Global Financial Stability Report

Old Risks, New Challenges

April 2013

International Monetary Fund

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PREFACE

The *Global Financial Stability Report* (GFSR) assesses key risks facing the global financial system. In normal times, the report seeks to play a role in preventing crises by highlighting policies that may mitigate systemic risks, thereby contributing to global financial stability and the sustained economic growth of the IMF's member countries. Risks to financial stability have declined since the October 2012 GFSR, providing support to the economy and prompting a rally in risk assets. These favorable conditions reflect a combination of deeper policy commitments, renewed monetary stimulus, and continued liquidity support. The current report analyzes the key challenges facing financial and nonfinancial firms as they continue to repair their balance sheets and unwind debt overhangs. The report also takes a closer look at the sovereign credit default swaps market to determine its usefulness and its susceptibility to speculative excesses. Lastly, the report examines the issue of unconventional monetary policy ("MP-plus") and its potential side effects, and suggests the use of macroprudential policies, as needed, to lessen vulnerabilities, allowing country authorities to continue using MP-plus to support growth while protecting financial stability.

The analysis in this report has been coordinated by the Monetary and Capital Markets (MCM) Department under the general direction of José Viñals, Financial Counsellor and Director. The project has been directed by Jan Brockmeijer and Robert Sheehy, both Deputy Directors; Peter Dattels and Laura Kodres, Assistant Directors; and Matthew Jones, Advisor. It has benefited from comments and suggestions from the senior staff in the MCM department.

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This particular issue draws, in part, on a series of discussions with banks, clearing organizations, securities firms, asset management companies, hedge funds, standards setters, financial consultants, pension funds, central banks, national treasuries, and academic researchers. The report reflects information available up to April 2, 2013.

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 April 1, 2013. 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.

The following symbols have been used throughout this volume:

. . . to indicate that data are not available;

— to indicate that the figure is zero or less than half the final digit shown, or that the item does not exist;

– between years or months (for example, 2008–09 or January–June) to indicate the years or months covered, including the beginning and ending years or months;

/ between years (for example, 2008/09) 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 is equivalent to 1/4 of 1 percentage point).

"n.a." means not applicable.

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

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

The boundaries, colors, denominations, and other information shown on the maps do not imply, on the part of the International Monetary Fund, any judgment on the legal status of any territory or any endorsement or acceptance of such boundaries.

Chapter 1: Acute Risks Reduced: Actions Needed to Entrench Financial Stability

Global financial and market conditions have improved appreciably in the past six months, providing additional support to the economy and prompting a sharp rally in risk assets. These favorable conditions reflect a combination of deeper policy commitments, renewed monetary stimulus, and continued liquidity support. Together, these actions have reduced tail risks, enhanced confidence, and bolstered the economic outlook. However, as global economic conditions remain subdued, the improvement in financial conditions can only be sustained through further policy actions that address underlying stability risks and promote continued economic recovery. Continued improvement will require further balance sheet repair in the financial sector and a smooth unwinding of public and private debt overhangs. If progress in addressing these medium-term challenges falters, risks could reappear. The global financial crisis could morph into a more chronic phase, marked by a deterioration of financial conditions and recurring bouts of financial instability.

The Euro Area Crisis: Acute Risks Have Declined, Much Work Lies Ahead

In the euro area, acute near-term stability risks have been reduced significantly. Funding conditions in the markets for sovereign, bank, and corporate debt have improved. Despite this notable progress, many banks in the euro area periphery remain challenged by elevated funding costs, deteriorating asset quality, and weak profits. Credit transmission remains weak in several economies, as bank balance sheet repair is uneven, while fragmentation between the core and periphery of the euro area persists. Corporations in the periphery are directly affected by bank balance sheet weakness, cyclical headwinds, and, in many cases, their own debt overhangs.

