumstances additional measures may be needed. Under extreme circumstances:

- Deposit insurance of individual retail accounts could be expanded beyond normal limits. However, expansion of deposit insurance limits or, if conditions deteriorate further, use of a blanket guarantee should only be undertaken as a temporary, emergency measure and is best undertaken in a coordinated fashion across countries.
- Guarantees could cover senior and subordinated debt liabilities for a temporary period of time. Ideally, these types of guarantees should include some cost to the institutions receiving coverage, such as a usage fee, fitness test, or other criteria.

While these measures represent a broad approach, some of the specifics have already been put in place by various authorities, and there are encouraging signs that more are being considered. Other positive developments include the resolve and determination of the authorities to act decisively; the significant balance sheet adjustments already under way; and an openness to revisit the global regulatory framework. This opens a window of opportunity to better align regulation and incentives in various jurisdictions in the medium run. For now, however, the principal focus will remain that of containing existing disruptive forces.

Chapter 1

Against this backdrop, Chapter 1 of the GFSR assesses the extent of further losses faced by global institutions. It measures the reduction in leverage needed in the financial system, estimates the amount of assets that need to be shed, and calculates the amount of capital to be raised. This analysis concludes that public resources will be needed to ensure a return to financial stability and a more orderly deleveraging process that avoids a severe credit crunch. The most significant risk remains the intensification of the adverse feedback loop between the financial system and the real economy.

Because the United States remains the epicenter of the financial crisis, Chapter 1 examines U.S. prospects in some detail. The continuing decline in the U.S. housing market and wider economic slowdown is contributing to new loan deterioration—delinquencies on prime mortgages and commercial real estate as well as corporate and consumer loans are increasing. With default rates yet to peak and the recent heightened market distress, declared losses on U.S. loans and securitized assets are likely to increase further to about $1.4 trillion, significantly higher than the estimate in the April 2008 GFSR. With the economic slowdown spreading, financial institutions will increasingly face losses on non-U.S. assets as well. In some European countries, too, these difficulties are being accentuated by weakening local housing markets.

Financial institutions had been raising capital to bolster their balance sheets and these efforts were initially successful, but now the prospects for further issuance are more limited and more expensive, reflecting weaker confidence in the underlying viability of institutions. As a result, Chapter 1 suggests that the deleveraging in the banking sector will take place along multiple dimensions: requiring asset sales, slower new asset growth, and radical changes to banks' business models as many previous sources of revenue have nearly disappeared. A similar deleveraging process is under way for many nonbanks, such as hedge funds, where the ability to use margin financing and private repurchase (repo) markets to take leveraged positions has been severely curtailed. Strains in funding

markets have increased redemptions in money market mutual funds and exacerbated rollover risks for corporate borrowers. The far-reaching nature of the events that are unfolding is illustrated by the fact that within a period of one week, large stand-alone investment banks disappeared from the U.S. financial landscape. While the long-run implications are not certain, financial sectors are likely to consolidate, new business models will need to be found, and firms will operate with less leverage in the foreseeable future.

The ongoing uncertainty surrounding valuation of what were once thought to be low-risk assets has led to difficulties in judging capital adequacy. Chapter 1 observes that most market participants, rating agencies, and regulators agree that capital buffers will need to be higher than previously thought. Moreover, they should be based on a forward-looking analysis of risk, rather than a mechanical application of regulatory ratios. To the extent that the move to permanently higher capital ratios is mandated, the ratios should be phased in so that their attainment does not amplify the existing cyclical downturn. Though achieving higher levels will further slow the restoration of normal credit conditions, the process should be under way by late 2009 to put financial institutions in a better position to support the recovery.

Whereas emerging markets overall had initially remained fairly resilient to global financial turmoil, they have recently come under increasing pressure. The cost and availability of financing have become more difficult and equity markets have corrected sharply, albeit from elevated levels. Capital outflows have intensified, leading to tighter international and, in some cases, domestic liquidity conditions. Borrowers and financial institutions in emerging markets will be confronted with a more trying macroeconomic environment. Policymakers, too, face challenges as global growth slows and the lagged pass-through of domestic inflationary pressures continues—and all this against the backdrop of lower confidence and the reversal of earlier flows into these markets. There is an important risk that such a confluence of circumstances could accelerate a downturn in the domestic credit cycle in some emerging market economies.

Chapter 1 also lays out some more specific policy implications for public authorities than those presented above, building on the analysis in the chapter and conclusions of previous GFSRs. Although the focus has been on what the public sector should do, private sector financial institutions continue to play a crucial role in identifying and rectifying deficiencies in order to place financial intermediation on a more sound footing. The key elements, which will need to be reinforced through support from regulators and supervisors, are:

- *Maintain an orderly deleveraging process*. Financial institutions should, first, focus on strengthening their balance sheets—preferably by attracting new capital rather than selling assets; and second, ensure adequate funding sources consistent with their business model.
- *Strengthen risk management systems*. As part of overall risk management improvements, firms should endeavor to better align compensation packages to reward returns on a risk-adjusted basis using more robust risk management practices, with greater emphasis on the long-term component of compensation.
- *Improve valuation techniques and reporting*. Implementation of new Financial Stability Forum (FSF) disclosure guidelines and frequent asset valuations and timely disclosures will reduce uncertainty and are important steps that can help provide information about the health of counterparties.
- *Develop better clearing and settlement mechanisms for over-the-counter products*. Private sector efforts to build clearing and settlement facilities to lower counterparty risks should continue apace, particularly for the credit default swaps market, where settlement issues need to be addressed urgently. Higher capital charges for counterparty exposures would

help and are being considered by various regulators.

Chapter 2

The combination of liquidity and solvency risks has led to a period of elevated short-term interest rate spreads and substantially reduced transaction volumes, with funding markets remaining stressed for an unprecedented period. Chapter 2 delves into the ongoing inability of the bank funding markets to perform their role in distributing liquidity across banks and near-banks and the consequences for the interest rate channel of monetary policy transmission.

The chapter first notes that the short-term rates-setting procedures, including for London Interbank Offer Rates (LIBOR) and the Euribor rate, are not broken, but improvements are desirable, since the LIBOR rates are estimated to underpin some $400 trillion of financial derivatives contracts. Although most of the analysis in the chapter preceded the most recent steep rise in LIBOR rates, the basic recommendations remain intact. In examining the reasons for the elevated spreads between the LIBOR and the overnight index swap (OIS) market, the chapter confirms that default concerns became the overriding component of the U.S. dollar LIBOR-OIS spread starting in early 2008. In addition, foreign currency swap spreads explain the Euribor-OIS and sterling LIBOR-OIS spreads, signifying that U.S. dollar liquidity pressures are spilling over into these other currencies.

The chapter also examines how the interest rate channel of monetary policy transmission has been affected by the crisis, in light of three longer-term trends: increased growth of activity in near-banks, more extensive use of wholesale funding markets, and a movement away from a stable deposit base to a larger proportion of funding obtained with short-term maturities. Although these trends have generally made interest rate transmission more stable, over the last year the smooth relationships between the policy rate and lending rates that had been established changed dramatically, particularly for the United States. From mid-2007 until June 2008, the reliability of forecasting lending rates for both the United States and for the euro area has deteriorated, but more so for the United States.

The chapter recommends:

- *Improving infrastructure in funding markets.* Specifically, for the calculation of the LIBOR, a larger sample of banks and quotes that also includes nonbank sources of unsecured term funding, as well as publishing aggregate volume data, would engender greater confidence in these benchmark rates.
- *More attention to both credit and liquidity risks by the authorities.* Since wide interbank spreads were driven primarily by bank distress risks (encompassing both credit and liquidity risks), it is unlikely that ever-easier access to emergency liquidity from central banks will relieve the continued stress in interbank funding. Public authorities will need to continue to address counterparty risks, since private institutions are finding it increasingly difficult to do so.
- *Limited indirect support to money markets.* Central bank lending facilities aimed at restoring the functioning of interbank markets to transmit monetary policy need to be designed carefully. They should provide incentives for market participants to start dealing among themselves and thus to allow for an orderly exit by the central bank once more extreme strains have eased. The European Central Bank's alterations to its collateral policies beginning next year is a step in this direction.
- *Encouraging central bank cooperation and communication.* Recent experience has highlighted the importance of properly functioning forex swap markets in addition to local money markets. In particular, the latest round of liquidity distress was countered by the cooperative actions of major central banks to address foreign currency funding needs. Regular communication by central banks about their actions and reasons for them can reduce

uncertainties. Continued convergence of their operational procedures would also aid in achieving this goal.

Chapter 3

Since the crisis began, the role of fair value accounting (FVA) practices has been under close scrutiny. Chapter 3 examines the potential procyclical role that the application of FVA methods may have played in the development and outcome of the current credit cycle.

Using actual accounting data from five representative types of financial institutions, this chapter simulates the balance sheet effects of several shocks calibrated to recent events. The analysis confirms that, depending on the types of assets and liabilities present on the balance sheet, these shocks amplify cyclical fluctuations of valuations. The simulations are also used to examine potential adjustments surrounding FVA methods, showing such adjustments act as expected to smooth the cyclical variation, but by doing so the assigned valuations do not represent fair values. It is worth recognizing, however, that in some cases, such as in highly illiquid markets or in buoyant or dire circumstances, FVA can also produce valuations that do not reflect longer-term fundamentals and the cash flows and risks under consideration.

Overall, the chapter concludes that the application of FVA is still the way forward, but that further enhancements of FVA methodologies are needed to help mitigate the exaggerated effects of some valuation techniques. A key challenge will be to enrich the FVA framework so that it can contribute to better market discipline and financial stability. The various accounting, prudential, and risk management approaches to valuation should be reconciled so that they work together to promote a more stable financial system. Importantly, this will require adjustments on the part of all three disciplines to ensure consistency.

The policy recommendations are:

- *Selectively add information on valuation*. Accounting valuations themselves need to be supplemented with additional information, such as the expected variation of fair value valuations, modeling techniques, and assumptions, so that the user can appropriately assess the risks of the institution.
- *Raise capital buffers and provisions.* Higher capital buffers and the use of forward-looking provisioning would help protect against the downturn in the cycle. If protection against the full magnitude of the downward cycle is desired, then the simulations suggest that building up a capital cushion of some 30–40 percent above normal levels in good times would be required to absorb the most severe shocks.
- *Provide targeted risk disclosures.* Firms could contemplate providing more focused reporting that is meant to satisfy different needs of users. Shorter reports at higher frequencies may be better than longer reports and lower frequencies, depending on the intended audience.

Chapter 4

Emerging market (EM) countries have not been at the forefront of the crisis, but their vulnerability to knock-on effects should not be underestimated. Chapter 4 examines equity markets in EM countries to assess the extent to which external/global and domestic/fundamental factors drive equity market valuations. It confirms that global factors are important in explaining the movement in EM equity prices, as are domestic fundamentals. Using various measures of correlation, Chapter 4 also finds that the scope for spillovers to emerging equity markets has risen, suggesting a growing transmission channel for equity price movements. This can, in turn, affect consumption and investment in emerging markets, although such macrofinancial linkages are found to be small and they tend to play out gradually. Nevertheless, it suggests that policymakers need to remain engaged over the longer run in building resilience in their local financial markets.

Specifically, the standard policies that could help to make markets more resilient in the medium run are well-known and typically include:

- *Fostering a broader and more diversified investor base.* Encourage a diversity of investors, including institutional investors, such as pension funds and insurance companies, which tend to have long-term investment horizons.
- *Aiding price discovery.* Remove impediments to price discovery by avoiding artificial delays in revealing prices or limiting price movements.
- *Supporting infrastructure development.* Adopt legal, regulatory, and prudential rules that are consistent with international best practice.
- *Ensuring stock exchanges are well run.* A robust trading environment and supporting infrastructure for trading equities and new financial instruments can also help develop capital markets, although enhancements and innovation need to be properly sequenced.

* * *

A number of the policy lessons arising from the crisis are now beginning to be implemented and many more will need to be formulated and evaluated before coming into effect. The IMF has been active in the debates on a number of items, some of which have been covered in this latest GFSR. While not all the policy recommendations in the April 2008 GFSR are repeated here, they remain relevant. The IMF will continue to cooperate with the FSF, monitor progress, and assist its member countries through its bilateral surveillance, including the Financial Sector Assessment Program, and technical assistance to make their financial systems healthier and more resilient to global financial sector risks.

CHAPTER 1

ASSESSING RISKS TO GLOBAL FINANCIAL STABILITY

The global financial system has undergone a period of unprecedented turmoil. Market confidence dwindled and has remained fragile, leading to the collapse or near-collapse of large, and in some cases systemically important, financial institutions, and calling forth public intervention in the financial system on a scale not seen for decades. The financial system has been severely weakened by mounting losses on impaired and illiquid assets, uncertainty regarding the availability and cost of funding, and further deterioration of loan portfolios as global economic growth slows. Finding a purely private sector resolution of financial market strains has become increasingly difficult, while case-by-case intervention by authorities has not alleviated market concerns. In response, more comprehensive approaches are now being considered or implemented to bring about a more orderly process of deleveraging and to break the adverse feedback loop between the financial system and the global economy. Such a comprehensive approach—if well coordinated among countries—should be sufficient to restore confidence and the proper functioning of markets and avert a more protracted downturn in the global economy.

As anticipated in the April 2008 *Global Financial Stability Report* (GFSR), credit quality concerns are broadening. In the United States, credit deterioration has spread to higher quality residential mortgages and to consumer and corporate loans as the economy slows. Pressures are now emerging in Europe, as house prices in some countries decline, economic growth falters, and lending conditions tighten. Although financial firms have recognized much of the subprime-related losses, further potential credit-related writedowns are placing additional strains on balance sheets.

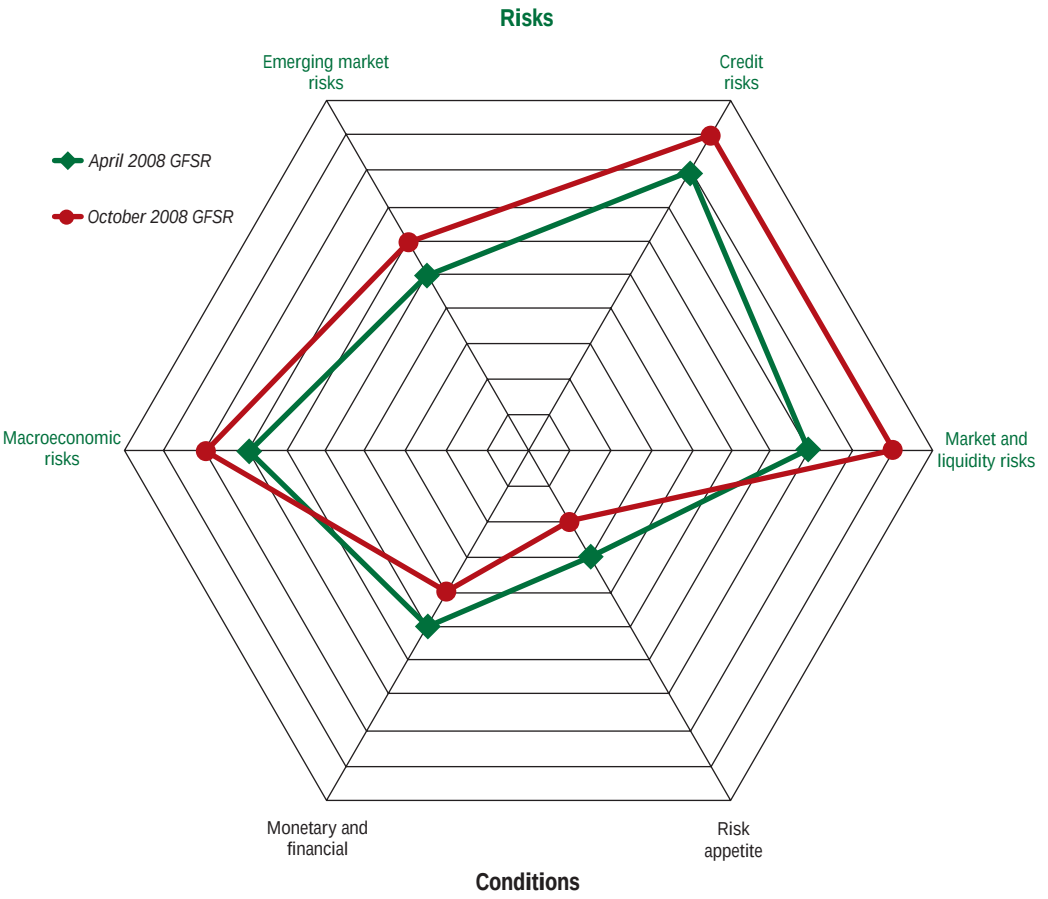
A more resilient financial system will ultimately emerge from restructuring and deleveraging, but market forces are in the meantime resulting in a disorderly, accelerated adjustment process, requiring the use of public balance sheets to restore order. In this environment, financial firms face enormous challenges in raising capital to cover losses, while efforts to shed assets are keeping downward pressures on prices. In addition, doubts about the soundness of some banks and their business models have led to severe impairment of the funding markets and sudden and at times unruly consolidation in the sector. Government initiatives aim to support a more orderly deleveraging process, but its difficult and protracted nature is likely to curtail credit availability, placing a further drag on the economic recovery. The most significant risk remains a worsening of an adverse feedback loop between the financial system and the real economy.

Emerging markets had been fairly resilient to the global credit turmoil, but now face greater risks. The pronounced reduction in investors' risk appetite has resulted in a retrenchment in short-term capital flows to emerging markets, exerting pressure on local markets, and sharply raising costs of credit. Together with slowing global growth, this results in a very challenging environment for some countries.

Policies will need to continue to consider carefully the balance of risks to the financial system and to the broader economy and are likely to require further initiatives to restore confidence. Effective and coordinated imple-

Note: This chapter was written by a team led by Peter Dattels and comprised of Sergei Antoshin, Elie Canetti, Ana Carvajal, Sean Craig, Antonio Garcia-Pascual, Kristian Hartelius, Geoff Heenan, Xiongtao Huang, Phil de Imus, Rebecca McCaughrin, Ken Miyajima, Michael Moore, Chris Morris, Silvia Ramirez, Mustafa Saiyid, Andre Santos, Narayan Suryakumar, Rupert Thorne, and Chris Walker.

Figure 1.1. Global Financial Stability Map



Source: IMF staff estimates.
Note: Closer to center signifies less risk, tighter monetary and financial conditions, or reduced risk appetite.

mentation should stabilize market sentiment and protect against downside economic risks, and allow for a more orderly and smooth deleveraging. Such measures could help asset prices rebound, and with them, the willingness of investors to again provide a now more consolidated banking sector with fresh capital. This would allow financial intermediation and credit markets to normalize more quickly and at less economic cost.

Against this backdrop, Chapter 1 first outlines the key risks that have materialized since the April 2008 GFSR. Second, it examines the depth of the default cycle and potential losses. The third and fourth sections evaluate the challenges posed by the deleveraging of the financial system in mature economies and the broader systemic implications. The fifth section assesses the vulnerability of emerging markets to global stress. Finally, the last section considers near-term policy priorities aimed at rebuilding confidence and improving the functioning of global markets, along with medium-term policies to strengthen the international financial architecture and reduce systemic risks.

Global Financial Stability Map

Since the April 2008 GFSR, monetary and financial conditions have tightened further, risk

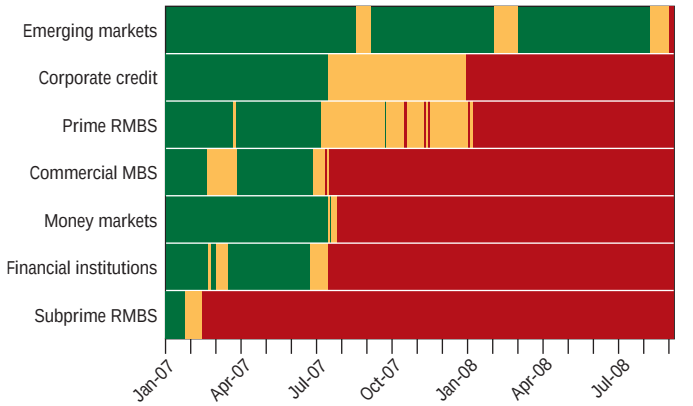
appetite has continued to contract, and global macroeconomic, credit, market and liquidity, and emerging market risks have increased (Figure 1.1).

As envisaged in the last GFSR, an adverse feedback loop between the banking system and the global economy appears to be unfolding, as weakening economic conditions reinforce the credit deterioration and stress in mortgage, credit, and funding markets, with risks also rising in certain emerging markets that had shown considerable resilience until recently (Figure 1.2).

Macroeconomic risks continue to rise . . .

Global economic activity is decelerating as growth in advanced economies slows and expansions in emerging economies lose momentum. Despite better-than-expected performance early this year, rising financial turmoil has led to a downgrade in the IMF's baseline forecast for global economic growth in 2008-09, and global growth is expected to moderate as the forces that weigh on activity remain firmly in place.[1] In particular, the supply of credit is expected to contract markedly, placing a drag on economic growth—not just in the United States, but in other advanced and emerging economies. Global inflation risks have moderated on the back of sharp declines in commodity prices from mid-year highs. However, the volatility of inflation expectations, particularly in emerging markets, is challenging monetary authorities in an environment of slowing growth, and may hamper their abil-

Figure 1.2. 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 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 red signifies greater than 4 standard deviations. MBS = mortgage-backed security; RMBS = residential mortgage-backed security.

[1]See the October 2008 *World Economic Outlook* (WEO) (IMF, 2008d). Both the WEO and GFSR provide assessments of macroeconomic risks, but in the former report, these metrics are viewed in the context of risks around a baseline projection for global growth. The GFSR incorporates these metrics, as well as inflation risks, economic confidence, and other factors, all viewed from the perspective of financial stability. Hence, the overall portrayals of macroeconomic risks in the WEO and GFSR, while closely related, are not directly comparable. See Annex 1.1 for details of the specific metrics.

ity to respond to potential financial stability concerns.[2]

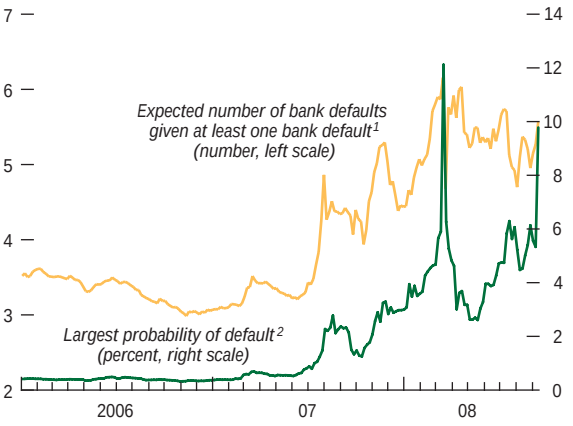
. . . as credit market stress and spillovers have led to a further tightening of financial conditions.

The effects of easing monetary conditions on firms' financing costs in the United States and United Kingdom have been more than offset by equity price declines and wider credit spreads. As financial institutions attempt to delever and reduce risks, their willingness and ability to continue extending credit has been curtailed, resulting in a tightening of *monetary and financial conditions*. The pressure to reduce leverage and risk has also had a pronounced impact on nonbank financial institutions, including hedge funds and other leveraged entities, leading to the demise of the independent broker-dealer model. Exacerbated by the adverse feedback loop between the financial system and the real economy, credit supply constraints could persist for a prolonged period.

Systemic risks have risen as credit deterioration broadens, further straining financial institutions.

Credit risks have risen, reflecting continued pressures on bank balance sheets and weakness in broader credit markets as well as plunging equity prices that make further capital-raising efforts difficult (Figure 1.3). Financial institutions in the United States and Europe continue to face enormous strains as a result of past credit indiscipline, market demands for larger capital cushions, and the likelihood of assets being brought back onto balance sheets. Uncertainty as to the treatment of systemically connected institutions under stress, in particular in the wake of the bankruptcy of a major U.S. broker-dealer, has raised the perception of counterparty credit risk to financial institutions around the world, most visibly in the United States and Europe. As such, the global financial system has

Figure 1.3. Systemic Bank Default Risk



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

[2]The earlier run-up in commodity prices was accompanied by increased investment flows to commodity index funds, but our analysis fails to find meaningful causal relationships between financial positions and prices of major commodities (see Annex 1.2).

entered a new phase of the crisis where solvency concerns have increased to the point where further public resources have had to be committed to contain systemic risks and the economic fallout.

Despite extraordinary measures by central banks to contain systemic risks, market and liquidity risks have risen . . .

Coordinated central bank actions have continued to aim at reducing risks to systemically important financial institutions. However, funding and liquidity strains remain high, as reflected in persistently wide interbank spreads and liquidity premia (see Figure 1.4 and Chapter 2), and have recently risen even further. Funding in interbank and commercial paper markets have locked up with mostly overnight rolls and little to no term activity, reflecting persistent and increasing concerns about counterparty credit risk and future liquidity needs (Box 1.1). Furthermore, the pressure of asset sales from financial institutions as they seek to, or are forced to, delever under highly illiquid and uncertain conditions has pushed *market and liquidity risks* to the same heightened level as credit risks.

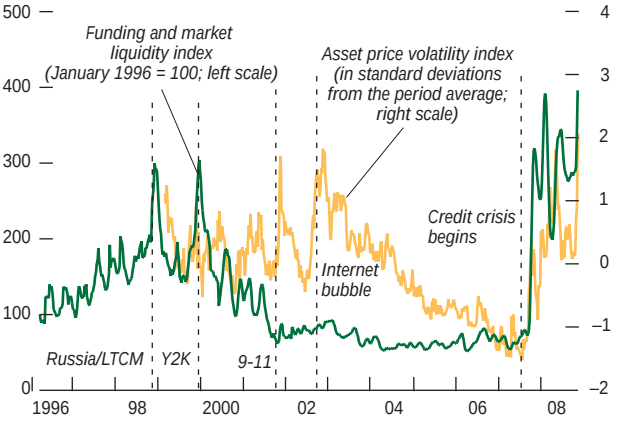
. . . and risk appetite has continued to evaporate.

More fragile market sentiment, the loss of market liquidity, and elevated macroeconomic risks have, in turn, suppressed *risk appetite* to very low levels. A number of indicators show fund managers have become even more risk averse, increasing cash allocations and scaling back positions in risky assets (Figure 1.5). While at times some investors cautiously sought value in distressed assets at current prices, at other times of market stress, the flight to safety has been extreme and broad-based. Going forward, a bottoming in prices of distressed assets is needed to help the financial sector to delever through asset sales and reduced writedowns.

Overall risks to emerging markets have deepened.

Emerging market risks have risen as global financial deleveraging and derisking weigh on

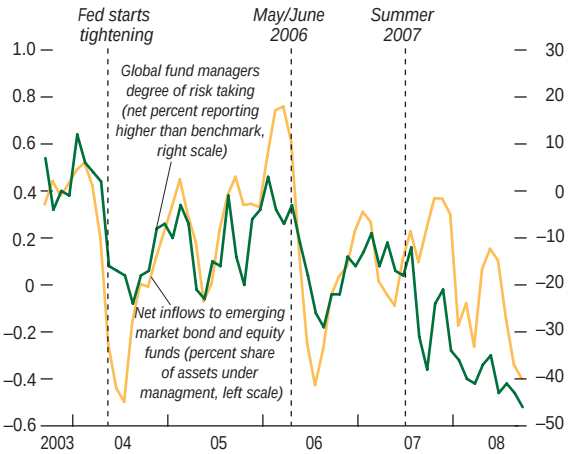
Figure 1.4. Asset Price Volatility and Funding and Market Liquidity



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

Note: Asset price volatility index uses implied volatility derived from options from stock market indices, interest, and exchange rates. Funding and market liquidity index uses the spread between yields on government securities and interbank rates, spread between 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. LTCM = Long-Term Capital Management; Y2K = Year 2000.

Figure 1.5. Allocation to Global and Emerging Market Risk Assets



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

Box 1.1. Recent Financial Market Developments

This box describes recent dramatic market developments, including the responses by markets and policymakers, and assesses remaining uncertainties.

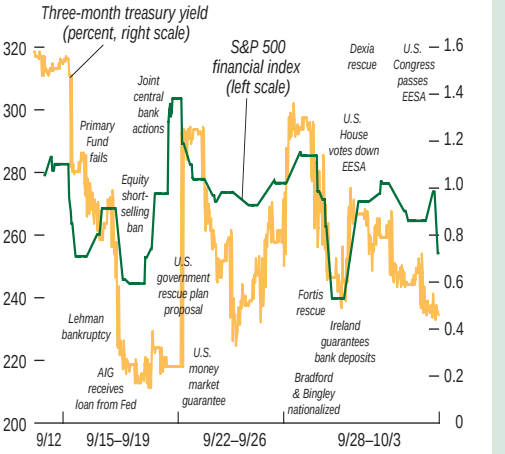
The financial crisis entered a new phase in September as the rise of systemic risks led to a sweeping government response and an unprecedented restructuring of the financial system. First, Lehman Brothers Holdings, Inc. declared bankruptcy, prompting the three largest remaining U.S. investment banks to sell themselves to, or become, depository institutions. Lehman's bankruptcy also spread default risk and removed an important financial counterparty, sharply reducing liquidity in derivatives markets. Second, the insurance conglomerate AIG nearly collapsed, raising broader concerns about financial product insurance and instigating a public sector rescue. Third, prime money market funds experienced massive withdrawals and some closures, forcing asset liquidations and capital hoarding, and bringing into question the viability of financial institutions dependent on wholesale funding.

The market response was swift, intense, and broad-based (see first figure). Risky assets sold off, overnight interbank rates surged, implied dollar funding costs increased, interest rate swap spreads widened, and, as default probabilities increased, credit default swap (CDS) spreads soared. Emerging markets, which had been relatively insulated from the crisis, came under pressure as global financing conditions deteriorated.

Liquidity became increasingly scarce and funding shifted almost exclusively to overnight markets. Demand for dollar funding grew acute, driving rates sharply higher in unsecured funding markets, while bid-ask spreads widened in foreign currency swap markets. As a flight-to-quality intensified, yields on some U.S. treasury bills temporarily became negative and market-making declined sharply. CDS markets became illiquid as counterparty risk concerns rose, making it difficult for investors to hedge positions.

Note: The main author of this box is Rebecca McCaughrin.

Timeline of Recent Market Developments

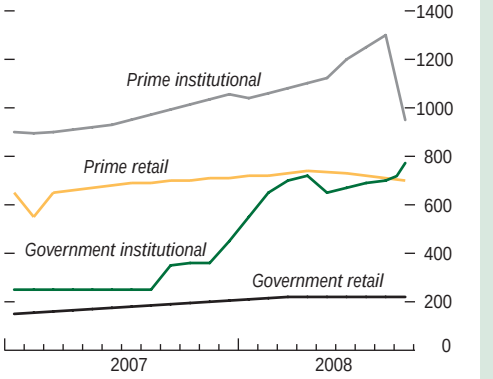


Sources: Bloomberg L.P.; and IMF staff estimates.
Note: EESA = Emergency Economic Stabilization Act.

The beginnings of a run on money market funds led many to limit their investments to very short-term, safe collateral. Prime money market funds, which invest partly in corporate debt and asset-backed securities, suffered some $320 billion of redemptions in one week, threatening especially those with no external support

U.S. Money Market Fund Assets Under Management

(In billions of U.S. dollars)



Sources: iMoneyNet; JPMorgan Chase & Co.; and IMF staff estimates.

Recent Central Bank and Government Actions

	United States	Euro Area[1]	United Kingdom[1]	Other[1]
9/14/2008	Federal Reserve expands eligible collateral for Primary Dealer Credit Facility and Term Securities Lending Facility (TSLF), increases frequency and size of schedule 2 TSLF auctions, and eases restrictions on transactions between banks and broker-dealers			
9/15/2008	$70 billion overnight repos	€30 billion overnight repos	£5 billion 2-day repos	Other central banks provide liquidity, including Japan (¥1.5 trillion) and Australia (A$2.1 billion), among others
9/16/2008	Federal Reserve extends $85 billion 2-year credit line to AIG; $50 billion overnight and $20 billion 28-day repos	€70 billion overnight repos	£20 billion 2-day and £5 billion 3-month repos	Other central banks provide liquidity, including Japan (¥2.5 trillion), Switzerland (SF726.4 million) and Australia (A$1.7 billion), among others
9/17/2008	Treasury announces supplemental financing program for Federal Reserve, and auctions $40 billion special cash management bills	€150 billion 7-day repos	Bank of England (BoE) extends Special Liquidity Scheme	Other central banks provide liquidity, including Japan (¥3 trillion), and Australia (A$4.3 billion), among others
9/18/2008	Federal Reserve expands its temporary reciprocal currency arrangements by $180 billion with major central banks, and conducts $5 billion 14-day and $100 billion overnight repos; Treasury auctions $60 billion for supplemental financing program	€25 billion overnight and $40 billion overnight repos	$14 billion overnight and £66 billion 7-day repos	Other central banks provide liquidity, including Japan (¥2.5 trillion), Switzerland ($10 billion), and Australia (A$2.8 billion), among others
9/19/2008	Federal Reserve announces plan to loan banks funds to buy asset-backed commercial paper (ABCP) and buy agency discount notes (DN) outright; Federlal Reserve purchases $8 billion agency DNs and conducts $20 billion in 3-day repos; Treasury proposes $700 billion troubled asset resolution program, announces guaranty program for money market funds, and auctions $60 billion for supplemental financing program; Securities and Exchange Commission (SEC) tightens restrictions on net short positions on financial stocks	$40 billion in 3-day repos	Financial Services Authority tightens restrictions on net short positions on financial stocks; BoE conducts $21 billion in 3-day repos	Other central banks provide liquidity, including Japan (¥3 trillion), Switzerland ($10 billion), and Australia (A$1.9 billion), among others; several regulatory institutions impose restrictions on equity short sales
9/22/2008	Federal Reserve conducts $20 billion in overnight repos	European Central Bank (ECB) conducts $25 billion 28-day repos	BoE conducts $26 billion repos	

Box 1.1 *(continued)*

Recent Central Bank and Government Actions *(continued)*

	United States	Euro Area[1]	United Kingdom[1]	Other[1]
9/23/2008	Federal Reserve conducts $20 billion in 28-day repos and purchases $2 billion in agency DNs		BoE conducts $30 billion repos	
9/24/2008	Federal Reserve expands its temporary reciprocal currency arrangements to Australian and Scandinavian central banks; conducts $25 billion in overnight reverse repos	€50 billion 84-day repos	BoE conducts $30 billion repos	
9/25/2008	Federal Reserve conducts $22 billion in overnight reverse repos		BoE conducts $35 billion repos	
9/26/2008	Federal Reserve conducts $26 billion in 3-day reverse repos; purchases $4.5 billion agency DNs		BoE conducts $10 billion overnight repos and $30 billion 7-day repos	
9/28/2008		Fortis partly taken over by governments of Belgium, Netherlands, and Luxembourg via €11.2 billion bailout package for 49 percent ownership stake; Germany organizes a €35 billion credit line for Hypo Real Estate	Bradford & Bingley (B&B) nationalized; Santander to pay £612 million for B&B's branches and deposits	
9/29/2008	Federal Reserve increases swap lines to foreign central banks from $290 billion to $620 billion, increases the size of the 84-day Term Auction Facility (TAF) auctions from $25 billion to $75 billion, introduces forward TAF auctions	ECB conducts €120 billion 38-day repos	BoE conducts $10 billion repos	Iceland's government takes 75 percent stake in Glitnir Bank
9/30/2008	Federal Reserve conducts $20 billion 28-day repos	Irish government guarantees all deposits, covered bonds, senior and dated subordinated debt (until September 2010); Dexia receives €6 billion infusion from Belgian and French governments and main shareholders; ECB conducts €190 billion 7-day repos	BoE conducts $10 billion repos	
10/1/2008	Federal Reserve conducts $20 billion overnight reverse repos		BoE conducts $7.5 billion overnight repos and $13.4 billion 7-day repos	
10/2/2008	Federal Reserve conducts $25 billion overnight reverse repos	Greek government guarantees all bank deposits	BoE conducts $8.9 billion repos	Brazilian central bank eases reserve requirements

Recent Central Bank and Government Actions *(concluded)*

	United States	Euro Area[1]	United Kingdom[1]	Other[1]
10/3/2008	Congress approves $700 billion rescue package: Treasury authorized to purchase distressed assets; FDIC temporarily allowed to borrow unlimited funds from the Treasury; FDIC deposit insurance temporarily increased from $100,000 to $250,000; Federal Reserve granted the ability to pay interest on reserves; SEC authorized to suspend mark-to-market accounting rules; Federal Reserve conducts $25 billion 3-day reverse repos	ECB to allow more banks to participate in unscheduled cash auctions; Netherlands government purchases Dutch operations of Fortis for €16.8 billion; ECB auctions $50 billion overnight repos and a €194 billion liquidity-absorbing quick tender	BoE extends eligible collateral for its weekly long-term repo operations to include AAA-rated ABS and highly rated ABCP; conducts $8.2 billion overnight repos and $30 billion 7-day repos	Russian central bank extends unsecured loans to qualified banks for up to six months and introduces other measures
10/5/2008		€35 billion rescue package promised to Germany's Hypo Real Estate Group withdrawn		

Sources: JPMorgan Chase & Co.; and national authorities.
[1]U.S. dollar operations are an extension of the Federal Reserve TAF.

from a parent bank (see second figure). As a result, they were unable to provide the nearly $2 trillion of credit they typically extend daily, leading to difficulties for financial institutions dependent on wholesale funding and nonfinancial corporations needing refinancing.

Global central banks moved rapidly to provide liquidity, including to prime money market funds (see table).[1] Liquidity support was accompanied by other forms of government support and regulatory action. The Federal Reserve extended an $85 billion, two-year loan to AIG when no private rescue materialized, facilitated by the U.S. Treasury's establishment of a supplementary financing facility. In addition, the government announced a guaranty program for money market funds, protecting investors from loss. Regulators in a number of countries limited equity short sales in an effort to stem precipitous declines in financial institutions' share prices. Last, the U.S. government proposed a Troubled Asset Relief Program (TARP) to purchase distressed assets from financial institutions in order to reduce balance sheet pressures.

Market conditions remained mixed in the wake of these initiatives. Liquidity support helped reduce overnight borrowing costs, but effective overnight policy rates experienced significant intraday volatility as a result of the large liquidity injections, increased demand for dollar funding by non-U.S.-market participants, and delays by money managers in completing funding. Term funding costs are still elevated and tiering has become noticeable, reflecting concerns about counterparty risk and future liquidity needs. Conditions in other markets, including, for instance, major equity indices, CDS spreads on key financial companies, short-term dollar lending rates in overseas markets, and emerging market assets, eased from extreme levels, though they remained under stress.

Significant uncertainties remain, resulting in fragile market confidence. First, the scope of government programs to help financial institutions dispose of troubled assets remains uncertain. Second, the simultaneous occurrence of several large credit events is testing the CDS

[1]In addition, a consortium of financial firms set up a pooled fund to provide collateralized borrowing to each other, with the intention of accepting a broader range of collateral for longer durations than central banks.

Box 1.1 *(concluded)*

settlement infrastructure. Market participants are still assessing their counterparty exposures in markets that are neither well-automated nor transparent. Many will face logistical risks identifying, closing, offsetting, and reestablishing positions, while others may face debilitating losses on their credit exposure. Third, markets will remain subject to the potential for disorderly asset sales as current (and likely future) bankruptcy proceedings ensue. Fourth, while the government actions may help accelerate the deleveraging process, this will not eliminate the need for banks to continue to delever and replenish capital over the coming years. Fifth, while the viability of the business models of major independent broker-dealers has now been resolved (in the negative), uncertainties remain about other financial business models, including, for instance, financial insurers, nondiversified mortgage originators and servicers, and certain types of money market funds. Finally, markets remain uncertain about how policy authorities will balance the competing claims of trying to minimize moral hazard while protecting against systemic risk, thus complicating policymakers' abilities to send clear signals about their intentions.

the appetite for emerging market assets and exacerbate vulnerabilities. Emerging market equities and corporate bonds have followed a similar downward trajectory as mature credit markets, and default probabilities have risen on sovereign and corporate debt. Capital outflows have intensified, leading to tighter international and in some cases internal liquidity conditions. Vulnerabilities vary across different economies, but those economies with greater reliance on short-term flows or with leveraged banking systems funded internationally are particularly vulnerable. In addition, slowing global growth could accelerate a downturn in domestic credit cycles, raising defaults. Though inflation concerns have eased over the past few months, sharp increases in inflation volatility could induce financial instability in some local markets, should inflation expectations become entrenched, and reduce policy flexibility amid heightened global risks. Nonetheless, sizable reserve cushions and favorable external balances in many emerging economies and sound policies continue to provide resilience to global stress.

The Default Cycle

The depth and breadth of the credit default cycle will be a key determinant of pressures on the financial system going forward. This section assesses recent performance of key U.S. and European credit markets, and estimates the trajectory of the U.S. default cycle for a variety of loans. The base case suggests that charge-off rates on U.S. residential mortgages, already at historic highs, will climb further, while consumer loans exceed record levels and corporate and commercial real estate (CRE) loans reach multi-year highs (Figure 1.6).[3] The results show that further losses lie ahead for financial institutions, rising well beyond the estimates of nearly $1 trillion in the April 2008 GFSR. Under a more stressed economic scenario, entailing a deeper and more protracted U.S. recession, larger declines in house prices, and a longer period of tight lending standards, charge-off rates on CRE and corporate loans could climb close to historical peaks, exacerbating losses.[4]

[3]A charge-off is a loan that is removed from a bank's books and charged against loan loss reserves. Loans that are removed are those that are no longer collectible, due either to bankruptcy or default. Charge-off rates are the ratio of gross charge-offs minus recoveries to the average level of loans outstanding during a quarter, annualized.

[4]See Box 1.6 in Annex 1.3 for details on the econometric results. In addition to the assumptions in Table 1.1, bank lending standards are expected to be at their tightest in Q4 2008 in the base case. Our stress case assumes lending standards remain tight for a longer period. This scenario analysis was applied only to whole loans (not securities).

Highly levered U.S. households are under pressure from falling net worth and tighter credit conditions.

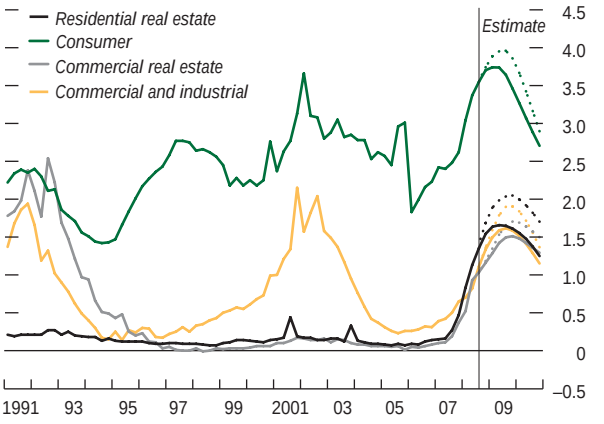
After amassing record amounts of mortgage debt and housing assets in recent years, household balance sheets and real disposable incomes have come under pressure owing to falling house prices, a deteriorating employment backdrop, and rising oil and food prices. In the first half of 2008, U.S. household net worth fell on a year-on-year basis for the first time since 2003, driven primarily by the halt in both real estate and financial asset growth (Figure 1.7).[5]

Falling house prices and a slowing economy threaten to weaken higher-quality mortgages.

U.S. residential mortgages are experiencing unprecedented credit deterioration. Since the last GFSR, delinquencies on U.S. subprime and Alt-A mortgages have risen further and home foreclosures have reached new highs, especially in regions where home prices have fallen the most (Figure 1.8). Reflecting this credit deterioration, bank charge-offs have risen, and prices on nonagency mortgage-related securities (especially Alt-A and senior subprime tranches) have resumed their declines (Figure 1.9). At the same time, nonconforming prime mortgages ("jumbo") are facing tighter lending standards, higher mortgage rates, and more limited securitization potential, making them harder to refinance. The increases in the conforming loan limits of the government-sponsored enterprises (GSEs) and the Federal Housing Authority (FHA) have yet to alleviate pressure in that sector. The conforming mortgage market has benefited from GSE securitization (and a more explicit government guarantee), but faces many of the same cyclical pressures as the broader mortgage market, which have led to a rise in prime mortgage defaults.

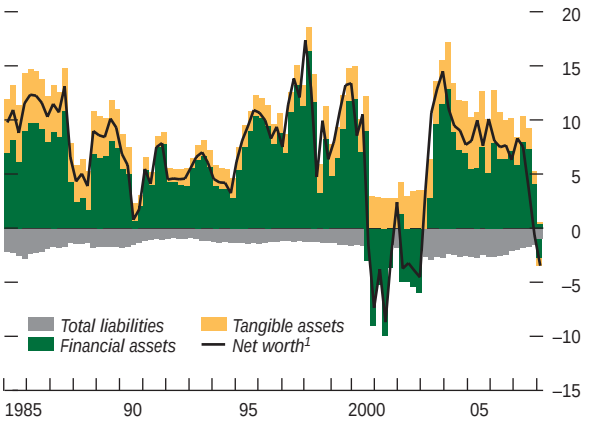
[5]By contrast, during the early 1990s downturn, the growth in household net worth slowed but did not decline, despite the savings and loan crisis. In the downturn beginning in 2000, net worth fell, primarily due to falling equity prices.

Figure 1.6. U.S. Loan Charge-Off Rates
(In percent of loans outstanding; annualized rate)



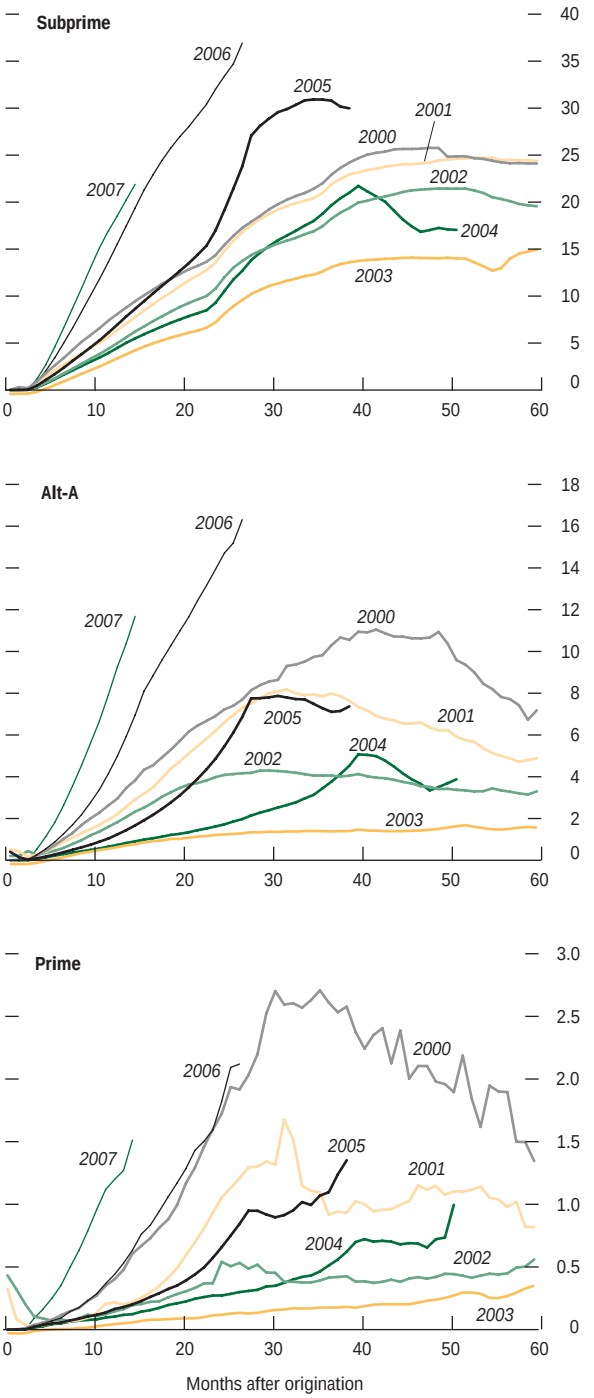
Sources: Federal Reserve; and IMF staff estimates.
Note: Dotted lines are stress case estimates.

Figure 1.7. U.S. Households' Balance Sheets: Net Worth
(Percent yearly contributions to net worth growth)



Sources: Federal Reserve; and IMF staff estimates.
[1]Year-on-year percent change in net worth.

Figure 1.8. U.S. Mortgage Delinquencies by Vintage Year
(60+ day delinquencies, in percent of original balance)



Sources: Merrill Lynch; and LoanPerformance.

While the U.S. housing sector may finally trough at some point in 2009, continued declines in house prices and sluggish growth are likely to deepen and broaden the default cycle. The combination of tighter lending standards, falling home prices, and lower recovery values would lead to a rise in charge-off rates on residential mortgages from the current 1.1 percent rate to a peak of 1.9 percent by mid-2009, and they could remain elevated throughout 2010 (Figure 1.10).

Pressures on household balance sheets presage deterioration in consumer loans.

Charge-off rates on U.S. consumer loans have risen. In addition, there are rising signs of stress as consumers tap credit lines to support consumption amid higher mortgage and other costs. Additionally, the ability to pay down higher-interest credit card debt with cheaper home equity loans has diminished, suggesting that some consumers are being forced to shift from secured mortgage debt to higher-cost, unsecured credit card debt.[6] However, with tighter lending standards, the availability of this type of credit may fall. Our analysis shows that tighter bank lending standards and slowing growth are likely to lead to consumer loan charge-off rates of about 3.9 percent by early 2009, slightly above the peak levels of 2002, before falling to more normal levels by 2010 (Figure 1.11). Under a stress scenario, charge-off rates climb to over 4 percent.

Stresses on U.S. consumers are also leading to credit weakening in commercial real estate loans.

Charge-off rates on U.S. CRE loans have already reached decade-high levels, as weaker consumer fundamentals weigh on the retail and condominium sectors. As with other loan categories, credit deterioration has been more pronounced on recently originated (2006–07) loans, which had weaker underwriting standards

[6]Banks have accommodated this increase so far, partly because credit card securitization has remained relatively robust over the last year.

(e.g., higher loan-to-value and debt service coverage ratios). Econometric analysis indicates that private consumption strongly affects the level of CRE charge-off rates. Charge-offs may rise to a 17-year high of about 1.7 percent by the end of 2009, or to 1.9 percent under our stress scenario, remaining elevated for some time, though still below the levels reached in the early 1990s.

Tighter access to credit is pressuring leveraged companies and small and mid-sized enterprises, while nonfinancial investment-grade firms' access remains relatively robust.

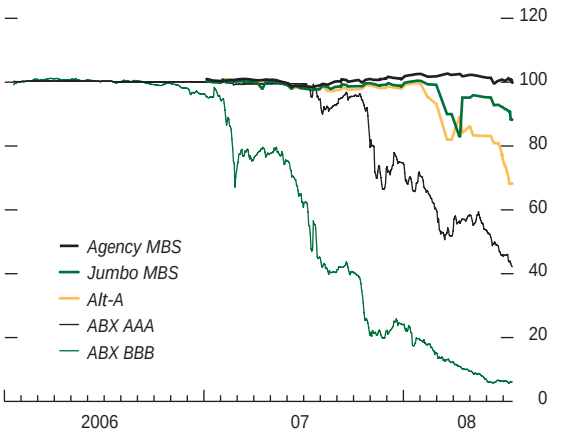
A weakening economic environment is already leading to corporate credit deterioration, especially for firms closely tied to the consumer. Credit quality has deteriorated on leveraged buyout deals in the last few years, as shown by the rising ratio of rating downgrades to upgrades in this sector.[7] Secondary market liquidity for leveraged loans remains low and banks and managers of collateralized loan obligations are selling loans at significant losses. Some of these sales have been to private equity firms, partly encouraged by lower prices and seller-provided financing for the purchases. Consequently, the leveraged loan pipeline has declined to $70 billion from a peak of $304 billion in mid-2007, relieving one source of potential stress on asset prices.

High-yield corporate bond issuance has slowed considerably, and firms are facing reduced access, higher rates, and shorter durations on their commercial paper obligations. As the cycle has begun to turn, default rates have started to increase, rising to 2.5 percent. Through mid-September of this year, globally, 57 corporate issuers have defaulted, compared with just 22 issuers in all of 2007.[8] The cur-

[7]A more pronounced deterioration in recent leveraged loans may ultimately materialize where "covenant-lite" agreements may have hindered early intervention by lenders.

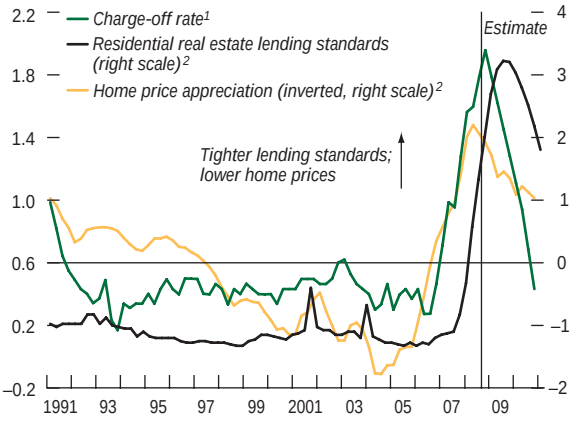
[8]In the United States, the ratio of rating agency upgrades to downgrades on high-yield bonds is at its lowest level in four years.

Figure 1.9. Prices of U.S. Mortgage-Related Securities
(In U.S. dollars)



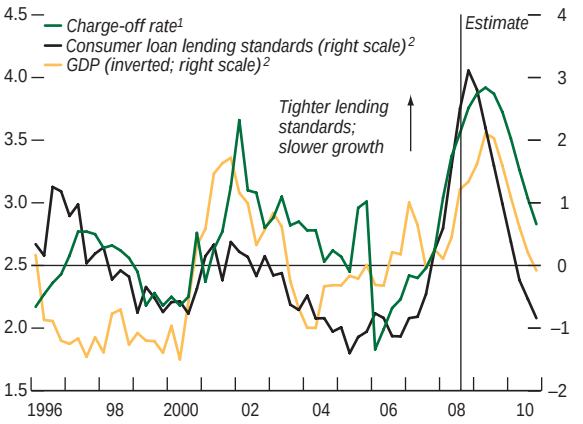
Sources: JPMorgan Chase & Co.; and Lehman Brothers.
Note: ABX = an index of credit default swaps on mortgage-related asset-backed security; MBS = mortgage-backed security.

Figure 1.10. U.S. Residential Real Estate Loan Charge-Off Rates
(In percent)



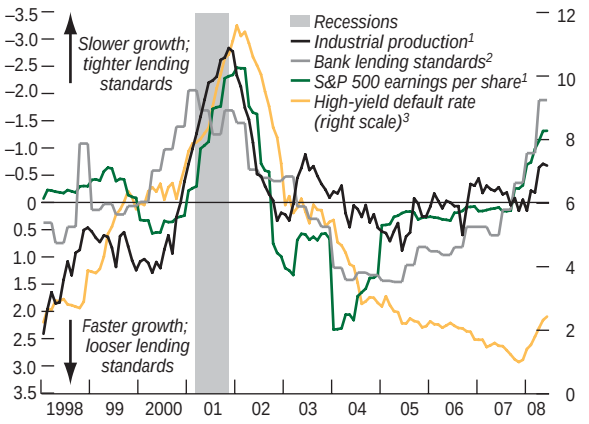
Sources: Federal Reserve; S&P Case-Shiller; and IMF staff estimates.
[1]As a percent of loans outstanding; annualized rate.
[2]Series standardized over the period from 1991:Q1 to 2010:Q4.

Figure 1.11. U.S. Consumer Loan Charge-Off Rates
(In percent)



Sources: Federal Reserve; Bureau of Economic Analysis; and IMF staff estimates.
[1]As a percent of loans outstanding; annualized rate.
[2]Series standardized using data from 1996:Q1 to 2010:Q4.

Figure 1.12. Macroeconomic and Corporate Indicators and Default Rates
(In percent)



Sources: Bureau of Economic Analysis; Federal Reserve; JPMorgan Chase & Co.; Merrill Lynch; Moody's; National Bureau of Economic Research; and IMF staff estimates.
[1]Year-on-year changes; standardized; inverted scale.
[2]Net survey balances; standardized.
[3]Issuer-weighted.

rent trend is broadly in line with our baseline forecast (a 4 to 6 percent U.S. high-yield default rate) (Figure 1.12).[9] Moreover, tighter bank lending standards are set to squeeze small and medium-sized firms, given their greater reliance on direct bank borrowing than on capital market financing. Despite continued strong balance sheets for investment-grade nonfinancial corporations, charge-off rates on commercial and industrial loans have already increased to their highest level since 2004. Our analysis suggests that slowing GDP growth and tighter lending standards could raise charge-off rates from 0.7 to 1.7 percent by the second quarter of 2009—still slightly below the level reached during the 1990–91 and 2001 downturns. They would match the previous peak only under the stress scenario.

Significant writedowns have already been realized, but more may lie ahead. . .

Our estimate of aggregate writedowns based on global holdings of U.S.-originated and securitized mortgage, consumer, and corporate debt has risen to $1.4 trillion (versus $945 billion in April), largely due to higher-than-expected losses on prime mortgage loans and corporate debt (Table 1.1) and wider spreads on related securities.[10]

The scale of the current credit crisis is likely to be higher in dollar terms compared with financial crises over the past two decades, and could be sizable relative to GDP, though costs are more broadly spread across different countries and institutions. The ultimate fiscal cost is highly uncertain at this stage and is policy dependent (Figure 1.13).

Increased writedowns owe to a further deterioration in the corporate debt and prime residential mortgage markets, as the crisis originally centered in subprime mortgages has spilled over

[9]See Box 1.1 of the April 2008 GFSR for details (IMF, 2008a).
[10]The methodology for estimating losses and charge-off rates is discussed in greater detail in Annex 1.3. Losses on loans and securities in other regions are not included in these estimates.

Table 1.1. Estimates of Financial Sector Potential Writedowns
(In billions of U.S. dollars)

	Base Case Estimates of Writedowns on U.S. Loans			Writedowns on U.S. Loans				
	Outstandings	April estimated losses	October estimated losses	Banks	Insurance	Pensions/ Savings	GSEs and government	Other (hedge funds, etc.)
Subprime	300	45	50	35–40	0–5	0–5	—	10–15
Alt-A	600	30	35	20–25	0–5	0–5	—	5–10
Prime	3,800	40	85	25–30	0–5	0–5	45–55	0–5
Commercial real estate	2,400	30	90	60–65	5–10	0–5	—	10–20
Consumer loans	1,400	20	45	30–35	0–5	0–5	—	10–15
Corporate loans	3,700	50	110	80–85	0–5	0–5	—	25–30
Leveraged loans	170	10	10	5–10	0–5	0–5	—	0–5
Total for loans	12,370	225	425	255–290	5–40	0–35	45–55	60–100
	Base Case Estimates of Mark-to-Market Losses on Related Securities			Losses on Securities				
	Outstandings	April estimated mark-to-market losses	October estimated mark-to-market losses	Banks	Insurance	Pensions/ Savings	GSEs and government	Other (hedge funds, etc.)
ABS	1,100	210	210	100–110	40–45	35–55	10–15	10–25
ABS CDOs	400	240	290	145–160	55–75	30–45	15–20	15–30
Prime MBS	3,800	0	80	20–25	10–15	10–20	20–25	0–5
CMBS	940	210	160	80–90	20–25	15–35	10–20	15–20
Consumer ABS	650	0	0	—	—	—	—	—
High-grade corporate debt	3,000	0	130	65–75	20–30	20–35	—	5–20
High-yield corporate debt	600	30	80	45–50	10–15	15–20	—	5–15
CLOs	350	30	30	15–20	0–5	0–5	—	5–10
Total for securities	10,840	720	980	470–530	155–210	125–215	55–80	55–125
Total for loans and securities	23,210	945	1,405	725–820	160–250	125–250	100–135	115–225

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

Note: The prime residential loans category includes a portion of GSE-backed mortgage securities. ABS = asset-backed security; CDO = collateralized debt obligation; CLO = collateralized loan obligation; GSE = government-sponsored enterprise; CMBS = commercial mortgage-backed security; MBS = mortgage-backed security.

to adversely affect economic prospects more broadly. Both high- and low-grade corporate debt have been significantly weakened by developments in the financial sector, while non-financial sectors, such as industrials and utilities, are also starting to weaken.[11] The prime residential mortgage market has been affected by a combination of factors, including especially rising unemployment and falling U.S. house prices. The impact of these factors had previously been felt mostly by less creditworthy borrowers of mortgage loans.

While writedowns have mushroomed over the last year, there is still a significant gap between reported and estimated writedowns. Reported writedowns reached $760 billion by end-September, $580 billion of which were incurred by global banks (Figure 1.14).[12] As expected, losses have been mostly mortgage-

[11]Potential losses due to the bankruptcy of Lehman Brothers are included in our estimates for losses on corporate debt.

[12]Writedowns for individual banks have been somewhat higher than expected. This appears to be mainly due to one or more of the following factors: (1) earlier incomplete disclosure of exposure to problem loans or securities; (2) higher-than-expected loss provisions for loans held to maturity; (3) losses on restructurings and sales of subsidiaries with credit market exposure; and (4) losses on trading and execution, possibly due to leveraged exposure.

related, and have been primarily shouldered by U.S. and European banks, with limited losses in Asia. At the same time, provisioning for future losses on corporate and leveraged loans has increased, and further writedowns have been taken on trading activities and exposures to monolines.

Nonbank institutions have shouldered at least $180 billion of losses to date. Some $100 billion of credit-related losses have been reported by insurance companies thus far (of which $20 billion is by monolines). Writedowns taken by GSEs have been about $20 billion but are expected to climb further by up to $115 billion over the full credit cycle. Hedge funds and other market participants are estimated to have incurred $60 billion in losses. Data on losses by pension and savings institutions are unavailable. Accordingly, at least 55 percent of known potential losses (in our base case) have already been recognized by financial institutions.

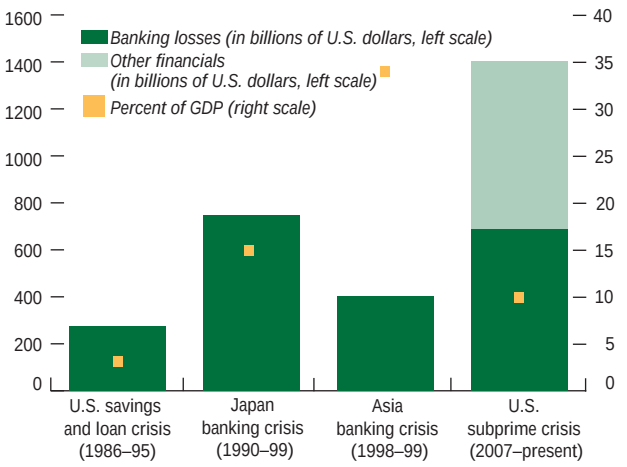
. . . and could rise further under a scenario of greater stress.

Higher losses could materialize across most loan categories under the stress scenario (Table 1.2).[13] Peak charge-off rates (which are 30 to 50 basis points higher than in our baseline scenario) would translate into losses on bank loans that are about 20 percent ($80 billion) higher. Should markets for securitized debt price in a more negative scenario, losses could be of a greater magnitude.

In Europe, high leverage and falling house prices portend worsening credit quality in some mortgage markets.

Global losses could be higher should credit quality worsen and writedowns mount on non-U.S. loans. Already, fundamentals are deteriorating in some European economies, where house price appreciation has slowed considerably or turned negative, lending standards have tightened, and mortgage rates have risen. Delinquen-

Figure 1.13. 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, Malaysia, Korea, the Philippines, and Thailand.

[13]See Annex 1.3 for details on the scenario analysis.

Table 1.2. Estimates of Potential Losses on Loans

(In billions of U.S. dollars; 2007:Q2 through August 2008)

	Outstanding	Base Case	Stress Case	Difference
All residential	4,700	170	210	40
Commercial real estate	2,400	90	100	10
Consumer loans	1,400	45	50	5
Corporate loans	3,700	110	130	20
Leveraged loans	170	10	15	5
Total for loans	12,370	425	505	80

Source: IMF staff estimates.

Note: The analysis applies the specific lending standards index for each loan class, and the assumptions for them are discussed in Box 1.6 in Annex 1.3.

cies have begun to rise on mortgage-related and other asset-backed securities, though they vary by sector, vintage, and collateral type. Collateral performance has been weakest on U.K. mortgage-related assets, for which primary markets are inactive, secondary market liquidity is thin (with the exception of AAA-rated securities), and spreads on related securities continue to widen.

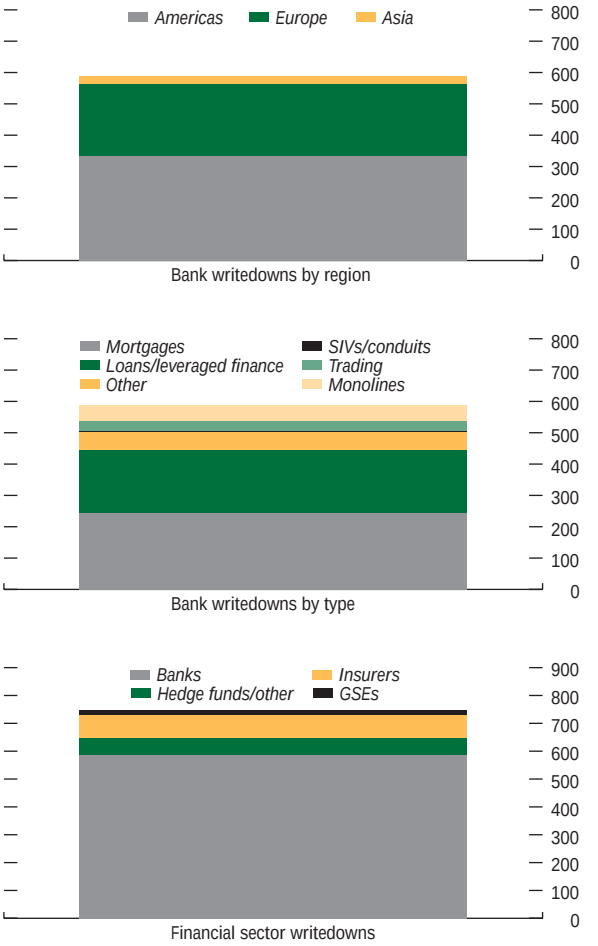
As in the United States, the U.K. household sector is highly leveraged and is now undergoing a similar deleveraging-cum-housing-deflation cycle (Figure 1.15). So far, mortgage arrears have picked up moderately from low historical levels, and bank charge-offs on mortgages remain very low.[14] However, with house prices falling rapidly, arrears and losses are likely to rise several times over. Nevertheless, our analysis suggests that U.K. defaults are unlikely to breach their historical peak, reached in the early 1990s, with mortgage loss rates likely to be considerably lower than those observed in the United States (Figure 1.16).[15] Moreover, the effects of

[14]These data may understate the actual level, since they exclude many of the lenders that specialize in the nonconforming market, several of which have already experienced difficulties and scaled back their operations.

[15]These estimates assume that house prices decline 15.5 percent year-on-year, GDP growth troughs at 0.6 percent year-on-year, and the unemployment rate remains fairly stable at 5.8 percent in 2009.

Figure 1.14. Financial Sector Losses

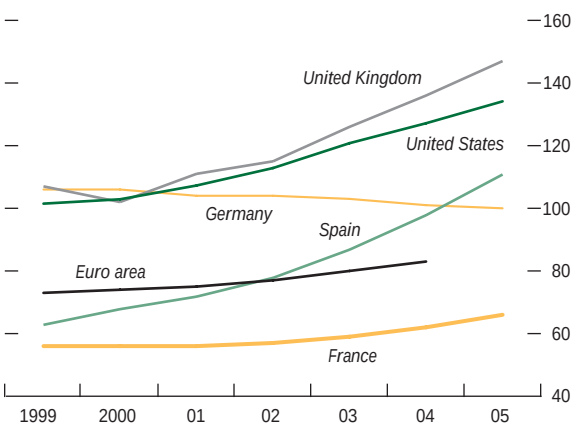
(In billions of U.S. dollars; 2007:Q2 through August 2008)



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

Note: SIVs = structured investment vehicles; GSEs = government-sponsored enterprises.

Figure 1.15. Ratio of Household Debt to Gross Disposable Income
(In percent)



Sources: Banco de España; Datastream; Eurostat; and IMF staff estimates.

nonprime losses should be less pronounced, given the small market share of U.K. nonprime loans.

The Spanish household sector has also become significantly leveraged in recent years, with the ratio of household debt to disposable income exceeding the average ratio for the euro area, and approaching that of the United States. Doubtful loans are increasing, although from a historically low level.[16] However, as in housing markets with similar appreciations elsewhere in Europe, banks have become more cautious in their lending, with year-on-year euro area mortgage lending falling.

Financial System Deleveraging

This section examines the difficult and protracted nature of the deleveraging process in the financial system and its implications for the real economy. There has been an epochal restructuring of the financial system, triggered and accelerated to a large extent by market pressures. Financial institutions have been forced to make significant adjustments over the past six months, with the process at times disorderly and exacerbating the systemic aftershocks. Each of the major U.S. broker-dealers no longer exists in its previous form, whether due to bankruptcy or by either becoming, or being absorbed by, a deposit-taking bank. In addition, substantial amounts of capital have been raised. Banks have widened their sources of funding to compensate for dysfunctional securitization and interbank funding markets. Some banks have sold liquid assets and absorbed off-balance-sheet structured investment vehicles and conduits, while attempting to reduce balance sheet risk and strengthen liquidity buffers. Others are allowing illiquid assets to

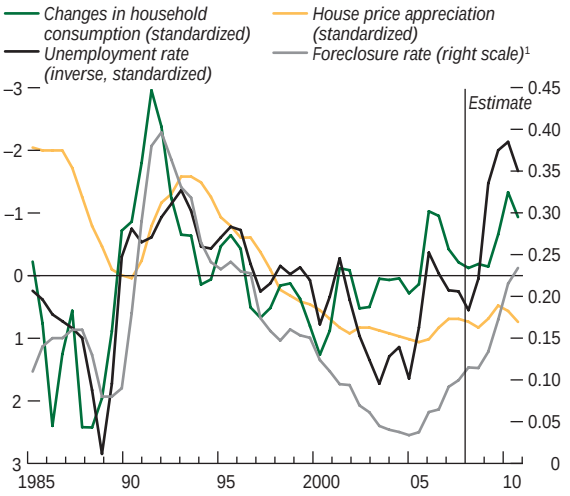
[16]Nonperforming loans at large Spanish banks have risen from 0.6 percent of total loans at the end of 2007 to 1.1 percent as of June 2008. The nonperforming-loan ratio is based on an unweighted average of the five largest Spanish banks. For an assessment of global housing market developments, see Box 1.2 of the October 2008 WEO (IMF, 2008d).

run off at maturity, but this takes time, as the impaired assets have average maturities of four to five years.

The deleveraging process may continue past the end of the decade.[17] Bank balance sheets are under pressure to expand, as certain types of near-bank entities contract, fold, or are bought, and credit is reintermediated, and as firms draw down prenegotiated credit lines.[18] Confidence in securitization markets remains impaired, and regulators, credit rating agencies, and markets are reevaluating whether and how banks should continue to be restructured to cope with the risks revealed during the crisis. The pace of deleveraging will depend on the depth of the economic and housing downturns, the scope for banks to restructure activities and rebuild profits, and the willingness of investors to provide banks with fresh capital. Should conditions improve faster than expected, deleveraging will be smoother and the supply of credit less constrained.

Deleveraging extends beyond the banking system to other leveraged financial institutions, such as hedge funds and other near-bank entities through the unwinding of structures that were highly leveraged, thinly capitalized, and/or

Figure 1.16. U.K. Mortgage Foreclosures
(In percent)



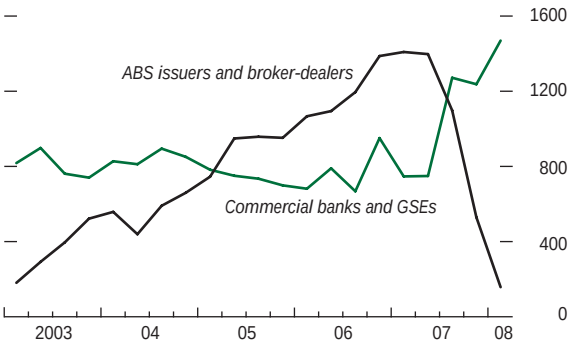
Sources: Bank of England; HBOS; U.K. Office for National Statistics; and IMF staff estimates.

[1]As a percent of all loans.

[17]Deleveraging, in this context, covers a range of strategies. On the liabilities side of bank balance sheets, these strategies entail raising fresh capital, as well as ensuring diversified, longer-maturity, and durable sources of funding. On the assets side, the strategies are to avoid concentrated exposures to illiquid or risky assets, dispose of noncore assets, and adopt hedging strategies that accurately mirror exposures.

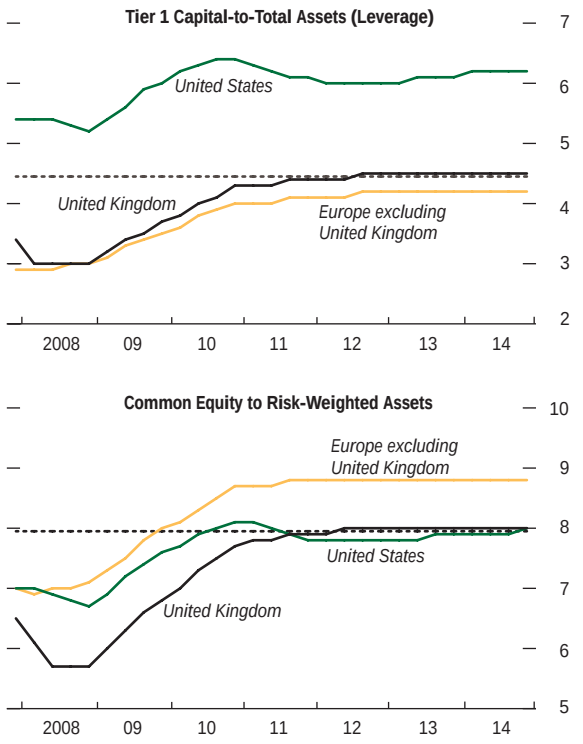
[18]"Near-bank entities" typically intermediate credit (or hold securities of those loans) traditionally originated by banks, primarily rely on capital market financing, have not generally been eligible for regular central bank funding (though access has been expanding), and in some cases are only loosely regulated. They include the special-purpose entities that issue ABS, mortgage-backed securities (MBS), CDOs, and asset-backed commercial paper (ABCP), and firms such as real estate investment trusts, global funds, the GSEs, and, until recently, the five major U.S. investment banks. These entities also intermediate some securities, such as auction rate securities, tender option bonds, and variable-rate demand obligations that transform the long-term liabilities of U.S. municipalities, student loan originators, and others into short-term liabilities.

Figure 1.17. Net Acquisition of Financial Assets by U.S. Financial Firms
(Annual rate in billions of U.S. dollars, four-quarter moving average)



Sources: Federal Reserve; and IMF staff estimates.
Note: ABS = asset-backed security; GSE = government-sponsored enterprises.

Figure 1.18. Bank Ratios
(In percent)



Sources: Bankscope; Bloomberg L.P.; Merrill Lynch; and IMF staff estimates.
Note: Dotted lines represent base case scenario for new standards of capital adequacy.

heavily reliant on short-term financing to fund long-term assets.[19] Deleveraging can be observed in the curtailment in asset acquisition by U.S. ABS issuers and the major broker-dealers since mid-2007 (Figure 1.17).

Capital will need to rise in relation to credit and balance sheet size, but to what standard?

Regulators, rating agencies, and investors use different metrics for assessing bank capital adequacy, and these measures have influenced the amount and form of capital raised by banks. The Basel II regime puts primary emphasis on the ratio of Tier 1 capital to risk-weighted assets. Rating agencies, too, continue to prefer risk-weighted asset measures, although they favor different measures of capital. However, investors have placed increasing emphasis on simple measures, after losing confidence in the valuation and risk assessment of structured finance products and other illiquid assets. The leverage ratio (i.e., the ratio of Tier 1 capital to total assets) is a simple measure that is used as an additional capital floor by U.S. regulators, and recently has been promoted as a complementary measure by Swiss regulators (though as noted below, it is not, by itself, precise enough to be the primary measure of solvency risk) (Box 1.2). The following exercise uses both the ratio of common equity to risk-weighted assets and the leverage ratio to project one possible profile and path of adjustment for U.S. and European banks (Figure 1.18), consistent with the credit growth scenario outlined above.[20] These leverage ratios are reduced over time by rebuilding capital cushions in relation to assets.

[19]As of early 2007, near-bank entities had an estimated $15 trillion of assets, compared with the $10 trillion and $40 trillion in assets of U.S. and European banks, respectively.

[20]This is not the only possible path, and should not be interpreted as suggesting that the new levels of capital are the "correct" ones. They are merely capital ratios that market analysts have suggested as appropriate medium-term goals for banking systems as a whole. Capital ratios for individual banks will, and should, vary, depending on their circumstances.

Box 1.2. Measuring Capital Adequacy

The current global crisis has greatly increased market uncertainty about the appropriate measures that should be used for measuring banks' capital adequacy.

Banking regulators and market practitioners point out that the build-up of excessive exposures occurred while banks were still largely operating under the Basel I capital framework, and that Basel II will more appropriately align capital requirements with risk, but would not have prevented the current outcome. Regulators will now take additional measures to improve the measurement of risks relating to structured instruments, off-balance-sheet items, and contingent liquidity risks. These will improve both the minimum capital requirements that Pillar 1 sets out and the supervisory review of banks' risk management practices under Pillar 2.[1] The net result will be more robust regulatory capital requirements going forward.

But many market participants and other observers are reacting to market valuation uncertainties by monitoring readily calculable measures of capital adequacy, including the leverage ratio—the ratio of equity to assets. Additionally, market observers and rating agencies are placing a particular premium on loss-bearing capital, in the form of common equity, as opposed to hybrid capital. Under current circumstances, the leverage ratio is a useful but simple measure that is not, by itself, precise enough to be the primary measure of solvency risk or to ensure a sufficient buffer against losses on risky assets.

A key lesson is that the risks to solvency cannot be adequately analyzed using only a single-dimensioned statistic. Risk-based capital ratios are, in principle, superior measures of capital adequacy, but their accuracy relies heavily on a proper risk valuation of assets. Under current circumstances, given the uncertainty about valuations of assets, the simple leverage ratio may be a useful complementary measure. Monitoring of multiple measures of capital and liquidity ratios (whether or not formal limits are established for them), together with rigorous stress testing, can help to ensure that firms remain robust to a variety of shocks.

Recent events have also highlighted a dilemma over capital adequacy; in principle, capital exists as a buffer to protect firms under difficult market conditions. But minimum requirements (whether set by regulators, by rating agencies, or implicitly by markets) can become hard limits and in some cases become more demanding during periods of market stress if risk measures rise as market volatility increases. In this regard, some have recommended allowing capital to be drawn down during such times, so that it acts as a true buffer. But such a policy probably implies that there should be significantly higher average capital ratios over the cycle than at present, and even if supervisors may be willing to tolerate buffers dipping during downturns, markets may require further convincing that this is appropriate as they make their own assessments of solvency risks.[2]

Note: The main author of this box is Rupert Thorne.

[1]Basel II is arranged into three pillars: Pillar 1 on minimum capital requirements; Pillar 2 on supervisory review of bank practices; and Pillar 3 on market disclosure.

[2]Chapter 3 provides some rough guidelines given the propensity of fair value accounting techniques to operate procyclically.

The factors influencing the path of adjustment are discussed below.

There are important differences between the drivers of deleveraging in the United States and those in Europe. In the United States, the pressures derive to a greater extent from the need to cover losses, which have depleted capital, while in Europe, the deleveraging process is also driven by the need to reduce leverage multiples closer to those in the United States and to avoid the earnings volatility that comes with having a large marked-to-market balance sheet.

Capital-raising by banks has been significant, but has become more difficult.

Global banks raised some $430 billion of capital from the second half of 2007 through September 2008.[21] However, raising capital has become extremely difficult in recent months. First, as growth weakened and house prices continued to fall, investors' hopes that the turmoil would be short-lived proved false. Second, equity holders in distressed institutions have incurred heavy losses. Third, bank share prices more generally have fallen substantially and could fall further, reducing investors' incentives to provide fresh capital.[22] Fourth, some rights issues in Europe have been poorly received. Issuing banks received the capital they sought, but substantial amounts were left with the underwriters, creating an overhang of shares that then depressed prices further.[23] In response to concerns that short selling was seriously frustrating efforts by financial firms to raise capital, and also concerns that it was aggravating the effects of false reports and unfounded rumors in the marketplace, regulators in several mature and emerging market economies adopted temporary bans on short sales of certain stocks, and permanent measures to broadly discourage "naked" short selling and raise disclosure requirements for short selling.[24]

Under a scenario of still weak housing markets, in which price declines only start to slow in mid-2009, public markets may not be hospitable to raising public capital. Faced with these circumstances, banks would need to rely more on raising capital through retained earnings and from private sources of capital, while slowing the pace of asset growth to reduce leverage. However, in view of further losses ahead, prospects for building internally generated capital are likely to remain poor through 2009.[25]

With the global economy starting to recover later in 2009, consistent with the WEO scenario, and house prices showing early signs of stabilizing, bank earnings rise and prospects for raising capital improve.[26] Just ahead of these developments, the market for raising bank capital is expected to re-open in 2009, allowing banks to raise $675 billion in additional capital globally over the next few years. Nevertheless, sizable adjustments would be needed on the asset side of bank balance sheets, in addition to capital-raising, in order to boost capital ratios and achieve the desired restructuring of business lines, as illustrated below.

Deleveraging through asset sales and run-off is proving to be challenging given current market conditions.

Deleveraging by reducing assets has also proved problematic for banks. Selling assets in illiquid market conditions crystallizes losses that deplete capital and therefore push up leverage multiples. Distressed sale prices can establish a fresh benchmark price to which remaining assets are marked, potentially affecting large

[21]Box 1.3 provides a fuller analysis of reported bank losses and capital-raising by type and source.

[22]In some cases, options granted to strategic investors when banks raised capital at the start of the crisis are pushing up the cost of raising additional capital, as the earlier investors have to be compensated for the paper losses they have suffered before new capital can be raised.

[23]Unlike in the United States, European companies are required to offer new shares to existing shareholders first to protect them from dilution ("preemption rights"), making issuance time-consuming. Under unstable conditions, there can be increased volatility in the price of the shares, which in turn can affect the success of a rights issue if the market price falls below the issue price. Streamlining the rights issue process while ensuring existing shareholders have other mechanisms to protect against dilution would help alleviate these problems.

[24]Countries that adopted such measures included Australia, Belgium, France, Germany, the Netherlands, Russia, Taiwan Province of China, the United Kingdom, and the United States. The U.S. Securities and Exchange Commission (SEC) issued new rules to curtail "naked" short sales—which have been prohibited since 1938—by tightening prior possession requirements and raising penalties for delivery failure. This ban was lifted in early October. The U.K. Financial Services Authority also banned short selling in securities of financial firms and added disclosure requirements for substantial short interest positions in securities undertaking rights issues.

[25]Under our stress scenario, peak defaults would be about 20 to 25 percent higher than in our base case, and they could persist for longer than in our base case. This would considerably aggravate the challenge of acquiring more bank capital.

[26]Although only an illustration, the paths fit well with other approaches. See, for instance, IMF (2008b, 2008d); and Claessens, Kose, and Terrones (forthcoming).

Box 1.3. Global Bank Writedowns and Capital-Raising

This box provides greater detail on bank writedowns and capital-raising efforts, as well as the changing nature of banks' investor base.

Since the turmoil started in mid-2007, global writedowns at banking institutions have totaled roughly $580 billion through September 2008. They have been concentrated in a few banks, with the three largest losers accounting for around 30 percent, and the 20 largest around three-quarters, of the total. About 95 percent of the writedowns were reported by North American and European banks, with only a small amount reported by Asian firms. Over the same period, capital raised has totaled $430 billion and has been similarly concentrated in a small number of institutions in the United States and Europe (see first figure).

The form of capital that was raised changed during this period (see second figure). At first, a substantial portion was in the form of hybrid securities, which combine elements of debt and equity.[1] These were attractive to issuers, as they are tax efficient, do not dilute common—shareholders, and partly count toward—regulatory capital. They were seen as signaling to the market that the bank was in a strong position (in contrast to common equity issuance), and offered investors the security of a bond, with some element of upside potential. However, hybrid capital has become less attractive in recent months as regulators, rating agencies, and investors have grown less comfortable with its high share within total capital.[2] Recently issued hybrid instruments

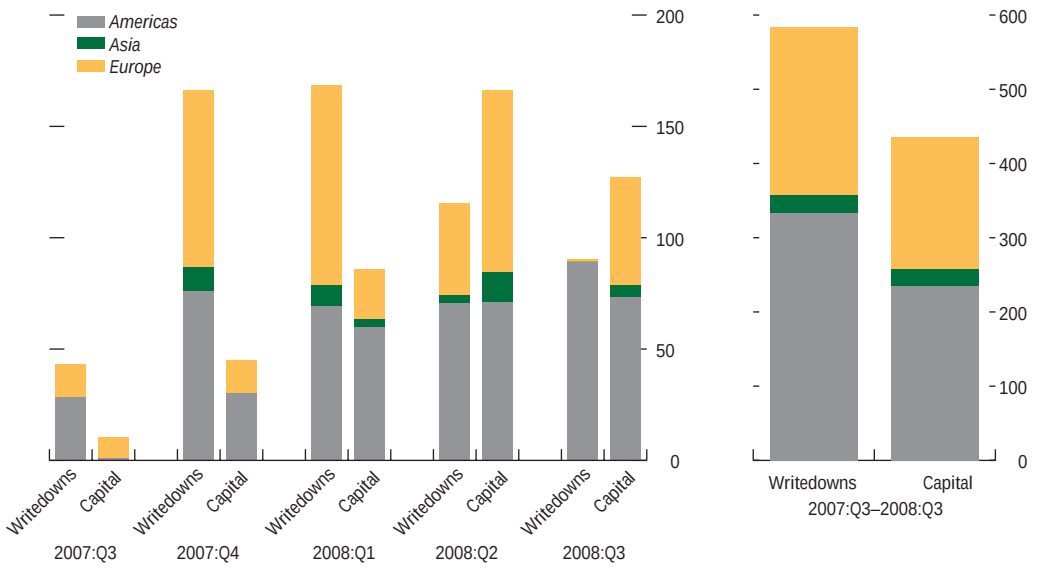
Note: The authors of this box are Ana Carvajal, Antonio Garcia Pascual, and Xiongtao Huang.

[1]These include preferred and preference shares, trust preferred securities, deferrable coupon securities, and various convertible securities.

[2]Beginning in 2009, U.S. banks will be limited to a maximum of 25 percent trust preferred capital to Tier 1 capital (and 15 percent for internationally active banks).

Bank Writedowns and Capital Raised

(In billions of U.S. dollars)



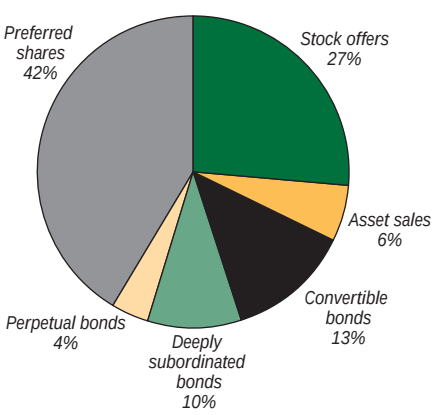
Source: Bloomberg L.P.

Box 1.3 *(concluded)*

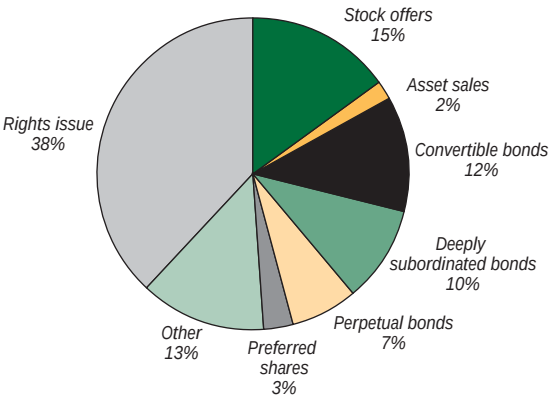
Capital Raised by Type of Instrument

(In percent)

North American Banks
($178 billion)



European Banks
($153 billion)



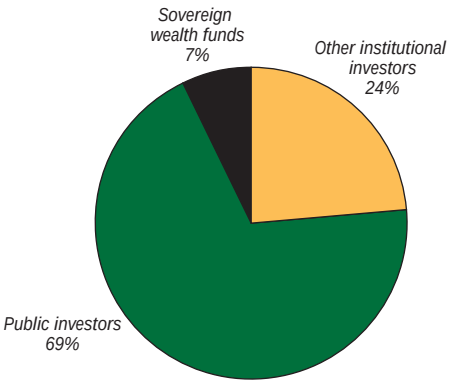
Sources: Bloomberg L.P.; and IMF staff estimates.

carry considerably higher spreads than those issued before the crisis. For example, deeply subordinated bonds issued by some of the affected institutions were paying yields of 7.5 to 8.5 percent (spreads of 300 to 400 basis points over U.S. treasuries), compared with around 6 percent (or about 100 basis points over treasuries) before the crisis.

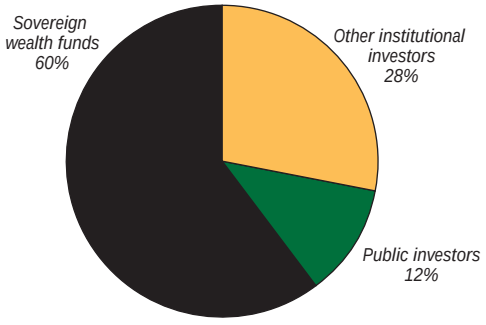
Capital Raised by Source

(In percent)

January 2008–July 2008
($300 billion)



July 2007–December 2007
($56 billion)



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

There has been a marked difference between the forms of capital raised by U.S. and European banks. U.S. banks have issued more hybrid capital, while European banks relied more on new stock issues. The difference reflects in part the larger share of hybrid instruments in Tier 1 capital for European versus U.S. firms already, and the significantly larger use of discounted rights issues by European institutions. Rights issues allow firms to mitigate the "dilution" of existing shareholders that arises from discounted sales that target a narrow group of investors.

The profile of those investing in banks has also changed (see third figure). In the second half of 2007, some 88 percent of fresh capital came from institutional investors and sovereign wealth funds (SWFs), with the latter investing in just a handful of institutions. Since January 2008, in contrast, 69 percent of the funds raised came from public investors and only 31 percent from institutional investors and SWFs.

parts of the banking system and providing a further negative feedback loop.[27] Deleveraging has also been hampered as off-balance-sheet vehicles are absorbed and customers tap credit lines. Banks are renewing such lines sparingly when they expire, but most are reluctant to reduce or withdraw lines before expiry for fear of alienating good customers. While some banks have failed or been bought outright, others are pursuing the sale, or winding down, of businesses less viable under current funding conditions, but this takes time. In the scenario above, we assume that banks are able to sell some $2.4 trillion of assets to nonbanks, while some $7.6 trillion of bank assets run off bank balance sheets during 2008–13, reducing credit growth. In total, U.S. and European banks shed some $10 trillion of assets, equivalent to around 14.5 percent of the stock of bank credit in those regions.[28]

Markets are pressuring banks to fundamentally change business models, and the deleveraging process is forcing industry consolidation.

The financial crisis has prompted a broad reassessment of financial sector business models, and in some cases investors are making swift judgments regarding which institutions are likely to survive or thrive. This has exerted pressure on bank equity valuations, pushing a number of bell-weather institutions into consolidation, and ultimately resulted in the demise of the stand-alone broker-dealer model. Many market participants concluded that the business model they followed made them vulnerable, especially during periods of prolonged market illiquidity. In particular, broker-dealers generally had leverage of around 30 times, with around half of their assets funded in the repurchase ("repo") market. Repo markets are subject to sudden pullbacks by cash lenders, especially when markets are illiquid, since a default may leave the cash lender with collateral that may be difficult to sell. The short maturity of most repo transactions means margins and "haircuts" can swiftly be used to exclude a borrower from the market. If the broker-dealer tries to pass on higher financing costs to its clients, those clients will take their business elsewhere, and may ask for their cash to be segregated, potentially leading to a run on cash at the broker-dealer. After this happened to Bear Stearns, markets were finely tuned to the risk of another occurrence. It was this factor that helped push Lehman Brothers to file for Chapter 11 bankruptcy protection, which created the conditions that were conducive to the merger of Bank of America and Merrill Lynch, and which made the remaining invest-

[27]For instance, Merrill Lynch's $6.7 billion sale of ABS CDOs to an affiliate of Lone Star Funds in August 2008 at a price equivalent to 22 cents on the dollar was seen as establishing a new mark for such assets that all banks would then have to adopt.

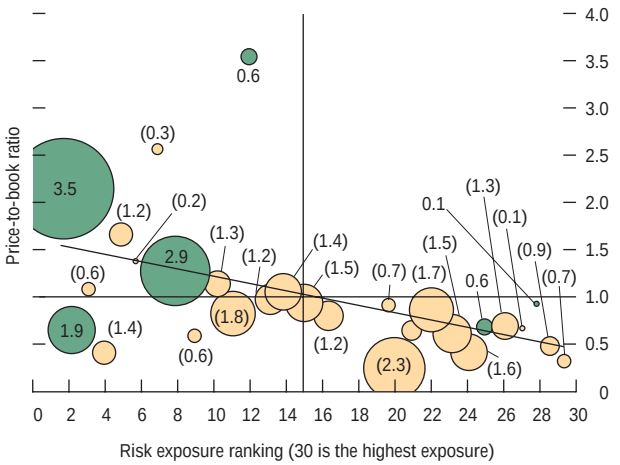
[28]We assume that heavier borrowing in securities markets offsets only a small part of the slowdown in asset growth.

ment banks targets for speculative pressure. Subsequently, both Morgan Stanley and Goldman Sachs were granted approval to transform into bank holding companies, effectively ending the era of a distinction between investment and commercial banking created by the 1933 Glass-Steagall Act.

Markets are also discriminating between different commercial bank business models, as suggested by the relationship between U.S. bank business lines, price-to-book values (P/B), and capital positions (Figure 1.19). First, after having an average P/B of almost 2.0 prior to the crisis, most banks now have ratios below 1.0 as share prices have fallen. Those banks also have Tier 1 regulatory capital ratios that are lower than the average of 8.9 percent for banks with P/B values over 1.0, suggesting that markets may still view these banks as undercapitalized. Second, a majority of banks that have a measure of business risk greater than the median (15) are trading below 75 percent of their book values. This could reflect investors' lack of confidence in the banks' ability to manage future credit losses. Third, most of the firms with a Tier 1 ratio that is more than 1 percentage point below 8.9 percent have especially low P/B ratios. Most of the banks in the bottom right quadrant of Figure 1.19 are U.S. regional banks or thrifts. In sum, market participants are penalizing banks with significant exposure to weaker business lines and lower capital adequacy ratios, suggesting that these banks need to enhance capital buffers, sell assets, or be acquired by more diversified and better-capitalized competitors.

In Europe, banks exposed to falling real estate values have lower relative valuations. For example, the P/B ratios of banks in Denmark, Ireland, and the United Kingdom have fallen significantly since early 2007 (to below 1.0 in the case of Ireland). These countries have experienced the steepest deceleration in real estate values in the region over the last couple of years (Figure 1.20). In contrast, the P/B ratios of banks in Germany and the Netherlands have been steadier over the crisis period, as have their corresponding real estate values.

Figure 1.19. U.S. Banks' Price-to-Book Ratios and Risk Exposures



Sources: SNL Financial; and IMF staff estimates.

Note: Represents the top 30 publicly-traded U.S. banks and thrifts by assets. The size of the circles represents a bank's percentage point deviation from an 8.9 percent Tier 1 regulatory capital ratio. Yellow circles represent negative deviations; green circles represent positive deviations. The risk exposure is a composite ranking of a firm's exposure to real estate loans, to regions that have experienced the largest declines in home prices, and that have the largest share of nonperforming assets.

Within countries, investors are discriminating between banks with high real estate exposures and those with diversified businesses. In the United Kingdom, mortgage banks are currently trading significantly below their book values, while those with more diversified revenue streams (e.g., global exposure, several business lines) are trading above (Figure 1.21). As in the United States, markets are also penalizing U.K. banks that rely disproportionately on wholesale funding. In order to reduce funding risk, banks are competing aggressively for retail deposits, with some mortgage specialists offering retail accounts at above-wholesale-market interest rates. However, markets appear to doubt the longer-term viability of these mortgage banks as stand-alone businesses, leading to speculation that they could be consolidated with more diversified firms.

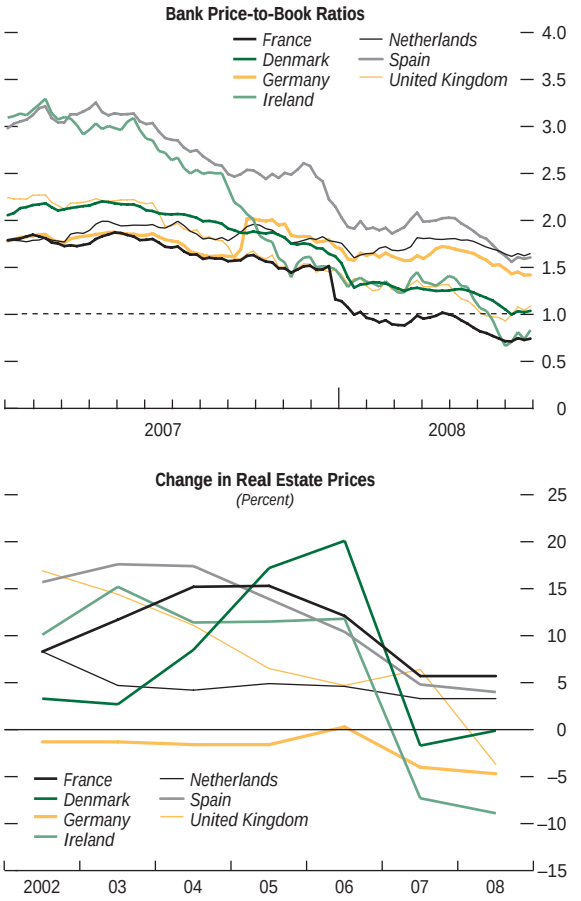
Other factors besides real estate exposure are also affecting bank valuations. For example, overall, Spanish banks have maintained P/B ratios of 1.6, above those in much of Europe. This may reflect their lower leverage levels compared with other European banks, greater reliance on more stable deposit funding, and a better regulatory environment.