The analysis presented in this report suggests that the debt overhang at listed companies in the euro area periphery is sizable—up to one-fifth of debt outstanding. To limit the extent of required deleveraging in the corporate sector, continued efforts to reduce fragmentation and lower funding costs, as well as ongoing restructuring plans to improve productivity, are essential. In addition, a combination of asset sales or cutbacks in dividends and investment may be needed to reduce debt burdens.

Banking Challenges: Deleveraging, Business Models, and Soundness Challenges

Banks in advanced economies have taken significant steps to restructure their balance sheets, but progress has been uneven, as systems are at different stages of repair. The process is largely completed in the United States, but it requires further efforts for some European banks. Banks in the euro area periphery, in particular, face significant challenges that are impairing their ability to support economic recovery. Balance sheet pressures are less acute for other European banks, but the process of de-risking and deleveraging is not complete. For banks in emerging market economies, the main challenge is to continue supporting growth while safeguarding against rising domestic vulnerabilities. The new market and regulatory environments are also forcing banks globally to reshape their business models to become smaller, simpler, and more focused on their home markets.

Rising Stability Risks of Accommodative Monetary Policies

The use of unconventional monetary policies in advanced economies continues to provide essential support to aggregate demand. These policies are generating a substantial rebalancing of private investor portfolios toward riskier assets, as intended. However, a prolonged period of extraordinary monetary accommodation could push portfolio

rebalancing and risk appetite to the point of creating significant adverse side effects. While the net benefits of unconventional policies remain highly favorable today, these side effects must be closely monitored and controlled. Of particular concern is the possible mispricing of credit risk, riskier positioning by weaker pension funds and insurance companies, and a rise in liquidity risk, particularly in countries where recoveries are more advanced. Corporate leverage is rising in the United States and is already around one-third of the way through a typical cycle. Other spillovers include excessive capital flows into emerging market economies, where corporations—which generally have sound finances at present—are taking on more debt and foreign exchange exposure in response to low borrowing costs. More broadly, the favorable funding environment for emerging market economies might breed complacency about growing challenges to domestic financial stability. Valuations have not yet reached stretched levels (except in a few hot spots), but sensitivity to higher global interest rates and market volatility has increased across asset classes, including in emerging market economies. A prolonged period of continued monetary accommodation will increase vulnerabilities and sensitivity to a rise in rates.

Reinvigorating the Regulatory Reform Agenda

While much has been done to improve global and national financial sector regulations, the reform process remains incomplete. Banking sectors are still on the mend, and the pace of reform has appropriately been moderated to avoid making it harder for banks to lend to the economy while they are regaining strength. But the pace of the reform process also reflects difficulties in agreeing on the way forward on key reforms due to concerns about banks facing more structural challenges.

Delays in completing the reform agenda are not only a source of continued vulnerability, but also a source of regulatory uncertainty that may impact the willingness of banks to lend. They foster the proliferation of uncoordinated initiatives to directly constrain banking activity in different jurisdictions, given the strong political imperatives to take action. Such initiatives may be inconsistent with the efforts

to harmonize minimum global standards and may hamper, rather than complement, the effectiveness of the G20 reform agenda.

Policymakers must therefore take decisive action to restructure weak banks and encourage the buildup of the new capital and liquidity buffers as part of the implementation of Basel III rules on an internationally consistent basis. Improved financial reporting and disclosures by banks remain essential to promote better transparency and prudent and consistent valuation of risk-weighted assets. Enhanced disclosure will help improve market discipline and restore confidence in banks. Effective resolution regimes also need to be established to allow for the orderly exit of unviable banks, including effective cross-border agreements for winding down failing cross-border banks. Finally, further work is needed on the too-big-to-fail problem, over-the-counter derivatives reform, accounting convergence, and shadow banking regulation.

What is needed now is a renewed political commitment at the global and national levels to complete the reform agenda. This commitment is critical to minimize regulatory uncertainty and arbitrage, and to reduce financial fragmentation. Without greater urgency toward international cooperation and comprehensive bank restructuring, weak bank balance sheets will continue to weigh on the recovery and pose ongoing risks to global stability.