In sum, the market is sending clear signals to bank management regarding unfavored business models; this has already resulted in the effective end of independent U.S. investment banks as viable entities. More broadly, this is likely to result in further consolidation, including through the exit of further banks and nonbank intermediaries.

Certain aspects of bank funding models—including over-reliance on cross-border funding—have contributed to vulnerabilities and exacerbated deleveraging pressures.

With securitization and wholesale funding markets adversely affected by the credit crisis, many banks have sought alternative sources of funds, including by increasing debt issuance (especially covered bonds, private placements, registered bonds, and offshore issues), aggressively bidding for customer deposits, and drawing on central bank and other facilities. Events

Figure 1.20. European Banks' Price-to-Book Ratios and European Real Estate Prices



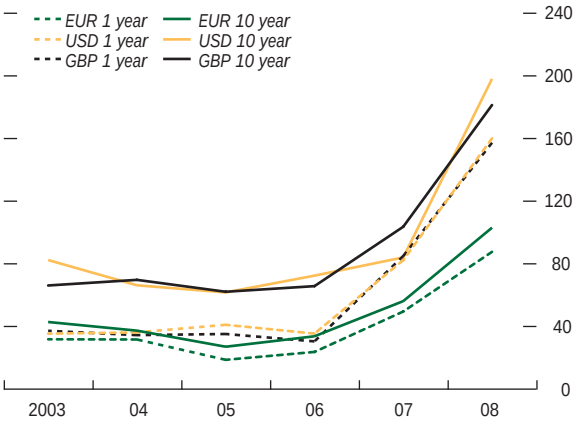
Sources: Bloomberg L.P.; and IMF staff estimates.
Note: Price-to-book values less than 1.0 may indicate the market's lack of confidence in the ability of banks in the respective countries to manage potential losses from current exposures.

Figure 1.21. U.K. Banks' Price-to-Book Ratios

Source: Bloomberg L.P.

Figure 1.22. AA Rated Bank Bond Index Spreads Relative to Government Bonds

(In basis points)



Source: Bloomberg L.P.

Note: Banks' bond spreads are estimated as the difference in the Bloomberg corporate bond bank AA indices in the United States, United Kingdom, and European Union. Indices covered domestic currency bond issued by the banking industry in corresponding region. The government bond benchmarks are chosen to match the relevant maturities of the bank bond issues.

have shown that over-reliance on wholesale funding can be a critical vulnerability, especially when the quality of the assets funded is called into question.[29]

Simultaneously, refinancing risk and costs have increased (Figure 1.22), as longer-term wholesale financing has become less available, leading to greater bank reliance upon short-term funding (overnight and weekly). Given the shortening in maturity of previous debt and loan issues (Figure 1.23), over the next 15 months the top 15 banks face funding needs of over $700 billion. More creditworthy banks have responded by expanding their issuance of longer-dated paper to secure their funding over the medium term, leading to "barbell-shaped" maturity profiles for their debt.[30]

Some banks with high exposure to less hospitable wholesale funding markets have responded by aggressively competing for deposits. Euro-area banks hit by wholesale funding strains, for example, were able to expand their retail deposit base and reduce their funding gap.[31] Despite these efforts to diversify funding, however, wholesale borrowings remain their largest funding source with large refinancing requirements in 2009 and 2010. In general, highly leveraged and less creditworthy banks that aggressively bid for customer deposits and rely heavily on short-term debt have experienced relatively large increases in their funding costs, reducing their profitability and ability to raise additional capital. The almost complete shutdown of securitization markets in Europe has made deleveraging more difficult (Table 1.3). In contrast, in the United States, the securitization market, though impaired, is still allowing banks

[29]See Chapter 2 for further details.

[30]For example, major Australian banks sharply expanded their bond issuance during the first quarter of 2008, over two-thirds of which was issued in longer-dated offshore tenors, mostly in dollars and euros. As a result, these Australian banks are generally ahead of their funding plans, albeit at a higher cost.

[31]The funding gap was reduced from 1,540 billion euros in September 2007 to 1,410 billion euros in March 2008 (ECB, 2008, p. 110).

Table 1.3. European and U.S. Public Securitization
(In billions of U.S. dollars)

	2008 annualized	2007	2006
European (RMBS and CMBS)	0	250	308
United States (HEL, CMBS, credit card, and student loan)	180	614	790

Sources: Citibank; and IMF staff estimates.
Note: CMBS = commercial mortgage-backed security; HEL = home equity loan; RMBS = residential mortgage-backed security.

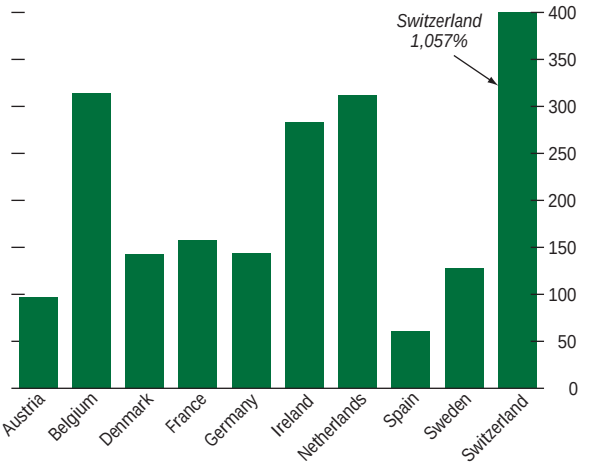
to move some assets they originate off balance sheets.[32]

Cross-border financing of banking systems has also emerged as a source of systemic liquidity risk. Banks heavily dependent on international funding and swap markets experienced significant stress as these markets came under pressure. Indeed, those that have experienced the most severe stress where governments had to inject capital, notably Iceland (Glitnir Bank) and Belgium (Fortis and Dexia), are large relative to their home country financial systems and therefore had to rely more on wholesale cross-border financing to achieve the high leverage necessary to boost returns. European banks with large holdings of dollar assets were especially exposed. These assets were financed in the wholesale market, including from U.S. banks, with much of this short-term borrowing from interbank markets, as reflected in the rise in borrowings from banks shown in Figure 1.24.[33] This became apparent when the crisis hit and European banks responded by raising additional funds in Japanese yen, euros, and British pounds, and swapping them into dollars using foreign exchange and cross-currency swaps. The U.S. dollar foreign exchange swap and the cross-currency swap basis widened sharply against major currencies, as swap markets tended to become

[32]Almost all new securitization in Europe is now retained (mostly for use as collateral with the ECB), as compared to before the crisis when it could be distributed to capital markets.

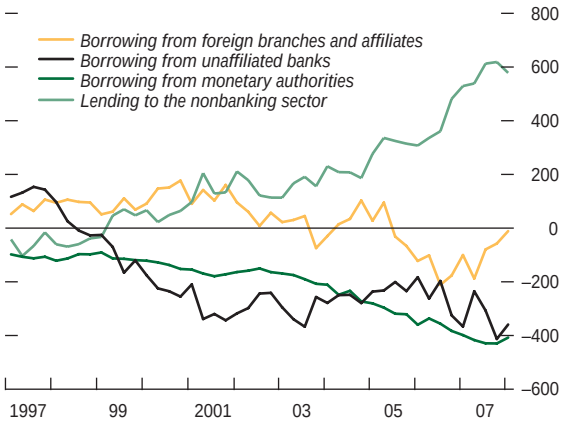
[33]See McGuire and von Peter (2008) for more details on the structure of this financing.

Figure 1.23. European Banks' Cross-Border Liabilities, end-2007
(As a percentage of GDP)



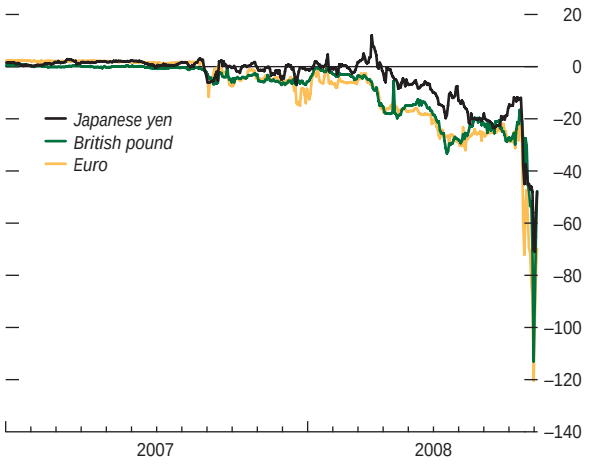
Sources: Bank for International Settlements; IMF, World Economic Outlook database.

Figure 1.24. Net Cross-Border U.S. Dollar Claims of European Banks
(In billions of U.S. dollars)



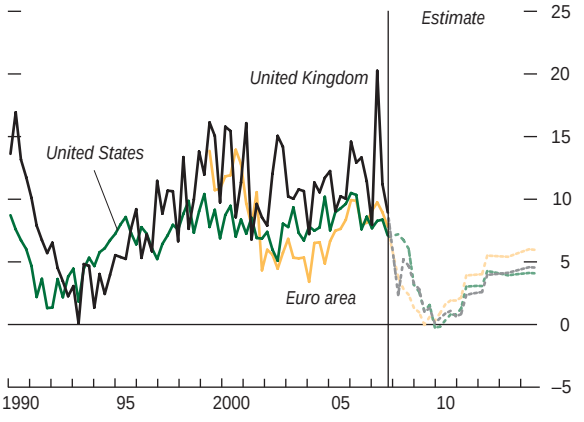
Source: Bank for International Settlements.

Figure 1.25. Cross-Currency Swaps with U.S. Dollar
(In basis points, one-year tenors)



Source: Bloomberg L.P.

Figure 1.26. Private Sector Credit Growth
(Borrowing as a percentage of debt outstanding, quarter-on-quarter annualized, seasonally adjusted)



Sources: Federal Reserve; official sources; and IMF staff estimates.

one-sided and illiquid (Figure 1.25),[34] pushing European and other banks to rely on their branches and subsidiaries in the United States to raise dollar funding. The swap basis widened again around end-March as stresses on global markets increased, raising cross-border funding costs and encouraging European banks to draw on the Federal Reserve's new Term Auction Facility (TAF). In September, it reached record wides in the wake of the Lehman Brothers bankruptcy, and narrowed only when the Fed added an overnight TAF and sharply increased dollars available through swaps with major central banks, effectively substituting for the illiquid swap market. Demand for the European Central Bank (ECB) TAF has been especially strong, as demonstrated by high participation and bid/cover ratios (see Box 2.3 in Chapter 2), particularly by smaller European banks with limited U.S. operations.

However, official support should be used only in the short-term, and many banks that have relied heavily on potentially risky cross-currency funding will need to delever before funding market conditions can return to normal.

The deleveraging process will take a toll on credit growth to the private sector.

The complexity of the deleveraging process is likely to hamper the availability, and raise the cost, of credit for a prolonged period. Building upon earlier analysis (IMF, 2008c), we estimate the impact of bank balance sheet adjustment on the global supply of credit to the private sector.[35] The supply of credit is driven by several factors, including the pace and depth of credit deterioration, capital market sentiment, and the degree of balance sheet adjustment needed

[34]See Baba, Packer, and Nagano (2008) for a more detailed description of the link between swap markets and bank funding.

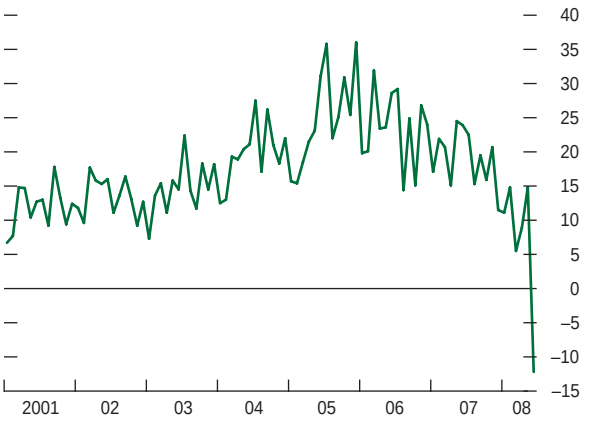
[35]The April 2008 GFSR outlined two scenarios for private sector credit growth for the United States. This analysis draws upon more recent data and broadens the analysis to include the euro area and the United Kingdom. The scenario uses WEO growth assumptions as the basis for generating an implied path for the demand for credit.

to restore capital ratios. The scenario shows that credit growth is likely to fall sharply in the period ahead to levels that are consistent with the "credit crunch" scenario sketched in the April 2008 GFSR (Figure 1.26). These constrained conditions for credit are likely to persist at least through next year, and perhaps longer.[36]

This pattern is consistent with developments so far. U.S. credit growth has started to slow to rates last seen just after the 2001 downturn, broadly in line with the predictions in the last GFSR. Household borrowing has slowed markedly. The growth in corporate lending is likely to abate once existing loan commitments have matured or been drawn down. In Europe, household credit growth is also slowing, driven almost exclusively by mortgage lending (Figure 1.27). Corporate loan growth has begun to slow in Ireland, Spain, and the United Kingdom as earnings prospects have dimmed along with weaker economic growth.

If the expected private sector fresh capital-raising were to fail to materialize, and in the absence of public sector asset purchases, private sector credit growth could fall as low as –7.3 percent quarter-on-quarter annualized in the United States, and would be slightly less negative in Europe (Table 1.4).[37] The private sector bank capital purchases alone would limit that drop, but credit growth would still turn slightly negative quarter-on-quarter in all three regions before rebounding.[38] To the extent the private sector bank capital purchases do not materialize, then a public sector alternative would need to be substituted. Finally, purchases of troubled

Figure 1.27. Euro Area Financial Institution Lending for House Purchase
(In billions of euros)



Source: European Central Bank.

[36]There is, of course, considerable uncertainty surrounding this scenario, and changes in the environment can rapidly alter the outcome. For instance, a more determined effort by banks to shrink their balance sheets through the sale, rather than run-off, of assets may alter the trajectory. Similarly, a greater-than-expected willingness among investors to subscribe to fresh capital for banks might allow more assets to be rolled over rather than to mature, and keep credit growth from dipping.

[37]So far, only the United States has announced a major publicly funded asset management initiative.

[38]As a point of reference, U.S. credit growth to the private sector has never been negative in the 55 years for which records exist.

Table 1.4. Sensitivity of Deleveraging to Public Sector Support
(In percent, quarter-on-quarter)

	Trough in Private Sector Credit Growth		
	United States	United Kingdom	Europe excluding the United Kingdom
With $2 trillion public sector purchases	0.1	0.0	0.1
With private sector bank recapitalization, but no public sector purchases	–2.7	–2.2	–1.3
No public purchases and no private bank recapitalization	–7.3	–6.3	–4.5

Source: IMF staff estimates.

Note: Public sector purchases (50 percent, United States; 10 percent, United Kingdom; and 40 percent, Europe excluding the United Kingdom).

assets of $1 trillion in the United States[39] along with support measures for banks taken and expected from Europe, sees credit growth troughing at just above zero quarter-on-quarter annualized in the base case. In sum, in a disorderly deleveraging scenario where the private sector is unwilling to provide fresh capital to banks or purchase troubled assets, credit growth would become sharply negative, having a profoundly negative impact on the real economy. Government intervention to inject capital and remove troubled assets would be needed to prevent such an occurrence.

Systemic Implications

The global financial system has entered a new phase of the crisis, where the threat to solvency of some institutions has led to persistent, widespread counterparty risk concerns and required the commitment of public resources to contain systemic risks and the economic fallout. The burden of providing liquidity and supporting markets is stretching the existing capacities of monetary and other authorities. This section addresses specific areas of the U.S. and other financial systems that could undergo further stress on a systemic scale. In addition, some wider ramifications of deleveraging are highlighted.

Raising capital from the private sector has become very challenging and segments of the financial system have become undercapitalized.

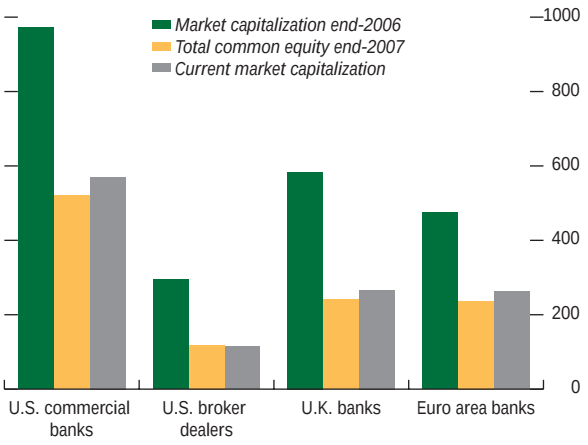
The extreme downward pressure on equity prices of financials can be likened to a "run on bank capital," or rather on the capitalization value of banks. Much as depositors in a conventional run on a bank might rush to withdraw their funds before others do so, now investors have been rushing to sell equities of financial institutions. As a consequence, many banks that were mainstays of their economies until recently have seen their market capitalizations crushed, and are trading at close to common equity and less than book values (Figure 1.28). As a temporary measure to short circuit a vicious downward spiral, the authorities have resorted to temporary bans on short selling. Nevertheless, falling equity prices and the difficulties financial institutions face in raising equity from public markets illustrate a challenge for the authorities in restoring market confidence. The authorities can give reassurance to depositors and, in some exceptional circumstances, other creditors by assurances of prompt action to resolve problem institutions and to prevent failures that could cause systemic problems. But such assurances provide little comfort to equity investors who believe that their investments could be largely wiped out in a public resolution. Indeed, the likelihood of official intervention in less viable banks may, in some cases, have accelerated the downward pressure on equity prices of other banks struggling to delever or absorb the economic downturn. Government involvement in the resolutions of Northern Rock, Bear Stearns, Fannie Mae, Freddie Mac, AIG, Fortis, Dexia, and other institutions have illustrated this, as in each case the announced resolutions failed to support equity prices of other financial institutions.

[39]Including $700 billion under the U.S. Treasury authority to purchase troubled assets, and some $300 billion assumed to result from the earlier commitment to purchase mortgage-backed securities.

The government-sponsored enterprises were unable to withstand sizable losses or provide extensive support to the U.S. mortgage and housing markets without support from the government.

The GSEs' capital positions—which were already thinner than for most other financial institutions—came under pressure as mortgage credit deterioration broadened, posing vulnerabilities for broader markets. Given the massive size of the GSEs' assets and liabilities and global investor base, the broader global markets were vulnerable to further losses (Box 1.4), while further weakness in their capital positions limited their ability to facilitate new mortgage originations. Losses incurred by the GSEs have been relatively limited compared with their outstanding mortgage exposure. However, our estimates suggest that over the next few years, the GSEs are likely to incur a total of $100 billion to $135 billion in gross losses (excluding the effects of hedging and mortgage insurance) (Table 1.1). Although excess capital remained above the surcharge on the minimum regulatory capital requirements for both GSEs, it would have been insufficient had losses breached the upper range of loss estimates.[40] Furthermore, given their public policy mandate, the GSEs were also under pressure to help stabilize mortgage markets, which would have required further capital-

Figure 1.28. Market Capitalization and Equity Book Values of Select Financial Institutions
(In billions of U.S. dollars)



Source: Bloomberg L.P.
Note: U.S. broker dealers include Lehman Brothers, Morgan Stanley, Goldman Sachs and Merrill Lynch. The other three categories, namely, U.S., U.K. and euro area banks, include institutions that have retail banking businesses in their respective regions.

[40]To be classified as adequately capitalized, the GSEs needed to meet the minimum and risk-based capital (RBC) standards. The minimum capital requirement for the retained portfolio of mortgages was set at 2.5 percent of assets plus 0.45 percent of adjusted off-balance-sheet obligations and 0.5 percent for the guarantee business that provides mortgage insurance. As of 2004–05, an additional 30 percent surcharge was applied to the GSEs' minimum capital requirements, though this was reduced to 20 percent in March 2008 (and then to 15 percent in May 2008 in the case of Fannie Mae). The RBC requirement is equal to the amount of capital that each GSE must hold to absorb projected losses and management and operations risk, and is based on interest rate stress test scenarios. The new statutory regulator—the Federal Housing Finance Agency (FHFA)—is formulating new capital requirements for Fannie Mae and Freddie Mac. However, following the placement of the GSEs into conservatorship and the announcement of an enhanced credit line and capital injection from the U.S. Treasury, capital support is essentially being provided by U.S. taxpayers.

Box 1.4. U.S. Government-Sponsored Enterprises and Housing Reform Developments

This box discusses the role of the mortgage-related U.S. government-sponsored enterprises, and assesses government actions taken to restore confidence, reduce systemic risks of a more pronounced liquidity crisis, and stabilize the secondary mortgage market.

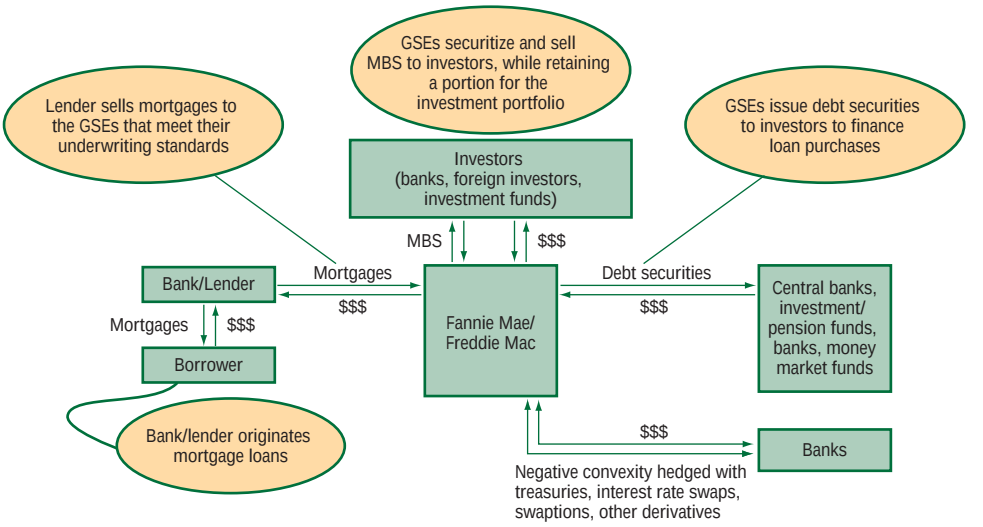
The two largest housing-related U.S. government-sponsored enterprises (GSEs), Fannie Mae and Freddie Mac, were established with the intent of providing liquidity to the residential mortgage market, thereby promoting home ownership, particularly among low- and middle-income households. They fulfill their mission by purchasing mortgages from primary mortgage originators, packaging them into securities, enhanced with credit guarantees, and then selling the guaranteed securities in the secondary market (see first figure). In addition, the GSEs purchase mortgage-related securities, loans, and other types of assets for their investment portfolios; this business line has been the subject of controversy owing to their funding advantage and the lack of a clear public purpose.

The GSEs are systemically important institutions, affecting a wide range of market participants and breadth of assets. Fannie Mae and Freddie Mac have a combined $5.3 trillion in mortgage risk, based on mortgages they securitize ($3.7 trillion) or directly hold in their portfolios ($1.6 trillion). Taking into account the debt issued to fund their activities, the GSEs thus contribute roughly one-quarter of the $31 trillion outstanding U.S. bond market debt (see second figure). The GSEs' activities also have important implications for broader fixed-income asset prices and volatility, since they hedge mortgage convexity risk associated with the prepayments of mortgages with treasuries, interest rate swaps, swaptions, treasury options, and other instruments.

Banks, as large originators of conforming mortgages and investors in agency debt and MBS, have significant ties to the GSEs. Money

Note: The main author of this box is Rebecca McCaughrin.

Basic Structure of Government-Sponsored Enterprises' (GSEs) Business Practices



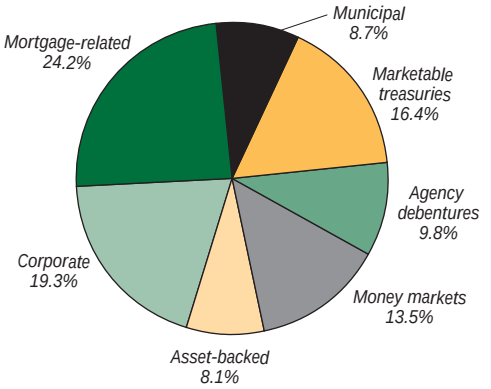
Source: IMF staff.
Note: MBS = mortgage-backed security; GSE = government-sponsored enterprise.

U.S. Fixed-Income Market

(In percent)

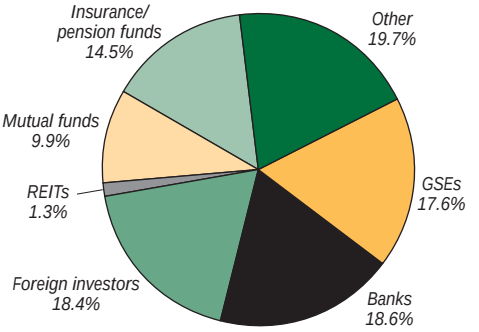
Composition of Outstanding U.S. Bond Market

($30.5 trillion, as of 2008:Q1)



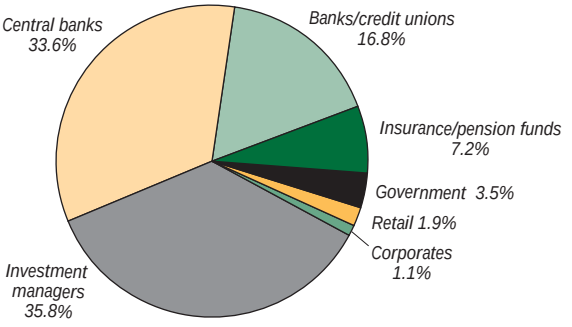
Primary Investors in Mortgage-Related Securities

($6.6 trillion, as of mid-2007)



Primary Investors in Fannie Mae/Freddie Mac Debt

($1.7 trillion as of mid-2008)



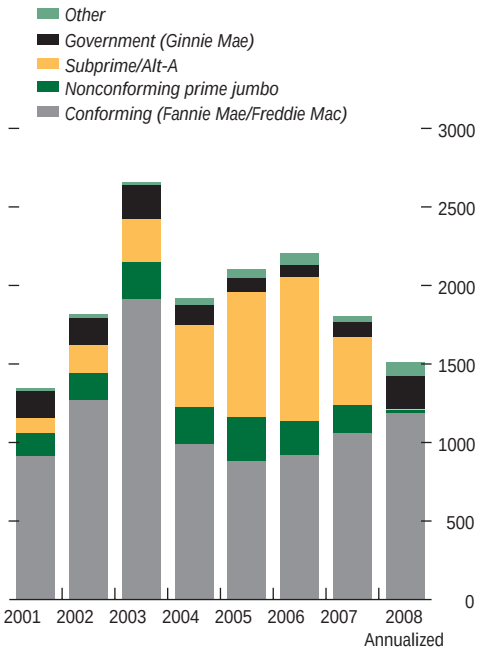
Sources: Bloomberg L.P.; Fannie Mae; Freddie Mac; Inside MBS & ABS; Securities Industry and Financial Markets Association; U.S. Treasury; Federal Reserve; Thomson Financial.

market funds are also dependent on the short-term discount notes issued by the GSEs, particularly as other forms of short-term investment (e.g., asset-backed commercial paper, auction rate securities, etc.) have declined or become more risky. Foreign institutions—central banks in particular—also have significant exposures to debt issued and guaranteed by the GSEs.

The GSEs are important participants in the mortgage market, both as investors and providers of mortgage financing. As the credit turmoil deepened, traditional investors scaled back their demand for mortgage products, as did providers of mortgage financing, shifting the burden more heavily to the GSEs. Despite the deterioration in the housing market, the GSEs have continued to (modestly) grow their investment portfolios and to guarantee mortgages that conform to their requirements. Together with Ginnie Mae, they stepped up their provision of liquidity to the secondary mortgage market, accounting for over 90 percent of new securitizations in recent months, as liquidity provided by private securitizers dried up (see third figure).

Box 1.4 *(concluded)*

Mortgage Securitizations
(In billions of U.S. dollars)



Sources: *Inside MBS & ABS*; and IMF staff estimates.

As capital needs intensified owing to rising losses and limited alternative sources of mortgage financing, government efforts sought to reduce the probability of a liquidity-driven event at the GSEs and to stabilize mortgage markets. The government initially implemented a series of measures, including (1) a temporary increase in the line of credit with the U.S. Treasury;[1] (2) temporary authority for the U.S. Treasury to purchase unlimited equity in the GSEs at terms and conditions it sets; and (3) a temporary consultative role for the Federal Reserve to regulate the GSEs. In the interim, the Federal Reserve also temporarily provided an unconstrained liquidity backstop to the GSEs through collateralized loans at the primary discount rate.

However, as risks to the overall safety and soundness of the enterprises and to broader financial markets continued to increase, the government sought a more direct and broad intervention, placing Fannie Mae and Freddie Mac into conservatorship under the direction of the newly created Federal Housing Finance Agency (FHFA). The U.S. Treasury injected capital through the purchase of $1 billion of senior preferred equity in each company (plus warrants representing 79.9 percent of the common stock) and was given authority to inject a maximum of $100 billion of capital into each entity to ensure their net worth remains positive. Dividends on existing common and preferred stock were immediately suspended, in effect drawing a distinction between debt and equity holders. Under the new structure, Fannie Mae and Freddie Mac are able to securitize GSE-eligible mortgages without limit, while their investment portfolios are permitted to expand moderately (to $850 billion each) through end-2009. Beyond that period, they will be required to shrink their investment portfolios 10 percent per annum until each reaches $250 billion. In addition, the U.S. Treasury was granted temporary authority to purchase new agency-backed MBS through a designated asset manager. Finally, a short-term secured credit facility was established for the housing GSEs, including the Federal Home Loan Banks (FHLBs).

The government's actions achieved three goals in the short term. First, by appointing FHFA as the conservator, the U.S. Treasury avoided full nationalization and instead became a stakeholder, thus limiting the potential fiscal impact. Second, the plan ensured the GSEs will maintain positive net worth (up to a limit), in turn restoring confidence in the agency debt market, while the reduced risk of a portfolio reduction by the GSEs and the U.S. Treasury's authority to purchase agency-backed MBS supports that market. Third, the secured lending facility, which is intended to serve as a last resort liquidity backstop, reduced

[1]The line of credit had not been increased since it was set at $2.25 billion in 1957, and was generally viewed as insufficient given the growth in the GSEs since then.

the potential for liquidity problems among the GSEs in the future.

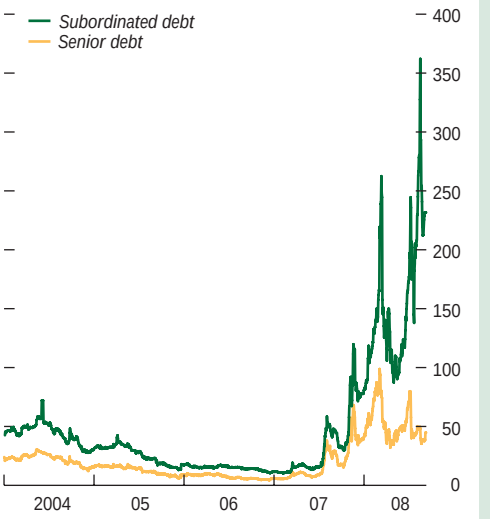
The longer-term role of the GSEs, though, must still be resolved. Ultimately, the government will need to determine the GSEs' status and role in the housing markets. The U.S. Treasury has explicitly noted that their business model is inherently flawed.[2] This suggests that the hybrid nature of the companies is not sustainable and that they will eventually need to be converted either into fully private or fully public companies or operate under a stronger regulatory framework. There are a number of outstanding questions that remain beyond 2009, once the U.S. Treasury's extraordinary support expires and the portfolios of the GSEs begin to shrink over the coming decade.

Reinforced government support has helped to bolster confidence in the GSEs' debt and MBS. While the major rating agencies cut the ratings of the preferred stock issued by the GSEs in light of the suspension of dividends and the dilutive impact of the government's capital injection, they also upgraded their outlook on the GSEs' subordinated debt, owing to the reduced risk of a deferral of interest payments. Reflecting a more explicit government guarantee, senior and subordinated agency debt and agency-backed MBS debt spreads tightened relative to both treasuries and interest rate swaps and default risk fell (see fourth figure). The risk premia on the GSEs' regular short-term discount note and longer-term debt auctions declined, thus enabling the GSEs to continue to

[2]Statement by U.S. Treasury Secretary Henry M. Paulson, Jr. on Treasury and Federal Housing Finance Agency Action to Protect Financial Markets and Taxpayers, September 7, 2008.

Credit Default Swap Spreads on Government-Sponsored Enterprise Debt

(In basis points, five-year tenors)



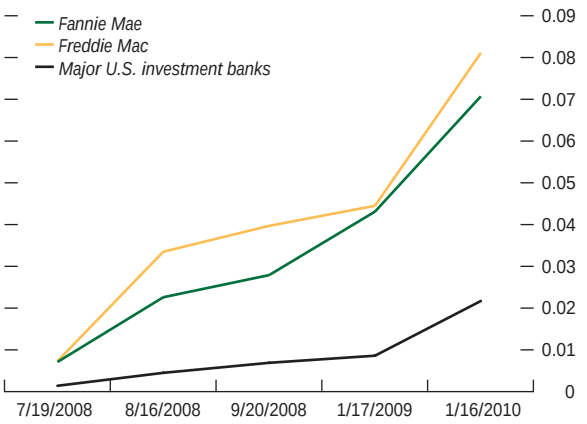
Source: Datastream.

guarantee new mortgages. The spread between MBS issued by public (e.g. Ginnie Mae) and conventional (e.g., Fannie Mae, Freddie Mac) entities also narrowed. Debt issued by the FHLBs, which had been trading in line with agency debt, continued to do so under the new structure, since all three entities have access to the short-term credit facility. With the existing shareholders diluted and dividends suspended, the GSEs' common and preferred equity prices plunged. Placing the GSEs into conservatorship introduced an additional operational complication for the credit default swap market, since such an action constitutes a credit default-triggering event.

raising efforts, over and above those entailed by absorption of credit losses.

In July, the U.S. authorities put in place the legal apparatus and authority for more direct and explicit support to the GSEs, but hopes that this would be sufficient to restore market confidence and encourage further private capital provision subsequently diminished. Those pressures were reflected in market-based indicators. For instance, equity option prices implied, at the time, that the probability of equity values falling to zero was higher than for investment banks

Figure 1.29. Probability of Default Based on Equity Option Prices
(In percent)



Sources: Bloomberg L.P.; IMF staff estimates; see Capuano (2008) for further details.

and that the GSEs needed to increase their capital base in the next few quarters in order to delever their portfolios and adjust their balance sheets (Figure 1.29).[41]

The loss of confidence in the GSEs and risks to the global financial system prompted the government to intervene in early September, placing the two largest GSEs into conservatorship. The authorities' intervention has reduced the risk of portfolio reduction by the GSEs in the near term, removed uncertainty regarding their capital adequacy, potentially freed up scarce market capital, reinforced confidence in their debt and mortgage guarantees, and in general helped to improve mortgage securitization. The GSEs now have greater ability to support the mortgage market through a (modest) expansion in their investment portfolios through end-2009, supplemented by the U.S. Treasury's intended purchases. The initial market reaction was a tightening in agency debt and agency-backed MBS spreads, while GSE equity prices fell sharply. Tighter agency-backed MBS spreads and lower guarantee fees should, in turn, help to reduce mortgage rates and increase the availability of mortgage credit for GSE-eligible borrowers. However, the government's plan has only limited beneficial impact on the moribund primary and secondary nonagency mortgage market. More generally, the deleveraging trend remains in place, as do pressures on the housing market and household balance sheets.

Mounting credit losses could result in further bank solvency issues, potentially stretching deposit insurance resources.

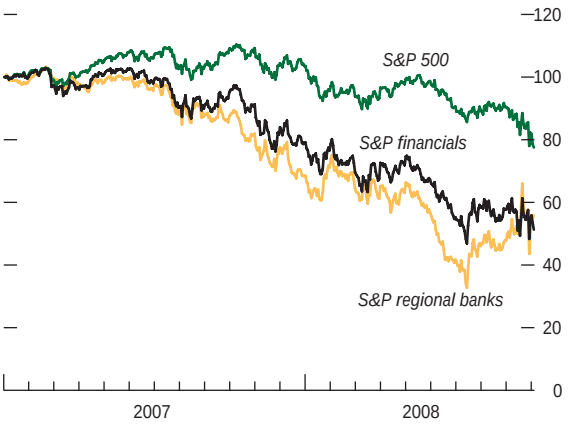
In view of their significant exposure to real estate assets, a number of U.S. regional banks have come under significant pressures (Figure 1.30). The dilution of existing GSE equity and the elimination of dividends appears manageable for most banks, but a few have signifi-

[41]The higher probability of default based on equity option prices may also have reflected the risk that equity holders may not be prioritized in the event of a government recapitalization.

cant exposure relative to their tangible capital. In addition, the banking sector will likely continue to face a challenging environment until U.S. house prices stabilize. This raises concerns about the adequacy of Federal Deposit Insurance Corporation (FDIC) reserves to cover the insurance of deposits, especially given a possible increase in the size of covered accounts.

Were further big depository institutions to fail, this could put a substantial strain on government depository insurance funds. There have been few failures in deposit-taking institutions in the United States so far—especially in comparison with the savings and loan crisis—though the failure of IndyMac, one of the large mortgage lenders (with assets of about $30 billion) has raised concerns about the adequacy of funds for multiple large-scale bank resolutions. The Emergency Economic Stabilization Act (ESSA) has provided for additional resources in such an event.[42] Other countries also face challenges with respect to deposit insurance. A number of authorities are taking steps to boost market confidence by temporarily expanding the coverage provided by their deposit insurance regimes. Some are also considering steps to make more permanent improvements in the design of schemes. For instance, the U.K. authorities are considering reforming their deposit insurance regime following the deposit run on, and subsequent nationalization of, Northern Rock, including improving the clarity and funding of the arrangements. Deposit guarantee arrangements in a wide range of other countries are being reassessed, and lessons need to be shared between countries.

Figure 1.30. U.S. Equity Index Performance
(January 2007 = 100)



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

[42]As of the second quarter of 2008, FDIC data showed that large banks ($50 billion and larger) are all well-capitalized. However, the number and combined assets of banks on the FDIC's regulatory watch list rose to 117 and $78 billion, respectively. FDIC reserves have fallen to $45.2 billion (representing just 1.01 percent of all insured deposits, which is considered historically low), owing to costs of absorbing IndyMac and other bank closures. If funds are drained further, the FDIC may raise insurance premiums to replenish its reserves, borrow up to $40 billion from the Federal Financing Bank, and, with the passage of EESA, request an unlimited line of credit from the U.S. Treasury.

Operational risks in credit derivative and repurchase markets pose risks, already evident during the bankruptcy of Lehman Brothers, spreading and intensifying concerns of counterparty risk.

Despite actions taken by the major market participants, encouraged by the Federal Reserve Bank of New York and other authorities to reduce the risk of unconfirmed trades and settlement problems, the settlement of CDSs referencing Fannie Mae, Freddie Mac, Lehman Brothers Holdings Inc., and other systemically important financial institutions could cause a disruptive chain reaction in the event of a failure of a major CDS protection counterparty. The problem lies in the large overhang of redundant bilateral contracts, as counterparties often establish offsetting contracts rather than close out existing contracts, thereby increasing counterparty risks. These risks have been partly mitigated by increased efforts to terminate offsetting contracts, more electronically processed transactions, and the creation of a central clearinghouse (although it will not be fully operational until late 2009).[43] Somewhat similar operational challenges can occur in the settlement of repurchase transactions, including those via triparty arrangements, and other over-the-counter derivative trades. Moreover, these challenges can be exacerbated by the potentially complex nature of the bankruptcy of a large counterparty. The Lehman Brothers Holdings Inc. bankruptcy demonstrated how such operational risks can have systemic implications because it was one of the 10 market makers standing behind about 90 percent of outstanding contracts. The logistics of closing out trades in which Lehman Brothers was a counterparty are daunting. All surviving counterparties will have to replace, offset, or close their outstanding derivative trades (not just CDS trades) against Lehman Brothers. These operational challenges are exacerbated by elevated market volatility, reduced liquidity, and concerns about the creditworthiness of other prospective counterparties.

Deleveraging and funding pressures are having wider repercussions on liquidity in core markets . . .

Global deleveraging, financial sector consolidation, the reduced number of leveraged investors and market makers, and heightened uncertainty have reduced trading liquidity in various core markets and have reduced the ability of market participants to adjust their positions quickly to market developments.[44] This, in turn, further contributes to reducing liquidity and increasing idiosyncratic and basis risks. Such risks are evident in sovereign swap and bond markets where hedging activities associated with synthetic structures have led to high volatility, resulting in sizable losses for dealers. Reduced liquidity extends to emerging markets where market-making costs have increased significantly as use of bank balance sheets has been circumscribed, for example, in offering total return swaps. With counterparty concerns at elevated levels, some prime brokers have experienced a sharp drop in liquidity as hedge funds have shifted funds into segregated accounts or into trust vehicles, and many are aiming to reduce their concentration in a single prime broker after the Lehman Brothers bankruptcy. In turn, prime brokers are tightening lending standards or, in some cases, have ended their relationships with hedge funds, reinforcing the broader deleveraging of the financial system (Box 1.5).[45]

. . . posing significant threats to financial intermediaries.

Persistent strains on term funding markets have escalated to a point where most credit is

[43]For any given participant, all transactions on the same underlying entity will be netted to a single position, and a single margin account maintained on its whole portfolio of CDS.

[44]For example, in Japan, foreign relative-value hedge funds have largely departed the Japanese market after many suffered large losses in March. Typically, government bond market makers hedge their cash positions in the futures market. However, the volume of open futures positions has fallen dramatically, and correlations with cash market movements have declined.

[45]Since banks that have large prime brokerage units cannot use segregated funds to help finance their assets, this therefore adds to deleveraging pressures.

Box 1.5. Impact of Credit Market Turmoil on Hedge Funds

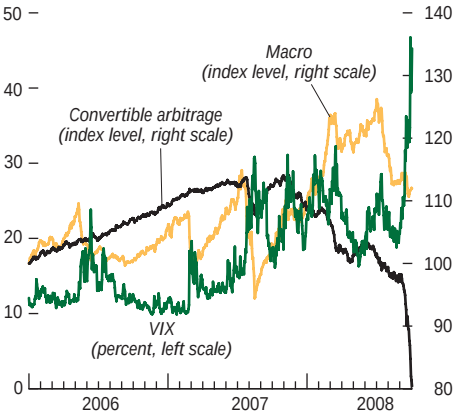
This box discusses the channels by which the credit market deterioration has affected hedge fund performance.

A number of hedge funds with large credit-related exposure have been negatively affected by the current market turmoil, particularly those with U.S. mortgage-related asset-backed securities and collateralized debt obligation exposure. Equity funds have also suffered losses, especially those with net long exposure to financials and consumer cyclical companies. The more volatile trading environment also appears to have impaired the performance of many hedge funds, including macro and convertible arbitrage strategies (see first figure).[1] Finally, the credit market crisis has resulted in tighter financing conditions specifically for fixed-income-oriented hedge funds, reducing their ability to lever returns.

Typically, hedge funds seeking direct (or explicit) leverage can obtain funding either through margin financing from a prime broker or through private repo markets. Margin financing from prime brokers has been cut, and haircuts and fees on repo financing have increased (see first table). The combination of these factors has caused average hedge fund leverage to fall to 1.4 times capital (from 1.7 times last year) according to market estimates.[2] Hedge funds have also increased cash balances. In the United States, cash balances have doubled to 16 percent of portfolios over the past year. Globally, average cash balances of hedge funds have risen to 22 percent (up from 14 percent one year ago) (see second figure).

Hedge funds are reportedly receiving large-size redemption requests from investors seeking to withdraw capital before others. Only a certain amount of capital is allowed to leave the fund through a "gate" at each quarter. The first ones to redeem come out relatively whole as the fund's most liquid assets are sold to service their requests, compared with those that seek to redeem later and are left holding more illiquid assets. Ninety-five percent of hedge funds have "gates" in their offering memoranda, which allow redemptions of up to 10 percent of fund assets. Redemption requests are usually allocated on a pro-rata basis, a procedure that

Performance of Hedge Fund Strategies and Risk Appetite



Sources: Bloomberg L.P.; and IMF staff estimates.
Note: VIX = S&P 500 volatility index.

Note: The main author of this box is Mustafa Saiyid.

[1]Theoretically, higher market volatility should have increased profit opportunities for strategies such as macro and convertible arbitrage, allowing macro managers to take advantage of wider swings in the performance of various asset classes, and convertible arbitrage managers to go long or short on the more highly-valued convertibility option relative to the underlying stock.

[2]Changes in leverage are calculated over the whole universe of strategies, heavily weighted by equity long-short and merger arbitrage strategies, which typically carry low leverage of 1.5 to 2.0 times (equity) capital. Other strategies typically operate with much higher levels of leverage, although it is difficult to make a direct comparison between equity and fixed-income leverage. For example, leverage is 4 times capital for tactical/macro funds; 5 to 9 times capital for convertible arbitrage funds; and as much as 10 times capital for relative value/fixed-income arbitrage funds. Since fixed-income arbitrage strategies rely more heavily on leverage to generate returns, changes in financing conditions affect the performance of these strategies more than others.

Box 1.5 *(concluded)*

Typical "Haircut" or Initial Margin

(In percent)

	April 2007	August 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 corporate CDS	1	5
Senior leveraged loans	10–12	15–20
Mezzanine leveraged loans	18–25	35+
ABS CDOs: AAA	2–4	95[1]
AA	4–7	95[1]
A	8–15	95[1]
BBB	10–20	95[1]
Equity	50	100[1]
AAA CLO	4	10–20
Prime MBS	2–4	10–20
ABS	3–5	50–60

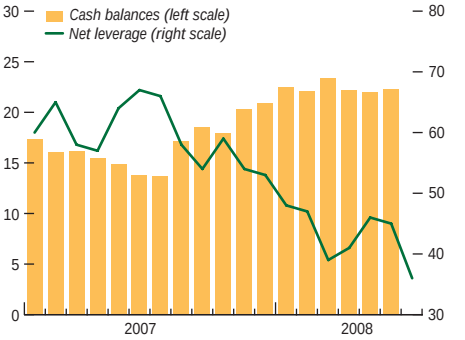
Sources: Citigroup; Morgan Stanley Prime Brokerage; and IMF staff estimates.

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

[1]Theoretical haircuts as CDOs are no longer accepted as collateral.

Leverage and Cash Balances of Global Hedge Funds

(In percent)



Source: Morgan Stanley Prime Brokerage.

Note: Leverage defined as assets divided by equity capital cash balances as a percent of total assets.

results in investors seeking larger redemptions than they need, as this increases the likelihood of being allocated redemption amounts more in line with their actual needs.

The combination of falling asset values, higher volatility, rising collateral haircuts, and investor redemptions have resulted in an increasing frequency of hedge fund failures in recent months, especially for those with exposure to structured credit.[3] Fixed-income hedge funds that have failed since June 2007 managed $97 billion in assets (see second table). Losses of investors in these hedge funds may already be as high as $60 billion over the course of the past year.

In response, hedge funds are seeking to restrict redemptions, but in return are having to cut their fees. Some are seeking to lengthen "lock-ups" of investor capital for as long as three years, while others have increasingly invoked "gates." Moreover, the average annual base fee has declined by as much as 50 basis points from 2 percent last year.

New restrictions on short selling could add further pressure to business models of hedge funds. Equity long-short strategies, which make up almost half of the $2 trillion hedge fund universe, are likely to suffer from reduced opportunities to make money from short positions. Some hedge funds report that they are avoiding the financial sector altogether, as they are unable to hedge long exposures with

Large Hedge Fund Failures

(June 2007–August 2008)

Strategy	Number	Assets[1]	Asset-Weighted Leverage[2]
Fixed-income	31	97	16
Structured products	21	79	17
Sovereign/Macro	4	8	14
Other fixed-income	6	10	10

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

Note: Includes hedge fund failures exceeding $100 million.

[1]In billions of U.S. dollars

[2]Leverage is defined as the ratio of assets to equity capital.

[3]Even relatively small declines in performance—5 to 10 percent, for instance—can force funds to liquidate large amounts of assets to meet margin calls or redemption requests. See Table 1.3 in the October 2007 GFSR (IMF, 2007).

shorts in this sector. Prime brokers comment that there are few alternatives to short sales, as synthetic shorts through options markets remain expensive and the credit default swap market provides imperfect hedges for long stock exposures.

From a systemic point of view, mounting strains on hedge funds could force rapid and disorderly unwinding of positions in various assets with wider ramifications for market liquidity. This could have potential knock-on effects for other market participants, for example, through counterparty exposures in derivatives markets. Institutional investors, including some pension funds and endowments, could suffer losses on exposures to fixed-income and equity long-short hedge funds, as such allocations had risen significantly in recent years.

now provided primarily on overnight terms. As a result, a number of nonbank institutions face possible failure, require official sector support, or must sell assets into illiquid markets to meet redemption pressures. Prime money market mutual funds (MMFs) have already experienced escalating redemptions, forcing failures in some cases, and a shortening in duration and reallocation to safe haven assets in other cases (Box 1.1). Instead of their traditional role of supplying liquidity to banks, they are now competing with banks for overnight funds and with financial firms for safer assets. This has exacerbated interbank funding pressures and increased rollover risks. The conservative stance of prime MMFs has also reduced the availability and raised the cost of commercial paper financing to nonfinancial corporations. To break this spiral, the U.S. authorities introduced a temporary guarantee on MMF investments in ABCP. Importantly, hedge funds are also facing tighter funding conditions, exacerbating redemption pressures due to weak performance, reduced investor risk appetite, and the impact of equity short selling restrictions. There are risks of a forced unwinding of their asset positions in the months ahead and a disorderly exit from hedge funds, with wider ramifications for market liquidity and volatility (Box 1.5).

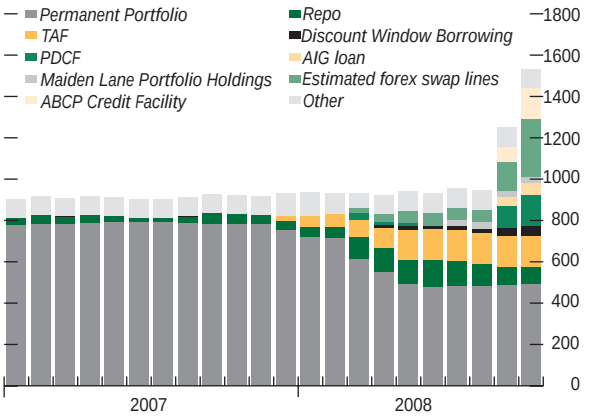
Rising public commitments could put pressure on perceived risks of sovereign credits.

Since balance sheet stresses in both the bank and near-bank sectors have severely compromised their ability to provide credit to the broader economy, the official sector has had to play a more active role in alleviating stresses. Government efforts to bolster market confidence and support broader financial and nonfinancial sectors should eventually assist in an orderly deleveraging by providing support to private balance sheets (Figures 1.31 and 1.32). However, increasing government commitments could further raise concerns about sovereign risk as risk is transferred from the private to the public sector. For instance, there are significant uncertainties about the budgetary impact of the U.S. government's GSE rescue operations, supplemental financing support to the Federal Reserve, support to the FDIC and other government agencies, and the $700 billion troubled asset purchase program. There is similar fiscal uncertainty related to government bilateral commitments introduced in Europe to support troubled institutions.[46] Reflecting concerns about a deterioration in fiscal positions and uncertainty

[46]There are several channels through which fiscal costs could rise: (1) a decline in net worth in the GSEs, thus requiring further capital infusions; (2) a deterioration in U.S. secondary mortgage market, requiring additional purchases of agency-backed MBS; (3) funding difficulties among the GSEs, leading to the extension of funds through the secured lending credit facility; (4) losses due to price declines on troubled assets that the U.S. Treasury might purchase from financial institutions; (5) increased demand for temporary insurance for money funds; and (6) a depletion in FDIC reserves, requiring a line of credit or other funds. At this stage, it is difficult to quantify the outlays with any degree of confidence.

Figure 1.31. Total Assets on Federal Reserve's Balance Sheet

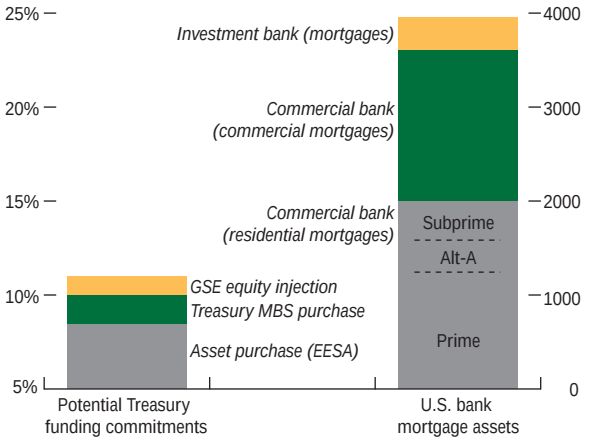
(In billions of U.S. dollars)



Sources: Federal Reserve; and Morgan Stanley.
Note: ABCP = asset-backed commercial paper; AIG = American International Group; PDCF = Primary Dealer Credit Facility; TAF = Term Auction Facility.

Figure 1.32. Potential U.S. Commitments and Mortgage Markets

(In percent of GDP; and billions of U.S. dollars)



Sources: Federal Reserve, *Flow of Funds*; JPMorgan Chase & Co.; and IMF staff estimates.
Note: GSE = government-sponsored enterprise; MBS = mortgage-backed security; EESA = Emergency Economic Recovery Act.

regarding the effectiveness of the government actions, mature market sovereign CDS spreads have widened (Figure 1.33).

Emerging Market Resilience Is Being Tested

Global stress spreads to emerging markets . . .

As the global financial turmoil has intensified, emerging market countries that once appeared relatively immune to the financial and economic shocks emanating from mature markets have increasingly been tested. Deleveraging by global financial institutions has raised the cost and reduced the availability of external financing, and investor risk appetite has decreased, reducing the demand for emerging market assets. Hopes for "decoupling" of emerging market countries from mature markets have diminished,[47] and emerging market policymakers are coping with a global growth slowdown, the risk of capital outflows, and inflation risks on the back of earlier commodity price increases.

. . . and vulnerabilities are broadening.

Vulnerabilities have risen in a number of emerging markets, some of which are highlighted in Table 1.5. Emerging Asia has suffered a substantial increase in vulnerability over the last six months, with inflation and terms-of-trade shocks hitting particularly hard, accompanied by concerns over the region's gearing to weakening global growth. Latin America has generally benefited from a positive terms-of-trade effect from higher commodity prices, while monetary policy has been more aggressive in containing inflation risk, but recent commodity price declines have raised concerns about the region's continued ability to resist a global slowdown. As highlighted in earlier GFSRs, domestic credit and inflation have grown rapidly in emerging Europe, and now that the domestic credit cycle

[47]Chapter 4 examines whether increasing financial integration has potentially raised emerging markets' vulnerability to external global shocks, focusing on the channel of equity markets.

is turning in some economies, the risk of a hard landing or regional financial crunch has increased.

Against the backdrop of rising emerging market risks, institutional investors have reduced positions, especially in equities.

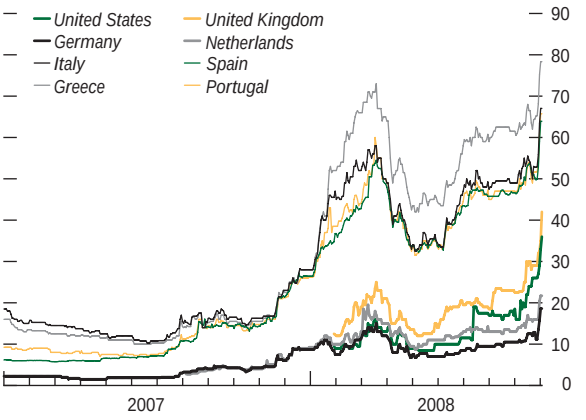
Mutual and pension funds have scaled back emerging market exposure in response to rising emerging market vulnerabilities. Flows into emerging equity markets have slowed or reversed since the beginning of the year, amid investor concerns about emerging market inflation and exposure to a slowing global business cycle (see Chapter 4 and Figure 1.34).[48] This has been more pronounced in Asia, with especially heavy outflows from Korea and Thailand, bringing net sales of Asian equities to $56 billion in the year through September. Latin America and Emerging Europe, the Middle East, and Africa have also experienced net equity portfolio outflows in recent months. As a consequence, share prices have dropped sharply.

Tightening external and internal conditions in emerging markets could result in a downturn in the domestic credit cycle.

Emerging economies are faced with more costly and less available external financing, as strained global banks restrict funding in the face of the credit crunch. Spreads on emerging market sovereigns and corporates have widened substantially (Figure 1.35). Issuance of emerging market external corporate debt contracted from $88 billion in the first three quarters of 2007 to $40 billion during the same period in 2008. Leveraged investors—such as hedge funds—that depend on funding from prime brokers or other financial institutions have been forced to scale back emerging market investments. The slowdown or reversal of funding inflows has contributed to sharp increases in onshore dollar funding costs—as implied by currency forwards or cross-currency swaps—in economies as

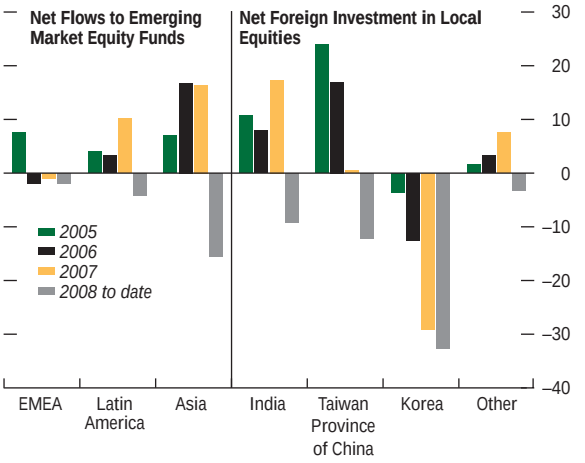
[48]Chapter 4 provides a longer-term view of vulnerabilities to equity market changes.

Figure 1.33. Sovereign Credit Default Swap Spreads
(In basis points, ten-year tenors)



Source: Bloomberg L.P.

Figure 1.34. Net Foreign Equity Investment in Emerging Economies
(In billions of U.S. dollars)



Sources: Bloomberg L.P.; and IMF staff estimates.
Note: "Other" includes Indonesia, Philippines, Thailand, and Vietnam.
EMEA = Emerging Europe, the Middle East, and Africa.

Table 1.5. Macro and Financial Indicators in Selected Emerging Market Countries[1]

	Commodity Price Sensitivity[2] *(Ratio)*	Current Account Balance[3] *(In percent of GDP)*	Gross Reserves to Short-Term External Debt[4] *(Ratio)*	Net External Position vis-à-vis BIS-Reporting Banks[5] *(In percent of GDP)*	Growth in Credit to the Private Sector[6] *(In percent, year-on-year)*	Inflation[7] *(In percent)*	Real Policy Rate[8] *(In percent)*
Europe							
Bulgaria	1.6	–21.9	1.1	–29.0	54.5	14.5	–9.4
Croatia	1.1	–9.0	0.9	–59.7	11.6	8.4	. . .
Estonia	1.2	–11.2	0.2	–78.7	21.5	11.1	. . .
Hungary	0.6	–5.5	0.9	–54.1	18.0	6.7	1.8
Iceland[9]	3.9	–8.0	. . .	–267.9	. . .	13.6	1.9
Kazakhstan	4.5	–1.7	0.6	–8.0	22.8	20.0	–9.5
Latvia	1.9	–15.0	0.3	–72.5	22.2	16.7	–10.7
Lithuania	1.2	–10.5	0.9	–45.6	36.4	12.2	–7.0
Poland	0.7	–5.0	0.8	–17.1	29.5	4.8	1.2
Romania	0.6	–14.5	0.9	–36.4	62.0	9.0	1.2
Russia	4.1	5.8	2.9	2.2	51.4	14.7	–3.7
Serbia	. . .	–16.1	2.8	–15.1	37.0	14.3	. . .
Turkey	0.3	–6.7	0.9	–12.2	32.9	12.1	4.7
Ukraine	0.6	–7.6	1.0	–9.5	63.9	26.8	–14.8
Gulf States							
Kuwait	13.6	45.2	. . .	8.9	35.5	11.4	–5.7
Saudi Arabia	7.6	31.3	. . .	27.9	28.5	10.6	. . .
United Arab Emirates	5.3	27.5	. . .	–1.3	45.3	. . .	. . .
Africa							
Egypt	2.1	0.8	7.5	16.0	12.6	22.2	–11.2
Ghana	2.7	–9.8	. . .	–8.0	. . .	15.3	. . .
Nigeria	4.5	6.5	. . .	15.5	96.5	9.7	. . .
South Africa	1.2	–7.7	1.6	4.7	15.2	11.6	0.4
Uganda	2.8	–7.7	. . .	13.4	41.2	8.7	. . .
Asia							
China	0.3	9.8	6.9	1.1	17.5	6.3	1.2
India	0.5	–3.1	5.9	–8.9	24.1	12.0	–3.0
Indonesia	1.2	1.8	2.1	–8.5	31.4	11.9	–2.9
Korea	0.2	–1.0	1.3	–17.5	16.0	5.9	–0.7
Malaysia	1.4	11.7	6.0	–10.1	10.3	7.7	–4.2
Pakistan	0.6	–6.9	12.1	4.8	21.6	24.3	–11.3
Philippines	0.3	2.1	2.2	–2.2	5.2	12.2	–6.5
Thailand	0.6	3.4	3.1	3.2	7.0	9.2	–5.7
Vietnam	1.9	–13.6	14.5	–10.2	63.9	27.0	–13.0
Latin America							
Argentina[10]	6.7	0.4	1.1	2.8	37.6	9.1	–0.2
Brazil	1.8	–0.7	1.7	–8.1	31.0	6.4	6.6
Chile	2.5	–0.5	1.1	–7.9	17.8	9.5	–1.8
Colombia	4.8	–4.9	1.7	0.4	21.0	7.5	2.5
Mexico	1.4	–1.0	1.4	–2.3	11.5	5.4	2.9
Peru	2.7	–0.2	3.0	2.6	31.7	5.8	0.2
Venezuela	8.3	7.2	2.2	24.1	51.8	33.7	–8.9

Sources: Bloomberg L.P; Bank for International Settlements (BIS); IMF, *Direction of Trade Statistics, International Financial Statistics* (IFS), and *World Economic Outlook* (WEO); and IMF staff estimates.

[1]The shaded boxes of the table point to areas of potential concern. Cut-off values are as follows: measure of commodity price sensitivity of less than 1; current account balance below –5 percent of GDP; ratio of reserves to short-term debt below 1; net external liabilities to BIS-reporting banks less than –10 percent of GDP; growth of credit to the private sector greater than 20 percent year-on-year; inflation greater than 10 percent year-on-year; real policy rates below zero.

[2]The ratio of exports of primary commodities to total exports divided by the ratio of imports of primary commodities to total imports estimated by IMF staff. Average of 2002–04.

[3]Projections of the current account balance and GDP for 2008 in dollar terms from the WEO.

[4]Short-term debt is measured at remaining maturity. End–2007 estimated by IMF staff.

[5]Data on external positions of reporting banks vis-à-vis individual countries and all sectors from the BIS.

[6]The latest observations ranging from February 2007/08 to June 2007/08 from the IFS.

[7]Year-on-year inflation in July 2008 or latest observations.

[8]Policy rates in mid-August 2008 are deflated by inflation shown in the previous column.

[9]Though it is classified as a mature market, Iceland is included in this table becuase of its relatively high levels on some indicators included in this table.

[10]Analysts believe and various indicators suggest that actual inflation is considerably higher than the official data.

diverse as Brazil, Korea, and India (Figure 1.36). Smaller corporates and financials have been especially squeezed and in some cases shut off from dollar funding.

A combination of global credit tightening, rising domestic interest rates based on inflation concerns, and a global growth slowdown could accelerate a downturn in domestic credit, which, following a lending boom, is likely to lead to rising defaults and deterioration in asset quality. Credit growth in several emerging markets has begun to slow, forcing a downturn in real estate prices in some cases.[49] Most emerging market banking systems had been insulated from the global credit turmoil (Figure 1.37),[50] but some are facing increasing external financing pressures. In those dominated by foreign-owned banks dependent on parent bank financing, the deterioration in asset quality as well as a downturn in parent banks' home markets, could slow external funding, as seems evident in the Baltics. In countries more reliant on portfolio flows, banks have come under stress as outflows have tightened money market liquidity, raising concerns about access to funding. These pressures are most evident in Russia, where they aggravated concerns about counterparty risk and led to illiquid interbank markets and substantial emergency public support to avert a systemic crisis.

High inflation rates have complicated policymaking, sending real interest rates below zero.

Inflation-targeting regimes are being tested as inflation exceeds central bank targets in many emerging markets. In response, many central banks have tightened monetary policy. However, policy rate increases have often been insufficient to prevent real interest rates from falling, often into negative territory, as monetary policy

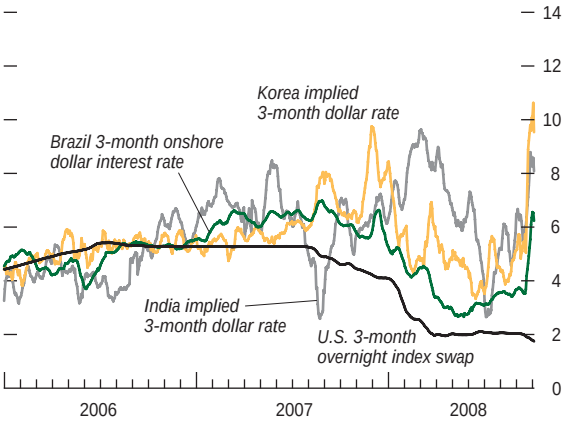
[49]See Figure 1.40 in Annex 1.1 for private sector credit growth among emerging market economies.

[50]Emerging market economies have largely avoided direct exposure to mortgage-related structured products, reflecting in part that attractive domestic investment opportunities obviate the need for complex products that enhance yield.

Figure 1.35. Emerging Market External and U.S. High-Grade Corporate Spreads
(In basis points)

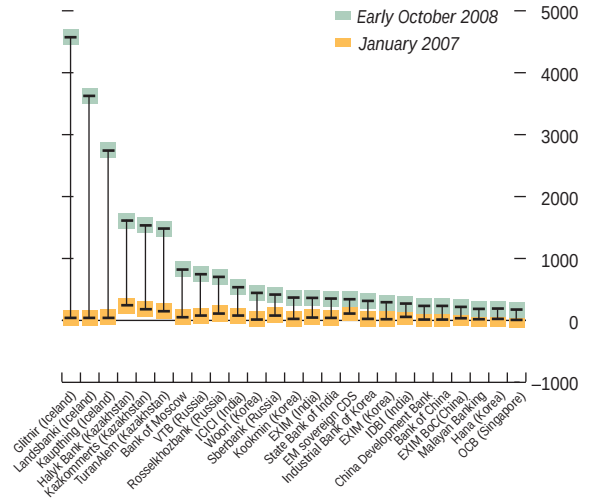
Sources: J.P. Morgan Chase & Co.; and Merrill Lynch.

Figure 1.36. Onshore Emerging Market Dollar Interest Rates
(In percent; 10-day moving averages)



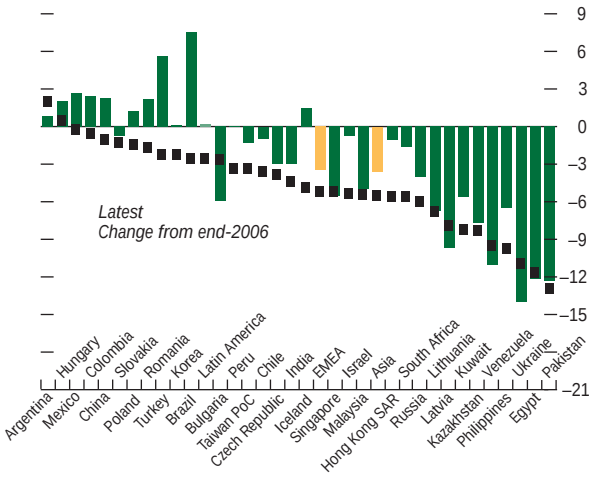
Sources: Bloomberg L.P.; and IMF staff estimates.

Figure 1.37. Credit Default Swap Spreads on Selected Emerging Market Banks, January 2007—Early October 2008
(In basis points)



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

Figure 1.38. Real Policy Rates: Latest Levels and Changes from end-2006
(In percent)



Sources: Bloomberg L.P.; and IMF staff estimates.
Note: Policy rates or similar indicators used by market analysts and year-on-year inflation in December 2006 and September 2008 or latest. Analysts believe and various indicators suggest that actual inflation is considerably higher than the official data in Argentina. EMEA = Emerging Europe, the Middle East, and Africa.

authorities viewed commodity price shocks as either exogenous or transitory (Figure 1.38).[51] Compounding the problem, policy settings in many economies were relatively loose coming into the credit crisis, partly owing to accommodative monetary conditions in mature economies.

More recently, with global growth prospects weakening further, commodity prices have fallen, leading to a moderation in market-based inflation expectations (Figure 1.39). However, the gradual removal of distortionary subsidies, while welcome, and the potential for another run-up in commodity prices once the global economy stabilizes, continue to pose risks to the inflation outlook. Moreover, signs of second-round effects are showing up on the back of relatively robust domestic demand, as core inflation and wages have risen.

The risks of a hard landing are highest in Eastern Europe.

House prices in eastern Europe have soared in tandem with domestic credit growth, and the credit portfolios of banks in emerging Europe have become increasingly exposed to the real estate sector. Banks have not experienced a significant increase in loan losses so far, but have increased provisions for bad loans. Internal risk controls could force a sharp reduction in credit growth to protect bank capital if asset quality deteriorates sharply. The risk of such a scenario has risen, for instance, in the Baltics, where house price appreciation has slowed or prices have fallen, real credit growth is falling sharply (Figure 1.40), real GDP growth has decelerated sharply or turned negative, and inflation remains elevated. Elsewhere in eastern Europe, specifically in Bulgaria, Romania, and Ukraine, house prices and domestic credit are still growing, but credit spreads have risen as well, signaling an increase in risks.

Domestic banks in central and eastern Europe have also built up large negative net foreign

[51]See Chapter 3 of the October 2008 WEO (IMF, 2008d) for a discussion on the linkage between inflation and commodity prices.

positions vis-à-vis international lenders. In these countries, the maintenance of credit growth hinges crucially on cross-border lending by foreign parent banks to local subsidiaries.[52] Most of those parent banks remain vulnerable to a downturn in market sentiment as they obtain a substantial part of their funding from international wholesale markets, and many—including parent banks in Sweden, Austria, and Italy—have come under increasing stress from the global credit shocks in September. While most are committed to a long-term presence in the region, if external financing conditions deteriorate further and force parent banks to contract credit to the region, a soft landing in the Baltics and southeast Europe could be jeopardized. Indeed, IMF analysis finds that, under a stress scenario, shocks emanating from common western European lenders could have widespread spillover effects across emerging Europe, provoking or contributing to contagion in the region (Àrvai, Driessen, and Ötker-Robe, forthcoming).

Global spillovers and rising vulnerabilities could test the resilience of emerging markets

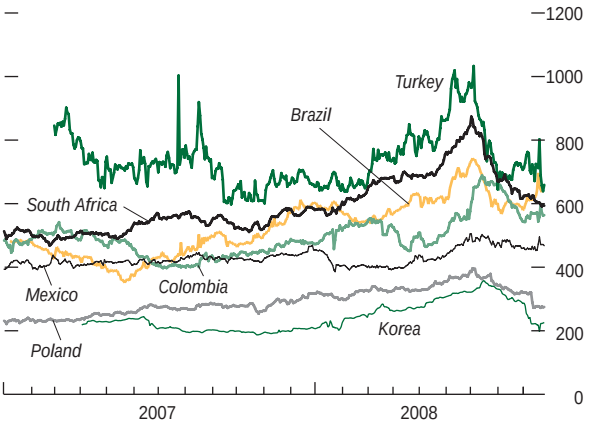
A continuation of heavy capital outflows from emerging markets would pose challenges for countries that rely heavily on external financing and with lower reserve ratios. Should difficult external credit conditions persist or even intensify, economies that are more leveraged, or those where domestic credit growth has been particularly rapid, are likely to see a buildup of pressures on domestic banking systems. Under such conditions, the premium on the maintenance of a sound macroeconomic framework is increased.

Financial Stability Policies

The analysis in this report sets out the sizable adjustments needed as part of the deleveraging process and highlights the pressures that

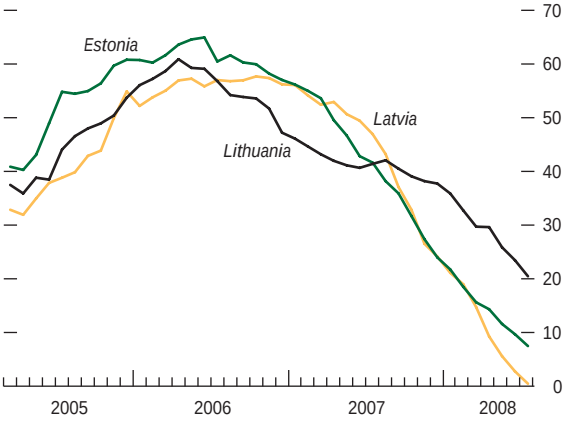
[52]Net foreign liabilities (external positions vis-à-vis Bank for International Settlements (BIS) reporting banks) have risen as a consequence of sustained large current account deficits and rapid growth in domestic credit (Table 1.5).

Figure 1.39. Break-Even Inflation Rates
(In basis points)



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

Figure 1.40. Baltic States: Real Bank Loan Growth to Nonfinancial Private Sector
(In percent, real terms, year-on-year change)



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

systemically important institutions are facing as part of that adjustment. Even before the events of recent weeks, finding a purely private sector resolution of financial market strains had become increasingly difficult in an environment marked by declining asset values, exacerbated by procyclical forces such as ratings downgrades, and the challenges of distinguishing good from bad assets and strong from weak institutions. Now, the global disappearance of trust in counterparties and widespread cash hoarding that has surfaced recently has made it inevitable that, if a resolution plan is to achieve an orderly deleveraging process that limits damage to the financial system and the economy, the authorities will need to play a major role in it.

The ultimate goal should be to mitigate the adverse feedback loop between the financial system and the economy. To achieve this, measures must focus on rebuilding confidence in institutions and markets and on reducing the pressures on banks to cut back the provision of new credit as part of their deleveraging. The public sector must signal as clearly as possible the principles that guide its approach. In recent months, volatility and illiquidity have been exacerbated by market uncertainty about how authorities will balance the competing claims of minimizing moral hazard and protecting against systemic risk.

Measures must be comprehensive, timely, and clearly communicated, addressing the underlying causes of uncertainty and the areas under strain from deleveraging pressures. IMF experience in previous financial crises indicates that early and decisive action is needed in order to normalize markets and stem the spread of financial and economic distress. To halt—and begin to reverse—the negative spiral in markets and the economy, the policy strategy needs to address three key, interrelated, sources of stress: first funding markets need to be restarted; continuing uncertainties about problem assets need to be reduced; and firms' capital positions need to be improved.

Actions to stabilize the global financial system should be coordinated across countries, and in particular across the major financial centers. While the specific measures adopted may vary from country to country, depending on their individual areas of weaknesses and relative strengths, coordination of early action to address problems would send a strong signal to boost market confidence, and will also help avoid adverse effects that one country's measures may have on others or perverse incentives in international markets. Authorities need to ensure that they can rapidly respond to further emerging pressures, based on a mechanism for the early detection of strains, to contain systemic repercussions. This may require an enabling framework that allows for decisive action when needed.

Private sector solutions are preferred but, if needed, emergency government interventions should be temporary and taxpayer interests protected. The objectives of intervention should be clear and operating procedures transparent. Accountability of government actions to all stakeholders is important and conditionality for support of institutions should include steps to restructure weak but viable institutions so as to place them on a sounder footing. Mechanisms should limit moral hazard and taxpayer costs as much as possible, while recognizing the exigency of the situation and the clear need for public support. Those measures that have a distorting effect on markets should be removed once confidence is restored.

Lastly, measures taken must further the medium-term objective of a restructured financial system that is sound, competitive, and efficient. Achieving this requires an orderly resolution of unviable banks and the repairing of market discipline. Funding and securitization markets critical to pricing and intermediating credit should be strengthened, including by reducing over time counterparty risks through centralized clearing. This period of change provides an opportunity to reexamine the international macrofinancial stability framework governing the regulation of the financial sector and strengthen the hand of supervisors and regulators. Events have highlighted the need to

focus regulation and supervision on the types of financial activities, rather than the type of intermediary—bank, insurance, company, or investment fund. Mechanisms for closer and more effective cross-border coordination and collaboration among supervisors, regulators, and central banks are needed.

In the near term, a comprehensive and global approach is needed to stem crisis risks and address their underlying causes.

The worsening in confidence and market dysfunction in September led the U.S. authorities to supplement their case-by-case approach that addresses points of distress as they arise with a more comprehensive and systemic response. The new approach encompasses a wide-ranging set of measures, including liquidity support for banks and near-bank institutions such as broker-dealers and money market funds; asset purchases to free up bank balance sheets; support for the housing market; extending deposit insurance; and restricting short selling. The actions taken by the U.S. authorities are intended to relieve pressures on financial balance sheets and to restore confidence. These measures are positive, comprehensive, and necessary; their goal is to provide a catalyst for private markets to support asset prices, open up funding, and allow the rebuilding of capital cushions. It is too early to assess their impact, but, given the obvious continuing uncertainties, these measures have provided some reassurance to markets that the authorities stand ready to take the necessary measures to avoid more disruptions.

While the epicenter of the crisis is the United States, the financial strains caused by a disorderly deleveraging and a rapid retrenchment of risk positions is global, and thus many other countries around the world have undertaken policy responses. Actions have been the most wide-ranging in the United States and Europe, while some Asian countries have expanded their liquidity support to markets.

In Europe, measures to improve funding have been coordinated within the euro area through the ECB's operations, and internationally, dollar liquidity needs have been alleviated through swap facilities between European central banks and the Federal Reserve. EU-wide action is also under way to improve supervisory capital requirements and other aspects of market structure. However, near-term measures to address capital, shortages, and problem assets have tended to be undertaken more on a case-by-case and on a national basis.

Policy actions to date have varied, both between Europe and the United States, and between different countries within Europe, partly reflecting different circumstances. In the case of the United States, there is a greater need to address the resolution of problem loans themselves—notably subprime mortgages—than in Europe, where problems over the loan quality of domestically generated assets have been less severe to date and housing market conditions vary widely from country to country, but financial institutions have faced funding and asset quality problems in both U.S. dollars and domestic currency.

However, the common cross-border problems that financial institutions, markets, and real economies face argue for more globally consistent policy approaches than have so far been the case. Without such coordination, the adjustment process is likely to be more painful and protracted, steps by individual jurisdictions to defuse their own market pressures may spill over to other jurisdictions, and concerns about inequitable burden-sharing may prevent necessary but costly measures from being taken. This may reduce the benefit of policies to restore confidence to the global financial system and increase the costs.

Measures to address problem assets.

As private sector balance sheets seek to shed assets in order to delever, the use of public sector balance sheets can help prevent "fire sale" liquidations that threaten to reduce bank capital. Countries where banks have large exposures to securitized or other problem assets could consider mechanisms for the government to purchase or provide long-term funding to assets.

This should create greater certainty about balance sheet health. Setting up an asset management company provides a framework of legal clarity and accountability for the process.

The Troubled Asset Relief Program (TARP)envisaged under the recently enacted U.S. Emergency Economic Stabilization Act presents both opportunities and challenges. The program represents a systematic approach to purchase troubled assets from financial institutions and is consistent with international experience that removing unsound assets from banks' balance sheets is a vital step in the resolution of crises. However, its operational design has yet to be established and international experience suggests that it is these operational details that will be crucial to its success. In order to reduce public costs, it is important that the objectives behind the repurchase program be clearly set out from the beginning, that asset purchases help to reestablish market prices, and that appropriate expertise and incentives be put in place to ensure reasonable returns for public sector capital. Management of the program needs to be independent of political considerations, but still be subject to a high degree of accountability.

A major challenge will be to avoid adverse selection in the troubled assets that the government buys. The structured assets to be bought under the program are inherently heterogeneous and the difficulty of accurately estimating their value and risks lies at the heart of the crisis. Care will therefore be needed to ensure that the purchase process results in prices that adequately reflect the difference in quality of the assets bought. In the absence of such differentiation there is the risk that those parties that own more inferior assets benefit at the expense of those that showed more credit discipline during the boom and therefore offer higher-quality assets under the program.

Although the program should improve banks' liquidity and free up space on their balance sheets, its impact on banks' capital positions will likely be uneven. Indeed, banks' sale of assets may crystallize their losses, potentially accelerating the need to raise new capital. The program has enough flexibility to be able to focus on the capitalization needs. In addition, the asset purchases may need to be combined with a wider capital-raising strategy, or with a plan to resolve banks that may become unviable. Moreover, in balancing both objectives, experience shows that capitalization should be the first priority. In the meantime, relief from strict application of mark-to-market prices for regulatory capital purposes or some other form of regulatory forbearance may avoid accelerating capital needs while capital-raising remains very difficult.

The major budgetary implications of an asset purchase program mean that any decision in Europe to set up such a program will inevitably need to take place at the individual country level, but further coordination and a common approach is needed, even if the implementation has to be tailored to the specific circumstances of each country. It is also an opportunity to resolve the diversity of deposit insurance regimes, one of the most important reforms needed to strengthen the financial stability framework in Europe. Governments in countries where market confidence in their financial institutions is being hindered by large exposures to structured, securitized assets trapped on balance sheets due to illiquid markets, or by other problem assets (whether U.S. or domestic), should similarly consider putting in place mechanisms for government purchase or funding of problem assets. Authorities should ensure that these mechanisms are consistent with each other in their design and underlying principles, to avoid adding to uncertainty over valuations of assets and balance sheets.

Measures to improve capital positions.

To keep credit growing while strengthening capital ratios, this chapter suggests that an estimated $675 billion of additional capital needs to be raised from public markets. With capital markets at present almost shut, governments will likely, in some cases, need to be involved in recapitalization of financial institutions where they are viable and important to the financial

system. Even if recapitalization plans are government-led, they should ensure that incentives remain for private sector capital-raising, including from existing shareholders, and they should also be tied to measures to restructure firms and deal with troubled assets so as to ensure future balance sheet health. In order to protect public interests, any new capital provided by governments should have preferred status. Unviable banks should be closed in orderly fashion. Careful consideration of takeovers of troubled institutions is needed to ensure that the consolidated entity is not unduly weakened nor that it is of a size or results in a level of financial sector concentration that would imply higher systemic risks in the future.

Although restrictions on short sales of shares of financial institutions may provide some temporary support to financial institutions' market capitalization in an environment of uncertainty, such measures do not fundamentally address underlying balance sheet weaknesses. Moreover, their impact may also be vitiated by the ability of market participants to take short positions through other instruments, such as derivatives. They may also have unintended and unhelpful consequences, including on market liquidity. Such restrictions should therefore be temporary and limited in scope to the measures needed to prevent systemic instability under exceptional circumstances while broader measures to restore confidence are being introduced.

Measures to restart funding and improve liquidity management.

Financial institutions that rely on wholesale funding, including in cross-border markets, have been facing severe and mounting refinancing problems and concerns about counterparty risk have risen sharply. Stabilizing institutions' access to funding is essential while progress in improving capitalization and asset quality is made. For the time being, therefore, central banks will need to continue to coordinate to supply liquidity in sufficient scale and with long enough maturities to provide confidence in the stability of banks' funding.

However, if systemic circumstances deteriorate further to a point where the loss of confidence in financial institutions puts their access to sufficient liquidity and capital market funding in doubt, official guarantees may be unavoidable as a temporary measure until confidence returns. Furthermore, a guarantee for the senior and subordinated debt liabilities of financial institutions need not be blanket to all institutions (e.g., guarantees of wholesale market liabilities may not be needed for those institutions that do not rely on such funding). Provision of such guarantees should include safeguards (fees, recourse to the balance sheet of the guaranteed bank, etc.). Alternatively, caps on deposit insurance of retail accounts could be increased beyond normal limits, as a number of countries have already done or are considering. The capacity of the government balance sheet to absorb the extra cost needs to be carefully considered when deciding whether and how to expand guarantees. Actions should be coordinated across countries and should include measures to prevent banks from using the expanded guarantee to gain international market share, so as to avoid transferring pressure to other countries. The U.S. government's actions to temporarily provide guarantees to money market mutual funds are a helpful step to restore investor confidence in that sector. In some countries, support for short-term collateralized funding between banks through triparty repurchase agreements or for money market funds could be provided through a backstop guarantee, while longer-term solutions to reduce counterparty risks in the broader markets are addressed, such as centralized clearing and settlement arrangements.

Cross-border vulnerabilities have been exposed by the crisis.

Many banks have faced persistent difficulty in obtaining cross-border funding of sufficiently long maturity and with sufficient reliability. All banks with significant cross-border activities need to reassess the adequacy and robustness of their cross-border funding plans. In addition, national authorities need plans in place to deal with

banking crises that involve large cross-border funding needs. The Federal Reserve's Term Auction Facility, accessible in several other countries through swap operations, is a useful example of cross-border cooperation, albeit on a temporary basis. Central banks should seek to regularize the procedures for cooperation going forward.

Authorities continue to work on cross-border cooperation and contingency planning for crisis management, but more progress is needed. Further international work is needed to address the difficulties of dealing with cross-border firms under existing bankruptcy laws and insolvency regimes. This includes the need to address national legislation, such as requirements to ring-fence assets, where it acts as an obstacle to internationally cooperative solutions. Authorities should also clarify international arrangements for coordinating the deposit insurance of cross-border institutions. In the meantime, more robust information-sharing arrangements and mechanisms for rapid cooperation need to be put in place. Countries should start by addressing potential vulnerabilities and exposures in financial relationships between particular pairs or small groups of countries where they are systemically important.

Emerging markets should also address risks spread through financial channels.

Financial institutions in emerging markets have been less affected than those in mature markets, in part because the use of structured credit products was largely restricted to the latter. But spillovers have been increasing in recent weeks, sharply in some cases. Many of the policy lessons from the crisis for mature markets are similarly applicable to emerging market authorities in areas such as crisis management, central bank liquidity operations, capital adequacy, supervision of liquidity management, deposit insurance, and the clarity of authorities' roles and responsibilities.

Authorities need to ensure that they have the flexibility in their market operations to address liquidity and other market strains that may suddenly arise. The large foreign exchange reserves buildup in many emerging market countries in recent years means that many have the financial resources to provide foreign currency liquidity or to otherwise lend to their systems if needed; they must also make sure that they have the operational capacity and contingency plans to do so.

With regard to emerging Europe, recent assessments of countries under the IMF's Financial Sector Assessment Program (FSAP) have stressed the need for close cooperation between home and host supervisors. This should, at a minimum, include coordinated inspections of internationally active banks, joint risk assessments, and "war games" to handle stress situations. Cooperative arrangements for the joint management of a major bank failure also need to be further developed. Going forward, FSAPs will continue to stress the need for authorities to improve their contingency plans and take better account of the risk of spillovers across institutions, markets, and regions. Where financial systems are exposed to heightened liquidity risks and loss of market confidence, the IMF can play a role in sharing information and experiences on best practices for policy responses, providing technical assistance on instrument design, strengthening surveillance and, if needed, providing program support.

Alongside short-term measures to stabilize markets, more robust foundations for the global financial system are needed.

Events of the last few weeks have dramatically changed the financial landscape. There can be little doubt that some of these changes in market behavior and functioning will prove to be lasting. This period of change provides an opportunity to rethink the financial architecture with fewer constraints about the need to preserve existing market practices than in the past. Events have shown that problems of measuring solvency, liquidity, and risk are in many cases common across sectoral and national boundaries. Regulation and supervision should be designed according to the type of financial activities being performed by regulated institutions, and less by the type of intermediary—

bank, insurance company, or investment fund. There is an opportunity and a need to move toward a macroprudential and regulatory framework that is more integrated in its approach and uniform in its standards, and that involves closer and more effective cross-border coordination and collaboration among supervisors, regulators, and central banks.

Clarity is needed regarding authorities' roles and responsibilities.

The market turmoil has illustrated how fluid the distinction between liquidity and solvency support becomes during systemic financial crises and has raised questions about the costs of intervention. It is important that decisions to address the turmoil are not hampered by lack of clarity over the roles and responsibilities of authorities. The following actions can help avoid such potential confusion:

- The respective roles of central banks, regulators, supervisors, and fiscal authorities regarding financial stability should be clarified. Central banks should focus on systemic liquidity needs and the lender-of-last-resort function. They should play a central role in maintaining financial stability and should have access to the information on individual financial institutions necessary to perform this task. Regulators and supervisors (whether inside or outside central banks) should focus on prudential issues at individual firms while taking full account of overall financial stability conditions. Fiscal authorities should decide on and meet the costs of resolving solvency problems. There need to be enhanced procedures for these authorities to communicate and cooperate.
- Where costs to the public sector arise from support for problem firms, or where funds or guarantees are provided to address solvency issues, these costs should be reflected directly on the fiscal authorities' balance sheet to provide political accountability.
- Regulatory and prudential regimes should be updated to provide comprehensive financial oversight, allow for prompt responses to risks, and remove adverse incentives and conflicts of interest. In the United Kingdom, following lessons from Northern Rock, reforms are being undertaken to enhance supervision; this would be an opportunity to take a more transparent, rules-based approach. In the United States, the Treasury blueprint for a modernized financial regulatory structure, emphasizing regulatory consolidation, and the recent changes to regulation of GSEs, are useful starting points for reform, but further steps are needed. For instance, the business models of the GSEs need to be clarified, differentiating their public and private sector activities. Their commercial activities should be regulated and capitalized in the same way as fully private-sector institutions, facilitating a level playing field and fostering market discipline. It will be important to ensure that regulatory changes in individual jurisdictions are well aligned in order to avoid regulatory arbitrage.

Monitoring of multiple measures of capital and liquidity by regulators, rating agencies, and markets should be accompanied by transparent risk disclosure.

Going forward, changes to the monitoring of capital adequacy and broader balance sheet health are needed. Risk-based capital measures continue to be the right approach for the regulation of capital, but they require a good risk assessment of the assets. The shortcomings that have been exposed in the ability of even the most sophisticated market participants to value and measure the risks underlying structured products have led to uncertainty about the appropriate capital targets for banks to pursue. Monitoring of multiple measures of capital and liquidity ratios, together with rigorous stress testing, can help in assessing firms' ability to withstand a variety of shocks. The third Corrigan Report (Counterparty Risk Management Policy Group, 2008) provides a number of useful guidelines for financial institutions to improve their management of economic capital. Regulators need to closely examine the lessons from the current crisis to ensure that risk measure-

ment takes a sufficiently long-term perspective and to avoid procyclical elements that allowed capital requirements to be reduced during periods of market calm, but have aggravated the capital shortages during the current downturn. Finally, any changes to capital requirements should be phased in to avoid aggravating the impact of deleveraging.

Disclosure of the risks on (and off) banks' balance sheets needs to be transparent and consistent both across institutions and over time. Supervisors need to examine firms' progress in meeting the recommendations of the Financial Stability Forum on standardized risk disclosures as part of, or alongside, their financial reports. But these recommendations are highly specific to the problem assets that triggered the current turmoil; it is even more important for supervisors, accounting bodies, and markets to search for more timeless standards for general risk disclosures that are consistent across firms and borders.

Globally, differences in regulatory and accounting measures that obscure comparability between institutions' risk, solvency, and liquidity measures need to be eliminated where possible. In the United States, regulatory consolidation would help to achieve this. Global moves to make regulatory practices, measures, and published data more consistent across countries would also be very helpful.

Policies are needed to improve the robustness of liquidity management.

Temporary measures to shore up financial institutions' liquidity need to be backed up by actions to improve the robustness of their liquidity management going forward. This will require a three-pronged approach:

- Banks and securities firms need to improve their liquidity management practices, raising holdings of liquid assets and limiting reliance on central bank term financing as a liquidity backstop.
- Regulators need to devise more rigorous standards for firms' liquidity plans, especially given the potential for major markets to remain illiquid for much longer periods than had previously been considered. The Basel Committee on Banking Supervision's draft revised guidelines on liquidity are a welcome step forward, including the recommendation that national supervisors enforce closer compliance than in the past. Much remains to be done on the specifics to translate these principles into practice.
- At the same time, it is not realistic to expect every firm to be able to hold sufficient liquidity to cope with all possible market-wide problems, without a central bank backstop that can be applied quickly and flexibly in the event of system-wide pressures.

Chapter 2 discusses some specific proposals to enhance liquidity management. In addition, all authorities should review their national deposit insurance schemes and, where needed, strengthen the schemes' funding and ensure that they are appropriately supported by prudential regimes and bank resolution procedures. Authorities should agree on a set of international principles for deposit insurance systems that sets out a common core of objectives while recognizing that there may be different system designs that can achieve them.[53]

Annex 1.1. Global Financial Stability Map: Construction and Methodology[54]

This annex outlines our choice of indicators for each of the broad risks and conditions in the global financial stability map (Figure 1.1). 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

[53]The International Association of Deposit Insurers has developed a set of core principles for effective deposit insurance systems that could provide a possible basis. At the same time, work has been taking place for several years on revising the European Union Directive on deposit insurance to achieve greater harmonization and clearer resolution of cross-border issues.

[54]The main author of this annex is Ken Miyajima.

level of each indicator relative to its history to guide our assessment of current conditions, relative both to the April 2008 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 1.6 shows how each indicator has changed since the last GFSR and our 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 1.41). To capture movements in general 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 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. In particular, the recycling of dollar reserves in the United States contributes to looser liquidity conditions. 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.

Table 1.6. Changes in Risks and Conditions Since the April 2008 *Global Financial Stability Report*

Conditions and Risks	Changes since April 2008 GFSR
Monetary and Financial Conditions	↓
G-7 real short rates	↔
G-3 excess liquidity	↓
Financial conditions index	↓
Growth in official reserves	↑
G-3 lending conditions	↓
Risk Appetite	↓
Investor survey of risk appetite	↓
Investor confidence index	↔
Emerging market fund flows	↓
Risk aversion index	↓
Macroeconomic Risks	↑
World Economic Outlook global growth risks	↔
G-3 confidence indices	↑
Economic surprise index	↓
OECD leading indicator	↑
Implied global trade growth	↑
Global break-even inflation rates	↓
Emerging Market Risks	↑
Fundamental EMBIG spread	↔
Sovereign credit quality	↑
Credit growth	↓
Median inflation volatility	↑
Corporate spreads	↔
Credit Risks	↑
Global corporate bond index spread	↑
Credit quality composition of corporate bond index	↑
Speculative-grade corporate default rate forecast	↑
Banking stability index	↔
Loan delinquencies	↑
Market and Liquidity Risks	↑↑
Hedge fund estimated leverage	↓
Net noncommercial positions in futures markets	↔
Common component of asset returns	↑
World implied equity risk premia	↓
Composite volatility measure	↑
Financial market liquidity index	↑

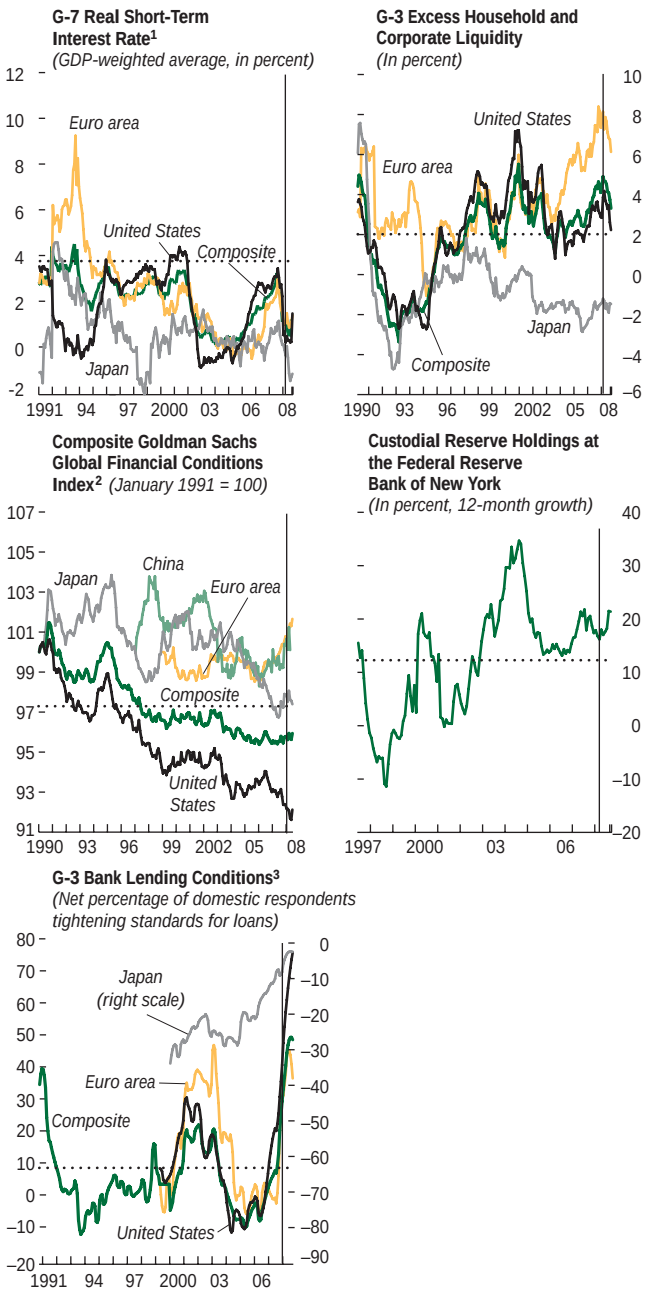
Source: IMF staff estimates.