Policies for Securing Financial Stability and Recovery

Further policy actions are needed to address balance sheet weaknesses in the private and public sectors, improve the flow of credit to support the recovery, and strengthen the global financial system. These actions should continue to be supported by accommodative monetary policies.

In the *euro area*, the priorities are bank balance sheet repair and steps toward a stronger financial oversight framework within the European Union.
• Bank balance sheets and business models need to be strengthened to improve investor confidence, reduce fragmentation, and improve the supply of credit for solvent small and medium-sized

enterprises. Enhanced disclosure for banks and conducting selective asset quality reviews will help restore confidence in bank balance sheets and improve market discipline.

- To anchor financial stability in the euro area and for ongoing crisis management, fast and sustained progress toward an effective Single Supervisory Mechanism (SSM) and the completion of the banking union are essential. A Single Resolution Mechanism should become operational at around the same time as the SSM becomes effective. This should be accompanied by agreement on a time-bound roadmap to set up a single resolution authority and common deposit guarantee scheme, with common backstops. Proposals to harmonize capital requirements, resolution, common deposit guarantee schemes, and insurance supervision frameworks at the EU level should be implemented promptly. Modalities and governance arrangements for direct recapitalization of banks by the European Stability Mechanism should also be established.

- The developments in Cyprus underscore the urgency for completing reforms across the euro area in order to reverse financial fragmentation and further strengthen market resilience.

On a *global level*, vigilance is needed to ensure that accommodative monetary policies and an extended period of low rates do not give rise to fresh credit excesses. This is particularly important in the case of the United States. Financial supervision should be tightened to limit the extent of such excesses; and regulation will need to play a more proactive role in this cycle at both the macro- and microprudential levels. Restraining a too rapid rise in leverage and encouraging prudent underwriting standards will remain key objectives.

In *emerging market economies*, policymakers must remain alert to the risks stemming from increased cross-border capital flows and rising domestic financial vulnerabilities.

Together, these policies will consolidate the recent gains in financial stability, strengthen the global financial system, and support continued improvement in the economic outlook.

Chapter 2: Sovereign Credit Default Swaps

The debate about the usefulness of markets for sovereign credit default swaps (SCDS) intensified with the most recent bout of sovereign stress in the euro area. Chapter 2 takes a closer look at whether SCDS markets are good market indicators of sovereign credit risk and whether they provide valuable protection to hedgers; or whether they are prone to speculative excesses and lead to higher sovereign funding costs and financial instability. The chapter finds that many of the negative perceptions are unfounded. The markets for both SCDS and sovereign bonds are similar in their ability to reflect economic fundamentals and market factors. SCDS markets tend to convey new information more rapidly than do the markets for government bonds during periods of stress, although not during other times; but SCDS markets do not appear to be more prone to high volatility than other financial markets. While overshooting was detected in some euro area SCDS markets during the latest bout of stress, there is little evidence that "excessive" increases in a country's SCDS spreads generally lead to higher sovereign funding costs. The question of whether SCDS markets are more likely to be contagious than other markets is difficult to answer because sovereigns and financial institutions are now more interconnected, and hence the risks embedded in SCDS cannot be readily isolated from the risk of the financial system.

The chapter's results do not support the need for a ban on "naked" SCDS protection buying, which went into effect in the European Union in November 2012. The policy initiatives underlying the over-the-counter derivatives reforms—mandating better disclosure, encouraging central clearing, and requiring the posting of appropriate collateral—should help to allay concerns about spillovers and contagion that may arise in these derivatives markets.

Chapter 3: Do Central Bank Policies Since the Crisis Carry Risks to Financial Stability?

Chapter 3 returns to the issue of unconventional monetary policy and its potential side effects with further in-depth analysis. The chapter investigates the policies as pursued by four central banks (the

Federal Reserve, Bank of England, European Central Bank, and Bank of Japan), which include a prolonged period of low real policy interest rates and a host of unconventional measures including asset purchases. The policies, termed "MP-plus" in the chapter, appear to have lessened banking sector vulnerabilities and contributed to financial stability in the short term—in line with the intentions of the central banks. So far, central bank intervention in specific asset markets has not adversely affected market liquidity. MP-plus policies have improved some indicators of bank soundness, although the evidence suggests some reluctance by banks to clean up their balance sheets. Although potential risks raised by MP-plus in the banking system so far appear relatively benign, policymakers should be alert to the possibility that risks may be shifting to other parts of the financial system—shadow banks, pension funds, and insurance companies—due in part to increasing regulatory pressures on banks. Policymakers should use targeted micro- and macroprudential policies to mitigate emerging pockets of vulnerability (identified in Chapter 1) that are likely to increase the longer that MP-plus policies are in use. Implementing macroprudential policies in a measured manner, as needed, would allow central banks to continue to use MP-plus to support price stability and growth while protecting financial stability.

ACUTE RISKS REDUCED: ACTIONS NEEDED TO ENTRENCH FINANCIAL STABILITY

Global Financial Stability Assessment

Global financial stability has improved since the October 2012 report. Policy actions have eased monetary and financial conditions and reduced tail risks, leading to a sharp increase in risk appetite and a rally in asset prices. But if progress on addressing medium-term challenges falters, the rally in financial markets may prove unsustainable, risks could reappear, and the global financial crisis could morph into a more chronic phase.

Status of the Stability Indicators

Since the October 2012 *Global Financial Stability Report* (GFSR) all risk dimensions of the global financial stability map have improved (Figures 1.1 and 1.2). Markets have rallied and near-term stability risks have eased in response to accommodative monetary policies and precautionary policy measures (Figure 1.3). In the euro area, the authorities have clearly signaled their dedication to achieving "more and stronger Europe." Commitments by the European Central Bank (ECB) have reduced sovereign liquidity risk, and together with the ongoing advance toward a banking union and additional debt relief for Greece, have greatly reduced redenomination risk. These broad improvements in risks and conditions have helped boost the resilience of markets to political uncertainty in Italy and the events in Cyprus. The United States avoided a year-end fall from the "fiscal cliff." However, the postponement of decisions on the debt ceiling, automatic spending

cuts, and budget appropriations continue to weigh on sentiment, as noted in the April 2013 *Fiscal Monitor*. The Federal Reserve's move from time-specific to indicator-specific forward guidance has provided assurance that the policy stance will remain accommodative until meaningful increases in activity and inflation are realized. The Bank of Japan has also undertaken further easing steps by adopting a 2 percent inflation target and a commitment to open-ended purchases of assets.

Improved financial market conditions are benefiting the broader economy, but the transmission is slow and incomplete, as noted in the April 2013 *World Economic Outlook*. Overall *macroeconomic risks* have declined. In the United States, prospects have brightened; a recovery in the housing market and progress in household deleveraging are bolstering consumption, while banks are poised to increase lending. *Emerging market risks* have also declined, as growth has stabilized and external funding conditions for emerging market economies are very favorable. However, near-term economic prospects in the euro area remain weak, as public and private balance sheet repair and bank deleveraging continue.