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

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 1.42). We aim to measure the

Figure 1.41. 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 April 2008 GFSR.

[1]Only G-3 subindicators are shown.

[2]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.

[3]Monthly interpolated GDP-weighted average. Euro area 1999:Q1 to 2002:Q4 based on values implied by credit growth.

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 an estimated 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 large international institutional investors relative to domestic investors to measure relative risk tolerance.[55] The index extracts relative 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 bond and equity 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.[56] By comparing returns between government debt 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 1.43). Our principal assessment of the macroeconomic risks is based on the analysis contained in the

[55]The estimated changes in relative risk tolerance of institutional investors from Froot and O'Connell (2003) are aggregated using a moving average. The index is scaled and rebased so that 100 corresponds to the year 2000.

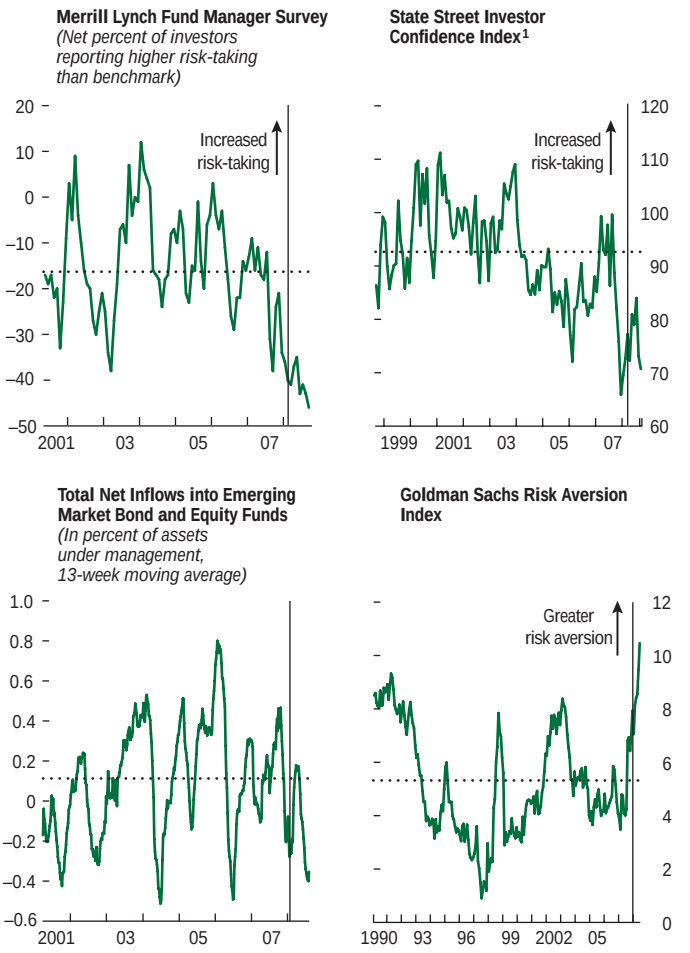
[56]The index represents the value of the coefficient of risk aversion, constrained to values between 0 and 10.

WEO and is consistent with the overall conclusion reached in that report on the outlook and risks for global growth. 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 economic activity, we incorporate changes in the Organization for Economic Cooperation and Development's composite leading indicator. Fourth, in order 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. Finally, market-implied break-even inflation rates, based on estimates of intermediate-dated yield differentials between nominal and inflation-linked domestic bonds, proxies expectations of inflation.

Emerging Market Risks

Underlying fundamentals in emerging markets and vulnerabilities to external risks (Figure 1.44). These risks are conceptually separate from, though closely linked to, macroeconomic risks, except 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

Figure 1.42. Global Financial Stability Map: Risk Appetite

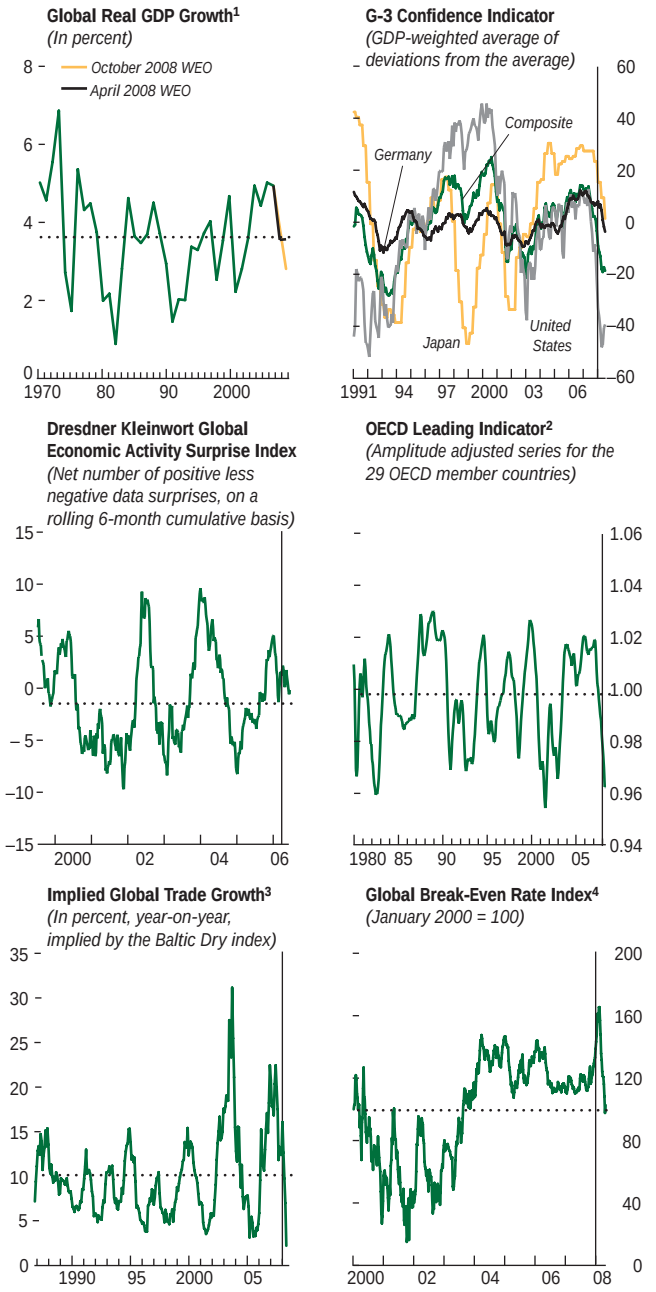


Sources: Emerging Portfolio Fund Research, Inc.; Goldman Sachs; Merrill Lynch; State Street Global Markets; and IMF staff estimates.

Note: Dashed lines are period averages. Vertical lines represent data as of the April 2008 GFSR.

[1]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 1.43. Global Financial Stability Map: Macroeconomic Risks



Sources: IMF, *World Economic Outlook*; Bloomberg L.P.; Dresdner Kleinwort; OECD; The Baltic Exchange; Barclays Capital; and IMF staff estimates.

Note: Dashed lines are period averages. Vertical lines represent data as of the April GFSR, except for "Global Real GDP Growth".

[1]2008 and 2009 data points account for skewness in the distribution of risks to the baseline forecast.

[2]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.

[3]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.

[4]Tracking GDP-weighted basis point-changes of estimated longer-term breakevens for Australia, Brazil, Canada, Colombia, France, Germany, Greece, Italy, Japan, Korea, Mexico, Poland, South Africa, Sweden, Turkey, the United Kingdom, and the United States.

risks within the country.[57] 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 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 1.45). 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 component of the subindex is a Banking Stability Index, which represents the expected number of defaults among large

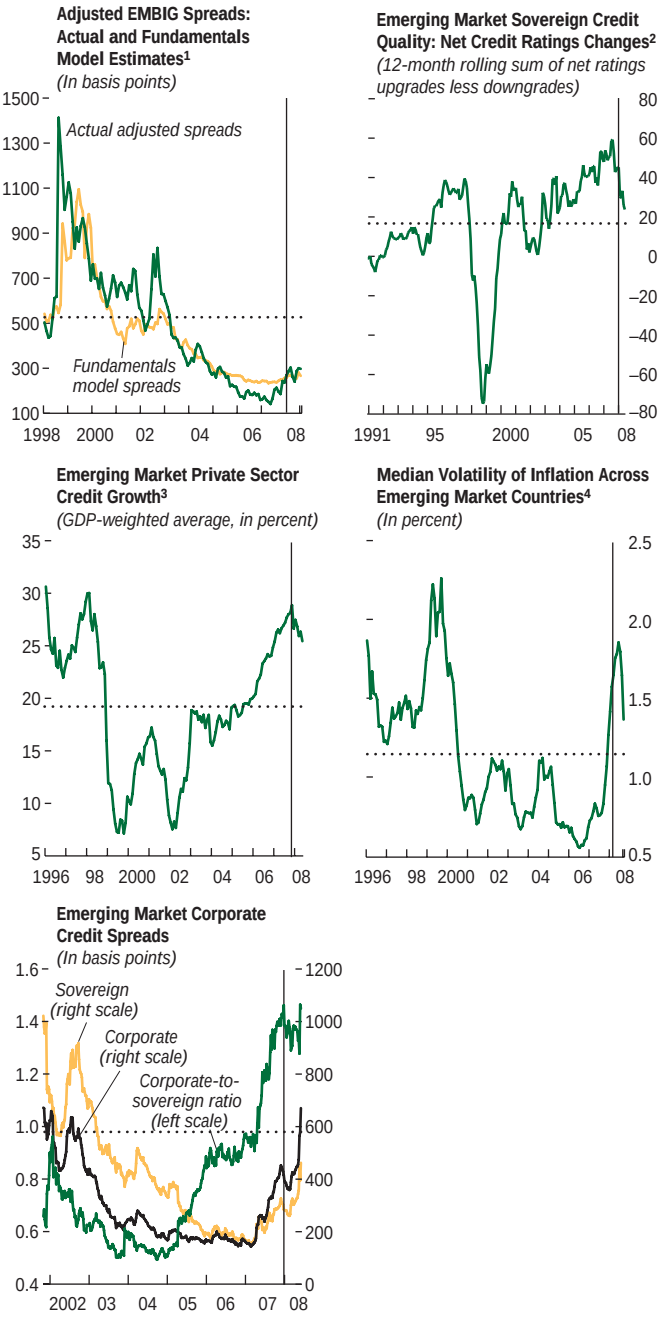
[57]The model uses three fundamental variables to fit EMBIG spreads: economic, financial, and political risk ratings. The economic risk rating is the sum of risk points for annual inflation, real GDP growth, the government budget balance as a percentage of GDP, the current account balance as a percentage 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 using 12 indicators representing government stability and social conditions.

complex financial institutions (LCFIs), given at least one LCFI default (see, for example, Goodhart and Segoviano, forthcoming). This index is intended to highlight market perceptions of systemic default risk in the financial sector. To capture broader credit risks, we also 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 1.46). 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 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 size of a common factor across asset-class returns, 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, thereby 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.

Figure 1.44. 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 April 2008 GFSR.

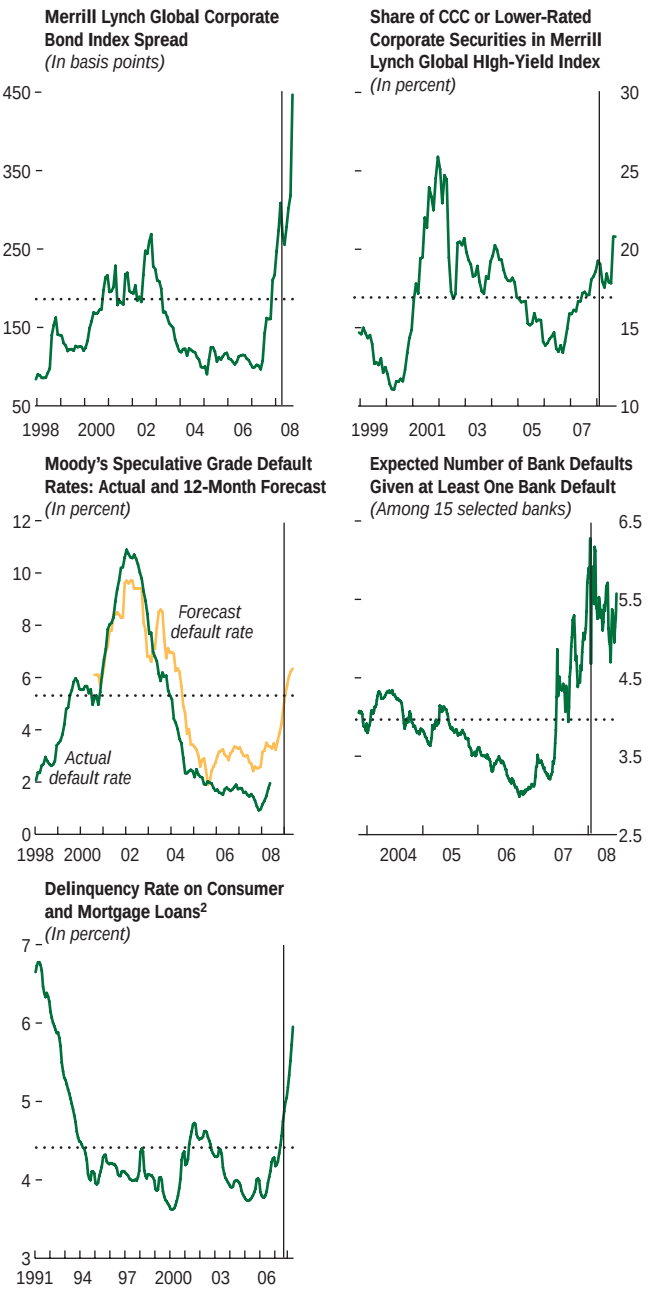
[1]EMBIG = Emerging Market Bond Index Global. The model excludes Argentina because of breaks in the data series related to debt restructuring. Owing to the short data series, the model also excludes Indonesia and several smaller countries. The analysis thus includes 32 countries.

[2]Net actions of upgrades (+1 for each notch), downgrades (–1 for each notch), changes in outlooks (+/– 0.25), reviews and creditwatches (+/–0.5).

[3]44 countries.

[4]Average of 12-month rolling standard deviations of consumer price changes in 36 emerging markets.

Figure 1.45. 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 April 2008 GFSR.

[1]Measuring the largest probability of default among the sampled 15 banks each day.

[2]30-, 60-, and 90-day delinquencies for residential and commercial mortgages, and credit card loans in the United States.

Annex 1.2. Financial Investment in Commodities Markets[58]

This annex addresses the possible causal relationships between increased financial market participation and commodity prices. Using investor positioning data, the findings suggest it is difficult to establish a causal relationship for the six commodities studied, though numerous caveats should lead to caution in interpreting the econometric results.

Commodity Investing

Commodities have attracted increasing financial interest in recent years, owing to low or negative correlations with other major asset classes and hedging properties against inflation (Table 1.7).[59] The case for commodities investment has been buttressed by strong returns, with the Goldman Sachs Commodity Index (GSCI) returning an annual average of 9 percent in U.S. dollar terms from 1990 through July 2008, and more than 40 percent since early 2007 (Table 1.7). While difficult to verify, private sector estimates suggest that commodities assets under management totaled $270 billion in the second quarter of 2008, $175 billion of which were institutional investor flows linked to commodity indices (Cooper, Norrish, and Sen, 2008). These figures do not fully capture investments from more specialized asset managers. Commodity-trading advisers (CTAs) may

[58]The main authors of this annex are Sergei Antoshin, Elie Canetti, and Ken Miyajima.

[59]Views are mixed on the effectiveness of commodities as a hedge against U.S. dollar depreciation. IMF (2008c, Box 1.4) and other studies have found that commodity prices in dollar terms tend to increase as the dollar depreciates. However, measured in a currency basket, commodity prices are generally less correlated with the dollar and the sign is reversed (Table 1.7), suggesting negative correlations between the prices of dollar-denominated commodities and the dollar may partly reflect changes in the value of the dollar against other currencies. Also, commodity prices have been significantly more volatile than the dollar, prompting some to argue that commodities are a poor dollar hedge.

Table 1.7. Asset Class Characteristics

(Based on monthly change during January 1990–July 2008)

	GSCI TR	GSCI TR in SDRs	Global Equities	EM Equities	US$ NEER	U.S. CPI
			(Correlations)			
GSCI TR	1.00					
GSCI TR in SDRs	0.97	1.00				
Global Equities	–0.03	–0.06	1.00			
EM Equities	0.06	0.07	0.71	1.00		
US$ NEER	–0.11	0.06	–0.18	–0.08	1.00	
U.S. CPI	0.14	0.11	–0.17	–0.09	–0.16	1.00
			(Annualized average change and volatility, in percent)			
Average change	9.0	7.8	5.1	8.7	–1.4	3.0
Volatility	19.7	19.7	13.9	23.2	5.6	0.8

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

Note: All assets are in dollar terms, unless otherwise specified. GSCI TR signifies the S&P Goldman Sachs Commodity Total Return Index, which reflects spot, roll, and cash yields; SDRs signifies special drawing rights; NEER signifies the nominal effective exchange rate, where a higher value signifies the dollar's appreciation; EM = emerging markets; CPI = consumer price index.

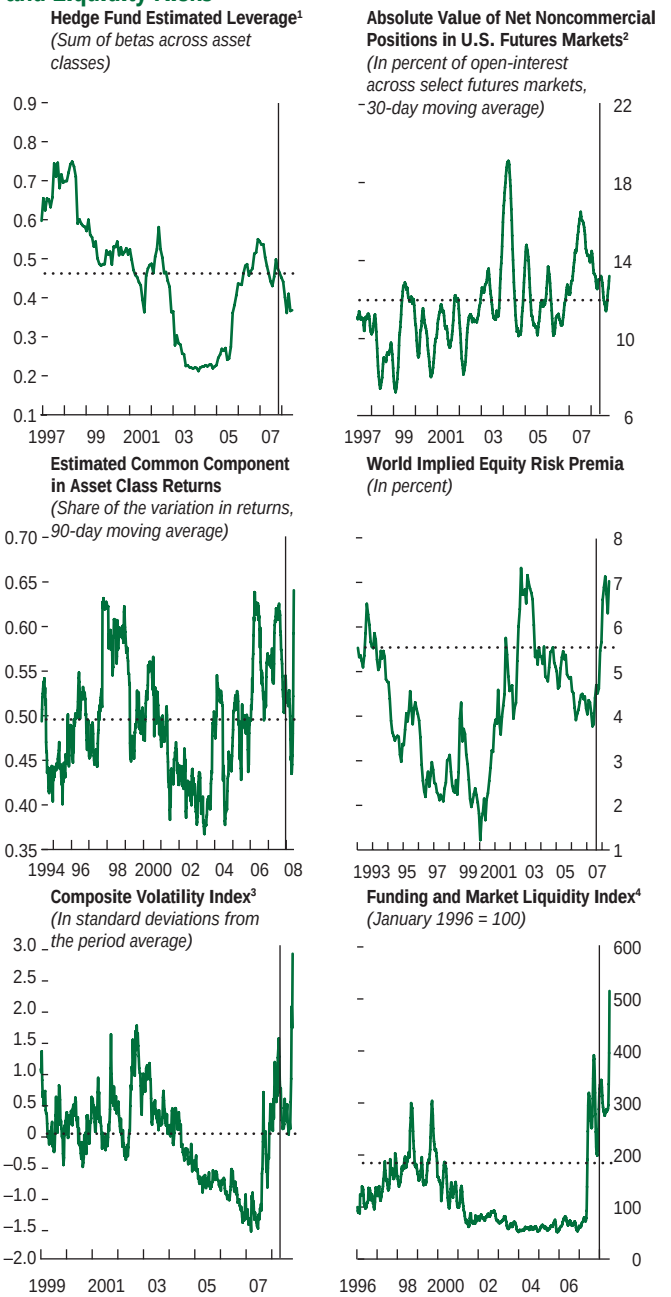
have as much as $40 billion to $60 billion in assets under management, while hedge funds may have as much as $80 billion in commodity investments, much of it, however, in "spread" trades that do not impart a directional bias to prices.[60]

Commodity-indexed funds have attracted attention because of their aggregate size and rapid growth in recent years, and because, unlike many other investments, they represent a long-only investment in commodity futures. The two largest indices are the GSCI and the Dow Jones' AIG Commodity Index, which together account for well over three-quarters of total indexed investments. The funds generally gain exposure to commodities through over-the-counter (OTC) total return swaps (primarily from major broker-dealers) that replicate the performance of the key commodity indices. The dealers, in turn, hedge their exposure, in part through exchange-traded futures.

At least two arguments are commonly advanced suggesting that financial invest-

[60]See Tesar (2008). CTAs use a wide variety of trading models, including simple technical trading rules that can amount to trend-following strategies that are independent of fundamentals.

Figure 1.46. 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 April 2008 GFSR.

[1]36-month rolling regressions of hedge fund performance versus real asset returns.

[2]Data represent the absolute value of the net position taken by noncommercial traders in 17 selected U.S. futures markets. High values are indicative of heavy speculative positioning across markets, either net-long or net-short.

[3]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.

[4]Based on the spread between yields on government securities and interbank rates, spread between 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.

ment in commodities, particularly in index funds, does not have a material impact on commodity prices. First, index investors do not take physical delivery, a fact supported by the lack of evidence from inventory data of commodity hoarding, though the quality and coverage of such data are questionable. Many observers have questioned whether financial investors can influence commodity prices in the absence of physical demand. The second justification argues that some commodities without significant financial market participation have exhibited price rises and volatility equal to or greater than commodities with liquid futures markets, suggesting a limited role for financial investors.[61] Other observers, however, argue that large increases in financial investment in commodities futures and the fact that near futures prices and spot prices generally converge provide a prima facie case that increased financial investment may influence commodity prices, at least in the short run.

Causality Study

Whatever the merits of these arguments, if financial market participation influences commodity prices, increases in investment should precede price increases. This annex examines such temporal causality between investor positions and prices of oil, copper, wheat, corn, soybeans, and rice.[62] Positioning data comes from the publicly available *Commitment of Traders Report* from the U.S. Commodities and Futures Trading Commission (CFTC). Investors are classified as "commercial" if they are hedging an existing exposure and "noncommercial" if they are not. Swaps dealers are classified as commercial investors, since they use futures markets to offset their OTC positions. However, since those OTC positions sometimes have as their counterparties the commodity index funds, which generally invest with a return motive (rather than to hedge), the CFTC started to publish the positions of commodity index traders (CITs) separately from 2006.[63,64]

While there clearly are periods and commodities where positions and prices move together, there are other times when positions were not rising during periods of rapid price appreciation (Figure 1.47). For example, wheat index positions were fairly flat while noncommercial positions were declining, even as prices rose rapidly from mid-2007 through the first quarter of 2008. Corn index positions were the same at the end of the second quarter of 2008 as two years earlier, during which time the spot price more than tripled. Noncommercial positions in corn and soybeans peaked in February 2008, while prices kept rising through the end of the second quarter. Noncommercial positions in oil were quite volatile, even as oil prices rose almost continuously from the beginning of 2007 through the second quarter of 2008, by which time net oil positions had dropped roughly to zero. Noncommercial copper positions were declining through the period of the sharpest price increases, roughly from the beginning of 2004 through mid-2006.

Granger causality tests can evaluate whether changes in investor positions precede price changes. Earlier work has generally failed to find

[61]The WEO (IMF, 2008d) studies the relationship between commodities that are heavily traded in financial markets and those that are not. It finds that while financialization may have led to increased co-movements between some commodities, no apparent connection is found to either price volatility or price changes (see Box 3.1 in Chapter 3).

[62]The CFTC does not publish index positions on rice, another agricultural commodity of interest.

[63]In addition to swaps with indexed funds, dealers also tailor swaps to individual investors or commercial entities, involving both long and short positions, especially in oil markets. Thus, swap dealers generally hedge only net positions, which may be much smaller than their aggregate gross positions.

[64]Prices are as reported by U.S. commodities exchanges. The spot price is defined as the price of the futures contract closest to expiration, while the futures price is the price of the contract expiring in 12 months.

such a temporal relationship, concluding that causality runs from prices to positions.[65] This annex extends those earlier studies to encompass the most recent period during which commodity prices rose particularly sharply, and also tests whether the new CIT positions data can explain prices.

However, there are a few shortcomings that limit the power of the statistical tests and that require that caution be taken in interpreting these results. First, the CFTC only publishes traders' positions aggregated across maturities. It would be preferable to use only the positions in the maturity of the contract for which prices are being tested. Second, the data are weekly, which may hamper the identification of very short-run effects, given that transmission from positions to prices may happen at a higher frequency. Indeed, some market participants anecdotally suggest there are short-run effects that may last only a matter of days.[66] Third, as the CFTC acknowledges, traders sometimes may be misclassified between commercial and noncommercial positions, and some traders classified as commercial may have speculative motives.[67]

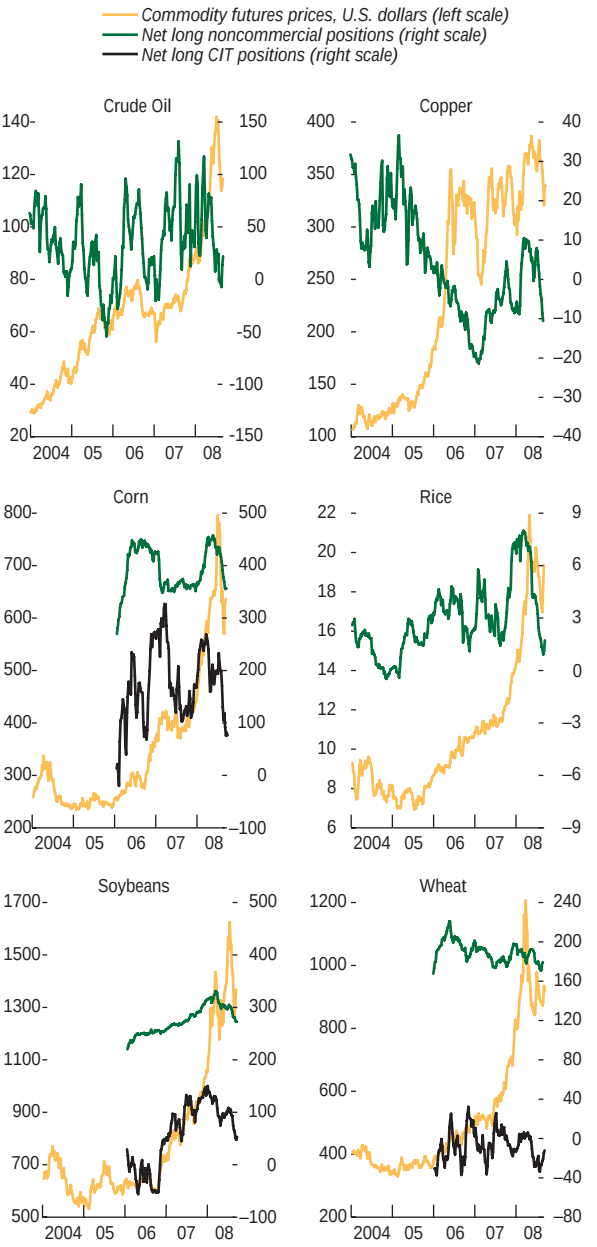
For tests on financial positions, we used data over the entire period for which CIT positions are available (since January 2006). For corn, soybeans, and wheat, the hypothesis that CIT positions and noncommercial (excluding CIT) positions lead prices is tested. For rice, crude oil, and copper, for which CIT positions data are not available, noncommercial positions are used to test whether they lead (or

[65]Box 5.1 in the September 2006 WEO did not find strong evidence of the influence of speculative positions as a driver of commodity prices (IMF, 2006). See also Haigh, Hranaiova, and Overdahl (2007) and Interagency Task Force on Commodity Markets (2008).

[66]However, using formal statistical tests, the report by the Interagency Task Force on Commodity Markets (2008) failed to find any significant causality from position changes to price changes using nonpublic daily data.

[67]The CFTC reviews, and occasionally revises, the classifications of futures market traders on an ongoing basis.

Figure 1.47. Commodity Futures Prices and Financial Positions



Sources: Bloomberg L.P.; and the U.S. Commodities Futures Trading Commission, *Commitment of Traders Report*.
Note: CIT = commodity index traders.

Table 1.8. Test for Causality Between Commodities Prices and Financial Positions

	Correlation between Prices and Positions[1]	Causality from Positions to Prices[2]	Causality from Prices to Positions[3]
Crude oil			
Noncommercial traders	No	No	No
Copper			
Noncommercial traders	No	Yes	No
Corn			
Index traders	Yes	No	No
Noncommercial traders	Yes	No	No
Soybeans			
Index traders	Yes	No	No
Noncommercial traders	No	No	No
Rice			
Noncommercial traders	Yes	No	Yes
Wheat			
Index traders	No	No	No
Noncommercial traders	Yes	No	No

Sources: Commodities Futures Trading Commission, *Commitment of Traders Report*; and IMF staff estimates.

[1]"Yes" means cointegration exists between prices and positions at 5 percent significance. "No" means no cointegration.

[2]"Yes" means the short-run coefficient on the first lag of positions in the price equation is significant and positive. "No" means the coefficient is insignificant or negative.

[3]"Yes" means the short-run coefficient on the first lag of prices in the positions equation is significant and positive. "No" means the coefficient is insignificant or negative.

Granger-cause) price movements. Time series vector models and Granger causality tests are used to address causality between positions and prices.

The results of our study are summarized in Table 1.8. In four of six commodities, there is a strong correlation between financial positions and commodities prices. However, tests for causality yield much weaker results. The second column demonstrates that financial positions lead prices only in the case of copper. Moreover, the significance of this finding is limited by the fact that net long noncommercial positions are negative most of the time (Figure 1.47). Causality from prices to positions is established only for rice.

Overall, there is correlation between prices and positions in some commodities markets. However, we are unable to detect causality from financial positions to prices for major commodities used in the study.

Annex 1.3. Loss Estimates on U.S. Credit Instruments[68]

This annex updates the methodology for estimating losses on U.S. credit instruments, and highlights the main revisions.

In light of further developments in delinquencies and charge-offs as well as a repricing in securitized debt, we have updated the loss estimates laid out in the April 2008 GFSR as shown in Table 1.9. Our estimate of total near-term global losses on U.S. credit-related debt has been raised to $1.4 trillion (from $945 billion). The upward revision mostly reflects increased loss estimates on corporate debt and prime residential mortgages.[69] Our loss estimates for corporate debt, including loans and securities, have risen significantly to reflect the deterioration in the debt of financial institutions that has taken place since April. Higher loss estimates for the prime mortgage market reflect a more negative base case home price scenario.

For the corporate sector, our estimate of losses on securities debt has risen to $210 billion, while that on loans has increased to $110 billion, reflecting a more negative base case assumption about the credit cycle over the next few years (Box 1.6). Loss estimates for collateralized loan obligations (CLOs) are unchanged.[70]

[68]The main authors of this annex are Mustafa Saiyid and Sergei Antoshin.

[69]Loss estimates have also been published by the Bank of England (BoE) and the Organization for Economic Cooperation and Development (OECD), but they are not fully comparable to those of the IMF due to differences in the size and variety of asset classes considered. The IMF's April loss estimate of $945 billion related to U.S. residential and commercial mortgages, consumer credit, and corporate debt. In contrast, the BoE loss estimates of $317 billion to $380 billion applied to U.S. subprime residential mortgage securities only; while the OECD's loss estimate of $422 billion was only for U.S. residential mortgage-related securities.

[70]Like the CMBX, the LCDX (the leveraged loan credit default swap index) was reportedly shorted extensively by speculators seeking to profit from deterioration of the leveraged loan market, and index pricing used earlier may have exaggerated loss estimates.

Table 1.9. Comparison of Financial Sector Loss Estimates, October 2008

(In billions of U.S. dollars)

Base-Case Estimates of Losses on U.S. Loans

	Outstanding	Estimated loss April 2008 GFSR	Estimated loss October 2008
Subprime residential	300	45	50
Alt-A residential	600	30	35
Prime residential	3,800	40	85
Commercial real estate	2,400	30	90
Consumer loans	1,400	20	45
Corporate loans	3,700	50	110
Leveraged loans	170	10	10
Total for loans	12,370	225	425

Base-Case Estimates of Mark-to-Market Losses on Related Securities

	Outstanding	Estimated mark-to-market loss April 2008 GFSR	Estimated mark-to-market loss October 2008
ABS	1,100	210	210
ABS CDOs	400	240	290
Prime MBS	3,800	0	80
CMBS	940	210	160
Consumer ABS	650	0	0
High-grade corporate debt	3,000	0	130
High-yield corporate debt	600	30	80
CLOs	350	30	30
Total for securities	10,840	720	980
Total for loans and securities	23,210	945	1,405

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

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

Losses on prime residential mortgage loans has increased to $85 billion, and we are now estimating mark-to-market losses on prime securities of $80 billion. The increase for loans reflects higher-than-expected delinquencies on prime loans and losses for government-sponsored enterprises (GSEs) on loans pooled into guaranteed securities.[71] The increase for prime securities is mostly coming from mark-to-market losses on prime nonconforming ("jumbo") mortgage loans packaged into securities.

Another contribution to the change in loss estimates since April is due to a $50 billion increase in the valuation of subprime mortgage-related CDOs. The TABX (tranched ABX index) used as a benchmark for these securities now shows no distinction in pricing between senior and junior tranches, which are all marked at around 3 to 4 cents on the dollar, reflecting the erosion of any protection from relative subordination of securities in the capital structure. Estimated losses on subprime mortgage-related asset-backed securities (ABS) are little changed since April, with realized delinquencies on 2006–07 subprime vintages higher than projected, but those on the 2004–05 vintages lower than projected.[72] As a result, prices of 2006–07 vintage subprime ABS have continued to fall, but those of 2004–05 vintages have risen.

Our earlier estimate of the distribution of losses between various types of market participant has been modified to reflect the impact of credit derivatives in transferring risk from one type of market participant to another. We continue to estimate that some 50 to 60 percent of losses will be borne by banks, 10 to 20 percent by insurance companies, 10 to 15 percent by pension funds and savings institutions, 5 to 10 percent by the GSEs, and the remainder by hedge funds and other participants.

Looking ahead, the market pricing of various U.S. securities, including prime mortgage securities, consumer ABS, and corporate debt, could deteriorate further if realized cash flow losses come out higher than market expectations. Over the past year, wider spreads on these types of securities have been partially, if not completely, offset by falling U.S. Treasury yields on a total return basis. This may not be the case in the future.

[71]Losses on loans pooled into guaranteed securities are expected to accrue only to the GSEs, since the GSEs guarantee timely principal and interest payments.

[72]This may reflect the fact that the earlier vintages are more seasoned, or that the relaxation of underwriting standards intensified after 2005.

Box 1.6. Forecasting Loan Charge-Off Rates

This box provides technical details on the baseline and stress scenario for bank charge-off rates on various types of loans.

To forecast bank charge-off rates for each bank loan type, a distributed lag model was used to accommodate the highly autocorrelated time series. The following potential explanatory variables for individual and joint significance were tested: bank lending conditions; financial and real estate assets, liabilities, and net worth from both household and corporate balance sheets; drivers of households' net worth (housing prices and equity prices); measures of households' debt obligations (the mortgage obligation ratio, bank loans); measures and drivers of income (disposable personal income, corporate profits, personal consumption); and business-cycle variables (GDP, industrial production, the purchasing managers index, employment, the unemployment rate). The sample was comprised of quarterly data from 1991 to 2008 so as to incorporate the last two recessions.

Corporate Loans

In estimating charge-offs on commercial and industrial (C&I) loans, bank lending conditions and business-cycle variables were strongly significant. After running various specifications we adopted the following representation:

$$C\_CI(t) = 0.292 + 0.589*C\_CI(t-1) + 0.194*C\_CI(t-2) + 0.004*L\_CIL(t) - 0.059*GDP(t),$$

where $C\_CI(t)$ is the charge-off rate for C&I loans at time t, $L\_CIL(t)$ is bank lending conditions for C&I loans, and GDP(t) is gross domestic product.

The baseline scenario relied on WEO estimates for GDP, where GDP growth troughs at –0.33 percent in the second quarter of 2009 before rising to 2.81 percent in 2010. Lending standards are assumed to peak at 70 percent in the fourth quarter of 2008 and revert to their long-run equilibrium level by end-2010. Under these assumptions, the charge-off rate rises from the current 0.82 percent to a high of 1.69 percent in the third quarter of 2009, before leveling off at 1.27 percent in 2010. In the stress scenario, GDP declines 1.35 percent in the third quarter of 2009 and then recovers to 2.51 percent by the end of 2010. Lending standards remain at 75 percent for two quarters and then take 1.5 years to normalize. Under this scenario, the charge-off rate reaches 2.06 percent in the fourth quarter of 2009.

Commercial Real Estate (CRE) Loans

Forecasting CRE charge-off rates is complicated by structural breaks during the estimation period and the variation within the sector.[1] Several variables were significant, including retail sales, consumption, employment, and bank lending standards, resulting in the final estimated model specification of:

$$C\_CRE(t) = 0.200 + 0.917*C\_CRE(t-1) - 0.054*C(t),$$

where $C\_CRE(t)$ is the charge-off rate for CRE loans and $C(t)$ is private consumption.

Under the baseline scenario for this model, we assumed that private consumption growth troughs at –1.62 percent in the second quarter of 2009 before picking up to 2.83 percent in 2010, consistent with the WEO. The charge-off rate rises from the current 0.93 percent to 1.71 percent by end-2009, and then declines to 1.51 percent in 2010. In the stress scenario, consumption contracts by 2.59 percent in the second quarter of 2009 but recovers to grow at 2.65 percent by end-2010. The charge-off rate peaks at 1.90 percent by the end of 2009.

Residential Real Estate (RRE) Loans

We estimated delinquency rates instead of charge-offs, using bank lending standards and

[1]Since the nature of the current cycle is somewhat similar to the 1990–91 recession, in the sense that the banking sector comes under significant pressure, we ran the estimation over the entire period of 1991–2008.

home prices as explanatory variables.[2] The model specification is:

$$D\_RRE(t) = 0.366 + 0.851*D\_RRE(t-1) + 0.008*L\_RRE(t) - 0.008*HP\_RRE(t),$$

where $D\_RRE(t)$ is the delinquency rate for RRE loans, $L\_RRE(t)$ is bank lending standards for RRE loans, and $HP\_RRE(t)$ is the Case-Shiller 10 house price index.

Under the baseline scenario, the tightening in bank lending standards peaks at 90 percent in the fourth quarter of 2008 and then declines relatively quickly in 2009–10. House prices based on historical and future data have troughed at –17 percent in 2008:Q2 and will continue to decline through 2010. Under these assumptions, residential real estate loan charge-offs are expected to rise from the current 1.13 percent to a peak of 1.89 percent in the second quarter of 2009, but then decline to 1.32 percent by the end of 2010. The stress scenario assumes that bank lending standards remain at 90 percent for two quarters and then take 2.5 years to normalize, house prices decline by 22 percent by the end of 2008, and recovery rates remain at 61 percent, on average, through 2010. In this case, charge-off rates peak at 2.32 percent in end-2009.

[2]Due to the nature of the historical charge-offs series (which show little variability and thus cannot be used for forecasting), we instead used delinquency rates (which show a greater variability). In addition, since the episode of severe house price deterioration is unique in the United States, the effect of house price depreciation could be nonlinear, pushing delinquencies higher and depressing recovery rates. Using delinquencies instead of charge-offs and an assumption about future recovery rates help model a nonlinear effect of house price appreciation. Forecasted delinquencies are then converted into charge-offs assuming that 23 percent (30 percent) of delinquent loans will be charged off under the baseline (stress) case scenario. The assumptions on the default and recovery rates are consistent with dealers' estimates.

Consumer Loans

We combined data on credit cards and other consumer credit into a single category for "consumer loans."[3] The final model was estimated as:

$$C\_CL(t) = 1.187 + 0.608*C\_CL(t-1) + 0.007*L\_CL(t) - 0.072*GDP(t),$$

where $CL\_L(t)$ denotes the charge-off rate for consumer loans. $L\_CL(t)$ is lending standards for consumer loans, and $GDP(t)$ is gross domestic product.

Under the baseline scenario, charge-off rates rise from the current 3.37 percent to 3.92 percent in the second quarter of 2009 and then decline to 2.83 percent by end-2010. Under the stress scenario, charge-offs climb to 4.16 percent in the second quarter of 2009.

[3]Credit card charge-offs exhibit clear cyclical behavior, whereas other consumer credit (mostly auto loans) tends to be highly autocorrelated and has a low sensitivity to its key driver, GDP.

Annex 1.4. Factors Influencing the Pace and Level of Bank Capital Rebuilding[73]

This annex describes the approach taken in preparing an illustration of how global banks may delever to raise capital ratios, and outlines some of the factors that have to be taken into account in such an exercise. The task of assessing how much capital banks need is made more complex by different objectives and time scales over which they are to be achieved.

[73]The main author of this annex is Christopher Morris.

The simulation in this annex endeavors to derive both the demand and supply of credit for 2008–14 (Table 1.10). The demand for credit is driven by the nominal GDP growth forecasts projected by the WEO (IMF, 2008d). The supply of credit is driven by the various factors that will lead banks' balance sheets to expand or contract, and by bank profitability. Underlying this adjustment is a need to achieve higher capital adequacy for investors, regulators, and policymakers.

Table 1.10. Deleveraging Illustration: Key Assumptions

Asset growth	Driven by October 2008 WEO growth forecasts.
Bank income	Driven by returns on assets that dip as growth is weak to 2009, but rebounds to historical norms as growth returns to trend.
Bank charge-offs	For the United States, driven by our model for defaults; for Europe, by charge-offs as estimated by Merrill Lynch Research.
Taxes	At rate relevant for the country, tax losses reclaimed immediately.
Dividends	Drop rapidly to below historical norm payout ratios and stay there until 2011 before returning to historical norms.
New capital-raising	None until 2009:Q1, then a total of $675 billion spread evenly over the next eight quarters.
Drawdown of committed credit lines	$2.5 trillion in 2008–09, trailing off toward the end.
Lack of securitization	$3 trillion of assets build up on bank balance sheets until securitization market gradually reopens in 2010.
Financial Accounting Standard 140	Brings $3 trillion of U.S. bank QSPEs onto balance sheets during 2010–12.
Asset maturities	$7.6 trillion during 2008–13, front loaded tailing off at the end.
Asset sales	$2.4 trillion during 2008–12.

Source: IMF staff estimates.
Note: GSE = government-sponsored enterprise; QSPE = qualifying special-purpose entity.

First, it is necessary to make some judgment on what proportion of the more than $7.6 trillion or so of committed corporate credit lines globally will be drawn down (King, 2008; Malhotra and Henriques, 2008). These credit lines were negotiated when liquidity risk was seriously underpriced, and are therefore at highly attractive rates for the borrower. However, some customers do not need the funds, and may be wary of increasing their debt at this point. The committed credit lines will expire in a year or so. For these reasons, we assume that only around $2.4 trillion of these credit lines will be drawn down.

Strains in the securitization market also complicate the calculations. The securitization market has been seriously impaired for over a year now, and there are few signs of any imminent rebound. For the purposes of these calculations, we surmise that the securitization market will remain closed until well into 2009, and that, as a result, some $3 trillion of assets that would otherwise be securitized will remain on bank balance sheets.[74] We assume that the securitization market will revive gradually starting at the end of 2008.

The introduction of an accounting rule in the United States—FAS 140—also complicates the picture. Having already been delayed by a year, this new rule is scheduled to come into effect in 2010, and will likely require a significant amount of assets that were previously off-balance-sheet by U.S. banks to be brought onto the balance sheet. This is a pure accounting change that will have no direct economic or financial impact, but it will cause the capital and leverage ratios of U.S. banks to change, perhaps with some indirect financial impact (King and others, 2008). We assume FAS 140 is introduced on schedule, but in a milder form, and with some phasing in. As a result, some $2 trillion of assets will transfer onto U.S. bank balance sheets during 2010 through 2012.

We also provide a projection of the new levels of capital that authorities, regulators, ratings agencies and investors will demand, and how patient they are prepared to be. Our base case is that the new standards of capital adequacy are 8 percent common equity to risk weighted assets ratios, and 4.5 percent Tier 1 capital to total assets ratios (equivalent to 22 times leverage) (King, Samuels, and Harrison, 2008; Rams-

[74]U.S. securitization net issuance in the first half of 2008 was around half the $2 trillion issued a year earlier, reflecting the sharp fall in issuance of collateralized debt obligations and asset-backed securities. A similar decline can be seen in the European market.

den and others, 2008; and Steenis, Helby, and Hayne, 2008). We assume that regulators will be tolerant in giving banks time to achieve these new levels.

As mentioned in the main text, we assume that banks shed some $10 trillion of assets from their balance sheets compared with those they would have otherwise retained if there were no need to delever.[75] This is assumed to be split into $7.6 trillion of assets that are simply allowed to mature and not be replaced, and $2.4 trillion of assets that are sold. The former are assumed to reduce credit growth; the latter are assumed not to do so.

It is assumed that banks are unable to raise fresh capital for the remainder of 2008, but in 2009 some appetite for bank capital is assumed to return, enabling banks in the United States, United Kingdom, and the rest of Europe to raise roughly $675 billion collectively over the next few years.

Bank revenues are assumed to dip to below historical norms as growth weakens into 2009, but then to pick up to historical norms as growth rebounds. Bank charge-offs for U.S. banks are in line with the estimates described in Annex 1.3. For European banks they reflect a combination of a joint exercise undertaken with Merrill Lynch's research department, and our own estimates described in Annex 1.3.

Assets brought on-balance-sheet as a result of committed credit lines or impaired securitization markets are assumed to come on with 40 percent risk weightings. Taxes are charged at the corporate income tax rate for the country, and any tax losses are assumed to be reclaimed immediately. Dividends are assumed to move swiftly down from the current high payout ratios to historical norms by the end of 2008 and then fall below historical norms until March 2010, after which they gradually return to historical norms.

[75]This is mathematically the amount banks need to remove from their balance sheets to achieve the new ratios given the other assumptions. See also Graham (2008).

References

Árvai, Zsofia, Karl Driessen, and Inci Ötker-Robe, forthcoming, "Regional Financial Interlinkages and Contagion Channels in Emerging Europe," IMF Working Paper (Washington: International Monetary Fund).

Baba, Naohiko, Frank Packer, and Teppei Nagano, 2008, "The Spillover of Money Market Turbulence to FX Swap and Cross-Currency Swap Markets," *BIS Quarterly Review* (March) (Basel: Bank for International Settlements), pp. 73–86.

Capuano, Christian, 2008, "The Option-iPoD. The Probability of Default Implied by Option Prices Based on Entropy," IMF Working Paper 08/194 (Washington, International Monetary Fund).

Chailloux, Alex, S. Gray, and R. McCaughrin, "Central Bank Collateral Frameworks: Principles and Policies," IMF Working Paper 08/222 (Washington, International Monetary Fund).

Claessens, Stijn, M. Ayhan Kose, and Marco E. Terrones, forthcoming, "What Happens during Recessions, Crunches and Busts?" IMF Working Paper (Washington, International Monetary Fund).

Cooper, Suki, Kevin Norrish, and Amrita Sen, 2008, "Commodity Investment Flows: Q2 `08 Update," Barclays Capital (July 24). Available via the Internet: www.ecommerce.barcap.com/research/user/article/summary?view=89&category=1600&id=216014.

Counterparty Risk Management Policy Group (CRMPG), 2008, "Containing Systemic Risk: The Road to Reform," Report of the CRMPG III (August 6). Available via the Internet: www.crmpolicygroup.org.

European Central Bank (ECB), 2008, "Funding Liquidity Risks," *Financial Stability Review* (June), pp. 106–10.

Froot, Kenneth, and Paul G.J. O'Connell, 2003, "The Risk Tolerance of International Investors," NBER Working Paper No. 10157 (Cambridge, Massachusetts: National Bureau of Economic Research).

Goodhart, Charles, and Miguel Segoviano, forthcoming, "Banking Stability Measure," IMF Working Paper (Washington: International Monetary Fund).

Graham, Stuart, 2008, "European Banking Advisor: Opportunities as Well as Threats," Merrill Lynch Research (June 4). Available via the Internet: http://www.ml.com/independentresearch.

Haigh, Michael S., Jana Hranaiova, and James Overdahl, 2007, "Hedge Funds, Volatility, and Liquid-

ity Provision in Energy Futures Markets," *Journal of Alternative Investments,* Vol. 9, No. 4 (Spring), pp. 10–38.

Interagency Task Force on Commodity Markets, 2008, "Interim Report on Crude Oil," July 22 (Washington: Commodity Futures Trading Commission).

International Monetary Fund (IMF), 2006, *World Economic Outlook,* World Economic and Financial Surveys (Washington, September).

———, 2007, *Global Financial Stability Report,* World Economic and Financial Surveys (Washington, October).

———, 2008a, *Global Financial Stability Report,* World Economic and Financial Surveys (Washington, April).

———, 2008b, United States: 2008 Article IV Consultation, IMF Country Staff Report No. 08/255 (July 30) (Washington: International Monetary Fund).

———, 2008c, *World Economic Outlook,* World Economic and Financial Surveys (Washington, April).

———, 2008d, *World Economic Outlook,* World Economic and Financial Surveys (Washington, October).

King, Matt, 2008, "Why the Banks Aren't Lending," Citigroup Credit Products Strategy (July 23). Available via the Internet (by subscription): www.fidirect.citigroup.com.

———, Simon Samuels, and Mike Harrison, 2008, "There's a Hole in My Bucket: Further Deterioration in European Banks' Capital Ratios," Citigroup Equity Research, Europe (June 12). Available via the Internet (by subscription): www.fidirect.citigroup.com.

King, Matt, Bret Dooley, Stav Gaon, Keith Horowitz, and Brad Ball, 2008, "The $5 Trillion Question: Assessing FAS 140/FIN46R," Citigroup Credit Products Strategy (June 23). Available via the Internet (by subscription): www.fidirect.citigroup.com.

Lowe, Philip, 2008, speech by Reserve Bank of Australia Assistant Governor Philip Lowe on "The Financial Cycle and Developments in the Australian Financial System" at the Sixth Annual Retail Financial Services Forum, Sydney, August 13.

Malhotra, Priyanka, and Roberto Henriques, 2008, "A Question of Commitment: European Banks and Contingent Credit Facilities," JPMorgan European Credit Research (July 8). Available via the Internet (by subscription): www.mm.jpmorgan.com.

McGuire, Patrick, and Goetz von Peter, 2008, "International Banking Activity Amidst the Turmoil," *BIS Quarterly Review* (June) (Basel: Bank for International Settlements), pp. 31–43.

Ramsden, Richard, Brian Foran, Louise Pitt, and Quan Mai, 2008, "Timing the Turnaround: Credit, Capital, Consensus, and Curve," Goldman Sachs Credit Research (June 17). Available via the Internet (by subscription): www.gs.com/research.

Steenis, Huw van, Michael Helby, and Steven Hayne, 2008, "Focus on European and US Banks' Capital Ratios," Morgan Stanley Research, Europe (July 14). Available via the Internet: www.morganstanley.com/institutional/research/.

Tesar, Robert, 2008, "The Impact of Managed Money on Futures Markets," presentation at the conference on "Spikes and Calls: Commodity Markets in 2008," Merrill Lynch Global Markets and Investment Banking Group, Chicago, June 17.

CHAPTER 2

STRESS IN BANK FUNDING MARKETS AND IMPLICATIONS FOR MONETARY POLICY

In the current crisis, bank funding markets have struggled to provide liquidity across the banking sector and thus to act as a conduit for monetary policy in mature economies. This chapter examines the reasons for the recent difficulties in these markets and the effects on the interest rate channel of monetary policy transmission. It finds that elevated interbank spreads are not just the product of how interbank rates are calculated and that the recent pressures have been principally driven by concerns about bank distress risk, with U.S. dollar liquidity strains playing a significant role in the European money markets. Empirical work shows that aspects of the transmission of policy rate changes are far less reliable, particularly in the United States. Policy interventions to further broaden access to emergency liquidity may be necessary to constrain systemic risks but are unlikely to resolve bank funding stresses until broader policy measures, including those aimed at the underlying counterparty credit concerns, are implemented.

The persistence of high interbank rates in the main advanced economies since the current crisis began in the summer of 2007 is startling, even as central banks have taken unprecedented steps to ease conditions. After a period of some moderation of pressures following the rescue of Bear Stearns in mid-March, ongoing concerns about the health of financial institutions and the reemergence of financial distress in September brought back renewed pressures to interbank rates. Uncollateralized interbank rates serve as a benchmark for a significant proportion of financial derivative instruments, and therefore have important knock-on effects for other financial markets as well as borrowers with interest rates indexed to interbank rates. In addition to having adverse consequences for banks' cost of funding, elevated interbank rate spreads may also have serious effects on the transmission of monetary policy. A change in the central bank policy rate (typically an overnight rate) is designed to be transmitted through interbank and money market interest rates, ultimately influencing consumer and business lending rates and therefore domestic demand. However, the interconnections between money and other credit markets that have developed over the past two decades mean that disruptions to the money and funding markets can have adverse macroeconomic consequences.

This chapter examines the current stress in interbank markets from three perspectives. First, the basic microstructure of how interbank markets operate is examined. The discussion includes an assessment of whether the quoted London Interbank Offered Rate (LIBOR) and euro counterpart (the Euro Interbank Offered Rate, or Euribor) are currently distorted.[1]

Note: This chapter was written by a team led by Brenda González-Hermosillo and Mark Stone, and comprised of Andreas Jobst, John Kiff, Paul Mills, Miguel Segoviano, and Seiichi Shimizu. Vance Martin (University of Melbourne), Alin Mirestean, and Jean Salvati assisted in the empirical work, and Yoon Sook Kim provided research assistance.

[1]The LIBOR, calculated by the British Bankers' Association, and the Euribor, calculated by the European Banking Federation, are benchmarks based on expected marginal unsecured funding costs of a creditworthy bank in the interbank market at various maturities out to one year. In contrast, the Euro Overnight Index Average

Second, uncollateralized interbank rates are analyzed empirically to determine what has driven interbank spreads higher. In particular, the question examined is whether the persistent, wide spreads over policy rates that have been observed reflect credit risk or other factors, and whether the underlying causes have changed over time. Third, structural changes influencing monetary transmission and the recent impact of elevated interbank spreads are described and empirically analyzed to test whether the interest rate channel of monetary policy has recently become less dependable. The final section identifies policy proposals to redress current interbank market pressures. In particular, a wide array of policies should aim at cross-market credit and liquidity issues, which have become intertwined during the current period of stress. This will entail central banks and other government entities rethinking their policy options.

The Microstructure of Bank Funding Markets

Term LIBOR and Euribor rates remain worthwhile as measures of a typical creditworthy bank's marginal cost of unsecured term funds in the wholesale money market, although volumes of unsecured term interbank lending have been shrinking as a proportion of short-term funding activity for many years. Nevertheless, given the huge outstanding amounts of derivative contracts and other financial instruments linked to term LIBOR and Euribor, these benchmark rates need to be maintained. Although the survey methodologies have been effective at eliminating most biases at the individual contribution level, proposals by the British Bankers' Association (BBA) to increase the number of sampled banks and introduce more aggressive scrutiny of individual bank contributions are welcome. However, the definition of LIBOR and Euribor in the calculation process should be amended to reflect bank unsecured term funding costs in wholesale money markets more generally, rather than just in the interbank market, to ensure that the indices remain representative of actual unsecured wholesale bank funding costs. Collection and publication of aggregate volume data would also help users to assess the reliability of term interbank rate fixings.

Interbank markets are integral to the functioning of many other financial markets, and so understanding the reasons for their disruption is important for relieving strains elsewhere in the financial system. They are especially tightly linked to interest rate derivatives (forwards, futures, and swaps), of which an estimated $400 trillion principal outstanding are LIBOR-related interest rate swaps (BBA, 2008a). In addition, interbank rates play key roles in capital markets more generally. For example, "credit" spreads on most fixed-income instruments are calculated from LIBOR- and Euribor-based interest rate swap curves to facilitate cross-market and cross-currency comparison given that issuers and investors use LIBOR-based derivatives to hedge and transform interest rate and currency risks (see Box 2.1).

Conceptually, large commercial banks fund their balance sheets in layers, starting with a capital base comprised of equity, subordinated debt, and hybrids of the two, plus medium- and long-term senior debt. The next layer consists of customer deposits—assumed to be "sticky" in most circumstances even though callable at little or no notice.[2] The final funding layer comprises various shorter-term liabilities such as commercial paper, certificates of deposit, repurchase agreements, swapped foreign exchange liabilities, and wholesale deposits. This layer is managed on a dynamic basis as its composition and maturity can change rapidly with cash flow needs and market conditions. Within this layer,

(EONIA) and Sterling Overnight Index Average (SONIA) are weighted-average rates of actual unsecured overnight rates by all banks surveyed for unsecured loans in euros and sterling, respectively.

[2]The embedded call option at par in a bank deposit makes banks vulnerable to deposit "runs" whereby depositors rush to withdraw deposits to avoid principal loss or being denied access through the bank's bankruptcy.

Box 2.1. Pricing and Hedging Role of Interbank Deposit-Related Derivatives

Until recently, marketable government securities were the pricing benchmarks for fixed-income transactions, primarily because of their large outstanding amounts and market liquidity. It was not until the early 1990s that potential benchmarks based on derivatives, such as interest rate swaps and futures, were liquid enough to be considered as viable alternatives.

There are several reasons why government bonds no longer serve as very useful benchmarks for anything other than the most commonly traded government securities:

- Government securities often enjoy a "flight to quality" during episodes of market stress (Fleming, 2000; McCauley, 2001).
- Many governments do not issue enough securities at the right maturities to be adequate for hedging purposes (Remolona and Wooldridge, 2003; Fleming, 2000).
- Even individual government securities issued by the same issuer, differing only by maturity date or even subtle contractual terms, are subject to idiosyncratic pricing (Duffee, 1996).

As a result, interbank deposit-rate-based derivatives have become the preferred fixed-income benchmarking and hedging instruments, with U.S. corporate bonds being the exception. Not only are they more liquid than the alternatives, but long and short positions in these derivative markets are unrestricted, so the kinds of idiosyncrasies seen in securities markets are rare.

For some purposes, overnight index swap (OIS) rates may be more appropriate benchmarks, because they are more representative of risk-free rates, and they better reflect changes in policy rates (Goldman Sachs, 2008). However, shifting a legacy of over $400 trillion of instruments based on the London Interbank Offered Rate (LIBOR) would be a daunting operational task, and OIS benchmarks have their own downsides. For example, the overnight rates on which they are based can be subject to significant volatility, and benchmarks based on actual bank funding costs are the most appropriate when the marginal cost of bank funding is the relevant comparator. A likely outcome is that, as a greater credit and liquidity risk component has become evident in LIBOR and Euribor rates, parties to interest rate derivatives will more carefully consider various benchmark rates.

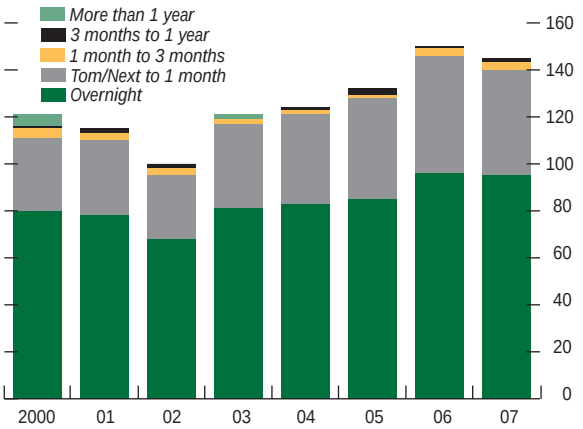
Note: John Kiff prepared this box.

unsecured interbank funding has become a relatively small component of a typical large bank's short-term funding mix due to the regulatory capital charges associated with unsecured lending to other banks.[3]

For some time, the majority of the limited amount of unsecured interbank lending that does take place has been at maturities of one week or less, and predominantly overnight. This reflects general trends in money market activity. The European Central Bank euro money market survey (ECB, 2007) showed that in recent years the vast majority of transactions (about 70 percent) are overnight, while maturities of one month or less account for nearly all of them (about 95 percent) (Figure 2.1). Most bank short-term funding now comes from nonbank sources such as money market funds, securities lending reinvestment portfolios, and central bank foreign exchange reserves. However, these sources are increasingly switching to secured lending and derivatives-based structures—for example, lending overnight and

[3]Under Basel I, unsecured interbank deposits maturing within one year attracted a 20 percent risk-weighting for capital requirement purposes. Basel II uses ratings to determine risk weights. While the minimum weighting remains 20 percent, it can be higher for deposits of greater than three months' maturity. As a result, banks are encouraged to collateralize their exposures with bank counterparties or, if lending is unsecured, to do so at maturities of three months or less.

Figure 2.1. Unsecured European Bank Borrowing Volumes
(In euros; indexed to 2002:Q2 = 100)



Source: European Central Bank.
Note: Tom/Next is a transaction for settlement tomorrow and maturity the next day.

positioning for monetary policy actions with interest rate derivatives such as overnight index swaps (OIS).[4]

The relative paucity of interbank term lending means that LIBOR and Euribor "fixings" beyond a week or month's maturity may not represent actual transactions but rely instead on banks' assessments of their notional ability to borrow at those rates.[5] Although the integrity of the U.S. dollar LIBOR fixing process has been questioned by some market participants and the financial press, it appears that U.S. dollar LIBOR remains an accurate measure of a typical creditworthy bank's marginal cost of unsecured U.S. dollar term funding (Box 2.2). A BBA proposal to introduce more aggressive scrutiny of individual bank contributions is still welcome, as it should improve the accuracy of the LIBOR calculation by, potentially, expanding the panel of contributing banks, and increasing incentives to submit accurate funding rates while maintaining transparency (BBA, 2008a, 2008b).

In addition, consideration should be given formally to expanding the scope of the LIBOR and Euribor so that they represent unsecured term funding rates available to banks in wholesale money markets. This would ensure that they remain indicative of marginal unsecured bank funding costs, and would better reflect the range of funding sources that contributing banks actually consider when estimating their "interbank" funding costs. Broadening the meaning of these rates should not undermine the contractual

[4]An OIS exchanges the average realized overnight unsecured rate with a fixed interest rate over a specified term. Hence, the three-month OIS swap rate embodies the market's expectation of overnight rates over the next three months.

[5]For example, each day, just before 11:00 a.m. London time, each member bank of the BBA's LIBOR contributor panels for 10 different currencies submits the rate at which it could borrow funds in reasonable market size at various maturities (from overnight out to 12 months) in the interbank market. For each currency and maturity, the highest and lowest quartiles of rates are excluded and the rate is fixed at the simple average of the remaining contributions. Rate contributions are nonbinding, in that the banks are not obliged to prove that they did, or could, trade at the submitted levels.

Box 2.2. Is the LIBOR Fix Broken?

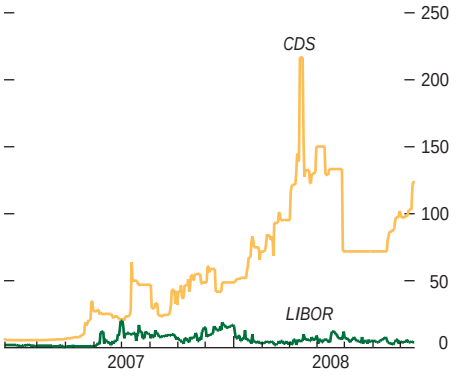
Market observers have been expressing concerns that some LIBOR contributors submit rates that are too low, particularly when they are facing liquidity constraints (Mollenkamp and Whitehouse, 2008). This is said to be driven by the requirement of the British Bankers' Association (BBA) that all rate submissions be published, and by the fact that banks facing liquidity strains may not want to reveal the higher market rates they are actually being offered.

For example, between January and April 2008, the range of contributor bank short-term credit default swap (CDS) spreads far exceeded the range of three-month U.S. dollar LIBOR contributions as a spread over the three-month U.S. dollar overnight index swap (OIS) rate (a proxy for the effective "risk free" rate). Prior to August 2007, the two ranges fluctuated very closely together, but since then, and particularly since January 2008, the range of CDS spreads has been far wider than that of the LIBOR-OIS contribution spreads (see the first figure). However, contributing banks say that CDS spreads play little to no role in day-to-day short-term lending decisions per se.

In practice, outlier rate contributions have little impact on LIBOR fixings, because the lowest and highest are trimmed from the averaging calculation. However, if a downward bias in reported rates were to involve more banks, the median rate would provide a more accurate fixing in some situations. It has also been suggested that the LIBOR panel be expanded to minimize the impact of outliers and of contributors that may not be representative of banks that actually need funds in the relevant currency at the time of fixing. For example, European banks that are active in the London interbank market, but that book transactions at their continental head offices, could be included. Although JPMorgan (2008) suggests that the impact of such an expansion is likely to be marginal,[1] it is a welcome development that the BBA's committee overseeing the LIBOR setting process is to consider expanding the LIBOR contributor panels.

Even though volumes of unsecured term interbank lending have been shrinking for some years, the BBA has argued that the LIBOR remains reflective of the rate at which the panel banks could raise unsecured cash in the interbank lending markets. Also, LIBOR rates remain worthwhile as a measure of a typical creditworthy bank's marginal cost of unsecured funds, irrespective of source. For example, the second figure shows that various potential U.S. dollar three-month bank unsecured funding rates trade very closely to each other.

Spread Between Highest and Lowest Three-Month U.S. Dollar LIBOR Contributions and Highest and Lowest Short-Term Contributor CDS Spreads
(In basis points)



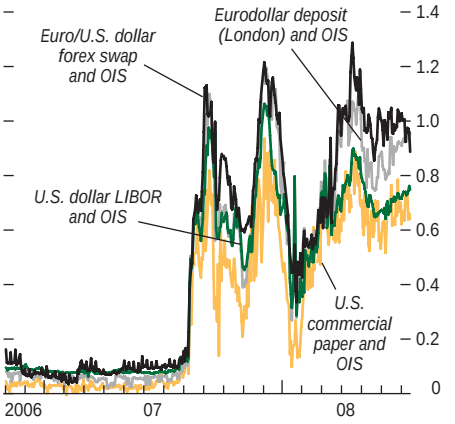
Sources: Bloomberg L.P.; and British Bankers' Association.
Note: CDS = credit default swap.

Note: John Kiff prepared this box.

[1]JPMorgan (2008) compared three-month euro LIBOR to Euribor fixings, and found the difference to be statistically insignificant. The Euribor contributor panel is much broader than the BBA LIBOR panel (43 versus 16), and proportionally fewer observations are trimmed before averaging (the Euribor averaging calculation covers the middle 70 percent of contributions versus LIBOR's 50 percent).

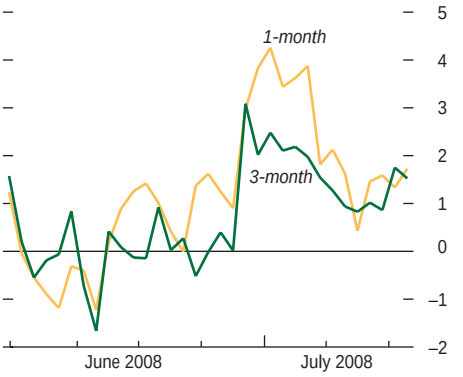
Box 2.2 *(concluded)*

Selected Three-Month Spreads
(In percent)



Sources: Board of Governors of the Federal Reserve System; British Bankers' Association; and JPMorgan Chase & Co.
Note: OIS = overnight index swaps.

ICAP NYFR and BBA LIBOR Spread
(In basis points)



Sources: British Bankers' Association (BBA); and ICAP plc.

In addition, the money market broker ICAP has recently introduced a more broadly defined measure of one- and three-month bank funding costs, and their fixings have differed little from U.S. dollar LIBOR fixings (see third figure).[2]

[2]ICAP asks banks to contribute their estimates of the rates at which prime banks would likely obtain funding (as opposed to what they themselves are funding at) as of 9:15 a.m. New York time. Any unsecured funding sources are covered, including interbank deposits, certificates of deposit, and commercial paper.

integrity of the trillions of LIBOR- and Euribor-indexed financial contracts, since this would better align the formal definition and procedures with how the rates are actually estimated.

The Causes of Elevated Interbank Spreads

The empirical results presented below provide evidence that the sustained strains in U.S. and European unsecured interbank markets have been driven by concerns about the distress risk of financial institutions (accounting for as much as 30 to 45 percent of the total variance). In the case of European banks, U.S. dollar liquidity pressures have also been important (representing up to an additional 30 to 35 percent of the variance). Once these factors are incorporated, other sources of stress in the markets are found to be relatively unimportant.

Although credit risk is theoretically distinguishable from liquidity risk, in practice these risks are intertwined, particularly during periods of stress. The empirical analysis suggests that high interbank rate spreads are due to banking sector distress risk, a term used here to represent both banks' credit and liquidity risks. Consequently, the results suggest that policies aimed at only

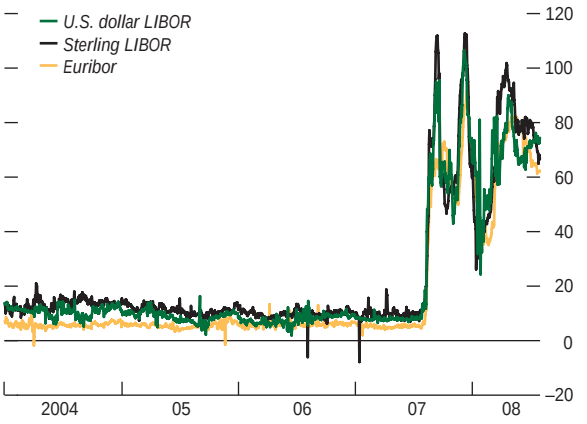
addressing market liquidity pressures may be ineffective, unless credit concerns are also addressed.

Interbank money markets have continued to show unabated signs of stress since the summer of 2007 (Figure 2.2). Not only the level, but also the volatility of these spreads has remained elevated. What has been driving elevated LIBOR-OIS spreads in recent months? Are these spreads driven primarily by liquidity factors or credit concerns in the interbank market?[6] Answers to these questions should allow central banks and other authorities to better calibrate their response to the ongoing crisis.

In principle, term LIBOR rates reflect the expected path of monetary policy, as well as a risk premium associated with credit, liquidity, and other risks.[7] However, the OIS rate embodies the market's estimation of the path of unsecured overnight rates, and so of policy rates in U.S. dollars, euros, and sterling. Hence, the LIBOR-OIS spread should strip out the effects of policy rate expectations, leaving a measure of interbank rate stress and credit concerns.

Several recent studies have attempted to separate the credit and noncredit components of LIBOR-OIS spreads.[8] However, they essentially focus on the role of the credit component measured by an aggregation of credit default swap (CDS) spreads among a collection of banks that are assumed to be independent of each other. The remaining noncredit component is typically *assumed* fully to represent liquidity risk. The

Figure 2.2. Spread Between Three-Month Uncollateralized Interbank Rates and Overnight Index Swaps
(In basis points)



Source: Bloomberg L.P.

[6]Earlier work on the transmission of liquidity shocks was presented in IMF (2008b) and further documented in Frank, González-Hermosillo, and Hesse (2008, 2008b).

[7]Although, for simplicity, most analyses assume that credit default swap (CDS) spreads primarily reflect credit risk, liquidity risks are also embedded in these spreads and it is difficult to disentangle them. There are two reasons for this. First, CDS are traded instruments so their prices contain a risk premium that reflects current market conditions, such as market volatility and investors' risk appetite. Second, banks' funding liquidity risk—the ease with which banks can raise funds—are likely to be also factored into their CDS.

[8]See Bank of England (2007); Taylor and Williams (2008a); Michaud and Upper (2008); Baba, Packer, and Nagano (2008); ECB (2008a); and Imakubo, Kimura, and Nagano (2008).

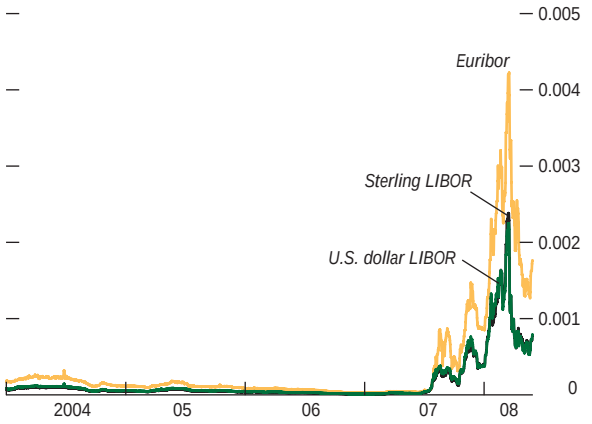
recent literature also finds conflicting evidence of the role of credit and liquidity risks in driving interbank lending spreads. For example, Michaud and Upper (2008) find that their measure of credit risk has little explanatory power for the day-to-day fluctuations in the premium. The Bank of England (2007) finds that while in the early stages of the crisis the spreads were more reflective of liquidity factors, a larger part of the move could be attributed to an increase in credit risk premia during the last months of 2007. Taylor and Williams (2008a) argue that counterparty risk between banks was largely responsible for the rise in the LIBOR-OIS spreads. In contrast, the ECB (2008a) assigns about 50 percent of the recent rise in interbank spreads to credit risk and assigns the remainder to liquidity risk.

This section attempts to refine these initial estimates for the U.S. dollar, Euribor, and sterling LIBOR rates less the OIS.[9] First, the joint probability of distress of the banking system, as a measure of systemic bank credit risk, is introduced (Figure 2.3). In addition, the remaining noncredit component is not *assumed* to be equivalent to a generic type of "liquidity" risk. Instead, a number of variables are used to proxy for different types of liquidity and volatility risk. Third, the estimation technique explicitly takes into account the observed time-varying variances in the variables that proxy for the risks, resulting in more precise estimates of the various components.

Turning first to the choice of variables:

- *Joint probability of distress.* The measure of systemic distress risk used is represented by the joint probability of distress (JPoD) of a group of systemically important banks corresponding to the group of banks that are contributors to each of the interbank rate fixings. The JPoD represents the probability of distress of all the banks in that group and, therefore, embeds banks' distress dependence.[10] Since the JPoD

Figure 2.3. Joint Probability of Distress: Selected Financial Institutions Participating in Interbank Panels



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

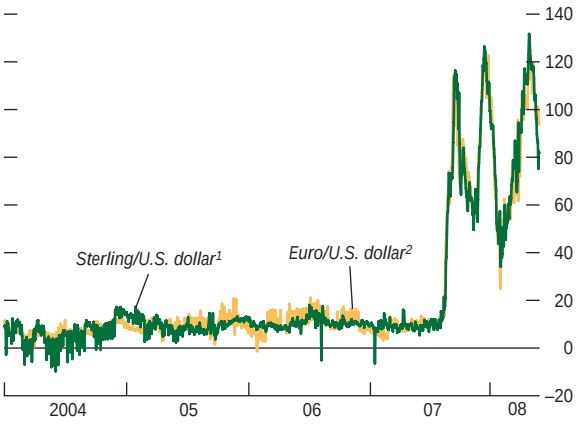
[9]The euro LIBOR and Euribor results are similar and, given the higher volumes of transactions in Euribor, only the Euribor results are reported.

[10]For further details, see IMF (2008b); Segoviano (2008); Segoviano, Goodhart, and Hoffmann (2006); and Segoviano and Goodhart (2008).

is constructed from individual banks' probabilities of distress, which are extracted from CDS spreads, JPoDs necessarily embody both credit and liquidity risks.

- *Collateralized bank funding market (repo spread).* Reflecting the fact that banks face a trade-off as they largely fund themselves in secured interbank markets, the degree of stress in the collateralized bank funding market is proxied by the spread between U.S. government-sponsored enterprises (GSE) debt three-month repo rates, and U.S. government collateralized repo rates. This spread is used as a proxy for global stress in secured interbank lending markets.
- *Market liquidity.* Market liquidity risk, measured by the spread between five-year on-the-run and off-the-run U.S. treasury notes, captures the flight to liquid assets. U.S. treasury notes are viewed by the markets as free of credit risk. However, periods of stress are often characterized by strong demand for the most liquid (on-the-run) U.S. treasury notes.
- *Market volatility.* Volatility risk in financial markets is proxied by the implied volatility in the S&P 500 (VIX), a measure often used to reflect investors' risk appetite.[11]
- *Interest rate volatility.* Another measure of volatility risk is uncertainty about the future path of interest rates, proxied by the implied volatility of swaptions (options to enter into an interest rate swap) with maturities between one and six months.
- *Forex swap.* The role of U.S. dollar liquidity pressures is also examined, as many European banks with U.S. dollar assets have faced difficulties funding these positions (see Box 2.3). U.S. dollar liquidity pressures are proxied by forex swap spreads, or the spread between the three-month pound sterling (or euro) and U.S. dollar forward rates, and the three-month U.S. OIS rate (Figure 2.4).[12]

Figure 2.4. Three-Month Forex Swap Spreads
(In basis points)



Sources: Bloomberg L.P.; JPMorgan Chase & Co.; and IMF staff estimates.
[1]Spread between sterling/U.S. dollar forex swap and 3-month U.S. dollar overnight index swaps.
[2]Spread between euro/U.S. dollar forex swap and 3-month U.S. dollar overnight index swaps.

[11]González-Hermosillo (2008) discusses the variables typically used to measure investors' risk appetite.

[12]A forex swap is a bilateral contract where different currencies are exchanged by combining foreign currency spot and forward contracts. Financial institutions with a need for foreign currency funds face a choice between

Box 2.3. The Federal Reserve's Term Auction Facility

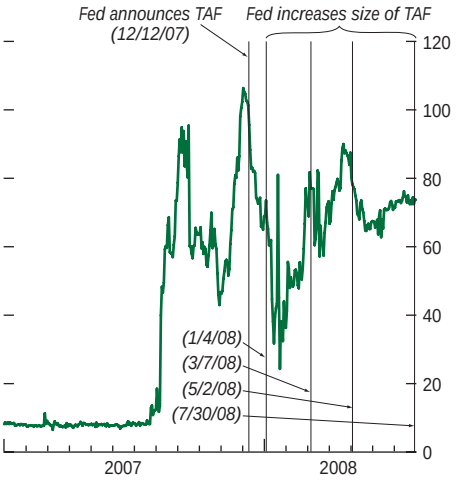
In December 2007, the Federal Reserve announced a temporary Term Auction Facility (TAF) that enabled U.S. banks to borrow for four weeks against the wider range of collateral permissible at the discount window.[1] This direct provision of term funding using an open auction process with a minimum interest rate removed the stigma associated with discount window access while preserving the anonymity of users.[2] By the end of June 2008, the amount of outstanding borrowing through the TAF was $150 billion (versus $14 billion at the discount window). U.S. dollars were also made available to European banks through foreign currency swap arrangements between the Fed and the European Central Bank (ECB) and Swiss National Bank.[3]

The initial TAF auctions were seemingly successful in reducing the spread between the three-month U.S. dollar LIBOR and overnight index swap rates (see first figure). However, uncollateralized term funding conditions deteriorated again in March, coinciding with problems at Bear Stearns, and despite some improvement have remained strained since then.

Despite an increase in the amounts allotted to the ECB's TAF auctions in May, auction demand for U.S. dollars from European banks has increased more rapidly (see second figure).

Impact of Term Auction Facility (TAF) on U.S. Dollar LIBOR Minus Overnight Index Swap Spread

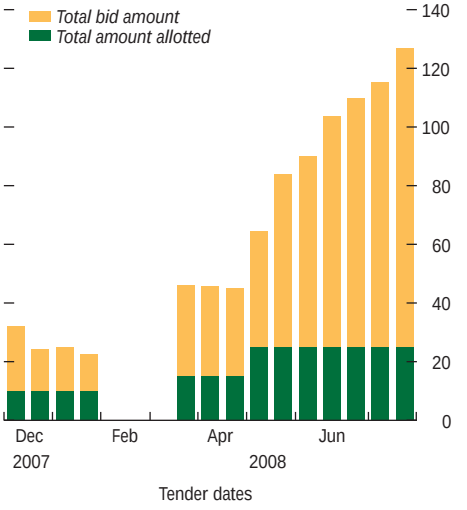
(In basis points)



Sources: Bloomberg L.P.; and Board of Governors of the Federal Reserve System.

European Central Bank: U.S. Dollar Term Auction Facility (TAF)

(In billions of U.S. dollars; 4-week tender)



Source: European Central Bank.

Note: This box was prepared by Brenda González-Hermosillo and John Kiff.

[1]The outstanding TAF balance was originally effectively capped at $40 billion, but it was increased in several steps to $150 billion in May 2008. On July 30, the Fed also announced that it would extend the maturity of some TAF auctions from the original four weeks to 12.

[2]In August, the Fed narrowed the spread between the discount and target Fed Funds rates from 100 to 50 basis points, and extended the term of the primary credit program to up to 30 days (from overnight). However, despite encouragement from Fed officials, banks remained reluctant to tap the facility, although its usage did increase somewhat after the Fed reduced the spread to 25 basis points in March 2008.

[3]The outstanding ECB and Swiss National Bank swap facilities were originally capped at $20 billion and $4 billion, respectively, but the caps were also increased in steps, and stood at $55 billion and $12 billion in August 2008.

This growing excess demand, and widening foreign currency (forex) swap spread (see Figure 2.4) suggests that the facility is serving a useful function but is yet to satisfy the strong demand for dollars arising from European banks bringing onto their balance sheets U.S. dollar-denominated assets that were previously in off-balance-sheet vehicles funded by asset-backed commercial paper and other means.

The effectiveness of the TAF in reducing interbank funding market strains has been intensely debated. There is, as yet, no consensus in the literature. Some find that the TAF has been effective in reducing spreads and dampening volatility (see Michaud and Upper, 2008; McAndrews, Sarkar, and Wang, 2008; Frank, Hesse, and Klueh, forthcoming; and Wu, 2008), whereas others find little impact (Taylor and Williams, 2008a, 2008b). As shown in this chapter, volatility in uncollateralized interbank funding rates reflects not only liquidity pressures, but also default risks and other factors. Moreover, identifying and untangling potential drivers of interbank liquidity conditions is empirically challenging, so it is not surprising that there is disagreement about the causes of elevated interbank rates. In particular, the TAF, with its currency-swap facility, was not designed to address uncertainty about the size of the banks' assets coming onto their balance sheets or potential counterparty risks, which is why the TAF has not been fully successful in eliminating interbank funding market strains.

However, banks are also likely to be facing other liquidity pressures that are difficult to measure directly. These include uncertainty relating to their own funding liquidity needs as they move off-balance-sheet positions onto their balance sheets, as well as uncertainty about asset valuation, particularly if others unwind similar positions at distressed prices. Banks may also hoard liquidity during periods of market stress as a mechanism to avoid potential signaling effects that they may be the ones in need of liquidity. These and other factors are captured by the unexplained component of the variation of interbank spreads, which is reflected in the residual of the model discussed below and described in Annex 2.1.

To examine these questions, a multivariate vector autoregression (VAR) and a structural VAR (SVAR) model are used based on a sample of daily data from January 1, 2004, through May 28, 2008. In using the VAR and SVAR frameworks, and in contrast with other approaches in the empirical literature that have examined interbank lending spreads, the model captures the observed time-varying volatility in the spreads highlighted by the data. The adoption of a time-varying volatility structure is consistent with the observation that the factors explaining the spread are not constant over the sample, but can change at each point in time.[13]

Empirical Results

In a standard VAR model, the variables are ordered to reflect the econometricians' views about the relative sequential influence of each of the variables. By contrast, the SVAR requires a more direct set of assumptions about the relationships among the variables. The benefits of this approach are that the assumptions are transparent, and that the restrictions about the

borrowing directly in the uncollateralized cash market for the foreign currency, or borrowing in another (typically domestic) currency's uncollateralized cash market and then converting the proceeds into a foreign currency obligation through a forex swap. For example, when an institution raises U.S. dollars via a forex swap using the euro as the funding currency, it exchanges euros for dollars at the spot rate, while contracting to exchange in the reverse direction at maturity at the forward rate.

[13]Further technical details of the model specification are provided in Annex 2.1.

Table 2.1. List of Restrictions Used in the Structural Vector Autoregression for Each LIBOR and Euribor Spread

	Market Volatility	Interest Rate Volatility	Market Liquidity	U.S. Dollar Liquidity	Credit	Distress	Residual
S&P 500 volatility index	X						
Swaption	X	X					
On/Off-the-run			X			X	
Currency/U.S. dollar swap			X	X		X	
Repurchase agreement					X	X	
Joint probability of distress					X	X	
LIBOR/Euribor	X	X	X	X	X	X	X

interactions among the variables can be made explicit and consistent with stylized facts.[14]

Thus, for each of the interbank lending markets, the associated SVAR model makes several assumptions about the relationships among the variables of interest (Table 2.1). For instance, the market volatility factor is assumed to affect the implied volatility from equity markets represented by the VIX and the implied volatility from swaption contracts. The volatility of the interest rate factor is applied to the implied volatility from the swaption and so on. Finally, the residual factor affects only LIBOR/Euribor, as it is assumed to be unrelated to the other variables, perhaps capturing bank-specific risks. All factors are designed to influence the unsecured interbank rates.

The empirical results suggest that the dominant influence on the movements in the variance of all three interbank rates arises from the proxy for systemic distress risk. For example, in the case of the three-month U.S. dollar LIBOR-OIS spread, the JPoD variable (the measure of systemic distress risk) reaches around 45 percent of total variance on April 2, 2008, shortly after the Bear Stearns' collapse.[15] In the past six months or so, until very recently, the systemic distress risk variable has accounted for the majority of the explained portion of the variance in the spread (Figure 2.5). In addition, the first hump in the JPoD contribution occurred much earlier, in late July 2007, when the markets first showed signs of significant stress. The role of the other variables is relatively small, but notably the repo spread began to show signs of stress in 2005 when the U.S. housing market began its recent downturn. After being important during much of 2005–06, the effects from forex swaps (dollar/euro) have been relatively small since mid-2007.

Similar results are found for the Euribor panel of banks, with systemic bank distress risk dominating the variance decomposition during the period around the Bear Stearns collapse. Importantly, the forex swap variable accounted for over 30 percent of the total variance at an earlier point of the crisis. U.S. dollar liquidity pressures have also become more important in recent months. The relative contribution of

[14]The variance decomposition reported is based on a one-day lag in order to reduce problems arising from time differences between U.S. and European markets. For robustness, various lags were examined. Additionally, two alternative SVAR specifications were modeled, as well as an unconstrained VAR model with a time-varying variance-covariance matrix, all of which gave similar results. Finally, various tests of over-identification of the restrictions were undertaken. Due to space constraints, only the results of the SVAR are presented here. See González-Hermosillo, Martin, and Segoviano (forthcoming) for details.

[15]The panels in Figure 2.5 are designed to show the percentage of the variance decomposition represented by each variable, adding up to 100 percent. The period before mid-2007 had a much smaller variance than during the crisis.

other factors is relatively small in comparison (Figure 2.5).

For the sterling LIBOR-OIS spread, the dominant variable is the forex swap spread, amounting to close to half the total LIBOR-OIS variance at times. The movements of the forex swap and systemic risk variables show collinearity as they are very similar. When the forex swap variable is omitted, the JPoD for the banks on the sterling LIBOR panel represents as much as 35 percent of the total variance during March 2008. The contributions from other variables are relatively small (Figure 2.5).

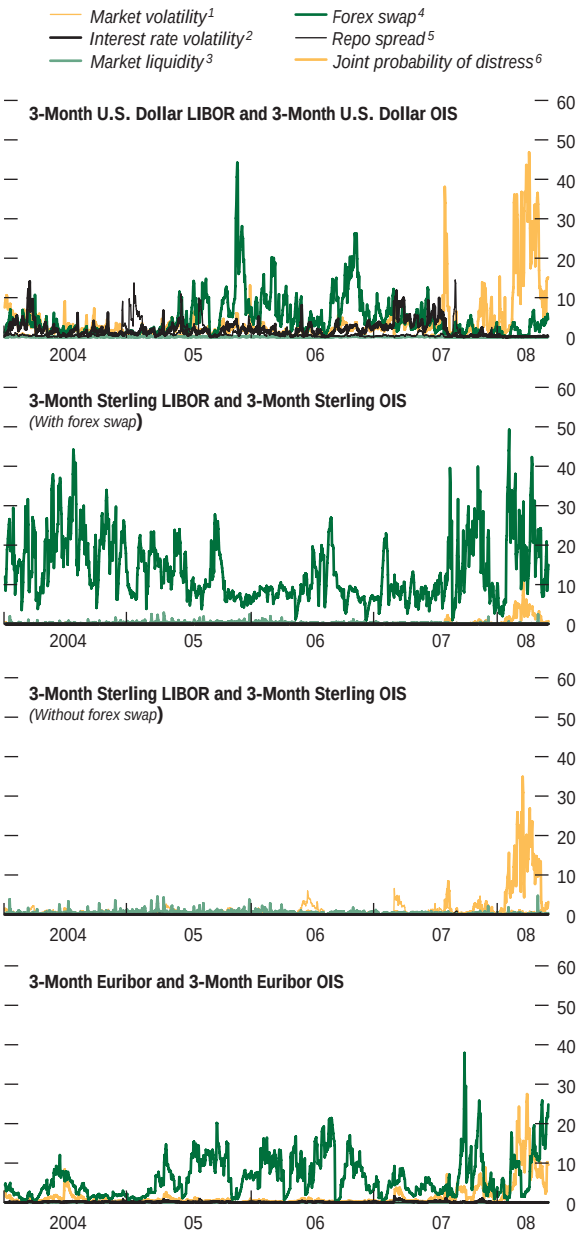
Implications for the Interest Rate Transmission Mechanism of Monetary Policy[16]

Structural changes in the financial sector appear not to have undermined monetary policy transmission over the past 25 years, but did set the stage for the alterations in the interest rate transmission mechanism beginning in the summer of 2007. The most germane structural changes were the emergence of near-banks, the shift of banks toward market financing, and the shortening of the term of market liabilities through the late-1990s.

Most importantly, empirical work indicates that the normal relations governing the pass-through of policy rates into the markets for short-term bank financing and for short- and long-term near-bank financing has become less reliable over the past year, particularly in the United States. The early stages of transmission have been impeded by (1) banks' higher dependence on short-term market financing and the dislocation of these markets, and (2) the increased importance of near-banks in the financial sector coupled with disruption to their financing. The alterations in the early stages of the transmission process mean that

[16]This section was developed in part based on discussions at the conference on "Challenges for Monetary Policy from Financial Innovation and Globalization" in January 2008 in Paris. See IMF (2008a).

Figure 2.5. Structured VAR Model: Variance Decomposition of LIBOR/Euribor Minus Overnight Index Swap (OIS) Spread
(In percent)



Source: IMF staff estimates.
[1]Implied volatility from S&P 500 equity index.
[2]Lehman Brothers swaption volatility index. Implied volatility of interest rate swaption with maturities ranging from 1 month to 6 months.
[3]Five-year on-the-run/off-the-run U.S. treasury note spread.
[4]Spread between 3-month euro/U.S. dollar and sterling/U.S. dollar forex and 3-month OIS.
[5]Spread between the yields on 3-month U.S. agency repo and 3-month U.S. treasury repo.
[6]Joint probability of distress of selected banks participating in U.S. dollar LIBOR, sterling LIBOR, or Euribor fixing.

changes in the policy interest rate are less likely to be reliably passed on to the middle and late stages. The results for borrower financing rates, which have thus far been less affected, need to be interpreted alongside other evidence (such as tighter lending standards and slower credit growth) that suggests that banks are reducing lending by cutting back loan originations rather than raising interest rates. The current re-intermediation process, whereby loans shift from lightly capitalized, market-funded "near-banks" back to more heavily capitalized banks, will add to the capital needs of the system and act as a drag on credit creation, possibly exaggerating the credit cycle.[17]

Structural Changes to the Financial System

This section examines the impact of structural changes in the financial sector and the current financial turmoil on interest rate transmission of monetary policy.[18] A change in the policy interest rate is transmitted in three stages:

(1) To the interest rates in money and other lender financing markets (early linkages);

(2) From lender financing interest rates to the funding costs and lending rates for household and business borrowers (middle linkages);[19] and

(3) From household and business financing costs to the ultimate policy objectives of price and output stability (final linkages) (IMF, 2006, 2008b; and Bhatia, 2007).

This section focuses on the early and middle linkages of interest rate transmission because they are easier to model empirically and insufficient time has passed to assess the impact of the current turmoil on the final linkages.

The structural changes in the financial sector over the past 25 years, which are described in the next section, may be altering monetary transmission by reshaping the traditional maturity transformation function of banks. And, at this crucial juncture in the business cycle, policymakers are acutely concerned about the implications of these structural changes for interest rate transmission and how they may have complicated the early linkages of transmission in the turmoil.

Against this backdrop, this section is concerned with two questions: How have the early and middle linkages of interest rate transmission been affected by financial sector structural changes over the past 25 years? And how is transmission being altered by the financial turmoil that began in the summer of 2007?

The analysis is primarily concerned with the United States, where structural changes have been most evident and monetary transmission seems to have been the most disrupted. The euro area and, to a lesser extent, Japan and the United Kingdom are also examined.

Implications of Structural Changes for Interest Rate Transmission

The main structural changes over the past 25 years are outlined below.

"Near-bank" financial institutions have gained a large share of financial intermediation. In the United States, near-banks (issuers of asset-backed securities [ABS] and other structured products, GSEs, finance companies, securities brokers and dealers, and funding corporations) now account for a large share of the financial sector (Figure 2.6). Banks' share of the financial sector declined through the 1980s and 1990s and leveled off thereafter. Meanwhile, the long-

[17]See IMF (2008e, Chapter 4) for further analysis of procyclical lending behavior.

[18]The main channels of monetary transmission are overlapping and shifting in line with changes in the financial system. (For a recent review of monetary transmission see Kuttner and Mosser, 2002.) *Interest rate channel* transmission begins with a change in the short-term policy rate that influences market interest rates, and, after some price stickiness, will raise the real rate of interest and the user cost of capital, thereby affecting aggregate demand, and so economic output and inflation. The other main channels are the *bank-lending channel* (Bernanke and Blinder, 1988), the *balance-sheet/financial accelerator channel* (Bernanke, Gertler, and Gilchrist, 1999), and the *expectations channel*. The interruption of monetary transmission during the recent financial turmoil is addressed in IMF (2008a) and Adrian and Shin (2008).

[19]Business borrowers in this section refers to nonfinancial businesses.

term growth of GSEs, ABS issuers, and broker dealers accelerated around 2000 (Box 2.4). Then, around 2003, GSE and bank shares of the mortgage market shrunk rapidly as other near-bank entities, market-financed ABS issuers, and finance companies grew. In the euro area, the shift from traditional banks to other intermediaries has been more moderate than in the United States and the United Kingdom. The majority of "other intermediaries" in the euro area are mutual funds that function as investment vehicles for households and insurance corporations, holding shares and other securities. Corporate financing through debt securities is relatively limited, and the recent increase in home mortgages appears to have been mainly supplied by commercial banks.[20]

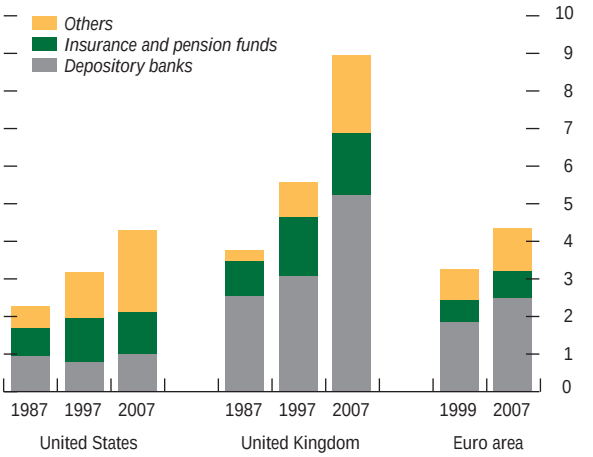
Banks have been shifting away from deposits to less reliable market financing. "Core deposits" dominated U.S. banks' liabilities in the past, but have been gradually replaced by other "managed liabilities" (Figure 2.7).[21] At the same time, near-banks—which are entirely market financed—have grown sharply. This is related to the "originate-to-distribute" financing model that relies heavily on sound short-term market liquidity management. Euro area and U.K. banks also rely more on market financing than in the past, as in the United States. Similarly, the share of deposits by households (defined roughly the same as U.S. core deposits[22]) has been gradually declining over time, while deposits held by nonfinancial corporations, other financial intermediaries, and nonresidents have

[20]ECB (2008b) suggests that statistical differences in the share of monetary financial institutions' (MFI) financing derived from households among the euro area, the United Kingdom, and the United States are partly the result of respective accounting and statistical treatments. For example, European accounting rules have largely prevented MFIs from removing securitized loans from their balance sheets, thereby making MFIs' assets larger relative to U.S. counterparts.

[21]U.S. "core deposits" are defined as the sum of checkable deposits and low value time and saving deposits, which includes some (checkable) deposits from businesses.

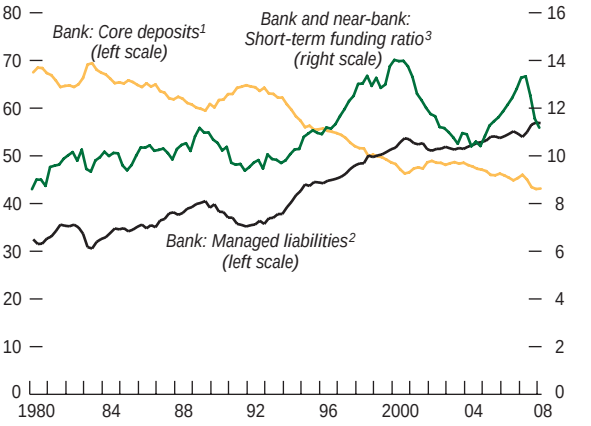
[22]The euro area and U.K. equivalents of core deposits are specified as deposits by households only.

Figure 2.6. Selected Countries: Size of Financial Assets
(In multiples of GDP)



Sources: U.S. Board of Governors of the Federal Reserve System; U.K. Office of National Statistics; European Central Bank; and IMF staff estimates.

Figure 2.7. United States: Structural Changes in Financial Sector Liabilities
(In percent of total liabilities)



Sources: U.S. Board of Governors of the Federal Reserve System; and IMF staff estimates.
[1]Core deposits: checkable deposits, and small time and savings deposits.
[2]Managed liabilities: total liabilities less core deposits.
[3]Ratio of banks' and near-banks' funding through Fed Funds, security repo agreements, and commercial paper, vis-à-vis total liabilities.

Box 2.4. Breakdown of the Financial Sector for Monetary Transmission Analysis

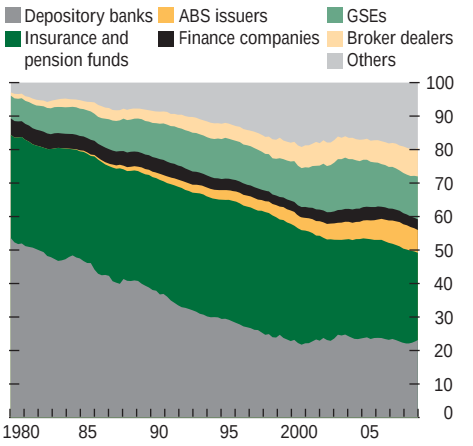
For purposes of this analysis of monetary transmission, the financial sector can be divided into banks and near-banks (see figure).

Banks. Traditionally collected short-term deposits and transformed into long-term loans, but more recently have moved to greater reliance on market financing.

Near-banks. Similar to banks on the asset side but dissimilar in financing. In the U.S. flow of funds tables, near-banks comprise the following entities:

- *Asset-back security (ABS) issuers*, which typically are private bank-controlled conduits that securitize mortgages and consumer credits, and are financed by ABS and asset-backed commercial paper (ABCP), which in turn are held by a variety of investors including banks, life insurance companies, mutual funds, and foreign entities. ABS issuers are very similar in terms of assets but mainly issue bonds and differ from banks on the liability side.
- *Government-sponsored enterprises (GSEs) and GSE pools*, which finance home mortgages through issuing agency- and GSE-backed securities that banks, foreign investors, and many other sectors purchase. These entities largely benefit from the information collection specialization of banks and hold similar assets to banks, but are financed mainly by long-term bonds.
- *Finance companies*, which are similar to banks on the asset side but are market-financed and relatively small.
- *Securities brokers and dealers*, which are largely investment banks that finance their traded assets by security repo agreements and other types of credit that are advanced again by banks, money market mutual funds, and, especially in recent years, foreign entities. The information collection skills of these brokers and dealers are different from those of banks and their role in monetary transmission is related to security transactions and their role as market-makers. This group also includes funding corporations, which are funding subsidiaries of foreign financial institutions, nonbank financial holding companies, and custodial accounts associated with security lending. Their funding is obtained mainly from commercial paper markets.

United States: Breakdown of Financial Sector
(In percent of total assets)



Source: U.S. Board of Governors of the Federal Reserve System.
Note: Government-sponsored enterprises (GSEs) include agency- and GSE-backed mortgage pools. Broker dealers include funding corporations. ABS = asset-backed security.

Note: Mark Stone and Seiichi Shimizu prepared this box.

steadily increased.[23] In addition to these "managed deposits," financing through repurchase agreements and issuance of debt securities, both in domestic and foreign markets, have expanded, indicating that European banks are also increasingly exposed to developments in money markets. At the same time, the share of household deposits for Japanese banks has been stable and even increasing over time. This may

[23]For example, deposits by nonresidents recently accounted for 46 percent of U.K. bank liabilities.

partly reflect the prolonged low interest environment since the late-1990s.[24]

Until recently, bank liability maturities had shortened and become more volatile. The short-term markets became more important for banks and near-banks through the mid-1990s as a more flexible way to manage their asset and liability structures. An "aggregate short-term funding ratio" for the United States comprising commercial paper, Fed Funds, and security repo agreements of banks and near-banks shows an upward trend through 2000, with a subsequent large swing (Figure 2.7). Banks in the United Kingdom have also tapped an increased share of funding through repo agreements through 2004.[25] However, short-term market financing costs are more volatile than the traditional main financing source of core deposits. The interest rate on checkable deposits is relatively stable compared with rates on federal funds and repurchase agreements and time deposits, and the liability share of checkable deposits has fallen.

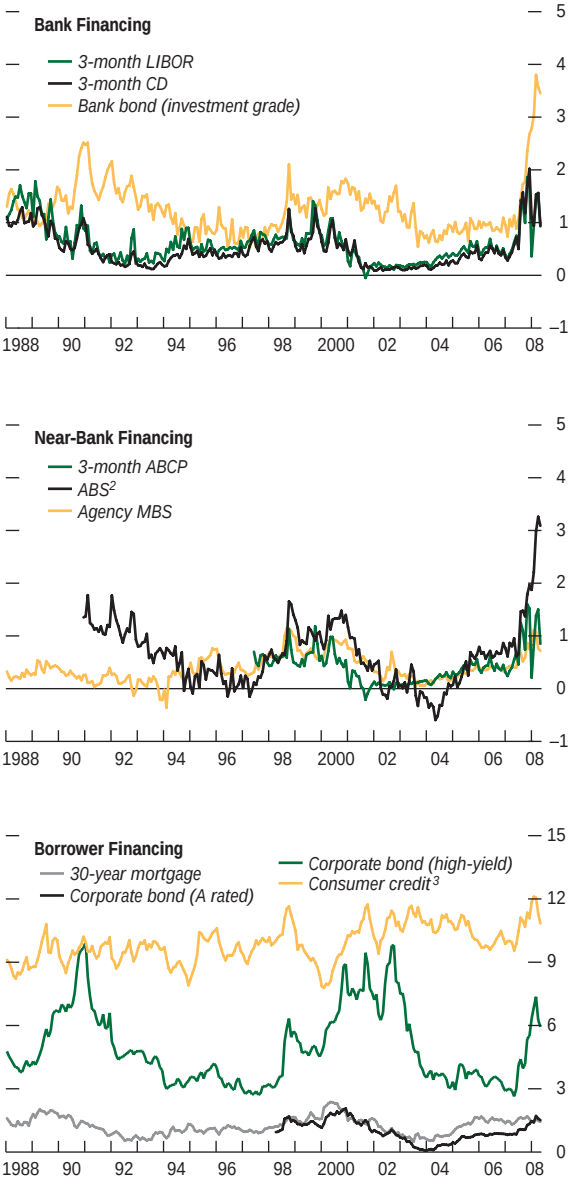
Implications of the Current Financial Turmoil for Interest Rate Transmission

The dramatic alteration in the interest rate transmission mechanism brought on by the market turbulence that erupted in July 2007 can be seen in the changing costs and composition of bank and near-bank financing (IMF, 2008c, Chapter 3). In the United States, interest rate spreads and the volatility of banks' short-term financing rose to levels exceeding

[24]In addition, limited subprime exposure has sheltered Japanese banks from the balance sheet and funding difficulties experienced by U.S. and European banks (IMF, 2008d).

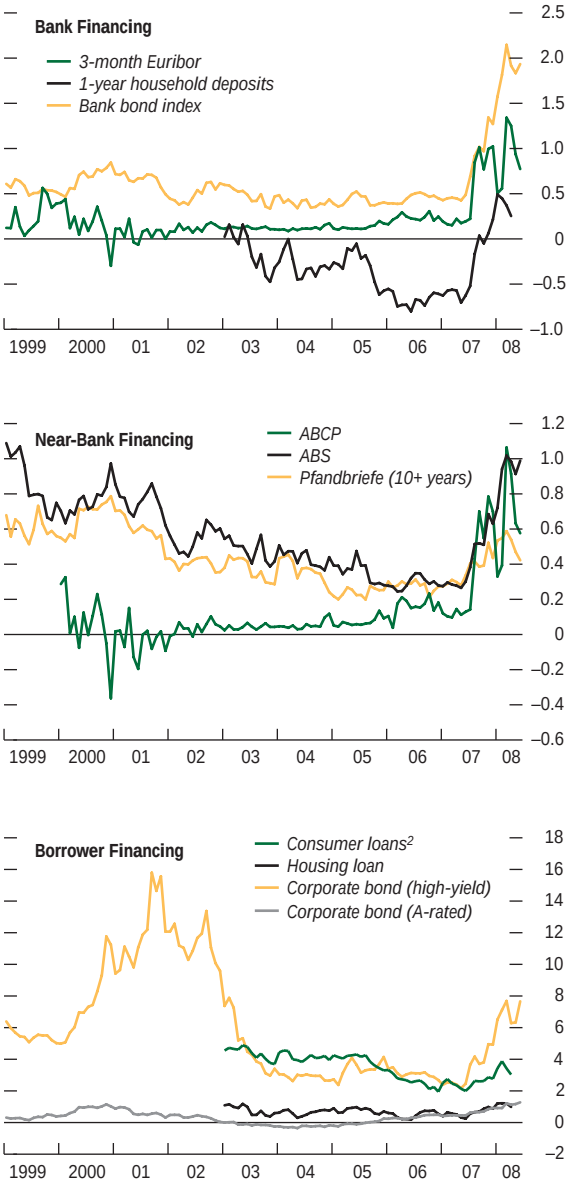
[25]Data show a fairly low and stable share of repo funding in the euro area. This is mostly because noneuro repo funding is apparently not included. According to the latest European repo market survey conducted by the International Capital Market Association, the outstanding volume of repo in Europe increased from 924 billion euros as of June 2001 to 3,153 billion euros as of end-2007, equivalent to 7 percent and 14 percent of MFI liabilities, respectively (see International Capital Market Association, 2008).

Figure 2.8. United States: Selected Interest Rate Spreads[1]
(In percent)



Sources: Bloomberg L.P.; and Merrill Lynch.
Note: ABCP = asset-backed commercial paper; ABS = asset-backed security; CD = certificate of deposit; MBS = mortgage-backed security.
[1]Spread over treasury securities of comparable maturity.
[2]Merrill Lynch fixed ABS index.
[3]Credit card (accounts assessed) interest rate.

Figure 2.9. Euro Area: Selected Interest Rate Spreads[1]
(In percent)



Source: Eurpean Central Bank.
Note: ABCP = asset-backed commercial paper; ABS = asset-backed security.
[1]Spread over government securities of comparable maturity.
[2]Consumer credit (over 1 year and up to 5 years) rate as reported in the ECB Monthly Bulletin.

those of previous downturns (Figure 2.8, top panel), immediately raising marginal financing costs and probably, in effect, cutting off some banks from the markets. The overall short-term funding ratio for banks and near-banks declined sharply beginning in the second half of 2007 (Figure 2.7). Banks' financing from the Fed Funds and repo markets declined from the third quarter of 2007. Similarly, security brokers and dealers reduced funding from repo markets in line with attempts to deleverage, while customer lending associated with security transactions increased and the issuance of asset-backed commercial paper (ABCP) contracted significantly.

Banks and near-banks were compelled to tap longer-term financing, notwithstanding the higher costs. The spreads over treasury securities of comparable maturities of long-term bank financing instruments shot up to levels far above previous cyclical highs (Figure 2.8, middle panel). In the United States, Federal Home Loan Bank advances were another important source of mortgage-related financing for banks.

Funding stresses exerted downward pressure on bank lending even as lenders faced increasing demand for commercial and industrial loans, as nonfinancial corporations drew down previously established credit lines (Federal Reserve Board, 2008). According to the Federal Reserve's Senior Loan Officer Opinion Survey, banks significantly and quickly tightened lending standards for most categories of loans (see Chapter 1). However, neither bank lending rate spreads over treasury securities nor corporate bond yield spreads have risen to date above levels previously experienced during economic downturns, suggesting that credit tightening is in the form of quantity rather than price adjustment (Figure 2.8, bottom panel).

Thus far, the upshot of the market turmoil has been an expanding role for banks at the expense of near-banks. Near-banks are more vulnerable to funding illiquidity and have stopped gaining market share in relation to the banks. This is partly explained by the contrac-

tion of ABS and ABCP issuance, reflecting banks bringing the associated assets onto their balance sheets (IMF, 2008c, Chapter 2).

In the euro area over the past year, interest rate spreads for both lender and borrowing financing display patterns similar to the United States, indicating that other monetary systems may have suffered a similar alteration to the normal interest rate transmission process (Figure 2.9). Banks have tried to secure more stable financing through deposits with an agreed maturity as well as debt securities, and near-bank financing spreads have widened, although they account for a smaller share of the financial system. Household mortgage loan growth has abated in line with the ongoing trend since 2006, but credit growth to nonfinancial corporations has remained robust.

Empirical Analysis

The empirical analysis below aims to gauge the impact of structural changes in the financial sector on interest rate transmission in the past and during the current time of stress. The specific questions examined are:

(1) Have structural changes in the financial sector over the past 25 years undermined or enhanced interest rate transmission?[26]

(2) How has the recent market turmoil affected the markets crucial for interest rate transmission?

Interest rate transmission in the United States and the euro area is modeled here in a system of simultaneous regression equations comprising the effective policy rate and a market interest rate or yield.[27] The policy rates are the actual Fed Funds rate for the United States and the Euro Overnight Index Average (EONIA) for the euro area, and the market interest rates or yields comprise (1) lender financing interest rates and yields (three-month LIBOR, the investment-grade bank bond yield, the ABS yield, and the mortgage agency bond yield); and (2) borrower financing rates and yields (the mortgage rate and high-yield corporate bond yields).

The regressions are estimated using monthly data from the initial date of data availability to end-June 2008, using an approach aimed at distinguishing between the short- and long-term effects of changes in monetary policy rates on market rates (in terms of direction, timeliness, and magnitude).[28] The estimated equations model the contemporaneous monthly change in the market rate as dependent on its previous changes and on past changes in the overnight unsecured rate, and any deviation from the long-run equilibrium (with the core deposit ratio of the banking sector as an unreported control variable). The impact of the policy rate on each market rate is the focus, as opposed to direct estimation of the potential variables that explain the market rate itself.[29] This approach facilitates the analysis of shifts in interest rate transmission as well as cross-market comparisons.

The results suggest that interest rate transmission from the Fed Funds or EONIA to market rates has operated broadly as expected over the past 25 years (Tables 2.2 and 2.3).[30] The long-term pass-through is

[26]The empirical literature has generally concluded that over the last several decades the interest rate pass-through has probably strengthened while other transmission channels may have weakened (Kuttner and Mosser, 2002).

[27]The technical details are presented in Annex 2.2.

[28]Specifically, a two-dimensional Vector Error Correction Mechanism (VECM) model with a three-period lag structure is estimated. The cointegration vector represents a possible linear combination of each interest rate pair, which establishes a long-term relation towards which convergence occurs over time (Banerjee and others, 1993; Granger, 1986; Hendry and Juselius, 2000).

[29]For instance, with elevated commodity prices, measures of inflation expectations may be expected to influence market rates. However, market implied inflation expectations in advanced economies have, until recently, remained relatively stable (compared with emerging economies), indicating that their influence on monetary policy transmission has been limited.

[30]Kok Sørensen and Werner (2006) found that, in the euro area, rates on mortgage loans and time deposits adjust more efficiently than rates on consumer loans and checking deposits.

Table 2.2. Static Vector Error Correction Mechanism (2, 3) Estimation with Variable Controls: United States

Fed Funds Rate vis-à-vis:	*Long-Term Pass-Through* Cointegration factor coefficient	*Short-Term Pass-Through* Fed Funds At 1-month coefficient	Fed Funds At 2-month coefficient	*Direction of Causality* Modified GG score	Adj. R^2
		Lender Financing Rates (Banks)			
Three-month LIBOR rate					
Entire sample: 1/1985–6/2008	**–1.48*** **	**0.06*** **	**–0.05***	**–1.00[1]**	**0.05**
Period I: 1/1985–12/1991	–1.13***	0.34	0.05	–1.00[1]	0.05
Period II: 12/1991–9/2000	–0.11	0.42	0.15	0.72[1]	0.43
Period III: 9/2000–12/2004	–6.30***	0.04	–0.30	–0.66[1]	0.19
Period IV: 12/2004–6/2008	–1.17***	1.27***	–0.11	–1.00[1]	0.56
Bank bond yield					
Entire sample: 12/1987–6/2008	**–1.25*** **	**0.06**	**–0.05**	**–1.00[1]**	**0.07**
Period I: 12/1987–12/1991	–0.50**	0.14	–0.02	–0.71[1]	0.23
Period II: 12/1991–9/2000	4.27***	0.17	–0.04	1.00[1]	0.15
Period III: 9/2000–12/2004	–0.42	0.05	–0.27*	–0.01[1]	0.12
Period IV: 12/2004–6/2008	6.26	–0.46**	0.17	1.00	0.27
		Lender Financing Rates (Near-Banks)			
Asset-backed security (ABS) yield					
Entire sample: 11/1987–6/2008	**–1.45*** **	**0.06**	**–0.07**	**–1.00[1]**	**0.10**
Period I: 11/1987–12/1991	–3.33***	–0.17	–0.91	–1.00[1]	0.83
Period II: 12/1991–9/2000	–1.23***	0.06	0.03	–1.00[1]	0.07
Period III: 9/2000–12/2004	–1.43***	0.18	–0.28	–1.00[1]	0.25
Period IV: 12/2004–6/2008	8.43*	–0.16	–0.30	1.00[1]	0.25
Agency mortgage-backed security (MBS) yield					
Entire sample: 1/1985–6/2008	**–1.66*** **	**0.04**	**0.00**	**–1.00[2]**	**0.09**
Period I: 1/1985–12/1991	–2.46***	–0.01	0.00	–1.00[1]	0.16
Period II: 12/1991–9/2000	–1.14***	0.09	–0.01	–1.00[1]	0.11
Period III: 9/2000–12/2004	–0.98***	0.09	–0.08	–1.00[1]	0.10
Period IV: 12/2004–6/2008	–2.47***	0.03	–0.06	–1.00[1]	0.31
		Borrower Financing Rates			
30-year mortgage loan rate (fixed)					
Entire sample: 1/1985–6/2008	**–2.35*** **	**0.02**	**–0.05**	**–1.00[1]**	**0.23**
Period I: 1/1985–12/1991	–1.16***	0.03	–0.12	–1.00[1]	0.31
Period II: 12/1991–9/2000	–1.66***	–0.12	0.09	–1.00[1]	0.16
Period III: 9/2000–12/2004	–0.24	–0.12	–0.18	–0.03[2]	0.37
Period IV: 12/2004–6/2008	–6.42***	0.05	0.07	–1.00[1]	0.20
Corporate bond (high-yield)					
Entire sample: 12/1987–6/2008	**0.43***	**–0.09**	**0.01**	**–1.00[1]**	**0.11**
Period I: 12/1987–12/1991	0.48**	–0.04	0.01	–0.22[1]	0.26
Period II: 12/1991–9/2000	0.25	0.23	0.70	0.23[2]	0.15
Period III: 9/2000–12/2004	0.11	0.65	–0.44	–1.00[1]	0.14
Period IV: 12/2004–6/2008	1.14*	–0.13	0.70**	0.77[1]	0.49

Note: The modified GG score is between –1 and 1, where –1 means that the Fed Funds rate leads the market rate perfectly whereas +1 means the opposite (Jobst, 2006; Gonzalo and Granger, 1995). The superscript "1" indicates that the parameter associated with causality in the GG score is statistically significant. A superscript "2" indicates both the parameter associated with causality and the one associated with the adjustment to the long-run equilibrium are statistically significant. *,**, and *** indicate statistical significance at the 10, 5, and 1 percent level.

measured by the cointegration factor, which measures the speed with which deviations from long-run relationships return to normal. These factors are mostly stable over time and are close to unity for all market interest rates (with the exception of high-yield bonds). This indicates a smooth long-run transmission of policy rate changes to market interest rates. Further, over the long run, the three-month U.S. dollar LIBOR and Euribor rates have a more stable and reliably estimated relation with the policy rate compared with other lender financing rates (Figures 2.10 and 2.11).

Table 2.3. Static Vector Error Correction Mechanism (2, 3) Estimation with Variable Controls: Euro Area

EONIA Rate vis-à-vis:	*Long-Term Pass-Through* Cointegration factor coefficient	*Short-Term Pass-Through* EONIA At 1-month coefficient	EONIA At 2-month coefficient	*Direction of Causality* Modified GG score	Adj. R^2
		Lender Financing Rates (Banks)			
3-month Euribor rate					
Entire sample: 12/1998–6/2008	**–0.97*** **	**0.21*** **	**0.20*** **	**–0.53[1]**	**0.22**
Period II: 12/1998–9/2000	–1.13***	0.00	–0.01	–1.00[1]	0.54
Period III: 9/2000–12/2004	–1.03***	0.16	–0.01	–0.94[1]	0.22
Period IV: 12/2004–6/2008	–3.29***	0.02	0.23*	0.10[2]	0.53
Bank bond yield					
Entire sample: 12/1998–6/2008	**–1.14*** **	**0.08**	**0.06** **	**–0.97[1]**	**0.08**
Period II: 12/1998–9/2000	3.64***	0.12	0.10	1.00[2]	0.60
Period III: 9/2000–12/2004	–1.43	0.00	–0.01	–1.00[1]	0.10
Period IV: 12/2004–6/2008	–0.20	–0.07	–0.15	–0.25[1]	0.28
		Lender Financing Rates (Near-Banks)			
Asset-backed security (ABS) yield					
Entire sample: 12/1998–6/2008	**–1.17*** **	**0.06**	**0.10**	**–1.00[1]**	**0.05**
Period II: 12/1998–9/2000	3.35***	0.16	0.11	1.00[2]	0.66
Period III: 9/2000–12/2004	–1.40***	–0.03	–0.03	–1.00[1]	0.08
Period IV: 12/2004–6/2008	–0.82***	0.00	0.06	–1.00[1]	0.15
Pfandbriefe (German covered bond) yield					
Entire sample: 12/1998–6/2008	**–1.44*** **	**0.07**	**–0.06**	**–1.00[1]**	**0.08**
Period II: 12/1998–9/2000	2.01***	0.16	–0.17	1.00[1]	0.69
Period III: 9/2000–12/2004	–2.09***	–0.02	–0.01	–1.00[1]	0.12
Period IV: 12/2004–6/2008	–1.45***	0.02	–0.04	–1.00[1]	0.28
		Borrower Financing Rates			
Housing loan rate (ECB)					
Entire sample: 2/2003–6/2008	**–0.64*** **	**0.10** **	**0.04**	**–1.00[2]**	**0.41**
Period II: n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Period III: 2/2003–12/2004	0.36	0.18*	0.29***	–0.81[1]	0.63
Period IV: 12/2004–6/2008	–1.37***	–0.06	–0.12**	0.05[1]	0.63
Corporate bond (high-yield)					
Entire sample: 12/1998–6/2008	**–0.24*** **	**–0.51**	**–0.32**	**–0.93[1]**	**0.15**
Period II: 12/1998–9/2000	–0.90***	–0.15	–0.36	–1.00[1]	0.59
Period III: 9/2000–12/2004	–0.24***	–0.57	–0.38	–0.96[1]	0.19
Period IV: 12/2004–6/2008	0.13	–1.45**	–0.62	–1.00[1]	0.35

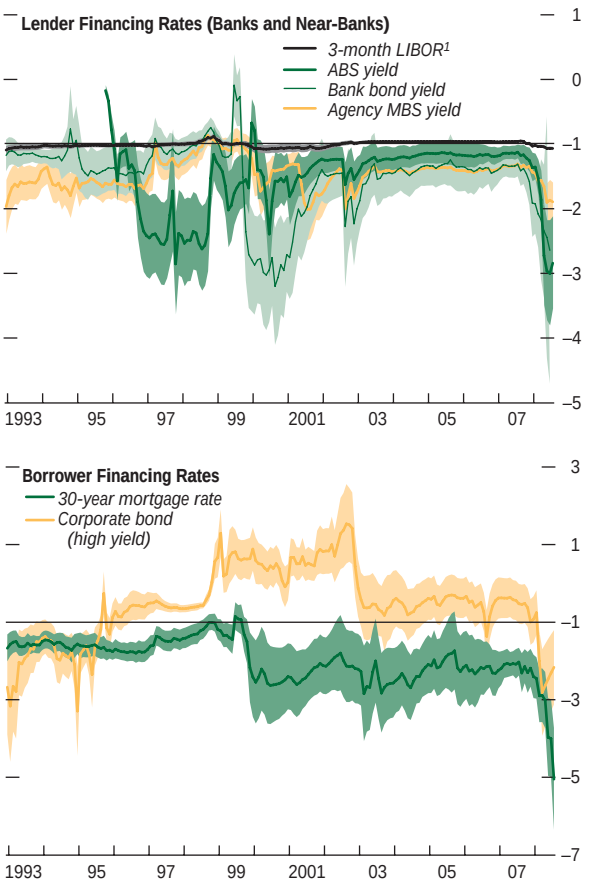
Note: EONIA = Euro Overnight Index Average; Euribor = Euro interbank offered rate; ECB = European Central Bank. The modified GG score is between –1 and 1, where –1 means that the effective European Central Bank policy rate (EOCNIA) leads the market rate perfectly whereas +1 means the opposite (Jobst, 2006; Gonzalo and Granger, 1995). The superscript "1" indicates that the parameter associated with causality in the GG score is statistically significant. A superscript "2" indicates both the parameter associated with causality and the one associated with the adjustment to the long-run equilibrium are statistically significant. *,**, and *** indicate statistical significance at the 10, 5, and 1 percent level.

The results for the short-run pass-through coefficients are more mixed. The one- and two-month pass-through estimates vary widely, and in most cases are not statistically significant, indicating that the initial impact of changes in the policy rate takes more than two or three months to take effect.

Another method to assess whether the overnight rate is transmitted to other market rates is to look at lead-lag relations. The application of the modified Gonzalo-Granger (GG) (1995) score of adjustment coefficients gauges the direction of causality between the various interest rate pairs.[31] The generally negative

[31]The modified GG-test measure of the error correction coefficients on the first and second lags in a regression gauges how much each interest rate contributes individually to the differential price discovery and how quickly deviations from their long-run equilibrium will be eliminated. A negative GG score means that an increase in the interest rate differential will initiate an adjustment in the market interest rate.

Figure 2.10. Dynamic Vector Error Correction Mechanism (VECM) (2,3) Estimation of the U.S. Fed Funds Rate and Market Rates—United States
(Coefficient value)



Source: IMF staff estimates.

Note: Sample time period: 1/31/1985–6/30/2008. VECM (2,3) eight-year rolling window estimation results of the cointegration coefficients (with 90 percent confidence band) denoting the long-term equilibrium relation between level changes in the effective U.S. Federal Funds rate and selected market rates of lenders and borrowers (with seasonal control). A coefficient value of "–1" indicates a stable long-term equilibrium relation of the policy rate and the selected market rate, whereas deviations from this value indicate a breakdown in the relation. The dates in the charts refer to the end dates of the rolling window. ABS = asset-backed security; MBS = mortgage-backed security.

[1]The error bands for the 3-month LIBOR rate are very tight (between 1.6 percent and 7.6 percent of the coefficient value) and have thus been suppressed from the figure for clarity.

GG scores (close to unity) suggest that (in this model specification) the policy rate almost always leads the market rate—a good indication of normal transmission processes.

Impact of Structural Changes in the Financial Sector on Interest Rate Transmission

Rolling window estimates of long-run pass-through (gauged by the cointegration factors) between market rates and policy rates show generally stable interest rate transmission for the three-month LIBOR and Euribor rates up to the summer of 2007 (Figures 2.10 and 2.11).[32] The absolute value of the cointegration coefficient is rarely less than one and varied considerably during the 1990s, but stabilized beginning in the early 2000s in both economies at the same time as these markets deepened. The estimated long-term interest rate pass-through for the near-bank U.S. agency mortgage-backed security (MBS) yield and the Pfandbriefe yield has stabilized beginning only in the early 2000s.

Not surprisingly, borrower financing rates generally have a less stable relationship with the policy rate. Mortgage rates have a cointegration factor lower than –1 for much of the period in both the United States and euro area, perhaps because banks feel the need to increase their lending rates more than the Fed Funds or EONIA rates to compensate for attracting a riskier class of borrowers. As expected, the long-term impact of policy rate changes is the weakest and least stable for high-yield corporate bonds.

Impact of Recent Market Disruption on Interest Rate Transmission

Market disruptions since the summer of 2007 appear to have been more severe for the United States compared with the euro area. In the United States, rolling window forecasts of the market rates based on the historical trend over the past 15 years are fairly accurate prior to the

[32]Rolling window regressions move the estimation period ahead by one month, allowing assessment of the stability of the estimated relations.

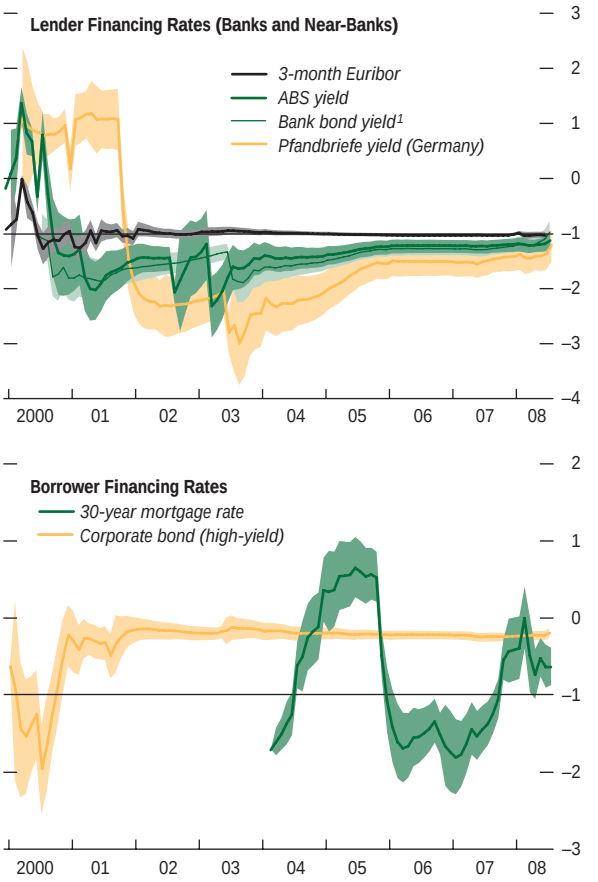
summer of 2007 (Figure 2.12).[33] However, from mid-2007 the forecast errors for the three-month LIBOR jumped substantially at the same time as the extraordinary increase in money market spreads and the collapse of the structured credit market in response to subprime mortgage market distress (Figure 2.13).[34] The larger forecast errors for the near-bank financing rates (ABS and U.S. agency MBS yields) and a widening of forecast confidence intervals after the summer of 2007 is evidence of a dramatic alteration in the predictability of interest rate transmission. These results suggest that the early linkages of interest rate transmission in the United States have been impeded by the financial turmoil. At the same time, forecasts of borrower financing rates have not been significantly altered to the same degree as lender financing markets thus far, but forecast accuracy appears to have decreased after the crisis.

Monetary transmission in the euro area appears to have suffered from a similar—but smaller—degree of uncertainty in the pass-through of policy rates to short-term lender financing rates (Figure 2.14). Similar to the United States, longer-term financing rates continue to show unstable forecasts, and deviations from actual rates reveal that policy rates have become disconnected over the past six months. The gradual movement of credit creation from near-banks back to banks does not seem to have, as yet, translated into significantly higher retail borrowing rates, perhaps reflecting the smaller role of near-banks in the euro area. The relatively reliable forecasts of mortgage rates may be due to euro area banks' lower dependence on money markets (as well as alternative sources of

[33]These forecasts are derived as out-of-sample estimates of the market rate in the next month based on the VECM model parameters over an eight-year (six-year) rolling window of preceding observations of U.S. (euro area) data.

[34]Note that the large over-prediction in January 2008 for the bank and near-bank financing rates in the United States is a result of the dramatic cut of the Fed Funds (target) rate from 4.25 to 3 percent and should be excluded from our general assessment of forecast accuracy.

Figure 2.11. Dynamic Vector Error Correction Mechanism (VECM) (2,3) Estimation of the EONIA Rate and Market Rates—Euro Area
(Coefficient value)

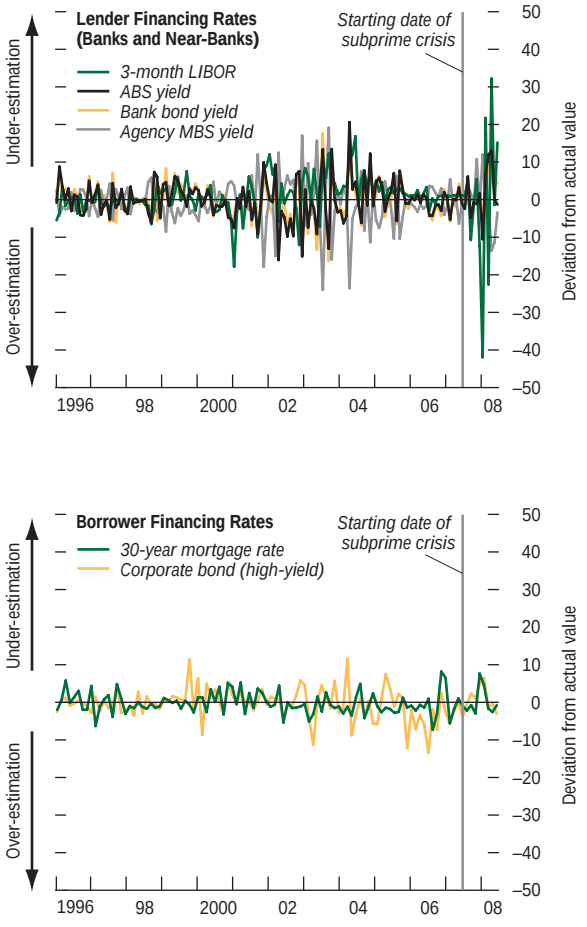


Source: IMF staff estimates.

Note: EONIA = Euro Overnight Index Average. Sample time period: 1/31/1985–6/30/2008. VECM (2,3) six-year rolling window estimation results of the cointegration coefficients (with 90 percent confidence band) denoting the long-term equilibrium relation between level changes in the effective European Central Bank policy rate (EONIA) and selected market rates of lenders and borrowers (with seasonal control). A coefficient value of "–1" indicates a stable long-term equilibrium relation of the policy rate and the selected market rate, whereas deviations from this value indicate a breakdown in the relation. The dates in the charts refer to the end dates of the rolling window. ABS = asset-backed security.

[1]The data series of bank of bank bond yields starts in June 1992.

Figure 2.12. Summary Chart: Accuracy of Forecasts—U.S. Model, 1996–2008
(In percent)



Source: IMF staff estimates.

Note: Forecast error represents deviation (in percent) of dynamic (out-of-sample) Vector Error Correction Mechanism (2,3) forecast estimate from actual market rates (based on eight-year rolling window, starting in January 1988). The estimation algorithm includes the change of core deposits of commercial banks as seasonal control variable. ABS = asset-backed security; MBS = mortgage-backed security.

funds via the covered mortgage bond market). Corporate bond yields are mostly underpredicted since the summer of 2007.

The relatively stable relationship between borrower financing rates and the Fed Funds rate should not be seen as evidence of unimpeded monetary transmission. First, separate regressions suggest that the sensitivity over the past 25 years of the mortgage rate to changes in the Fed Funds rates is largely explained by the indirect effect of policy rate changes operating through the LIBOR rate rather than by the direct effect of the policy rate on the mortgage rate.[35] Thus, the early linkages of interest rate transmission from the Fed Funds rate to the mortgage rate seem to be historically strong. By contrast, in the euro area, the indirect effect of the EONIA on the mortgage rate is much less apparent. Second, stricter overall lending standards as well as shrinking issuance in high-yield and structured credit markets indicate that lenders are tightening credit availability by adjusting quantities rather than prices. In this light, overall monetary transmission—including through channels other than interest rates—may be constrained.

Policy Recommendations

This chapter has shown that the persistence of disturbances in money and related financial markets that began in the summer of 2007 appears to be impeding interest rate transmission. The increased complexity, depth, and interconnectedness of these markets means that measures to help restore normal market conditions necessarily cover a wide policy spectrum. Below are recommendations aimed at alleviating the strains in U.S. and European interbank markets.

The following recommendations concern interbank rate setting and use:

[35]A three-equation model (not reported) of the mortgage interest rates was estimated including bank financing rates (LIBOR and the three-month Euribor, in addition to the policy rates).

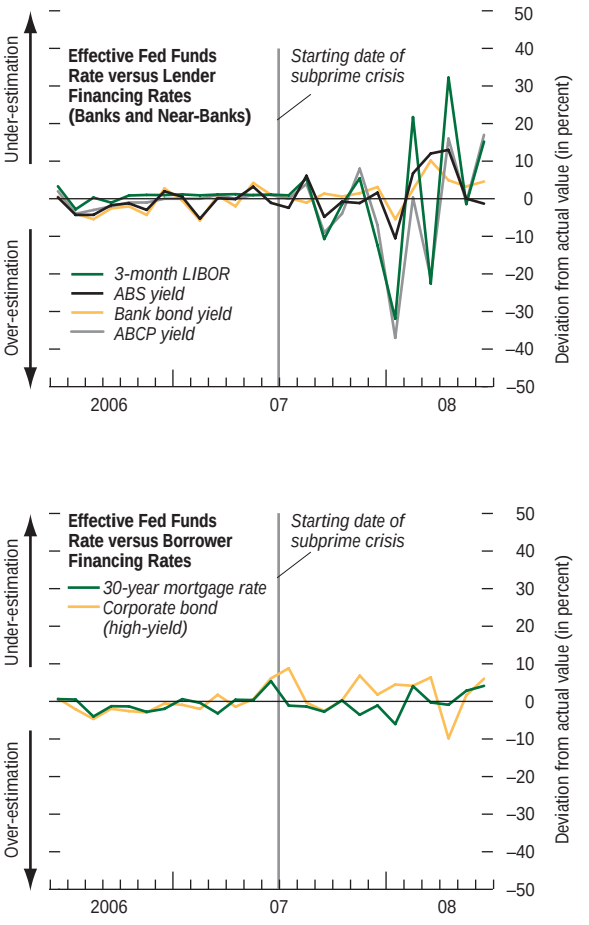
- *Improve infrastructure in funding markets.* Although transaction volumes in the London and euro area term interbank markets on which LIBOR and Euribor calculations are based have shrunk to negligible levels, they remain worthwhile measures of banks' marginal funding costs and there is no systematic evidence that published rates are biased. However, greater confidence in the representativeness of the calculated rates would be achieved by expanding their scope to encompass banks' unsecured term funding costs in wholesale money markets more generally, rather than just in the interbank market, and by publishing aggregate volume data.[36]
- *Allow markets to choose own benchmark.* Official policies to encourage a switch to the use of OIS rates, rather than LIBOR or Euribor rates, are not warranted. Although OIS rates are more representative of credit risk-free rates and the expected path of policy rates, shifting an estimated legacy of over $400 trillion notional outstanding of LIBOR-based instruments would be a daunting operational task. In addition, LIBOR remains the appropriate benchmark rate for contracts needing to reflect marginal bank funding costs. Hence, counterparties to interest rate derivatives should use whichever benchmark (LIBOR/Euribor or OIS) is most appropriate to their needs. While an active OIS market provides useful information about market expectations to policymakers, no formal policy action is justified.

The following recommendations are based on the empirical analysis of the factors driving interbank spreads:

- *Attention to both credit and liquidity strains.* Wide interbank spreads appear to have been primarily driven by systemic distress risk—a combination of credit and liquidity risk repre-

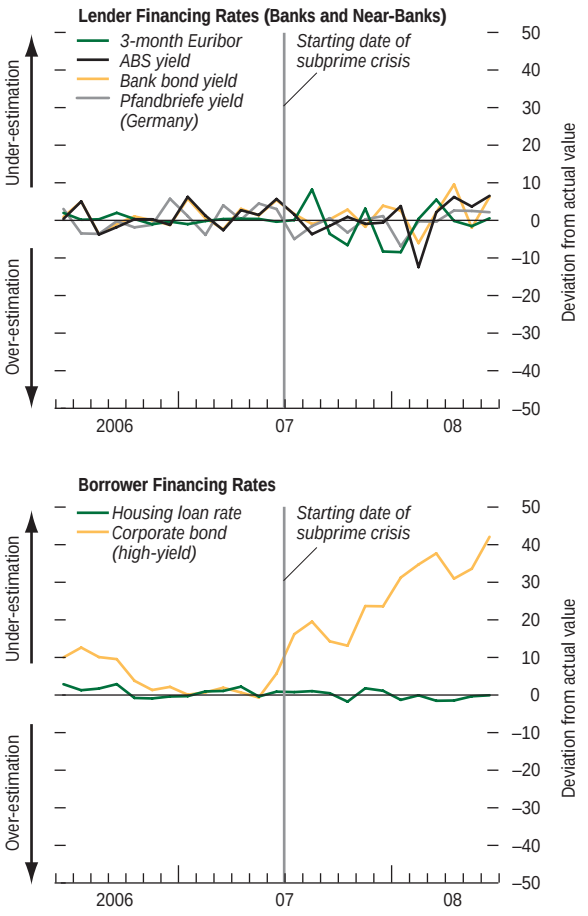
[36]The BBA has announced that it will be seeking to expand the number of banks it surveys for its rate fixings. The need for such expansion has been underscored since mid-September, when the spreads between various unsecured funding rates widened significantly.

Figure 2.13. Summary Chart: Accuracy of Forecasts—U.S. Model, 2006–08
(In percent)



Source: IMF staff estimates.
Note: Forecast error represents deviation (in percent) of dynamic (out-of-sample) Vector Error Correction Mechanism (2,3) forecast estimate from actual market rates (based on eight-year rolling window, starting in May 1988). The estimation algorithm includes the change of core deposits of commercial banks as seasonal control variable. ABS = asset-backed security; ABCP = asset-backed commercial paper.

Figure 2.14. Summary Chart: Accuracy of Forecasts—Euro Area Model, 2006–08
(In percent)



Source: IMF staff estimates.
Note: Forecast error represents deviation (in percent) of dynamic (out-of-sample) Vector Error Correction Mechanism (2,3) forecast estimate from actual market rates (based on six-year rolling window, starting in May 1999). The estimation algorithm includes the change of core deposits of commercial banks as seasonal control variable. ABS = asset-backed security.

sented in an interdependent measure derived from CDS spreads of major banks. Hence, to relieve interbank funding stresses, policies should aim at jointly addressing credit and liquidity issues.

- *More transparency to remove uncertainty.* To this end, regulators and supervisors can facilitate the reduction in uncertainty surrounding the assessment of credit risk by market participants. For example, they could move to standardize and improve the disclosure of off-balance-sheet items; increase the transparency of the valuation of collateral; and require better disclosure of the maturity structure of liabilities and of the liquidity management practices of major financial institutions (IMF, 2008c). Although such steps would not remove counterparty credit concerns, they would help address some of the uncertainty about the health of some banks' balance sheets.

The severe alteration in the reliability of interest rate transmission during the past year, as evidenced by the empirical results for bank and near-bank financing rates, demonstrates the interconnections between the various financial market rates that serve as the early and middle linkages of monetary transmission. Policies to restore these linkages are complex and interconnected and encompass central bank liquidity management, financial institution and market oversight, systemic crisis management, the monetary policy framework, and even fiscal policy. In this light, the aims and instruments of policy measures should be specified as transparently as possible to foster effectiveness, accountability, and credibility.[37] Such policy measures include:

- *Indirect money market support.* The disturbances of markets in securities used as collateral—such as the GSE securities and ABS markets—can spread to the repo markets for which they serve as collateral. Thus, central banks should have a broad mandate and strategy to take measures to restore the functioning

[37]This discussion draws on Chailloux and others (2008), and IMF (2008e).

of markets indirectly necessary for smooth monetary transmission. In the United States, the Federal Reserve introduced the TAF (as well as other facilities, including the Term Securities Lending Facility [TSLF] and the Primary Dealer Credit Facility [PDCF]), which indirectly undertook significant market risk from $29 billion of securities owned by Bear Stearns, and was given the capacity to lend against collateral to the largest GSEs. The Special Liquidity Scheme announced by the Bank of England in April 2008 also serves as indirect money market support by exchanging treasury bills for other types of securities used as collateral.[38] Circumstances permitting, the design of such interventions should be considered ahead of time and incorporated into central bank contingency planning and crisis simulations. Clear exit criteria for extraordinary interventions should be in place to help address moral hazard and limit the degree to which intervention substitutes for regular market functioning in the long term.

- *Oversight of bank liquidity management.* The latest disruptions to interbank funding markets, and the resulting increased dependence on overnight and short-term liquidity, justify an escalation in the oversight of bank liquidity management. In particular, supervisors and central banks should ensure that stress testing is rigorous and includes scenarios involving sustained market-wide shocks and possible spillovers; that current elevated operational risks are being addressed; and that financial institutions' liquidity buffers and contingency plans are robust and comprehensive.[39] Access to emergency central bank liquidity facilities should be granted only in extreme scenarios to ensure that banks do not become overly dependent on central bank support during periods of liquidity stress.
- *Oversight of near-banks.* Actual and potential liquidity support to near-banks (primary dealers, GSEs) justifies stronger oversight of them by the central banks providing such liquidity. Efforts in this direction are under way, though in some cases assuring compliance with supervisory recommendations may entail legislative change. The U.S. Securities and Exchange Commission and the Federal Reserve recently agreed to a memorandum of understanding under which they will freely share information and analysis pertaining to the financial conditions of U.S. investment banks. Further, the Federal Reserve has been given a consultative role in the supervision of the housing GSEs. The U.K. Treasury proposed broadening the mandate of the Bank of England over systemic financial stability, including the establishment of a financial stability committee.
- *Central bank cooperation*. The importance of U.S. dollar liquidity pressures for Euribor spreads, suggested by the empirical results, highlights the global integration of funding markets and the importance for central banks of the spillover of shocks from one county to another. More frequent cooperation and communication between central banks, including information sharing, becomes ever more important in a crisis (see IMF, 2008c, Chapter 3).
- *Fiscal costs.* Central bank losses that could result from their absorption of credit risk in liquidity crises should ultimately be borne by the government to protect the balance sheet of the central bank, so reinforcing its independence while fostering transparency and political accountability for taxpayers' interests.[40] Crisis

[38]The TSLF, introduced in March 2008, involves the Federal Reserve swapping government securities with primary dealers for illiquid collateral-serving securities for extended periods. The PDCF, also announced in March 2008, gives primary dealers access to Fed discount window liquidity against a wide pool of collateral. The Special Liquidity Scheme announced by the Bank of England in April 2008 plays a role similar to that of the TSLF in exchanging risky collateral for government securities, but for terms of up to three years.

[39]Good practices for liquidity risk management are outlined in the *Principles of Liquidity Risk Management* published by the IIF (2007) and the draft of the *Principles for Sound Liquidity Risk Management and Supervision* of the Basel Committee on Banking Supervision (2008).

[40]For instance, there should be a mechanism to transfer the substantial credit risk incurred by the Federal

management can also be facilitated through close cooperation between the government's debt manager and the central bank if additional government collateral is required.

- *Communication*. During a period of stress, central banks need to provide more information about market conditions than in normal times, including details on monetary operations, to maintain functioning markets and to facilitate transmission. In particular, information may need to be delivered more frequently, including between regular meetings of the monetary policy committee. Separating measures aimed at price stability from those in support of market liquidity can be especially challenging when money market conditions are stressed but inflation is on the rise.[41] Further, there should be a more explicit discussion of the uncertainties pertaining to the impact of financial stress on monetary transmission in order to prepare the public and markets for unforeseen changes in the policy stance necessitated by systemic developments. Indeed, monetary policymakers should consider whether the market turbulence, and the resulting rise in the cost of bank capital, changes their estimation of the neutral policy rate.

Conclusions

Short-term funding markets in mature economies have been under stress for an extended period despite extraordinary policy interventions by central banks to widen the availability of secured liquidity. Although interbank lending is no longer the principal source of bank term funding, wide spreads are not simply arising from the method for calculating interbank rates and are principally driven by concerns about banks being in significant distress, with U.S. dollar liquidity strains also representing a significant factor in the euro money market. Further, evidence of disruptions to bank and near-bank financing markets indicates that the transmission of policy interest rate changes are less certain and reliable. Policy interventions to further broaden access to emergency liquidity may continue to contain systemic risks but are unlikely to resolve the crisis until broader policy measures are implemented.

Annex 2.1. Empirical Framework: The Causes of High Interbank Spreads[42]

This annex explains the variables used in the Structural Vector Autoregression (SVAR) model, which is used to estimate the components of the various LIBOR spreads, and the technical rationale for undertaking this modeling technique. The variable used in the SVAR model to proxy bank distress risk is relatively new and has been adapted to assess the joint risk of distress in a number of the banks included in the LIBOR and Euribor panels. The construction of this variable is described first, followed by the SVAR model.

Joint Probability of Distress

The measure of systemic distress risk used here is represented by the joint probability of distress (JPoD) of a group—portfolio—of systemically important banks. The JPoD represents the probability that all the banks in the group experience distress, and embeds banks' distress dependence. This is based on the fact that banks are usually connected—either directly, through the interbank deposit market and joint participation in syndicated loans, or indirectly, through lending to common sectors or engaging in similar proprietary trades. Banks' distress dependence tends to rise in times of stress, since the fortunes of banks decline concurrently through either spillovers and contagion after idiosyncratic shocks (direct links) or through negative systemic shocks (indirect links). Therefore, in

Reserve to support the Bear Stearns takeover to the U.S. Treasury.

[41]For the ECB, this challenge is discussed in González-Páramo (2007).

[42]See González-Hermosillo, Martin, and Segoviano (forthcoming) for a more detailed presentation of this framework.

such periods, the banking system's JPoD may experience larger and nonlinear increases than those experienced by the probabilities of distress (PoDs) of individual banks. Consequently, it becomes essential for the proper measurement of systemic distress risk to incorporate banks' distress dependence.

In modeling the JPoD, we follow Segoviano and Goodhart (2008). Thus, first, we conceptualize the banking system as a *portfolio* of banks. Then, we infer from credit default swap (CDS) spreads the PoDs of the individual banks comprising the portfolio. Subsequently, using such PoDs as inputs (exogenous variables), and employing a novel nonparametric methodology—the Consistent Information Multivariate Density Optimizing (CIMDO) methodology—we derive the banking system's multivariate density from which the JPoD is estimated.[43]

The banks' distress dependence embedded in the JPoD captures the linear (correlation) and nonlinear dependencies among the banks in the portfolio, and allows for these to change throughout the economic cycle. These are key advantages over traditional risk models, the majority of which incorporate only correlations, and assume them to be constant throughout the economic cycle.[44]

The Vector Autoregression Framework

A vector autoregression (VAR) framework was specified to decompose the variance of LIBOR spreads into the contributions of various factors characterizing the LIBOR market. In specifying the VAR, the factors are characterized to have General Autoregressive Conditional Heteroscedasticity (GARCH) volatility specifications to capture the empirically observed volatility in the spreads.[45] In identifying the structural shocks, two types of specifications are adopted: (1) a recursive identification; and (2) a structural VAR.

Model Specification

As previously discussed, the factors driving the movements in LIBOR spreads broadly encompass volatility, credit, and different types of liquidity risks, as well as idiosyncratic risk. Systemic distress risk is measured by the JPoD of the various groups of banks—effectively, portfolios of banks—participating in the setting of the LIBOR and Euribor rates.[46] Finally, the contribution of idiosyncratic shocks represents the residual part of the variance that is not explained by the other measures of risk.

In specifying the VAR, separate models are adopted for each of the three LIBOR spreads and Euribor spreads. The full set of seven variables, denoted by y_t below and associated with the LIBOR and Euribor spreads, is given in Table 2.4.

Consider the following dynamic structural model of y_t:

$$B_0 y_t = B_1 y_{t-1} + B_2 y_{t-2} + \ldots + B_k y_{t-k} + u_t, \qquad (1)$$

where the B_i ($i = 0,1,\ldots,k$) are matrices of structural parameters with B_0 having coefficients of 1 down the main diagonal to represent the usual normalization, k represents the order of the

[43]The CIMDO methodology is a nonparametric approach to model densities based on cross-entropy (Segoviano, 2006).

[44]The distress dependence embedded in the JPoD is characterized by the CIMDO-copula (Segoviano, 2008). The structure of linear and nonlinear dependencies among the assets in a portfolio can be represented by copula functions. Our approach infers copulas directly 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 with limited available data.

[45]The adoption of a time-varying volatility structure means that the variance decompositions are no longer constant over the sample, but can change at each point in time as a result of changes in the conditional variance.

[46]The 16 banks participating in the British Bankers' Association's LIBOR fixings are listed at www.bba.org.uk, and the 43 banks in the Euribor panel are listed at www.euribor.org. For the Euribor panel, only 15 banks were considered for the construction of the JPoD due to constraints in the availability of CDS data.

Table 2.4. List of Variables Used in the Vector Autoregressions

Variable	U.S. Dollar LIBOR	Euro LIBOR	Sterling LIBOR	Euribor
Volatility_Market	VIX	VIX	VIX	VIX
Volatility_Interest Rates	Implied volatility from swaption	Implied volatility from swaption	Implied volatility from swaption	Implied volatility from swaption
Liquidity_Market	On/Off–the-run	On/Off-the-run	On/Off-the-run	On/Off-the-run
Liquidity_U.S. dollar	Euro/U.S. dollar forex swap	Euro/U.S. dollar forex swap	Pound sterling/ U.S. dollar forex swap	Euro/U.S. dollar forex swap
Interbank_Secured	Repo	Repo	Repo	Repo
Systemic Distress	JPoD (portfolio of banks setting the U.S. LIBOR)	JPoD (portfolio of banks setting the euro LIBOR)	JPoD (portfolio of banks setting the U.K. LIBOR)	JPoD (portfolio of banks setting the Euribor)
Interbank_Unsecured	LIBOR (U.S.)	LIBOR (Euro)	LIBOR (U.K.)	Euribor

Note: VIX = S&P 500 volatility index; JPoD = joint probability of distress; Euribor = Euro Interbank Offered Rate.

lags, and u_t is a vector of independent structural disturbances with the property

$$E[u_t] = 0,\ E[u_t u_t'] = H_t,\ E[u_t u_s'] = 0,\ t \neq s. \qquad (2)$$

The matrix H_t is a time-varying diagonal matrix where the diagonal terms have univariate GARCH (1,1) representations:

$$h_{i,t} = \delta_i + \alpha_i u_{i,t-1}^2 + \beta_i h_{i,t-1}. \qquad (3)$$

When embedded into the VAR, the GARCH variable framework implies that the variance-covariance matrix of the VAR disturbances is time-varying, but unlike the structural disturbances in equation (2), this matrix is not necessarily diagonal, in which case the volatilities of all factors have an effect on all variables in the VAR.

The model is estimated using maximum likelihood methods, by maximizing the conditional log-likelihood with respect to the unknown parameters $\{B_0, B_1,...,B_k, \delta, \alpha, \beta\}$.

The dimension of the model is represented by N, where $N = 7$.

Recursive Identification

In identifying the structural shocks, first, a recursive identification is adopted. This is standard in the VAR literature. Let B_0 in equation (1) be lower triangular, in which case its inverse is also lower triangular and is given by:

$$L = B_0^{-1}. \qquad (4)$$

For the $N = 7$ variate model, L is represented as:

$$L = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ l_{2,1} & 1 & 0 & 0 & 0 & 0 & 0 \\ l_{3,1} & l_{3,2} & 1 & 0 & 0 & 0 & 0 \\ l_{4,1} & l_{4,2} & l_{4,3} & 1 & 0 & 0 & 0 \\ l_{5,1} & l_{5,2} & l_{5,3} & l_{5,4} & 1 & 0 & 0 \\ l_{6,1} & l_{6,2} & l_{6,3} & l_{6,4} & l_{6,5} & 1 & 0 \\ l_{7,1} & l_{7,2} & l_{7,3} & l_{7,4} & l_{7,5} & l_{7,6} & 1 \end{bmatrix} \qquad (5)$$

In choosing the ordering of the variables, the LIBOR is chosen last so that all factors have an instantaneous effect on the LIBOR, as given by the last rows in equation (5).

The ordering of the recursive identification is to a certain extent arbitrary.

Structural VAR

The full structural VAR is given by specifying the following restrictions given by the L matrix below.[47]

$$L = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ a_{2,1} & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & a_{3,6} & 0 \\ 0 & 0 & a_{4,3} & 1 & 0 & a_{4,6} & 0 \\ 0 & 0 & 0 & 0 & 1 & a_{5,6} & 0 \\ 0 & 0 & 0 & 0 & a_{6,5} & 1 & 0 \\ a_{7,1} & a_{7,2} & a_{7,3} & a_{7,4} & a_{7,5} & a_{7,6} & 1 \end{bmatrix} \qquad (6)$$

[47]See Table 2.1 for the associated list of restrictions used in the structural VAR for each LIBOR and Euribor spread.

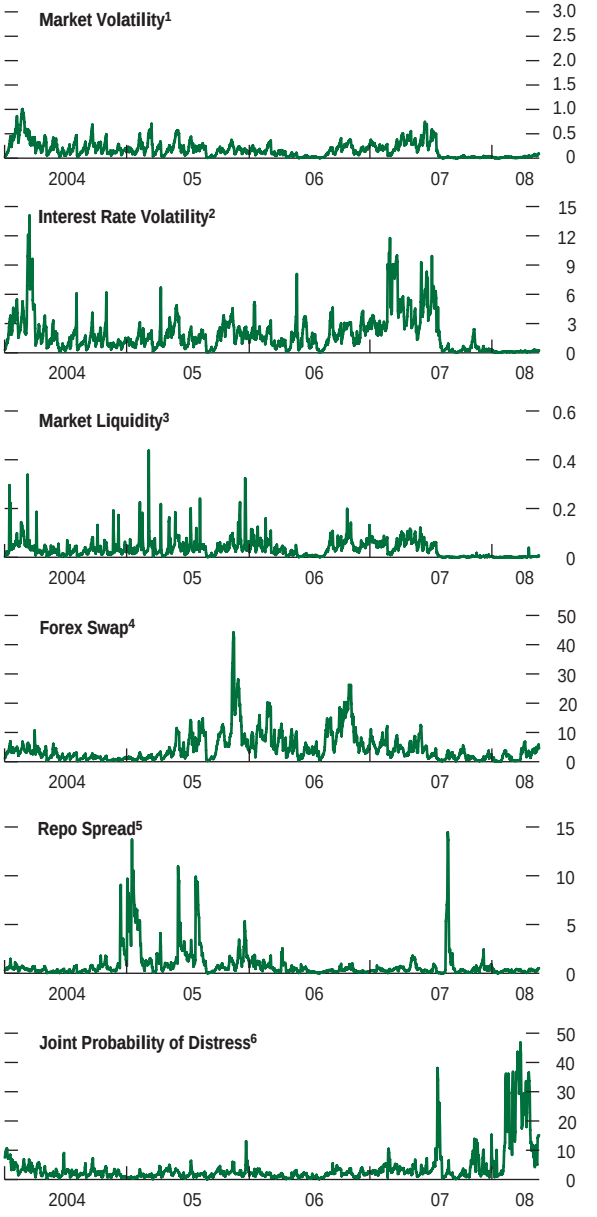
This suggests the following interpretations for the structural factors following Table 2.4. The volatility factor is assumed to affect VIX and Swaption. The volatility of interest rates factor hits the Swaption. The market liquidity factor affects the on-the-run/off-the-run treasury note spread and the forex swap. The U.S. dollar liquidity factor affects the forex swap. The credit factor impacts the Repo and JPoD variables. The distress factor affects the credit variables (Repo and JPoD) and the liquidity variables (on-the-run/off-the-run and forex swap). Finally, the idiosyncratic or residual factor only hits the LIBOR/Euribor and represents the effects not captured by the factors described above. Notice that all factors are designed to impact the LIBOR/Euribor, as given by the last row in the *L* matrix.

For example, the structural VAR results for the U.S. dollar LIBOR-overnight index swap (OIS) spread are depicted in more detail in Figure 2.15. The results suggest that the JPoD has been the dominant factor explained by the model since the onset of the current crisis, peaking at around 45 of the total variance in the spring of 2008. Interestingly, the first hump in the JPoD contribution occurred much earlier, in July 2007, when it contributed to more than 30 percent of the LIBOR-OIS variance. The role of the other variables has been relatively small during the crisis period. Notably, however, the repo spread began to show signs of stress in 2005 when the U.S. housing market began its recent downturn. In contrast with the Euribor fixing, the effect from the dollar/euro forex swap has been relatively small during the current crisis.

Annex 2.2. Empirical Framework: Monetary Transmission

As one measure of monetary policy transmission (and interest rate elasticity) over time, we adopt a restricted VAR framework in the form of a simple Vector Error Correction Mechanism (VECM). In general, the VECM specification defines the long-term consistency of joint dynamics of endogenous variables within

Figure 2.15. Decomposition of Spread Between Three-Month U.S. Dollar LIBOR and Overnight Index Swaps
(In percent)



Source: Bloomberg L.P.; and IMF staff estimates.
[1]Implied volatility from S&P 500 equity index.
[2]Lehman Brothers swaption volatility index. Implied volatility of interest rate swaption with maturities ranging from 1 month to 6 months.
[3]Five-year on-the-run/off-the-run U.S. treasury note spread.
[4]Spread between 3-month euro/U.S. dollar forex swap and 3-month U.S. overnight index swaps.
[5]Spread between the yields on 3-month U.S. agency repo and 3-month U.S. treasury repo.
[6]Joint probability of distress of selected banks participating in U.S. dollar LIBOR fixing.

a linear system of simultaneous equations. If the variables share at least one cointegration vector—which means that there is one long-term stable relation between them—we restrict their long-run behavior to converge to their cointegrating relationship while allowing the model to accommodate a wide range of short-term random disturbances (Johansen, 1991; Johansen and Juselius, 1990). The cointegration restriction shows the scale and direction of short-term adjustments needed to restore the long-term equilibrium relation.

The degree of cointegration is reflected in the specification of the error correction term, which is defined by past deviations from the long-run equilibrium through a series of partial short-run adjustments of level changes over the sample time period. These adjustments represent intertemporal corrections that indicate the short-term lead-lag relation of the endogenous variables.[48]

The VECM model used for this chapter defines the long-run intertemporal relation between the policy rate and selected market rates of lenders (banks and near-banks) and borrowers (households and nonfinancial corporates) in both the United States and the euro area. The model estimates show the direction of causality (and its significance) between changes in the policy rate and market rates over the short run and the nature of their long-term relation in response to unanticipated interest rate shocks.

For the United States, we pair the monthly average effective Fed Funds rate (as a proxy for the official policy rate, or "target rate") with several financing rates (e.g., three-month LIBOR rate for unsecured interbank lending, asset-backed commercial paper and certificate of deposit rates, and yields of either bank-issued bonds or asset-backed securities) and borrower rates (e.g., corporate bond yield, 30-year mortgage rate, and consumer loan rates). Analogously, for the euro area, the effective policy rate of the European Central Bank (ECB), the Euro Overnight Index Average (EONIA), is matched with market rates for both financiers and borrowers.[49]

The two-dimensional VECM model,

$$X_t, = C + \Lambda(\underbrace{i_t - \alpha - \beta_2 r_t}_{CE}) + \sum_{j=1}^{p} \Phi X_{t-j} + \Xi_t Z_t + E_t, \quad (7)$$

is specified with the endogenous data vector $X_t = (\Delta i_t, \Delta r_t)'$ consisting of the effective Fed Funds rate (or the EONIA rate for the euro area), i_t, and the selected end-of-month market interest rate, r_t, at first differences. All endogenous variables are cointegrated at the same order and are stationary in differences.[50] The endogenous variables have one cointegration equation at a statistical significance level below 5 percent according to the Unrestricted Cointegration Rank Test (MacKinnon, Haug, and Michelis, 1999). The model has a uniquely defined cointegration equation ordered such that the Fed Funds rate coefficient is set to one. The estimated parameter coefficients of short-term dynamics are represented by the (2 x 2) matrix Φ of jointly dependent past X_t values.[51] C is a (2 x 1) vector of constants c_1 and c_2. Ξ is the (2 x 1) parameter coefficient vector of the core deposit rate[52] as contemporaneous seasonal control variable. E_t is the (2 x 1) vector of non-

[48]For instance, an integrated variable, $I(1)$, is typically one exhibiting trending behavior, with a differenced series showing mean-reverting behavior.

[49]Instead of using the ECB interest rate on the main refinancing operations, which changes only infrequently, as the effective policy rate in the euro area, we used the EONIA, which is the interest rate the ECB tries to align with the rate of open market operations.

[50]The classical Augmented Dickey-Fuller (Dickey and Fuller, 1979, 1981) and Phillips-Perron (1988) unit root tests suggest that all endogenous variables are stochastic with a constant forecast value and time-varying autocovariance. Although the cointegration restriction of VECM does not require level stationarity of the constituent time series (unlike VAR), it implies difference stationarity of each time series regardless of the individual degree of integration.

[51]The simple lag structure has been optimized based on the Akaike criterion over all iterative estimation steps.

[52]The core deposit ratio is defined as the sum of checkable deposits and savings deposits held by banks in the United States/euro area as a share of total liabilities each month.

autoregressive and heteroscedastic normal i.i.d. residuals.

The cointegration equation (with rank order of one and constant drift) restricts the long-run behavior of the two level series of vector X_t to converge to a common, long-term trend subject to the short-term impact of interest rate shocks. The short-term adjustment factors λ_1 and λ_2 of (2 x 1) vector Λ correct these deviations against the long-term trend and indicate the short-term lead-lag relation of the endogenous variables. We compute the modified Gonzalo and Granger (GG) score $(\lambda_1 - \lambda_2)/(|\lambda_1| + |\lambda_2|)$(Jobst, 2006) as an indication of the direction of causality, with –1 implying that the Fed Funds rate (or the EONIA rate for the euro area) leads the market rate perfectly and +1 implying the reverse.

In the chapter, we focus primarily on the market rate equation of our VECM specification, where the contemporaneous monthly change of the selected market rate, r_t, is modeled as dependent on its previous changes, past changes of the policy rate, i_t, and any deviation from the long-run relation. The model is estimated both statically for nonoverlapping sample periods and dynamically over an eight-year rolling window with monthly updates based on a heteroscedasticity-consistent coefficient covariance matrix (White, 1980). There is a particular focus on the evolution of the cointegration coefficients. Over a relatively long span of data, Monte Carlo simulation of possible interest rate paths confirms that these coefficients can reasonably be interpreted as "long-term elasticities" of selected market rates to changes in the policy rate.[53]

References

Adrian, Tobias, and Hyun Song Shin, 2008, "Financial Intermediaries, Financial Stability and Monetary Policy," paper prepared for the Federal Reserve Bank of Kansas City Symposium, Jackson Hole, Wyoming, August 21–23.

Baba, Naohiko, Frank Packer, and Teppai Nagano, 2008, "The Spillover of Money Market Turbulence to FX Swap and Cross-Currency Swap Markets," *Bank for International Settlements Quarterly Review* (March), pp. 73–101.

Banerjee, Anindya, Juan J. Dolado, John W. Galbraith, and David F. Hendry, 1993, *Co-integration, Error Correction and the Econometric Analysis of Non-Stationary Data* (Oxford, U.K.: Oxford University Press).

Bank of England, 2007, "Markets and Operations," *Bank of England Quarterly Bulletin–Q4*, Vol. 47, No. 4, pp. 490–510.

Basel Committee on Banking Supervision, 2008, *Principles for Sound Liquidity Risk Management and Supervision* (Basel: Bank for International Settlements).

Bernanke, Ben S., and Alan S. Blinder, 1988, "Credit, Money, and Aggregate Demand," *American Economic Review*, Vol. 78, No. 2 (May), pp. 435–39.

Bernanke, Ben S., Mark Gertler, and Simon Gilchrist, 1999, "The Financial Accelerator in a Quantitative Business Cycle Framework," in *Handbook of Macroeconomics*, ed. by John B. Taylor and Michael J. Woodford (Amsterdam: Elsevier).

Bhatia, Ashok V., 2007, "New Landscape, New Challenges: Structural Change and Regulation in the U.S. Financial Sector," IMF Working Paper 07/195 (Washington: International Monetary Fund).

British Bankers' Association (BBA), 2008a, "Understanding the Construction and Operation of BBA LIBOR—Strengthening for the Future," *Consultative Paper*, June 10. Available via the Internet: www.bba.org.uk/bba/isp/polopoly.jsp?d=227&a=13900.

———, 2008b, "BBA LIBOR Consultation," *Feedback Statement*, August 5. Available via the Internet: www.bba.org.uk/bba/jsp/polopoly.jsp?d=145&a=14382.

Chailloux, Alexandre, Simon Gray, Ulrich Klueh, Seiichi Shimizu, and Peter Stella, 2008, "Central Bank Response to the 2007-08 Financial Market Turbulence: Experiences and Lessons Drawn," IMF Working Paper 08/120 (Washington: International Monetary Fund).

Dickey, David A., and Wayne A. Fuller, 1979, "Distribution of the Estimators for Autoregressive Time Series with a Unit Root," *Journal of the American Statistical Association*, Vol. 74, No. 366, pp. 427–31.

[53]We recognize that for short samples it is possible for cointegration analysis to indicate that a long-run relation can be found when in fact there is only a cyclical relation.

———, 1981, "Likelihood Ratio Statistics for Autoregressive Time Series with a Unit Root," *Econometrica*, Vol. 49, No. 4 (July), pp. 1057–72.

Duffee, Gregory, 1996, "Idiosyncratic Variation of Treasury Bill Yields," *Journal of Finance*, Vol. 51, No. 2 (June), pp. 527–51.

European Central Bank (ECB), 2007, *Euro Money Market Survey* (Frankfurt, November).

———, 2008a, *Financial Stability Report* (Frankfurt: European Central Bank).

———, 2008b, *Monthly Bulletin* (Frankfurt: European Central Bank, July).

Federal Reserve Board, 2008, *Profits and Balance Sheet Developments at U.S. Commercial Banks in 2007* (Washington: Federal Reserve Board).

Fleming, Michael J., 2000, "The Benchmark U.S. Treasury Market: Recent Performance and Possible Alternatives," *FRBNY Economic Policy Review*, Vol. 6, No. 1 (April), Federal Reserve Bank of New York, pp. 129–45.

Frank, Nathaniel, Brenda González-Hermosillo, and Heiko Hesse, 2008a, "The Transmission of Liquidity Shocks during the Crisis," *Central Banking*, Vol. 19, No. 1, pp. 63–7.

———, 2008b, "Transmission of Liquidity Shocks: Evidence from the 2007 Subprime Crisis," IMF Working Paper 08/200 (Washington: International Monetary Fund).

Frank, Nathaniel, Heiko Hesse, and Ulrich Klueh, forthcoming, "Term Funding Stress and Central Bank Policy during the 2007/2008 Financial Crisis," IMF Working Paper (Washington: International Monetary Fund).

Goldman Sachs, 2008, "LIBOR, Deleveraging and the Case for an OIS Benchmark," Goldman Sachs Global Economics, June 19.

González-Hermosillo, Brenda, 2008, "Investors' Risk Appetite and Global Financial Market Conditions," IMF Working Paper 08/85 (Washington: International Monetary Fund).

———, Vance Martin, and Miguel Segoviano, forthcoming, "Frenzy in Interbank Lending Spreads during the Crisis of 2007-08: A Matter of Liquidity or Solvency?" IMF Working Paper (Washington: International Monetary Fund).

González-Páramo, Manuel, 2007, "The Role of Information and Communication in Central Bank Policy: The Experience of the Recent Financial Turmoil," keynote address at the European Money and Finance Forum (SUERF) Conference on "Tracking Financial Behavior: Where Do Macro and Micro Meet?" Milan, December 3.

Gonzalo, Jesus, and Clive W.J. Granger, 1995, "Estimation of Common Long-Memory Components in Cointegrated Systems," *Journal of Business & Economic Statistics*, Vol. 13, No. 1, pp. 27–35.

Granger, Clive W.J., 1986, "Developments in the Study of Cointegrated Economic Variables," *Oxford Bulletin of Economics and Statistics*, Vol. 48, No. 3, pp. 213–28.

Hendry, David F., and Katarina Juselius, 2000, "Explaining Cointegration Analysis: Part I," *Energy Journal*, Vol. 21, No. 1, pp. 1–42.

Imakubo, Kei, Takeshi Kimura, and Teppei Nagano, 2008, "Cross-Currency Transmission of Money Market Tensions," *Bank of Japan Review*, No. 2008-E-2. (Tokyo: Bank of Japan).

Institute of International Finance (IIF), 2007, *Principles of Liquidity Management* (Washington: Institute of International Finance).

International Capital Market Association, 2008, "European Repo Market Survey, Number 14—Conducted December 2007," Zurich, March. Available via the Internet: www.icma-group.org/market_info/surveys/repo/latest.Par.0023.ParDownLoadFile.tmp/ICMA%20ERC%20repo%20survey%20December%202007.pdf.

International Monetary Fund (IMF), 2006, "How Do Financial Systems Affect Economic Cycles?" in *World Economic Outlook*, World Economic and Financial Surveys (Washington, September), pp. 105–38.

———, 2008a, "Challenges for Monetary Policy from Financial Innovation and Globalization," keynote address at the IMF European Office and Monetary and Capital Markets Department, Bank of England, and Banque de France Conference, Paris, January 29.

———, 2008b, "Financial Stress and Economic Downturns," *World Economic Outlook*, World Economic and Financial Surveys (Washington, October).

———, 2008c, *Global Financial Stability Report*, World Economic and Financial Surveys (Washington, April).

———, 2008d, *Japan: Selected Issues*, IMF Staff Country Report No. 08/254 (Washington, July).

———, 2008e, *United States: Staff Report for the 2008 Article IV Consultation*, IMF Staff Country Report No. 08/25 (Washington, July).

Jobst, Andreas, 2006, "Correlation, Price Discovery and Co-Movement of ABS and Equity," *Derivatives Use, Trading & Regulation*, Vol. 12, No. 1–2, pp. 60–101.

Johansen, Søren, 1991, "Estimation and Hypothesis Testing of Cointegration Vectors in Gaussian Vector Autoregressive Models," *Econometrica*, Vol. 59, No. 6, pp. 1551–80.

———, and Katarina Juselius, 1990, "Maximum Likelihood Estimation and Inference on Cointegration—With Applications to the Demand for Money," *Oxford Bulletin of Economics and Statistics*, Vol. 52, No. 2, pp. 169–210.

JPMorgan Chase & Co. (JPMorgan), 2008, "The Outlook for LIBOR," JPMorgan Securities Inc. Fixed Income Strategy, May 16.

Kok Sørensen, Christoffer, and Thomas Werner, 2006, "Bank Interest Rate Pass-Through in the Euro Area a Cross-Country Comparison," ECB Working Paper No. 580 (Frankfurt: European Central Bank).

Kuttner, Kenneth N., and Patricia C. Mosser, 2002, "The Monetary Transmission Mechanism: Some Answers and Further Questions," *FRBNY Economic Policy Review*, Vol. 8, No. 1 (May), pp 15–26.

MacKinnon, James G., Alfred A. Haug, and Leo Michelis, 1999, "Numerical Distribution Functions of Likelihood Ratio Tests for Cointegration," *Journal of Applied Econometrics*, Vol. 14, No. 5, pp. 563–77.

McAndrews, James, Asani Sarkar, and Zhenyu Wang, 2008, "The Effect of the Term Auction Facility on the London Inter-Bank Offered Rate," Federal Reserve Bank of New York Staff Report No. 335 (July).

McCauley, Robert N., 2001, "Benchmark Tipping in the Money and Bond Markets," *Quarterly Review, Bank for International Settlements* (March), pp. 39–45.

Michaud, François-Louis, and Christian Upper, 2008, "What Drives Interbank Rates? Evidence from the LIBOR Panel," *Bank for International Settlements Quarterly Review* (March), pp. 47–58.

Mollenkamp, Carrick, and Mark Whitehouse, 2008, "Study Casts Doubt on Key Rate," *Wall Street Journal*, May 29, p. A1.

Phillips, Peter C.B., and Pierre Perron, 1988, "Testing for a Unit Root in Time Series Regression," *Biometrika*, Vol. 75, No. 2, pp. 335–46.

Remolona, Eli M., and Philip D. Wooldridge, 2003, "The Euro Interest Rate Swap Market," *Bank for International Settlements Quarterly Review* (March), pp. 47–56.

Segoviano, Miguel, 2006, "The Consistent Information Multivariate Density Optimizing Methodology," Financial Markets Group Discussion Paper, No. 557, (London: London School of Economics).

———, 2008, "The CIMDO-Copula: Robust Estimation of Default Dependence under Data Restrictions" (unpublished; Washington: International Monetary Fund).

———, and Charles Goodhart, 2008, "The Banking Stability Measures" (unpublished; Washington: International Monetary Fund).

Segoviano, Miguel, Charles Goodhart, and Boris Hofmann, 2006, "Default, Credit Growth, and Asset Prices," IMF Working Paper 06/223 (Washington: International Monetary Fund).

Taylor, John, and John Williams, 2008a, "A Black Swan in the Money Market," NBER Working Paper No. 13943 (Cambridge, Massachusetts: National Bureau of Economic Research).

———, 2008b, "Further Results on a Black Swan in the Money Market," Discussion Paper No. 07–46. (Palo Alto, California: Stanford Institute for Economic Policy Research).

White, Halbert, 1980, "A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity," *Econometrica*, Vol. 48, No. 4, pp. 817–38.

Wu, Tao, 2008, "On the Effectiveness of the Federal Reserve's New Liquidity Facilities," Working Paper No. 0808, April (Dallas, Texas: Federal Reserve Bank of Dallas).

CHAPTER 3

FAIR VALUE ACCOUNTING AND PROCYCLICALITY

In light of the uncertainties about valuation highlighted by the 2007–08 market turbulence, this chapter provides an empirical examination of the potential procyclicality that fair value accounting (FVA) methods could introduce in bank balance sheets. The chapter finds that, while weaknesses in the FVA methodology may introduce unintended volatility and procyclicality, thus requiring some enhancements, it is still the preferred accounting framework for financial institutions. It concludes that capital buffers, forward-looking provisioning, and more refined disclosures can help to mitigate the procyclicality of FVA. The analysis presented does not preclude that there are other dimensions to FVA that are relevant and that, after further scrutiny, may indicate the need for additional refinements to the FVA methodology. Going forward, the valuation approaches for accounting, prudential measures, and risk management need to be reconciled and will require adjustments on the part of all parties.

Since the 2007 market turmoil surrounding complex structured credit products, fair value accounting (FVA) and its application through the business cycle has been a topic of considerable debate. As the illiquidity of certain products became more severe, financial institutions turned increasingly to model-based valuations that, despite increased disclosure requirements, were nevertheless accompanied by growing opacity in the classification of products across the fair value (FV) spectrum. Moreover, under stressed liquidity conditions, financial institutions made wider use of unobservable inputs in their valuations, increasing uncertainty among financial institutions, supervisors, and investors regarding the valuation of financial products under such conditions.

It has been during this period that the procyclical impact of FVA on bank balance sheets and, more specifically, the valuation of complex financial instruments in illiquid markets came to the fore, raising questions on the use of market prices below "theoretical valuation" and the validity of "distressed sales." Financial products were fair valued despite concerns that the current market prices were not an accurate reflection of the product's underlying cash flows or of the price at which the instrument might eventually be sold. Sales decisions based on fair value pricing in a weak market with already falling prices resulted in further declines in market prices, reflecting a market illiquidity premium. Additionally, falling prices can, and did, activate margin calls and sale triggers that are components of risk management criteria, contributing further to the downward trend. As bank net worth is positively correlated with the business cycle, and as fair market values for collateral values fall, losses have been passed through to banks' capital (Kashyap, 2005). The weakening of bank balance sheets and regulatory requirements for prudential capital replenishment has served to heighten concerns as to the future course of some mar-

Note: This chapter was written by a team led by Jodi Scarlata and comprised of Alicia Novoa and Juan Solé. Kenneth Sullivan provided consultancy support. Yoon Sook Kim provided research support, and Xiaobo Shao provided technical support.

kets, the health of banks, and, more broadly, the financial system.

This chapter reviews the principles and application of fair value accounting and the implications of its features and how these impact bank balance sheets. Using a simple model, it provides empirical support for the public discussions regarding the procyclicality of FVA on bank balance sheets. Utilizing representative bank balance sheets from a sample of actual institutions, the chapter examines the application of FVA to banks' balance sheets during the course of a normal business cycle, as well as during extreme shocks, such as have recently occurred, to distill in what manner FVA may contribute to procyclicality. The chapter examines the results obtained, discusses actual and proposed alternatives to FVA, and elaborates on policy implications going forward.

The chapter addresses one angle of the FVA debate, focusing on the relationship between procyclicality, FVA, and its impact on banks' balance sheets. This chapter does not intend to provide a definitive assessment of FVA and recognizes that—beyond its cyclical aspects—there may be additional elements that deserve further scrutiny, such as regulatory and risk management considerations, and the need for further enhancements to the FVA methodology. In its specific analysis of FVA and procyclicality, the chapter finds that, while the application of FVA methodology introduces unwanted volatility across time, for the purposes of obtaining a point estimate at a specific date of a bank's current financial condition, FVA ensures the most accurate assessment—alternative techniques have their own shortcomings. Yet difficulties exist not only in determining the fair values of assets in downturns and illiquid markets, but also during boom times in active markets when prices can overshoot and incorporate risk premia that inflate profits. Under such circumstances, market prices may not accurately reflect risks and can result in exaggerated profits that distort incentives (e.g., management compensation) and amplify the cyclical upturn. In rapidly evolving financial markets, inaccurate valuations may quickly alter the implications for solvency and, more broadly, financial stability.

The chapter emphasizes that FVA should be structured so that it contributes to good risk management and ensures that financial statements include adequate disclosure of valuations, methodologies, and volatilities such that inherent uncertainties are well understood. While the volatility of estimation errors in valuation techniques should be reduced as much as possible, genuine economic volatility should be faithfully reflected in financial statements and preserved by regulators and supervisors (Barth, 2004; Borio and Tsatsaronis, 2005). The chapter concludes by providing some quantitative insight for regulators and supervisors to better assess the implications of FVA on bank balance sheets and capital, and puts forward proposals for dealing with issues of the volatility of FVA and FV classification. Importantly, it stresses the need for resolving the tensions between valuation approaches across risk managers, accountants, and prudential supervisors and regulators, so as to ensure that accounting frameworks do not unduly contribute to potential financial instability.

Fair Value Accounting Through the Business Cycle

The Current Accounting Framework

Both U.S. Generally Accepted Accounting Principles (U.S. GAAP) and International Financial Reporting Standards (IFRS) use a mixed attributes model in which different valuation criteria are applied to different types of assets and liabilities, depending on their characteristics and on management's intentions in holding them. In essence, both frameworks require FV valuation for financial assets and liabilities held for trading purposes and available-for-sale assets, and all derivatives. Held-to-maturity (HTM) investments,[1]

[1]Nonderivative financial assets with fixed or determinable payments and fixed maturity that an entity has the intention and ability to hold to maturity.

Box 3.1. Off-Balance-Sheet Entities and Procyclicality

Recent market turmoil has heightened public awareness of the extensive use of off-balance-sheet entities (OBSEs) by financial institutions. With variations, both the International Financial Reporting Standards and the U.S. Generally Accepted Accounting Principles (U.S. GAAP) have specific criteria to determine when instruments transferred to OBSEs should be consolidated on-balance-sheet. Any retained interest in securitized financial assets should be on-balance-sheet and accounted for at fair value, usually in the trading book.

Mandatory disclosures on OBSEs are not prevalent. Their absence may have added to market confusion and contributed to procyclical behavior by helping to create a market perception that the banks were standing behind their OBSEs. Both the International Accounting Standards Board (IASB) and the U.S. Financial Accounting Standards Board (FASB) have projects under way to improve OBSE disclosures and enhance the criteria for derecognition and consolidation of OBSEs. Examples are the IASB's consolidation and derecognition projects, and the FASB's changes to FAS 140 and Interpretation 46(R). The FASB's recently revised standard, FAS 140, would go into effect for fiscal years beginning after November 15, 2009.

Regardless, OBSEs require financial supervisors to revisit prudential reporting so that the integrity of banks' risk exposures can be better captured and explained, as well as adequately buffered (i.e., capital) to the satisfaction of supervisors.

Note: Alicia Novoa prepared this box.

loans, and liabilities not fair valued are valued at amortized cost. Both frameworks provide a carefully specified option to fair value (FVO) certain financial assets and liabilities[2] that would normally be valued at amortized cost.

The mixed attributes model is intended to be as neutral as possible—without emphasizing one accounting principle over another. But its uneven application to balance sheets produces accounting volatility and may not fully capture the effects of economic events in all instruments included in the banks' financial statements.

What Is Fair Value?

IFRS and U.S. GAAP similarly define FV as the amount for which an asset could be exchanged, and a liability settled, between knowledgeable, willing parties, in an arm's-length, orderly transaction. U.S. GAAP (Financial Accounting Standard (FAS) 157) are more prescriptive than IFRS because they consider that FV is an "exit" or "selling" price.[3] Both accounting frameworks prescribe a hierarchy of FV methodologies that start with observable prices in active markets (Level 1), using prices for similar instruments in active or not active markets or valuation models using observable inputs (Level 2), and moving to a mark-to-model methodology with unobservable inputs and model assumptions (Level 3).[4] The absence of market prices, trading activity, or comparable instruments' prices and inputs is a prominent feature of complex structured credit products, many of which are held off-balance-sheet (Box 3.1). Consequently, both frameworks require extensive disclosures of information on

[2]Namely, when they are risk-managed on a FV basis, though differences remain between FAS 159 and IAS 39.

[3]Nevertheless, differences will disappear given the international convergence to IFRS currently under way, led by both the U.S. Financial Accounting Standards Board and the International Accounting Standards Board, which will help achieve a single set of high-quality accounting standards.

[4]This language is U.S. GAAP-specific and not IFRS, but it is used extensively in the banking industry and in financial statements of IFRS users as well.

the FV methodologies used, specific assumptions, risk exposures, sensitivities, etc.

Thus defined, FV does not require the presence of deep and liquid markets to be applied. FV can be estimated when a market does not exist, as FV valuation models comprise the expected, risk-discounted cash flows that market participants could obtain from a financial instrument at a certain point in time. While FV incorporates forward-looking assessments, it must also reflect current market conditions and measures of risk-return factors,[5] and incorporate all factors that market participants consider relevant, with firm-specific risk preferences or inputs kept to a minimum. Under this definition, two key issues underlying the FV methodology present a challenge—what constitutes an active market, and what can be considered an observable price or input.

Forced or "fire" sales would not be valid determinants of market prices, because the accounting frameworks presume that a reporting entity is a going concern that does not need or intend to liquidate its assets, or materially curtail the scale of its operations. Yet, accounting standard setters have decided to leave to the judgment of management, supervisors, and auditors how to determine "regularly occurring" or "distressed" sales, and when sales in thin markets, at heavy discounts, could be used for balance sheets' FVA.[6] Consequently, market participants and supervisors would expect to see banks' external auditors use a very cautious approach to examining the prices and inputs used to FV financial instruments in order to minimize late write-downs or write-offs and opportunities for management to "cherry-pick" the accounting treatment of financial instruments.[7]

Disclosures of Fair Value Accounting

Both IFRS and U.S. GAAP mandate various disclosures, particularly when information other than market inputs is used to estimate FV. For example, IFRS 7 requires disclosure (1) if the transaction price of a financial instrument differs from its FV when it is first recorded in the balance sheet; and (2) of the implications of using "reasonably possible alternative assumptions" to reflect the sensitivities of FV measurement.[8] IFRS 7 also contains reporting requirements that include the publication of sensitivity tests for individual items of the financial statements. Similarly, FAS 157 requires banks' balance sheets to be sufficiently clear and transparent so as to fully explain to market participants, through quantitative and qualitative notes to the financial statements, the nature of the changes and the methodologies used, to name a few items.[9]

Although some U.S. and European Union (EU) financial institutions voluntarily provide such disclosures, neither IFRS nor U.S. GAAP require disclosure on the governance and management control processes[10] surrounding FV

[5]IFRS do not explicitly mention some risk factors (e.g., counterparty credit risk, liquidity risk), which may have added confusion to financial statement preparers during the 2007–08 turmoil. An International Accounting Standards Board Expert Advisory Group is currently working on this and other FV issues. The U.S. Financial Accounting Standards Board is reevaluating some disclosure requirements (e.g., credit derivatives) and has issued new standards (e.g., FAS 161 on derivatives and hedging). Both boards are examining requirements for off-balance-sheet entities.

[6]White papers prepared by the six largest international audit firms and other audit firms summarize guidance on what constitutes an active market, FV measurement in illiquid markets, and forced sales. See Center for Audit Quality (2007) and Global Public Policy Committee (2007).

[7]The International Auditing and Assurance Standards Board has issued ISA 540, "Auditing Accounting Estimates, Including Fair Value Accounting Estimates, and Related Disclosures," providing criteria on how auditors must assess accounting estimates, and might issue further guidance on the audit of FV estimates some time in 2009, if warranted.

[8]IFRS 7, "Financial Instruments: Disclosures," became effective on January 1, 2007.

[9]For those financial assets measured at amortized cost, the entity must also disclose the FV in the notes to the statements.

[10]Including audit-related programs.

Box 3.2. Disclosures Recommended by the Financial Stability Forum

At the request of the Financial Stability Forum (FSF), a Senior Supervisors Group conducted a survey of disclosure practices for selected financial exposures such as special purpose entities (SPE) and collateralized debt obligations, among others. The group issued a report concluding that disclosure practices currently observed can be enhanced without amending existing accounting disclosure requirements.[1] The FSF is encouraging financial institutions to use these disclosure practices for their mid-year 2008 financial reports and urging supervisors to improve risk disclosure requirements in Pillar 3 of Basel II.

A preliminary reading of financial reports prepared for mid-2008 by some U.S., European Union and Canadian banks shows the inclusion by U.S. banks of more quantitative notes in their financial statements, as compared with their end-2007 reporting.[2] Typical information includes financial assets securitized, cash flows received on SPE-retained interests, assets in nonconsolidated variable-interest entities (VIEs), and maximum exposures to loss in consolidated and nonconsolidated VIEs, with details broken down by instrument.

Note: Alicia Novoa prepared this box.

[1]"Leading-Practice Disclosures for Selected Exposures," April 11, 2008. Twenty large, internationally oriented financial firms were surveyed (15 banks and five securities firms) as of end-2007.

[2]Canada has postponed adoption of the full International Financial Reporting Standards until 2011.

valuation.[11] Enhancement of disclosures in this direction could increase confidence in banks' balance sheets and lower investors' aversion to transact in instruments whose valuations may not be well understood (Box 3.2).[12] This would not necessarily indicate a need for more disclosures, but for a more appropriate composition, medium (e.g., websites), and frequency of disclosures.

Volatility and Procyclicality of Fair Value Accounting

Barth (2004) argues that there are three potential channels through which FV may introduce volatility into financial statements. The first is the volatility associated with changes in the underlying economic parameters. The second is the volatility produced by measurement errors and/or changing views regarding economic prospects throughout the business cycle. As to the third, volatility may be introduced by relying on the mixed attributes model that applies FVA to certain instruments and amortized cost to others, reducing the netting effect that full fair valuation of assets and liabilities would produce.[13] Each of these sources of volatility is either explicitly or implicitly present in the simulation exercises examined later in the chapter.

The mixed attributes model adopted by IFRS and U.S. GAAP has embedded volatility and procyclicality aspects.[14] On the one hand, historical cost accounting, applicable to HTM investments

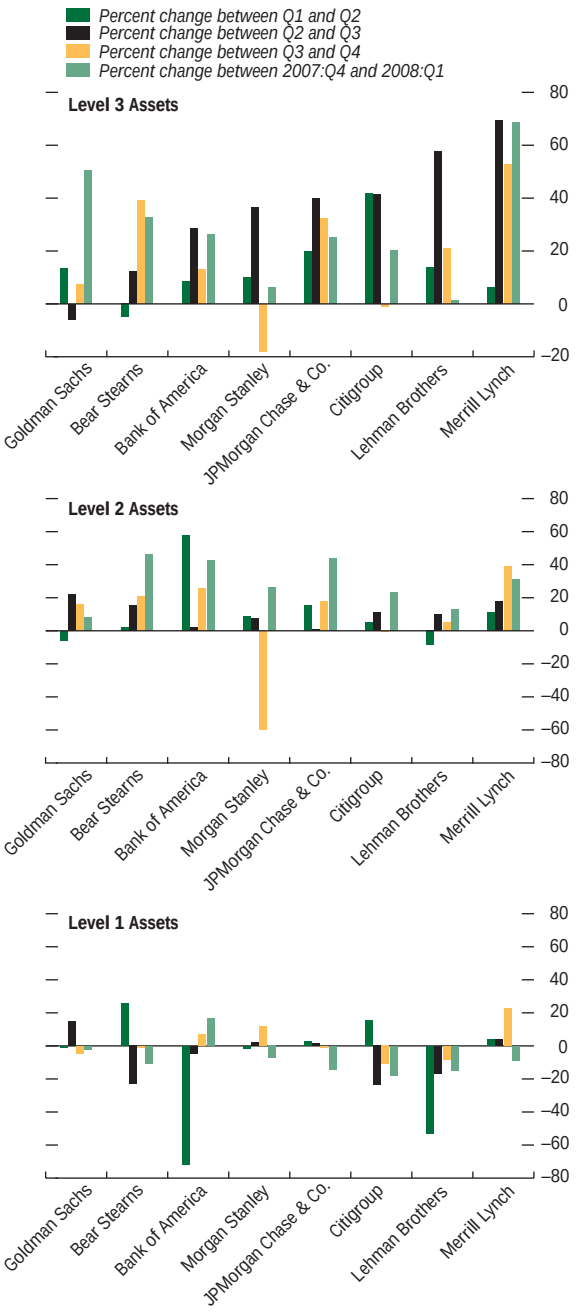
[11]The Financial Stability Forum recommends disclosures about price verification processes to enhance governance and controls over valuations and related disclosures (Box 3.2). Disclosures regarding risk management governance structures and controls would also be welcome.

[12]An example is the U.S. Securities and Exchange Commission letter of March 2007 to major financial institutions outlining the nature of recommended disclosures.

[13]Barth (2004) argues that mixed attributes models impair the relevance and reliability of financial statements and that this constitutes one of the primary reasons behind hedge accounting. IAS 39 aimed to alleviate mismatches in assets and liabilities valuations due to the mixed attributes model and the complexities of hedge accounting.

[14]It should be noted that procyclicality of accounting and reporting standards existed prior to the recent attention to FVA. It has long been recognized that as the business cycle and market sentiment change, so too will valuations of assets and liabilities.

Figure 3.1. Selected U.S.-Based Financial Institutions: Change in Level 1, 2, and 3 Assets
(Percent change; 2007:Q1–2008:Q1)



Source: Quarterly reports.

Note: Level 1 assets use quoted prices for identical assets. 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. Citigroup, JPMorgan Chase & Co., Lehman Brothers, and Merrill Lynch reported fourth quarter at end-December, while the other banks concluded their fourth quarter at end-November.

and loans, is less volatile and backward-looking. When such an investment or loan is correctly priced at origination, its FV equals its face value. Over the life of the asset and until maturity, its reported stream of profits is stable and its carrying value is based on its value at origination. But if market conditions negatively affect these portfolios and there is evidence of a credit loss event and asset impairment, then the reporting values must be reassessed and provisions for losses must be accrued or write-offs recorded. The latter is often a late recognition of excess risk taken earlier, in good times. In this sense, historical costs are subject to a backward-looking assessment of value (e.g., signs of loan distress) combined with procyclical provisioning, which often coincide with a downturn of an economic cycle, adding to stresses.

On the other hand, FVA introduces more volatility in earnings and capital during the life of an asset or liability than historical cost accounting and incorporates forward-looking assessments.[15] Gains and losses in fair valued instruments generally affect the income statement, and this increased volatility of FVA and resulting procyclical effects may create incentives for banks to restructure their balance sheets (e.g., lower loan originations, higher/lower securitizations, introduce hedging, etc.).[16] Nevertheless, higher FV volatility, per se, would not necessarily be a problem if market participants are well informed and could correctly interpret the information provided in the financial statements. In this sense, increased volatility may be thought of as part of the process of fair valuing financial instruments, and a reflection of genuine economic volatility, not as a cause itself of procyclicality.

However, in some cases, the symmetrical treatment within FVA can produce seemingly misleading results. For example, the use of FVA on

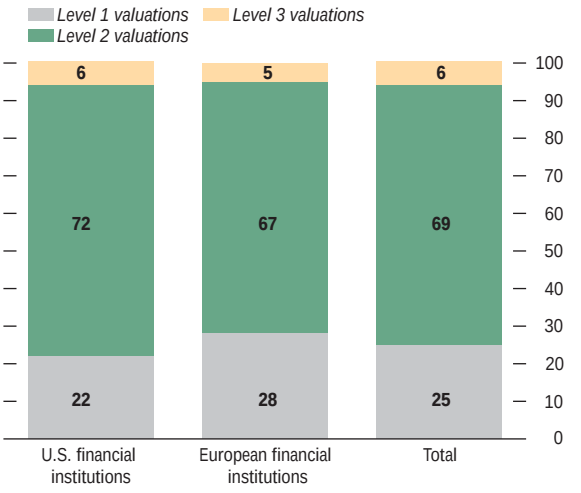
[15]IFRS and U.S. GAAP accounting standards—and FVA is no exception—are applicable to reporting entities irrespective of their size or systemic importance.

[16]One intention of the FVO in both accounting frameworks is to enable entities to reduce accounting mismatches by applying FV on matching assets and liabilities.

a bank's own debt, where the price of the bank's bonds and notes falls due to a decline in its own creditworthiness, will result in a gain that must be recognized in the bank's financial statements, equal to the difference between the original value of the debt and its market price. As counter intuitive as this situation may be, it is still a faithful representation of FV and is a signal to supervisors or other users of financial statements to have appropriate tools (e.g., prudential filters)[17] for understanding the implications of FVA and the impact on regulatory capital.