The reduction of acute financial stress has led to a substantial decline in market and liquidity risks. Market positioning has become more optimistic, volatility has declined, and access to funding has improved for corporations and banks. In the euro area periphery, bank issuance has recovered; even lower-tier banks have gained some access to funding markets. External investors have returned in force to periphery sovereign markets. Nevertheless, the situation remains fragile, as illustrated by recent market volatility following the Italian parliamentary elections. Still-high funding costs, amid persistent financial fragmentation and low growth in the euro area, compound the debt overhang built up during the boom in periphery corporate balance sheets. The second section of this chapter assesses tail risks, funding conditions in sovereign and banking markets, and the sustainability of corporate debt in the euro area, and concludes that persistent fragmentation and continued impairment of credit

Figure 1.1. Global Financial Stability Map
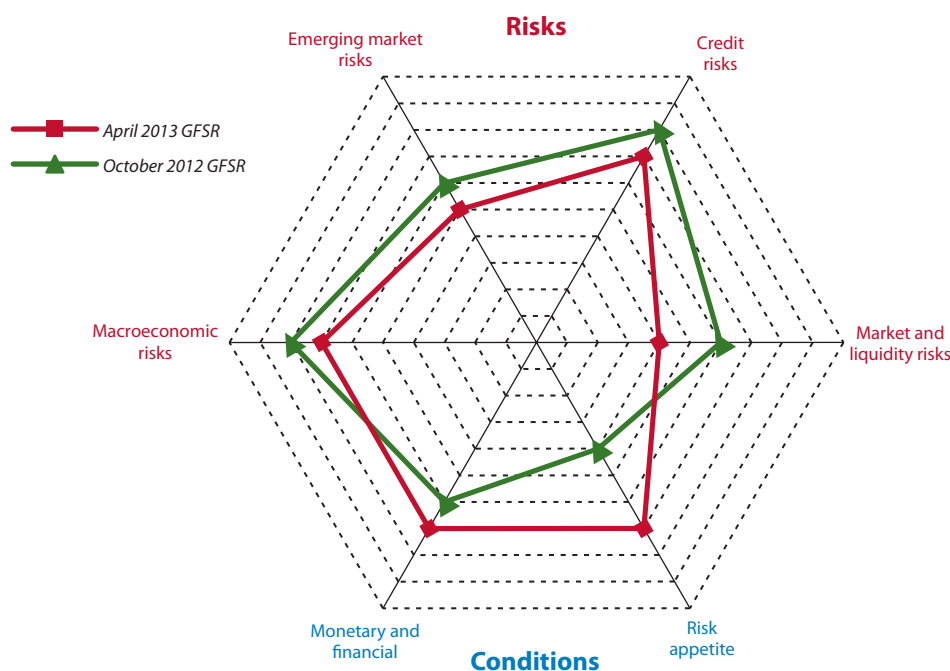
Source: IMF staff estimates.
Note: Away from center signifies higher risks, easier monetary and financial conditions, or higher risk appetite.

channels call for further progress in restoring stability and market functioning.

Uneven progress in strengthening balance sheets means that medium-term risks remain elevated. Although *credit risks* have improved somewhat, there are still important downside risks and medium-term challenges. In the euro area, the prospect for further reform and balance sheet repair is clouded by political uncertainties and rising reform fatigue, while economic momentum remains weak and unemployment high. In the United States and Japan, credible plans for medium-term fiscal adjustment are needed to help avoid a sudden deterioration in risk perceptions.

The third section of this chapter, on Banking Challenges assesses the state of recovery and health in various banking systems and remaining structural challenges, as the new market and regulatory environment is forcing banks to reshape their business models.

Monetary and financial conditions have eased further, as unconventional monetary policies in advanced economies continue to provide essential support to credit and aggregate demand. However, a prolonged

period of low interest rates and continued monetary accommodation could generate significant adverse side effects. *Risk appetite* has strengthened markedly (three notches on the stability map) on expectations of a prolonged period of low interest rates and lower tail risks. A higher appetite for risk could lead to exaggerated valuations and rising leverage, which may become systemic and spill over to emerging market economies.[1] Most sectors exhibit few clear signs of asset price bubbles just yet, despite relatively rapid price gains. For advanced economies, equity valuations appear to be within historical norms, and forward-looking valuations are below the peaks reached before the 2008–09 financial crisis (Figures 1.4 and 1.5). However, signs of overheating in real estate markets are evident in some European countries, in Canada, and in some emerging market economies (Figure 1.6). Meanwhile, access by emerging market and developing economies to international capital markets has also picked up, with external factors

[1]See also Chapter 3, which discusses the impact of central bank interventions on banks and asset markets.