As valuation moves from market prices to mark-to-model valuation, FVA poses reliability challenges to which markets, particularly under distress, are sensitive.[18] These "subjective" aspects of FVA may compound market illiquidity or price spirals if they increase uncertainty around valuations. In both the United States and European Union, financial institutions' balance sheets are heavily represented in Level 2 instruments, a possible indication that financial institutions are biased toward using Level 2 methods due to their flexibility, as well as a desire to avoid "obscure" Level 3 assets and liabilities (Figures 3.1 and 3.2). Falling valuations can activate certain management decision rules that trigger the liquidation of certain assets or portfolios, adding additional stress. Hence, there is a need for good risk management practices to be consistent with FV mark-to-model valuations. Clear and transparent quantitative and qualitative notes to the financial statements regarding the nature of the changes and methodologies could enhance reliability of mark-to-model valuations.

Figure 3.2. Aggregate Fair Value Hierarchy, end-2007[1]
(In percent)



Source: Fitch Ratings.
[1]Aggregates asset and liability positions.

[17]Bank supervisors use prudential filters as a tool to adjust changes in the (accounting) equity of a bank due to the application of the accounting framework, so that the quality of regulatory capital may be properly assessed. For example, when the gains that result from a deterioration in a bank's own creditworthiness (fair valued liability) are included in a bank's prudential own funds, they must be "filtered out" by the supervisor in order to determine the true amount of regulatory own funds.

[18]In principle, valuations are thus better aligned with the prevailing mark-to-model techniques used in risk management.

Box 3.3. Dealing with Procyclicality in the Basel II Framework

A key improvement in the Basel II framework is its enhanced risk sensitivity. Yet this very feature is associated with the unintended effect of heightening its procyclical propensity. Basel II recognizes possible business cycle effects and how they should be addressed in both Pillar 1 (minimum capital requirements) and Pillar 2 (supervisory review process) of the framework. If Basel II is properly implemented, then greater risk sensitivity can lead banks to restore capital earlier in a cyclical downturn, thus preventing a buildup of required capital when it could amplify the cycle.

Under Basel II's Standardized Approach, risk weights are based on external ratings constructed to see through the cycle, so that cyclical effects are muted. It is in the internal-ratings-based (IRB) approaches that deterioration in credit risk feeds more directly into the capital requirements. The three main risk components in the IRB approaches (e.g., probability of default, loss given default, and exposure at default) are themselves influenced by cyclical movements and may give rise to a cyclical impact on banks' capital requirements.

Basel II includes mitigating measures to address these concerns. Although Pillar 1 does not mandate the use of through-the-cycle models, it promotes estimates of risk components based on observations that "ideally cover at least one economic cycle," and whose validation must be based on data histories covering one or more complete business cycles. It also requires the use of the so-called downturn loss given default which factors in the risk that recoveries will fall as defaults increase in downturns. Sound stress testing processes must be in place that involve scenarios based on economic or industry downturns and include specific credit risk stress tests that take into account a mild recession to assess the effects on the bank's risk parameters.

Pillar 2 places the onus on both banks and supervisors to assess business cycle risk and take appropriate measures to deal with it. Banks are required to be "mindful of the stage of the business cycle in which they are operating" in their internal assessment of capital adequacy, perform forward-looking stress tests, address capital volatility in their capital allocation, and define strategic plans for raising capital. In turn, encouraging forward-looking credit risk assessments or higher provisioning for loan losses (that consider losses over the loans' whole life) is left to national supervisors.[1] Thus, where Pillar 1 does not adequately capture business cycle effects, supervisors should take remedial action under Pillar 2, including through additional capital buffers.

The capital disclosures required by Pillar 3 may assist markets and stakeholders in exercising pressure on the banks to maintain their capital levels throughout the full business cycle.

In its recent report, "Enhancing Market and Institutional Resilience," the Financial Stability Forum called for the Basel Committee to develop Pillar 2 guidance on stress testing practices and their use in assessing capital adequacy through the cycle; examine the balance between risk sensitivity and cyclicality; and update the risk parameters and the calibration of the framework, if needed (Financial Stability Forum, 2008). In response, the committee is establishing a data collection framework to monitor Basel II's impact on the level and cyclicality of prudential capital requirements over time across member countries. The committee is expected to use these results to further calibrate the capital adequacy framework.

Note: Aditya Narain and Alicia Novoa prepared this box.

[1]The U.S. Financial Accounting Standards Board has a project under way to address provisioning and related credit risk disclosures.

Although more volatile, FVA could play a role by partially mitigating the turbulence if warning signals are heeded, thereby helping markets to recover earlier before damaging self-fulfilling downturns worsen. FVA that captures and reflects current market condi-

tions on a timely basis could lead to a better identification of a bank's risk profile, if better information is provided. An earlier warning that can prompt corrective action by shareholders, management, and supervisors allows for a timelier assessment of the impact of banks' risky actions on regulatory capital and financial stability. Moreover, since FVA should lead to earlier recognition of bank losses, it could have a less protracted impact on the economy than, for example, loan portfolios whose provisions for losses are usually made when the economy is already weak. Raising new capital at an earlier stage might enable banks to retain written-down assets or other assets originally not for sale on their balance sheets and, thus, to avoid asset price spirals.

On the prudential front, the negative impact of vastly lower valuations stemming from recent market conditions raises questions as to whether increases in regulatory capital may be needed for complex structured products, off-balance-sheet entities (OBSEs), or other risks. Guidance from Pillar 2 of Basel II could encourage banks to put greater attention into FV during periods of falling or rising asset prices, so that they may better control for the procyclical aspects of FVA (Box 3.3). Pillar 3 disclosures could improve the transparency of valuations, methodologies, and uncertainties. Nevertheless, FVA can serve as an early warning system for supervisors to pursue closer scrutiny of a bank's risk profile, risk-bearing capacity, and risk management practices.

Modeling Fair Value Accounting Through the Business Cycle Using Simulations

Using model simulations, this section assesses the effects that changes in financial instruments' fair value have on the balance sheet of three types of large, internationally active financial institutions—U.S. commercial banks, U.S. investment banks, and European banks—as well as more retail-oriented U.S. and EU banks. The balance sheets of a sample of representative institutions were taken as of end-2006 to construct prototypical institutions (Table 3.1). The simulations illustrate the impact of changes in valuations and, ultimately, on these representative banks' equity capital. The section also explores possible alternatives related to FVA and its current application—full fair value, smoothing techniques, circuit breakers, and reclassifications—that aim to reduce its volatility on balance sheets (Box 3.4).

The first simulation serves as the baseline for subsequent scenarios and consists of tracking the evolution of the banks' balance sheets throughout a normal business cycle.[19] Four scenarios are applied to the normal cycle with the goal of gauging the degree to which fair valuations amplify fluctuations in balance sheet components, and more notably, on accounting capital.[20] The sources of increased cyclicality are (1) a bust-boom cycle in equity valuations; (2) a bust-boom cycle in the housing market; (3) a widening and then contraction of banks' funding spreads; and (4) a bust-boom cycle in debt securities' valuations, all of which are calibrated using the most current cyclical movements (Table 3.2). As noted by Fitch Ratings (2008a, 2008b), among others, the sensitivities of FV measurements to changes in significant assumptions are particularly important when valuations are model-based and/or markets become highly illiquid. Specifically, the method by which an institution chooses to value components of its balance sheet constitutes one of the three main transmission channels through which FVA introduces volatility into the balance sheet (Barth, 2004). The simulations help underscore this point and provide a sense of the magnitude of these effects. In addition, the simulations illustrate how a sudden tightening in banks' funding conditions, or changes in the liquidity conditions in securi-

[19]Annex 3.1 discusses the data and underlying assumptions for the simulations.

[20]Enria and others (2004) examine the impact of several one-off shocks on the balance sheet of a representative European bank under alternative accounting frameworks.

Table 3.1. Balance Sheet of Representative U.S. and European Financial Institutions

(In percent of total assets, as of December 31, 2006)

		U.S. Commercial Banks	U.S. Investment Banks	European Banks	U.S. Retail-Oriented Banks	European Retail-Oriented Banks
Financial assets						
Securities						
Debt securities		21.82	27.85	15.71	14.96	17.72
Trading book	FV[1]	21.82	27.85	14.98	5.09	16.59
Banking book[2]		—	—	0.73	9.87	1.13
Shares		6.73	7.50	6.55	0.64	2.96
Trading book	FV[1]	6.73	7.50	6.32	0.47	2.96
Banking book[2]		—	—	0.23	0.17	—
Derivatives (trading)		2.67	5.28	14.71	1.19	4.44
Interest rate swaps		1.48	1.87	7.76	. . .	. . .
Other derivatives		1.20	3.41	6.96	. . .	. . .
Loans						
Corporate/consumer		10.11	5.63	23.77	23.00	25.84
Short-term (fixed rate) <1 year	FV[1]	4.72	2.82	11.88	6.84	12.92
Medium-term (>1 year and <5 year)		3.66	2.82	3.57	10.97	3.88
Fixed rate	FV[1]	0.72	1.41	1.78	1.71	1.94
Variable rate	FV[1]	2.94	1.41	1.78	9.26	1.94
Long-term (>5 year)		1.73	n.a.	8.32	5.19	9.04
Fixed rate	FV[1]	0.46	n.a.	4.16	2.03	4.52
Variable rate	FV[1]	1.27	n.a.	4.16	3.16	4.52
Mortgages		16.51	n.a.	6.54	37.44	26.43
Fixed rate	FV[1]	12.83	n.a.	1.40	29.09	10.78
Variable rate	FV[1]	3.68	n.a.	5.14	8.35	15.65
Other assets		28.60	43.27	20.93	17.34	5.41
Financial liabilities						
Debt securities/equity (trading)	FV[1]	4.68	8.68	12.77	0.01	12.71
Derivatives (trading)		3.20	5.49	15.34	0.96	3.47
Interest rate swaps		2.09	1.73	7.84	. . .	. . .
Other derivatives		1.10	3.76	7.49	. . .	. . .
Short- and long-term financial liabilities/bonds	FV[1]	18.25	27.21	10.35	19.56	18.97
Other liabilities		65.26	51.52	56.23	69.72	61.16
Of which: deposits and interbank borrowing		42.44	3.72	24.88	60.12	56.72
Net equity[3]		7.65	3.71	2.86	9.75	4.36

Sources: Annual reports; the U.S. Securities and Exchange Commission's 10-K filings; and IMF staff estimates.
Note: Columns may not add to 100 percent as some balance sheet items are not displayed in the table.
[1]Valued at fair value.
[2]Annual statements showed negligible or zero holdings for the sampled banks.
[3]Net equity in percent of total (non-risk-weighted) assets.

ties markets, exacerbate cyclical fluctuations in balance sheets.

It is worth noting that from a cash flow perspective, the changes in assumptions underlying valuations (such as those made in the simulations below) may not necessarily be of future consequence to the reporting institution, as those gains and losses have not been realized and may never be. In this sense, the ensuing changes in regulatory capital produced by the updated valuations are somewhat artificial. With these considerations in mind, the simulation results should be interpreted as a simple exercise to gauge how changes in the underlying valuation parameters in the presence of FVA may lead to substantial fluctuations in banks' equity.

Simulation Results

The simulations highlight three key points regarding FVA and its potential regulatory and financial stability implications: (1) strong capital buffers are crucial to withstand business cycle fluctuations in balance sheet components, especially when FV is applied more

Box 3.4. Options Surrounding the Application of Fair Value Accounting to Mitigate Procyclicality

The procyclicality of fair value accounting has prompted the search for options that allow financial institutions to cope with situations of market turmoil. Alternatives range from considering a wider selection of "observable" prices or inputs to a change in the accounting treatment of financial instruments.

Consensus Pricing Services

Consensus pricing services, often independent brokers and agencies, can provide price quotes for complex or illiquid financial instruments, often using prices based on their own sales of relevant instruments that allow them to observe price behavior and market-test their estimates. Through this approach, illiquid products could obtain a Level 2 price, potentially limiting valuation uncertainty and underpricing in downturns. However, difficulties may remain if there is a wide dispersion of values or if banks contend that values do not reflect market conditions.

Valuation Adjustments

Banks could estimate the "uncertainty" surrounding the price of certain assets and make a valuation adjustment to the carrying value of an instrument disclosed in the financial statements. Valuation adjustments would allow banks to work with less perfect prices that are corrected to reflect current market conditions. These estimates of "uncertainty" might incorporate the liquidity of inputs, counterparty risk, or any market reaction likely to occur when the bank's position is realized. Valuation adjustments could improve fair value measurements and discipline in reporting, yet they need close monitoring to ensure that this practice does not evolve into management "cherry picking," providing a means to evade a certain accounting fair value level classification, or improving the balance sheet.

Reclassifications

The transfer of assets from available-for-sale or trading to the held-to-maturity category could avoid the volatility resulting from valuation changes amid a downward spiral. From an accounting perspective, reclassifications could be penalized by not allowing banks to revert to the trading book when markets rebound. From a prudential standpoint, deteriorated held-to-maturity assets would require higher regulatory capital. Allowing reclassifications—particularly if not fully disclosed—may postpone the weaknesses of the balance sheets, and promote cherry-picking elements of the accounting framework.

Full Fair Value Accounting

Recognizing the significant challenges full fair value accounting would pose, a longer-term alternative would be to adopt a full fair value model for all financial assets and liabilities, irrespective of an entity's intention of holding them. One single fair value principle, with some limited exceptions, would reduce the complexity of financial instruments reporting, balance sheet window dressing, and cherry picking, and allow for more transparent representations of the financial condition of an entity. It could improve the comparability of financial information across balance sheets and enhance market discipline, but it would pose challenges for implementation, modeling capabilities, and auditing estimates.

Internal Decision Rules

Regulators could require banks to have internal decision rules based on fair value that require careful review of all the implications of changing fair value and the specific occasions when such changes could trigger management decisions, so that these decisions do not adversely affect regulatory capital or accentuate downward price spirals.

Smoothing Techniques and Circuit Breakers

Smoothing asset prices and circuit breakers could be used as price adjusters to fair value accounting to reduce excessive price volatility in the balance sheet. However, both reduce the information content of financial statements by suspending equity at an artificially higher-than-fair-value calculated level.

The simulation exercises examine the following alternatives: reclassifications, full fair value accounting, smoothing techniques, and circuit breakers.

Note: Alicia Novoa and Jodi Scarlata prepared this box.

Table 3.2. Parameter Values for Each Simulation

(In percent)

		Business Cycle Trend Points	Business Cycle Trough Points	Business Cycle Peak Points
Normal cycle	PD for all loans and securities	1.18	1.40	0.73
	LGD for mortgages	20.30	20.30	20.30
	LGD for loans[1] and securities	46.20	46.20	46.20
	Stock market index	100.00	100.00	100.00
Stock market cycle	PD for all loans and securities	1.18	1.40	0.73
	LGD for mortgages	20.30	20.30	20.30
	LGD for loans[1] and securities	46.20	46.20	46.20
	Stock market index	100.00	80.00	120.00
Real estate market cycle	PD for mortgages	1.18	5.29	0.73
	PD for loans[1] and securities	1.18	1.40	0.73
	LGD for mortgages	20.30	30.50	20.30
	LGD for loans[1] and securities	46.20	46.20	46.20
	Stock market index	100.00	100.00	100.00
Funding spreads cycle	PD for all loans and securities	1.18	1.40	0.73
	LGD for mortgages	20.30	20.30	20.30
	LGD for loans[1] and securities	46.20	46.20	46.20
	Stock market index	100.00	100.00	100.00
	Change in spreads (in basis points)	0.00	58.66	–58.66
Debt securities valuation cycle	PD for all loans and securities	1.18	1.40	0.73
	LGD for mortgages	20.30	20.30	20.30
	LGD for loans[1]	46.20	46.20	46.20
	Stock market index	100.00	100.00	100.00
	LGD for debt securities	46.20	67.30	25.10

Sources: IMF staff estimates; Nickell and others (2000); and BCBS (2006a).
Note: PD = probability of default; LGD = loss given default.
[1] Loans excluding mortgages.

extensively to assets than liabilities; (2) fair valuing an expanded set of liabilities acts to dampen the overall procyclicality of the balance sheet; and (3) when combined with additional liquidity shortages in financial markets, the FVA framework magnifies the cyclical volatility of capital.

The Effects of Economic Shocks Under Full Fair Value

In the normal cycle, fair valuing both sides of the balance sheet produces fluctuations that are mild compared with the bust-boom scenarios seen in Figure 3.3, an intuitive result.[21] However, it is worth noting that, in the case of the representative U.S. investment bank, equity behaves in a countercyclical manner due to the strong effect of fair valuing the liabilities.[22] Under full fair value (FFV), the value of the bank's liabilities declines as economic activity weakens and probabilities of default (PDs) rise, mitigating the decline in equity. This effect arises because of the asset/liability structure of the investment banks' balance sheet, which consists of a large proportion of financial liabilities that are fair valued. Liabilities at FFV, as is done by some U.S. investment banks, can introduce an element of countercyclicality by serving as an implicit counterbalancing hedge to the fair

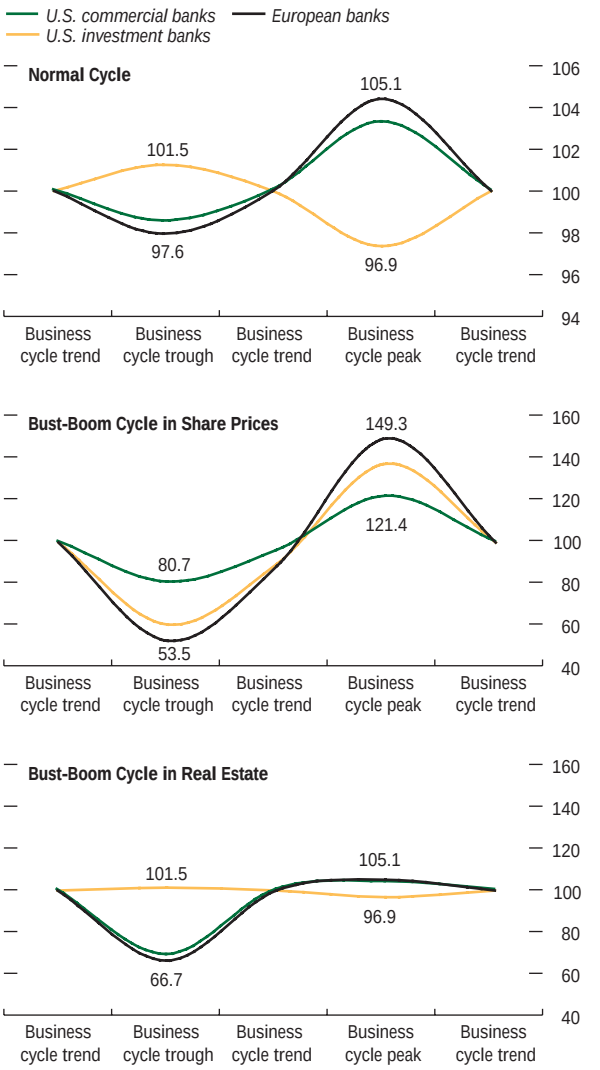
[21]The results are presented in terms of the evolution of banks' normalized equity through the cycle—that is, at each point in the cycle, banks' equity is divided by their initial level of equity (i.e., at end-2006).

[22]Chapter 4 of the October 2008 *World Economic Outlook* (IMF, 2008a) examines the procyclicality of leverage ratios of U.S. investment banks, finding their extreme variation across the cycle. Note that this is consistent with the scenario conducted later in this chapter where funding spreads vary through the cycle, producing the same procyclicality found in IMF (2008a).

valuation of assets.[23] This phenomenon has raised related concerns by some market observers who regard with unease a bank's ability to record revaluation gains as its own creditworthiness weakens and the price of its own debt declines.[24] The presence of gains that are a construct of the particular technique chosen for valuation signals the need for clear disclosure of underlying assumptions to avoid misrepresentation of financial statements.

In the bust-boom cycles in equity valuations and in the housing market, the European banks exhibit the largest deviations from trend. For the equity price shock, despite roughly comparable magnitudes of equity shares across the portfolios of the three groups of banks shown in Table 3.1, a combination of two effects are at work. First, there is the countercyclical effect of the relatively greater proportion of FV liabilities for U.S. investment banks. Second, European banks have a lower capital base and thus the relative size of valuation changes to normalized equity capital is larger. In the housing market scenario, the European banks exhibit wider fluctuations, despite the fact that the U.S. commercial banks hold a much larger fraction—about two-and-half times greater—of their loan portfolio in mortgages. In both scenarios, the lower capital base of the European banks vis-à-vis the U.S. commercial banks is a key element. Similar results in terms of capital-to-assets ratios are presented in Table 3.3, but reflect a less dramatic impact on European banks.[25] More generally, a bank's balance sheet would evolve through the cycle—contracting in downturns and expanding in upturns—such that it would restore a bank's

Figure 3.3. Simulation of Full Fair Value



Source: IMF staff estimates.

[23]Note, however, that this result reflects only one element of countercyclical forces, as "other liabilities" represent about 50 percent of the balance sheet and can potentially introduce additional countercyclicality.

[24]See Guerrera and White (2008). Additionally, Barth, Hodder, and Stubben (2008) suggest that these counterintuitive effects are attributable primarily to incomplete recognition of contemporaneous changes in asset values.

[25]Some portion of the lower equity position in European banks may stem from differences in IFRS versus U.S. GAAP accounting treatments (Citigroup, 2008; and *Financial Times*, 2008).

Table 3.3. Equity-to-Assets Ratio Through the Business Cycle
(In percent)

	Baseline Business Cycle Trend	Period 1 Business Cycle Trough	Period 2 Business Cycle Trend	Period 3 Business Cycle Peak	Period 4 Business Cycle Trend
U.S. Commercial Banks					
Normal cycle	7.6	7.5	7.6	7.9	7.6
Bust-boom cycle in share prices	7.6	6.3	7.3	9.1	7.6
Bust-boom cycle in real estate	7.6	5.4	7.6	7.9	7.6
U.S. Investment Banks					
Normal cycle	3.7	3.8	3.7	3.6	3.7
Bust-boom cycle in share prices	3.7	2.3	3.4	5.0	3.7
Bust-boom cycle in real estate	3.7	3.8	3.7	3.6	3.7
European Banks					
Normal cycle	2.9	2.8	2.9	3.0	2.9
Bust-boom cycle in share prices	2.9	1.6	2.6	4.2	2.9
Bust-boom cycle in real estate	2.9	1.9	2.9	3.0	2.9

Source: IMF staff estimates.

capital adequacy ratio, a result that is not easily testable in this simple framework.

The recent events have raised two interesting scenarios regarding increased funding costs and a downward spiral in the valuation of debt securities. Sudden changes in a bank's ability to obtain funding largely exacerbate the fluctuations in balance sheets (Figure 3.4). This exercise underscores the significance of general liquidity conditions in driving balance sheet fluctuations and how the FVA framework recognizes these changes promptly. Interestingly, the countercyclical behavior observed in the U.S. investment banks' equity disappears. In fact, the U.S. investment banks are hardest hit by both the tightening of funding conditions and the distress in securities markets. This should not be surprising given that, contrary to the U.S. commercial banks and European banks, the U.S. investment banks do not rely on deposits—which are not fair valued—to fund their activities. Note, too, that these simulations do not account for structured credit products or the OBSEs that were so central to much of the 2007–08 turbulence and would likely increase the procyclicality of the balance sheets. Such a deterioration of banks' balance sheets could affect market confidence and overall share prices, which in turn could generate additional volatility in banks' balance sheets.

The results presented thus far have focused on the balance sheets of large internationally active institutions. Comparatively, the more retail-oriented banks tend to have larger loan and mortgage portfolios and rely more extensively on deposits for their funding.[26] To illustrate the effects of these two structural characteristics, simulations comprising the cycle in funding spreads and the bust-boom cycle in real estate were conducted for all banks, excluding the representative U.S. investment banks. The results corroborate the supposition that the more retail-oriented institutions are less vulnerable to changes in funding conditions than their internationally active counterparts (Figure 3.5). Conversely, the retail-oriented banks are harder hit by a bust in the housing market than the internationally active banks.

The Effects of Mixed Attributes Models

Using two versions of the mixed attributes model, this exercise shows how the degree to which financial institutions apply FV to their assets and liabilities affects the extent to which there can be offsetting volatility effects.

[26]Note, however, that retail-oriented European banks also have a larger fraction of debt securities and financial liabilities than the larger European banks.

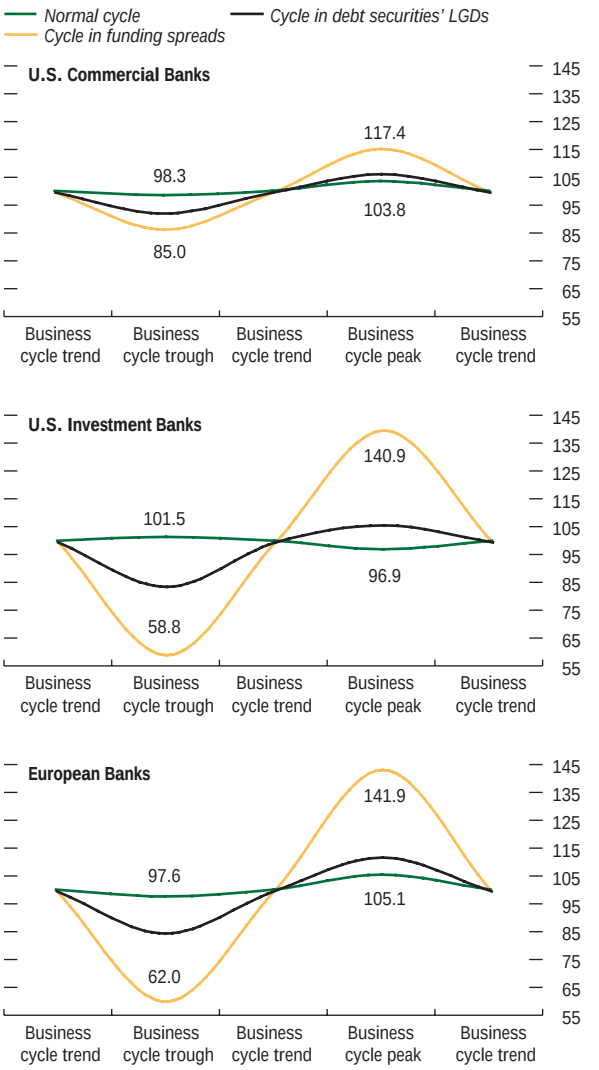
Table 3.4. Application of Fair Value by U.S. and European Banks, 2007

(In percent of total balance sheet)

Financial Institutions	Assets at Fair Value on a Recurring Basis	Liabilities at Fair Value on a Recurring Basis	Return on Equity
JPMorgan Chase & Co.	41	16	12.86
Citigroup	39	22	3.08
Bank of America	27	6	10.77
Goldman Sachs	64	43	31.52
Lehman Brothers	42	22	20.89
Merrill Lynch	44	33	–25.37
Morgan Stanley	44	27	9.75
Credit Suisse	64	39	17.88
Société Générale	46	32	3.36
Royal Bank of Scotland	45	31	15.13
BNP Paribas	65	55	16.98
Deutsche Bank	75	48	18.55
UBS	54	35	–10.28
HSBC	40	25	16.18
Barclays	52	39	20.50
Crédit Agricole	44	24	10.67

Sources: Fitch Ratings (2006b); and Bloomberg L.P.

Figure 3.4. Simulation of Full Fair Value: Changes in Funding Conditions and Financial Market Distress



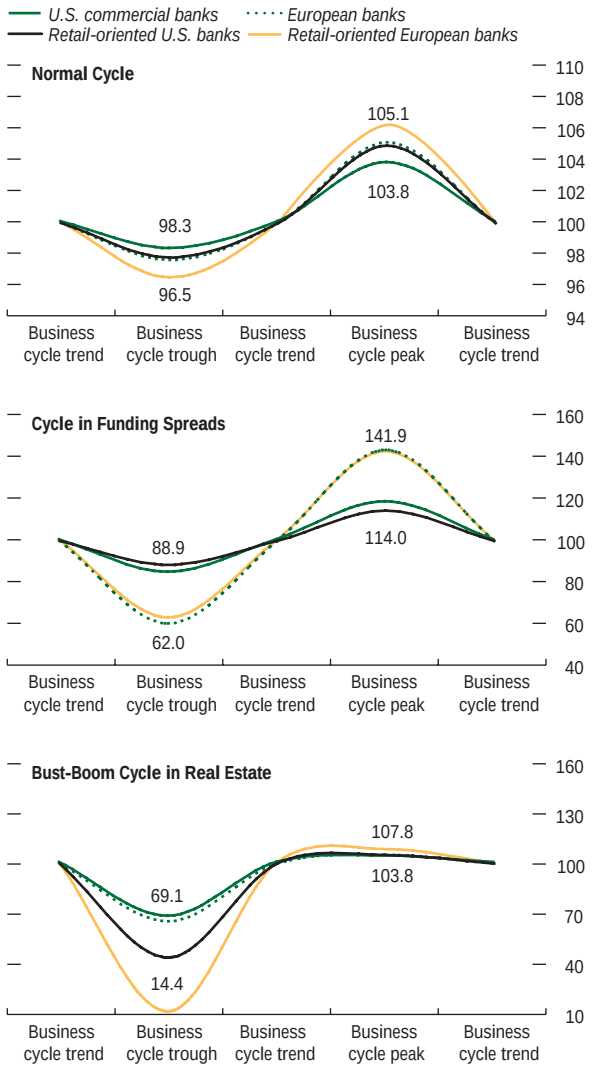
Source: IMF staff estimates.
Note: LGD = loss given default.

Table 3.4 shows that financial institutions apply FV differentially. But what is not shown in the table is the extent to which the vast majority of banks continue to use amortized cost to value their loan portfolio. Thus, for the purposes of the simulations, two variations of the model are considered: (1) "financial liabilities and bonds" are valued at amortized cost throughout the cycle; and (2) "loans" and "mortgages" are also valued at amortized cost.[27]

Figure 3.6 underscores the idea that the asymmetric application of a mixed attributes model, where FV is applied more extensively to assets than liabilities, has the effect of mechanically increasing the procyclical behavior of the balance sheet. In other words, the fluctuations in equity—for all types of institutions and for all the scenarios considered—are larger when a smaller fraction of liabilities are fair valued (compare with Figure 3.3., the results under FFV). Thus, the benefits intended by the introduction of the FVO, which were to reduce the accounting volatility of the mixed attributes

[27]In effect, valuing these instruments at amortized cost would produce comparable results to being classified as HTM.

Figure 3.5. Simulation of Full Fair Value: International versus Retail-Oriented Banks



Source: IMF staff estimates.

methods and the need for FV hedge accounting techniques, are lessened. This could be interpreted as supporting an expanded application of FV, rather than a reduced application, however, this conclusion should be interpreted cautiously. Bear in mind that the application of FV to banks' own debt may produce revaluation gains as the value of liabilities declines on their balance sheets. While this logically has the effect of reducing procyclicality, the lower value of liabilities should lead a user of financial statements to consider the reason for the lower valuation and thus the future viability of the bank, as this information cannot be considered a positive factor even though procyclicality is reduced. Thus, the reasons for variability in own-debt valuations should be properly disclosed.

This simulation highlights that the greater the imbalance of the mixed attributes application to assets and liabilities, the greater is the accounting volatility. When financial instruments are valued at a historical cost that does not represent the current market conditions, an accurate picture of a bank's equity becomes blurred and the informational content of the accounting statement weakens. Historical costs have low information content for investors who rely on current financial figures as a basis for investment decisions. For a regulator, making an accurate assessment of the health of a bank, and formulating the appropriate regulatory response, becomes increasingly difficult.

The second simulation (not shown), where financial liabilities plus loans and mortgages are all valued at amortized cost, showed that the range of fluctuations diminished further than in the above simulation. Thus, although the wider application of the mixed attributes model can reduce fluctuations in the balance sheet, the cost comes in the form of a further reduction in up-to-date information.

Smoothing Techniques and Circuit Breakers on Reporting Prices

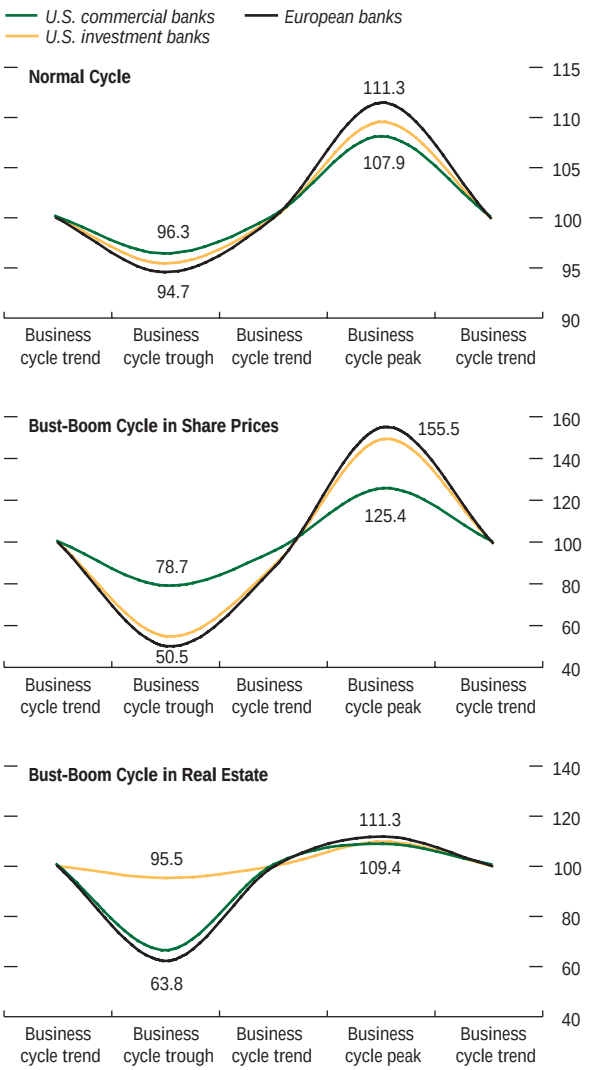
Simulations using proposed alternatives to smooth balance sheet volatility show that a smoothing/averaging technique for falling

asset prices blurs the bank's capital position in magnitudes varying by the amount and period over which the averages are calculated. Smoothing techniques and other impediments to allowing valuations to adjust—so-called "circuit breakers"—make it harder for regulators and investors to accurately assess the financial position of a bank, as they hide the economic volatility that should be accounted for in the balance sheet.

To illustrate, two smoothing simulations were conducted, each averaging share prices over different lengths. The first simulation uses a two-period average, whereas the second simulation is extended to three periods. As shown in Figure 3.7, the longer the averaging length, not surprisingly, the smoother is the path of the balance sheet. Notably, the application of a smoothing technique might reduce the occasion for "forced" sales, as it could avoid sale triggers in some cases. Accordingly, this could lessen a downward price spiral in the market for a financial product by avoiding forced sales, but comes at the expense of a reduction in the informational content of financial statements and potentially lengthening the resolution period.

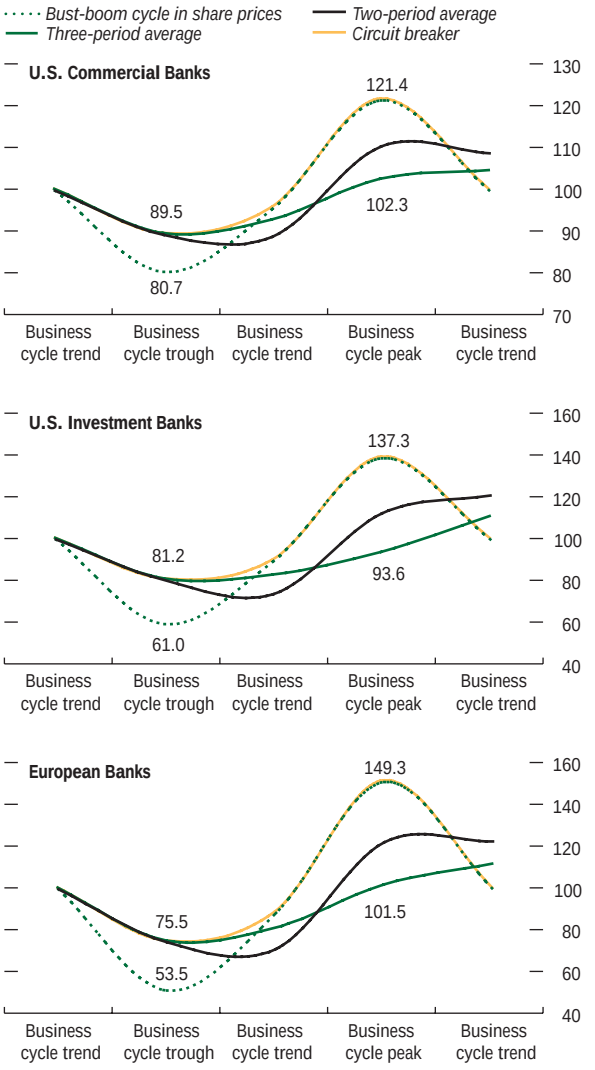
Similarly, concepts such as a circuit breaker, whereby rules stem the recognition of a fall in asset prices, mask the underlying equity position by suspending equity at an artificially higher level than under FV and, more generally, may hamper price discovery. However, in this case, the cycle may be extenuated even longer than with a smoothing technique because the circuit breaker can maintain the same value for a given period, while the smoothing is a rolling average that is updated during each period of the cycle. Additionally, this measure is asymmetrically applied, as the circuit breaker has generally been proposed for when valuations are falling. Even though not a preferred technique, for symmetry, one could apply circuit breakers during "bubble" periods to stop the artificial inflation of equity. If not, asymmetric treatment of valuations may create perverse risk-taking incentives for managers as long as financial institutions are able to benefit from the upside in valuation while the downside would remain capped.

Figure 3.6. Simulation of Partial Fair Value[1]



Source: IMF staff estimates.
[1]Includes short- and long-term financial liabilities valued at amortized cost.

Figure 3.7. Simulation of Smoothing Techniques



Source: IMF staff estimates.

The Effects of a Changing Yield Curve

Yield curve effects are introduced to the baseline scenario to evaluate how the change in interest rates over the cycle affects the balance sheet.[28] This chapter follows Keen (1989) and assumes the following stylized facts regarding the cyclical behavior of yield curves:[29] (1) both short- and long-term rates tend to decline during business cycle downturns and rise during expansions; and (2) short-term rates tend to rise more relative to long-term rates during expansions (i.e., the yield curve flattens) and fall more relative to long-term rates during recessions (i.e., the yield curve steepens) (Figure 3.8).[30]

The influence of interest rates tends to dominate the effect of the change in PDs, such that the interest rate effect dampens the magnitude of procyclical equity fluctuations for the European banks, and even becomes countercyclical for the U.S. commercial banks (Figure 3.9). For the U.S. investment banks, the change in interest rates renders the evolution of equity procyclical, rather than countercyclical, as in the baseline simulation. This reversal in behavior is due to the fact that the U.S. investment banks have a slightly larger share of FV liabilities than assets being revalued when interest rates change.[31] But this also highlights the European banks as an intermediate structure between the investment bank and retail bank characteristics. Regardless of the balance sheet structure, changes to

[28]Although this simulation is subject to the Lucas critique in that bank behavior is assumed not to change in response to policy adjustments, it provides some insights into the interaction between FVA and interest rates.

[29]See also Piazzesi and Schneider (2006).

[30]Interestingly, the addition of changes in the yield curve counteracts the effect of the evolution of PDs. The drop in the yield curve in the downturn results in higher valuations and thus counterbalances the downward effect of the PDs, while the positive effect on valuations stemming from lower PDs is counterbalanced by a higher yield curve in the upturn.

[31]This simulation abstracts from the effect of revaluing interest rate swaps. Unfortunately, it was not possible to obtain a sufficiently complete and consistent data set on these instruments to include them in the simulation. Nevertheless, preliminary results using available data on interest rate swaps showed similar qualitative results.

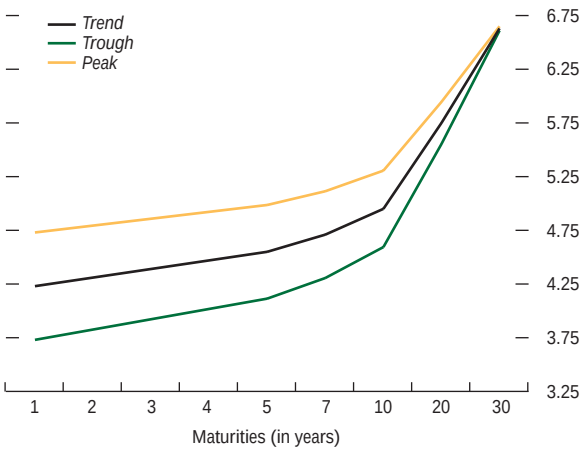
interest rates and other monetary policy tools can dampen procyclical influences, suggesting countercyclical monetary policy could have the beneficial outcome of also helping to counteract the effects of the asset valuation cycles on banks' equity. Note, however, that these simulations do not allow the financial institutions to respond to policy changes, and thus these results, while informative, should be taken with caution.

Conclusions and Policy Recommendations

The financial turmoil that started in July 2007 unveiled weaknesses in the application of some accounting standards[32] and with the valuation and reporting of certain structured products. While these weaknesses may have contributed to the recent events, they also provide an opportunity to better understand them.

The chapter finds that, despite concerns about volatility and measurement difficulties, FVA is the appropriate direction forward and can provide a measure that best reflects a financial institution's current financial condition, though various enhancements are needed to allow FVA to reinforce good risk management techniques and improved prudential norms. Nevertheless, the application of FVA makes more transparent the effects of economic volatility on balance sheets that, under certain risk management frameworks, could exacerbate cyclical movements in asset and liability values. Exaggerated profits in good times create the wrong incentives. Conversely, more uncertainty surrounding valuation in downturns may translate into overly tight credit conditions, and negatively affect growth at a time when credit expansion is most needed. This is not to say that alternative accounting frameworks such as historical cost accounting avoid such fluctuations, but rather that FVA recognizes them as they develop. Regardless, accounting frameworks are not meant to address the market-wide or

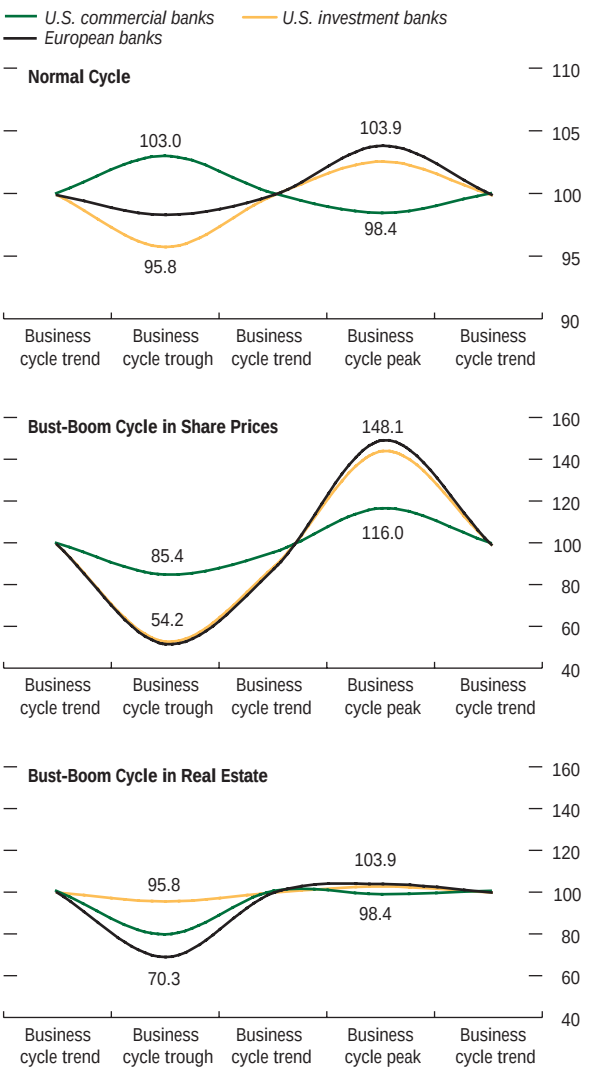
Figure 3.8. Yield Curves and Business Cycles
(In percent)



Source: IMF staff calculations.

[32]Although the weaknesses are related more to issues of OBSEs, consolidation, and derecognition, than to FV.

Figure 3.9. Simulation of Full Fair Value with Upward Sloping Yield Curve



Source: IMF staff estimates.

systemic outcomes of their application, as they are applied only to individual institutions. Nevertheless, much of the controversy surrounding FV stems more from the risk management and investment decision rules using FV outcomes, rather than the framework itself. The interaction of FV estimates with other decision rules should be delinked from specific covenants such as sales triggers, margin calls or additional collateral requirements during downturns, or compensation tied to short-term profits during upturns.

Overall, the simulations confirm a number of issues in the ongoing FVA debate and underscore three key points regarding FVA and its potential regulatory and financial stability implications. First, strong capital buffers and provisions make an important contribution to withstanding business cycle fluctuations in balance sheets, especially when FVA is applied more extensively to assets than liabilities. Second, when combined with additional liquidity shortages in financial markets, the FVA framework magnifies the cyclical volatility of capital. Third, fair valuing an expanded set of liabilities acts to dampen the overall procyclicality of the balance sheet. However, the latter may also give rise to the counterintuitive outcome of producing gains when the valuation of liabilities worsens. This is of particular concern when a deterioration in a bank's own creditworthiness, and the subsequent decline in value of own debt, results in profits and a false sense of improvement in the bank's equity position.

Proposals for alternative accounting methods, such as historical cost or simplistic mechanisms to smooth valuation effects on bank balance sheets, reduce the transparency of a financial institution's health by blurring the underlying capital position. While these techniques may avoid sale triggers incorporated in risk management covenants and limit downward price spirals, the measurement variance that they introduce can increase uncertainties regarding valuations. The loss of transparency makes it more difficult for all users of financial statements—for example, for supervisors to conduct adequate oversight of financial institu-

tions and recommend appropriate regulatory measures to deal with prudential concerns, and for investors who will demand increased risk premia in the face of uncertainty.

Policy Proposals

Most proposals should aim to deal with the use of FV estimates to lessen the volatility that FVA can introduce to the balance sheet. Assessments of provisioning and capital adequacy should take better account of the business cycle. Improved transparency can be achieved not necessarily by more disclosures, but better disclosures. The proposal this year by the Financial Stability Forum (2008) on disclosure practices in financial reports provides recommendations in this direction.

The simulations support the relevance of establishing a capital buffer that looks through the cycle, augmenting the capital position during boom cycles to withstand the burden on capital that stems from economic downturns. Although a partial analysis, the simulations show that FVA can introduce financial statement volatility and provide a first indication that buffers of around 2 to 4 percent of additional capital would help banks weather normal cyclical downturns, whereas higher buffers—on the order of 30 to 40 percent extra capital—would be needed to offset more severe shocks. Recognizing that these estimates do not reflect concurrent changes in risk-weighted assets, they nevertheless provide an initial estimate of the magnitude of the needed capital buffer, as well as the direction for further analysis. Note that these are not adjustments to FV calculation, per se, but are adjustments meant to help mitigate the impact on bank balance sheets. Consideration to making other changes to the accounting framework so that the FV calculations themselves obviate the need for these other adjustments would be useful at this juncture.

Broadening the current narrow concept of provisions to incorporate additional methods of retaining income in upswings could provide a way of better offsetting balance sheets' procyclical effects. It is generally agreed that provisions protect against expected losses and capital protects against unexpected losses. A buildup of provisions better linked to the expected volatility, higher risks, and potentially larger losses of an asset could better anticipate the potential negative effects on the balance sheet that would be reflected through the cycle, as long as the buildup does not provide a way for smoothing or manipulating earnings. Coordination between accounting standard setters and supervisors would be needed to effect such changes.

Similarly, the use of forward-looking provisioning,[33] combined with a supervisor's experienced credit judgment in assessing the probability of default, loss given default, and loan loss provisioning,[34] could mitigate the procyclical forces on the balance sheet. The recognition of credit losses in the loan portfolio earlier in a downward cycle would lessen an accompanying decline in bank profits and the potential for a squeeze in credit extension that could contribute to a further downward economic trend. Similarly, on the upside, dividend distributions should only come from realized earnings that are not biased by upward cyclical moves.

From an oversight perspective, the simulations underscore the importance of understanding the cyclical implications of FVA. An enhanced role for prudential supervisors will be needed to ensure close inspection of a bank's risk pro-

[33]Forward-looking provisioning denotes provisions based on the likelihood of default over the lifetime of the loan, reflecting any changes in the probability of default (after taking into account recovery rates). Dynamic (or statistical) provisioning can be considered an extension of forward-looking provisions with reliance on historical data on losses for provisioning calculations. Conceptually, dynamic provisioning would entail that during the upside of the cycle, specific provisions are low and the statistical provision builds up, generating a fund; during the downturn, the growth in specific provisions can be met using the statistical fund instead of the profit and loss account. See Enria and others (2004) and Bank of Spain (2007). For further discussion of this topic and the transparency of the Spanish provisioning method, see Fernández de Lis, Pagés, and Saurina (2000) and Jiménez and Saurina (2006).

[34]Basel Committee on Banking Supervision (2006b) and IAS 39.

file and risk management practices, and make appropriate recommendations for augmented capital buffers and provisions, as needed. A comprehensive bank supervisory framework should include stress tests of FV positions through the business cycle. Similarly, auditors will have a critical role to play in ensuring credibility, consistency, and neutrality in the application of FVA, and overall in supporting market confidence rather than appearing to augment procyclicality by encouraging lower valuations during a downturn. A closer collaborative framework among audit and accounting standard setters and supervisors would be highly beneficial for markets and financial stability.

In light of the different dynamics through the financial cycle and the doubts that can surround valuations, FV estimates should be supplemented by information on a financial instrument's price history, the variance around the FV calculations, and management's forward-looking view of asset-price progression and how it will impact the institution's balance sheet. Reporting a range within which the FV price could fall would help users of financial statements to better understand and utilize the volatilities with which they are dealing. FV estimates should be supplemented with detailed notes on the assumptions underlying the valuations and sensitivity analyses so that investors can conduct their own scenario analyses and determine whether the FV price is representative of market conditions.

More refined disclosures could meet the expanding needs of various users, including investors, supervisors, and depositors, in a common framework of disclosure. For example, a series of shorter reports that would be available on websites,[35] issued more frequently (e.g., quarterly),[36] and cater to a narrower group of users' needs could highlight the most relevant information, with a particular emphasis on risk developments. Further, the volatility associated with an FV balance sheet may mean that the balance sheet is no longer the primary medium for evaluating bank capital. Market participants and supervisors may increasingly turn to cash flow statements, income and equity statements, and risk measures to provide enhanced information, and these statements must evolve in response to users' needs.

Albeit of a simple structure and subject to isolated shock scenarios, the simulations point to the fact that the application of FV to both sides of the balance sheet would introduce a countercyclical component that may cushion some of the financial shocks that can result in large swings in bank equity. This result, however, arises in the shock scenarios, in part, from a deterioration in the own-debt values as risk premia rise on the liability side of the balance sheet. This logically compensates for the deterioration of the asset side during a downturn. From the viewpoint of assessing the riskiness of the financial institution or its future prospects, the result can be viewed as paradoxical, as it can hardly be regarded as a positive factor for the financial institution to have its own-debt values deteriorate. The simulations also illustrate how a bank's response to a particular shock varies substantially depending on the specific balance sheet structure and thus there is a need to discern the source of the cyclicality through additional disclosures.

A key challenge going forward will be to enrich the FVA framework so that market participants and supervisors are better informed in order to promote market discipline and financial stability. The fragmented solution that currently exists between the accounting, prudential, and risk management approaches to valuation is insufficient and must be reconciled. Importantly, this will require adjustments on the part of all three disciplines to resolve these tensions. As the 2007–08 financial turmoil continues to unfold, FVA alternatives and disclosures will continue to be tested and provide insights for improvement.

[35]The Financial Accounting Standards Board's XRBL project for financial institutions would provide data online in about three years, as discussed in the April 2008 edition of the *Global Financial Stability Report* (IMF, 2008b).

[36]This would be separate from U.S. SEC 10-Q filings.

Annex 3.1. Data and Modeling Assumptions[37]

This annex presents the construction of the simulation exercises and reviews the assumptions underlying the various scenarios.

Banks' Balance Sheets

To accurately reflect the balance sheets of a representative large U.S. commercial bank, a large U.S. investment bank, a large European bank, and retail-oriented U.S. and European banks, the financial statements at end-2006 for these five banking groups were compiled from the institutions' annual reports and the U.S. Securities and Exchange Commission's 10-K filings.[38] Individual bank balance sheets were then used to construct a weighted average for each type of institution, and the resulting representative balance sheets (Table 3.1).

Table 3.1 indicates the line items that were fair valued in the simulations.[39,40] Not all the items in the balance sheet were fair valued in the simulations: items that are typically not available for sale (e.g., securities in the banking book) and items that fall under the "other" categories were held constant.[41]

[37]Juan Solé prepared this annex.

[38]December 2006 was selected as the filing period in order to obtain balance sheets that are relatively recent, while at the same time not reflecting too closely banks' balance sheet structure in the run-up to or fall-out from the 2007–08 U.S. subprime meltdown.

[39]For simulation purposes, all banks were assumed to be newly established, so that all balance sheet items are at fair value at the start of the simulations. Thus, the shocks applied to the baseline reflect only the pure impact of the shocks, and not a combination of the imposed shock plus any initial deviations from fair value.

[40]IAS 39 prevents the valuation of demand deposits at less than face value, even if a significant portion of these display economic characteristics of a term deposit. Consequently, deposits remain at face value in the exercise.

[41]Despite credit derivative exposures being a central element in the 2007–08 turmoil, an explicit breakdown of them was unavailable in the 2006 reports. Some mortgage-backed securities were included in the debt securities category.

Valuation of Assets and Liabilities Under Fair Value

Loans and debt securities are valued at their expected net present value (NPV), which takes into account the probability of default (PD) and the loss given default (LGD) of each instrument. In other words, the value of a given security (or loan) with a maturity of T years is given by the expression

$$NPV = \sum_{t=1}^{T} \frac{E(CF_t)}{(1+\delta_t)^t},$$

where δ_t is the discount rate for year t, and $E(CF_t)$ is the expected cash flow for year t factoring in the possibility that the security (or loan) defaults, that is,

$$E(CF_t) = [PD_t \cdot (1+r_t) \cdot N \cdot (1-LGD_t)] + [(1-PD_t) \cdot r_t \cdot N] \text{ for all } t < T,$$

and

$$E(CF_T) = [PD_T \cdot (1+r_T) \cdot N \cdot (1-LGD_T)] + [(1-PD_t) \cdot (1+r_T) \cdot N],$$

where PD_t stands for probability of default,[42] r_t is the interest rate on the loan, N is the notional amount of the loan, and LGD_t is the loss given default.

Under fair value (FV), traded shares are valued at their market price. Since the detailed composition of the shares portfolio of banks was not available, it was assumed that banks hold a generic type of share that represents the Standard & Poor's 500 Stock Market Index. Therefore, the number of shares for each type of bank was obtained by dividing the value of their shares portfolio at end-2006 by the value of the S&P 500 index at the same date.

Characterization of the Business Cycles

To simplify the analysis, the chapter considers a stylized business cycle consisting of four periods representing different points in a typical

[42]Strictly speaking, PD_t is the conditional probability of default at time t. That is, the probability that, conditional on not having defaulted before, a loan defaults in period t.

business cycle: trend, trough, peak, and back to trend. Each point in the business cycle is characterized by a different probability of default on securities and loans. To construct the normal business cycle, the PDs on loans and debt securities were assumed to change with the pulse of the cycle, increasing during economic downturns and decreasing during upswings. To isolate the effect of the evolving PDs on valuations, the baseline simulation abstracts from changes in interest rates during the cycle and initially assumes a flat yield curve.

In principle, different classes of securities and loans may have different PDs and evolve differently throughout the cycle. For simplicity, however, this chapter assumes that all securities and loans have the same PD and display the same cyclical behavior, except for the scenario of the bust-boom cycle in real estate, where a different PD for mortgages is assumed. In addition, loans are assumed to be bullet instruments whose principal is repaid in full upon maturity. The specific values for these PDs were derived from Nickell, Perraudin, and Varotto (2000), who investigated the dependence of securities-rating transition probabilities on the state of the economy.[43] The PDs at different stages of the business cycle were computed using their estimated transition matrices at different points in the cycle (Table 3.2).[44]

To compute the NPV of loans and securities, it is also necessary to have a measure of losses in the event of default. Thus, LGD rates were taken from the Basel Committee on Banking Supervision's (2006a) Fifth Quantitative Impact Study (QIS-5), and equal 20.3 percent for mortgage loans and 46.2 percent for corporate loans. To isolate the effect of the evolving PDs, the LGD rates were held constant through the cycle (except in the bust-boom cycle in the housing market and in the downward price spiral for debt securities).[45]

Characterization of the Economic Shocks

The first scenario considered is a bust-boom cycle in stock market valuations where, concurrent with a normal cycle, share prices initially plummet by 20 percent during the downturn of the economic cycle and then surge to a level that is 20 percent above the original level, to ultimately return to their trend value (Table 3.3).[46]

The second scenario is a bust-boom cycle in the housing market, in which mortgage default rates and LGD rates dramatically increase during the downturn, and then rebound during the recovery. In this scenario, PDs of mortgage loans increase to 5.29 percent in the trough of the cycle—a magnitude that is commensurate with the recent meltdown in the U.S. housing market.[47] Additionally, the reduction in house values—and thus the expected decline in recoveries—was factored in through a 50 percent increase in the LGD rate over the average values reported in the QIS-5 (i.e., from 20.3 to 30.5 percent).

To simulate the cycle in funding conditions, the chapter assumes that during the business cycle trough, banks' cost of funding increases by 58.7 basis points. This increase in spreads was obtained by computing the average rise in LIBOR overnight index swap spreads for U.S. and European banks during the summer of 2007 (see Figure 2.2 in Chapter 2). Conversely,

[43]See also Pederzoli and Torricelli (2005), Bangia and others (2002), and Altman and others (2005).

[44]It should be noted that the Basel Committee on Banking Supervision's Fifth Quantitative Impact Study estimated the PD for a group of G-10 (ex-U.S.) banks' retail mortgage portfolio at 1.17 percent, very close to the estimate of 1.18 percent for the trend period used here.

[45]Although this may be a less realistic assumption than allowing LGDs to evolve through the cycle, the qualitative results of the simulations would not be altered.

[46]The initial price of the representative stock held by banks was normalized to the value of the S&P 500 index at end-2006, which closed at 1,418 on December 29, 2006.

[47]To estimate the PDs during the 2007–08 U.S. housing crisis, it was assumed that 100 percent of foreclosures and 70 percent of delinquencies beyond 90 days end up in default. These percentages are then combined with the respective PDs to yield an overall estimated PD of 5.29 percent for all mortgages. See UBS (2007). The data source is Merrill Lynch, April 2008.

to analyze the effects of ample liquidity conditions, the simulation assumes that banks' funding costs decrease by the same amount during the cycle peak.

To construct the scenario of distressed securities markets and then recovery, it was assumed that the LGD rates for debt securities sharply increase during troughs and decrease by the same amount during peaks.[48] During the cycle trough, the LGD rate for debt securities increases to 67.3 percent[49] from its initial base of 46.2 percent. Subsequently, the simulation applies the same shock magnitude (but reversed sign) to the LGD during the cycle peak—that is, the LGD decreases to 25.1 percent.

References

Acharya, V.V., S.T. Bharath, and A. Srinivasan, 2007, "Does Industry-wide Distress Affect Defaulted Firms?—Evidence from Creditor Recoveries," *Journal of Financial Economics*, Vol. 85, No. 3, pp. 787–821.

Altman, Edward, B. Brady, A. Resti, and A. Sironi, 2005, "The Link between Default and Recovery Rates: Theory, Empirical Evidence, and Implications," *Journal of Business*, Vol. 78, No. 6, pp. 2203–27.

Bangia, Anil, Francis Diebold, André Kronimus, Christian Schagen, and Til Schuermann, 2002, "Ratings Migration and the Business Cycle, with Application to Credit Portfolio Stress Testing," *Journal of Banking and Finance*, Vol. 26, No. 2–3, pp. 445–74.

Bank of Spain, 2007, "Dynamic Provisioning in Spain: Impacts of the New Spanish Statistical Provision in the Second Half of 2000." Available via the Internet: www.bde.es/provesta/impactoe.htm.

Barth, Mary, 2004, "Fair Values and Financial Statement Volatility," in *The Market Discipline Across Countries and Industries*, ed. by Claudio Borio, William Curt Hunter, George G Kaufman, and Kostas Tsatsaronis (Cambridge, Massachusetts: MIT Press).

———, Leslie D. Hodder, and Stephen R. Stubben, 2008, "Fair Value Accounting for Liabilities and Own Credit Risk," *The Accounting Review*, Vol. 83, No. 3, pp. 629–64.

Basel Committee on Banking Supervision (BCBS), 2006a, *Results of the Fifth Quantitative Impact Study (QIS-5)* (Basel: Bank for International Settlements).

———, 2006b, *Sound Credit Risk Assessment and Valuation for Loans* (Basel: Bank for International Settlements).

Borio, Claudio, and Kostas Tsatsaronis, 2005, "Accounting, Prudential Regulations and Financial Stability: Elements of a Synthesis," BIS Working Paper No. 180 (Basel: Bank for International Settlements).

Bruche, Max, and Carlos González-Aguado, 2008, "Recovery Rates, Default Probabilities, and the Credit Cycle," CEMFI Working Paper No. 0612 (Madrid: Centro de Estudios Monetarios y Financieros).

Center for Audit Quality, 2007, "Measurements of Fair Value in Illiquid (or Less Liquid) Markets," Center for Audit Quality White Paper (October).

Citigroup, 2008, "There's a Hole in My Bucket: Further Deterioration in European Banks' Capital Ratios," Industry Focus, Citigroup Global Markets: Equity Research, June 16.

Enria, Andrea, Lorenzo Cappiello, Frank Dierick, Sergio Grittini, Andrew Haralambous, Angela Maddaloni, Philippe A.M. Molitor, Fatima Pires, and Paolo Poloni, 2004, "Fair Value Accounting and Financial Stability," ECB Occasional Paper No. 13 (Frankfurt: European Central Bank).

Fernández de Lis, Santiago, Jorge Martínez Pagés, and Jesús Saurina, 2000, "Credit Growth, Problem Loans and Credit Risk Provisioning in Spain," Banco de España Working Paper No. 0018. Available via the Internet: www.bde.es/informes/be/docs/dt0018e.pdf.

Financial Stability Forum, 2008, "Report of the Financial Stability Forum on Enhancing Market and Institutional Resilience," paper presented to the meeting of the G-7 Ministers and Governors, Washington, April 7.

Financial Times, 2008, "Banks According to GAAP," July 29. Available via the Internet: www.ft.com.

[48]The rationale behind this characterization of distressed markets follows Altman and others (2005) in that, during times of distress, the demand for securities declines, hence reducing both the market price and the recovery rate (i.e., the inverse of LGD) of securities. See Acharya, Bharath, and Srinivasan (2007), Altman and others (2005), and Bruche and González-Aguado (2008) for discussions of the link between distressed markets and increases in LGD rates.

[49]Derived from Bruche and González-Aguado (2008).

Fitch Ratings, 2008a, "Fair Value Accounting: Is It Helpful in Illiquid Markets?" *Credit Policy Special Report* (April 28). Available via the Internet (by subscription): www.fitchratings.com.

———, 2008b, "Fair Value Disclosures: A Reality Check," *Credit Policy Special Report*, (June 26). Available via the Internet (by subscription): www.fitchratings.com.

Global Public Policy Committee, 2007, "Determining Fair Value of Financial Instruments under IFRS in Current Market Conditions." Available via the Internet: www.pwc.com.

Guerrera, F., and B. White, 2008, "Banks Find Way to Cushion Losses," *Financial Times*, July 8. Available via the Internet: www.ft.com.

International Accounting Standards Board (IASB), 2001, "Financial Instruments: Recognition and Measurement," IAS 39. Available via the Internet: www.iasb.org.

———, 2007, "Disclosure of Financial Instruments," IFRS 7. Available via the Internet: www.iasb.org.

International Monetary Fund (IMF), 2008a, "Financial Stress and Economic Downturns," Chapter 4, *World Economic Outlook*, World Economic and Financial Surveys (Washington, October).

———, 2008b, *Global Financial Stability Report*, World Economic and Financial Surveys (Washington, April).

Jiménez, Gabriel, and Jésus Saurina, 2006, "Credit Cycles, Credit Risk, and Prudential Regulation," *International Journal of Central Banking*, Vol. 2, No. 2 (June), pp. 65–98.

Kashyap, Anil, 2005, "Financial System Procyclicality," paper presented at the "Joint Conference of the IDB and Federal Reserve Bank of Atlanta's Americas Center: Toward Better Banking in Latin America," Washington, January 10.

Keen, Howard, 1989, "The Yield Curve as a Predictor of Business Cycle Turning Points," *Business Economics*, (October). Available via the Internet: http://findarticles.com/p/articles/mi_m1094/is_n4_v24/ai_7987167.

Nickell, Pamela, William Perraudin, and Simone Varotto, 2000, "Stability of Rating Transitions," *Journal of Banking and Finance*, Vol. 24, No. 1–2, pp. 203–27.

Pederzoli, Chiara, and Costanza Torricelli, 2005, "Capital Requirements and Business Cycle Regimes: Forward-Looking Modeling of Default Probabilities," *Journal of Banking and Finance*, Vol. 29, No. 12 (December), pp. 3121–140.

Piazzesi, Monica, and Martin Schneider, 2006, "Equilibrium Yield Curves," NBER Working Paper No. 12609 (Cambridge, Massachusetts: National Bureau of Economic Research).

Union Bank of Switzerland (UBS), 2007, "Subprime Loss Protection—A Do-It-Yourself Kit," *Mortgage Strategist*, June 26.

CHAPTER 4

SPILLOVERS TO EMERGING EQUITY MARKETS

This chapter shows that emerging market equity prices are influenced by both global and domestic factors, and therefore global developments constitute a significant channel for spillovers when the international economic environment changes. This can, in turn, affect domestic consumption and investment. Strengthening their resilience to equity price declines remains an important goal for emerging market countries.

After months of relative resilience, emerging market (EM) equities have now experienced the effects of the financial turmoil that began in advanced economies in the summer of 2007. This chapter examines whether increasing financial integration has potentially raised EMs' vulnerability to external global shocks, focusing on the channel of equity markets. This question remains relevant because many EM economies have experienced a long run-up in equity prices, despite the partial reversal of recent months. Moreover, EM resilience will likely continue to be tested if the global financial turmoil remains protracted and the global economic slowdown continues.

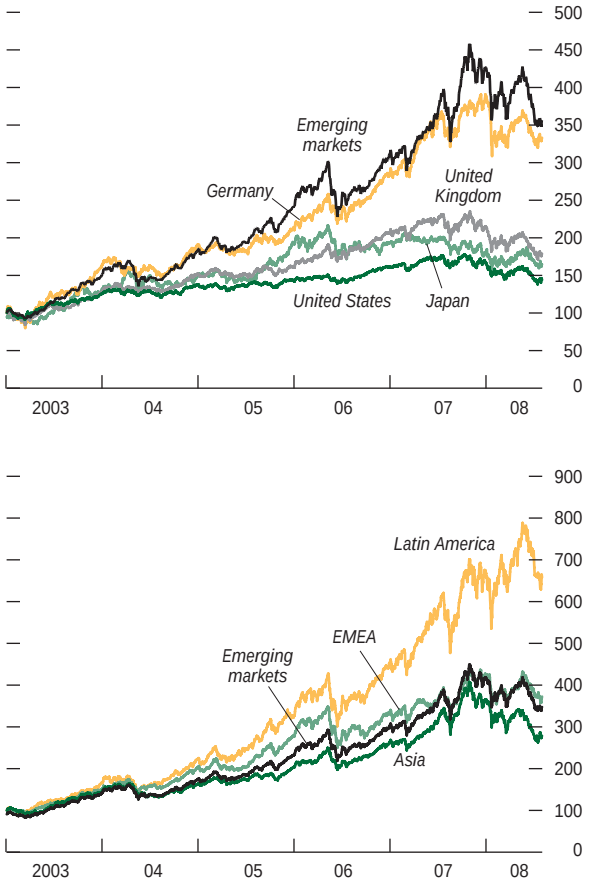
The chapter addresses three key questions:

- *How vulnerable are EMs to changing external conditions?* In tackling this question, the chapter explores the external and domestic determinants of EM equity market valuations and analyzes whether the external determinants are economically important. It finds that, although closer links with foreign markets are important drivers of equity prices, to date, the more open EM economies or those with higher levels of foreign investor participation have not been affected disproportionately by the global financial turbulence.
- *How extensive are macro-financial linkages?* The chapter considers whether wealth effects are important and whether they make EM consumption and investment growth vulnerable to equity market declines. It finds the effect on private consumption and investment to be statistically significant but small. Moreover, wealth effects tend to play out gradually as opposed to financial-to-financial spillover channels.
- *What can EM countries do to minimize their vulnerability to spillovers?* The chapter stresses the importance of building and sustaining resilient capital markets, particularly equity markets. This can be achieved not only by fostering deeper capital markets, but by introducing legal, regulatory, and accounting reforms that conform to international best practice and developing a well-functioning securities market with supporting infrastructure.

The chapter first traces developments in the equity prices of EMs during the long run-up and correction, and compares this cycle to the previous peak and trough for a selected number of countries, for which the experiences from the two cycles have been quite different. An overall increase in equity market correlations across countries is evident. The chapter then develops an empirical framework for assessing what drives EM equity prices, and finds that domestic/fundamental factors, such as growth and exchange rate expectations, and global/external conditions, such as excess liquidity and credit

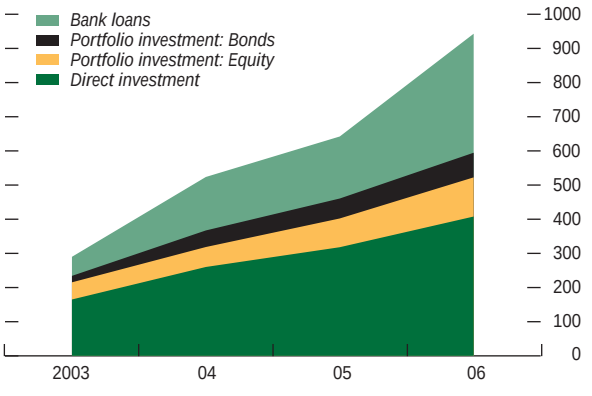
Note: This chapter was written by a team led by L. Effie Psalida and comprising Heiko Hesse and Tao Sun. Oksana Khadarina provided research support.

Figure 4.1. Selected Equity Market Indices
(January 1, 2003 = 100; in U.S. dollars)



Sources: Bloomberg L.P.; and Datastream.
Note: EMEA = Emerging Europe, Middle East, and Africa.

Figure 4.2. Emerging Market Economies: Composition of Capital Inflows
(In billions of U.S. dollars)



Source: IMF, International Financial Statistics database.

and market risk premia, both play a role. The chapter then provides additional results showing potential spillovers to EM equities and discusses their effects on consumption and investment. It finishes with a summary of the key results, draws some policy conclusions, and points to measures that can help make equity markets more resilient when equity prices decline.

Performance of Emerging Market Equity Markets

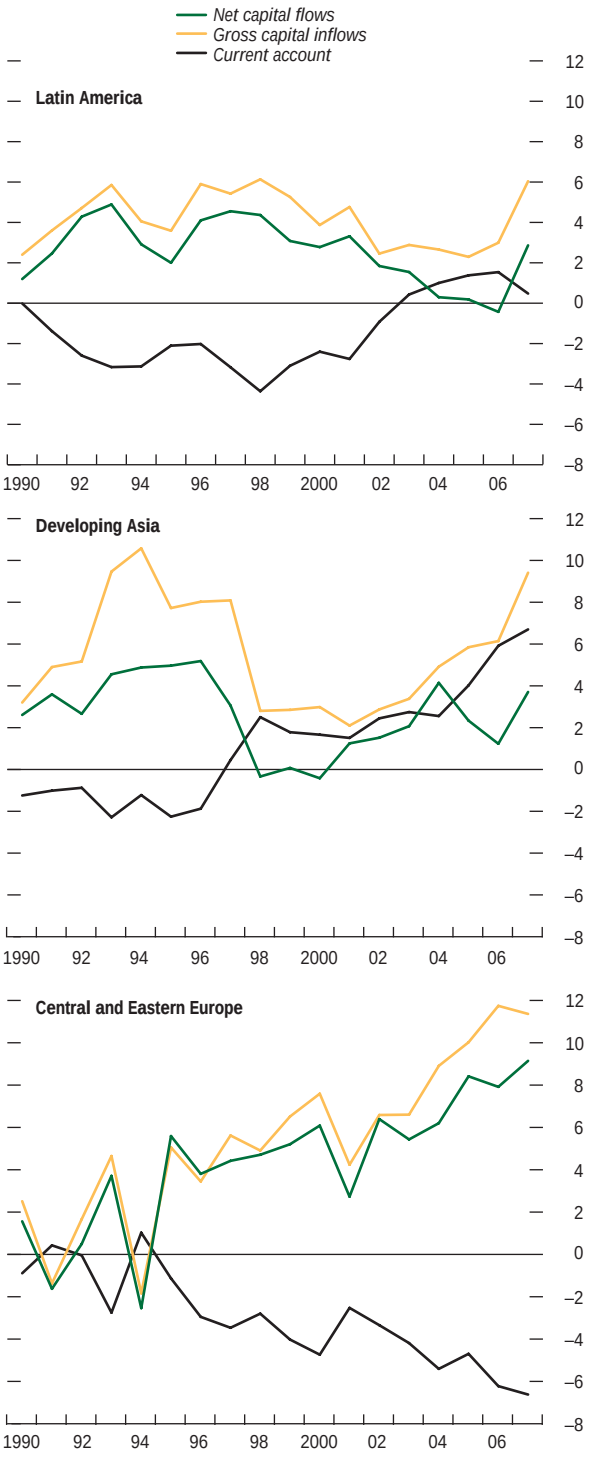
After a period of lackluster growth, EM equity market prices rose significantly beginning in 2003 (Figure 4.1). This development was associated with a concomitant rise of EM capital inflows (Figure 4.2), which in net terms often masked the high level of gross capital inflows because of the growing role of EM cross-border outward investments (Figure 4.3).

In a number of the more mature emerging markets, the stock market capitalization-to-GDP ratio is now approaching that of advanced economies, although it is not certain that the ratio is sustainable in all cases (Figure 4.4). It is noteworthy that in many EM economies, total equity market returns have increased at a much faster pace than in advanced economies (Figure 4.5), although, on the whole, the price-earning ratios are comparable (Figure 4.6).

Foreign holdings of EM equity have increased overall since 2003, although not necessarily as a proportion of the total value of equities in all cases (Figure 4.7). In addition to push factors in this period, such as abundant global liquidity and a search for yield, growing nonresident holdings can be, at least partially, attributed to the diversification of the international investor base (IMF, 2007a) and the opening up and maturation of emerging financial markets (IMF, 2007b, Chapter 3). Although in principle a higher proportion of foreign equity holdings can increase the sensitivity of EM equity prices to changes in the global environment, the presence of foreign investors does not seem to be associated with larger equity losses since the October 2007 peak (Figure 4.8).

Figure 4.3. Current Account Balances and Capital Flows from a Global Perspective

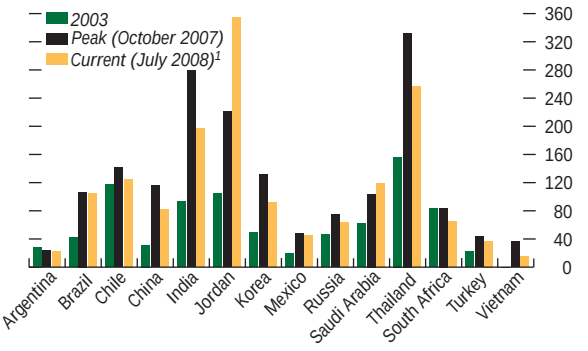
(In percent of GDP)



Source: IMF, World Economic Outlook database.

Figure 4.4. Stock Market Capitalization

(In percent of GDP)

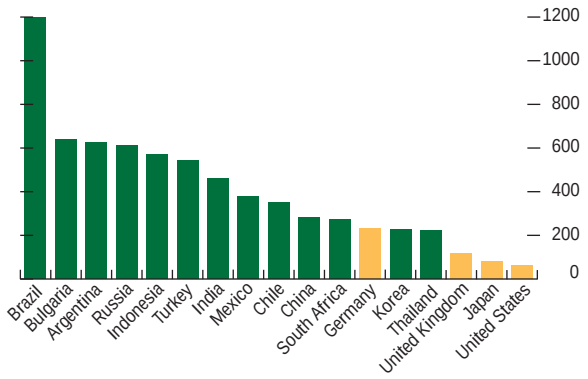


Sources: World Federation of Exchanges; Bloomberg L.P.; and IMF, World Economic Outlook database.

[1]In percent of GDP for 2007.

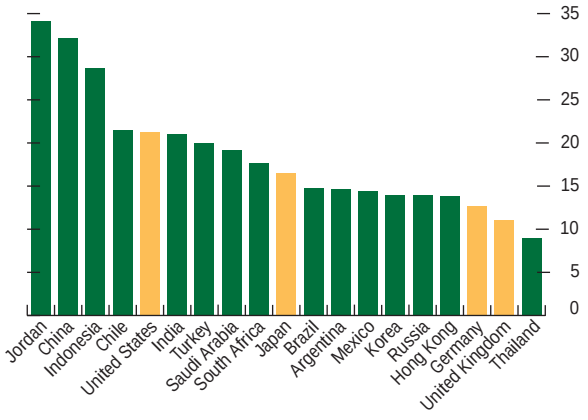
Figure 4.5. Total Equity Market Returns

(January 2003–July 2008; percent change)



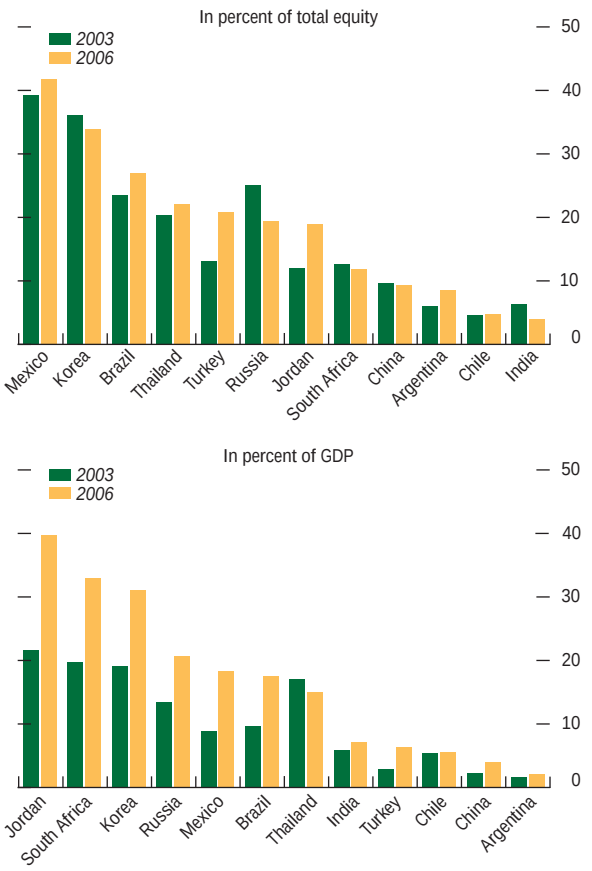
Sources: S&P Emerging Markets Database; and Datastream.

Figure 4.6. Price/Earnings Ratios, July 31, 2008



Sources: S&P Emerging Markets Database; Datastream; and Bloomberg L.P.

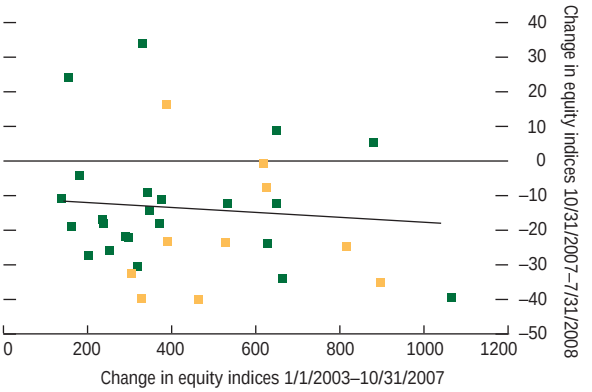
Figure 4.7. Total Foreign Holdings of Equity



Sources: IMF, Balance of Payments and World Economic Outlook databases.
Note: For China, data refer to 2004 and 2006.

Figure 4.8. Emerging Markets Equity Indices and Foreign Investor Presence

(Percent change)



Sources: IMF, World Economic Outlook and International Financial Statistics databases.
Note: Green squares indicate countries with foreign holdings of equities exceeding 5 percent of GDP.

Table 4.1 compares the current partial reversal of equity prices to the previous equity cycle for eight EM economies that had experienced high price rises and subsequent abrupt declines in the context of more generalized crises in the 1990s. These eight EM countries and events are also compared to four previous stock market events in advanced economies as well as their price decline through end-August 2008. A few observations are noteworthy. Unlike the previous large and, in many cases, disorderly corrections, which emanated from generalized crises in EM countries, downward equity price adjustments to date have been shallower when compared to the high levels reached at the peak of the cycle. Clearly, however, the downward phase may not be over. Current equity price corrections in advanced economies are also shallower and more gradual than past events, and, in some cases, they follow a more modest stock market rise than in the past—for example, when compared to Japan's bubble of the late 1980s and the dot-com bubble in the United States. During the upturn of the current cycle, stock market increases in advanced economies have also been modest relative to increases in EMs.

The fact that corrections to date have been only partial and more differentiated across EM countries points to a number of contrasts when compared to the previous cycle, including stronger and more differentiated country-specific fundamentals and deeper financial markets in EM economies, a substantial growth of "South-South" investment flows, and significant petrodollar recycling.

Cross-Country Equity Price Correlations

In principle more financial integration can increase EM equity price sensitivity to global events. Indeed, stock market correlations of EM economies with the United States have increased in recent years, and a simple pair-wise analysis indicates that on average the correlation between equity prices in a number of EMs' main stock index and equity prices in the S&P 500 increased from 0.17 during the period January

Table 4.1. Emerging Equity Market Peaks and Troughs: Current and Previous Episodes

	Current Episode (October 2007–August 2008)							
	Equity Price Index (percent change)		Equity Market Capitalization/GDP			Price/Earnings		
	Rise to peak	Peak to current	At peak	At current	Difference	At peak	At current	Difference
Emerging markets								
Argentina	1,006	–14	24	20	4	15.8	13.5	2.4
Brazil	1,364	–14	107	93	14	16.7	7.6	9.1
Hong Kong SAR	226	–31	1,435	946	489	22.9	13.3	9.6
Indonesia	882	–18	47	43	4	30.2	27.1	3.2
Korea	590	–40	129	78	52	17.6	9.5	8.1
Mexico	417	–15	42	37	5	19.8	11.6	8.2
South Africa	467	–26	333	245	87	19.7	17.7	2.0
Thailand	402	–26	84	65	19	12.2	9.1	3.0
Memorandum item:								
Advanced economies								
Germany	339	–19	64	50	14	13.9	13.3	0.6
Japan	111	–18	111	92	19	21.4	16.0	5.4
United Kingdom	162	–27	152	111	42	13.1	12.2	0.9
United States	84	–17	152	127	25	18.3	24.7	–6.5

	Past Episode								
		Equity Price Index (percent change)		Equity Market Capitalization/GDP			Price/Earnings		
	Peak to trough	Rise to peak	Peak to trough	At peak	At trough	Difference	At peak	At trough	Difference
Emerging markets									
Argentina	Feb. 2000–June 2002	86	–85	23	13	10	43.6	–10.2	53.8
Brazil	July 1997–Jan. 1999	134	–69	74	35	39	18.6	8.4	10.2
Hong Kong SAR	July 1997–Aug. 1998	99	–60	337	152	186	19.7	9.0	10.7
Indonesia	Jan. 1997–Sep. 1998	134	–92	42	10	32	24.0	–23.6	47.6
Korea	Apr. 1996–Aug. 1998	100	–83	37	14	23	16.5	–13.7	30.2
Mexico[1]	Nov. 1994–Feb. 1995	71	–64	28	25	3	17.9	16.4	1.6
South Africa	Jan. 1996–Aug. 1998	188	–64	214	106	109	20.3	7.8	12.6
Thailand	May 1996–Aug. 1998	174	–93	80	16	65	21.7	–1.9	23.6
Memorandum item:									
Advanced economies									
Germany	Feb. 2000–Sep. 2002	74	–63	81	31	51	24.7	9.6	15.1
Japan[2]	Dec. 1989–July 1992	928	–52	140	55	85	. . .	. . .	. . .
United Kingdom	Dec. 1999–Mar. 2003	122	–47	200	88	112	28.6	16.5	12.1
United States	Aug. 2000–Sep. 2002	235	–46	180	98	82	28.7	31.4	–2.7

Sources: Datastream; S&P Emerging Markets Database; World Federation of Exchanges; and IMF, World Economic Outlook database.

Note: All peaks/troughs refer to equity price peaks prior to the onset of financial crisis and the last troughs associated with the crisis. Difference denotes subtraction. For the past episode, "rise to peak" describes index price appreciation experienced since the previous trough, while "peak to trough" measures price declines from the peak to the following trough. In the current episode, we take end-October 2007 (when the equity prices in the U.S. and many EM economies reached peaks) as the peak time. "Peak to current" in the current episode demonstrates price performance for equity indices from the market peak to end-August 2008.

[1]For peak in 1994, stock market capitalization refers to December 1994.

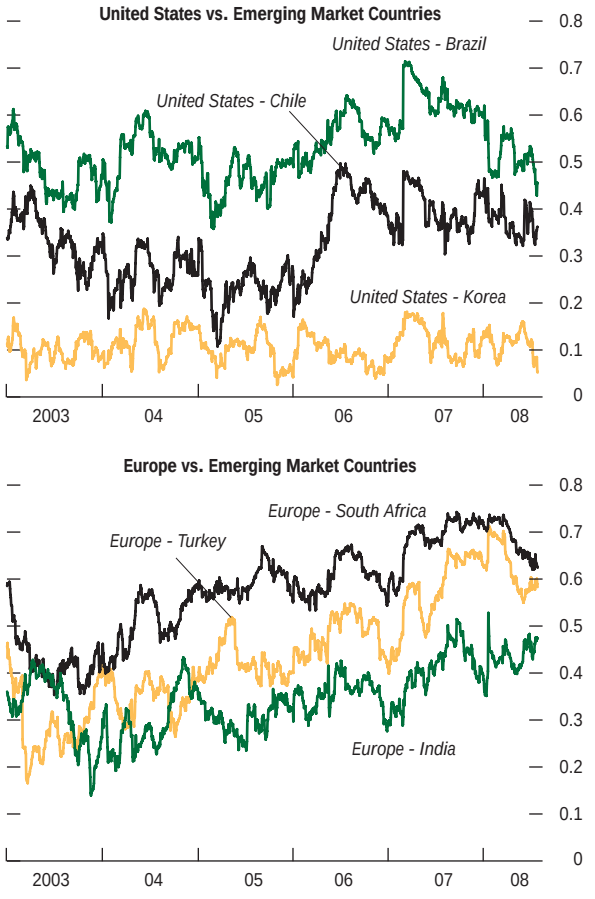
[2]Equity market capitalization of TOPIX stock index.

1998–December 2002 to 0.91 during the period January 2003–May 2008.[1]

A more robust test, which allows for analyzing the co-movement of the stock markets by

[1]Correlations are known for being biased estimates of potential linkages as they are overestimated in times of high volatility and underestimated in tranquil times. Appropriate corrections, however, require assumptions about the reason for the bias.

Figure 4.9. Implied Correlations from Dynamic Conditional Correlation GARCH Specification



Sources: Datastream; S&P Emerging Markets Database; and IMF staff estimates.
Note: GARCH = Generalized Autoregressive Conditional Heteroskedasticity.

inferring their correlation changes over time, also indicates varied but overall increasing correlation levels during the past five years.[2] Specifically, Latin American equity price indices are generally highly correlated with U.S. equities, peaking during the February 2007 short-lived turbulence (Figure 4.9).[3] Correlations between mature European bourses, proxied by the Euronext 300 index, Emerging Europe, Middle East, and Africa (EMEA), and Asia have increased, albeit from a relatively low level. Similarly, correlations between EM equity markets have risen both within and across geographic regions (Figure 4.10).

Determinants of Emerging Market Equity Prices

To examine whether EMs are more susceptible to the global distress, we examine first what drives equity prices. There is an extensive literature on the driving forces of equity prices ranging from the Gordon (1962) model, which uses the expected real dividend growth and real discount rates as primary determinants, to more elaborate analyses by Campbell Harvey and Geert Bekaert, which include liquidity and risk premia measures.[4] Expectations about the future path of dividend growth and discount rates can be influenced by global financial conditions such as the abundant liquidity experienced

[2]The Dynamic Conditional Correlation (DCC) Generalized Autoregressive Conditional Heteroskedasticity (GARCH) specification by Engle (2002) is used, estimated in a three-stage procedure. First, univariate GARCH models are fitted for each of the variables in the specification. Second, the intercept parameters are obtained from the transformed variables, and, finally, the coefficients governing the dynamics of the conditional correlations are estimated. See also Frank, González-Hermosillo, and Hesse (2008) for an application to the 2007 subprime crisis.

[3]In comparison, correlations between the United States and mature Europe and those between the United States and Japan have remained high and low, respectively, and generally stable throughout the five-year period.

[4]For more information on the work of Campbell Harvey and Geert Bekaert, see their respective websites at www.duke.edu/~charvey/curvit.htm and www.gsb.columbia.edu/faculty/gbekaert/.

during the run-up to the 1997–98 turbulence and 2003–07 asset price increases (IMF, 2000, 2007c) or irrational exuberance (Shiller, 2000, pp. xxi, 296), in addition to domestic micro and macro determinants. Empirical studies on the topic have been quite diverse in terms of model specification that embeds different hypotheses or explanations. However, despite the broad field of study in this area, the approaches focus primarily on two sets of factors as determinants of equity prices: domestic/fundamental and global/financial (IMF, 1998, 2000).

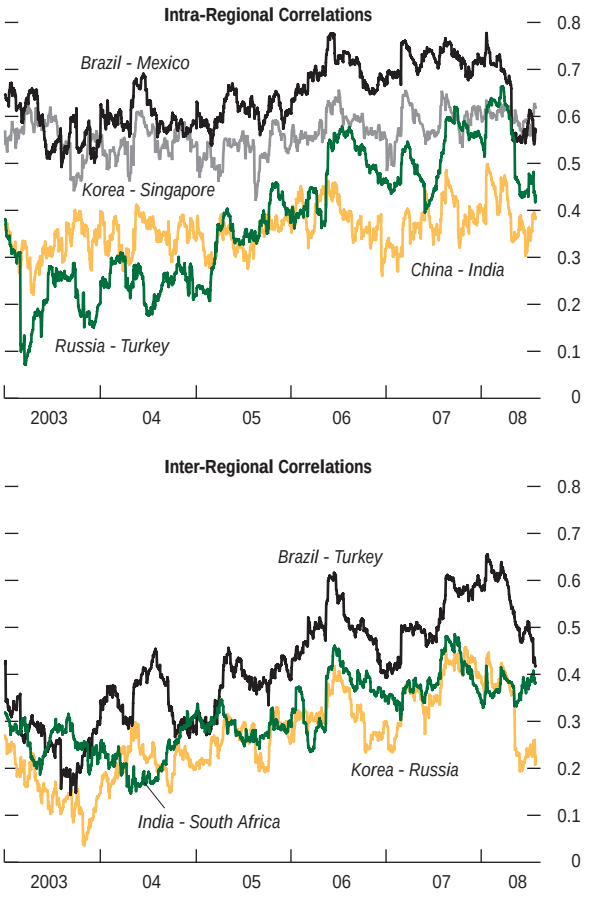
This section develops an empirical framework for assessing the determinants of EM equity prices. The framework employs fixed-effects panel data specifications for monthly observations—January 2001 to May 2008—covering 30 EM economies (see Annex 4.1 for a detailed presentation of the estimation specifications and results). The model utilizes two sets of explanatory variables:

- *Domestic or fundamental factors* include (1) economic growth; (2) the differential between domestic and global interest rates; (3) the forward exchange rate; (4) the inflation differential; and (5) equity market capitalization (measured as a ratio to GDP), which, in addition to price effects, captures increases in the volume of shares—such as new shares issued by listed companies and initial public offerings—and provides a proxy for equity market depth.[5]
- *Global factors* include proxies for (1) global excess liquidity (the difference between broad money growth and estimates for money demand in the euro area, Japan, and the United States; (2) credit risk premium (the level of the 10-year U.S. dollar swap spread); and (3) market risk premium (the implied volatility of the S&P 500 index [VIX]).

The estimation results for the full 30-country sample over the 89-month period suggest that,

[5]Although, at first view, the log change in equity prices and the stock market capitalization-to-GDP ratio may seem highly correlated, the correlation between the series is only 0.19 for the full country and period sample.

Figure 4.10. Emerging Market Countries: Implied Correlations from Dynamic Conditional Correlation GARCH Specification



Sources: Datastream; S&P Emerging Markets Database; and IMF staff estimates.
Note: GARCH = Generalized Autoregressive Conditional Heteroskedasticity.

Table 4.2. Fixed-Effects Panel Least-Squares Estimation of the Determinants of Emerging Market Equity Prices—Monthly Observations (January 2001–May 2008), 30 Countries, First Specification

Economies	30 Countries	Asia	EMEA	Latin America
Domestic factors				
GDP growth	0.5916	0.6191	0.4114	0.3869
	(0.0004)***	(0.0193)**	(0.1771)	(0.0752)*
Interest rate differential	–0.0893	–0.0923	0.0338	–0.0391
	(<0.0001)***	(0.0772)*	(0.6143)	(0.0616)*
Forward exchange rate	0.0260	0.0061	0.3615	0.2266
	(0.0002)***	(0.2091)	(<0.0001)***	(<0.0001)***
Inflation rate differential	–0.0564	0.0033	–0.0310	–0.1900
	(0.0155)**	(0.9497)	(0.3786)	(0.0002)***
Market capitalization/GDP ratio	0.5172	0.7572	0.3608	0.6450
	(<0.0001)***	(<0.0001)***	(<0.0001)***	(<0.0001)***
External factors				
Global excess liquidity	1.0842	0.4366	0.9136	1.0303
	(<0.0001)***	(0.0109)**	(0.0024)***	(<0.0001)***
Credit risk premium	–6.0922	–2.8994	–4.8127	–6.7605
	(<0.0001)***	(0.0119)**	(0.0233)**	(<0.0001)***
Market risk premium	–0.2247	–0.1381	–0.2542	–0.2839
	(<0.0001)***	(<0.0001)***	(<0.0001)***	(<0.0001)***
Foreign equity inflow	–0.0001	0.0000	0.0001	0.0000
	(0.1984)	(0.8676)	(0.4444)	(0.0473)
Error correction term	–0.0472	–0.0443	–0.0408	–0.0724
	(<0.0001)***	(<0.0001)***	(<0.0001)***	(<0.0001)***
Other factors				
Constant	–0.4429	–0.6888	–0.2933	–0.5407
	(<0.0001)***	(<0.0001)***	(<0.0001)***	(<0.0001)***
Adjusted R^2	0.5663	0.7634	0.4671	0.7456
Time-series sample (monthly)	Jan. 2001–May 2008	Jan. 2001–May 2008	Jan. 2001–May 2008	Jan. 2001–May 2008
No. of cross-section countries	30	12	12	6
No. of observations	2,294	892	875	527

Sources: IMF, World Economic Outlook and International Financial Statistics databases; World Bank, World Development Indicators database; S&P Emerging Market Database; Bloomberg L.P.; and Datastream.

Note: Probability values are in parentheses (***significant at 1 percent level; **significant at 5 percent level; *significant at 10 percent level). EMEA = Emerging Europe, Middle East, and Africa.

for a given economy, equity prices are positively associated with GDP growth, an expected exchange rate appreciation, and an increase of market capitalization as a ratio to GDP (Table 4.2). As regards the global factors, all three are statistically significant, with global excess liquidity being positively related and credit and market risk premia having a negative relation to equity prices as expected.[6] A comparison of the three main geographical regions of Latin America, Asia, and EMEA indicates stronger spillover effects for Latin America as the three global factors remain significant and with higher negative coefficients than in the full country sample for credit and market risk. Equity prices in EMEA are being driven strongly by exchange rate expectations, while in Asia they have the closest positive association with rises in the market-capitalization-to-GDP ratio.

In response to the intuition that equity market capitalization may be serially correlated with equity prices, an alternative model specification is used, which replaces equity market capitalization with private sector credit growth as a proxy for domestic financial deepen-

[6]A fourth external factor, portfolio equity inflows, is statistically insignificant; this result is consistent with previous studies indicating no statistically apparent effect of foreign inflows on domestic equity prices (see, for example, IMF, 2007b, Box 1.3).

Table 4.3. Fixed-Effects Panel Least-Squares Estimation of the Determinants of Emerging Market Equity Prices—Monthly Observations (January 2001–May 2008), 30 Countries, Second Specification

Economies	30 Countries	Asia	EMEA	Latin America
Domestic factors				
Credit growth	0.7124	0.6777	0.4711	0.3456
	(<0.0001)***	(<0.0001)***	(<0.0001)***	(<0.0001)***
GDP growth	0.3777	0.6727	0.1577	–0.1014
	(0.0893)*	–0.1785	–0.6549	–0.7599
Forward exchange rate	0.0361	0.0162	0.3816	0.6384
	(0.0002)***	(0.0774)*	(<0.0001)***	(<0.0001)***
Interest rate differential	0.0210	–0.2244	0.1084	0.0993
	(0.4125)	(0.0228)**	(0.1884)	(0.0026)***
Inflation rate differential	0.0507	–0.0720	0.0532	0.0188
	(0.1104)	(0.4711)	(0.2212)	(0.8076)
External factors				
Global excess liquidity	0.9203	1.5011	0.3663	0.8726
	(<0.0001)***	(<0.0001)***	(0.3334)	(0.0235)**
Market risk premium	–0.2746	–0.2699	–0.3177	–0.3514
	(<0.0001)***	(<0.0001)***	(<0.0001)***	(<0.0001)***
Credit risk premium	–6.7535	–7.3195	–4.1517	–7.0568
	(<0.0001)***	(0.0011)***	(0.1277)	(0.0082)***
MSCI	0.1141	0.1744	0.0474	0.1224
	(0.0187)**	(0.0168)**	(0.5823)	(0.1587)
Foreign equity inflow	0.0001	–0.0002	0.0004	0.0000
	(0.2157)	(0.7282)	(0.0169)**	(0.2741)
Error correction term	–0.0358	–0.0222	–0.0305	–0.0660
	(<0.0001)***	(0.1930)	(0.0003)***	(0.0002)***
Other factors				
Constant	0.0613	0.0513	0.0711	0.0900
	(<0.0001)***	(<0.0001)***	(<0.0001)***	(<0.0001)***
Adjusted R^2	0.1842	0.1564	0.1825	0.4017
Time-series sample (monthly)	Jan. 2001–May 2008	Jan. 2001–May 2008	Jan. 2001–May 2008	Jan. 2001–May 2008
No. of cross-section countries	30	12	12	6
No. of observations	2,301	892	882	527

Sources: IMF, World Economic Outlook and International Financial Statistics databases; World Bank, World Development Indicators database; S&P Emerging Market Database; Bloomberg L.P.; Datastream.

Note: Probability values are in brackets (***significant at 1 percent level; **significant at 5 percent level; *significant at 10 percent level). EMEA = Emerging Europe, Middle East, and Africa; MSCI = Morgan Stanley Capital International world index.

ing, and includes the Morgan Stanley Capital International world index (MSCI)—a measure of prices from advanced stock markets—as an additional global push factor. The results are along the same lines as in the previous model and, in this case, credit growth and the MSCI are significant and positively related to equity price increases (Table 4.3). Along regional lines, under this specification as well, the results indicate global factors are strong in both Latin America and Asia, with global excess liquidity having a strong positive relation and global market and credit risk being significantly negative, although the MSCI shows no significant effect in Latin America and EMEA. Exchange rate expectations are strongest in EMEA and Latin America, and domestic credit is significant in all three regions.

Two "what if" scenarios were performed to further analyze the impact of global factors on equity prices.[7] The first scenario is a 10 percent decline in global excess liquidity—from its May 2008 level of 4.5 percentage points—and

[7]The results are specific to this model's estimated coefficients, and a different analysis using a different methodology, country, and period coverage would likely come with slightly different results.

a 10 percent increase in both the credit and market risk premia. The results indicate that EM equity price growth would decline by 1.25 percentage points when all three global indicators worsen, with the liquidity indicator having the largest effect when applied individually. The second scenario, which is a much larger shock of zero excess liquidity and a sharp increase in risk premia, points to an equity price growth rate that could be as much as 16 percentage points lower than the base case.[8]

Spillovers and Their Impact

The results discussed in the previous section point to the strong influence of external factors on EM equity prices, thus indicating that spillovers play a potentially important role. This section considers an additional approach—vector autoregression (VAR)—in order to further test the role of co-movements in EM stock valuations. It then discusses the effect that such spillovers could have on consumption and investment when transmitted through the equities channel.[9]

A More Dynamic Analysis—Vector Autoregressions

A key limitation of the cross-economy panel regression approach used in the previous section is that it only allows for relatively simple interactions across economies. An analysis using a cross-economy set of VAR models allows for more precise disentangling of the separate spillover effects of unexpected changes in equity prices. Specifically, using the same sets of indicators that are statistically significant as in the data panel, we estimate an eight-variable structural VAR model for seven economies—Argentina, Chile, China, Romania, Russia, Singapore, and South Africa.[10] The VAR is partitioned into an exogenous foreign block and a country-specific block of variables. The foreign block includes global excess liquidity and credit and market risk premia in the United States, while the economy-specific block includes (economy-specific) GDP growth, the forward exchange rate, the interest rate and inflation rate differentials, and the market-capitalization-to-GDP ratio.[11] The data have monthly frequency, typically available for January 2001 to May 2008.[12]

Overall, the results of the dynamic VAR analysis are in line with those in the panel regressions. (Figures 4.11–4.13 in Annex 4.2 present some of the impulse responses for the seven countries examined.) Three observations can be made: (1) most individual equity price responses to shocks in the global indicators are as expected and in the same direction as for the panel; (2) the equity price response tapers off after three months in most cases; and (3) smaller countries have slightly larger responses overall.

[8]The risk premia in the second scenario increase to their high levels of May 2000 for credit risk, which was at 1.39 versus 0.59 in May 2008, and August 1998 for market risk, which was at 44 versus 18 in May 2008. Psalida and Sun (forthcoming) contains an elaboration of these scenarios.

[9]This is a modest approach, as the data requirements and model specification do not lend themselves to testing directly for cross-border spillovers and potential contagion across a large number of EMs.

[10]The seven economies are selected using the criterion of the most and the least open in their respective geographic region among the overall 30-country sample based on the Chinn-Ito Financial Openness Indicator. The least open economies are Argentina, China, and Russia, while the most open are Chile, Romania, Singapore, and South Africa.

[11]The lag length is selected using Schwarz's Bayesian information criterion, which points to one lag except for Romania (two lags).

[12]Granger Causality/Block Exogeneity Wald Tests were carried out to identify the exogeneity of variables. Wald statistics show that global excess liquidity, and credit and market risk premia, are generally not influenced by other variables in the model and are therefore treated as exogenous. Moreover, the Cholesky decomposition method (degrees-of-freedom adjusted) is used to transform the impulses. Several different orderings were performed keeping the most exogenous variable first and the most endogenous last. Changes in the ordering of the variables do not have a material effect on the statistical significance of the spillover effects.

Impact of Emerging Market Equity Valuation on Consumption and Investment

Does the significant impact of stock market changes on the consumption of advanced economies carry over to emerging markets? Research has shown that while results vary depending on the methodology or sample period used, estimates in the United States regarding changes in consumption are 0.3 to 0.7 percent for every 10 percent fluctuation in the real returns in the stock market. Similarly, wealth effects are estimated to be 0.15 to 0.3 percent in Japan and 0.1 to 0.3 percent across various European countries.[13]

The relationship between equity fluctuations and consumption patterns is also robust across emerging market countries, but is often of smaller magnitude, in most cases probably due to the lower and more concentrated domestic participation rate in the equity market and the relatively recent significant increases in equity valuations relative to GDP. Estimates for 22 EM economies indicate a statistically significant but small real wealth effect of about 0.15 percent for a 10 percent change in the stock market between 1985 and 2007 (see Box 4.1 for more details).

The effects of stock market valuation changes are also relevant for a number of other macroeconomic variables such as government revenues and private investment. Results from estimating a simple model for private investment suggest that a 10 percent change in stock prices would lead to about a 1 percent change in investment, which is a substantially stronger effect than on private consumption.[14]

[13]For more information, see IMF (2000, 2002), Ludwig and Sløk (2004), and Slacalek (2006), among others.

[14]It should also be noted that, when comparing the investment of publicly listed firms to aggregate private investment, in a number of EMs, unlisted companies may represent a larger share of economic activity. Nonetheless, their dynamics seem to mirror those of the aggregate economy.

The Role of Local Institutional Investors

It has been argued that a broad and diverse domestic investor base can cushion the domestic capital market from abrupt changes in international investor sentiment. The growing role of EM institutional investors—as funded pension schemes and insurance sectors grow across EM economies—contributes to broadening and diversifying the pool of investment into EM equities, both domestically and across EM borders. (Box 4.2 discusses aspects of this issue.)

The long-term horizon of institutional investors, such as pension and mutual funds and insurance companies, can play a stabilizing role in domestic equity markets. At the same time, the rise of more active and short-term-oriented local investors, such as hedge funds and private equity funds, albeit rather small at present, diversifies and broadens the investor base, although herding behavior among some more active participants potentially could also exacerbate market volatility during a downturn or financial turmoil.

Key Results and Conclusions

The key results from the empirical analysis above suggest that both global forces and domestic economic fundamentals contribute to emerging equity prices. More specifically, the panel estimations and the vector autoregression analysis presented in the previous sections can be summarized as follows:

- There is evidence of spillovers to emerging markets through the equity market channel as shown by the significant negative relationship of global credit and market risk premia, and the positive relationship of global excess liquidity to EM equity prices, indicating that emerging equity markets are integrated with advanced economies.[15]
- Strong domestic economic growth and indicators of financial deepening such as credit

[15]These results are consistent with studies on Asian and Latin American economies (IMF, 2007c, 2008a, 2008b).

Box 4.1. Is There a Stock Market Wealth Effect in Emerging Markets?

This box examines whether stock market valuation changes in emerging markets would affect consumption and finds that there is such an effect. With large increases in emerging equity prices in recent years and a fairly sharp recent correction, the magnitude of the impact of stock market wealth on household consumption becomes of interest.

Although there is a large body of literature about the effect of asset price changes on private consumption in advanced economies, such studies are scarce for emerging market (EM) economies.[1] To shed more light on the relationship between stock market valuation changes and private consumption, a simple two-step panel model following Bayoumi and Edison (2003) is estimated, covering 1985–2007 for 22 EMs in the Morgan Stanley Capital International EM equity index (MSCI).[2] The two-step procedure allows for differentiation between the long- and the short-run stock market wealth effects.[3]

At the first stage, the following levels-equation is specified:

$$C_{it} = \alpha BM_{it-1} + \beta GDP_{it-1} + \gamma SM_{it-1} + \varepsilon_{it}, \qquad (1)$$

where

C_{it} = log real private consumption expenditure per capita in country i and year t,

BM_{it-1} = log real broad money per capita and a proxy for money wealth

GDP_{it-1} = log real GDP per capita capturing household income, and

SM_{it-1} = log real stock market index.

At the second stage, differences are taken of the variables in equation (1) and an error correction mechanism (ECM), taken as the residual from (1), is introduced as well as the inflation rate.

$$C_{it} = b_1 \Delta BM_{it-1} + b_2 \Delta GDP_{it-1} + b_3 \Delta SM_{it-1} + b_4 ECM_{it} + b_5 inflation_{it-1} + \varepsilon_{it}, \qquad (2)$$

where b_3 is the short-run marginal propensity to consume out of equity wealth, proxied by the change in stock market returns, and b_4 is the rate at which the system converges to deviations from long-run equilibrium.

The table presents estimated stock market wealth effects under different model specifications, distinguishing between the long- and short-run relationship. A 10 percentage increase in the stock market valuation would on average lead to an increase of private per capita consumption of 0.12 percent in the short run and 0.15 percent in the long run. These

Stock Market Wealth Effect, 1985–2007

(Percent change in private consumption expenditure from a 10 percent change in stock market returns)

Model Specification	Short-Run	Long-Run
Baseline	0.12	0.15
	(0.029)**	(0.002)***
Threshold of +/– 20 percent	0.12	0.14
	(0.092)*	(0.057)*
Threshold of +/– 30 percent	0.07	0.36
	(0.381)	(0.001)***
1997–2007	0.12	0.21
	(0.094)*	(0.005)***

Sources: IMF, World Economic Outlook and International Financial Statistics databases; World Bank, World Development Indicators database; S&P Emerging Markets Database; Bloomberg L.P.; Datastream; and IMF staff estimates.

Note: The results are based on a two-step procedure with estimates from a short- and long-run relationship. The threshold of +/– 20 percent includes only observations where the stock market increased/decreased by more than 20 percent during any given year. The models are estimated with country fixed effects and include year dummy variables as well as robust standard errors. Nonstationarity and cointegration tests were conducted. P-values are in parentheses: *** significant at 1 percent level; ** significant at 5 percent level; and *significant at 10 percent level.

Note: Heiko Hesse prepared this box.

[1]Estimates of stock market wealth effects in the United States range from 0.3 to 0.7 percent for a 10 percent change in equity prices and vary across other advanced economies (see, for example, Bayoumi and Edison, 2003; Slacalek, 2006; and IMF, 2000, 2002). Funke (2004) presents evidence of a small but statistically significant stock market wealth effect in 16 EMs over 1985–2000 ranging from 0.2 to 0.4 percent.

[2]The countries are Argentina, Brazil, Chile, China, Colombia, Czech Republic, Hungary, India, Indonesia, Israel, Korea, Malaysia, Mexico, Morocco, Pakistan, Peru, Philippines, Poland, Russia, South Africa, Thailand, and Turkey.

[3]The long-run impact from changes in the stock market index on private consumption expenditure per capita refers to the estimated sample from 1985–2007 (and to 1997–2007 for one specification).

results are of the same order of magnitude as Funke (2004). Restricting the sample period to 1997–2007, when stock market valuations exhibited large increases as percent of GDP, shows a slightly higher stock market wealth effect.

Additional specifications consider the effect of large valuation changes, where the equity market increased/decreased by more than 20 and 30 percent, respectively, in any given year. These findings suggest a slightly more pronounced wealth effect for the 30 percent threshold.[4]

In addition to private consumption, the wealth effects of stock market valuation changes are also relevant for a number of other key macroeconomic variables, notably government revenues and private investment. A simple fixed-effects model (with year dummy variables) of real private investment regressed on contemporaneous and lagged real stock market returns for 19 EM countries over the period 1985–2007 suggests that a 10 percent change in stock prices would lead to about 1 percent change in investment. This is in line with the results in Henry (2000), who utilizes the same methodology.

Overall, the findings suggest that there is a stock market wealth effect in EM countries, albeit smaller than in advanced economies. What are the possible implications for policymakers? The significant effect of stock market fluctuation on private consumption and therefore demand is something that policymakers need to be aware of, especially since large buildups of asset prices are often followed by busts. Such considerations become even more relevant as—with continuing financial integration—domestic asset prices are increasingly influenced by regional and global factors.

[4]The model presented here does not take into account other factors affecting household wealth, such as increases in real estate values, structural differences across EM financial markets, such as depth and volatility, and the relatively low degrees in EMs of consumer leverage and stock market participation.

growth and higher market capitalization are key driving forces for equity prices, which supports the view that high EM equity prices are driven, at least partially, by underlying domestic fundamentals.

- Exchange rate expectations have been playing an important role in determining EM equity prices. The effective appreciation of EM currencies during the U.S. dollar's recent depreciation has contributed to EM equity price rises.

These results are reinforced by the results of the VAR models and the increased correlations during recent years between EM stock market indices and indices in Europe and the United States as well as rising correlations between EMs themselves.

The empirical analysis also suggests a relatively small but significant impact of changes in EM stock market valuations on EM consumption and investment. In general, there is no one-size-fits-all approach for dealing with the stock market wealth effect. The approach should be country-specific, depending on domestic factors such as the monetary policy framework, financial regulation, the degree of consumer leverage, especially for retail investors, and the level of stock market participation in the economy.

The empirical results point to a number of macroeconomic policy challenges facing the authorities in emerging markets. The protracted global financial crisis and dual inflation and growth threats are presenting a more serious test for emerging markets:

- As the experience of the past year has shown, emerging market authorities need to be alert to the negative impact of slowing global growth and its effect, among other factors, on EM asset prices.

Box 4.2. The Role of Emerging Market Institutional Investors in Emerging Market Equities

This box examines the evolving role of emerging market institutional investors in emerging stock markets and notes illustrative examples from a few selected countries. Emerging institutional investors with a long-term horizon can play a stabilizing role in emerging equity markets, while herding behavior among more active and short-term-oriented institutional investors could potentially exacerbate market volatility during a downturn or financial turmoil.

Financial globalization has been associated with increasing emerging market (EM) investor diversification (IMF, 2007a, 2007b, Chapter 1). In recent years, the EM institutional investor (EMII) base, including pension funds, insurance companies, and mutual funds, has grown substantially in many EM countries. Specifically, total assets of EM pension funds have risen by more than 140 percent since 2000, driven by both rising asset prices and the growth of domestic pension systems (first figure). The strong growth of the EM mutual fund industry corresponds with rapidly increasing equity valuations, fast income growth, and the emergence of a growing middle class channeling some of its savings away from traditional bank deposits.

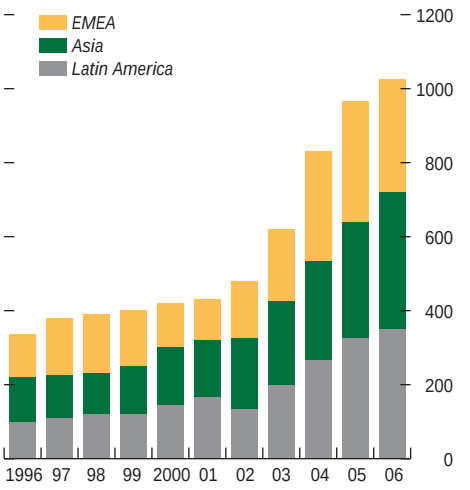
In recent years, countries such as Brazil, Korea, Malaysia, and Mexico have adopted legislation to build up their insurance and mutual fund sectors as well as domestic pension systems, while some have also eased domestic as well as outward investment limits by EMIIs. In addition, some EM sovereigns have set up new types of investment funds—often to complement their sovereign wealth funds—that actively invest in foreign assets in both advanced and other emerging markets, including equities.[1]

Despite its growth in recent years, the level of the EMII asset base remains relatively small

Note: Heiko Hesse is the primary author of this box.

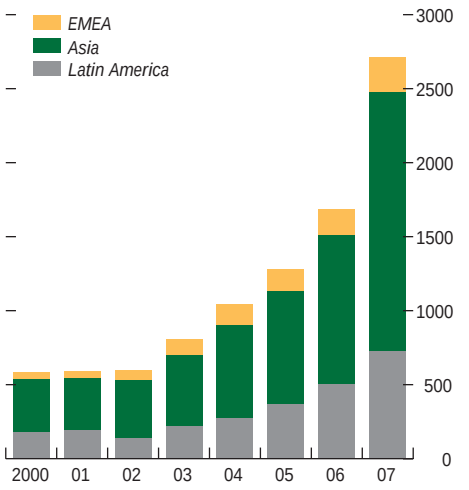
[1]Sovereign wealth funds typically invest most of their assets beyond their national borders, with a few exceptions where they are also active players in domestic financial markets.

Emerging Market Economies: Pension Fund Assets Under Management
(In billions of U.S. dollars)



Source: JPMorgan Chase & Co.
Note: EMEA = Emerging Europe, Middle East, and Africa.

Emerging Market Economies: Total Assets Under Management of Mutual Funds
(In billions of U.S. dollars)



Source: Investment Company Institute.
Note: EMEA = Emerging Europe, Middle East, and Africa.

compared to that of advanced economies, and it varies across countries and regions (second figure). For example, Turkey's mutual fund industry and private pension funds are very small compared to some of their middle-income peers, with 70 percent of the free float on the stock market held by nonresidents.[2] In contrast, South Africa has a thriving and large EMII base with the state-owned pension fund (Public Investment Corporation—PIC)—one of the largest in the world—being the biggest domestic equity holder, and with the insurance sector having the highest penetration (in terms of premia to GDP) among EMs. Similarly in Brazil, a large and diverse EMII base has contributed to the deepening of the financial market. However, compared to advanced economies, the asset allocation of pension funds and insurance companies in many EMs tends to include a higher proportion of government securities, in part due to government regulation.

[2]The relatively undeveloped state of Turkey's nonbank financial sector may be partly due to past periods of macroeconomic volatility and high inflation. Recent legislation with regard to private pension funds and insurance led to some rapid growth of the local EMII asset base, albeit from a low level.

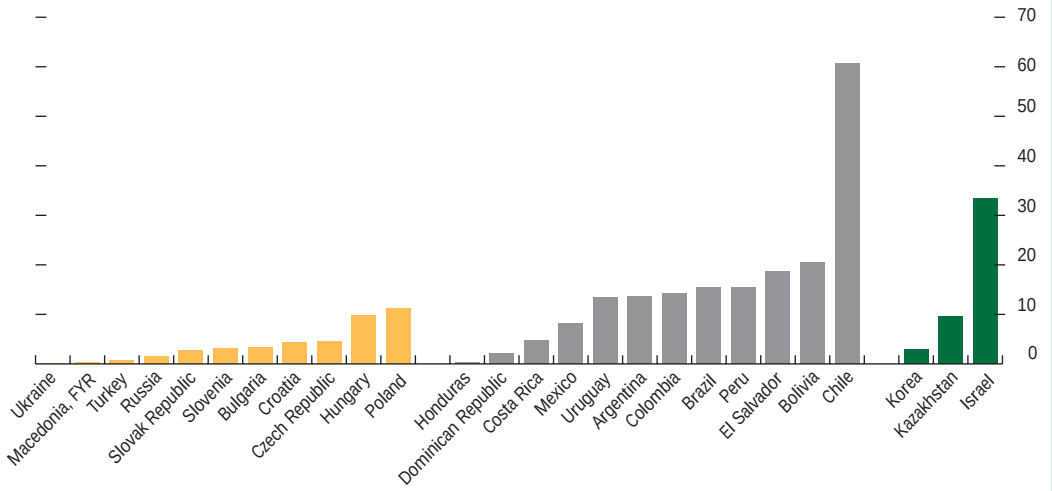
Amplifiers or Not?

In principle, a diverse investor base—with regard to investment horizons and risk appetite—can contribute to financial stability, especially by spreading risks more widely. In practice, however, whether EMIIs are a stabilizing factor moderating boom-and-bust cycles in equity markets depends on their asset allocation behavior, which in turn is driven by their risk profile, investment horizon, liability profile, and constraints imposed by their governance and regulation.

The stable investment horizon and typically buy-and-hold behavior of pension funds and insurance companies can contribute to a financially stable base for domestic stock markets.[3] These EMIIs are able to keep their

[3]See Roldos (2007) for a discussion of instances where pension funds can contribute to asset price distortions.

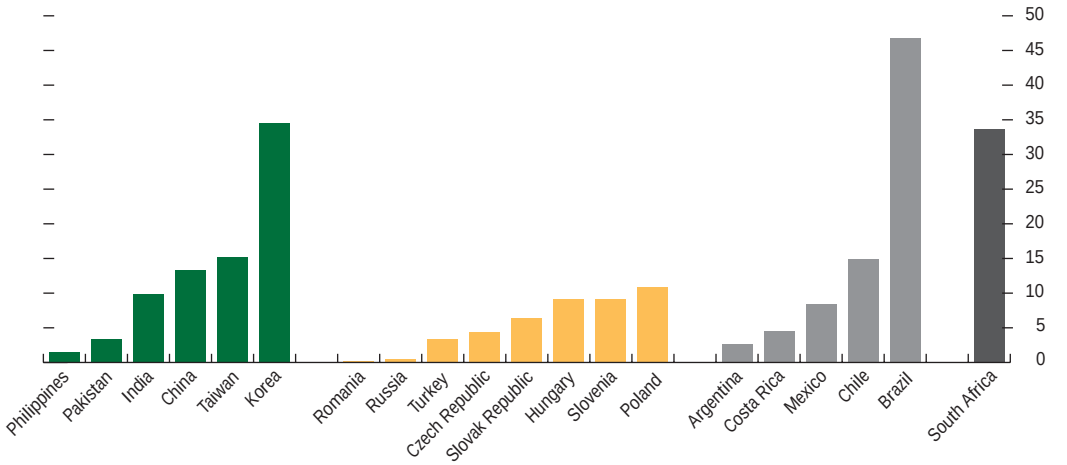
Pension Fund Assets in Selected Countries, 2006
(In percent of GDP)



Sources: International Federation of Pension Funds Administrators; OECD; IMF, World Economic Outlook database; and IMF staff estimates.

Box 4.2 *(concluded)*

Mutual Fund Assets in Selected Countries, 2007
(In percent of GDP)



Sources: Investment Company Institute; European Fund and Asset Management Association; and other national mutual fund associations.

asset allocations unchanged during market downturns or even go against market trends and may enhance the depth and breadth of equity markets. In addition, guided by their mandate, they pursue portfolio reallocations gradually, which can limit abrupt price movements. For example, in Korea, institutional investors' stable funding to the market can act as a buffer against the reversal of foreign equity inflows, especially since they are highly domestically oriented in their portfolios. However, the regulatory changes of recent years are reducing home bias, as indicated by the increasing foreign allocations of the Korean National Pension Fund as well as retail investors.

In some larger EM countries, foreign investors, including hedge funds, can contribute to equity price volatility. For example, foreign investor sentiment dominates developments in the Turkish stock market since free float holdings of local EMIIs are small compared to those of nonresidents. In the Brazilian equity market, one-third of the trading volume is by foreign investors, and nonresidents were the main players in the initial public offerings market until this segment significantly slowed following the onset of the international financial turbulence.

Overall, the EMII base is expected to continue to grow, benefiting from high GDP and export earnings growth and further enabling reforms and regulation, especially in the domestic pension systems and asset allocation liberalization, leading to a larger investment share of EMIIs in emerging equities.

- Changes in exchange rate expectations and a perception that monetary policy is "behind the curve" could be a possible trigger for further EM equity price declines. Therefore, greater exchange rate flexibility may help reduce pressures related to one-way exchange rate bets, while prompt and transparent monetary policy may help stabilize investor risk appetite.

The empirical results discussed above and the policy challenges associated with them point to the need to enhance the structural resilience of emerging equity markets. Although not directly stemming from the empirical work presented, there are a number of actions that facilitate the development of emerging capital markets more broadly and enhance their resilience:

- Fostering deeper and more liquid capital markets with diverse institutional investors, including domestic and foreign as well as both buy-and-hold and active participants, helps improve the resilience of a national financial market to withstand shocks.
- Establishing funded pension schemes and a domestic insurance sector broadens the local institutional investor base and creates demand for long-term financial instruments.
- Increasing the demand for long-term instruments may in turn facilitate the development of more diverse local financial products. This may entail extending the yield curve on sovereign and corporate fixed-income securities as well as equities, which would help to deepen and diversify domestic financial markets and, therefore, help to mitigate sensitivity to external shocks.[16]
- The benefits of discretionary interference by the authorities in a structured and formally regulated market—for example, to artificially delay or limit the magnitude of price declines during times of financial stress—need to be counterbalanced against possible reputational costs that can derail capital market development over the medium term.
- When reforms are adopted in the legal, regulatory and prudential, and accounting systems, they need to be consistent with international standards.
- At the firm level, the governance and transparency of performance and decision-making structures need improvement, and greater emphasis needs to be put on strengthening risk management.

As regards the development of EM equity markets more concretely, robust securities market infrastructure and institutions, including in the securities exchange and clearing systems, are necessary for developing a sound capital market.[17] Specifically, a well-functioning securities market and supporting infrastructure—such as repo markets, margin trading, securities lending, and derivatives markets—can reduce transaction costs and foster liquidity. A well-structured stock exchange also spreads risks through loss-sharing arrangements with members. Systemic risk is reduced when trading occurs in a formally regulated exchange that engages in market surveillance, undertakes adequate disclosure, and imposes appropriate margin requirements and position limits. Careful implementation is important at each stage:

- Enhancements to the securities market infrastructure and the introduction of new financial instruments in particular need to be properly sequenced, and with appropriate oversight in place, so as to reap the full benefits of innovation, while at the same time managing with due care the risks to financial stability and ensuring the proper functioning of markets.
- Derivatives markets in particular need to be developed within an appropriate framework of solid product design, regulation, and sound market infrastructure and oversight.
- A prerequisite for a proficient short selling mechanism is a well-functioning stock-lending system, which can develop with a sufficiently large participation of stock lenders to reduce the costs of covering short positions and, overall, to minimize the occurrence of a short squeeze. It should also be noted that

[16]For example, in Korea the strong growth of local savings instruments such as mutual funds, of which over 50 percent are invested in equities, has increased the household sector's stake in equity markets substantially.

[17]For further elaboration on these topics, see Purfield and others (2006), Fratzscher (2006), and Shah and others (forthcoming). See Ghosh and Revilla (2007) for a discussion on East Asia in particular.

introducing shorting in a bearish equity market could exacerbate the downturn.

In sum, while EM economies have so far remained relatively unaffected by the global turbulence, this chapter shows that they are not immune. Active steps to enhance their resilience are still needed in most EM countries.

Annex 4.1. Panel Estimation Specification and Results[18]

Two panel fixed-effects data models are employed to examine the factors driving equity valuations. In addition, the analysis employs nonstationary panel techniques to deal explicitly with the nonstationarities that are present in some individual time series that constitute the members of the panel. The error correction terms from the panel cointegration are taken as inputs to the driving factors panel specification. Therefore, this combination of conventional and nonstationary panel techniques allows us to focus explicitly on the stochastic and nonstochastic long-run trend features of the data and filter out the effects of short-run transitional dynamics.

Two steps are taken in each group of models.

Step 1. Unit root tests are performed for all variables and then cointegration tests are executed for nonstationary variables. The regressions of the price indices and nonstationary explanatory variables are then run to obtain error correction terms.[19]

Step 2. The driving factor model is run by incorporating the error correction terms.

Data Panel with Equity Market Capitalization

The first panel uses a monthly sample of 30 economies from January 2001 to May 2008.[20] The dependent variable—equity price growth—is modeled as a function of five domestic indicators, four global or external indicators, and an error correction term. The coefficients for these variables provide a measure of the magnitude of spillovers.

The panel regressions are run on a sample of the following 30 economies:

Asia: China, Hong Kong SAR, India, Indonesia, Korea, Malaysia, Pakistan, Philippines, Singapore, Sri Lanka, Thailand, and Vietnam.

Europe, Middle East, and Africa (EMEA): Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Nigeria, Romania, Russia, South Africa, and Turkey.

Latin America: Argentina, Brazil, Chile, Colombia, Mexico, and Peru.

The dependent variable in the panel regression is the log change in the U.S. dollar equity price indices, while the panel cointegration utilizes the log level in the U.S. dollar equity price indices. The independent variables are as follows:

- Domestic Factors

  (a) GDP growth: The change of the monthly consensus forecast for annual GDP growth rate in the Consensus Forecast Database, in local currency, as a proxy for macroeconomic fundamentals; [21]

  (b) Interest rate differential: The spread between the one-year domestic and the six-month U.S. treasury rates; [22]

  (c) Exchange rate expectation: The log change in forward exchange rates (including nondeliverable forward rates in 18 economies for which data were available); the log level in forward exchange rates in the panel cointegration;

  (d) Inflation rate differential: The difference between the domestic and the U.S monthly inflation rates;

[18]Tao Sun prepared this annex.

[19]See Psalida and Sun (forthcoming) for more details on panel cointegration tests performed on these data.

[20]The period since 2001 is chosen for two reasons. First, 2001 marked the beginning of a long upward trend for EM equities starting from a low point. Second, data availability, especially portfolio equity inflows, was much improved from that date.

[21]Forecasted GDP growth is chosen as a proxy for fundamentals rather than corporate profits, dividend yield, or taxes for reasons of data availability for this country sample.

[22]We use the six-month U.S. treasury rate because we do not have the one-year U.S. treasury rate for the full period sample.

(e) Equity market capitalization: Equity market capitalization-to-GDP ratio, calculated as (1 + growth of market capitalization)/(1+ GDP growth) in the panel regressions, as a proxy of capital market size; the log level of equity market capitalization in the panel cointegration.

- Global or External Factors
  (a) Global excess liquidity: The difference between broad money growth and estimates for money demand in the euro area, Japan, and the United States;
  (b) Market volatility premium: The implied volatility of the S&P 500 index (VIX) as a proxy for market volatility;
  (c) Credit risk premium: The level of the 10-year U.S. dollar swap spread, which is the difference between the 10-year U.S. dollar swap rate and the 10-year U.S. treasury note, as a proxy for aggregate default risk; [23]
  (d) Portfolio equity inflows: The growth of flows to emerging markets' (Asia, EMEA, and Latin America) equity funds as a proxy for portfolio equity inflows.

Error Correction Term

By employing nonstationary panel techniques, we obtain error correction terms from the panel cointegrations among log equity price index, log market capitalization, and the log forward exchange rate. The economic rationale for this cointegration is as follows: equity prices are related to market capitalization; an expected exchange rate appreciation could promote capital inflows and encourage domestic capital to remain in domestic equity markets, thus driving up equity prices. The results indicate that a 1 percent reduction in the error correction term is associated with a 0.05 percent increase in equity price growth, reflecting the adjustment over time for closing the gap with respect to the long-run relationship between these variables (see Table 4.2 for the results).

[23]For similar approaches see Hartelius, Kashiwase, and Kodres (2008), and Gonzalez-Hermosillo (2008).

Table 4.4. Unit Root Tests

	Log Equity Price Indices	Log Forward Exchange Rate	Log Market Capitalization
Levin-Lin rho-stat	4.13	1.99	4.76
Levin-Lin t-rho-stat	5.39	3.73	6.81
Levin-Lin ADF-stat	3.57	3.87	4.57
IPS ADF-stat	4.30	1.14	5.22

Sources: IMF, International Financial Statistics database; S&P Emerging Markets Database; Bloomberg L.P.; and Datastream.
Note: The critical values are –1.28 (10 percent) and –1.64 (5 percent).

Unit Root Tests and Panel Cointegration Test

Unit root tests show that the indicators used in panel cointegration tests—the log equity price index, log market capitalization, and log forward exchange rate—are nonstationary, while all other variables used in the panel regressions are stationary (Table 4.4). According to the Pedroni panel cointegration tests performed on the log equity price index, log market capitalization, and log forward exchange rate, the majority of statistics point to the conclusion that the variables are cointegrated (Table 4.5) (Pedroni, 1999).

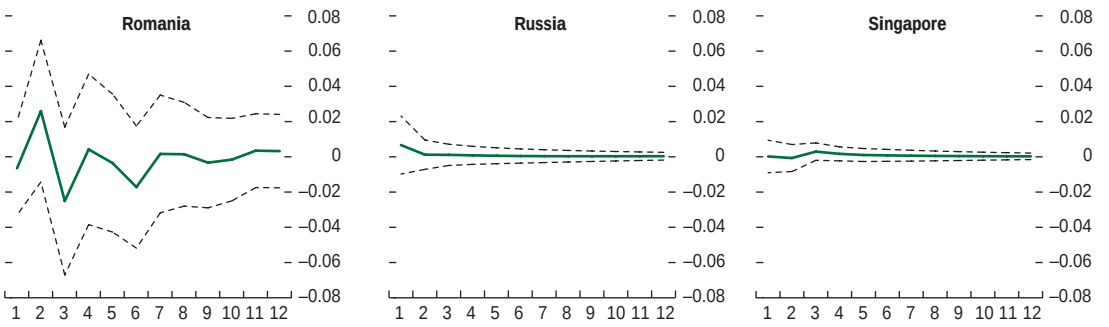
Table 4.5. Pedroni Heterogeneous Panel Cointegration Tests

	Log Equity Price Index, Log Forward Exchange Rate, Log Market Capitalization
Panel v–stat	3.47**
Panel rho–stat	–3.67**
Panel pp–stat	–2.16**
Panel adf–stat	1.34
Group rho–stat	–4.28**
Group pp–stat	–3.69**
Group adf–stat	1.49

Sources: IMF, International Financial Statistics database; S&P Emerging Markets Database; Bloomberg L.P.; and Datastream.
Note: The first four tests are pooled within-dimension tests and the last three tests are group mean between-dimension tests. Specifically, the first three statistics correct for serial correlation, the fourth parametric test similar to the ADF-type test allows the number of lags in the model to be estimated directly. The last three statistics treat the parameter of interest as varying across the members of the panel. The critical values for the variance statistic (v-stat) are 1.28 (10 percent) and 1.64 (5 percent), and those for all others are –1.28 (10 percent) and –1.64 (5 percent).

Figure 4.11. Equity Price Response to Global Excess Liquidity Increase

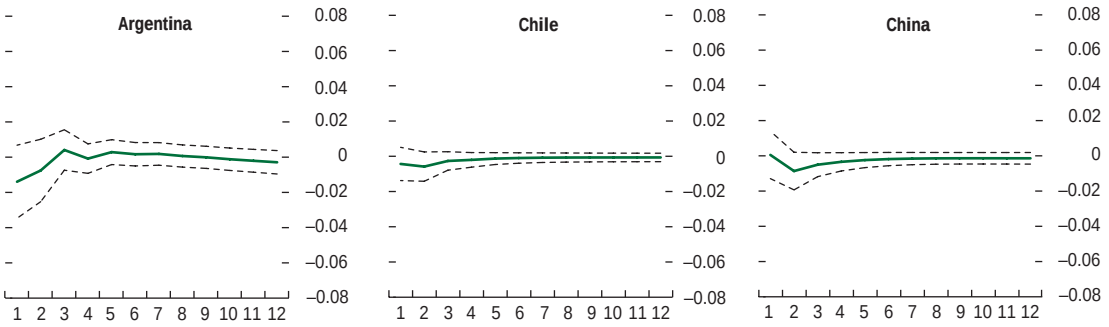
(Percentage points)



Sources: S&P Emerging Markets Database; Datastream; and IMF staff estimates.
Note: The solid line represents impulse response; the dotted lines are two-standard-error confidence interval.

Figure 4.12. Equity Price Response to Credit Risk Premium Increase

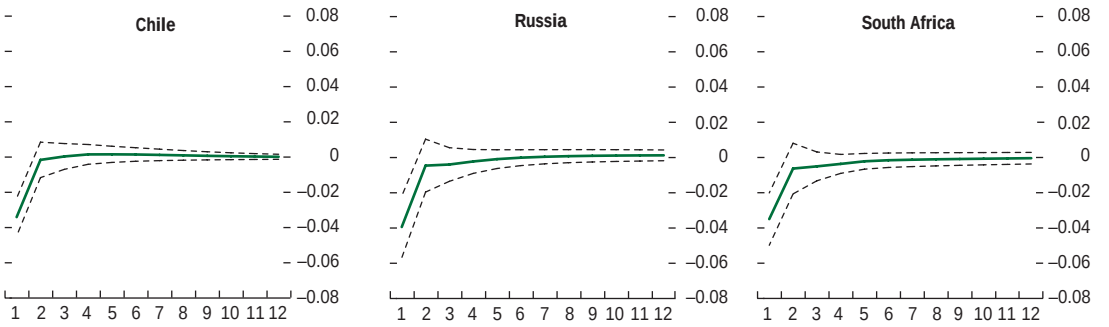
(Percentage points)



Sources: S&P Emerging Markets Database; Datastream; and IMF staff estimates.
Note: The solid line represents impulse response; the dotted lines are two-standard-error confidence interval.

Figure 4.13. Equity Price Response to Market Risk Premium Increase

(Percentage points)



Sources: S&P Emerging Markets Database; Datastream; and IMF staff estimates.
Note: The solid line represents impulse response; the dotted lines are two-standard-error confidence interval.

Data Panel with Domestic Credit and the MSCI

The second panel employs the same countries, frequency of data, and explanatory variables, the only difference being that equity market capitalization is replaced by private credit in the domestic factors and the MSCI is added to the global factors. Specifically:

- Domestic credit: The log change in the credit to the private sector, as a proxy for financial deepening; and
- MSCI: The log change in the Morgan Stanley Capital International world index of 23 major stock markets.[24]

See Table 4.3 for the results.

Annex 4.2. Vector Autoregression Model Results

Figures 4.11 to 4.13 in this annex present some of the equity price impulse responses for the seven countries examined.

References

Bayoumi, Tamim, and Hali Edison, 2003, "Is Wealth Increasingly Driving Consumption?" DNB Staff Report No. 101 (Amsterdam: De Nederlandsche Bank).

Engle, Robert, 2002, "Dynamic Conditional Correlation: A Simple Class of Multivariate Generalized Autoregressive Conditional Heteroskedasticity Models," *Journal of Business & Economic Statistics*, Vol. 20, No. 3, pp. 339–50.

Frank, Nathaniel, Brenda González-Hermosillo, and Heiko Hesse, 2008, "Transmission of Liquidity Shocks: Evidence from the 2007 Subprime Crisis," IMF Working Paper 08/200 (Washington: International Monetary Fund).

Fratzscher, Oliver, 2006, "Emerging Derivative Market in Asia," in *EAP Flagship on Asian Financial Market and Development* (Washington: World Bank).

Funke, Norbert, 2004, "Is There a Stock Market Wealth Effect in Emerging Markets?" *Economics Letters*, Vol. 83, No. 3, pp. 417–21.

[24]Only two of the 23 MSCI country components are also in our panel, namely Hong Kong SAR and Singapore, keeping to a minimum any endogeneity issues that may arise from adding the MSCI as an explanatory variable.

Ghosh, Swati, and Ernesto Revilla, 2007, "Enhancing the Efficiency of Securities Markets in East Asia," World Bank Policy Research Working Paper 4129 (Washington: World Bank).

Gonzalez-Hermosillo, Brenda, 2008, "Investors' Risk Appetite and Global Financial Market Conditions," IMF Working Paper 08/85 (Washington: International Monetary Fund).

Gordon, Myron J., 1962, *The Investment, Financing, and Valuation of the Corporation* (Homewood, Illinois: Irwin Publishers).

Hartelius, Kristian, Kenichiro Kashiwase, and Laura E. Kodres, 2008, "Emerging Market Spread Compression: Is it Real or is it Liquidity?" IMF Working Paper 08/10 (Washington: International Monetary Fund).

Henry, Peter Blair, 2000, "Do Stock Market Liberalizations Cause Investment Booms?" *Journal of Financial Economics*, Vol. 58, No. 1–2, pp. 301–34.

International Monetary Fund (IMF), 1998, "Financial Crises: Causes and Indicators," in *World Economic Outlook*, World Economic and Financial Surveys (Washington, May).

———, 2000, "Asset Prices and the Business Cycle," in *World Economic Outlook*, World Economic and Financial Surveys (Washington, May).

———, 2002, "Three Essays on How Financial Markets Affect Real Activity," in *World Economic Outlook*, World Economic and Financial Surveys (Washington, April).

———, 2007a, "Changes in the International Investor Base and Implications for Financial Stability," in *Global Financial Stability Report*, World Economic and Financial Surveys (Washington, April).

———, 2007b, *Global Financial Stability Report*, World Economic and Financial Surveys (Washington, October).

———, 2007c, "Decoupling the Train? Spillovers and Cycles in the Global Economy," in *World Economic Outlook*, World Economic and Financial Surveys (Washington, April).

———, 2008a, "Can Asia Decouple? Investigating Spillovers from the United States to Asia," in *Regional Economic Outlook—Asia and Pacific*, World Economic and Financial Surveys (Washington, April).

———, 2008b, "Latin American Linkages to Global Financial Market Turbulence," in *Regional Economic Outlook—Western Hemisphere*, World Economic and Financial Surveys (Washington, April).

Ludwig, Alexander, and Torsten Sløk, 2004, "The Relationship between Stock Prices,

House Prices and Consumption in OECD Countries," *Topics in Macroeconomics*, Vol. 4, No. 1. Available via the Internet: www.bepress.com/bejm/topics/vol4/iss1/art4.

Pedroni, Peter, 1999, "Critical Values for Cointegration Tests in Heterogeneous Panels with Multiple Regressors," *Oxford Bulletin of Economics and Statistics*, Vol. 61 (July 25), pp. 653–70.

Psalida, L. Effie, and Tao Sun, forthcoming, "Spillovers to Emerging Equity Markets: An Econometric Assessment," IMF Working Paper (Washington: International Monetary Fund).

Purfield, Catriona, Hiroko Oura, Charles Kramer, and Andreas Jobst, 2006, "Asian Equity Markets: Growth, Opportunities, and Challenges," IMF Working Paper 06/266 (Washington: International Monetary Fund).

Roldos, Jorge, 2007, "Pension Reform and Macroeconomic Stability in Latin America," IMF Working Paper 07/108 (Washington: International Monetary Fund).

Shah, Hemant, Ana Carvajal, Mangal Goswami, Andreas Jobst, Jack Ree, and Ivan Guerra, forthcoming, "Securitization in Emerging Markets" (unpublished; Washington: International Monetary Fund).

Shiller, Robert J., 2000, *Irrational Exuberance* (Princeton, New Jersey: Princeton University Press).

Slacalek, Jirka, 2006, "International Wealth Effects," DIW Discussion Paper No. 596 (Berlin: German Institute for Economic Research).

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, or 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 or home equity loans.
Auction rate security	Long-term debt or preferred stock for which the coupon or dividend is regularly reset via Dutch auction.
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 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. U.S. issues need not be registered with the 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 usually consist of short-term commercial paper and are supported by a liquidity facility with 100 percent coverage.
Convertible arbitrage strategy	A strategy entailing a long position on a convertible security and a short position on the underlying stock into which it converts.
Covered bond	A debt obligation on which the investor has recourse first to a pool of assets that secures the bond. Unlike asset-backed securities, covered bonds remain on the issuer's consolidated balance sheet and thus provide creditors with a second level of protection through recourse to other assets of the borrower.
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 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 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).
Derivative	A financial contract whose value derives from underlying securities prices, interest rates, foreign exchange rates, commodity prices, or market and other indices.
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 (EMs)	Developing countries' financial markets that are less than fully developed, but are nonetheless broadly accessible to foreign investors.
Government-sponsored enterprise (GSE)	A financial institution that provides credit to specific groups or areas of the economy, such as farmers or housing. Most GSEs maintain legal and/or financial ties to the government.
Fixed-effects panel data model	An econometric panel data technique that accounts for possible time-invariant unobserved characteristics in the underlying data.

GARCH model	The Generalized Autoregressive Conditional Heteroskedasticity (GARCH) framework allows for the modeling of the volatility—second moments—of the variables of interest. In the Dynamic Conditional Correlation (DCC) GARCH model, correlations are time-varying.
Hedge fund	Investment pool, typically organized as a private partnership 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 risk.
Hedging	Offsetting an existing risk exposure by taking an opposite position in the same or 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 an 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).
Hybrid security	A broad group of securities that combine the elements of both debt and equity. They pay a fixed or floating rate coupon or dividend until a certain date, at which point the holder has a number of options including converting the securities into the underlying share. Therefore, unlike equity, the holder has a predetermined cash flow, and, unlike a fixed-income security, the holder has the option to gain when the issuer's equity price rises. It is typically subordinate to other debt obligations in the capital structure of the firm.
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 by investors to satisfy risk neutral arbitrage conditions, and is calculated with the use of an options pricing model such as Black-Scholes.
Impulse response function	An econometric technique typically used for vector autoregressions that traces the impact to the variable in question over time from a shock to another variable.
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.
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)	The 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 loan	A bank loan that is 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 (earnings before interest, taxes, depreciation, and amortization) ratio, or trade at wide spreads over LIBOR (e.g., 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.
Loss given default (LGD)	The fraction of a loan or security's nominal value that would not be recovered following default.
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.
Mark-to-model	Pricing of a position or portfolio based on a set of assumptions and financial models.
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.
Originate-to-distribute model	A business model of financial intermediation, under which financial institutions originate loans such as mortgages, repackage them into securitized products, and then sell them to investors.

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.
Pfandbriefe	The German word (literally "letter of pledge") for covered bonds. They are mainly used to refinance mortgages or public projects, and issued only by specially authorized banks.
Prime brokerage	A bundled package of services provided by banks or investment banks to hedge funds, including global custody, securities lending, margin financing, portfolio reporting and accounting, and other operational support.
Private equity	Shares in privately held companies that are not listed on a public stock exchange.
Private equity fund	A pool of capital invested by a private equity partnership, typically involving the purchase of majority stakes in companies and/or entire business units to restructure their capital, management, and organization.
Probability of default (PD)	The likelihood that a loan or security will not be repaid and will fall into default.
Regulatory arbitrage	The process of 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.
Securitization	The creation of securities from a pool of preexisting 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.
Stock market wealth effect	The impact from changes in stock values on macroeconomic variables, for instance, consumption or investment.
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 tranched 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.
Subprime mortgage	A mortgage 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 reference financial instruments on a predetermined notional amount.
Tender option bond	A debt obligation that grants the debt holder the right to require the issuer, or a third-party agent of the issuer, to purchase the debt, typically at par value.
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.
Variable rate demand obligation	A floating rate, long-term debt instrument on which the coupon is reset periodically, typically daily or weekly, and where the investor has the option to sell the instrument back to the issuer or issuer's agent.
Vector autoregression (VAR)	An econometric time series technique that models the dynamic interaction among the variables of interest.
Yield curve	The relation between the interest rates (or yields) and time to maturity for debt securities of equivalent credit risk.

ANNEX

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 September 15, 2008.*

Executive Directors had a broad-ranging discussion of recent financial market developments, the prospects for global financial stability, and the linkages between financial markets and the macroeconomy. Since the issuance of the April 2008 *Global Financial Stability Report* (GFSR), the global financial system has come under increasing stress, which is unlikely to dissipate quickly. Directors welcomed the steps taken by governments in recent weeks to support the housing and mortgage finance markets and ensure systemic liquidity support. Private financial institutions, for their part, have taken notable remedial actions, by attempting to adjust their balance sheets and business models through revealing losses, raising capital, securing stable funding sources, and improving their risk management systems. Directors agreed that these efforts should assist eventual recovery in the financial system. However, they observed that near-term liquidity pressures, deleveraging, and banking consolidation still pose significant challenges, even while varying in their implications for banks across the advanced economies—in particular, between U.S. and euro area banks, and indeed, even within the European region. In any case, as the events of recent days demonstrate, the adjustment process has not yet run its full course, and financial institution failures and other market disturbances may still lie ahead.

Directors stressed that the preeminent policy challenge in the present context of uncertainty and turmoil is to mitigate the risks of an adverse feedback loop between the financial system and the economy in the near term, while establishing a clear road to lasting recovery for the financial system. Directors underscored the growing ramifications of the financial crisis for economic growth in the advanced economies and the greater risk of spillovers to emerging markets. The considerable uncertainty regarding the depth and breadth of the credit default cycle is likely to continue to curtail credit availability and place a further drag on economic recovery. Directors observed that financial market stresses—while emanating from and concentrated in advanced countries—have an evident potential to threaten emerging markets, where policy frameworks are being tested. In addition, more recent financial market developments suggest that national authorities will need to remain resolute in the face of pressures for further public resources to contain systemic risks and the economic fallout of threats to the solvency of some institutions. This will be challenging against the backdrop of the deterioration in the global economic outlook, with a deepening housing downturn, tighter credit conditions, and heightened inflation risks, which has—in turn—increased financial stresses. Against this background, Directors called for continued vigilance with respect to macrofinancial linkages, and welcomed the further work in the GFSR in this area.

Directors agreed with the staff's recommendation that national authorities will need to stand ready for further policy actions, as needed, in the event of a weaker-than-expected global economic recovery in 2009. Specifically, Directors were mindful that central banks and fiscal authorities will need to work together to address problems in the financial system as well as the prospects for slower growth and

potentially higher inflation. At the same time, various authorities will need to make clear to the public their respective roles in the event of broader threats to financial institutions' solvency. Directors generally agreed that central banks should primarily deal with liquidity issues, and that the fiscal authorities should take the lead on major institutions' solvency issues. They pointed out that liquidity and solvency issues are increasingly difficult to separate, but that transparency and clear communication about how various problems are to be addressed will be critical to their successful resolution. Directors stressed that public support for troubled financial institutions in the advanced economies should take account of moral hazard concerns, as well as its medium-term implications for the public sector balance sheet, and be backed up where possible by concrete restructuring plans. They also called for close monitoring of the performance of financial institutions and for continued coordination among national supervisors.

Directors underlined the importance of continuing to build the infrastructure necessary to handle effectively the liquidation of financial institutions in difficulty. Several Directors recognized that new product growth, such as credit default swaps, could raise important issues about resolution, as the newest bankruptcy of Lehman Brothers Holdings demonstrates.

Directors discussed the recent conservatorship of the U.S. government-sponsored enterprises (GSEs), Fannie Mae and Freddie Mac. They noted that the U.S. Treasury and the Federal Housing Finance Agency (FHFA) have acted promptly to avert fallout of potentially global systemic dimensions, and that the new plan should help support the U.S. housing and mortgage finance markets. Although a large tail risk event was avoided, Directors acknowledged that the broad stresses in the financial system will still be present for some time to come. Directors saw the recent intervention as an opportunity to develop and implement concrete plans for a broad restructuring of the GSEs that would aim at ensuring market discipline and facilitating competition, while minimizing fiscal costs and containing systemic risks.

Directors agreed that the deleveraging process raises several near-term issues. The private sector should take the lead on corrective actions—with regulators and supervisors providing guidance to regulated financial institutions to promote steady improvement. The environment for raising capital has become more difficult, and sustained efforts by private financial institutions will be required to raise capital and reduce assets. Directors acknowledged that reductions in assets would naturally limit credit extension. They also saw scope for reassessing funding models and mechanisms, and restructuring balance sheets and business models. Directors noted the updated estimate of potential future losses to financial institutions of their U.S.-based loans and securities, suggesting that the updated values could also be linked with information about progress on financial institutions' loss recognition and capital-raising activities.

Directors noted that emerging market countries have shown resilience to the global financial crisis thus far, reflecting policy improvements, strengthened reserves, and high growth in recent years, but are now experiencing the spillovers from the stresses in advanced economies. External corporate and bank borrowing is becoming more costly and less available, with falling domestic credit growth and slowing housing markets. Lower risk appetite of institutional investors has led to some easing in capital flows to emerging markets. Directors emphasized the considerable differences in the experience of emerging markets, and noted that the countries that are most vulnerable to spillovers are likely to be those with large current account deficits, recent rapid credit growth, and adverse terms of trade shocks.

Directors discussed various aspects of the financial crisis and its implications, as presented in Chapters 2, 3, and 4 of the GFSR. They welcomed the analysis in Chapter 2 of the stress in bank funding markets and its potential effect on monetary policy transmission. They observed that much of banks' funding liquidity difficul-

ties, as proxied by the difference between the 3-month London Interbank Offer Rate (LIBOR) and the overnight index swap rate, have been related to distress risk—a combination of credit and liquidity risks experienced by financial institutions. In the cases of the sterling LIBOR and the Euribor, an additional factor influencing those spreads was the inability to obtain dollar funding. Directors agreed that central banks would need to provide liquidity support, attempt to lower distress risks, and address foreign exchange funding issues.

Directors welcomed the analysis in Chapter 2 of the interest rate transmission mechanism for monetary policy in the United States and in the euro area. The empirical results in the chapter suggest that the interest rate transmission channel became less predictable during the crisis—more so in the United States than in the euro area, and more so for the transmission between the effective policy rates and intermediate interest rates than for final consumer and business borrowing rates. Several Directors saw this experience as pointing to the importance of resolving the underlying counterparty credit risk issues.

Directors noted that the crisis has raised issues about how financial firms arrive at valuations of assets and liabilities, particularly in illiquid markets. This issue was examined in Chapter 3 by looking at the relationship between fair value accounting (FVA) and procyclicality. Directors noted that, under different circumstances, FVA could either add to or mitigate the procyclicality of banks' balance sheets. In some cases, the procyclical effects could be dampened by certain enhancements to FVA methodologies, but it was noted that there are also other ways of accomplishing this through higher capital buffers and provisions. On balance, Directors generally considered that FVA is still the way forward. They also noted that some alternative accounting methods may reduce transparency and blur the assessment of financial institutions' capital positions. Directors supported the staff recommendation that accounting, prudential, and risk management practices will need to work more coherently to safeguard financial stability in the future.

Directors welcomed the analysis in Chapter 4 on the impact of the advanced country subprime crisis on equity markets in emerging market countries. Directors noted that global, external factors (including global liquidity, market and credit risks) have been found to be important influences on the evolution of domestic equity prices, and that, over time, the integration of equity markets has made the transmission of shocks more likely to occur. Directors welcomed the staff's additional work to gauge the possible effect of equity price changes on real domestic private consumption and investment, which shows that, although there is a statistically significant consumer wealth effect from equities, it is relatively small compared with advanced economies, and subject to a time lag. Even though the real economic effects are likely limited, Directors believed it is still important for emerging market countries to move forward to strengthen the infrastructure underpinning their equity markets, and to make them transparent, well-functioning parts of their financial systems so as to limit potential negative effects on the real economy.

In conclusion, while global financial stability continues to be impaired and systemic risks are still elevated, most Directors viewed the ongoing adjustment process as one that could lead, ultimately, to a stronger, more robust global financial system. In particular, Directors noted that regulators and supervisors have a responsibility to ensure comprehensive financial industry oversight that addresses past problems of lax supervision and regulatory gaps. They noted that, while national authorities in individual countries move forward to stem the effects of the financial market crisis and its macroeconomic consequences, the IMF should, in coordination with national bodies and other international groups such as the Financial Stability Forum, sustain and intensify its efforts to assess developments and influence policy. They agreed that the IMF is uniquely placed for adding a multilateral perspective to policy responses to the crisis, including through the GFSR and the *World Economic Outlook*, and country Financial Sector Assessment Programs (FSAPs).

* * *

Following the Executive Board meeting on the GFSR on September 15, the Executive Board was briefed informally on September 22 on the latest financial market developments and the exceptional policy responses contemplated by the United States and other governments. The following paragraphs provide an overview of this briefing.

Directors noted that acute strains in financial markets had been observed in mid-September and acknowledged that these threatened a severe disruption of the financial system as it became apparent that, without public intervention, market adjustment would be disorderly and more costly for the real economy. A host of authorities accordingly moved to provide a needed rapid and concerted response. Although the specifics of the measures are still being worked out, Directors emphasized that the recent events will likely have far-reaching consequences for the structure of the financial sector and for the macroprudential framework required to support financial stability. The staff observed that global financial strains will likely slow the growth recovery, as anticipated in the October 2008 *World Economic Outlook*. Moreover, the risk of a stronger adverse feedback loop between the financial system and the broader economy has been heightened and still represents the principal threat to the projected upturn. The effects of this distress are also spilling over to many other parts of the world, including emerging market countries.

Directors noted that addressing the attendant liquidity strains and resolving the troubled institutions on a case-by-case basis had failed to support market confidence, requiring the U.S. authorities to shift to a more comprehensive approach. Uncertainty about which institutions might be rescued and which would not intensified systemic concerns and obliged the Federal Reserve to extend a large collateralized emergency loan to insurance company AIG. It also required the commitment of a potentially large amount of public resources to facilitate the functioning of markets. Directors were broadly supportive of this strategy, and welcomed the U.S. authorities' intention to design the specifics of the proposal with due regard to minimizing the risk to the U.S. budget.

STATISTICAL APPENDIX

This 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 July 31, 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.

List of Tables and Figures

Key Financial Centers

Figures

Tables

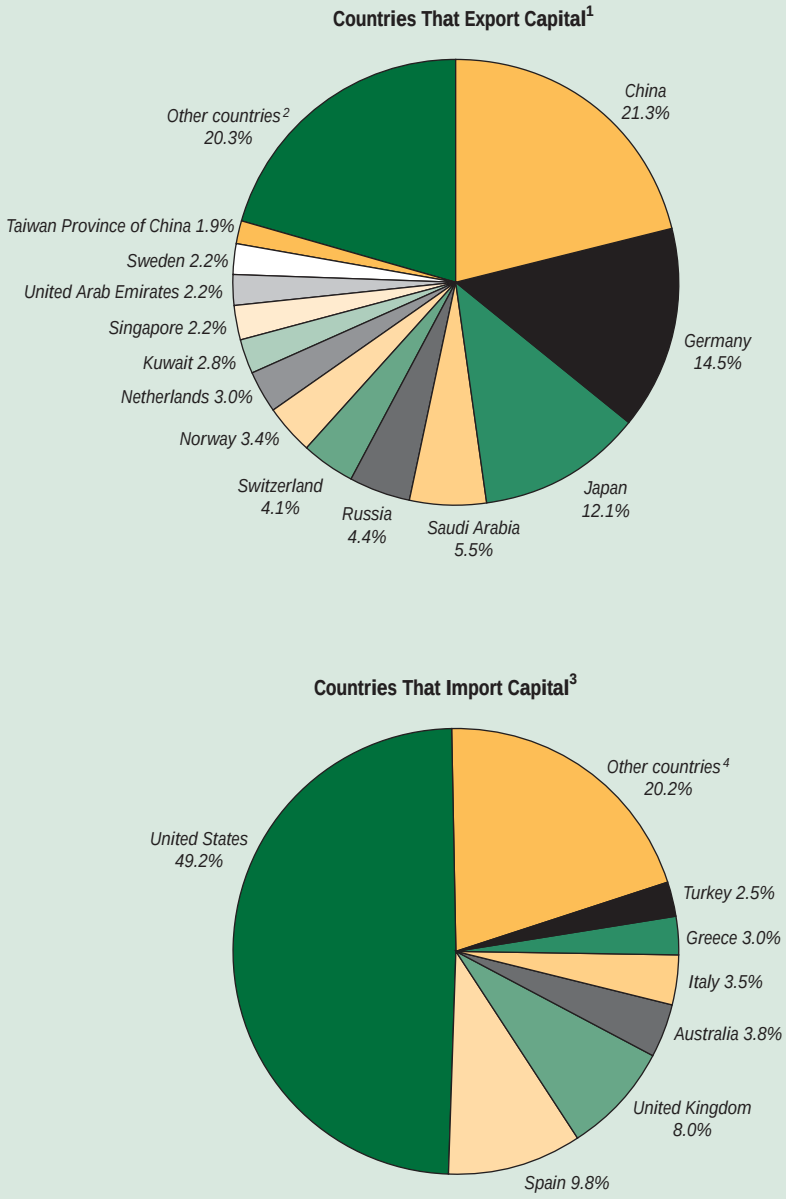
Emerging Markets

Figures

Tables

Financial Soundness Indicators

Figure 1. Major Net Exporters and Importers of Capital in 2007



Source: IMF, World Economic Outlook database as of September 25, 2008.

[1]As measured by countries' current account surplus (assuming errors and omissions are part of the capital and financial accounts).

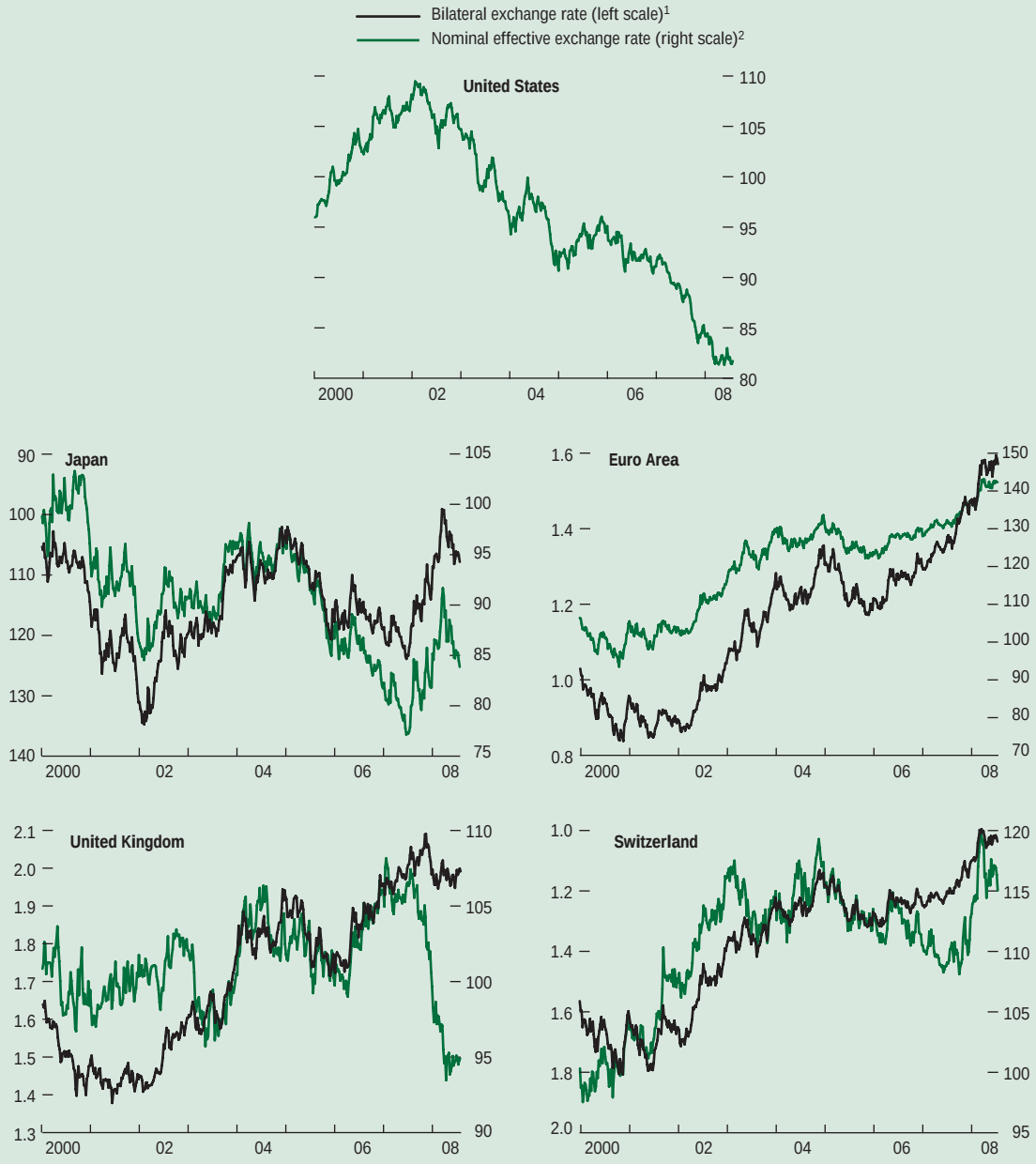
[2]Other countries include all countries with shares of total surplus less than 1.9 percent.

[3]As measured by countries' current account deficit (assuming errors and omissions are part of the capital and financial accounts).

[4]Other countries include all countries with shares of total deficit less than 2.5 percent.

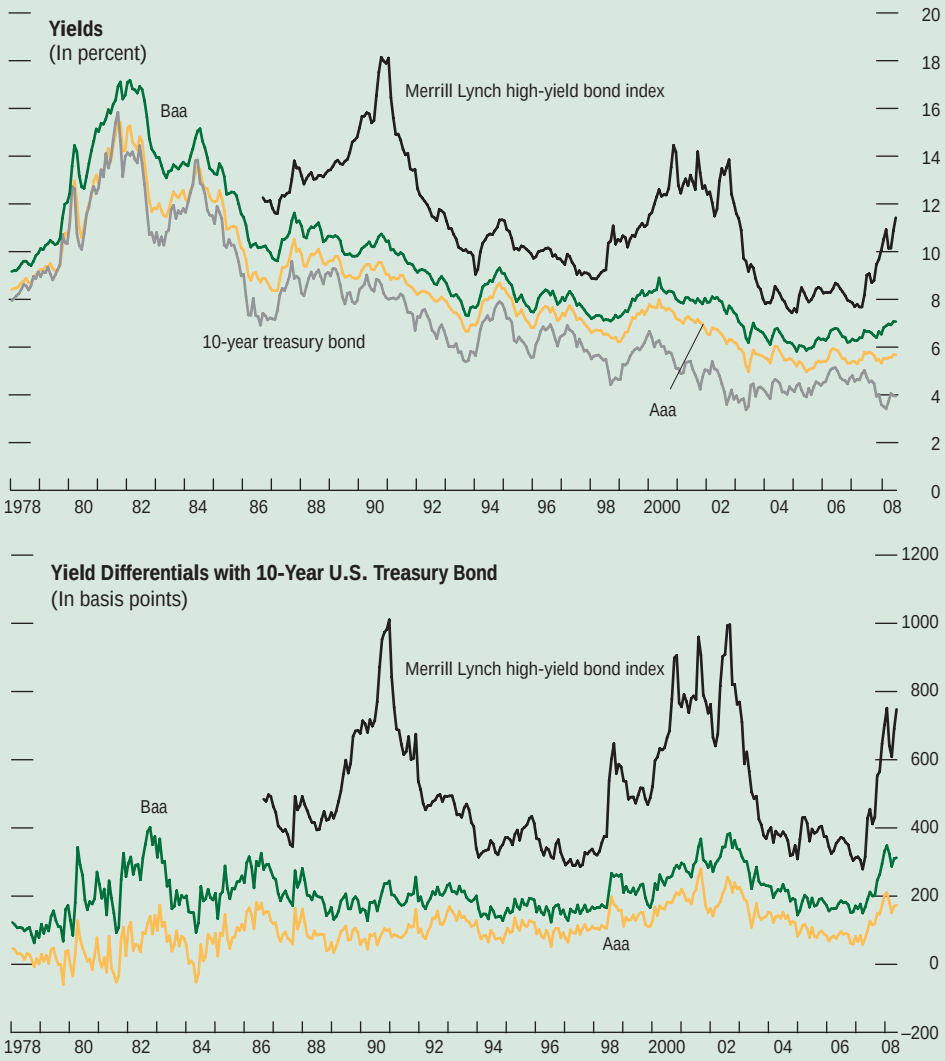
Figure 2. Exchange Rates: Selected Major Industrial Countries

(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.
[1]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.
[2]2000 = 100; constructed using 1999–2001 trade weights.

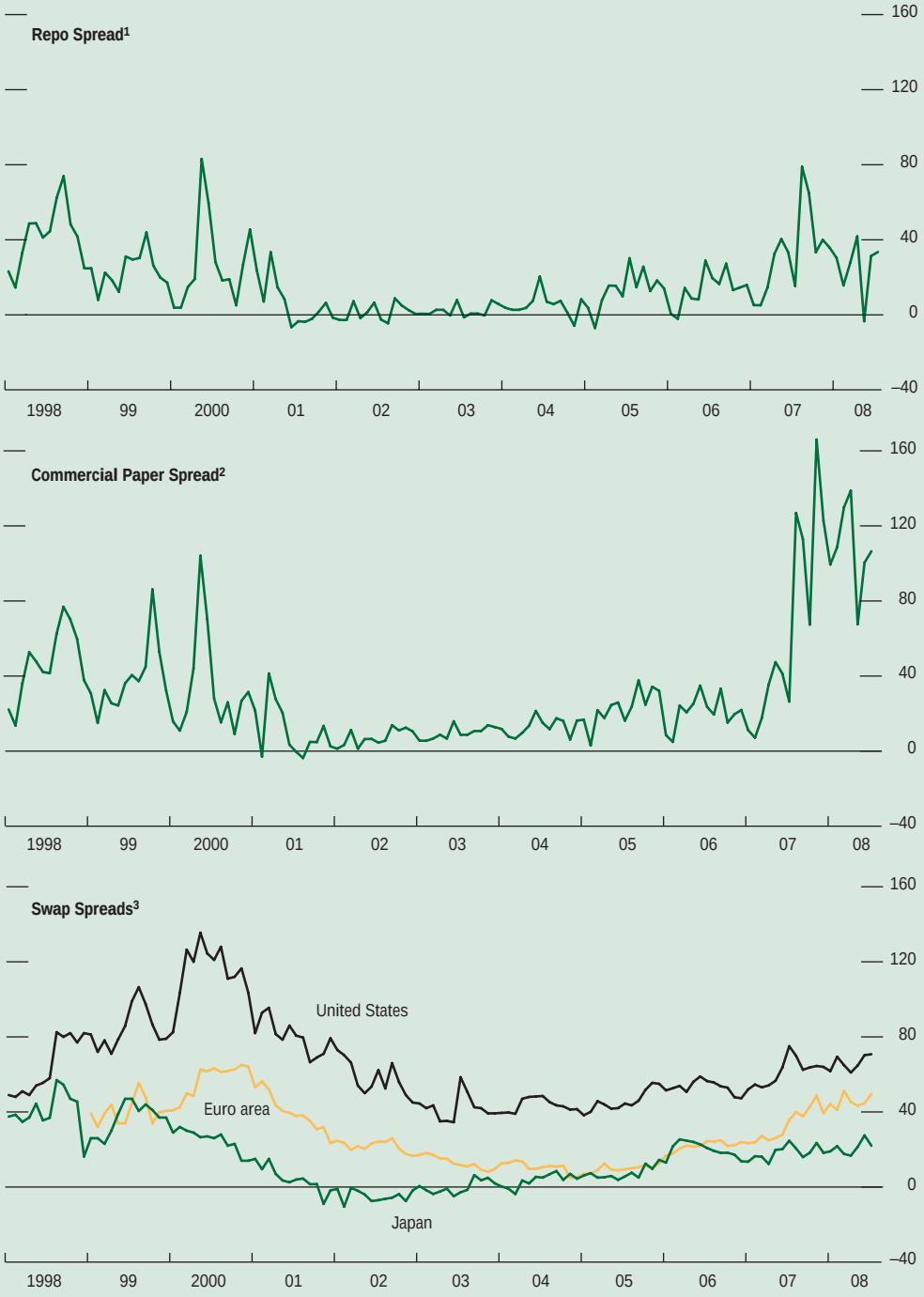
Figure 3. United States: Yields on Corporate and Treasury Bonds
(Monthly data)



Sources: Bloomberg L.P.; and Merrill Lynch.

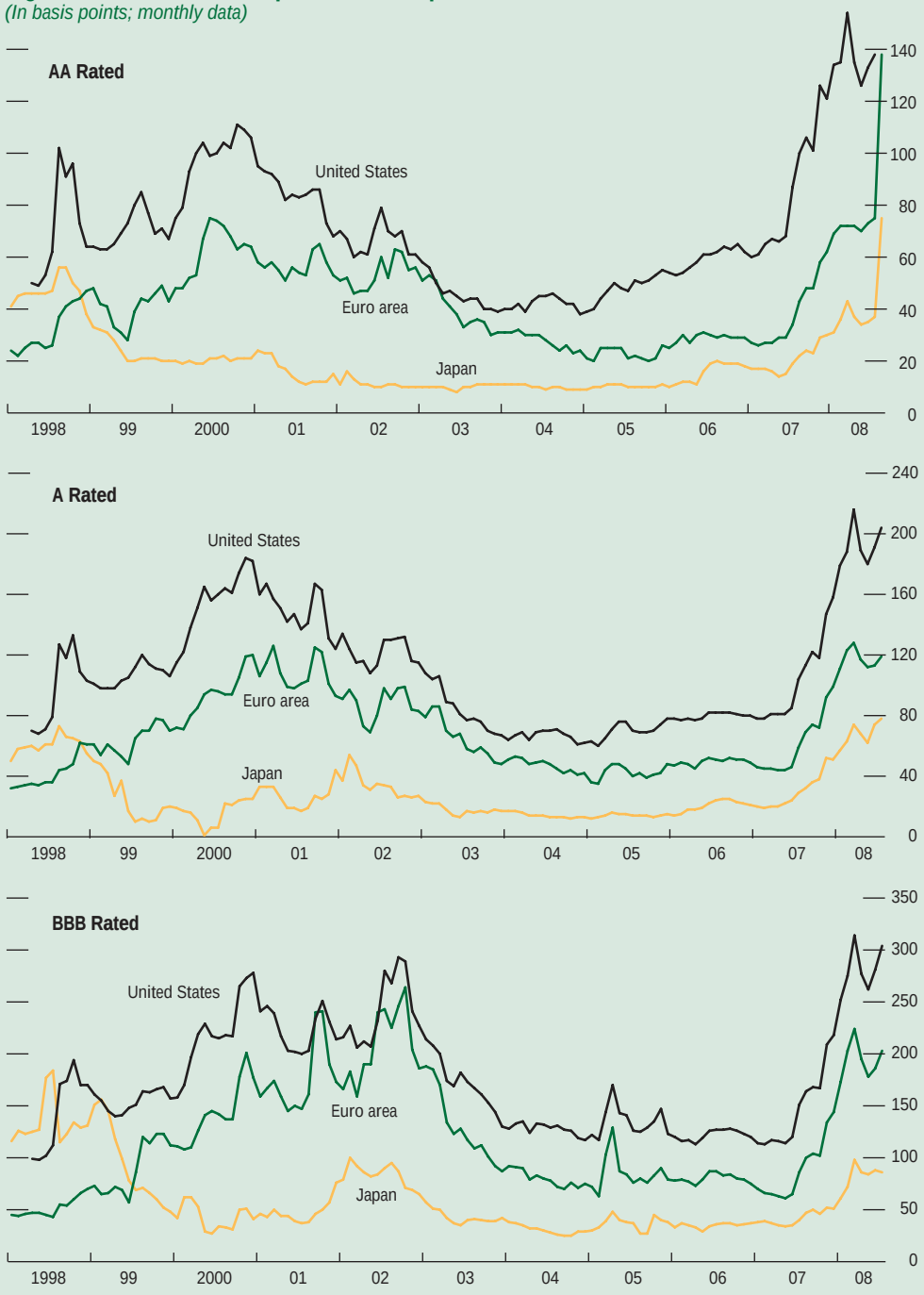
Figure 4. Selected Spreads

(In basis points; monthly data)



Sources: Bloomberg L.P.; and Merrill Lynch.
[1]Spread between yields on three-month U.S. treasury repo and on three-month U.S. treasury bill.
[2]Spread between yields on 90-day investment-grade commercial paper and on three-month U.S. treasury bill.
[3]Spread over 10-year government bond.

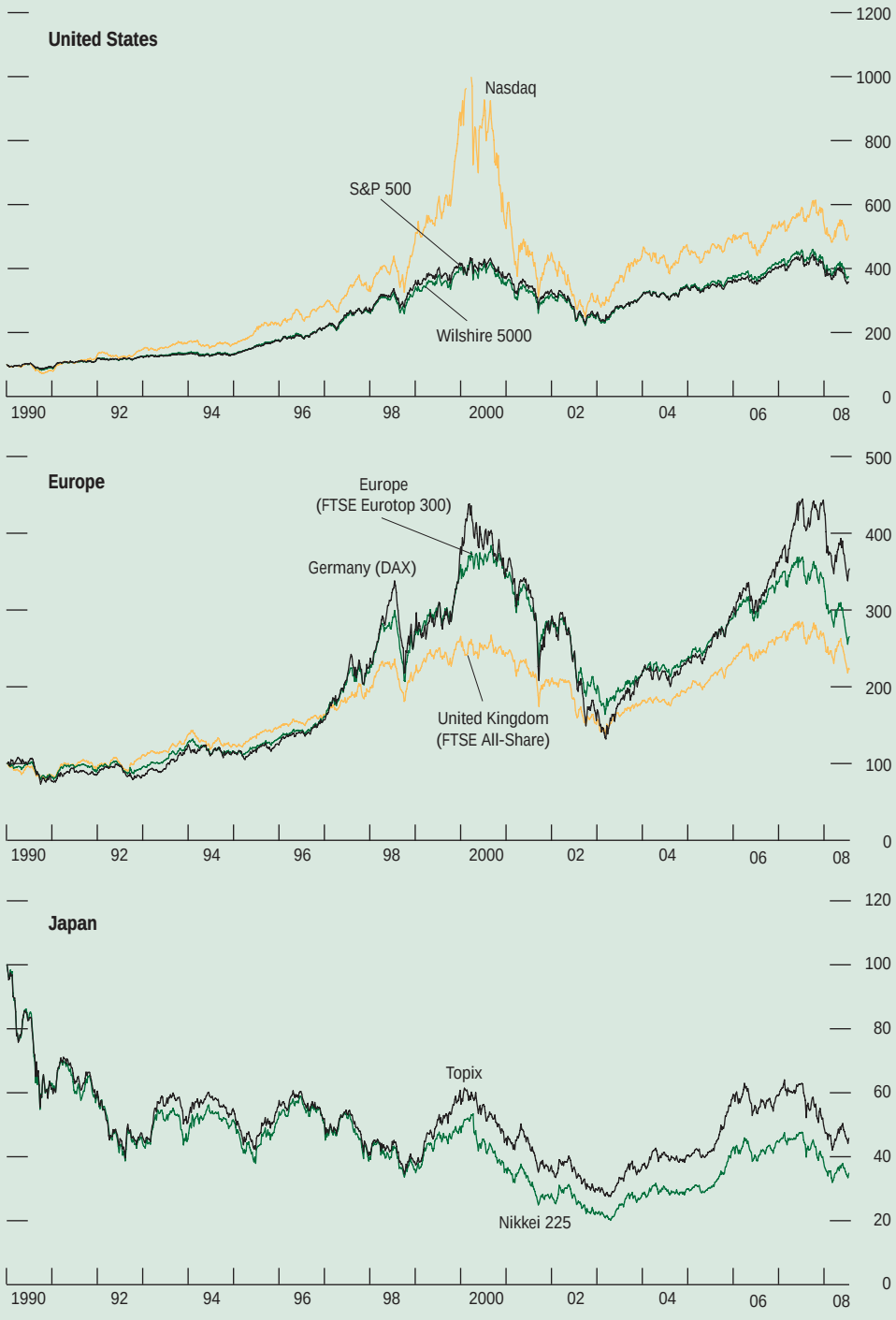
Figure 5. Nonfinancial Corporate Credit Spreads
(In basis points; monthly data)



Source: Merrill Lynch.

Figure 6. Equity Markets: Price Indices

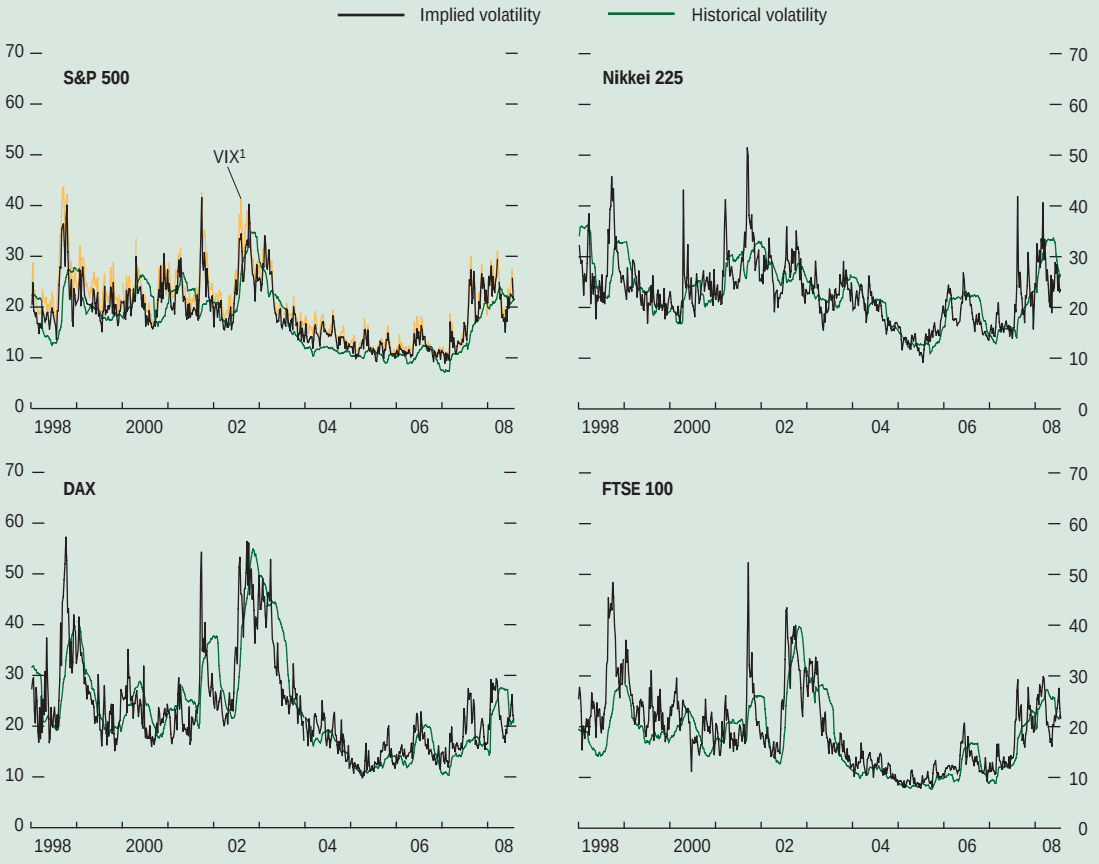
(January 1, 1990 = 100; weekly data)



Source: Bloomberg L.P.

Figure 7. Implied and Historical Volatility in Equity Markets

(Weekly data)



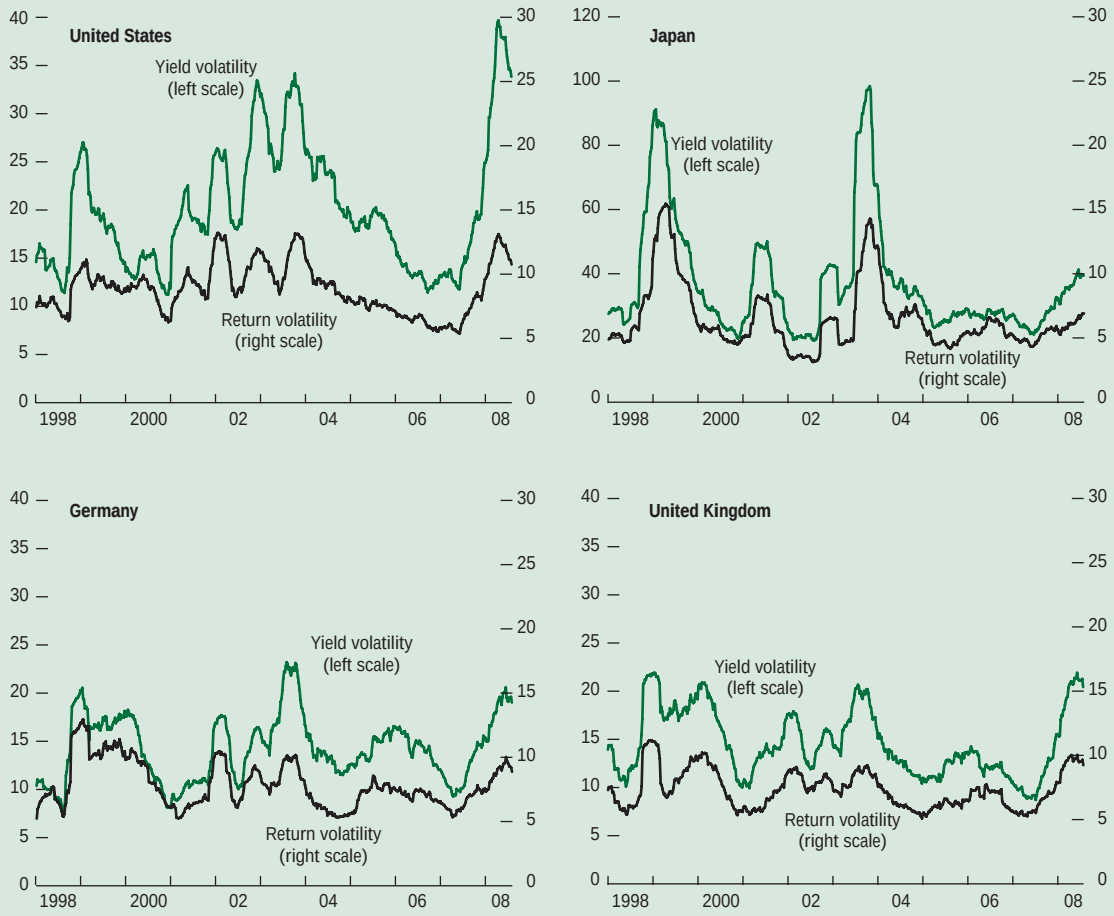
Sources: Bloomberg L.P.; and IMF staff estimates.

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.

[1]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[1]

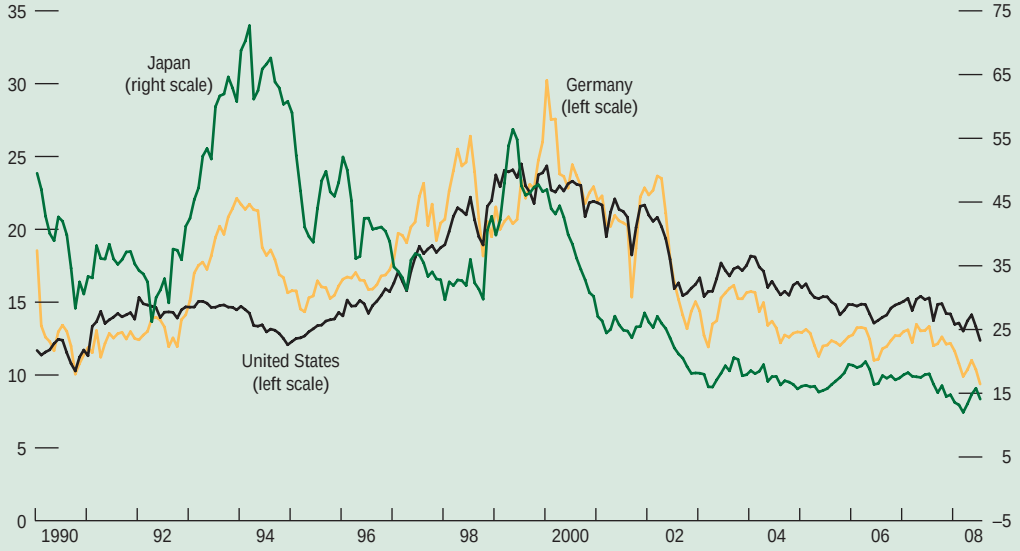
(Weekly data)



Sources: Bloomberg L.P.; and Datastream.

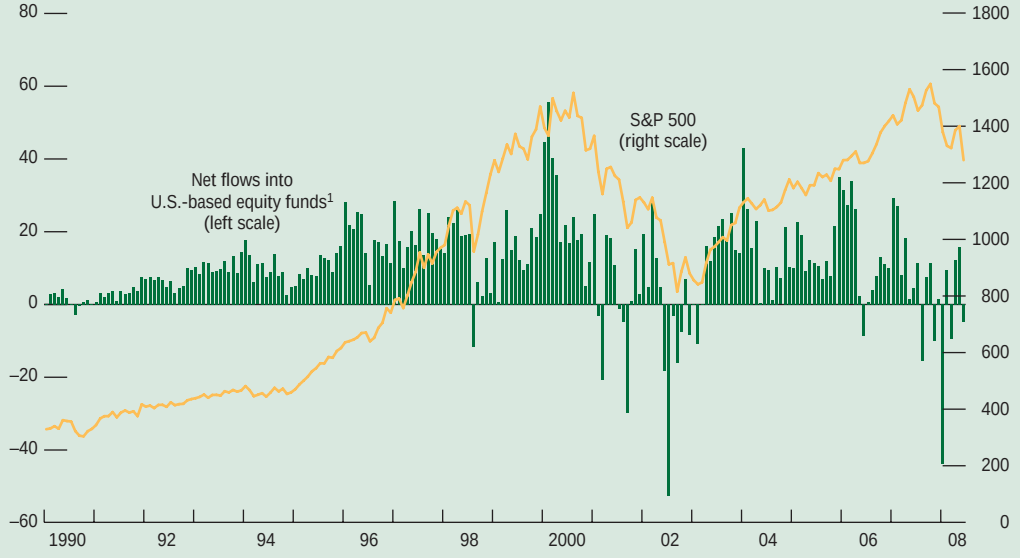
[1]Volatility calculated as a rolling 100-day annualized standard deviation of changes in yield and returns on 10-year government bonds. Returns are based on 10-plus-year government bond indices.

Figure 9. Twelve-Month Forward Price/Earnings Ratios



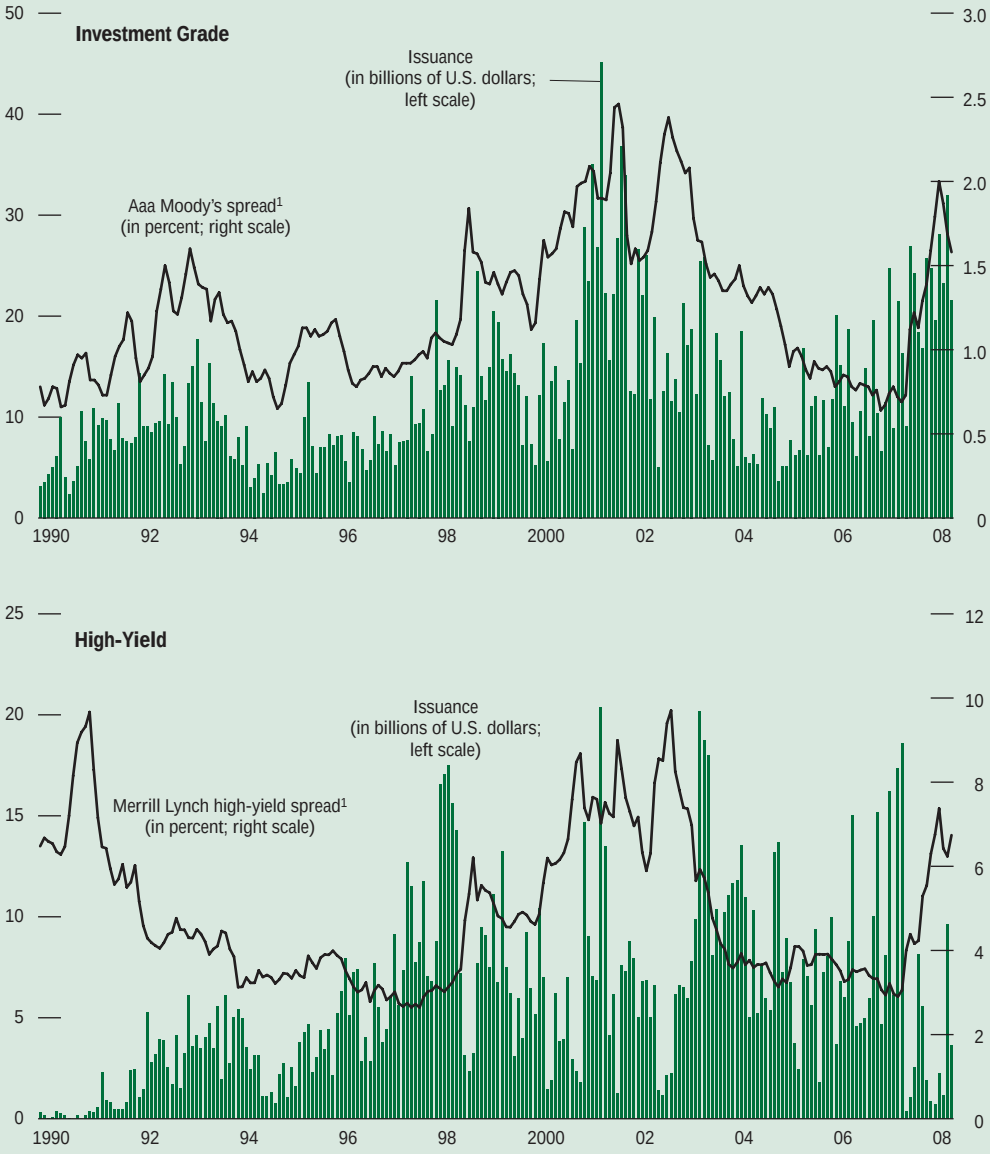
Source: I/B/E/S.

Figure 10. Flows into U.S.-Based Equity Funds



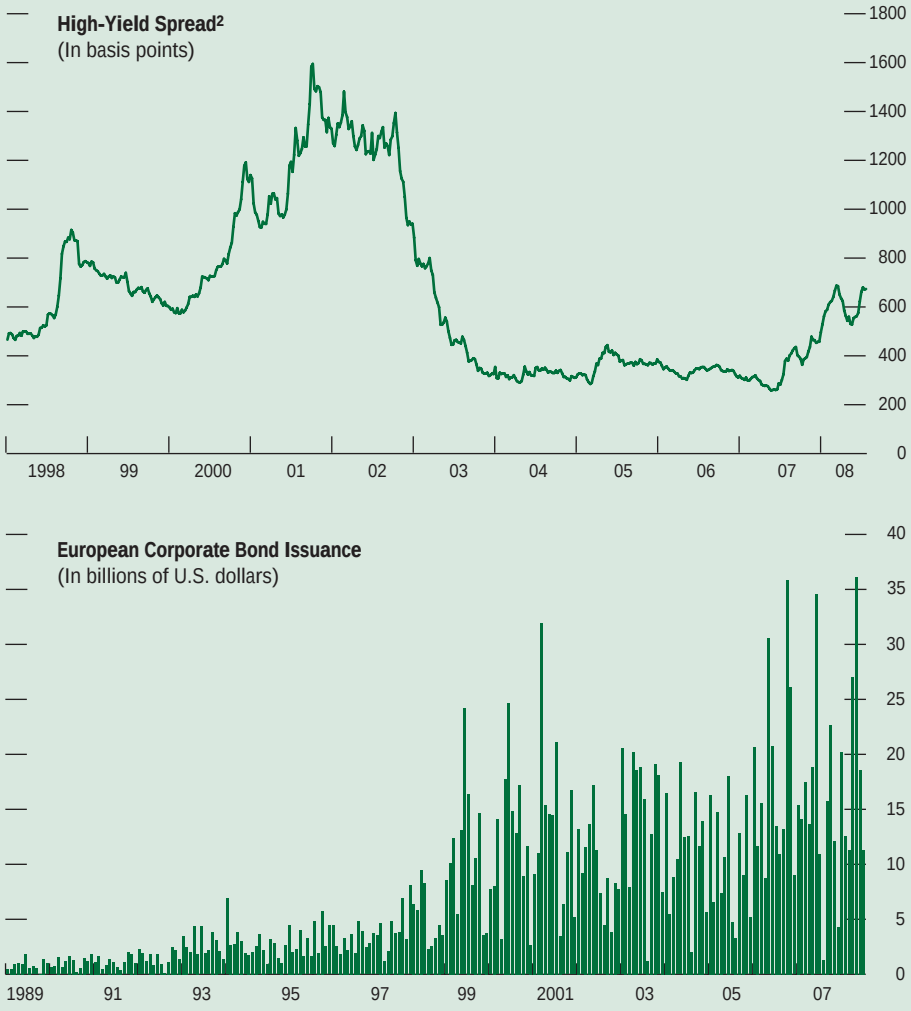
Sources: Investment Company Institute; and Datastream.
[1]In billions of U.S. dollars.

Figure 11. United States: Corporate Bond Market



Sources: Board of Governors of the Federal Reserve System; and Bloomberg L.P.
[1]Spread against yield on 10-year U.S. government bonds.