Figure 1.2. Global Financial Stability Map: Assessment of Risks and Conditions
(In notch changes since the October 2012 GFSR)

Market and liquidity risks have decreased in response to looser policies...
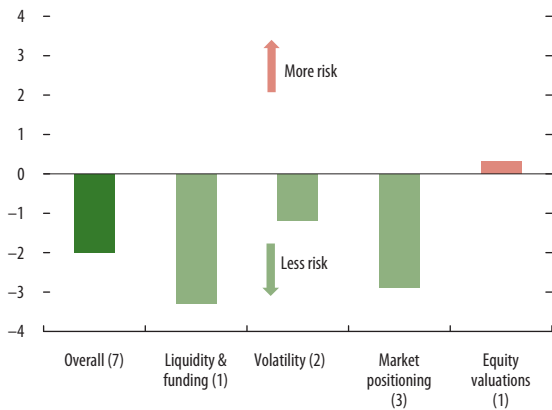
...but improved financial conditions are only slowly translating into lower *macroeconomic risks*.
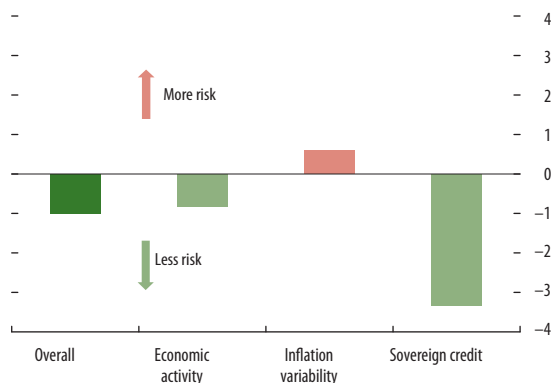
Emerging market risks have improved along with global macroeconomic and financial conditions.
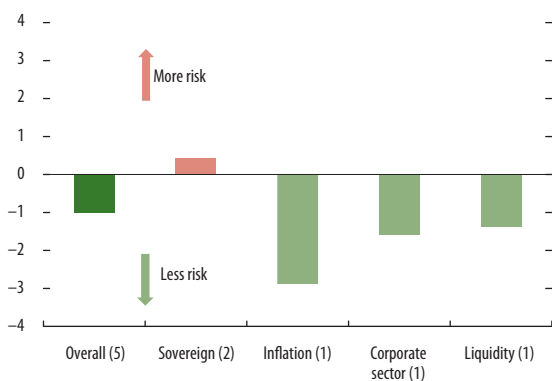
The reduction in *systemic risks* along with continuing balance sheet repair have lowered credit risks.
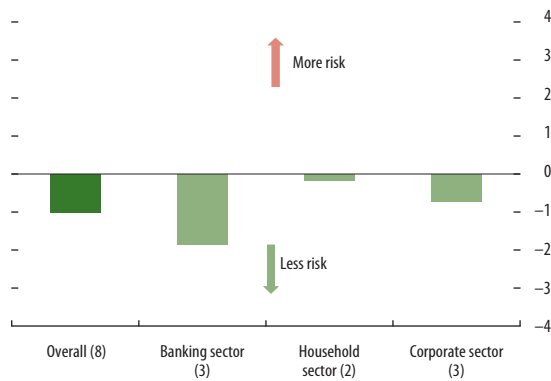
Monetary and financial conditions have loosened further with central bank policy easing and better financing and lending conditions...
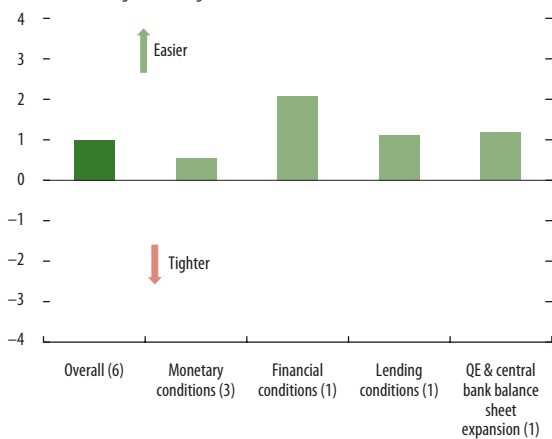
...which, in combination with strong policy action and reduced near-term event risks, has boosted *risk appetite*.
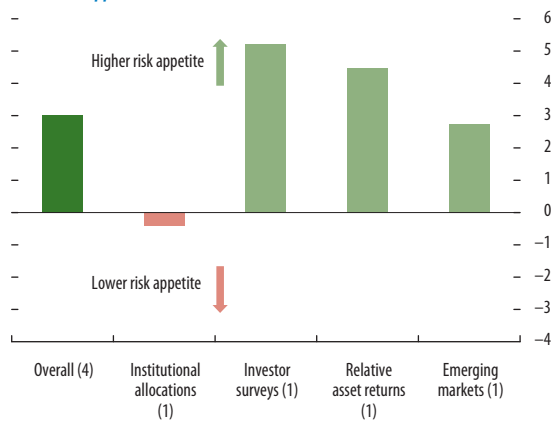
Source: IMF staff estimates.
Note: Changes in risks and conditions are based on a range of indicators, complemented with IMF staff judgment; see Annex 1.1 in the April 2010 GFSR and Dattels and others (2010) for a description of the methodology underlying the construction of the global financial stability map. The notch changes in the "overall" indicator in each panel are the simple average of notch changes in individual indicators. The number next to the legend for each indicator is the number of components it contains. For lending conditions (monetary and financial conditions panel), positive values represent slower tightening or faster easing of standards.