Figure 12. Europe: Corporate Bond Market[1]

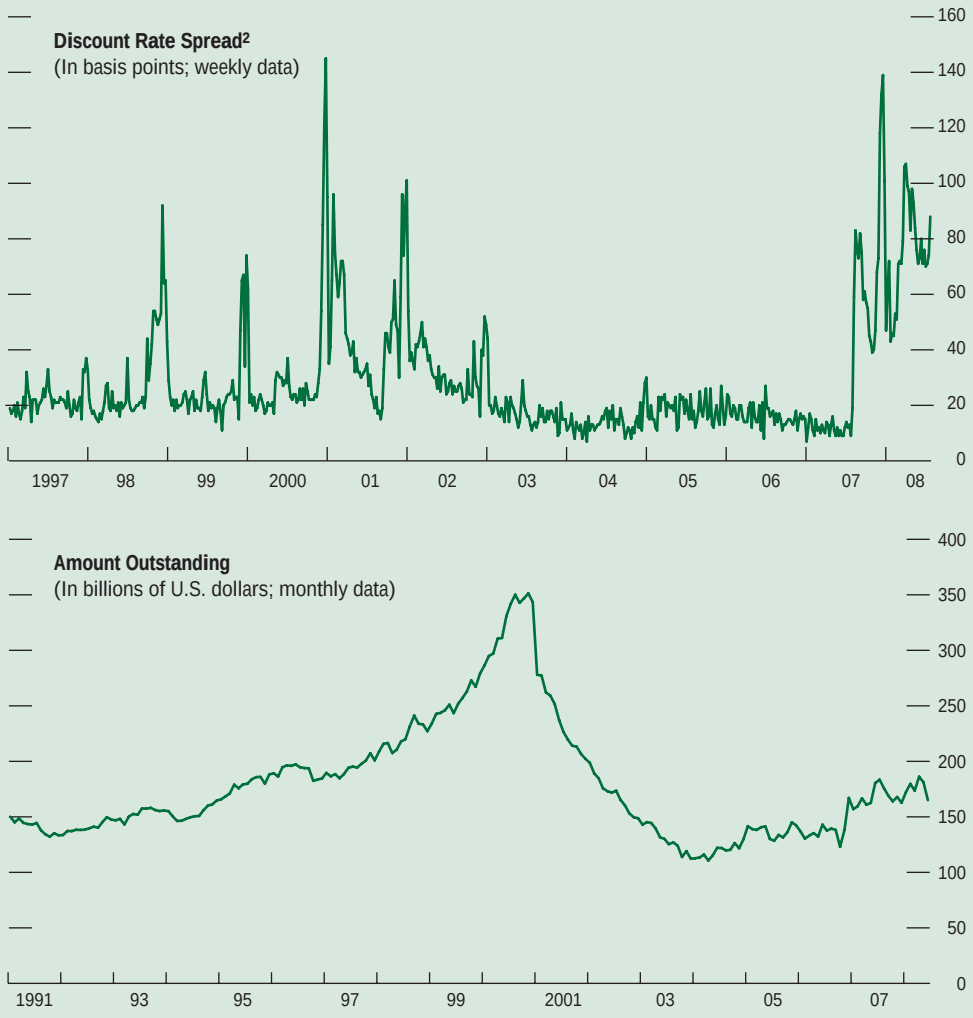


Sources: DCM Analytics; and Datastream.

[1]Nonfinancial corporate bonds.

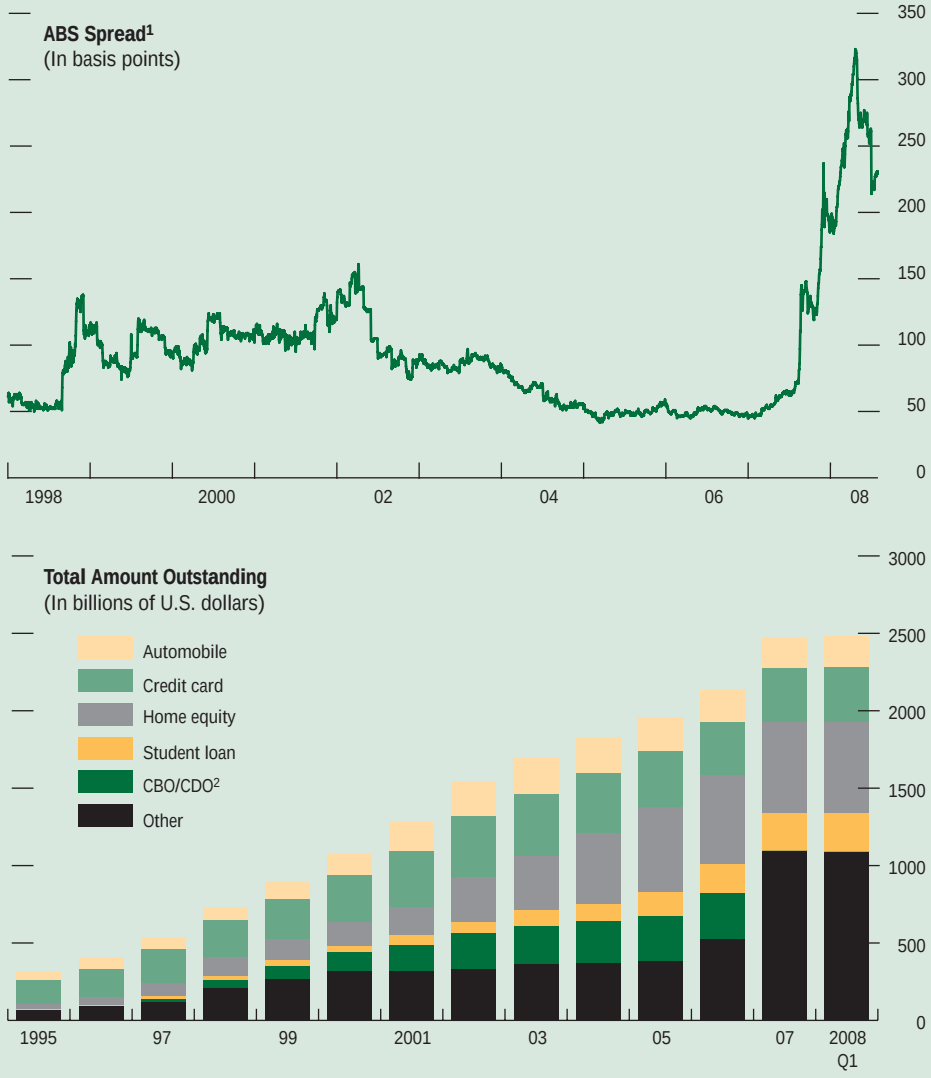
[2]Spread between yields on a Merrill Lynch High-Yield European Issuers Index bond and a 10-year German government benchmark bond.

Figure 13. United States: Commercial Paper Market[1]



Source: Board of Governors of the Federal Reserve System.
[1]Nonfinancial commercial paper.
[2]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.
[1]Merrill Lynch AAA Asset-Backed Master Index (fixed rate) option-adjusted spread.
[2]Collateralized bond/debt obligations; for 2007 and 2008 Q1, CBO/CDO amount outstanding is included in Other.

Table 1. Global Capital Flows: Inflows and Outflows[1]

(In billions of U.S. dollars)

	Inflows										
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
United States											
Direct investment	105.6	179.0	289.4	321.3	167.0	84.4	63.8	146.0	112.6	242.0	237.5
Portfolio investment	333.1	187.6	285.6	436.6	428.3	427.6	550.2	867.3	832.0	1,126.9	1,145.1
Other investment	265.7	54.2	167.2	280.4	187.5	283.2	244.4	519.9	302.7	692.3	675.0
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	704.4	420.8	742.2	1,038.2	782.9	795.2	858.3	1,533.2	1,247.3	2,061.1	2,057.7
Canada											
Direct investment	11.5	22.7	24.8	66.1	27.7	22.1	7.2	–0.7	27.2	62.8	111.8
Portfolio investment	11.7	16.6	2.7	10.3	24.2	11.9	14.1	41.8	7.8	27.9	–32.5
Other investment	28.0	5.4	–10.8	0.8	7.8	5.1	12.3	–3.9	29.8	30.8	56.8
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	51.2	44.8	16.6	77.2	59.7	39.0	33.6	37.1	64.8	121.5	136.0
Japan											
Direct investment	3.2	3.3	12.3	8.2	6.2	9.1	6.2	7.8	3.2	–6.8	22.2
Portfolio investment	79.2	56.1	126.9	47.4	60.5	–20.0	81.2	196.7	183.1	198.6	196.6
Other investment	68.0	–93.3	–265.1	–10.2	–17.6	26.6	34.1	68.3	45.9	–89.1	48.9
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	150.4	–34.0	–125.9	45.4	49.1	15.7	121.5	272.8	232.3	102.6	267.7
United Kingdom											
Direct investment	37.5	74.7	89.3	122.2	53.8	25.5	27.6	77.9	195.6	146.1	224.9
Portfolio investment	43.7	35.2	183.9	255.6	69.6	76.2	155.6	159.9	240.3	292.4	420.9
Other investment	322.2	110.5	90.0	414.6	327.0	109.1	396.7	741.2	936.2	862.2	1,554.2
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	403.4	220.3	363.3	792.4	450.5	210.8	579.9	979.0	1,372.1	1,300.7	2,200.0
Euro area											
Direct investment	. . .	. . .	216.3	416.3	199.8	185.0	153.2	121.4	189.2	258.7	391.0
Portfolio investment	. . .	. . .	305.1	268.1	318.3	298.4	383.3	520.0	682.4	1,008.8	891.7
Other investment	. . .	. . .	198.4	340.3	238.1	59.9	198.0	355.8	798.7	881.8	1,255.8
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	. . .	. . .	719.8	1,024.7	756.3	543.2	734.5	997.1	1,670.3	2,149.3	2,538.5
Emerging Markets and Developing Countries[2]											
Direct investment	191.4	186.7	212.0	212.0	227.9	190.1	203.8	276.4	374.2	464.0	532.5
Portfolio investment	146.3	37.9	103.9	94.9	13.7	–13.9	84.8	133.3	201.3	336.6	441.8
Other investment	142.9	–117.9	–83.7	–7.3	–59.0	3.4	126.4	211.1	184.6	383.8	955.1
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	480.7	106.8	232.2	299.6	182.7	179.6	415.0	620.9	760.0	1,184.5	1,929.4

Sources: IMF, International Financial Statistics and World Economic Outlook databases as of September 25, 2008.

[1]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.

[2]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										
1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
–104.8	–142.6	–224.9	–159.2	–142.4	–154.5	–149.6	–316.2	–36.2	–241.2	–333.3
–116.9	–130.2	–122.2	–127.9	–90.6	–48.6	–123.1	–177.4	–257.5	–499.0	–294.6
–262.8	–74.2	–165.6	–273.1	–144.7	–87.9	–54.3	–510.1	–267.0	–513.9	–661.9
–1.0	–6.7	8.7	–0.3	–4.9	–3.7	1.5	2.8	14.1	2.4	–0.1
–485.5	–353.8	–504.1	–560.5	–382.6	–294.7	–325.4	–1,000.9	–546.6	–1,251.7	–1,289.9
–23.1	–34.1	–17.3	–44.5	–36.2	–26.8	–23.6	–42.6	–29.7	–39.3	–54.0
–8.6	–15.1	–15.6	–43.0	–24.4	–18.6	–13.8	–18.9	–44.1	–69.2	–42.8
–16.2	9.4	10.2	–4.2	–10.7	–7.9	–14.2	–7.1	–16.6	–31.0	–55.1
2.4	–5.0	–5.9	–3.7	–2.2	0.2	3.3	2.8	–1.3	–0.8	–3.9
–45.4	–44.8	–28.5	–95.4	–73.4	–53.2	–48.4	–65.8	–91.7	–140.3	–155.8
–26.1	–24.6	–22.3	–31.5	–38.5	–32.0	–28.8	–31.0	–45.4	–50.2	–73.5
–47.1	–95.2	–154.4	–83.4	–106.8	–85.9	–176.3	–173.8	–196.4	–71.0	–123.5
–192.0	37.9	266.3	–4.1	46.6	36.4	149.9	–48.0	–106.6	–86.2	–260.6
–6.6	6.2	–76.3	–49.0	–40.5	–46.1	–187.2	–160.9	–22.3	–32.0	–36.5
–271.6	–75.8	13.4	–168.0	–139.2	–127.7	–242.3	–413.6	–370.8	–239.4	–494.1
–60.9	–122.8	–202.5	–246.3	–61.8	–50.3	–65.6	–98.2	–91.7	–89.5	–269.1
–85.0	–53.2	–34.3	–97.2	–124.7	1.2	–58.4	–259.2	–291.5	–366.9	–255.6
–277.8	–22.9	–97.1	–426.8	–255.5	–151.0	–415.6	–596.9	–931.6	–776.7	–1,520.0
3.9	0.3	1.0	–5.3	4.5	0.6	2.6	–0.4	–1.7	1.3	–2.6
–419.8	–198.6	–332.9	–775.6	–437.6	–199.5	–537.1	–954.7	–1,316.5	–1,231.8	–2,047.2
. . .	. . .	–348.8	–413.7	–298.0	–163.8	–165.4	–205.1	–459.7	–448.0	–552.0
. . .	. . .	–341.7	–385.3	–255.0	–163.2	–318.3	–428.1	–512.4	–667.8	–585.1
. . .	. . .	–30.1	–165.9	–243.6	–220.8	–284.0	–392.6	–689.8	–906.4	–1,152.9
. . .	. . .	11.6	16.2	16.4	–3.0	32.8	15.6	22.9	–2.6	–6.0
. . .	. . .	–709.1	–948.8	–780.1	–550.8	–735.0	–1,010.2	–1,639.0	–2,024.8	–2,296.0
–41.7	–27.2	–35.3	–41.7	–41.4	–32.9	–37.5	–86.7	–115.1	–213.7	–245.6
–110.2	–9.4	–43.9	–103.9	–105.7	–88.3	–131.6	–161.2	–265.7	–525.3	–497.0
–128.9	35.3	–61.6	–124.2	42.9	20.0	–131.3	–203.4	–261.1	–409.4	–788.0
–91.4	–29.8	–102.0	–138.0	–124.7	–195.1	–364.0	–508.5	–595.9	–754.5	–1,256.3
–372.2	–31.2	–242.9	–407.8	–228.9	–296.4	–664.3	–959.7	–1,237.8	–1,902.9	–2,786.9

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	2008 Q1
Amounts outstanding of international debt securities by currency of issue							
U.S. dollar	4,123.9	4,536.9	4,905.3	5,380.4	6,399.4	7,553.3	7,733.6
Japanese yen	433.2	487.7	530.1	471.7	486.9	577.7	668.5
Pound sterling	618.2	776.3	980.6	1,062.2	1,449.1	1,708.5	1,723.4
Canadian dollar	51.6	79.3	112.4	146.6	177.9	266.2	265.0
Swedish krona	11.1	15.8	20.9	23.2	34.3	46.7	50.8
Swiss franc	159.2	195.6	227.9	208.6	253.7	301.7	343.3
Euro	3,283.1	4,824.7	6,209.1	6,306.2	8,301.7	10,535.8	11,429.2
Other	151.9	216.6	285.0	354.5	454.4	609.5	648.7
Total	8,832.1	11,133.0	13,271.3	13,953.4	17,557.4	21,599.4	22,862.5
Net issues of international debt securities by currency of issue							
U.S. dollar	423.5	413.1	368.4	475.1	1,018.9	1,154.0	180.3
Japanese yen	–17.5	3.3	26.9	3.8	19.4	67.2	6.3
Pound sterling	52.4	84.4	132.8	197.6	222.7	228.0	28.8
Canadian dollar	3.6	15.5	25.5	29.4	32.1	51.1	8.9
Swedish krona	1.1	2.0	3.4	6.2	7.0	9.4	0.4
Swiss franc	8.0	15.8	12.7	13.1	28.1	24.5	1.7
Euro	491.9	777.5	917.2	986.0	1,201.1	1,153.0	105.1
Other	30.6	38.0	52.2	86.9	79.2	105.2	28.5
Total	993.7	1,349.6	1,539.0	1,798.1	2,608.7	2,792.4	360.1
Announced international syndicated credit facilities by nationality of borrower							
All countries	1,296.9	1,241.4	1,806.7	2,232.3	2,121.8	2,134.1	344.4
Industrial countries	1,199.8	1,131.2	1,637.7	1,991.0	1,824.3	1,676.3	278.9
Of which:							
United States	739.2	606.4	897.2	977.9	848.9	726.4	99.5
Japan	19.5	18.2	27.5	19.3	42.8	53.1	14.6
Germany	84.4	97.6	116.3	131.6	170.8	94.2	9.5
France	64.2	65.2	151.1	170.9	118.0	126.6	30.2
Italy	22.8	46.1	22.8	73.6	26.0	27.4	0.4
United Kingdom	109.9	103.9	151.4	180.6	137.0	166.4	59.2
Canada	34.9	30.2	38.7	71.3	72.7	76.5	13.4

Source: Bank for International Settlements.

Table 3. Selected Indicators on the Size of the Capital Markets, 2007

(In billions of U.S. dollars unless noted otherwise)

	GDP	Total Reserves Minus Gold[1]	Stock Market Capitalization	Debt Securities			Bank Assets	Bonds, Equities, and Bank Assets[2]	Bonds, Equities, and Bank Assets[2] *(In percent of GDP)*
				Public	Private	Total			
World	54,545.1	6,448.0	65,105.6	28,632.1	51,189.8	79,821.9	84,784.5	229,712.0	421.1
European Union	15,688.8	279.7	14,730.9	8,788.0	19,433.3	28,221.3	43,146.3	86,098.5	548.8
Euro area	12,202.6	172.1	10,040.1	7,612.7	15,411.2	23,023.8	30,137.1	63,461.4	520.1
North America	15,243.6	100.5	22,108.8	7,415.8	24,049.2	31,465.0	13,776.4	67,350.3	441.8
Canada	1,436.1	41.0	2,186.6	821.8	764.0	1,585.7	2,582.3	6,354.6	442.5
United States	13,807.6	59.5	19,922.3	6,594.0	23,285.2	29,879.3	11,194.1	60,995.7	441.8
Japan	4,381.6	952.8	4,663.8	7,147.7	2,069.8	9,217.5	7,839.4	21,720.6	495.7
Memorandum items:									
EU countries									
Austria	371.2	10.7	236.4	217.3	438.7	655.9	598.1	1,490.5	401.5
Belgium	454.3	10.4	404.4	515.6	540.3	1,055.9	2,278.8	3,739.1	823.1
Denmark	312.0	32.5	290.9	93.3	598.2	691.5	1,075.2	2,057.6	659.4
Finland	246.3	7.1	359.1	130.1	122.0	252.1	256.4	867.5	352.2
France	2,593.8	45.7	2,737.1	1,447.2	2,919.6	4,366.8	8,685.2	15,789.1	608.7
Germany	3,320.9	44.3	2,105.2	1,700.3	3,905.8	5,606.1	6,492.7	14,204.0	427.7
Greece	313.8	0.6	265.0	453.8	134.3	588.1	503.0	1,356.0	432.1
Ireland	261.2	0.8	143.9	57.3	507.2	564.5	1,481.9	2,190.3	838.4
Italy	2,104.7	28.4	1,072.5	2,019.0	2,201.1	4,220.1	3,746.5	9,039.1	429.5
Luxembourg	49.5	0.1	166.1	0.0	104.7	104.7	774.6	1,045.4	2,110.6
Netherlands	777.2	10.3	574.5	315.6	1,705.6	2,021.2	2,347.6	4,943.4	636.0
Portugal	223.4	1.3	147.2	176.5	270.2	446.7	257.1	850.9	380.8
Spain	1,440.0	11.5	1,799.8	580.0	2,561.6	3,141.7	2,915.6	7,857.1	545.6
Sweden	454.8	27.0	576.9	168.6	492.7	661.3	681.2	1,919.4	422.0
United Kingdom	2,765.4	49.0	3,851.7	913.5	2,931.2	3,844.7	11,052.5	18,748.9	678.0
Emerging market countries[3]	17,281.7	4,910.1	20,950.2	4,908.4	2,911.7	7,820.1	15,003.8	43,774.1	253.3
Of which:									
Asia	7,482.4	2,988.2	13,782.7	2,556.4	1,948.5	4,505.0	9,382.3	27,670.0	369.8
Latin America	3,608.5	445.2	2,292.2	1,456.5	628.4	2,084.9	1,988.7	6,365.8	176.4
Middle East	1,563.8	341.1	1,275.9	39.5	84.3	123.8	1,166.3	2,566.0	164.1
Africa	1,099.8	289.8	1,181.7	89.2	77.0	166.2	646.3	1,994.3	181.3
Europe	3,527.2	845.9	2,417.6	766.7	173.5	940.2	1,820.2	5,178.0	146.8

Sources: World Federation of Exchanges; Bank for International Settlements; IMF, International Financial Statistics (IFS) and World Economic Outlook databases as of September 25, 2008; ©2003 Bureau van Dijk Electronic Publishing-Bankscope; and Standard & Poor's Emerging Markets Database.

[1]Data are from IFS.

[2]Sum of the stock market capitalization, debt securities, and bank assets.

[3]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[1]

(In billions of U.S. dollars)

	Notional Amounts					Gross Market Values				
	End-Dec. 2005	End-June 2006	End-Dec. 2006	End-June 2007	End-Dec. 2007	End-Dec. 2005	End-June 2006	End-Dec. 2006	End-June 2007	End-Dec. 2007
Total	**297,666**	**370,178**	**414,845**	**516,407**	**596,004**	**9,748**	**9,949**	**9,691**	**11,140**	**14,522**
Foreign exchange	**31,360**	**38,127**	**40,271**	**48,645**	**56,238**	**997**	**1,136**	**1,266**	**1,345**	**1,807**
Forwards and forex swaps	15,873	19,407	19,882	24,530	29,144	406	436	469	492	675
Currency swaps	8,504	9,696	10,792	12,312	14,347	453	535	601	619	817
Options	6,984	9,024	9,597	11,804	12,748	138	165	196	235	315
Interest rate[2]	**211,970**	**262,526**	**291,582**	**347,312**	**393,138**	**5,397**	**5,445**	**4,826**	**6,063**	**7,177**
Forward rate agreements	14,269	18,117	18,668	22,809	26,599	22	25	32	43	41
Swaps	169,106	207,588	229,693	272,216	309,588	4,778	4,840	4,163	5,321	6,183
Options	28,596	36,821	43,221	52,288	56,951	597	580	631	700	953
Equity-linked	**5,793**	**6,782**	**7,488**	**8,590**	**8,509**	**582**	**671**	**853**	**1,116**	**1,142**
Forwards and swaps	1,177	1,430	1,767	2,470	2,233	112	147	166	240	239
Options	4,617	5,351	5,720	6,119	6,276	470	523	686	876	903
Commodity[3]	**5,434**	**6,394**	**7,115**	**7,567**	**9,000**	**871**	**718**	**667**	**636**	**753**
Gold	334	456	640	426	595	51	77	56	47	70
Other	5,100	5,938	6,475	7,141	8,405	820	641	611	589	683
Forwards and swaps	1,909	2,188	2,813	3,447	5,629	. . .	. . .	. . .	. . .	. . .
Options	3,191	3,750	3,663	3,694	2,776	. . .	. . .	. . .	. . .	. . .
Credit default swaps	**13,908**	**20,352**	**28,650**	**42,580**	**57,894**	**243**	**294**	**470**	**721**	**2,002**
Single-name instruments	10,432	13,873	17,879	24,239	32,246	171	186	278	406	1,143
Multi-name instruments	3,476	6,479	10,771	18,341	25,648	71	109	192	315	859
Unallocated	**29,199**	**35,997**	**39,740**	**61,713**	**71,225**	**1,659**	**1,685**	**1,609**	**1,259**	**1,642**
Memorandum items:										
Gross credit exposure[4]	n.a.	n.a.	n.a.	n.a.	n.a.	1,900	2,032	2,036	2,672	3,256
Exchange-traded derivatives	31,360	38,127	40,271	48,645	56,238	. . .	. . .	. . .	. . .	. . .

Source: Bank for International Settlements.

[1]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 nonreporting counterparties.

[2]Single-currency contracts only.

[3]Adjustments for double-counting are estimated.

[4]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[1]

(In billions of U.S. dollars)

	Notional Amounts					Gross Market Values				
	End-Dec. 2005	End-June 2006	End-Dec. 2006	End-June 2007	End-Dec. 2007	End-Dec. 2005	End-June 2006	End-Dec. 2006	End-June 2007	End-Dec. 2007
Total	**297,666**	**370,178**	**414,845**	**516,407**	**596,004**	**9,748**	**9,949**	**9,691**	**11,140**	**14,522**
Foreign exchange	**31,360**	**38,127**	**40,271**	**48,645**	**56,238**	**997**	**1,136**	**1,266**	**1,345**	**1,807**
By counterparty										
With other reporting dealers	12,165	15,306	15,532	19,173	21,334	323	368	438	455	594
With other financial institutions	12,721	15,123	16,023	19,144	24,154	412	471	521	557	801
With nonfinancial customers	6,474	7,698	8,716	10,329	10,751	261	297	307	333	412
By remaining maturity										
Up to one year[2]	23,907	29,579	30,270	36,950	40,316	. . .	. . .	. . .	. . .	. . .
One to five years[2]	5,164	5,851	6,702	8,090	8,553	. . .	. . .	. . .	. . .	. . .
Over five years[2]	2,289	2,697	3,299	3,606	7,370	. . .	. . .	. . .	. . .	. . .
By major currency										
U.S. dollar[3]	26,295	31,791	33,755	40,513	46,947	867	969	1,069	1,112	1,471
Euro[3]	12,857	15,344	16,037	18,280	21,806	397	472	509	455	790
Japanese yen[3]	7,575	9,536	9,490	10,602	12,857	255	243	325	389	371
Pound sterling[3]	4,424	5,217	6,135	7,770	7,979	121	148	197	174	260
Other[3]	11,571	14,366	15,124	20,125	22,888	354	439	431	561	723
Interest rate[4]	**211,970**	**262,526**	**291,582**	**347,312**	**393,138**	**5,397**	**5,445**	**4,826**	**6,063**	**7,177**
By counterparty										
With other reporting dealers	91,541	114,826	127,432	148,555	157,245	2,096	2,221	1,973	2,375	2,774
With other financial institutions	95,320	114,930	125,708	153,370	184,396	2,625	2,516	2,223	2,946	3,523
With nonfinancial customers	25,109	32,770	38,441	45,387	51,497	676	708	630	742	879
By remaining maturity										
Up to one year[2]	69,378	90,755	104,098	132,402	127,601	. . .	. . .	. . .	. . .	. . .
One to five years[2]	86,550	101,909	110,314	125,700	134,713	. . .	. . .	. . .	. . .	. . .
Over five years[2]	56,042	69,861	77,170	89,210	130,824	. . .	. . .	. . .	. . .	. . .
By major currency										
U.S. dollar	74,441	88,115	97,430	114,371	129,756	1,515	2,120	1,661	1,851	3,219
Euro	81,442	103,461	111,791	127,648	146,082	2,965	2,299	2,300	2,846	2,688
Japanese yen	25,605	32,581	38,113	48,035	53,099	294	463	297	364	401
Pound sterling	15,060	19,071	22,238	27,676	28,390	344	291	311	627	430
Other	15,422	19,298	22,009	29,581	35,811	279	273	257	375	439
Equity-linked	**5,793**	**6,782**	**7,488**	**8,590**	**8,509**	**582**	**671**	**853**	**1,116**	**1,142**
Commodity[5]	**5,434**	**6,394**	**7,115**	**7,567**	**9,000**	**871**	**718**	**667**	**636**	**753**
Credit default swaps	**13,908**	**20,352**	**28,650**	**42,580**	**57,894**	**243**	**294**	**470**	**721**	**2,002**
Unallocated	**29,199**	**35,997**	**39,740**	**61,713**	**71,225**	**1,659**	**1,685**	**1,609**	**1,259**	**1,642**

Source: Bank for International Settlements.

[1]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 nonreporting counterparties.

[2]Residual maturity.

[3]Counting both currency sides of each foreign exchange transaction means that the currency breakdown sums to twice the aggregate.

[4]Single-currency contracts only.

[5]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
			(In billions of U.S. dollars)			
Notional principal amounts outstanding						
Interest rate futures	5,876.2	5,979.0	7,586.7	8,031.4	7,924.9	7,907.8
Interest rate options	2,741.8	3,277.8	3,639.9	4,623.5	3,755.5	4,734.2
Currency futures	33.8	37.7	42.3	31.7	36.7	74.4
Currency options	120.4	133.4	118.6	49.2	22.4	21.4
Stock market index futures	172.2	195.9	210.9	291.6	346.9	377.5
Stock market index options	337.7	394.5	808.7	947.4	1,510.6	1,149.2
Total	9,282.0	10,018.2	12,407.1	13,974.8	13,597.0	14,264.6
North America	4,852.3	4,841.2	6,347.9	7,395.1	6,930.6	8,168.6
Europe	2,241.2	2,828.0	3,587.3	4,397.1	4,008.9	4,198.0
Asia-Pacific	1,990.1	2,154.0	2,235.7	1,882.5	2,407.8	1,611.8
Other	198.4	195.0	236.2	300.1	249.7	286.2
			(In millions of contracts traded)			
Annual turnover						
Interest rate futures	561.0	612.2	701.6	760.0	672.7	781.2
Interest rate options	225.5	151.1	116.8	129.7	118.0	107.7
Currency futures	99.6	73.7	73.6	54.5	37.1	43.5
Currency options	23.3	26.3	21.1	12.1	6.8	7.0
Stock market index futures	114.8	93.8	115.9	178.0	204.9	225.2
Stock market index options	187.3	172.3	178.2	195.0	322.5	481.5
Total	1,211.5	1,129.4	1,207.1	1,329.3	1,362.0	1,646.0
North America	455.0	428.3	463.5	530.0	462.8	461.3
Europe	354.8	391.7	482.8	525.9	604.7	718.6
Asia-Pacific	126.4	115.9	126.9	170.9	207.7	331.3
Other	275.5	193.4	134.0	102.5	86.8	134.9

Source: Bank for International Settlements.

2001	2002	2003	2004	2005	2006	2007	2008 Q1
			(In billions of U.S. dollars)				
9,269.5	9,955.6	13,123.7	18,164.9	20,708.8	24,476.2	26,769.6	26,794.8
12,492.8	11,759.5	20,793.7	24,604.1	31,588.3	38,116.5	44,281.7	45,391.2
65.6	47.0	79.9	103.5	107.6	161.4	158.5	164.2
27.4	27.4	37.9	60.7	66.1	78.6	132.7	193.6
344.2	365.7	549.4	635.3	784.1	1,045.4	1,131.9	1,160.9
1,575.4	1,701.7	2,203.4	3,025.1	4,533.9	6,565.5	8,106.8	7,745.1
23,775.0	23,856.9	36,787.9	46,593.7	57,788.7	70,443.7	80,581.3	81,449.7
16,203.5	13,720.2	19,504.4	27,608.9	36,385.2	42,551.4	43,991.3	38,894.2
6,141.8	8,801.6	15,407.1	16,308.6	17,973.5	23,217.1	30,568.1	36,682.9
1,318.4	1,206.0	1,659.9	2,426.9	3,004.5	4,049.6	4,971.0	4,790.5
111.2	129.1	216.5	249.3	425.5	625.6	1,050.9	1,082.0
			(In millions of contracts traded)				
1,057.5	1,152.1	1,576.8	1,902.6	2,110.4	2,621.2	3,076.6	820.9
199.6	240.3	302.3	361.0	430.8	566.7	663.3	198.6
49.0	42.6	58.8	83.7	143.0	231.1	353.1	102.1
10.5	16.1	14.3	13.0	19.4	24.3	46.4	17.4
337.1	530.6	725.8	804.5	918.7	1,233.7	1,930.2	629.6
1,148.2	2,235.5	3,233.9	2,980.1	3,139.8	3,177.5	3,815.6	851.9
2,801.9	4,217.2	5,911.8	6,144.9	6,762.1	7,854.5	9,885.2	2,620.5
675.6	912.2	1,279.8	1,633.6	1,926.8	2,541.8	3,146.5	881.1
957.7	1,075.1	1,346.5	1,412.7	1,592.9	1,947.4	2,560.2	816.1
985.1	2,073.1	3,111.6	2,847.6	2,932.4	2,957.1	3,592.5	772.3
183.4	156.7	174.0	251.0	310.0	408.2	586.0	150.9

Table 7. United States: Sectoral Balance Sheets

(In percent)

	2002	2003	2004	2005	2006	2007
Corporate sector						
Debt/net worth	49.7	47.7	44.4	42.0	40.7	40.2
Short-term debt/total debt	29.9	26.7	26.5	25.2	25.1	25.9
Interest burden[1]	14.4	11.8	8.6	6.8	6.3	6.4
Household sector						
Net worth/assets	81.5	81.7	81.3	80.9	80.5	80.0
Equity/total assets	21.0	24.3	24.4	23.9	24.5	23.4
Equity/financial assets	34.1	38.5	39.0	38.6	39.2	37.1
Net worth/disposable personal income	498.8	540.0	553.6	568.8	578.2	556.2
Home mortgage debt/total assets	12.6	12.8	13.3	13.9	14.3	14.6
Consumer credit/total assets	4.2	3.9	3.8	3.6	3.5	3.5
Total debt/financial assets	29.9	29.0	29.8	30.9	31.2	31.7
Debt-service burden[2]	13.4	13.6	13.6	14.0	14.3	14.3
Banking sector[3]						
Credit quality						
Nonperforming loans[4]/total loans	1.5	1.2	0.9	0.8	0.8	1.0
Net loan losses/average total loans	1.1	0.9	0.7	0.6	0.4	0.5
Loan-loss reserve/total loans	1.9	1.8	1.5	1.3	1.2	1.2
Net charge-offs/total loans	1.1	0.9	0.6	0.6	0.4	0.6
Capital ratios						
Total risk-based capital	12.8	12.8	12.6	12.3	12.4	12.2
Tier 1 risk-based capital	10.0	10.1	10.0	9.9	9.8	9.5
Equity capital/total assets	9.2	9.2	10.1	10.3	10.2	10.3
Core capital (leverage ratio)	7.8	7.9	7.8	7.9	7.9	7.6
Profitability measures						
Return on average assets (ROA)	1.3	1.4	1.3	1.3	1.3	0.9
Return on average equity (ROE)	14.5	15.3	13.7	12.9	13.0	9.1
Net interest margin	4.1	3.8	3.6	3.6	3.4	3.4
Efficiency ratio[5]	55.8	56.5	58.0	57.2	56.3	59.1

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.

[1]Ratio of net interest payments to pre-tax income.

[2]Ratio of debt payments to disposable personal income.

[3]FDIC-insured commercial banks.

[4]Loans past due 90+ days and nonaccrual.

[5]Noninterest expense less amortization of intangible assets as a percent of net interest income plus noninterest income.

Table 8. Japan: Sectoral Balance Sheets[1]

(In percent)

	FY2002	FY2003	FY2004	FY2005	FY2006	FY2007
Corporate sector						
Debt/shareholders' equity (book value)	146.1	121.3	121.5	101.7	98.2	97.1
Short-term debt/total debt	39.0	37.8	36.8	36.4	35.3	34.1
Interest burden[2]	27.8	22.0	18.4	15.6	15.2	16.2
Debt/operating profits	1,370.0	1,079.2	965.9	839.9	820.4	798.6
Memorandum item:						
Total debt/GDP[3]	100.9	90.9	96.4	85.6	89.6	83.4
Household sector						
Net worth/assets	84.4	84.5	84.6	84.9	85.0	. . .
Equity	3.5	4.9	5.7	8.7	8.8	. . .
Real estate	34.6	32.9	31.4	29.9	29.6	. . .
Net worth/net disposable income	725.2	728.5	723.0	739.0	744.1	. . .
Interest burden[4]	5.1	4.9	4.8	4.6	4.7	. . .
Memorandum items:						
Debt/equity	448.2	317.6	268.4	174.5	170.1	. . .
Debt/real estate	45.1	47.0	49.0	50.6	50.6	. . .
Debt/net disposable income	134.2	133.2	131.5	131.6	130.9	. . .
Debt/net worth	18.5	18.3	18.2	17.8	17.6	. . .
Equity/net worth	4.1	5.8	6.8	10.2	10.3	. . .
Real estate/net worth	41.0	38.9	37.1	35.2	34.8	. . .
Total debt/GDP[3]	79.4	77.5	76.1	76.2	75.2	. . .
Banking sector						
Credit quality						
Nonperforming loans[5]/total loans	7.4	5.8	4.0	2.9	2.5	2.4
Capital ratio						
Stockholders' equity/assets	3.3	3.9	4.2	4.9	5.3	4.5
Profitability measures						
Return on equity (ROE)[6]	–19.5	–2.7	4.1	11.3	8.5	6.1

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.*

[1]Data are fiscal year beginning April 1. Stock data on households are only available through FY2006.

[2]Interest payments as a percent of operating profits.

[3]Revised due to the change in GDP figures.

[4]Interest payments as a percent of disposable income.

[5]Nonperforming loans are based on figures reported under the Financial Reconstruction Law.

[6]Net income as a percentage of stockholders' equity (no adjustment for preferred stocks, etc.).

Table 9. Europe: Sectoral Balance Sheets[1]

(In percent)

	2002	2003	2004	2005	2006	2007
Corporate sector						
Debt/equity[2]	76.0	73.2	71.1	72.7	75.7	. . .
Short-term debt/total debt	35.3	35.2	35.0	37.1	39.1	. . .
Interest burden[3]	18.4	17.1	17.4	18.1	19.8	. . .
Debt/operating profits	339.3	328.5	326.4	348.4	381.5	. . .
Memorandum items:						
Financial assets/equity	1.4	1.5	1.5	1.5	1.6	. . .
Liquid assets/short-term debt	77.3	84.6	92.7	96.5	94.2	. . .
Household sector						
Net worth/assets	83.6	83.7	83.9	84.5	84.8	. . .
Equity/net worth	11.0	11.6	11.5	12.2	12.1	. . .
Equity/net financial assets	32.7	34.1	33.9	34.7	34.3	. . .
Interest burden[4]	6.1	6.0	5.7	5.7	5.8	. . .
Memorandum items:						
Nonfinancial assets/net worth	65.9	65.8	66.0	64.8	64.8	. . .
Debt/net financial assets	54.8	53.0	52.7	48.4	47.8	. . .
Debt/income	98.2	100.7	105.5	106.6	110.5	. . .
Banking sector[5]						
Credit quality						
Nonperforming loans/total loans	2.5	2.3	2.4	2.4	2.3	1.9
Loan-loss reserve/nonperforming loans	81.5	73.0	68.1	57.0	58.7	78.5
Loan-loss reserve/total loans	2.4	2.4	2.4	1.4	1.3	1.4
Capital ratios						
Equity capital/total assets	3.1	2.9	3.8	4.4	4.4	4.5
Capital funds/liabilities	5.4	5.0	5.7	6.7	6.6	6.7
Profitability measures						
Return on assets, or ROA (after tax)	0.4	0.5	0.5	0.6	0.6	0.6
Return on equity, or ROE (after tax)	9.0	11.3	13.5	14.2	14.7	12.5
Net interest margin	1.6	1.5	1.1	1.3	1.2	1.2
Efficiency ratio[6]	69.0	73.1	64.8	59.4	58.0	60.7

Sources: ©2003 Bureau van Dijk Electronic Publishing-Bankscope; and IMF staff estimates.

[1]GDP-weighted average for France, Germany, and the United Kingdom, unless otherwise noted.

[2]Corporate equity adjusted for changes in asset valuation.

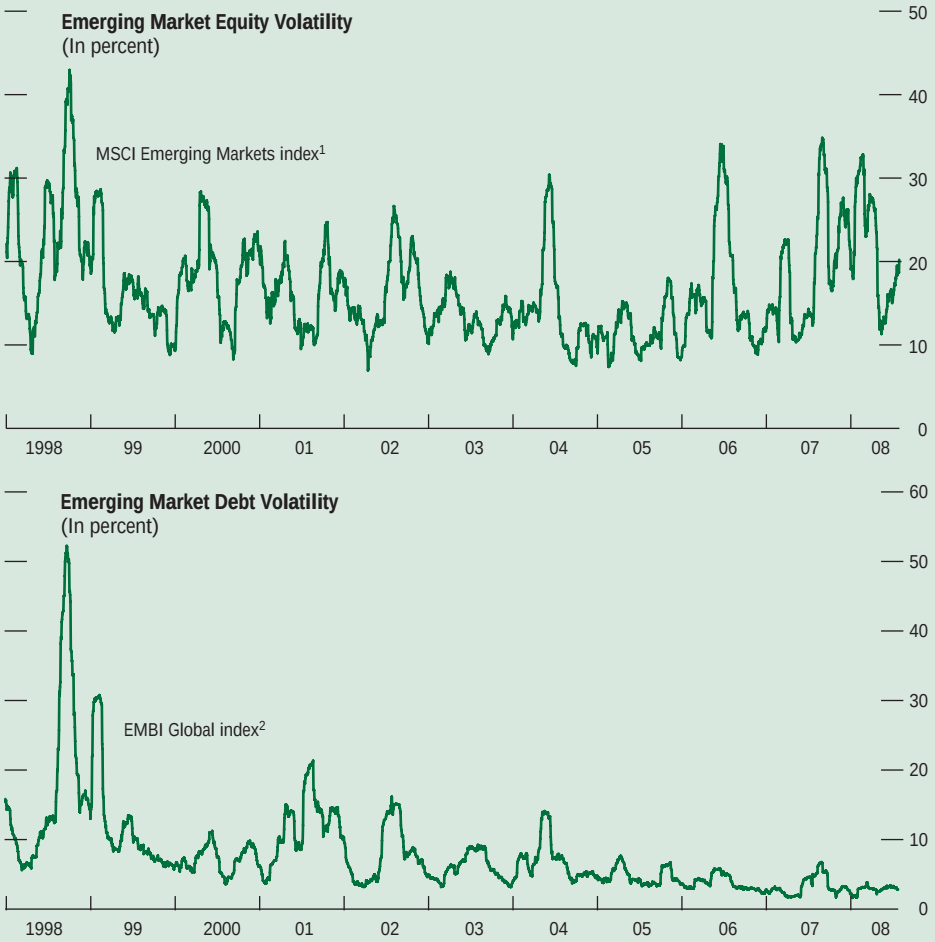
[3]Interest payments as a percent of gross operating profits.

[4]Interest payments as percent of disposable income.

[5]Fifty largest European banks. Data availability may restrict coverage to fewer than 50 banks for specific indicators.

[6]Cost-to-income ratio.

Figure 15. Emerging Market Volatility Measures

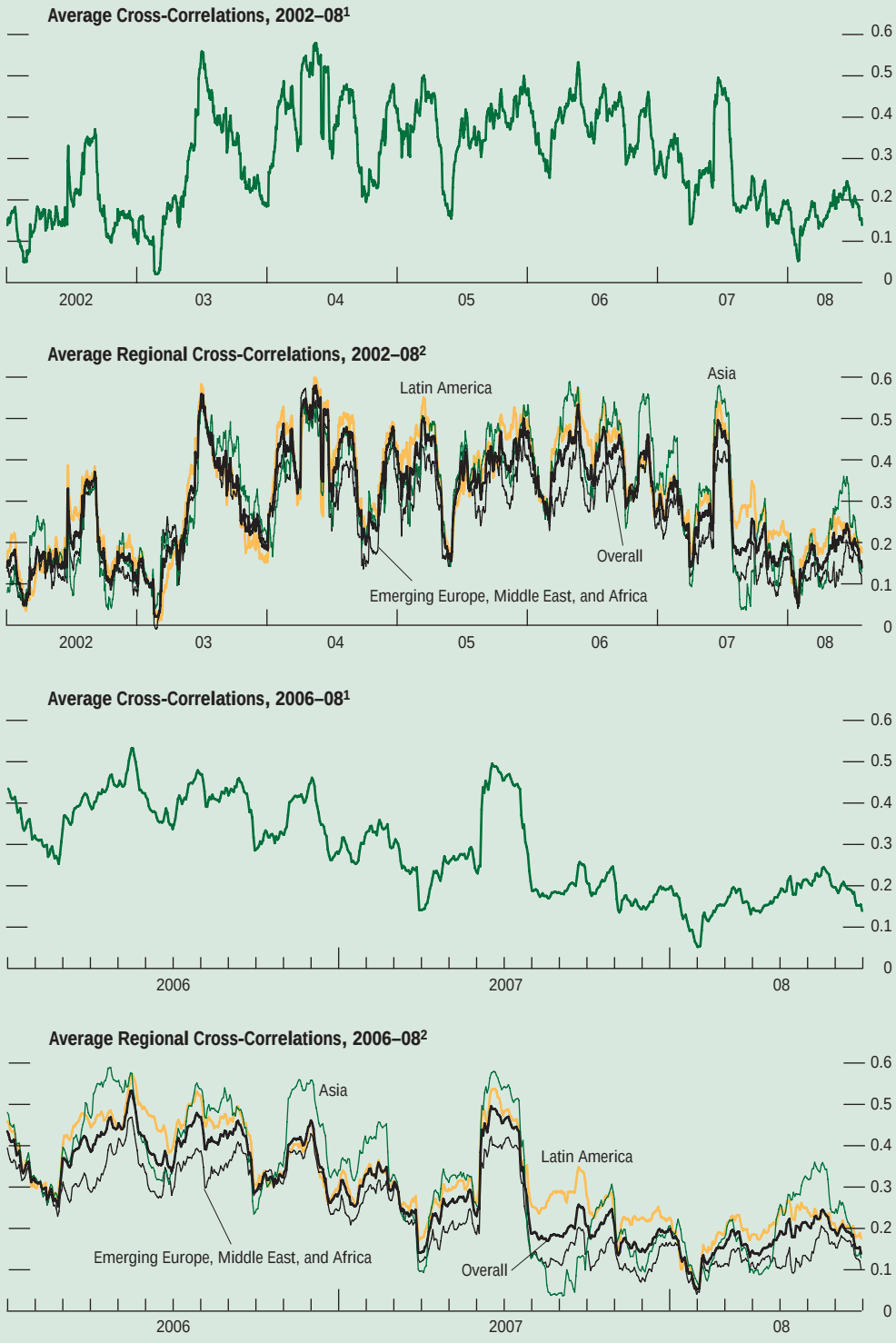


Sources: For "Emerging Market Equity Volatility," Morgan Stanley Capital International (MSCI); and IMF staff estimates. For "Emerging Market Debt Volatility," JPMorgan Chase & Co.; and IMF staff estimates.

[1]Data utilize the MSCI Emerging Markets index in U.S. dollars to calculate 30-day rolling volatilities.

[2]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.
[1]Thirty-day moving simple average across all pair-wise return correlations of 20 constituents included in the EMBI Global.
[2]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

	2008 End of Period		2007 End of Period		End of Period					12-Month High	12-Month Low	All-Time High[1]	All-Time Low[1]
	Q1	Q2	Q3	Q4	2003	2004	2005	2006	2007				
World	**1,437.4**	**1,402.1**	**1,633.6**	**1,588.8**	**1,036.3**	**1,169.3**	**1,257.8**	**1,483.6**	**1,588.8**	**1,682.4**	**1,378.6**	**1,682.4**	**423.1**
Emerging Markets	**1,104.6**	**1,087.1**	**1,204.9**	**1,245.6**	**442.8**	**542.2**	**706.5**	**912.7**	**1,245.6**	**1,338.5**	**956.9**	**1,338.5**	**175.3**
Latin America	**4,316.1**	**4,751.5**	**4,139.6**	**4,400.4**	**1,100.9**	**1,483.6**	**2,150.0**	**2,995.7**	**4,400.4**	**5,195.4**	**3,143.7**	**5,195.4**	**185.6**
Argentina	3,120.7	4,187.7	3,284.1	2,918.8	933.6	1,163.0	1,857.1	3,084.1	2,918.8	4,187.7	2,396.5	4,187.7	152.6
Brazil	3,648.3	4,292.5	3,430.6	3,867.2	802.0	1,046.6	1,569.4	2,205.4	3,867.2	4,727.6	2,354.3	4,727.6	84.1
Chile	1,972.2	1,714.7	1,840.5	1,802.8	800.6	997.3	1,180.7	1,492.4	1,802.8	2,057.9	1,478.6	2,057.9	183.0
Colombia	590.0	607.1	598.1	619.3	108.6	245.0	495.7	549.8	619.3	734.0	498.2	734.0	41.2
Mexico	6,288.2	5,947.3	6,192.4	5,992.1	1,873.1	2,715.6	3,943.6	5,483.3	5,992.1	6,775.7	5,021.7	6,775.7	308.9
Peru	1,306.7	1,320.9	1,320.0	1,248.7	344.1	343.4	441.3	671.4	1,248.7	1,488.3	968.6	1,488.3	73.5
Venezuela	163.4	163.4	161.6	163.4	103.8	151.0	107.4	174.1	163.4	180.2	156.9	278.4	56.1
Asia	**439.0**	**396.7**	**513.4**	**513.7**	**206.4**	**231.6**	**286.2**	**371.5**	**513.7**	**571.9**	**395.2**	**571.9**	**104.1**
China	65.1	62.2	88.6	85.5	25.5	25.3	29.3	52.3	85.5	104.2	57.6	136.9	12.9
India	635.0	544.6	701.9	855.1	246.2	273.1	382.9	560.8	855.1	884.8	544.6	884.8	77.7
Indonesia	3,536.1	3,338.1	3,197.4	3,857.1	831.1	1,324.0	1,579.8	2,449.0	3,857.1	4,053.5	2,544.3	4,053.5	280.0
Korea	469.8	458.0	529.8	516.9	246.0	256.4	386.3	395.2	516.9	562.7	428.1	562.7	59.5
Malaysia	472.4	435.2	501.4	542.4	300.4	335.9	329.0	408.8	542.4	573.5	435.2	573.5	88.3
Pakistan	500.5	397.4	432.6	447.6	188.2	211.7	333.3	333.7	447.6	516.4	348.4	516.4	54.4
Philippines	594.8	478.5	733.0	721.0	303.7	381.1	431.9	620.2	721.0	803.1	478.5	917.3	132.6
Taiwan Province of China	329.4	293.7	363.9	334.0	259.1	257.7	275.8	318.3	334.0	384.5	288.4	483.5	103.9
Thailand	344.9	319.4	347.9	361.0	280.5	263.9	292.0	274.9	361.0	385.7	301.1	669.4	72.0
Europe, Middle East, & Africa	**403.4**	**423.8**	**421.6**	**458.2**	**163.9**	**222.7**	**300.3**	**364.4**	**458.2**	**473.8**	**354.6**	**473.8**	**80.8**
Czech Republic	470.2	491.8	499.1	539.5	152.9	234.8	371.5	408.3	539.5	552.3	421.8	552.3	62.8
Egypt	2,211.9	1,925.6	1,698.0	2,077.9	234.6	505.3	1,215.7	1,389.3	2,077.9	2,309.7	1,484.5	2,309.7	89.9
Hungary	1,423.6	1,325.1	1,892.5	1,738.1	646.9	1,057.0	1,447.0	1,690.0	1,738.1	2,050.8	1,321.0	2,050.8	77.1
Israel	249.9	277.6	250.9	264.0	141.4	167.4	209.3	194.4	264.0	284.4	225.4	284.4	67.6
Jordan	518.5	600.7	427.8	531.4	238.3	379.2	650.6	439.6	531.4	636.0	410.1	760.7	103.1
Morocco	567.2	545.7	455.3	453.9	171.4	189.1	231.3	342.9	453.9	576.9	412.1	576.9	99.6
Poland	2,030.7	1,757.9	2,480.6	2,341.6	1,118.3	1,419.3	1,867.4	2,253.2	2,341.6	2,690.3	1,757.9	2,690.3	99.6
Russia	1,359.5	1,492.8	1,310.1	1,536.4	461.1	479.9	813.4	1,250.3	1,536.4	1,641.5	1,127.0	1,641.5	30.6
South Africa	717.1	716.3	714.3	713.1	296.8	352.4	492.0	641.3	713.1	808.8	631.1	808.8	99.7
Turkey	605,039.3	531,671.2	844,484.4	864,616.4	319,807.8	425,008.5	645,739.1	614,409.1	864,616.4	916,239.3	531,671.2	916,239.3	425.8
Sectors													
Energy	985.1	1,141.6	958.7	1,154.2	287.4	349.0	548.6	760.0	1,154.2	1,255.4	739.5	1,255.4	81.7
Materials	645.9	654.1	687.8	657.9	250.1	265.0	325.4	442.1	657.9	750.5	515.2	750.5	98.5
Industrials	290.9	246.0	353.0	351.1	98.9	128.0	156.1	210.7	351.1	403.8	246.0	403.8	52.6
Consumer discretionary	439.4	403.5	498.1	490.9	233.8	292.3	381.1	422.6	490.9	527.8	403.5	527.8	74.1
Consumer staples	313.3	307.3	317.6	330.2	118.6	147.0	197.0	266.2	330.2	343.1	261.8	343.1	80.4
Health care	437.0	442.6	435.3	458.8	272.5	290.8	393.3	356.3	458.8	476.4	396.2	476.4	83.3
Financials	351.0	326.7	419.7	424.0	138.8	187.9	240.6	328.8	424.0	473.0	326.7	473.0	74.6
Information technology	220.8	204.5	248.6	231.5	149.6	161.5	209.1	231.8	231.5	264.4	192.1	300.0	73.1
Telecommunications	295.6	272.7	299.9	328.0	100.8	131.6	158.9	218.0	328.0	343.2	235.0	343.2	62.9
Utilities	330.2	333.3	363.4	379.2	127.2	149.8	197.0	282.1	379.2	389.1	300.5	389.1	63.1

Table 10 *(continued)*

	Period on Period Percent Change								
	2008 End of period		2007 End of period		End of period				
	Q1	Q2	Q3	Q4	2003	2004	2005	2006	2007
World	**–9.5**	**–2.5**	**1.9**	**–2.7**	**30.8**	**12.8**	**7.6**	**18.0**	**7.1**
Emerging Markets	**–11.3**	**–1.6**	**13.7**	**3.4**	**51.6**	**22.4**	**30.3**	**29.2**	**36.5**
Latin America	**–1.9**	**10.1**	**10.3**	**6.3**	**67.1**	**34.8**	**44.9**	**39.3**	**46.9**
Argentina	6.9	34.2	3.0	–11.1	98.5	24.6	59.7	66.1	–5.4
Brazil	–5.7	17.7	20.1	12.7	102.9	30.5	50.0	40.5	75.3
Chile	9.4	–13.1	–2.7	–2.0	79.7	24.6	18.4	26.4	20.8
Colombia	–4.7	2.9	–1.0	3.5	59.0	125.7	102.3	10.9	12.6
Mexico	4.9	–5.4	–4.7	–3.2	29.8	45.0	45.2	39.0	9.3
Peru	4.6	1.1	21.2	–5.4	88.4	–0.2	28.5	52.1	86.0
Venezuela	0.0	0.0	–9.5	1.1	33.6	45.4	–28.9	62.2	–6.2
Asia	**–14.5**	**–9.6**	**17.8**	**0.1**	**47.1**	**12.2**	**23.5**	**29.8**	**38.3**
China	–23.8	–4.6	40.2	–3.4	80.3	–0.7	15.6	78.7	63.5
India	–25.7	–14.2	17.3	21.8	65.5	11.0	40.2	46.5	52.5
Indonesia	–8.3	–5.6	16.0	20.6	60.0	59.3	19.3	55.0	57.5
Korea	–9.1	–2.5	12.8	–2.4	33.2	4.2	50.6	2.3	30.8
Malaysia	–12.9	–7.9	–1.3	8.2	23.1	11.8	–2.1	24.2	32.7
Pakistan	11.8	–20.6	–6.5	3.5	28.9	12.5	57.5	0.1	34.1
Philippines	–17.5	–19.6	–3.8	–1.6	44.5	25.5	13.3	43.6	16.3
Taiwan Province of China	–1.4	–10.8	3.3	–8.2	36.7	–0.6	7.0	15.4	4.9
Thailand	–4.5	–7.4	11.2	3.7	115.4	–5.9	10.6	–5.9	31.3
Europe, Middle East, & Africa	**–12.0**	**5.1**	**7.7**	**8.7**	**51.2**	**35.8**	**34.9**	**21.3**	**25.8**
Czech Republic	–12.9	4.6	1.8	8.1	31.6	53.6	58.2	9.9	32.1
Egypt	6.5	–12.9	9.3	22.4	140.8	115.4	140.6	14.3	49.6
Hungary	–18.1	–6.9	–3.7	–8.2	20.8	63.4	36.9	16.8	2.8
Israel	–5.3	11.1	7.8	5.2	55.7	18.4	25.0	–7.1	35.8
Jordan	–2.4	15.8	–4.0	24.2	55.3	59.1	71.6	–32.4	20.9
Morocco	25.0	–3.8	8.8	–0.3	23.8	10.4	22.3	48.3	32.4
Poland	–13.3	–13.4	–4.4	–5.6	29.9	26.9	31.6	20.7	3.9
Russia	–11.5	9.8	9.0	17.3	70.3	4.1	69.5	53.7	22.9
South Africa	0.6	–0.1	2.7	–0.2	8.8	18.7	39.6	30.3	11.2
Turkey	–30.0	–12.1	15.4	2.4	88.2	32.9	51.9	–4.9	40.7
Sectors									
Energy	–14.6	15.9	18.8	20.4	76.2	21.4	57.2	38.5	51.9
Materials	–1.8	1.3	22.9	–4.4	36.8	6.0	22.8	35.9	48.8
Industrials	–17.1	–15.4	19.9	–0.5	60.1	29.5	22.0	35.0	66.6
Consumer discretionary	–10.5	–8.2	3.8	–1.4	68.4	25.0	30.4	10.9	16.2
Consumer staples	–5.1	–1.9	5.5	4.0	34.4	24.0	34.0	35.1	24.1
Health care	–4.8	1.3	3.4	5.4	60.5	6.7	35.2	–9.4	28.8
Financials	–17.2	–6.9	12.7	1.0	40.7	35.4	28.1	36.7	28.9
Information technology	–4.6	–7.4	2.1	–6.9	43.9	8.0	29.5	10.9	–0.1
Telecommunications	–9.9	–7.8	15.4	9.4	38.7	30.5	20.8	37.2	50.4
Utilities	–12.9	1.0	6.0	4.3	75.7	17.8	31.5	43.2	34.4

Table 10 *(concluded)*

	2008 End of Period		2007 End of Period		End of Period					12-Month High	12-Month Low	All-Time High[1]	All-Time Low[1]
	Q1	Q2	Q3	Q4	2003	2004	2005	2006	2007				
Developed Markets													
Australia	1,071.1	1,053.8	1,325.4	1,273.7	655.5	797.9	959.6	1,135.1	1,273.7	1,374.4	1,017.1	1,374.4	250.2
Austria	239.0	249.4	295.0	287.7	118.0	185.3	262.7	316.6	287.7	342.2	225.1	348.9	79.7
Belgium	86.3	68.0	105.6	96.5	60.1	77.9	94.8	113.0	96.5	117.7	68.0	121.0	35.4
Canada	1,712.1	1,870.6	1,784.1	1,761.7	1,019.7	1,139.3	1,406.8	1,628.3	1,761.7	1,952.7	1,549.0	1,952.7	338.3
Denmark	3,759.3	3,733.5	4,214.0	4,104.8	1,772.7	2,115.9	2,994.0	3,662.6	4,104.8	4,353.7	3,377.5	4,353.7	556.5
Finland	150.2	127.8	192.9	183.5	97.4	93.9	123.4	140.3	183.5	200.2	126.7	383.1	22.9
France	124.4	117.6	150.5	147.1	93.2	100.6	124.9	147.1	147.1	161.2	116.7	178.6	42.9
Germany	113.5	108.8	136.7	139.7	74.6	79.2	98.2	116.9	139.7	140.8	107.4	163.6	41.4
Greece	115.2	98.9	144.2	148.4	63.6	83.3	108.1	127.3	148.4	150.5	98.0	197.2	38.2
Hong Kong SAR	11,288.0	10,725.6	13,076.5	13,994.0	6,341.3	7,668.5	8,016.2	10,152.8	13,994.0	14,780.4	10,032.2	14,780.4	1,995.5
Ireland	76.5	62.7	98.7	84.8	65.9	85.2	93.5	120.3	84.8	121.2	62.7	126.8	40.5
Italy	91.6	84.3	115.7	112.4	78.1	93.2	106.0	121.4	112.4	123.1	83.9	132.1	39.5
Japan	765.4	834.5	1,031.5	940.1	637.3	699.1	999.3	1,060.2	940.1	1,135.4	726.5	1,655.3	462.1
Netherlands	92.2	82.9	112.5	107.3	68.4	69.3	88.3	101.3	107.3	117.5	82.7	134.9	38.5
New Zealand	108.1	95.0	140.4	131.7	107.6	127.0	130.0	138.2	131.7	145.8	95.0	145.8	56.7
Norway	2,768.7	3,075.8	3,327.3	3,305.9	1,240.9	1,690.3	2,267.7	2,951.8	3,305.9	3,501.4	2,530.4	3,501.4	455.9
Portugal	92.3	77.2	110.4	115.1	66.1	74.7	82.2	105.5	115.1	125.7	77.2	128.0	35.2
Singapore	1,745.7	1,676.6	2,118.9	1,971.8	1,005.1	1,148.1	1,295.4	1,696.1	1,971.8	2,216.4	1,613.5	2,216.4	508.2
Spain	149.0	135.5	164.5	172.2	89.6	104.3	122.1	158.2	172.2	180.3	135.5	180.3	27.4
Sweden	7,463.1	6,585.5	9,669.8	8,429.2	4,675.2	5,785.4	7,489.8	9,047.5	8,429.2	10,459.4	6,585.5	12,250.4	787.2
Switzerland	950.3	915.0	1,175.3	1,117.0	714.3	747.1	994.6	1,159.5	1,117.0	1,228.5	892.9	1,256.8	158.1
United Kingdom	1,698.5	1,665.8	1,934.2	1,920.8	1,348.7	1,453.0	1,685.3	1,865.6	1,920.8	2,011.3	1,609.8	2,016.6	585.4
United States	1,254.8	1,222.8	1,443.6	1,390.9	1,045.4	1,137.4	1,180.6	1,336.3	1,390.9	1,480.2	1,206.6	1,493.0	273.7
					Period on Period Percent Change								
Developed Markets													
Australia	–15.9	–1.6	5.4	–4.1	8.5	21.7	20.3	18.3	12.2	. . .	. . .	. . .	. . .
Austria	–16.9	4.3	–15.2	–2.5	28.5	57.0	41.7	20.5	–9.1	. . .	. . .	. . .	. . .
Belgium	–10.6	–21.2	–11.2	–9.4	8.7	29.5	21.7	19.2	–14.6	. . .	. . .	. . .	. . .
Canada	–2.8	9.3	1.9	–1.3	24.6	11.7	23.5	15.7	8.2	. . .	. . .	. . .	. . .
Denmark	–8.4	–0.7	3.5	–2.7	22.4	19.4	41.5	22.3	12.1	. . .	. . .	. . .	. . .
Finland	–18.2	–14.9	11.5	–5.1	–2.9	–3.6	31.4	13.7	30.8	. . .	. . .	. . .	. . .
France	–15.5	–5.5	–5.9	–2.3	14.6	7.9	24.2	17.8	0.0	. . .	. . .	. . .	. . .
Germany	–18.8	–4.1	–1.6	2.2	33.2	6.1	24.1	19.0	19.5	. . .	. . .	. . .	. . .
Greece	–22.3	–14.2	5.2	2.8	35.8	31.1	29.8	17.7	16.6	. . .	. . .	. . .	. . .
Hong Kong SAR	–19.3	–5.0	18.3	6.6	31.9	20.9	4.5	26.7	37.8	. . .	. . .	. . .	. . .
Ireland	–9.8	–18.0	–20.6	–16.4	16.0	29.2	9.8	28.7	–29.5	. . .	. . .	. . .	. . .
Italy	–18.5	–7.9	–5.0	–2.9	12.2	19.3	13.8	14.6	–7.4	. . .	. . .	. . .	. . .
Japan	–18.6	9.0	–8.9	–9.7	21.6	9.7	42.9	6.1	–11.3	. . .	. . .	. . .	. . .
Netherlands	–14.1	–10.1	–0.9	–4.8	3.6	1.3	27.5	14.7	6.0	. . .	. . .	. . .	. . .
New Zealand	–17.9	–12.1	–0.5	–6.6	19.6	18.0	2.4	6.3	–4.7	. . .	. . .	. . .	. . .
Norway	–16.3	11.1	–1.2	–0.6	38.1	36.2	34.2	30.2	12.0	. . .	. . .	. . .	. . .
Portugal	–19.9	–16.3	–12.2	4.1	15.9	13.1	10.0	28.3	9.2	. . .	. . .	. . .	. . .
Singapore	–11.5	–4.0	4.0	–7.5	31.4	14.2	12.8	30.9	16.3	. . .	. . .	. . .	. . .
Spain	–13.4	–9.1	–1.0	4.4	28.3	16.4	17.0	29.5	8.8	. . .	. . .	. . .	. . .
Sweden	–11.5	–11.8	–3.5	–14.7	32.9	23.7	29.5	20.8	–6.8	. . .	. . .	. . .	. . .
Switzerland	–14.9	–3.7	–3.4	–5.2	18.4	4.6	33.1	16.6	–3.7	. . .	. . .	. . .	. . .
United Kingdom	–11.6	–1.9	–2.3	–0.7	14.4	7.7	16.0	10.7	3.0	. . .	. . .	. . .	. . .
United States	–9.8	–2.5	1.6	–3.8	26.8	8.8	3.8	13.2	4.1	. . .	. . .	. . .	. . .

Source: Data are provided by Morgan Stanley Capital International. Regional and sectoral compositions conform to Morgan Stanley Capital International definitions.

[1]From 1990 or initiation of the index.

Table 11. Foreign Exchange Rates

(Units per U.S. dollar)

	2008 End of Period		2007 End of Period		End of Period					12-Month High	12-Month Low	All-Time High[1]	All-Time Low[1]
	Q1	Q2	Q3	Q4	2003	2004	2005	2006	2007				
Emerging Markets													
Latin America													
Argentina	3.17	3.03	3.15	3.15	2.93	2.97	3.03	3.06	3.15	3.02	3.18	0.98	3.86
Brazil	1.75	1.60	1.83	1.78	2.89	2.66	2.34	2.14	1.78	1.59	2.09	0.00	3.95
Chile	435.24	527.89	510.47	497.95	592.75	555.75	512.00	533.38	497.95	429.55	528.02	295.18	759.75
Colombia	1,831.30	1,913.50	2,024.50	2,018.00	2,780.00	2,354.75	2,286.50	2,240.00	2,018.00	1,655.03	2,202.50	689.21	2,980.00
Mexico	10.64	10.31	10.94	10.91	11.23	11.15	10.63	10.82	10.91	10.27	11.20	2.68	11.67
Peru	2.75	2.96	3.08	3.00	3.46	3.28	3.42	3.20	3.00	2.69	3.17	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
Asia													
China	7.01	6.85	7.51	7.30	8.28	8.28	8.07	7.81	7.30	6.85	7.62	4.73	8.73
India	40.12	43.04	39.77	39.42	45.63	43.46	45.05	44.26	39.42	39.27	43.04	16.92	49.05
Indonesia	9,229.00	9,228.00	9,105.00	9,400.00	8,420.00	9,270.00	9,830.00	8,994.00	9,400.00	9,000.00	9,480.00	1,977.00	16,650.00
Korea	990.30	1,046.05	915.25	936.05	1,192.10	1,035.10	1,010.00	930.00	936.05	900.75	1,049.49	683.50	1,962.50
Malaysia	3.19	3.27	3.41	3.31	3.80	3.80	3.78	3.53	3.31	3.13	3.52	2.44	4.71
Pakistan	62.70	68.40	60.71	61.63	57.25	59.43	59.79	60.88	61.63	60.35	69.70	21.18	64.35
Philippines	41.74	44.96	44.95	41.23	55.54	56.23	53.09	49.01	41.23	40.27	47.13	23.10	56.46
Taiwan Province of China	30.38	30.35	32.67	32.43	33.96	31.74	32.83	32.59	32.43	30.00	33.13	24.48	35.19
Thailand	31.44	33.44	31.88	29.80	39.62	38.92	41.03	35.45	29.80	29.18	33.59	23.15	55.50
Europe, Middle East, & Africa													
Czech Republic	15.98	15.16	19.32	18.20	25.71	22.42	24.55	20.83	18.20	15.10	21.22	17.71	42.17
Egypt	5.45	5.34	5.59	5.53	6.17	6.09	5.74	5.71	5.53	5.33	5.70	3.29	6.25
Hungary	165.14	149.41	175.93	173.42	208.70	181.02	212.97	190.29	173.42	149.41	194.47	90.20	317.56
Israel	3.56	3.35	4.02	3.86	4.39	4.32	4.61	4.22	3.86	3.24	4.33	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	10.13	10.08	10.61	10.43	10.08	11.09	11.94	11.70	10.43	9.75	10.85	7.75	12.06
Poland	2.22	2.13	2.64	2.47	3.73	3.01	3.25	2.90	2.47	2.13	2.86	1.72	4.71
Russia	23.49	23.44	24.86	24.63	29.24	27.72	28.74	26.33	24.63	23.32	25.89	0.98	31.96
South Africa	8.09	7.82	6.87	6.86	6.68	5.67	6.33	7.01	6.86	6.50	8.17	2.50	12.45
Turkey	1.32	1.23	1.21	1.17	1.41	1.34	1.35	1.42	1.17	1.15	1.39	0.00	1.77
Developed Markets													
Australia[2]	0.91	0.96	0.89	0.88	0.75	0.78	0.73	0.79	0.88	0.96	0.79	0.93	0.48
Canada	1.03	1.02	0.99	1.00	1.30	1.20	1.16	1.17	1.00	0.92	1.08	0.92	1.61
Denmark	4.72	4.73	5.23	5.11	5.91	5.49	6.30	5.65	5.11	4.67	5.54	5.01	9.00
Euro area[2]	1.58	1.58	1.43	1.46	1.26	1.36	1.18	1.32	1.46	1.60	1.34	1.31	2.37
Hong Kong SAR	7.78	7.80	7.77	7.80	7.76	7.77	7.75	7.78	7.80	7.75	7.83	7.70	7.83
Japan	99.69	106.21	114.80	111.71	107.22	102.63	117.75	119.07	111.71	97.33	123.41	80.63	159.90
New Zealand[2]	0.79	0.76	0.76	0.77	0.66	0.72	0.68	0.70	0.77	0.82	0.69	0.81	0.39
Norway	5.10	5.09	5.39	5.44	6.67	6.08	6.74	6.24	5.44	4.96	5.97	5.27	9.58
Singapore	1.38	1.36	1.49	1.44	1.70	1.63	1.66	1.53	1.44	1.35	1.53	1.39	1.91
Sweden	5.94	6.01	6.44	6.47	7.19	6.66	7.94	6.85	6.47	5.84	6.98	5.09	11.03
Switzerland	0.99	1.02	1.16	1.13	1.24	1.14	1.31	1.22	1.13	0.98	1.22	1.10	1.82
United Kingdom[2]	1.98	1.99	2.05	1.98	1.79	1.92	1.72	1.96	1.98	2.11	1.94	2.11	1.37

Table 11 *(concluded)*

	Period on Period Percent Change								
	2008 End of period		2007 End of period		End of period				
	Q1	Q2	Q3	Q4	2003	2004	2005	2006	2007
Emerging Markets									
Latin America									
Argentina	–0.6	4.7	–1.9	0.0	14.7	–1.4	–1.9	–1.0	–2.8
Brazil	1.5	9.2	5.2	3.0	22.4	8.9	13.7	9.4	20.0
Chile	14.4	–17.6	3.3	2.5	21.5	6.7	8.5	–4.0	7.1
Colombia	10.2	–4.3	–2.4	0.3	3.1	18.1	3.0	2.1	11.0
Mexico	2.5	3.2	–1.2	0.2	–7.6	0.7	4.8	–1.7	–0.8
Peru	9.0	–7.1	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
Asia									
China	4.1	2.3	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	1.9	0.0	–0.9	–3.1	6.3	–9.2	–5.7	9.3	–4.3
Korea	–5.5	–5.3	0.9	–2.2	–0.5	15.2	2.5	8.6	–0.6
Malaysia	3.5	–2.2	1.3	3.0	0.0	0.0	0.5	7.1	6.7
Pakistan	–1.7	–8.3	–0.4	–1.5	1.7	–3.7	–0.6	–1.8	–1.2
Philippines	–1.2	–7.1	2.8	9.0	–3.5	–1.2	5.9	8.3	18.9
Taiwan Province of China	6.7	0.1	0.6	0.7	2.0	7.0	–3.3	0.7	0.5
Thailand	–5.2	–6.0	–0.6	7.0	8.8	1.8	–5.1	15.7	19.0
Europe, Middle East, & Africa									
Czech Republic	13.9	5.4	9.9	6.1	16.9	14.7	–8.7	17.9	14.4
Egypt	1.6	2.1	1.9	1.0	–25.1	1.3	6.1	0.5	3.2
Hungary	5.0	10.5	3.6	1.4	7.6	15.3	–15.0	11.9	9.7
Israel	8.3	6.2	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	2.9	0.5	–0.1	1.8	–2.7	–9.2	–7.1	2.0	12.3
Poland	11.4	4.3	5.3	7.0	2.6	24.0	–7.2	11.8	17.5
Russia	4.9	0.2	3.6	0.9	9.3	5.5	–3.6	9.2	6.9
South Africa	–15.2	3.5	2.5	0.1	28.2	18.0	–10.5	–9.7	2.1
Turkey	–11.6	8.0	8.8	3.1	17.7	4.7	–0.6	–4.7	21.1
Developed Markets									
Australia	4.3	5.0	4.5	–1.4	33.9	3.8	–6.1	7.6	11.0
Canada	–2.6	0.4	7.4	–0.6	21.2	7.9	3.4	–0.3	16.8
Denmark	8.2	–0.2	5.2	2.2	19.8	7.8	–12.9	11.5	10.5
Euro area	8.2	–0.2	1.2	2.3	20.0	7.6	–12.6	11.4	10.5
Hong Kong SAR	0.2	–0.2	0.6	–0.3	0.4	–0.1	0.2	–0.3	–0.3
Japan	12.1	–6.1	7.3	2.8	10.8	4.5	–12.8	–1.1	6.6
New Zealand	2.6	–3.0	–1.9	1.1	25.0	9.5	–4.8	3.0	8.8
Norway	6.7	0.1	9.4	–0.9	4.1	9.6	–9.8	8.1	14.7
Singapore	4.7	1.2	3.0	3.1	2.1	4.2	–1.9	8.4	6.5
Sweden	8.9	–1.2	6.1	–0.5	20.9	8.0	–16.2	15.9	5.9
Switzerland	14.1	–2.7	4.9	2.7	11.7	8.7	–13.2	7.7	7.5
United Kingdom	–0.1	0.4	1.9	–3.0	10.9	7.4	–10.2	13.7	1.3

Source: Bloomberg L.P.

[1]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.

[2]U.S. dollars per unit.

Table 12. Emerging Market Bond Index: EMBI Global Total Returns Index

	2008 End of Period		2007 End of Period		End of Period					12-Month High	12-Month Low	All-Time High[1]	All-Time Low[1]
	Q1	Q2	Q3	Q4	2003	2004	2005	2006	2007				
EMBI Global	**411**	**408**	**398**	**409**	**283**	**316**	**350**	**384**	**409**	**398**	**348**	**418**	**63**
Latin America													
Argentina	97	93	105	112	67	81	83	126	112	119	90	194	47
Brazil	636	651	622	633	390	446	505	580	633	672	581	672	68
Chile	204	199	190	197	162	172	177	185	197	206	185	206	98
Colombia	313	315	300	309	201	228	256	283	309	327	285	327	70
Dominican Republic	187	187	190	198	99	126	156	184	198	198	185	198	83
Ecuador	834	862	761	811	464	562	636	561	811	889	655	889	61
El Salvador	159	158	159	165	110	123	134	152	165	165	154	165	95
Mexico	390	382	369	377	284	308	333	353	377	395	354	395	58
Panama	691	694	666	691	452	511	567	637	691	712	635	712	56
Peru	641	639	620	633	431	485	514	591	633	667	579	667	52
Uruguay	181	186	182	188	97	129	151	177	188	192	175	192	38
Venezuela	546	565	574	563	393	484	562	634	563	598	527	638	59
Asia													
China	299	295	281	289	241	253	260	271	289	302	273	302	98
Indonesia	160	150	157	159	. . .	121	133	154	159	161	148	161	98
Malaysia	248	244	232	240	194	207	215	224	240	249	225	249	64
Philippines	428	411	409	425	261	280	337	394	425	434	386	434	81
Vietnam	119	110	114	117	. . .	. . .	101	112	117	120	107	120	98
Europe, Middle East, & Africa													
Bulgaria	729	720	703	713	578	630	643	676	713	746	680	746	80
Egypt	175	176	168	171	140	150	155	161	171	178	164	178	87
Hungary	168	168	160	168	142	144	148	153	168	176	153	176	97
Iraq	124	130	101	115	. . .	. . .	. . .	102	115	134	91	134	91
Lebanon	240	250	225	236	177	195	212	215	236	250	222	250	99
Pakistan	120	110	118	111	160	107	112	123	111	124	108	160	91
Poland	385	375	355	373	290	312	327	340	373	387	340	387	71
Russia	619	614	585	607	426	475	538	568	607	627	568	627	26
Serbia[1]	121	122	122	121	. . .	. . .	108	117	121	125	116	125	99
South Africa	371	373	366	373	297	323	337	349	373	379	354	379	99
Tunisia	164	162	157	160	127	138	143	149	160	166	152	166	98
Turkey	384	368	377	392	279	307	336	356	392	396	363	396	91
Ukraine	380	362	369	372	289	310	334	353	372	386	358	386	100
Latin America	**373**	**375**	**366**	**372**	**252**	**285**	**316**	**354**	**372**	**383**	**345**	**383**	**62**
Non-Latin America	**482**	**471**	**460**	**476**	**342**	**374**	**413**	**443**	**476**	**486**	**445**	**486**	**72**

Table 12 *(concluded)*

	Period on Period Percent Change								
	2008 End of period		2007 End of period		End of period				
	Q1	Q2	Q3	Q4	2003	2004	2005	2006	2007
EMBI Global	**0.6**	**–0.8**	**2.6**	**2.6**	**25.7**	**11.7**	**10.7**	**9.9**	**6.3**
Latin America									
Argentina	–12.7	–4.7	–2.6	6.0	19.1	19.8	2.7	51.3	–11.1
Brazil	0.5	2.3	4.1	1.7	69.8	14.3	13.2	14.8	9.1
Chile	3.7	–2.2	1.7	3.5	8.3	6.0	3.2	4.1	6.4
Colombia	1.3	0.4	1.5	3.0	19.4	13.2	12.4	10.7	9.1
Dominican Republic	–5.3	–0.2	–0.7	4.0	–15.3	27.2	24.1	18.0	7.3
Ecuador	2.9	3.3	14.0	6.5	101.5	21.1	13.2	–11.8	44.6
El Salvador	–3.3	–0.9	1.1	3.6	11.9	11.5	8.8	14.1	8.0
Mexico	3.4	–1.9	3.1	2.1	11.6	8.6	8.1	6.0	6.9
Panama	–0.1	0.6	2.5	3.7	14.4	13.0	11.1	12.3	8.5
Peru	1.2	–0.2	3.4	2.1	26.6	12.6	6.0	14.8	7.1
Uruguay	–3.6	2.4	0.0	3.2	55.6	34.0	16.3	17.3	6.6
Venezuela	–3.0	3.6	0.7	–1.9	39.9	23.2	16.1	12.8	–11.2
Asia									
China	3.4	–1.3	2.4	2.9	4.5	5.1	3.0	4.1	6.7
Indonesia	1.0	–6.1	1.9	1.0	. . .	. . .	9.7	15.9	3.0
Malaysia	3.2	–1.8	2.4	3.9	10.7	6.6	3.7	4.3	7.4
Philippines	0.8	–4.1	3.0	3.9	13.4	7.1	20.6	16.8	7.9
Vietnam	1.4	–7.3	3.0	2.4	. . .	. . .	. . .	10.6	4.5
Europe, Middle East, & Africa									
Bulgaria	2.2	–1.2	3.0	1.6	10.2	8.9	2.1	5.1	5.6
Egypt	2.6	0.4	1.8	1.5	14.4	6.8	3.8	3.8	5.9
Hungary	0.1	–0.2	3.9	4.9	3.7	1.2	2.8	3.7	9.4
Iraq	7.4	4.8	0.4	13.5	. . .	. . .	. . .	. . .	12.4
Lebanon	1.5	4.3	–0.3	5.0	19.5	9.9	8.7	1.6	9.9
Pakistan	7.9	–7.6	–5.1	–5.8	–0.2	–33.3	4.5	10.3	–10.0
Poland	3.0	–2.5	3.9	5.0	3.7	7.5	5.0	3.8	9.9
Russia	2.1	–0.9	2.9	3.7	22.4	11.5	13.3	5.5	6.9
Serbia[1]	–0.2	1.4	0.7	–0.9	. . .	. . .	. . .	8.3	3.7
South Africa	–0.5	0.4	2.8	1.8	9.6	8.8	4.3	3.7	6.8
Tunisia	2.1	–1.2	2.8	2.4	13.3	8.7	3.7	3.8	7.8
Turkey	–2.1	–4.2	2.6	4.1	30.8	10.0	9.5	6.1	10.2
Ukraine	2.4	–5.0	1.2	0.7	19.8	7.2	7.7	5.9	5.2
Latin America	**0.1**	**0.7**	**2.7**	**1.9**	**33.0**	**13.4**	**10.9**	**11.9**	**5.2**
Non-Latin America	**1.2**	**–2.3**	**2.4**	**3.4**	**17.7**	**9.2**	**10.6**	**7.2**	**7.5**

Source: JPMorgan Chase & Co.

[1]Data prior to 2006 refer to Serbia and Montenegro.

Table 13. Emerging Market Bond Index: EMBI Global Yield Spreads

(In basis points)

	2008 End of Period		2007 End of Period		End of Period					12-Month High	12-Month Low	All-Time High[1]	All-Time Low[1]
	Q1	Q2	Q3	Q4	2003	2004	2005	2006	2007				
EMBI Global	**324**	**308**	**214**	**255**	**403**	**347**	**237**	**171**	**255**	**339**	**168**	**1631**	**151**
Latin America													
Argentina	400	614	398	410	5,485	4,527	504	216	410	614	303	7,222	185
Brazil	174	227	172	220	459	376	308	190	220	304	147	2,451	138
Chile	126	177	124	151	90	64	80	84	151	184	81	260	52
Colombia	168	221	166	195	427	332	244	161	195	286	109	1,076	95
Dominican Republic	254	463	252	281	1,141	824	378	196	281	489	150	1,750	122
Ecuador	618	596	616	614	799	690	661	920	614	779	538	4,764	436
El Salvador	296	285	175	199	284	245	239	159	199	307	113	434	99
Mexico	193	194	131	172	201	174	143	115	172	212	101	1,149	89
Panama	244	218	159	184	324	274	239	146	184	256	115	769	114
Peru	223	199	137	178	325	239	257	118	178	244	105	1,061	95
Uruguay	343	294	212	243	636	388	298	185	243	346	141	1,982	133
Venezuela	661	596	419	523	586	403	313	183	523	681	304	2,658	161
Asia													
China	90	137	88	120	58	57	68	51	120	164	54	364	39
Indonesia	329	381	217	275	. . .	244	269	153	275	382	156	433	136
Malaysia	144	153	108	119	100	78	82	66	119	153	73	1,141	65
Philippines	273	303	184	207	415	457	302	155	207	303	143	993	132
Vietnam	283	368	156	203	. . .	. . .	190	95	203	396	113	396	89
Europe, Middle East, & Africa													
Bulgaria	92	204	90	153	177	77	90	66	153	240	57	1,679	42
Egypt	105	201	103	178	131	101	58	52	178	275	50	646	20
Hungary	163	134	80	84	28	32	74	58	84	187	62	196	–29
Iraq	545	474	639	569	. . .	. . .	. . .	526	569	730	430	730	376
Lebanon	594	469	491	493	421	334	246	395	493	622	358	1,082	111
Pakistan	562	687	386	535	. . .	233	198	154	535	702	207	2,225	122
Poland	112	115	69	67	76	69	62	47	67	132	56	410	17
Russia	208	197	133	157	257	213	118	99	157	225	97	7,063	87
Serbia[1]	389	332	206	304	. . .	. . .	238	186	304	404	140	404	134
South Africa	271	232	115	164	152	102	87	84	164	307	83	757	50
Tunisia	214	197	105	140	146	91	81	83	140	244	67	394	48
Turkey	348	384	220	239	309	264	223	207	239	384	177	1,196	168
Ukraine	376	467	217	303	258	255	184	172	303	467	142	2,314	125
Latin America	**347**	**313**	**227**	**275**	**518**	**415**	**272**	**180**	**275**	**362**	**180**	**1,532**	**157**
Non-Latin America	**297**	**303**	**196**	**227**	**248**	**239**	**179**	**159**	**227**	**310**	**150**	**1,812**	**142**

Table 13 *(concluded)*

	Period on Period Spread Change								
	2008 End of period		2007 End of period		End of period				
	Q1	Q2	Q3	Q4	2003	2004	2005	2006	2007
EMBI Global	**69**	**–16**	**18**	**19**	**–322**	**–56**	**–110**	**–66**	**84**
Latin America									
Argentina	–10	214	22	3	–857	–958	–4,023	–288	194
Brazil	–46	53	8	28	–1,001	–83	–68	–118	30
Chile	–25	51	49	22	–86	–26	16	4	67
Colombia	–27	53	39	17	–206	–95	–88	–83	34
Dominican Republic	–27	209	61	12	642	–317	–446	–182	85
Ecuador	4	–22	–13	0	–1,002	–109	–29	259	–306
El Salvador	97	–11	38	14	–127	–39	–6	–80	40
Mexico	21	1	18	31	–128	–27	–31	–28	57
Panama	60	–26	22	16	–122	–50	–35	–93	38
Peru	45	–24	17	30	–284	–86	18	–139	60
Uruguay	100	–49	35	15	–592	–248	–90	–113	58
Venezuela	138	–65	18	25	–545	–183	–90	–130	340
Asia									
China	–30	47	63	36	–26	–1	11	–17	69
Indonesia	54	52	32	27	. . .	. . .	25	–116	122
Malaysia	25	9	44	10	–112	–22	4	–16	53
Philippines	66	30	19	13	–107	42	–155	–147	52
Vietnam	80	85	28	30	. . .	. . .	. . .	–95	108
Europe, Middle East, & Africa									
Bulgaria	–61	112	32	70	–114	–100	13	–24	87
Egypt	–73	96	102	73	–194	–30	–43	–6	126
Hungary	79	–29	13	5	–24	4	42	–16	26
Iraq	–24	–71	12	–11	. . .	. . .	. . .	. . .	43
Lebanon	101	–125	32	0	–355	–87	–88	149	98
Pakistan	27	125	80	39	–271	233	–35	–44	381
Poland	45	3	13	–3	–109	–7	–7	–15	20
Russia	51	–11	25	18	–221	–44	–95	–19	58
Serbia[1]	85	–57	36	48	. . .	. . .	. . .	–52	118
South Africa	107	–39	32	43	–98	–50	–15	–3	80
Tunisia	74	–17	44	33	–127	–55	–10	2	57
Turkey	109	36	16	9	–387	–45	–41	–16	32
Ukraine	73	91	39	40	–413	–3	–71	–12	131
Latin America	**72**	**–34**	**16**	**21**	**–463**	**–103**	**–143**	**–92**	**95**
Non-Latin America	**70**	**6**	**23**	**16**	**–196**	**–9**	**–60**	**–20**	**68**

Source: JPMorgan Chase & Co.
[1]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 Q3	2007 Q4	2008 Q1	2008 Q2
Total	**157,999.4**	**214,973.7**	**325,729.4**	**462,221.8**	**572,561.7**	**741,346.2**	**172,745.8**	**191,622.5**	**101,011.5**	**167,124.2**
Africa	**7,448.0**	**9,694.7**	**12,715.3**	**12,435.3**	**16,191.5**	**31,430.0**	**5,417.1**	**7,220.5**	**290.1**	**4,078.8**
Algeria	150.0	40.0	307.9	489.3	25.4	411.0	411.0	—	—	—
Angola	350.0	1,542.0	2,900.0	3,122.7	91.9	74.6	—	—	—	—
Botswana	—	—	28.4	—	—	—	—	—	—	—
Burkina Faso	—	—	—	11.0	—	14.5	—	—	—	—
Cameroon	—	—	48.0	30.0	—	—	—	—	—	—
Cape Verde	—	—	—	—	—	13.0	—	—	—	—
Central African Republic	—	—	—	—	—	305.5	305.5	—	—	—
Côte d'Ivoire	—	—	—	—	—	—	—	—	—	45.0
Djibouti	—	—	40.0	—	—	—	—	—	—	—
Ethiopia	—	—	40.0	—	—	—	—	—	—	100.2
Gabon	—	—	22.0	—	34.4	1,000.0	—	1,000.0	—	—
Ghana	420.0	650.0	850.0	706.5	860.0	1,464.3	973.8	340.5	—	—
Kenya	—	134.0	135.1	64.0	330.1	10.0	—	—	—	848.6
Lesotho	—	—	—	—	—	19.7	19.7	—	—	—
Malawi	—	—	4.8	—	—	—	—	—	—	—
Mali	150.4	287.6	288.9	—	—	180.9	31.0	—	110.4	—
Mauritius	—	—	—	99.3	180.0	—	—	—	9.0	—
Morocco	—	467.1	803.5	1.9	341.4	1,966.4	431.3	287.2	—	196.9
Mozambique	—	35.5	422.4	—	38.8	—	—	—	—	800.0
Namibia	—	35.0	—	50.0	100.0	—	—	—	—	87.6
Niger	—	27.0	—	—	—	—	—	—	—	—
Nigeria	1,000.0	762.0	875.0	874.0	640.0	5,515.7	874.7	2,100.0	—	—
Senegal	40.0	—	10.0	—	31.6	—	—	—	—	—
Seychelles	—	—	—	—	200.0	30.0	30.0	—	—	—
South Africa	4,587.6	5,200.2	5,324.8	6,265.9	12,700.7	19,766.1	2,086.7	3,297.9	38.7	1,549.6
Sudan	—	—	31.0	—	—	—	—	—	—	—
Tanzania	—	—	—	136.0	—	—	—	—	112.0	—
Tunisia	750.0	484.3	583.6	579.9	24.7	403.4	253.4	—	—	402.0
Uganda	—	—	—	—	12.6	—	—	—	—	—
Zambia	—	30.0	—	—	505.0	255.0	—	195.0	20.0	—
Zimbabwe	—	—	—	4.8	75.1	—	—	—	—	48.9
Asia	**76,536.3**	**100,246.0**	**152,357.7**	**195,322.2**	**243,069.2**	**315,300.1**	**71,497.8**	**90,172.4**	**62,971.8**	**47,483.3**
Bangladesh	—	10.0	176.8	16.7	106.5	57.5	21.8	7.0	11.3	—
Brunei Darussalam	129.0	—	—	—	—	—	—	—	—	—
Cambodia	—	—	—	—	105.5	250.0	—	—	—	—
China	10,205.3	15,772.8	25,661.6	41,331.2	63,393.5	87,615.0	25,687.9	30,150.6	15,755.2	8,285.6
Fiji	—	—	—	—	150.0	—	—	—	—	—
Hong Kong SAR	14,623.0	15,647.8	19,291.2	20,943.4	26,146.9	23,641.3	3,917.1	7,310.2	2,450.3	4,154.9
India	1,427.4	3,277.2	13,301.1	23,189.6	33,037.3	61,059.7	18,816.7	13,208.4	15,745.1	8,805.6
Indonesia	1,122.5	5,207.2	4,115.3	5,195.5	8,364.3	8,340.7	1,848.6	2,734.1	4,044.5	4,309.5
Korea	17,819.0	19,112.6	31,016.0	48,362.8	41,426.3	60,742.4	6,949.1	19,552.7	11,298.2	9,100.4
Lao P.D.R.	101.4	—	210.0	1,000.0	—	—	—	—	—	—
Macao SAR	—	—	382.0	729.0	3,692.7	4,531.3	—	2,726.2	180.0	—
Malaysia	5,976.3	5,743.7	7,977.8	6,193.2	7,707.4	7,111.7	749.8	2,301.3	236.0	599.7
Marshall Islands	34.7	—	—	24.0	170.0	1,069.3	118.0	557.1	—	204.0
Mongolia	—	—	—	30.0	6.0	85.0	—	10.0	500.0	4.0
Nepal	—	—	—	—	—	—	—	—	5.0	—
Pakistan	388.8	983.8	970.0	739.2	3,298.9	2,149.3	343.1	262.9	240.0	255.4
Papua New Guinea	85.0	153.7	—	—	—	1,024.3	—	14.8	—	—
Philippines	6,345.5	6,405.4	6,358.3	6,194.8	7,172.5	6,648.4	3,644.2	161.2	600.4	694.7
Singapore	4,949.0	7,448.1	11,949.3	14,624.9	20,096.7	19,974.3	2,941.8	3,542.9	5,116.3	5,755.0
Sri Lanka	33.7	186.0	135.0	383.0	129.8	755.0	—	545.0	—	340.0
Taiwan Province of China	10,230.7	16,040.6	26,558.0	19,085.5	22,374.8	24,986.0	5,317.0	5,611.7	6,238.9	3,181.1
Thailand	2,672.5	3,860.0	4,141.3	6,310.9	5,232.8	2,617.4	840.0	686.4	136.7	1,341.7
Vietnam	392.5	397.0	114.0	968.8	457.4	2,641.6	302.6	789.8	414.0	451.7
Europe	**29,639.2**	**45,102.0**	**70,204.0**	**104,340.5**	**133,624.8**	**164,830.4**	**29,742.1**	**33,309.2**	**19,357.9**	**58,386.0**
Albania	—	—	—	—	—	—	—	—	35.7	—
Belarus	—	—	21.4	32.0	338.6	302.8	145.5	76.0	43.0	149.0
Bulgaria	1,765.3	668.6	1,099.9	1,103.7	1,727.1	1,360.0	547.0	328.5	438.3	300.5
Croatia	1,619.0	2,963.6	2,737.4	1,263.7	2,177.7	2,786.5	755.8	1,692.8	—	419.6
Cyprus	550.1	653.9	1,178.4	1,189.9	3,839.0	3,099.9	485.3	158.8	69.5	1,320.7
Czech Republic	520.2	2,072.0	4,066.2	4,001.1	2,181.4	4,262.7	1,103.1	936.1	1,266.9	5,697.7
Estonia	485.0	455.9	1,181.4	692.8	473.7	299.2	89.2	38.0	178.8	117.7
Faroe Islands	—	—	—	85.3	273.8	431.2	—	—	—	217.4
Gibraltar	8.2	—	—	1,897.1	2,371.7	494.8	—	—	—	—

Table 14 *(concluded)*

	2002	2003	2004	2005	2006	2007	2007 Q3	2007 Q4	2008 Q1	2008 Q2
Europe *(continued)*										
Hungary	1,311.3	4,551.6	9,260.3	9,341.7	7,328.7	5,330.8	267.9	976.8	1,745.3	5,956.5
Latvia	51.9	70.7	881.6	516.1	1,457.4	1,614.7	550.1	55.8	1,115.8	—
Lithuania	369.6	432.7	986.0	1,220.0	1,292.0	1,645.3	—	971.9	15.4	31.1
Macedonia, FYR	—	47.6	66.0	176.5	—	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	6,023.9	7,812.4	5,259.4	17,007.6	8,319.2	7,401.4	1,499.4	728.6	577.3	5,127.0
Romania	1,456.6	1,763.8	1,116.7	2,611.0	747.2	1,168.2	3.1	893.7	176.6	1,410.1
Russia	8,102.0	11,198.6	22,121.2	37,003.6	64,706.8	87,964.7	11,770.1	20,480.3	7,410.9	31,530.4
Serbia[1]	—	—	213.4	1,252.6	60.2	568.6	176.5	202.8	7.8	—
Slovak Republic	232.7	967.6	1,319.0	711.5	1,210.7	1,354.2	—	—	—	—
Slovenia	378.0	430.3	1,321.9	1,887.3	1,837.8	4,759.9	—	1,695.2	1,532.3	1,974.9
Turkey	6,251.3	9,471.6	14,506.9	18,999.6	27,641.6	31,276.6	11,357.1	1,234.5	3,759.4	2,514.3
Ukraine	514.0	1,413.0	2,617.1	3,334.4	5,383.3	8,672.9	991.9	2,803.5	984.9	1,619.2
Middle East and Central Asia	**12,497.2**	**12,995.8**	**33,909.8**	**63,940.3**	**103,395.1**	**96,825.9**	**20,569.6**	**30,944.5**	**6,056.2**	**30,030.0**
Armenia	—	—	—	1.3	30.0	19.1	—	—	11.0	—
Azerbaijan	—	—	1,217.2	400.2	183.8	315.7	41.7	5.0	13.6	57.0
Bahrain	924.5	2,361.3	1,888.6	2,913.8	3,825.7	6,170.1	760.0	40.0	370.0	55.0
Egypt	670.0	155.0	1,465.0	3,855.8	4,379.6	5,602.1	2,788.1	1,122.4	1,220.0	3,366.4
Georgia	—	6.0	—	11.1	220.8	341.6	89.0	52.6	100.0	500.0
Iran, I.R. of	2,842.4	952.3	2,419.4	1,928.8	142.5	—	—	—	—	—
Iraq	—	—	—	107.8	2,877.0	—	—	—	—	—
Israel	390.2	2,050.0	3,977.9	5,113.0	3,518.4	2,662.2	587.8	794.2	717.9	1,364.0
Jordan	80.9	—	199.4	—	60.0	180.0	—	—	—	—
Kazakhstan	1,064.5	1,801.3	6,376.2	8,199.1	16,655.8	18,050.7	2,852.4	5,157.7	222.9	4,268.0
Kuwait	750.0	365.0	1,788.2	4,445.0	5,346.6	1,919.9	604.4	403.0	505.7	1,310.0
Kyrgyz Republic	95.0	—	—	2.0	—	—	—	—	—	0.8
Lebanon	990.0	160.0	5,382.8	2,558.0	6,040.0	2,420.0	500.0	400.0	875.0	1,763.2
Libya	—	—	—	—	—	38.0	38.0	—	—	—
Oman	2,417.0	907.8	1,328.6	3,320.7	3,430.2	3,580.7	1,428.3	—	450.0	96.0
Qatar	1,571.7	880.8	2,042.7	10,768.5	11,467.0	14,700.5	5,849.7	7,983.0	673.5	3,465.0
Saudi Arabia	300.0	969.5	2,749.6	5,791.0	9,115.5	7,110.6	70.0	780.6	52.0	6,564.0
Tajikistan	—	—	5.2	1.2	—	2.0	—	2.0	—	—
United Arab Emirates	370.0	2,348.1	3,041.0	14,519.5	36,097.2	33,712.6	4,960.1	14,203.9	844.6	7,220.6
Uzbekistan	31.0	38.7	28.0	3.6	4.9	—	—	—	—	—
Latin America	**31,878.8**	**46,935.1**	**56,542.5**	**86,183.4**	**76,281.1**	**132,959.9**	**45,519.3**	**29,975.9**	**12,335.6**	**27,146.1**
Argentina	824.2	100.0	1,790.0	20,663.0	3,343.6	9,946.1	5,252.5	860.0	1,026.0	265.0
Belize	125.0	100.0	—	—	—	—	—	—	—	—
Bolivia	90.0	30.0	—	54.0	—	—	—	—	100.0	—
Brazil	10,229.0	14,134.1	16,669.8	27,957.3	33,931.1	73,322.6	26,878.2	19,443.7	6,041.7	14,883.7
Chile	3,546.6	7,795.0	7,956.8	6,900.2	6,159.2	3,886.0	1,714.2	1,058.0	537.2	2,271.0
Colombia	1,880.0	1,765.0	1,628.4	3,063.3	5,049.6	7,931.8	4,319.9	1,909.0	1,750.0	202.0
Costa Rica	250.0	490.0	334.2	91.7	1.7	31.1	—	30.5	—	150.0
Cuba	—	—	69.8	1.9	—	—	—	—	—	—
Dominican Republic	423.3	670.4	140.5	284.4	779.8	657.9	—	—	—	—
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	—	150.0	—	350.0
Haiti	—	—	—	—	134.0	—	—	—	—	—
Honduras	—	—	119.0	4.6	—	—	—	—	—	—
Jamaica	300.0	49.6	905.3	1,466.6	1,076.1	1,275.0	2,157.2	1,200.0	1,500.0	626.0
Mexico	9,583.3	15,783.6	19,930.0	14,261.4	17,186.3	18,500.6	2,626.4	3,287.3	752.0	2,383.4
Nicaragua	—	—	22.0	—	—	—	—	—	—	—
Paraguay	—	—	—	—	—	—	—	—	18.8	80.0
Peru	1,133.0	1,445.0	1,388.2	2,583.9	1,489.9	5,805.1	2,471.9	772.3	610.0	1,285.0
St. Lucia	—	20.0	—	—	—	—	—	—	—	—
Trinidad and Tobago	213.0	46.0	415.0	100.0	2,708.0	955.4	—	—	—	—
Uruguay	400.0	53.1	—	1,061.2	2,700.0	1,148.3	10.0	—	—	—
Venezuela	—	3,672.5	4,394.0	6,111.3	376.1	9,381.0	—	1,250.0	—	4,650.0

Source: Data provided by the Bond, Equity and Loan database of the International Monetary Fund sourced from Dealogic.

[1]Data prior to 2006 refer to Serbia and Montenegro.

Table 15. Emerging Market External Financing: Bond Issuance

(In millions of U.S. dollars)

	2002	2003	2004	2005	2006	2007	2007 Q3	2007 Q4	2008 Q1	2008 Q2
Total	**58,278.4**	**89,358.0**	**128,346.9**	**179,506.6**	**163,124.6**	**184,375.9**	**23,144.8**	**26,665.5**	**18,988.5**	**58,568.3**
Africa	**2,845.9**	**2,375.9**	**2,250.1**	**3,170.0**	**4,898.9**	**13,243.3**	**2,359.5**	**1,393.9**	**—**	**513.6**
Gabon	—	—	—	—	—	1,000.0	—	1,000.0	—	—
Ghana	—	—	—	—	—	950.0	750.0	200.0	—	—
Morocco	—	457.3	—	—	—	671.3	—	—	—	—
Nigeria	—	—	—	—	—	525.0	—	—	—	—
Seychelles	—	—	—	—	200.0	30.0	30.0	—	—	—
South Africa	2,195.9	1,562.4	1,696.5	2,681.4	4,698.9	9,813.6	1,326.0	193.9	—	513.6
Tunisia	650.0	356.1	553.6	488.6	—	253.4	253.4	—	—	—
Asia	**17,179.7**	**26,738.6**	**44,566.9**	**44,502.1**	**41,705.3**	**47,314.6**	**5,939.9**	**6,160.4**	**6,536.2**	**13,642.9**
China	250.0	1,802.3	4,362.0	3,858.2	1,110.0	2,144.2	1,022.8	—	—	300.0
Fiji	—	—	—	—	150.0	—	—	—	—	—
Hong Kong SAR	1,230.9	1,868.8	3,316.8	4,626.9	3,595.8	5,122.6	—	420.0	288.5	766.2
India	—	300.0	3,199.8	2,118.3	2,644.2	7,549.4	2,000.0	286.0	157.5	1,250.0
Indonesia	275.0	609.2	1,363.6	2,817.3	2,000.0	1,750.0	—	—	2,000.0	2,200.0
Korea	8,777.3	12,303.3	17,717.7	17,953.7	18,345.6	22,250.3	2,462.7	4,954.4	3,270.7	6,816.0
Malaysia	1,168.9	897.7	1,975.0	1,184.1	2,076.2	918.6	203.8	—	—	—
Mongolia	—	—	—	—	—	75.0	—	—	500.0	—
Pakistan	—	—	500.0	—	1,050.0	750.0	—	—	—	—
Philippines	4,773.8	4,450.0	4,446.7	3,900.0	4,623.2	1,000.0	—	—	—	—
Singapore	703.7	3,849.2	5,727.9	4,245.7	4,750.5	4,489.1	25.6	—	319.6	1,784.4
Sri Lanka	—	—	100.0	—	—	500.0	—	500.0	—	—
Taiwan Province of China	—	358.0	457.4	806.0	304.7	—	—	—	—	2.4
Thailand	—	300.0	1,400.0	2,241.8	1,055.0	765.4	225.0	—	—	523.8
Vietnam	—	—	—	750.0	—	—	—	—	—	—
Europe	**14,866.1**	**22,787.0**	**33,016.7**	**52,290.5**	**50,649.5**	**59,776.4**	**5,259.0**	**9,063.9**	**6,862.3**	**26,669.6**
Belarus	—	—	—	—	2.5	19.4	—	—	3.0	—
Bulgaria	1,752.3	287.3	10.0	383.4	220.8	—	—	—	—	—
Croatia	844.1	978.0	1,654.3	—	384.9	746.4	408.5	—	—	—
Cyprus	482.0	653.9	1,178.4	1,135.5	1,694.9	2,427.8	—	—	—	202.3
Czech Republic	429.4	337.6	2,546.7	1,345.2	907.4	2,168.9	515.9	855.9	144.9	3,182.4
Estonia	296.7	328.8	958.5	426.6	—	38.0	—	38.0	—	—
Gibraltar	8.2	—	—	—	—	400.8	—	—	—	—
Hungary	71.3	2,441.7	5,002.1	7,351.4	6,900.9	4,088.2	—	726.8	1,466.1	3,441.6
Latvia	—	—	528.4	123.1	266.1	—	—	—	607.6	—
Lithuania	360.9	432.7	811.2	778.6	1,241.6	1,484.1	—	850.9	—	—
Macedonia, FYR	—	—	—	176.5	—	—	—	—	—	—
Poland	2,673.9	4,298.1	3,545.2	11,851.5	4,693.5	4,111.0	—	446.7	473.8	3,311.3
Romania	1,070.8	805.7	—	1,197.0	—	—	—	—	—	1,162.5
Russia	3,080.0	4,587.8	7,150.8	15,365.7	20,804.6	29,990.6	2,284.6	5,004.5	539.6	14,509.3
Serbia	—	—	—	1,018.5	—	165.2	—	—	—	—
Slovak Republic	141.7	866.3	1,188.7	—	1,208.8	1,354.2	—	—	—	—
Slovenia	30.2	—	67.3	156.5	—	1,614.8	—	141.1	1,477.3	—
Turkey	3,125.6	5,459.0	6,060.1	8,875.0	9,209.9	7,132.2	1,350.0	—	2,150.0	500.0
Ukraine	499.0	1,310.0	2,315.0	2,105.9	3,113.5	4,035.0	700.0	1,000.0	—	360.0

Table 15 *(concluded)*

	2002	2003	2004	2005	2006	2007	2007 Q3	2007 Q4	2008 Q1	2008 Q2
Middle East & Central Asia	**4,561.4**	**4,696.3**	**14,783.4**	**18,576.9**	**35,156.1**	**25,327.1**	**3,707.5**	**3,233.2**	**1,844.3**	**7,122.5**
Azerbaijan	—	—	—	—	5.0	100.0	—	—	13.6	26.0
Bahrain	584.5	1,311.3	665.6	1,296.7	1,120.0	1,767.7	200.0	—	350.0	—
Egypt	—	—	—	1,250.0	—	1,803.5	1,053.5	—	—	—
Georgia	—	—	—	—	—	200.0	—	—	—	500.0
Iran, I.R. of	999.9	—	—	—	—	—	—	—	—	—
Iraq	—	—	—	—	2,700.0	—	—	—	—	—
Israel	376.1	1,800.0	2,250.0	1,177.9	1,500.0	—	—	—	250.0	1,000.0
Jordan	80.9	—	145.0	—	—	—	—	—	—	—
Kazakhstan	550.0	825.0	3,225.0	2,850.0	7,055.8	8,808.6	429.7	807.4	—	3,540.0
Kuwait	750.0	200.0	500.0	500.0	1,137.0	575.0	475.0	—	305.7	—
Lebanon	990.0	160.0	5,382.8	1,780.0	5,741.6	2,300.0	500.0	400.0	875.0	1,763.2
Oman	—	—	250.0	—	25.0	—	—	—	—	—
Qatar	—	—	665.0	2,250.0	3,040.0	—	—	—	—	—
Saudi Arabia	—	400.0	—	1,800.0	2,913.8	—	—	—	—	—
United Arab Emirates	230.0	—	1,700.0	5,672.4	9,917.9	9,772.4	1,049.3	2,025.8	50.0	293.3
Latin America	**18,825.4**	**32,760.3**	**33,729.7**	**60,967.1**	**30,714.8**	**38,714.5**	**5,878.8**	**6,814.0**	**3,745.7**	**10,619.8**
Argentina	—	100.0	1,290.0	18,984.4	1,745.5	3,400.9	100.0	445.0	—	65.0
Belize	125.0	100.0	—	—	—	—	—	—	—	—
Brazil	7,209.7	11,803.7	9,716.4	17,769.0	12,303.9	10,091.9	402.0	2,930.0	1,245.7	4,929.0
Chile	1,632.3	3,200.0	2,350.0	900.0	1,100.0	250.0	—	—	—	99.8
Colombia	1,000.0	1,765.0	1,545.4	2,435.5	3,177.6	3,133.7	1,050.7	679.0	1,000.0	—
Costa Rica	250.0	490.0	310.0	—	—	—	—	—	—	—
Dominican Republic	—	600.0	—	196.6	550.0	430.0	—	—	—	—
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	—	—	—	150.0	—	350.0
Jamaica	300.0	—	809.0	1,050.0	880.0	625.0	2,157.2	1,200.0	1,500.0	526.0
Mexico	5,063.4	9,080.0	11,384.2	9,165.1	6,207.2	6,341.4	—	—	—	—
Peru	1,000.0	1,250.0	1,298.2	2,155.0	445.0	4,449.0	2,169.0	160.0	—	—
Trinidad and Tobago	—	—	100.0	100.0	980.7	900.0	—	—	—	—
Uruguay	400.0	53.1	—	1,061.2	2,700.0	342.6	—	—	—	—
Venezuela	—	3,670.0	4,260.0	5,925.3	—	8,750.0	—	1,250.0	—	4,650.0

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 Q3	2007 Q4	2008 Q1	2008 Q2
Total	**17,194.2**	**28,018.7**	**49,026.2**	**93,016.2**	**157,296.8**	**229,171.8**	**41,643.4**	**82,532.2**	**17,452.7**	**32,824.7**
Africa	**365.0**	**1,181.3**	**2,742.4**	**1,189.0**	**4,216.7**	**9,825.5**	**2,252.6**	**3,891.1**	**38.7**	**1,559.1**
Algeria	—	—	—	—	25.4	—	—	—	—	—
Central African Republic	—	—	—	—	—	305.5	305.5	—	—	—
Ghana	—	—	—	—	—	9.8	9.8	—	—	—
Kenya	—	—	—	—	—	—	—	—	—	848.6
Morocco	—	—	800.9	—	316.0	1,295.2	431.3	287.2	—	196.9
Namibia	—	—	—	—	—	—	—	—	—	87.6
Nigeria	—	—	—	—	—	1,324.2	824.2	500.0	—	—
South Africa	365.0	1,181.3	1,910.5	1,184.2	3,800.2	6,890.9	681.9	3,103.9	38.7	377.1
Sudan	—	—	31.0	—	—	—	—	—	—	—
Zimbabwe	—	—	—	4.8	75.1	—	—	—	—	48.9
Asia	**12,940.8**	**22,955.3**	**36,755.1**	**68,813.1**	**100,952.0**	**117,982.8**	**21,820.1**	**42,946.5**	**15,671.8**	**10,468.0**
Bangladesh	—	—	—	16.7	23.0	39.9	4.2	7.0	—	—
Cambodia	—	—	—	—	105.5	250.0	—	—	—	—
China	1,747.2	4,114.1	13,763.8	25,715.0	53,871.2	60,743.6	12,261.6	26,536.6	8,880.6	5,583.3
Hong Kong SAR	3,058.4	4,292.3	3,704.6	5,022.3	6,504.2	6,021.0	821.1	2,614.5	120.2	1,596.5
India	264.8	421.6	5,023.5	10,100.7	14,511.9	22,198.7	4,781.9	5,041.0	4,980.2	1,054.8
Indonesia	284.8	1,128.6	849.3	1,336.3	607.8	3,094.0	901.8	1,105.6	271.0	630.7
Korea	1,582.2	1,219.6	5,314.4	13,300.8	10,062.7	7,370.5	840.2	2,485.9	1,146.4	578.9
Macao SAR	—	—	—	—	1,316.8	581.3	—	581.3	—	—
Malaysia	1,143.2	559.3	964.7	710.9	580.0	1,870.4	—	746.3	100.0	—
Pakistan	—	—	—	—	961.1	784.4	134.1	—	—	109.3
Papua New Guinea	85.0	153.7	—	—	—	1,024.3	—	14.8	—	—
Philippines	—	103.9	47.0	740.2	1,646.4	2,556.2	1,289.2	111.2	105.4	169.4
Singapore	1,624.6	1,245.2	2,601.1	4,075.4	4,778.7	4,541.0	522.0	1,401.7	—	3.9
Sri Lanka	33.7	—	—	55.5	—	—	—	—	—	—
Taiwan Province of China	3,060.7	8,215.0	3,388.5	7,172.1	3,728.3	5,352.1	263.8	1,472.7	61.4	82.2
Thailand	56.3	1,501.9	1,098.4	567.2	2,254.5	943.1	—	686.4	6.7	569.0
Vietnam	—	—	—	—	—	612.4	—	141.7	—	90.0
Europe	**1,659.0**	**2,484.2**	**5,559.6**	**11,276.1**	**24,233.2**	**41,676.0**	**2,123.2**	**9,474.6**	**196.7**	**7,037.5**
Bulgaria	—	—	—	93.5	85.7	—	—	—	—	—
Croatia	—	—	—	—	500.9	1,377.6	—	1,377.6	—	—
Cyprus	—	—	—	54.4	1,178.4	20.8	—	20.8	—	28.4
Czech Republic	—	1,091.5	174.4	295.1	287.3	278.0	197.8	80.2	—	2,515.2
Estonia	41.3	—	—	266.2	24.2	216.1	44.1	—	—	—
Faroe Islands	—	—	—	—	67.7	225.1	—	—	—	—
Gibraltar	—	—	—	1,897.1	437.5	94.1	—	—	—	—
Hungary	—	13.2	884.7	48.8	—	191.8	—	—	—	—
Lithuania	—	—	—	51.2	—	—	—	—	15.4	—
Poland	245.4	758.6	964.7	1,865.6	1,575.5	556.7	149.0	99.5	103.5	627.5
Romania	—	—	—	—	172.5	156.0	—	97.9	—	—
Russia	1,301.0	570.0	2,554.9	6,458.2	18,706.9	33,540.2	1,023.7	6,806.5	—	2,846.1
Slovak Republic	—	—	—	88.8	1.9	—	—	—	—	—
Slovenia	—	—	—	—	—	453.6	—	453.6	—	305.0
Turkey	71.4	50.9	980.8	—	1,164.3	3,233.1	675.4	—	—	—
Ukraine	—	—	—	157.1	30.5	1,332.9	33.1	538.7	77.8	715.3
Middle East & Central Asia	**14.1**	**186.0**	**1,783.2**	**5,733.5**	**9,123.8**	**11,985.5**	**1,301.6**	**8,378.6**	**371.0**	**3,398.0**
Bahrain	—	—	—	87.2	420.5	266.4	—	—	—	—
Egypt	—	—	141.0	1,116.5	483.7	722.4	—	722.4	—	527.7
Georgia	—	—	—	—	159.8	—	—	—	100.0	—
Israel	14.1	186.0	1,357.9	1,894.7	921.6	1,459.2	152.8	194.2	91.6	364.0
Kazakhstan	—	—	—	1,548.2	4,303.6	5,031.4	977.5	3,201.3	152.9	67.0
Kuwait	—	—	260.7	—	—	—	—	—	—	1,141.0
Lebanon	—	—	—	778.0	248.4	—	—	—	—	—
Oman	—	—	23.6	148.4	—	—	—	—	—	—
Qatar	—	—	—	—	1,173.8	171.4	171.4	—	—	900.0
Saudi Arabia	—	—	—	—	—	41.8	—	41.8	—	—
United Arab Emirates	—	—	—	160.5	1,412.3	4,293.0	—	4,218.9	26.6	398.4
Latin America	**2,215.3**	**1,211.8**	**2,186.0**	**6,004.6**	**18,771.1**	**47,702.0**	**14,145.9**	**17,841.4**	**1,174.5**	**10,362.1**
Argentina	—	—	—	—	987.1	1,319.2	622.5	59.1	—	—
Brazil	1,148.5	556.2	1,830.5	4,254.0	13,888.9	38,848.0	9,718.0	15,952.7	1,174.5	7,978.7
Chile	—	115.6	105.5	689.7	892.3	460.5	96.7	155.0	—	—
Colombia	—	—	—	—	67.7	3,418.1	3,119.2	—	—	—
Mexico	1,066.8	540.0	250.1	1,060.9	2,358.2	2,932.8	534.4	1,447.3	—	2,383.4
Peru	—	—	—	—	576.9	723.3	55.1	227.3	—	—

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 Q3	2007 Q4	2008 Q1	2008 Q2
Total	**82,526.8**	**97,597.0**	**148,356.3**	**189,699.0**	**252,140.3**	**327,798.6**	**107,957.7**	**82,424.8**	**64,570.4**	**75,731.2**
Africa	**4,237.2**	**6,137.5**	**7,722.8**	**8,076.3**	**7,076.0**	**8,361.2**	**805.0**	**1,935.5**	**251.4**	**2,006.2**
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	—	—	—	—
Botswana	—	—	28.4	—	—	—	—	—	—	—
Burkina Faso	—	—	—	11.0	—	14.5	—	—	—	—
Cameroon	—	—	48.0	30.0	—	—	—	—	—	—
Cape Verde	—	—	—	—	—	13.0	—	—	—	—
Côte d'Ivoire	—	—	—	—	—	—	—	—	—	45.0
Djibouti	—	—	40.0	—	—	—	—	—	—	—
Ethiopia	—	—	40.0	—	—	—	—	—	—	100.2
Gabon	—	—	22.0	—	34.4	—	—	—	—	—
Ghana	420.0	650.0	850.0	706.5	860.0	504.5	214.0	140.5	—	—
Kenya	—	134.0	135.1	64.0	330.1	10.0	—	—	—	—
Lesotho	—	—	—	—	—	19.7	19.7	—	—	—
Malawi	—	—	4.8	—	—	—	—	—	—	—
Mali	150.4	287.6	288.9	—	—	180.9	31.0	—	110.4	—
Mauritius	—	—	—	99.3	180.0	—	—	—	9.0	—
Morocco	—	9.8	2.6	1.9	25.4	—	—	—	—	—
Mozambique	—	35.5	422.4	—	38.8	—	—	—	—	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	50.5	1,600.0	—	—
Senegal	40.0	—	10.0	—	31.6	—	—	—	—	—
South Africa	2,026.7	2,456.4	1,717.8	2,400.3	4,201.6	3,061.6	78.8	—	—	659.0
Tanzania	—	—	—	136.0	—	—	—	—	112.0	—
Tunisia	100.0	128.2	30.0	91.2	24.7	150.0	—	—	—	402.0
Uganda	—	—	—	—	12.6	—	—	—	—	—
Zambia	—	30.0	—	—	505.0	255.0	—	195.0	20.0	—
Asia	**46,415.8**	**50,552.1**	**71,035.7**	**82,007.0**	**100,411.9**	**150,002.6**	**43,737.7**	**41,065.5**	**40,763.8**	**23,372.4**
Bangladesh	—	10.0	176.8	—	83.6	17.6	17.6	—	11.3	—
Brunei Darussalam	129.0	—	—	—	—	—	—	—	—	—
China	8,208.1	9,856.4	7,535.7	11,757.9	8,412.3	24,727.2	12,403.4	3,614.0	6,874.6	2,402.4
Hong Kong SAR	10,333.7	9,486.7	12,269.8	11,294.2	16,046.8	12,497.7	3,096.0	4,275.8	2,041.6	1,792.1
India	1,162.7	2,555.5	5,077.8	10,970.7	15,881.2	31,311.6	12,034.8	7,881.4	10,607.4	6,500.9
Indonesia	562.7	3,469.4	1,902.4	1,041.8	5,756.5	3,496.7	946.8	1,628.5	1,773.5	1,478.7
Korea	7,459.6	5,589.7	7,983.9	17,108.2	13,017.9	31,121.7	3,646.1	12,112.4	6,881.1	1,705.5
Lao P.D.R.	101.4	—	210.0	1,000.0	—	—	—	—	—	—
Macao SAR	—	—	382.0	729.0	2,375.9	3,950.1	—	2,145.0	180.0	—
Malaysia	3,664.2	4,286.8	5,038.1	4,298.2	5,051.2	4,322.8	546.0	1,555.0	136.0	599.7
Marshall Islands	34.7	—	—	24.0	170.0	1,069.3	118.0	557.1	—	204.0
Mongolia	—	—	—	30.0	6.0	10.0	—	10.0	—	4.0
Nepal	—	—	—	—	—	—	—	—	5.0	—
Pakistan	388.8	983.8	470.0	739.2	1,287.8	614.9	209.0	262.9	240.0	146.1
Philippines	1,571.7	1,851.4	1,864.7	1,554.6	902.9	3,092.2	2,355.0	50.0	495.0	525.3
Singapore	2,620.7	2,353.8	3,620.4	6,303.7	10,567.4	10,944.2	2,394.2	2,141.2	4,796.7	3,966.7
Sri Lanka	—	186.0	35.0	327.5	129.8	255.0	—	45.0	—	340.0
Taiwan Province of China	7,170.0	7,467.6	22,712.1	11,107.4	18,341.9	19,633.9	5,053.2	4,139.0	6,177.6	3,096.5
Thailand	2,616.2	2,058.1	1,642.9	3,501.8	1,923.3	908.8	615.0	—	130.0	248.9
Vietnam	392.5	397.0	114.0	218.8	457.4	2,029.2	302.6	648.1	414.0	361.7
Europe	**13,114.1**	**19,830.8**	**31,627.7**	**40,773.9**	**58,742.1**	**63,378.1**	**22,359.9**	**14,770.7**	**12,298.9**	**24,678.9**
Albania	—	—	—	—	—	—	—	—	35.7	—
Belarus	—	—	21.4	32.0	336.1	283.5	145.5	76.0	40.0	149.0
Bulgaria	13.0	381.3	1,089.9	626.8	1,420.6	1,360.0	547.0	328.5	438.3	300.5
Croatia	774.9	1,985.5	1,083.1	1,263.7	1,291.9	662.6	347.4	315.3	—	419.6
Cyprus	68.1	—	—	—	965.7	651.3	485.3	138.0	69.5	1,090.0
Czech Republic	90.8	642.9	1,345.1	2,360.8	986.8	1,815.8	389.4	—	1,122.0	—
Estonia	147.1	127.1	222.9	—	449.4	45.1	45.1	—	178.8	117.7
Faroe Islands	—	—	—	85.3	206.2	206.1	—	—	—	217.4
Gibraltar	—	—	—	—	1,934.2	—	—	—	—	—
Hungary	1,240.0	2,096.7	3,373.4	1,941.4	427.8	1,050.9	267.9	250.0	279.2	2,514.8
Latvia	51.9	70.7	353.2	393.0	1,191.3	1,614.7	550.1	55.8	508.2	—

Table 17 *(concluded)*

	2002	2003	2004	2005	2006	2007	2007 Q3	2007 Q4	2008 Q1	2008 Q2
Europe *(continued)*										
Lithuania	8.8	—	174.8	390.2	50.4	161.2	—	121.0	—	31.1
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	2,733.7	1,350.4	182.5	—	1,188.2
Romania	385.9	958.1	1,116.7	1,414.0	574.7	1,012.2	3.1	795.8	176.6	247.5
Russia	3,721.0	6,040.8	12,415.5	15,179.7	25,195.4	24,433.9	8,461.8	8,669.3	6,871.3	14,175.0
Serbia	—	—	213.4	234.1	60.2	403.4	176.5	202.8	7.8	—
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	—	1,100.5	55.0	1,669.9
Turkey	3,054.3	3,961.7	7,466.0	10,124.6	17,267.4	20,911.3	9,331.7	1,234.5	1,609.4	2,014.3
Ukraine	15.0	103.0	302.1	1,071.4	2,239.3	3,305.0	258.8	1,264.9	907.0	543.8
Middle East & Central Asia	**7,921.7**	**8,113.5**	**17,343.2**	**39,630.0**	**59,115.2**	**59,513.2**	**15,560.6**	**19,332.7**	**3,840.8**	**19,509.5**
Armenia	—	—	—	1.3	30.0	19.1	—	—	11.0	—
Azerbaijan	—	—	1,217.2	400.2	178.8	215.7	41.7	5.0	—	31.0
Bahrain	340.0	1,050.0	1,223.0	1,530.0	2,285.2	4,136.0	560.0	40.0	20.0	55.0
Egypt	670.0	155.0	1,324.0	1,489.3	3,895.9	3,076.1	1,734.6	400.0	1,220.0	2,838.8
Georgia	—	6.0	—	11.1	61.0	141.6	89.0	52.6	—	—
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	1,203.0	435.0	600.0	376.3	—
Jordan	—	—	54.4	—	60.0	180.0	—	—	—	—
Kazakhstan	514.5	976.3	3,151.2	3,800.9	5,296.4	4,210.7	1,445.3	1,149.0	70.0	661.0
Kuwait	—	165.0	1,027.5	3,945.0	4,209.6	1,344.9	129.4	403.0	200.0	169.1
Kyrgyz Republic	95.0	—	—	2.0	—	—	—	—	—	0.8
Lebanon	—	—	—	—	50.0	120.0	—	—	—	—
Libya	—	—	—	—	—	38.0	38.0	—	—	—
Oman	2,417.0	907.8	1,055.0	3,172.2	3,405.2	3,580.7	1,428.3	—	450.0	96.0
Qatar	1,571.7	880.8	1,377.7	8,518.5	7,253.1	14,529.2	5,678.4	7,983.0	673.5	2,565.0
Saudi Arabia	300.0	569.5	2,749.6	3,991.0	6,201.7	7,068.8	70.0	738.9	52.0	6,564.0
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	19,647.3	3,910.9	7,959.2	768.0	6,528.9
Uzbekistan	31.0	38.7	28.0	3.6	4.9	—	—	—	—	—
Latin America	**10,838.1**	**12,963.1**	**20,626.9**	**19,211.7**	**26,795.2**	**46,543.4**	**25,494.5**	**5,320.5**	**7,415.4**	**6,164.3**
Argentina	824.2	—	500.0	1,678.6	611.0	5,226.0	4,530.0	356.0	1,026.0	200.0
Bolivia	90.0	30.0	—	54.0	—	—	—	—	100.0	—
Brazil	1,870.9	1,774.3	5,122.9	5,934.3	7,738.3	24,382.6	16,758.2	561.0	3,621.5	1,976.1
Chile	1,914.3	4,479.4	5,501.3	5,310.6	4,166.9	3,175.5	1,617.5	903.0	537.2	2,171.2
Colombia	880.0	—	83.0	627.8	1,804.4	1,380.0	150.0	1,230.0	750.0	202.0
Costa Rica	—	—	24.2	91.7	1.7	31.1	—	30.5	—	150.0
Cuba	—	—	69.8	1.9	—	—	—	—	—	—
Dominican Republic	423.3	70.4	140.5	87.8	229.8	227.9	—	—	—	—
Ecuador	910.0	—	—	109.0	19.1	104.0	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	—	—	—	—
Haiti	—	—	—	—	134.0	—	—	—	—	—
Honduras	—	—	119.0	4.6	—	—	—	—	—	—
Jamaica	—	49.6	96.3	416.6	196.1	650.0	—	—	—	100.0
Mexico	3,453.0	6,163.6	8,295.7	4,035.4	8,620.9	9,226.4	2,092.0	1,840.0	752.0	—
Nicaragua	—	—	22.0	—	—	—	—	—	—	—
Paraguay	—	—	—	—	—	—	—	—	18.8	80.0
Peru	133.0	195.0	90.0	429.0	468.0	632.9	247.9	385.0	610.0	1,285.0
St. Lucia	—	20.0	—	—	—	—	—	—	—	—
Trinidad and Tobago	213.0	46.0	315.0	—	1,727.3	55.4	—	—	—	—
Uruguay	—	—	—	—	—	805.7	10.0	—	—	—
Venezuela	—	2.5	134.0	186.0	376.1	631.0	—	—	—	—

Source: Data provided by the Bond, Equity and Loan database of the International Monetary Fund sourced from Dealogic.

Table 18. Equity Valuation Measures: Dividend-Yield Ratios

						2007		2008	
	2003	2004	2005	2006	2007	Q3	Q4	Q1	Q2
Composite	**2.28**	**2.29**	**2.28**	**2.14**	**1.56**	**1.81**	**1.56**	**1.78**	**2.13**
Asia	**1.97**	**2.20**	**2.42**	**1.88**	**1.32**	**1.60**	**1.32**	**1.51**	**2.08**
Europe/Middle East/Africa	**2.41**	**2.00**	**1.76**	**2.36**	**1.82**	**2.09**	**1.82**	**2.06**	**2.20**
Latin America	**3.26**	**3.24**	**3.07**	**2.56**	**1.99**	**2.11**	**1.99**	**2.22**	**2.18**
Argentina	1.37	0.98	1.20	1.21	1.20	1.36	1.20	1.19	0.76
Bahrain	2.27	1.19	1.77	4.16	3.80	3.97	3.80	5.52	5.37
Brazil	4.23	4.24	3.98	3.38	2.00	2.62	2.00	2.34	2.29
Chile	2.95	4.62	2.99	2.07	2.40	2.33	2.40	2.81	2.79
China	2.31	1.82	2.56	1.29	0.70	0.90	0.70	0.91	1.75
Colombia	5.89	5.44	1.38	1.96	1.89	2.09	1.89	1.83	2.10
Czech Republic	5.04	4.19	1.42	3.71	2.67	2.88	2.67	2.99	3.69
Egypt	4.94	1.45	1.54	2.29	1.76	2.18	1.76	1.80	2.31
Hungary	0.91	1.73	2.05	1.83	3.04	2.49	3.04	2.95	1.04
India	1.74	1.70	1.25	1.07	0.71	0.94	0.71	0.81	1.07
Indonesia	3.42	3.35	2.74	2.18	1.87	2.00	1.87	2.07	2.29
Israel	1.20	1.83	1.58	2.55	2.64	2.64	2.64	2.72	2.66
Jordan	2.40	1.49	2.19	1.06	1.48	1.93	1.48	2.32	1.26
Korea	2.08	2.25	1.70	1.49	1.30	1.40	1.30	1.09	1.61
Kuwait	. . .	. . .	. . .	2.97	3.01	3.07	3.01	3.60	4.36
Malaysia	3.02	3.50	4.33	3.72	3.38	4.10	3.38	4.63	4.92
Mexico	2.12	1.85	2.18	1.24	2.20	1.38	2.20	2.19	2.31
Morocco	4.65	2.71	3.61	2.22	1.85	2.05	1.85	1.60	2.64
Nigeria	4.11	3.70	3.14	2.29	1.47	2.00	1.47	1.21	1.77
Oman	5.38	3.32	2.15	4.64	3.25	3.75	3.25	4.93	4.75
Pakistan	7.47	6.98	2.50	3.96	3.25	3.10	3.25	3.39	4.71
Peru	2.83	3.10	3.45	3.83	3.65	2.80	3.65	3.59	3.62
Philippines	2.12	1.79	2.63	2.00	2.28	2.54	2.28	3.79	4.51
Poland	1.43	1.20	2.48	3.36	2.66	2.96	2.66	3.10	2.25
Qatar	. . .	. . .	. . .	1.69	2.31	2.88	2.31	2.74	2.12
Russia	1.78	1.21	1.07	1.83	0.53	0.61	0.53	0.63	0.70
Saudi Arabia	2.58	2.05	1.25	2.65	2.18	3.01	2.18	2.82	2.51
South Africa	3.96	3.09	3.09	2.77	3.33	2.98	3.33	2.96	3.38
Sri Lanka	3.64	4.67	2.47	1.77	2.28	2.54	2.28	3.11	3.75
Taiwan Province of China	1.47	2.67	3.39	3.06	3.03	3.34	3.03	3.02	3.14
Thailand	1.64	2.24	3.05	4.51	3.81	3.34	3.81	4.00	4.04
Turkey	1.15	2.97	1.81	2.19	1.96	2.13	1.96	2.63	3.71
United Arab Emirates	. . .	. . .	. . .	2.12	1.27	1.97	1.27	1.37	1.95
Venezuela	9.86	12.28	6.27	5.71	. . .	. . .	. . .	. . .	. . .

Source: Standard & Poor's Emerging Market Database.

Table 19. Equity Valuation Measures: Price-to-Book Ratios

	2003	2004	2005	2006	2007	2007 Q3	2007 Q4	2008 Q1	2008 Q2
Composite	**1.96**	**1.86**	**2.65**	**2.73**	**3.67**	**3.47**	**3.67**	**3.21**	**3.11**
Asia	**2.06**	**1.78**	**2.11**	**2.43**	**3.69**	**3.51**	**3.69**	**3.09**	**2.76**
Europe/Middle East/Africa	**1.86**	**2.21**	**3.91**	**3.26**	**3.91**	**3.55**	**3.91**	**3.54**	**3.75**
Latin America	**1.83**	**1.58**	**2.30**	**2.91**	**3.27**	**3.20**	**3.27**	**3.12**	**3.21**
Argentina	1.99	2.16	2.50	4.09	3.23	3.57	3.23	3.49	4.23
Bahrain	2.02	2.02	2.73	2.23	3.56	2.69	3.56	3.48	3.62
Brazil	1.79	1.93	2.16	2.68	3.30	3.08	3.30	3.09	3.29
Chile	1.87	0.55	1.93	2.43	2.54	2.62	2.54	2.41	2.46
China	2.55	2.03	1.81	3.12	6.26	6.24	6.26	4.59	3.91
Colombia	0.94	1.58	2.41	1.78	1.82	1.70	1.82	1.55	1.55
Czech Republic	0.99	1.58	2.35	2.39	3.12	2.91	3.12	2.80	2.95
Egypt	2.08	4.38	9.08	5.85	8.60	7.16	8.60	7.58	6.63
Hungary	2.00	2.78	3.08	3.08	3.24	3.48	3.24	2.64	2.46
India	3.50	3.31	5.15	4.89	7.90	6.23	7.90	5.79	4.95
Indonesia	1.62	2.75	2.50	3.35	5.57	4.47	5.57	5.10	5.23
Israel	2.61	2.58	3.00	3.48	4.37	4.25	4.37	3.79	3.98
Jordan	2.08	2.99	6.24	3.30	4.39	3.27	4.39	4.28	5.35
Korea	1.57	1.25	1.95	1.74	2.18	2.21	2.18	2.00	1.94
Kuwait	. . .	. . .	4.64	4.52	6.37	6.65	6.37	6.94	6.70
Malaysia	1.71	1.93	1.67	2.08	2.51	2.35	2.51	2.17	1.97
Mexico	2.02	2.51	2.88	3.84	3.58	3.87	3.58	3.64	3.25
Morocco	1.70	2.06	2.92	3.11	4.34	4.41	4.34	5.03	4.81
Nigeria	2.52	3.19	5.36	5.22	11.98	9.56	11.98	15.94	13.94
Oman	1.50	1.80	2.28	2.19	4.01	2.86	4.01	4.49	5.02
Pakistan	2.25	2.63	3.51	3.17	4.66	4.39	4.66	5.13	4.08
Peru	1.80	1.56	2.17	3.47	5.95	6.60	5.95	5.77	6.59
Philippines	1.06	1.35	1.73	1.92	2.76	2.65	2.76	2.27	1.64
Poland	1.76	2.04	2.53	2.52	2.84	2.85	2.84	2.43	2.15
Qatar	. . .	. . .	8.80	2.73	3.79	3.12	3.79	3.96	5.14
Russia	1.18	1.18	2.19	2.53	2.82	2.48	2.82	2.40	2.78
Saudi Arabia	3.56	6.50	14.54	7.57	9.95	7.25	9.95	8.49	8.33
South Africa	2.06	2.52	2.98	3.80	4.38	4.21	4.38	4.38	4.26
Sri Lanka	1.63	1.93	2.56	2.41	1.85	1.69	1.85	1.75	1.58
Taiwan Province of China	2.18	1.94	1.93	2.36	2.56	2.79	2.56	2.56	2.31
Thailand	2.84	2.03	2.06	1.85	2.46	2.37	2.46	2.41	2.14
Turkey	2.64	1.74	2.13	1.95	2.78	2.64	2.78	2.00	1.82
United Arab Emirates	. . .	. . .	9.98	3.07	4.69	3.40	4.69	4.30	4.58
Venezuela	1.10	1.18	0.72	2.59	. . .	. . .	. . .	. . .	. . .

Source: Standard & Poor's Emerging Market Database.

Table 20. Equity Valuation Measures: Price/Earnings Ratios

	2003	2004	2005	2006	2007	2007 Q3	2007 Q4	2008 Q1	2008 Q2
Composite	**21.7**	**16.5**	**18.9**	**17.7**	**23.4**	**22.0**	**23.4**	**20.6**	**19.7**
Asia	**30.3**	**16.8**	**17.9**	**18.0**	**26.9**	**25.3**	**26.9**	**22.6**	**20.4**
Europe/Middle East/Africa	**18.0**	**18.6**	**25.2**	**18.7**	**22.6**	**20.3**	**22.6**	**20.7**	**21.1**
Latin America	**13.3**	**12.8**	**12.2**	**15.2**	**17.2**	**17.0**	**17.2**	**16.5**	**16.8**
Argentina	21.1	27.7	11.1	18.0	13.6	15.2	13.6	14.8	17.9
Bahrain	21.3	21.5	31.7	14.3	20.3	17.2	20.3	20.5	21.3
Brazil	10.0	10.6	10.7	12.7	16.6	15.5	16.6	15.5	16.5
Chile	24.8	17.2	15.7	24.2	22.3	23.1	22.3	21.1	21.6
China	28.6	19.1	13.9	24.6	50.5	49.2	50.5	37.1	31.7
Colombia	13.0	19.2	28.8	21.9	21.8	20.9	21.8	18.6	18.6
Czech Republic	10.8	25.0	21.1	20.0	26.5	24.4	26.5	23.8	25.1
Egypt	11.7	21.8	30.9	20.2	30.2	24.7	30.2	26.6	23.1
Hungary	12.3	16.6	13.5	13.4	14.0	15.1	14.0	11.4	10.6
India	20.9	18.1	19.4	20.1	31.6	25.1	31.6	23.2	19.8
Indonesia	39.5	13.3	12.6	20.1	31.7	26.1	31.7	29.0	29.7
Israel	75.6	39.7	20.0	25.3	31.5	31.0	31.5	27.3	28.6
Jordan	20.7	30.4	57.1	20.8	28.0	20.7	28.0	27.3	33.6
Korea	30.2	13.5	20.8	12.8	16.4	16.7	16.4	15.1	14.7
Kuwait	. . .	. . .	21.5	21.1	29.7	31.1	29.7	32.4	31.3
Malaysia	30.1	22.4	15.0	21.7	20.1	19.4	20.1	17.4	15.8
Mexico	17.6	15.9	14.2	18.6	17.2	19.5	17.2	17.4	15.5
Morocco	25.2	24.6	22.4	22.5	30.4	31.9	30.4	35.3	33.7
Nigeria	18.5	23.5	20.7	24.1	58.4	44.1	58.4	77.8	68.0
Oman	15.2	14.2	15.8	13.1	23.1	17.0	23.1	25.9	28.9
Pakistan	9.5	9.9	13.1	10.8	15.3	15.0	15.3	16.8	13.4
Peru	13.7	10.7	12.0	15.7	20.9	22.4	20.9	20.3	23.6
Philippines	21.1	14.6	15.7	14.4	17.7	17.6	17.7	14.5	11.1
Poland	–353.0	39.9	11.7	13.9	15.6	15.8	15.6	13.3	11.7
Qatar	. . .	. . .	48.7	15.9	21.7	18.0	21.7	22.6	29.3
Russia	19.9	10.8	24.1	16.6	18.4	15.8	18.4	15.6	16.6
Saudi Arabia	27.2	50.6	104.8	52.0	70.1	49.8	70.1	59.8	58.7
South Africa	11.5	16.2	12.8	16.6	18.7	18.3	18.7	18.7	18.3
Sri Lanka	15.0	18.1	23.6	15.4	12.1	11.2	12.1	11.5	10.4
Taiwan Province of China	55.7	21.2	21.9	25.6	27.9	29.7	27.9	27.9	25.1
Thailand	16.6	12.8	10.0	8.7	11.7	11.1	11.7	11.4	10.2
Turkey	14.9	12.5	16.2	17.2	25.2	24.4	25.2	18.1	16.5
United Arab Emirates	. . .	. . .	54.7	13.4	19.7	14.8	19.7	18.0	19.2
Venezuela	14.4	6.0	5.1	13.1	. . .	. . .	. . .	. . .	. . .

Source: Standard & Poor's Emerging Market Database.

Table 21. Emerging Markets: Mutual Fund Flows

(In millions of U.S. dollars)

								2007		2008	
	2001	2002	2003	2004	2005	2006	2007	Q3	Q4	Q1	Q2
Bonds	–444	606	3,153	1,947	5,729	6,233	4,295	–1,185	943	492	174
Equities	–1,781	–1,512	8,500	2,784	21,706	22,441	40,827	16,637	22,049	–20,045	7,742
Global	–67	–2,082	2,119	–5,348	3,148	4,209	15,223	2,623	11,904	–6,638	247
Asia	–768	817	5,148	5,609	6,952	16,790	16,405	11,064	6,668	–12,065	2,238
Europe/Middle East/Africa	–327	65	857	2,185	7,587	–1,877	–953	–324	1,533	157	2,756
Latin America	–619	–312	376	338	4,020	3,319	10,153	3,274	1,944	–1,499	2,501

Source: Emerging Porfolio Fund Research, Inc.

Table 22. Bank Regulatory Capital to Risk-Weighted Assets

(In percent)

	2003	2004	2005	2006	2007	2008	Latest
Latin America							
Argentina	14.5	14.0	15.3	16.8	16.8	16.8	May
Bolivia	15.3	14.9	14.7	13.3	12.6	14.0	May
Brazil	18.8	18.6	17.9	18.9	18.7	18.1	March
Chile	14.1	13.6	13.0	12.5	12.2	12.4	March
Colombia	12.6	13.1	13.2	12.2	12.8	13.3	May
Costa Rica[1]	16.5	18.1	15.9	15.3	13.0	12.9	March
Dominican Republic	11.6	13.9	13.0	12.3	13.1	16.3	March
Ecuador	14.9	14.5	14.4	14.8	15.7	. . .	November
El Salvador	12.8	13.4	13.5	13.8	13.8	14.3	May
Guatemala	15.6	14.5	13.7	13.6	13.8	12.4	February
Mexico[2]	14.4	14.1	14.5	16.3	16.0	16.0	March
Panama	17.6	17.8	16.3	15.8	13.6	13.6	March
Paraguay	20.9	20.5	20.4	20.1	16.8	. . .	December
Peru	13.3	14.0	12.0	12.5	11.7	12.2	May
Uruguay[3]	18.1	21.7	22.7	16.9	17.8	17.7	March
Venezuela	25.1	19.2	15.5	14.3	12.1	11.9	May
Emerging Europe							
Albania	28.5	21.6	18.6	18.1	17.1	17.2	March
Belarus	26.0	25.2	26.7	24.4	19.3	. . .	December
Bosnia and Herzegovina	20.3	18.7	17.8	17.7	17.1	16.5	March
Bulgaria	22.0	16.1	15.2	14.5	13.9	14.5	March
Croatia	16.5	16.0	15.2	13.6	15.9	15.9	March
Czech Republic	14.5	12.6	11.9	11.4	11.5	12.3	March
Estonia	14.5	13.4	11.7	13.1	14.8	. . .	December
Hungary	11.8	12.4	11.6	11.0	10.8	. . .	December
Israel	10.3	10.8	10.7	10.8	11.1	. . .	September
Latvia	11.7	11.7	10.1	10.2	11.1	12.6	March
Lithuania[4]	13.3	12.4	10.3	10.7	10.9	. . .	December
Macedonia, FYR	25.8	23.0	21.3	18.3	17.2	. . .	September
Moldova	31.6	31.4	27.2	27.9	29.6	28.7	May
Montenegro	. . .	31.3	27.8	21.3	17.1	17.2	March
Poland	13.7	15.5	14.5	13.2	11.8	. . .	September
Romania[5]	21.1	20.6	21.1	18.1	13.8	13.0	March
Russia	19.1	17.0	16.0	14.9	15.5	15.3	March
Serbia	31.1	27.9	26.0	24.7	27.9	27.4	March
Slovak Republic	22.4	18.7	14.8	13.0	12.4	. . .	December
Slovenia	11.5	11.8	10.6	11.8	. . .	. . .	December
Turkey[6]	30.9	28.8	24.2	22.1	18.9	16.9	June
Ukraine	15.2	16.8	15.0	14.2	13.9	13.3	March
Western Europe							
Austria[7]	14.5	12.4	11.8	11.8	12.7	. . .	December
Belgium	12.9	12.9	11.5	11.9	11.2	12.3	March
Denmark	13.9	13.4	13.2	13.8	. . .	. . .	December
Finland[5]	18.7	19.1	17.2	15.1	15.1	. . .	June
France	11.9	11.5	11.4	10.9	10.1	. . .	December
Germany	13.4	13.2	12.2	12.5	. . .	. . .	December
Greece	12.0	12.8	13.2	12.2	11.2	10.4	March
Iceland	12.3	12.8	12.8	15.1	12.1	. . .	December
Ireland[8]	13.9	12.6	12.0	10.9	. . .	. . .	December
Italy[9]	11.4	11.6	10.6	10.7	10.4	. . .	December
Luxembourg	17.1	17.5	16.3	14.9	13.5	. . .	December
Malta	. . .	21.4	20.4	22.0	23.2	. . .	December
Netherlands	12.3	12.3	12.6	11.9	13.2	13.5	March
Norway	12.4	12.2	11.9	11.2	11.7	. . .	December
Portugal[10]	10.0	10.4	11.3	11.0	10.2	. . .	December
Spain	12.6	12.3	12.2	11.9	11.4	. . .	December
Sweden[11]	9.9	10.1	10.1	10.0	10.3	10.0	March
Switzerland	12.4	12.6	12.4	13.4	12.5	. . .	June
United Kingdom	13.0	12.7	12.8	12.9	12.6	. . .	December

Table 22 *(concluded)*

(In percent)

	2003	2004	2005	2006	2007	2008	Latest
Asia							
Bangladesh	8.4	8.8	7.3	8.3	10.0	. . .	December
China	–5.9	–4.7	2.5	4.9	7.7	. . .	June
Hong Kong SAR	15.3	15.4	14.9	15.2	13.4	14.3	March
India	12.7	12.9	12.8	12.3	12.3	12.6	March
Indonesia	22.3	19.4	19.3	21.3	19.3	20.5	March
Korea	11.1	12.1	13.0	12.8	12.3	12.0	March
Malaysia	13.8	14.4	13.7	13.5	13.2	. . .	December
Philippines[12]	17.4	18.7	17.8	18.5	15.9	. . .	September
Singapore	17.9	16.2	15.8	15.4	14.0	. . .	September
Thailand	13.4	12.4	13.2	13.6	14.8	. . .	December
Middle East & Central Asia							
Armenia	33.8	32.3	33.7	34.9	30.1	27.0	March
Egypt	11.1	11.4	13.8	15.1	. . .	. . .	December
Georgia	20.3	18.8	17.5	20.6	16.0	15.8	May
Jordan	15.9	17.8	17.6	21.4	20.8	. . .	June
Kazakhstan	16.9	15.3	14.9	14.8	14.2	. . .	December
Kuwait	18.4	17.3	21.3	21.8	20.4	. . .	December
Lebanon	22.3	22.2	22.9	25.0	24.0	. . .	June
Morocco	9.6	10.5	11.5	12.3	10.6	. . .	December
Oman	17.6	17.6	18.1	17.2	13.4	. . .	September
Pakistan	8.5	10.5	11.3	12.7	13.6	. . .	September
Saudi Arabia	19.4	17.8	17.8	21.9	21.8	. . .	December
Tunisia	9.3	11.6	12.4	11.3	11.0	. . .	December
United Arab Emirates	18.6	18.9	17.0	16.7	14.4	. . .	December
Sub-Saharan Africa							
Gabon	19.9	22.3	19.8	17.8	14.3	. . .	December
Ghana	9.3	13.9	16.2	15.8	14.8	15.4	December
Kenya	17.3	16.6	16.4	16.5	16.3	. . .	December
Lesotho	. . .	22.0	22.0	19.0	20.0	. . .	March
Mozambique	17.0	18.7	16.0	12.5	14.2	. . .	December
Namibia	14.8	15.4	14.6	14.2	15.8	. . .	December
Nigeria	17.8	14.7	17.8	22.6	21.0	. . .	December
Rwanda	14.6	18.3	14.7	. . .	. . .	. . .	December
Senegal	11.7	11.5	10.8	12.9	13.5	. . .	December
Sierra Leone[13]	27.3	25.1	26.4	36.0	38.7	. . .	December
South Africa	12.4	14.0	12.7	12.3	12.8	. . .	December
Swaziland	14.0	14.0	15.0	20.0	23.0	. . .	June
Uganda	17.0	20.5	18.3	18.0	19.5	. . .	December
Other							
Australia	10.0	10.4	10.4	10.4	10.2	10.5	March
Canada	13.4	13.3	12.9	12.5	12.1	12.3	March
Japan[14]	11.1	11.6	12.2	13.1	12.9	12.3	March
United States[15]	13.0	13.2	12.9	13.0	12.8	12.8	March

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.

[1]Banking sector excludes offshore banks.

[2]Commercial banks.

[3]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 change in calculation. The data exclude the state mortgage bank.

[4]Data exclude foreign bank branches.

[5]Break in the data series starting in 2003.

[6]Break in the data series in 2007.

[7]Starting in 2004 data reported on a consolidated basis.

[8]Domestic banks.

[9]Consolidated reports for banking groups and individual reports for banks not belonging to groups.

[10]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.

[11]Data for the four large banking groups.

[12]On a consolidated basis.

[13]From 2006 figures unadjusted; not directly comparable with previous years.

[14]For the end of the fiscal year, i.e., March of the following calendar year; for major banks.

[15]All FDIC-insured institutions.

Table 23. Bank Capital to Assets

(In percent)

	2003	2004	2005	2006	2007	2008	Latest
Latin America							
Argentina	11.9	11.8	12.9	13.4	13.1	12.6	May
Bolivia	12.1	11.5	11.3	10.0	9.6	9.0	May
Brazil	9.6	10.1	9.8	9.9	9.9	9.5	March
Chile	7.3	7.0	6.9	6.8	6.7	7.1	March
Colombia	11.6	12.1	12.3	12.0	11.4	11.2	May
Costa Rica[1]	11.3	9.9	10.5	11.2	10.7	10.4	March
Dominican Republic	8.4	9.4	9.7	10.1	9.5	8.9	March
Ecuador[2]	8.8	8.5	8.4	8.7	8.5	7.5	April
El Salvador	9.4	9.7	10.1	10.7	11.8	12.2	May
Guatemala	9.0	8.9	8.5	8.2	9.2	9.4	March
Mexico[3]	10.0	10.2	11.5	13.2	14.4	14.1	March
Panama[4]	12.2	13.2	12.8	12.0	13.7	13.8	May
Paraguay	9.5	10.5	11.0	12.5	11.6	10.2	April
Peru	9.3	9.8	7.7	9.5	8.8	8.0	May
Uruguay[5]	7.2	8.3	8.6	9.8	10.5	9.5	March
Venezuela	14.3	12.5	11.6	8.8	8.3	8.2	May
Emerging Europe							
Albania	4.7	4.8	5.4	5.9	5.8	6.1	March
Belarus	20.4	20.1	19.8	17.8	15.9	. . .	December
Bosnia and Herzegovina	17.0	15.7	14.4	13.8	13.1	. . .	September
Bulgaria	13.1	10.2	7.4	7.3	7.7	8.2	March
Croatia	8.9	8.6	9.0	10.3	12.5	13.5	March
Czech Republic[6]	5.7	5.6	5.7	6.2	6.0	. . .	September
Estonia	11.3	9.8	8.6	8.4	8.6	. . .	December
Hungary	8.3	8.5	8.2	8.3	8.3	. . .	December
Israel	5.3	5.5	5.6	5.9	6.2	. . .	September
Latvia	8.4	8.0	7.6	7.6	7.9	8.4	March
Lithuania[7]	9.8	8.7	7.2	7.1	7.4	. . .	December
Macedonia, FYR	. . .	. . .	. . .	. . .	. . .	. . .	
Moldova	21.1	19.3	16.7	17.3	17.3	. . .	December
Montenegro	. . .	20.4	15.3	10.4	8.0	8.3	March
Poland	8.3	8.0	7.8	7.6	7.4	. . .	September
Romania[8]	10.9	8.9	9.2	8.6	7.3	6.9	April
Russia	14.6	13.3	12.7	12.4	13.3	13.6	March
Serbia	22.5	18.8	16.0	15.6	17.1	17.8	March
Slovak Republic	8.9	7.7	9.7	8.0	10.6	. . .	December
Slovenia	8.3	8.1	8.4	8.4	. . .	. . .	December
Turkey[9]	13.7	14.4	12.9	11.3	13.0	11.7	June
Ukraine	12.3	13.8	12.4	13.3	12.5	13.1	March
Western Europe							
Austria	4.9	4.9	4.8	5.2	6.5	. . .	December
Belgium	3.1	3.1	2.7	3.3	4.3	4.0	March
Denmark	5.6	5.2	5.0	5.8	6.1	. . .	December
Finland	9.7	8.7	8.8	9.2	. . .	. . .	December
France	6.9	6.6	5.8	6.0	5.5	5.5	May
Germany	4.2	4.0	4.1	4.3	. . .	. . .	December
Greece[10]	6.9	5.3	5.9	6.7	6.6	6.2	March
Iceland[11]	7.1	7.1	7.4	7.8	6.9	. . .	December
Ireland	5.2	4.9	4.7	4.3	4.5	4.1	May
Italy	7.0	6.9	6.8	7.1	7.7	. . .	December
Luxembourg	5.8	5.5	5.3	5.0	4.6	. . .	December
Malta	. . .	7.9	6.8	8.6	. . .	. . .	December
Netherlands	4.3	3.9	4.2	3.0	3.3	3.5	March
Norway	5.9	5.9	5.2	5.0	. . .	. . .	September
Portugal[12,13]	5.8	6.2	5.8	6.2	6.2	. . .	December
Spain	8.1	8.5	7.7	7.2	7.0	6.9	April
Sweden[14]	5.0	4.3	3.9	4.0	4.0	4.0	March
Switzerland	5.7	5.3	5.1	4.9	. . .	. . .	December
United Kingdom	9.8	9.6	9.1	8.9	. . .	. . .	December
Asia							
Bangladesh	3.2	2.7	2.6	4.0	6.5	. . .	December
China[15]	4.9	4.9	4.4	5.1	5.5	. . .	September
Hong Kong SAR	10.6	10.8	11.8	11.2	12.0	. . .	November

Table 23 *(concluded)*

	2003	2004	2005	2006	2007	2008	Latest
Asia *(continued)*							
India	5.7	5.9	6.4	6.6	6.4	. . .	March
Indonesia	9.6	10.8	10.2	10.7	10.0	. . .	November
Korea[16]	7.0	8.0	9.3	9.2	9.0	8.8	March
Malaysia	8.5	8.2	7.7	7.6	7.5	7.4	May
Philippines	13.1	12.5	11.8	11.7	11.7	. . .	December
Singapore	10.7	9.6	9.6	9.6	9.3	. . .	September
Thailand	7.4	8.0	8.9	8.9	9.5	. . .	December
Middle East & Central Asia							
Armenia	18.1	17.8	21.5	22.9	22.5	22.7	March
Egypt	4.9	5.4	5.4	5.5	5.1	5.1	March
Georgia	26.5	22.0	18.8	21.2	20.4	21.4	May
Jordan	. . .	5.1	5.0	6.8	6.7	. . .	June
Kazakhstan[17]	9.0	13.1	13.0	13.2	15.2	. . .	December
Kuwait	10.7	12.1	12.7	11.7	12.0	. . .	September
Lebanon	6.9	6.8	7.5	9.1	8.1	. . .	December
Morocco	7.6	7.6	7.7	7.4	6.9	. . .	December
Oman	12.6	12.9	13.7	13.2	. . .	. . .	June
Pakistan	5.4	6.5	7.6	9.4	10.2	. . .	September
Saudi Arabia	8.8	8.0	8.8	9.3	9.9	. . .	December
Tunisia	7.6	7.5	7.7	. . .	. . .	. . .	December
United Arab Emirates	11.4	11.1	11.9	12.6	. . .	. . .	December
Sub-Saharan Africa							
Gabon	13.1	13.2	11.1	10.2	7.0	. . .	December
Ghana	12.0	12.5	13.0	11.9	11.8	. . .	February
Kenya	11.8	11.9	12.1	12.4	12.4	. . .	December
Lesotho	17.0	16.9	14.6	. . .	. . .	. . .	December
Mozambique	9.0	9.5	8.0	6.1	6.4	. . .	December
Namibia	8.3	8.8	7.8	7.5	7.9	. . .	December
Nigeria	9.6	9.9	12.4	14.7	16.3	. . .	December
Rwanda	8.9	10.1	9.4	9.2	. . .	. . .	April
Senegal	7.8	7.7	7.6	8.3	10.4	. . .	December
Sierra Leone	21.1	22.5	20.0	16.9	17.7	. . .	December
South Africa	8.0	8.2	7.9	7.9	7.9	. . .	December
Swaziland	13.7	22.4	22.9	. . .	. . .	. . .	December
Uganda	8.6	10.3	10.3	10.9	10.3	. . .	December
Other							
Australia[16]	5.2	5.1	5.2	4.9	4.6	4.1	March
Canada	4.7	4.4	4.4	5.7	5.5	5.3	March
Japan[18]	3.9	4.2	4.9	5.3	5.0	4.3	March
United States[19]	9.2	10.3	10.3	10.5	10.3	10.2	March

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.

[1]Banking sector excludes offshore banks.

[2]Total assets include contingencies.

[3]All deposit takers.

[4]General licensed banks.

[5]The data exclude the state mortgage bank.

[6]Total own funds.

[7]Capital is defined as bank shareholders' equity and foreign bank branches' funds received from the head office.

[8]Break in the data series starting in 2003.

[9]Break in the data series in 2007.

[10]Data on a nonconsolidated basis. From 2004 in accordance with IFRS.

[11]Commercial banks and six largest savings banks (five largest savings banks from 2006 due to a merger of two banks).

[12]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.

[13]On accounting basis, consolidated.

[14]Data for the four large banking groups.

[15]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).

[16]Tier 1 capital to total assets.

[17]Tier 1 capital to total assets for 2002–03.

[18]For the end of the fiscal year, i.e., March of the following calendar year; all banks.

[19]All FDIC-insured institutions.

Table 24. Bank Nonperforming Loans to Total Loans

(In percent)

	2003	2004	2005	2006	2007	2008	Latest
Latin America							
Argentina	17.7	10.7	5.2	3.4	2.7	2.8	May
Bolivia	16.7	14.0	11.3	8.7	5.6	5.4	May
Brazil	4.1	2.9	3.5	3.5	3.0	2.9	March
Chile	1.6	1.2	0.9	0.8	0.8	0.9	May
Colombia	6.8	3.3	2.7	2.6	3.2	3.9	May
Costa Rica[1]	1.7	2.0	1.5	1.5	1.2	1.3	March
Dominican Republic	6.5	5.8	5.8	4.6	4.0	4.2	March
Ecuador	7.9	6.4	4.9	3.3	2.9	3.1	April
El Salvador[2]	2.8	2.4	2.0	1.9	2.1	2.5	May
Guatemala	6.5	7.1	4.2	4.6	5.8	4.7	April
Mexico[3]	2.8	2.2	1.8	2.1	2.5	2.1	March
Panama[4]	2.5	1.8	1.8	1.4	1.3	1.4	March
Paraguay	20.6	10.8	6.6	3.3	1.3	1.3	April
Peru	5.8	3.7	2.1	1.6	1.3	1.3	May
Uruguay[5]	14.3	4.7	3.6	1.9	1.1	1.0	March
Venezuela	7.7	2.8	1.2	1.1	1.2	1.7	May
Emerging Europe							
Albania	4.6	4.2	2.3	3.1	3.4	3.9	March
Belarus	3.7	2.8	1.9	1.2	0.7	. . .	December
Bosnia and Herzegovina	8.4	6.1	5.3	4.0	3.0	3.1	March
Bulgaria	3.2	2.0	2.2	2.2	2.1	2.1	March
Croatia	8.9	7.5	6.2	5.2	4.8	4.8	March
Czech Republic	4.9	4.1	4.3	3.6	2.6	2.8	March
Estonia	0.4	0.3	0.2	0.2	0.5	. . .	December
Hungary	2.6	2.7	2.5	2.5	2.4	. . .	December
Israel	2.6	2.5	2.3	1.9	1.7	. . .	September
Latvia	1.4	1.1	0.7	0.4	0.4	0.5	March
Lithuania[6]	2.4	2.2	0.6	1.0	1.0	. . .	December
Macedonia, FYR[7]	22.1	17.0	15.0	11.2	9.1	. . .	September
Moldova	6.4	6.9	5.3	4.4	3.7	. . .	December
Montenegro	. . .	5.2	5.3	2.9	3.2	3.0	March
Poland	10.4	9.2	7.7	3.6	3.1	9.7	April
Romania	8.3	8.1	8.3	7.9	9.7	9.7	April
Russia	5.0	3.8	3.2	2.6	2.5	2.4	March
Serbia[8]	24.1	22.2	23.8	4.1	3.8	4.8	March
Slovak Republic	3.7	2.6	5.0	3.7	2.5	. . .	December
Slovenia	3.7	3.0	2.5	2.5	. . .	. . .	December
Turkey[9]	11.5	6.0	4.8	3.8	3.6	3.1	June
Ukraine[10]	28.3	30.0	19.6	17.8	13.2	13.1	March
Western Europe							
Austria	3.0	2.7	2.6	2.1	. . .	. . .	December
Belgium[11]	2.6	2.3	2.0	1.4	1.2	1.2	March
Denmark[12]	1.5	1.1	0.8	0.6	. . .	. . .	December
Finland[13]	0.5	0.4	0.3	0.3	0.3	. . .	June
France[14]	4.8	4.2	3.5	3.0	2.7	. . .	December
Germany	5.2	4.9	4.0	3.4	. . .	. . .	December
Greece	7.0	7.0	6.3	5.4	4.5	4.7	March
Iceland[15]	2.1	0.9	1.1	0.8	. . .	. . .	December
Ireland	0.9	0.8	0.7	0.7	. . .	. . .	December
Italy[16]	6.7	6.6	6.2	5.1	4.8	. . .	December
Luxembourg	0.5	0.3	0.2	0.2	0.2	. . .	December
Malta	. . .	6.5	3.9	2.8	1.8	. . .	December
Netherlands	2.0	1.5	1.2	0.8	. . .	. . .	December
Norway	1.7	1.1	0.8	0.6	0.6	0.6	March
Portugal[17,18]	2.4	2.0	1.5	1.2	0.8	. . .	December
Spain[19]	0.8	0.6	0.6	0.6	0.7	1.1	April
Sweden[20]	1.2	0.9	0.7	0.6	0.5	. . .	December
Switzerland	1.3	0.9	0.5	0.3	. . .	. . .	December
United Kingdom	2.5	1.9	1.0	0.9	0.9	. . .	December

Table 24 *(continued)*

	2003	2004	2005	2006	2007	2008	Latest
Asia							
Bangladesh	22.1	17.6	13.6	13.2	14.0	13.2	March
China[21]	20.4	12.8	9.8	7.5	6.7	. . .	December
Hong Kong SAR[22]	3.9	2.3	1.4	1.3	0.9	0.8	March
India	8.8	7.2	5.2	3.3	2.5	2.8	March
Indonesia[23]	19.4	14.3	14.8	13.2	9.3	8.5	March
Korea[24]	2.6	1.9	1.2	0.8	0.7	0.8	March
Malaysia	13.9	11.7	9.6	8.5	6.6	. . .	November
Philippines[25]	16.1	14.4	10.3	7.5	5.8	. . .	December
Singapore	6.7	5.0	3.8	2.8	1.8	. . .	September
Thailand	13.5	11.9	9.1	8.1	7.9	. . .	December
Middle East and Central Asia							
Armenia	5.4	2.1	1.9	2.5	2.4	4.0	March
Egypt	24.2	23.6	24.8	24.7	. . .	. . .	December
Georgia	7.4	6.2	3.8	2.5	2.6	3.8	May
Jordan	15.5	10.3	6.6	4.3	4.1	. . .	June
Kazakhstan[26]	. . .	4.3	3.3	2.4	2.7	. . .	December
Kuwait	6.1	5.3	5.0	3.9	3.2	. . .	September
Lebanon	12.8	17.7	16.4	13.5	10.1	. . .	December
Morocco	18.7	19.4	15.7	10.9	7.9	. . .	December
Oman	12.5	9.9	6.5	4.6	3.2	. . .	September
Pakistan	17.0	11.6	8.9	6.9	8.4	. . .	March
Saudi Arabia[27]	5.4	2.8	1.9	2.0	2.1	. . .	December
Tunisia	24.0	23.7	20.9	19.0	17.3	. . .	December
United Arab Emirates	14.3	12.5	8.3	6.3	. . .	. . .	December
Sub-Saharan Africa							
Gabon	13.9	16.0	14.1	10.7	7.6	. . .	December
Ghana	18.3	16.3	13.0	7.9	6.4	8.7	December
Kenya	34.9	29.3	25.6	21.3	22.7	. . .	December
Lesotho	. . .	1.0	2.0	2.0	3.0	. . .	March
Mozambique	14.4	6.4	3.8	3.3	2.6	. . .	December
Namibia	3.9	2.4	2.3	2.6	2.8	. . .	December
Nigeria	20.5	21.6	18.1	8.8	8.4	. . .	December
Rwanda	52.0	27.0	27.2	. . .	. . .	. . .	December
Senegal	13.3	12.6	11.9	16.8	18.6	. . .	December
Sierra Leone[28]	7.4	12.1	20.9	26.8	31.7	. . .	December
South Africa	2.4	1.8	1.5	1.1	1.4	. . .	December
Swaziland	2.0	3.0	2.0	4.0	4.0	. . .	June
Uganda	7.3	2.2	2.3	3.0	4.1	. . .	December
Other							
Australia[29]	0.3	0.2	0.2	0.2	0.2	0.3	March
Canada	1.2	0.7	0.5	0.4	0.7	0.9	March
Japan[30]	5.2	2.9	1.8	1.5	1.5	1.4	March
United States[31]	1.1	0.8	0.7	0.8	1.4	1.7	March

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.

[1]Banking sector excludes offshore banks.

[2]Official definition based on past-due loans.

[3]Commercial banks.

[4]Banking system.

[5]The data exclude the state mortgage bank.

[6]From end-2005 nonperforming loans are loans with payments overdue past 60 days. Until 2004 they are defined as loans in "substandard," "doubtful," and "loss" loan categories.

[7]Includes only loans to the nonfinancial sector.

[8]Break in the time series starting in 2006. Prior to 2006, assets classified in risk categories C, D, and E. From 2006, loans overdue past 90 days.

[9]Break in the data series in 2007.

[10]The increase in nonperforming loans in 2003 reflects a revision in the official definition.

[11]Unconsolidated data up to 2005; consolidated data from 2006.

[12]Accumulated impairment losses as a percentage of loans, guarantees, and impairment losses.

[13]Net of provisions.

Table 24 *(concluded)*

[14]Gross doubtful debts. A break in the data series in 2006.
[15]Commercial banks and six largest savings banks. 2005 and 2006 figures are for the largest banks.
[16]Banking groups. For the 2002–04 period, nonperforming loans include only substandard loans and bad debts. For the 2005–07 period, the aggregate includes also loans overdue past 180 days.
[17]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.
[18]On a consolidated basis. Nonperforming loans are defined as credit to customers overdue.
[19]Doubtful exposures to other resident sectors over total lending to other resident sectors.
[20]Data for the four large banking groups.
[21]Major commercial banks (state-owned commercial banks and joint stock commercial banks).
[22]Loans classified as "substandard," "doubtful," and "loss."
[23]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.
[24]Loans classified "substandard" or below.
[25]The data exclude IBL.
[26]Loans overdue past 60 days and other qualified loans.
[27]Gross nonperforming loans to net loans.
[28]Break in the data series in 2006.
[29]Impaired assets to total assets. Figures exclude loans in arrears that are covered by collateral.
[30]For the end of the fiscal year, i.e., March of the following calendar year; for major banks.
[31]All FDIC-insured institutions.

Table 25. Bank Provisions to Nonperforming Loans

(In percent)

	2003	2004	2005	2006	2007	2008	Latest
Latin America							
Argentina	79.2	102.9	124.5	129.9	129.6	122.3	May
Bolivia	74.0	84.3	81.1	90.7	92.6	93.0	May
Brazil	171.8	214.5	179.8	179.9	181.8	181.7	March
Chile	130.9	165.5	177.6	198.5	210.4	187.5	May
Colombia	98.1	149.7	166.9	153.6	134.5	120.2	May
Costa Rica[1]	145.9	122.6	153.0	162.2	144.0	140.8	March
Dominican Republic	65.6	112.9	123.5	142.0	134.5	128.3	March
Ecuador	127.3	119.0	143.7	182.7	169.8	180.1	April
El Salvador	129.8	132.3	126.7	116.4	120.0	104.7	May
Guatemala	. . .	. . .	43.2	39.6	42.7	59.1	April
Mexico	167.1	201.8	232.1	207.4	169.2	184.0	March
Panama[2]	150.3	149.4	116.2	128.5	143.1	128.9	March
Paraguay	54.8	54.6	57.7	59.1	78.2	86.3	April
Peru	67.1	68.7	80.3	100.3	131.6	139.4	May
Uruguay[3]	91.4	106.8	118.8	218.6	93.3	. . .	December
Venezuela	103.7	130.2	196.3	229.1	175.7	135.4	May
Emerging Europe							
Albania	. . .	. . .	. . .	. . .	. . .	. . .	
Belarus	29.9	32.4	48.4	51.3	58.9	. . .	November
Bosnia and Herzegovina	. . .	. . .	. . .	. . .	. . .	. . .	
Bulgaria[4]	50.0	48.5	45.3	47.6	. . .	. . .	September
Croatia	60.6	62.3	60.0	61.5	59.2	57.5	March
Czech Republic[5]	76.7	69.4	63.2	58.5	56.4	. . .	September
Estonia	214.5	276.9	215.0	153.6	. . .	. . .	November
Hungary	47.3	51.3	54.4	53.9	58.1	. . .	December
Israel	. . .	. . .	. . .	. . .	. . .	. . .	
Latvia	89.4	99.1	98.8	116.6	129.8	120.4	March
Lithuania	. . .	. . .	. . .	. . .	. . .	. . .	
Macedonia, FYR	. . .	. . .	. . .	. . .	. . .	. . .	
Moldova	92.3	84.1	95.6	128.8	105.3	. . .	December
Montenegro	. . .	77.3	67.4	78.8	73.6	85.3	March
Poland	53.4	61.3	61.6	57.8	. . .	. . .	September
Romania[6]	12.6	16.1	14.4	18.2	25.3	29.1	April
Russia[7]	118.0	139.5	156.3	159.3	144.0	145.8	March
Serbia	54.0	58.9	47.8	. . .	. . .	. . .	September
Slovak Republic	85.8	86.4	85.1	105.9	95.1	. . .	December
Slovenia	81.0	80.1	80.6	84.3	. . .	. . .	December
Turkey[8]	88.6	88.1	89.8	90.8	88.4	84.4	June
Ukraine	22.3	21.1	25.0	23.1	26.3	26.7	March
Western Europe							
Austria[9]	68.0	70.8	71.5	75.3	. . .	. . .	December
Belgium[10]	52.8	54.2	51.6	52.6	47.5	47.9	March
Denmark	63.0	66.0	75.7	. . .	. . .	. . .	December
Finland	77.7	78.5	85.8	. . .	. . .	. . .	December
France[11]	59.6	61.3	63.8	62.9	61.4	. . .	December
Germany	. . .	. . .	. . .	. . .	. . .	. . .	
Greece	49.9	51.4	61.9	60.9	. . .	. . .	June
Iceland[12,21]	77.5	80.9	112.9	99.6	84.1	. . .	December
Ireland	96.8	85.4	73.5	56.3	. . .	. . .	December
Italy[13]	. . .	. . .	. . .	46.0	49.5	. . .	December
Luxembourg	. . .	. . .	. . .	. . .	. . .	. . .	
Malta	. . .	. . .	. . .	. . .	. . .	. . .	
Netherlands[12]	73.8	69.2	65.5	56.0	. . .	. . .	December
Norway[12]	59.0	66.1	52.5	52.9	. . .	. . .	December
Portugal[14,15]	73.0	83.4	79.0	83.9	75.7	. . .	December
Spain[16]	231.5	289.0	235.7	255.1	204.8	144.1	April
Sweden[17]	73.9	78.9	84.7	78.5	79.9	. . .	December
Switzerland	89.9	90.9	116.0	122.6	. . .	. . .	December
United Kingdom[12]	69.8	61.5	54.0	54.6	. . .	. . .	December
Asia							
Bangladesh	18.3	18.9	25.3	26.3	42.3	43.4	March
China[18]	. . .	. . .	. . .	. . .	39.2	. . .	December
Hong Kong SAR	. . .	. . .	. . .	. . .	. . .	. . .	
India	46.4	56.6	60.3	58.9	. . .	. . .	March
Indonesia	146.5	158.7	82.2	99.7	120.5	122.4	September

Table 25 *(concluded)*

	2003	2004	2005	2006	2007	2008	Latest
Asia *(continued)*							
Korea	84.0	104.5	131.4	175.2	199.1	183.8	March
Malaysia	38.9	41.0	45.4	50.7	62.6	. . .	November
Philippines	51.5	58.0	73.8	75.0	81.5	. . .	December
Singapore	64.9	73.6	78.7	89.5	105.9	. . .	September
Thailand	72.8	79.8	83.7	82.7	86.5	. . .	December
Middle East & Central Asia							
Armenia	34.3	77.0	70.7	64.3	66.6	43.9	March
Egypt	57.0	60.2	61.5	68.2	. . .	. . .	December
Georgia	48.1	64.2	55.6	50.9	49.7	60.1	May
Jordan[19]	51.9	63.8	78.4	80.0	67.8	. . .	June
Kazakhstan[20]	. . .	64.4	104.9	102.7	60.2	. . .	December
Kuwait	77.7	82.5	107.2	100.6	92.0	. . .	September
Lebanon	. . .	57.3	64.1	72.4	78.1	. . .	December
Morocco	54.9	59.3	67.1	71.2	75.2	. . .	December
Oman	59.8	75.3	72.7	102.8	112.8	. . .	September
Pakistan	63.9	71.6	76.8	79.0	71.7	. . .	September
Saudi Arabia	128.2	175.4	202.8	182.3	142.9	. . .	December
Tunisia	43.1	45.8	47.4	49.2	53.8	. . .	December
United Arab Emirates	88.5	94.6	95.7	98.2	. . .	. . .	December
Sub-Saharan Africa							
Gabon	53.9	53.6	55.5	57.4	59.8	. . .	December
Ghana	. . .	. . .	. . .	. . .	. . .	. . .	
Kenya	79.2	102.9	115.6	115.6	. . .	. . .	September
Lesotho	. . .	. . .	. . .	. . .	. . .	. . .	
Mozambique	. . .	. . .	. . .	. . .	. . .	. . .	
Namibia	. . .	95.2	85.3	90.3	77.2	. . .	December
Nigeria	76.4	96.2	81.0	59.5	. . .	. . .	December
Rwanda	58.4	60.2	56.7	. . .	. . .	. . .	December
Senegal	75.3	75.7	75.4	52.0	53.8	. . .	December
Sierra Leone[21]	65.0	56.6	44.2	73.6	65.9	. . .	December
South Africa	54.2	61.3	64.3	. . .	. . .	. . .	December
Swaziland	. . .	. . .	. . .	. . .	. . .	. . .	
Uganda	76.5	97.8	103.8	74.4	69.3	. . .	June
Other							
Australia	131.8	182.9	203.0	202.5	183.7	128.6	March
Canada	43.5	47.7	49.3	55.3	42.1	36.7	March
Japan[22]	25.5	29.9	31.2	28.1	28.8	26.4	March
United States[23]	140.4	168.1	155.0	135.0	93.1	88.9	March

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.

[1]Banking sector excludes offshore banks.

[2]General licensed banks.

[3]The data exclude the state mortgage bank.

[4]Provisions to nonstandard loans.

[5]Allowances for individually assessed financial assets divided by receivables on investment portfolio classified as "substandard," "doubtful," and "loss."

[6]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.

[7]Change in definition in 2004; not strictly comparable with previous years.

[8]Break in the data series in 2007.

[9]2006 data cover two of the large banks only; not strictly comparable with previous years.

[10]Unconsolidated data up to 2005; consolidated data from 2006.

[11]Coverage of doubtful loans to customers by provisions.

[12]Data for large banking groups.

[13]Banking groups.

[14]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.

[15]On a consolidated basis. Nonperforming loans are defined as credit to customers overdue.

[16]Allowances and provisions to doubtful exposures.

[17]Data for the four large banking groups.

[18]Major commercial banks.

[19]Provisions to classified loans net of interest in suspense.

[20]Provisions to classified loans.

[21]Break in the data series in 2006.

[22]For the end of the fiscal year, i.e., March of the following calendar year; coverage of nonperforming loans by provisions for all banks.

[23]All FDIC-insured institutions.

Table 26. Bank Return on Assets

(In percent)

	2003	2004	2005	2006	2007	2008	Latest
Latin America							
Argentina	–3.0	–0.5	0.9	1.9	1.5	1.7	May
Bolivia	0.3	–0.1	0.7	1.3	1.9	1.5	May
Brazil[1]	2.0	2.2	2.9	2.7	2.9	2.8	March
Chile	1.3	1.2	1.3	1.3	1.1	1.1	May
Colombia	1.9	2.7	2.7	2.5	2.3	2.7	May
Costa Rica[1,2]	1.9	1.7	2.1	2.0	1.5	1.2	March
Dominican Republic	2.1	2.3	2.1	2.2	2.6	2.6	March
Ecuador	1.1	1.2	1.5	2.0	1.9	2.3	April
El Salvador	1.1	1.0	1.2	1.5	1.2	1.5	May
Guatemala	1.1	1.3	1.6	1.2	1.6	1.5	April
Mexico[1,3]	1.6	1.8	2.7	3.1	2.8	2.9	March
Panama[1,4]	2.1	2.3	2.1	1.7	2.0	2.8	May
Paraguay[1]	0.4	1.7	2.1	3.0	2.8	3.5	April
Peru	1.1	1.2	2.2	2.2	2.5	2.6	May
Uruguay[5]	–1.1	–0.1	0.7	1.2	2.8	1.0	March
Venezuela	6.2	5.9	3.7	3.0	2.6	2.5	May
Emerging Europe							
Albania	1.2	1.3	1.4	1.4	1.6	1.3	March
Belarus	1.5	1.5	1.3	1.7	2.3	. . .	December
Bosnia and Herzegovina	0.4	0.7	0.7	0.9	0.9	0.2	March
Bulgaria	2.4	2.1	2.1	2.2	2.4	2.5	March
Croatia	1.6	1.7	1.6	1.5	1.6	1.6	March
Czech Republic	1.2	1.3	1.4	1.2	1.3	1.4	March
Estonia[1]	1.7	2.1	2.0	1.7	2.6	. . .	December
Hungary	1.5	2.0	2.0	1.8	1.4	. . .	December
Israel	0.7	1.0	1.1	1.0	1.3	. . .	September
Latvia	1.4	1.7	2.1	2.1	2.0	1.6	March
Lithuania[6]	1.2	1.3	1.1	1.5	2.0	. . .	December
Macedonia, FYR[7]	0.5	0.6	1.2	1.8	2.0	. . .	September
Moldova	4.4	3.7	3.2	3.4	3.9	4.2	May
Montenegro	. . .	–0.3	0.8	1.1	0.7	0.2	March
Poland	0.5	1.4	1.6	1.7	1.8	. . .	September
Romania[8]	2.7	2.5	1.9	1.7	1.3	1.5	March
Russia[9]	2.6	2.9	3.2	3.2	3.0	0.7	March
Serbia	–0.3	–1.2	1.1	1.7	1.7	2.7	March
Slovak Republic	1.2	1.2	1.2	1.3	1.1	. . .	December
Slovenia[10]	1.0	1.1	1.0	1.3	. . .	. . .	December
Turkey[11]	2.3	2.3	1.7	2.5	2.6	2.3	June
Ukraine	1.0	1.1	1.3	1.6	1.5	1.4	March
Western Europe							
Austria[12]	0.3	0.6	0.6	0.7	0.7	. . .	September
Belgium[13]	0.5	0.6	0.7	0.7	0.4	. . .	December
Denmark	0.9	0.9	1.0	1.0	. . .	. . .	December
Finland	0.7	0.8	0.9	1.0	. . .	. . .	December
France	0.4	0.5	0.6	0.7	0.4	. . .	December
Germany	–0.1	0.1	0.3	0.3	. . .	. . .	December
Greece	0.6	0.4	0.9	0.8	1.0	0.7	March
Iceland	1.3	1.8	2.3	2.6	1.5	. . .	December
Ireland[1]	0.9	1.1	0.8	0.8	. . .	. . .	December
Italy	0.5	0.6	0.7	0.8	0.7	. . .	December
Luxembourg[14]	0.6	0.7	0.7	0.9	0.9	. . .	December
Malta	. . .	1.3	1.4	1.1	1.0	. . .	December
Netherlands	0.5	0.4	0.4	0.4	0.6	. . .	December
Norway	0.6	0.9	0.9	0.8	. . .	. . .	December
Portugal[15]	0.8	0.8	0.9	1.0	1.0	. . .	December
Spain	0.9	0.9	0.9	1.0	1.1	. . .	December
Sweden[16]	0.5	0.6	0.7	0.7	0.7	0.6	March
Switzerland[14]	0.7	0.8	0.9	0.9	. . .	. . .	December
United Kingdom[1]	0.6	0.7	0.8	0.5	0.4	. . .	December
Asia							
Bangladesh	0.5	0.7	0.6	0.8	0.9	. . .	December
China[17]	0.3	0.5	0.6	0.7	1.0	. . .	June
Hong Kong SAR[18]	1.9	1.7	1.7	1.7	1.9	2.0	March
India	1.0	0.8	0.9	0.9	0.9	1.0	March
Indonesia[1]	2.6	3.5	2.5	2.6	2.8	2.7	March

Table 26 *(concluded)*

	2003	2004	2005	2006	2007	2008	Latest
Asia *(continued)*							
Korea[19]	0.2	0.9	1.3	1.1	1.1	0.9	March
Malaysia[1]	1.3	1.4	1.4	1.3	1.5	. . .	December
Philippines[1]	1.1	0.9	1.1	1.3	1.4	. . .	December
Singapore	1.0	1.2	1.2	1.4	1.4	. . .	September
Thailand	0.6	1.2	1.4	0.8	0.1	. . .	December
Middle East & Central Asia							
Armenia[1]	2.7	3.2	3.1	3.6	2.9	3.0	March
Egypt	0.5	0.6	0.5	0.9	0.8	. . .	September
Georgia[1]	3.9	1.9	3.0	2.7	1.9	1.6	May
Jordan	0.7	1.1	2.0	1.7	1.6	. . .	December
Kazakhstan[1]	2.0	1.2	1.6	1.4	2.2	. . .	December
Kuwait	2.0	2.5	3.0	3.2	3.4	. . .	September
Lebanon	0.7	0.7	0.7	0.9	1.0	. . .	December
Morocco	–0.2	0.8	0.5	1.3	1.5	. . .	December
Oman	0.3	1.9	2.7	2.7	. . .	. . .	December
Pakistan[1]	1.9	1.8	2.8	3.1	3.0	. . .	September
Saudi Arabia[1]	2.2	2.5	3.4	4.0	2.8	. . .	December
Tunisia	0.6	0.4	0.5	0.7	0.9	. . .	December
United Arab Emirates	2.3	2.1	2.7	2.2	2.0	2.2	March
Sub-Saharan Africa							
Gabon	0.7	2.8	2.6	2.5	. . .	. . .	December
Ghana[1]	6.2	5.8	4.6	4.8	3.7	3.6	December
Kenya	2.3	2.1	1.0	2.8	3.2	. . .	December
Lesotho	. . .	3.0	2.0	2.0	1.0	. . .	March
Mozambique	1.2	1.4	1.8	3.5	3.5	. . .	December
Namibia	3.6	2.1	3.5	1.5	3.5	. . .	December
Nigeria	1.7	3.1	0.9	1.6	2.2	. . .	December
Rwanda	1.4	2.2	1.5	. . .	. . .	. . .	December
Senegal	1.8	1.8	1.6	1.6	. . .	. . .	December
Sierra Leone	10.5	9.7	7.9	5.8	3.1	. . .	December
South Africa	0.8	1.3	1.2	1.4	1.4	. . .	December
Swaziland	4.0	3.0	3.0	6.0	3.0	. . .	June
Uganda	4.5	4.3	3.6	3.4	3.9	. . .	December
Other							
Australia[20]	1.6	1.1	1.0	1.0	1.0	. . .	December
Canada	0.7	0.8	0.7	1.0	0.9	0.3	March
Japan[21]	–0.1	0.2	0.5	0.4	0.2	0.3	March
United States[22]	1.4	1.3	1.3	1.3	0.8	0.6	March

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.

[1]Before tax.

[2]Banking sector excludes offshore banks.

[3]Commercial banks.

[4]General licensed banks.

[5]The data exclude the state mortgage bank.

[6]Net income before extraordinary items and taxes to average total assets.

[7]Adjusted for unallocated provisions for potential loan losses.

[8]Break in the data series starting in 2003.

[9]Not annualized.

[10]Before extraordinary items and taxes.

[11]Break in the data series in 2007.

[12]Starting in 2004 data reported on a consolidated basis.

[13]Gross profits.

[14]Income before provisions and taxes to total assets.

[15]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.

[16]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.

[17]2007 figure is net income to end-of-period assets.

[18]Net interest margin, not comparable with the other indicators in the table.

[19]Excludes earnings from sale of equity stakes.

[20]Gross profits until 2003; return on assets (after taxes) from 2004.

[21]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.

[22]All FDIC-insured institutions.

Table 27. Bank Return on Equity

(In percent)

	2003	2004	2005	2006	2007	2008	Latest
Latin America							
Argentina	–22.7	–4.2	7.0	14.3	9.0	14.1	May
Bolivia	2.8	–1.2	6.4	13.3	21.2	18.2	May
Brazil[1]	21.1	22.1	29.5	27.3	28.9	29.4	March
Chile	16.7	16.7	17.9	18.6	16.2	15.7	May
Colombia	17.1	23.0	22.1	20.2	20.9	25.7	May
Costa Rica[1,2]	17.2	16.7	20.1	18.7	13.4	11.3	March
Dominican Republic	20.6	25.4	22.4	21.7	28.0	27.7	March
Ecuador	14.7	16.5	18.5	23.1	21.4	23.7	April
El Salvador	11.5	10.9	11.8	14.6	11.3	14.3	May
Guatemala	12.2	14.0	19.1	15.1	16.9	12.9	March
Mexico[1,3]	16.1	17.2	24.4	26.2	19.9	21.1	March
Panama[4]	16.9	16.7	15.7	13.3	15.7	20.9	March
Paraguay[1]	4.5	18.3	22.6	31.7	34.7	37.7	April
Peru	10.7	11.6	22.2	23.9	27.9	28.2	May
Uruguay[5]	–15.3	–0.9	7.6	12.7	27.7	33.9	March
Venezuela	44.0	45.2	32.2	31.6	32.4	30.8	May
Emerging Europe							
Albania	19.5	21.1	22.2	20.2	20.7	16.3	March
Belarus	8.4	7.8	6.8	9.6	13.8	. . .	December
Bosnia and Herzegovina	3.4	5.8	6.2	8.5	8.9	2.0	March
Bulgaria	22.7	19.6	21.4	25.0	24.8	28.6	March
Croatia	14.1	16.1	15.1	13.0	11.1	10.0	March
Czech Republic	23.8	23.3	25.2	22.5	24.5	26.0	March
Estonia	14.1	20.0	21.0	19.8	30.0	. . .	December
Hungary	19.3	25.3	24.7	24.0	18.1	. . .	December
Israel	14.1	17.9	19.4	17.6	22.0	. . .	September
Latvia	16.7	21.4	27.1	25.6	24.2	19.5	March
Lithuania[6]	11.8	13.5	13.8	21.4	27.2	. . .	December
Macedonia, FYR[7]	2.3	3.1	7.5	12.3	15.8	. . .	September
Moldova	19.7	17.8	15.4	20.5	24.2	24.5	May
Montenegro	. . .	–1.4	5.3	6.8	6.2	2.6	March
Poland	5.8	17.1	20.7	21.9	23.7	. . .	September
Romania	20.0	19.3	15.4	13.6	11.5	15.4	March
Russia[8]	17.8	20.3	24.2	26.3	22.7	4.8	March
Serbia	–1.2	–5.3	6.7	10.0	10.2	15.3	March
Slovak Republic[9]	10.8	11.9	16.9	16.6	16.6	. . .	December
Slovenia[10]	11.9	12.5	13.8	15.1	. . .	. . .	December
Turkey[11]	16.0	16.4	11.8	19.8	19.6	19.5	June
Ukraine	7.6	8.4	10.4	13.5	12.7	11.4	March
Western Europe							
Austria[12]	7.0	14.8	14.8	16.9	16.8	. . .	September
Belgium	13.6	15.8	18.5	22.4	13.2	. . .	December
Denmark	15.4	13.7	16.3	17.1	. . .	. . .	December
Finland	11.3	12.4	10.1	11.1	15.6	. . .	June
France	8.5	10.6	11.8	15.5	9.8	. . .	December
Germany	–1.5	1.9	9.2	7.5	. . .	. . .	December
Greece	8.9	6.4	15.9	12.8	14.8	11.2	March
Iceland[13]	22.1	30.9	41.7	39.1	22.4	. . .	December
Ireland[1]	17.8	20.7	19.6	19.1	. . .	. . .	December
Italy	7.4	9.3	9.7	11.4	9.7	. . .	December
Luxembourg[14]	34.9	39.8	37.8	55.6	47.0	. . .	December
Malta	. . .	13.2	14.3	11.7	10.7	. . .	December
Netherlands	14.8	16.8	15.4	15.4	18.7	. . .	December
Norway	9.6	14.6	18.0	15.7	15.9	8.3	March
Portugal[15]	13.9	12.8	16.8	16.9	15.2	. . .	December
Spain	13.2	14.1	16.9	19.9	19.9	. . .	December
Sweden[16]	12.3	14.6	17.4	18.0	17.0	15.9	March
Switzerland[17]	11.7	14.3	18.0	17.7	. . .	. . .	December
United Kingdom[1]	8.6	10.9	11.8	8.9	6.2	. . .	December
Asia							
Bangladesh	9.8	13.0	12.4	14.1	13.8	. . .	December
China[18]	. . .	13.7	15.1	14.8	19.9	. . .	June
Hong Kong SAR[19]	17.8	20.3	19.1	. . .	. . .	. . .	December
India	18.8	20.8	13.3	12.7	. . .	. . .	March
Indonesia	. . .	22.9	16.5	16.4	17.7	19.2	March

Table 27 *(concluded)*

	2003	2004	2005	2006	2007	2008	Latest
Asia *(continued)*							
Korea	3.4	15.2	18.4	14.6	14.6	. . .	December
Malaysia[1]	15.6	16.7	16.7	16.2	19.7	. . .	December
Philippines	8.5	7.1	8.7	10.6	11.8	. . .	December
Singapore	8.7	11.6	11.2	13.7	13.4	. . .	September
Thailand	10.3	16.8	14.2	8.8	7.3	. . .	December
Middle East & Central Asia							
Armenia[1]	14.4	18.4	15.5	15.9	14.9	13.0	March
Egypt	9.8	10.6	9.6	17.4	14.3	. . .	September
Georgia[1]	15.0	7.9	15.1	15.7	9.7	7.3	May
Jordan	. . .	13.1	20.9	15.0	12.6	. . .	June
Kazakhstan	14.2	11.5	16.6	14.6	18.2	. . .	December
Kuwait	18.6	20.9	22.9	27.1	28.1	. . .	September
Lebanon	10.9	9.3	11.0	10.2	12.1	. . .	December
Morocco	–2.0	10.9	6.3	17.4	20.6	. . .	December
Oman	1.7	12.9	16.6	18.1	. . .	. . .	December
Pakistan[1]	35.4	30.5	38.2	35.2	30.1	. . .	September
Saudi Arabia	22.7	24.3	28.5	30.5	. . .	. . .	December
Tunisia	7.6	5.1	6.5	7.7	9.0	. . .	December
United Arab Emirates	16.4	19.9	22.5	18.2	22.0	21.2	March
Sub-Saharan Africa							
Gabon	5.7	21.3	21.1	23.5	. . .	. . .	December
Ghana[1]	32.7	33.7	23.6	39.6	35.8	31.5	December
Kenya	23.2	22.0	25.0	28.6	32.3	. . .	August
Lesotho	. . .	27.0	15.0	27.0	8.0	. . .	March
Mozambique	16.3	18.7	27.4	55.4	47.7	. . .	December
Namibia	43.2	24.2	45.6	19.9	44.9	. . .	December
Nigeria	19.8	27.4	7.1	10.4	13.1	. . .	December
Rwanda	31.1	21.6	16.5	. . .	. . .	. . .	December
Senegal	22.1	17.6	15.8	14.6	. . .	. . .	December
Sierra Leone[20]	67.1	73.2	52.5	21.1	10.3	. . .	December
South Africa	11.6	16.2	15.2	18.3	18.1	. . .	December
Swaziland	29.0	20.0	20.0	52.0	26.0	. . .	June
Uganda	43.2	37.8	29.6	28.3	31.4	. . .	December
Other							
Australia[21]	24.2	16.0	14.7	16.8	18.1	. . .	December
Canada	14.7	16.7	14.9	20.9	16.1	6.3	March
Japan[22]	–2.7	4.1	11.3	8.5	3.2	6.1	March
United States[23]	15.0	13.2	12.7	12.3	7.8	5.7	March

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.
[1]Before tax.
[2]Banking sector excludes offshore banks.
[3]Commercial banks.
[4]General licensed banks.
[5]The data exclude the state mortgage bank.
[6]Capital is defined as bank shareholders' equity and foreign bank branches' funds received from the head office. Net income before extraordinary items and taxes.
[7]Adjusted for unallocated provisions for potential loan losses.
[8]Not annualized.
[9]2007 data do not include branches.
[10]Before extraordinary items and taxes.
[11]Break in the data series in 2007.
[12]Starting in 2004, data reported on a consolidated basis.
[13]Commercial banks and six largest savings banks (five largest savings banks from 2006 due to a merger of two banks).
[14]Net after tax income to paid-in capital.
[15]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.
[16]Data for the four large banking groups.
[17]Gross profits.
[18]2007 figure is net income to end-of-period equity.
[19]2005 figure on a domestic consolidation basis; not strictly comparable with previous years.
[20]Break in the data series in 2006.
[21]Gross profits until 2003; return on equity (after taxes) from 2004.
[22]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.
[23]All FDIC-insured institutions.