Figure 1.3. Asset Performance since the October GFSR
(Percent change)
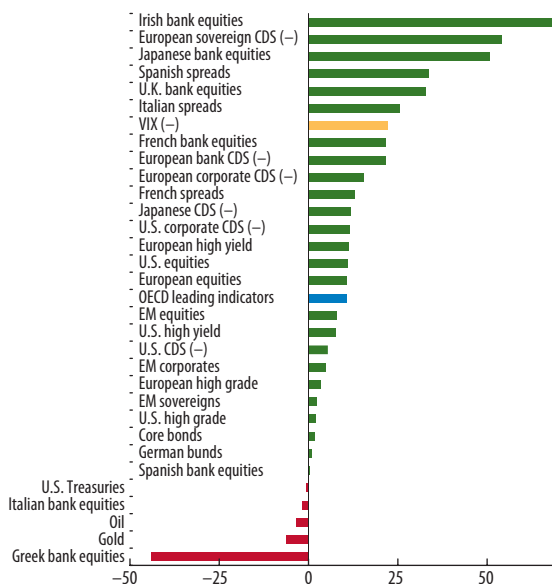
Sources: Bank of America Merrill Lynch; Bloomberg L.P.; JPMorgan Chase; and IMF staff estimates.

Note: CDS = credit default swaps; EM = emerging market; OECD = Organization for Economic Cooperation and Development. Percent changes in CDS spreads are reversed.

Figure 1.4. Global Equity Valuations
(In z-scores)

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

Note: Based on GDP-weighted average of z-scores of price-to-book (P/B) and forward price-to-earnings (P/E) ratios. The z-scores represent the deviation from the period average expressed in the number of standard deviations. Values above zero denote richer valuations relative to historical averages, while those below zero denote cheaper valuations. P/B and P/E ratios are monthly series beginning in 1996 and 1987, respectively, or earliest available. Advanced economies include 22 countries, and emerging market economies include 17 countries.

being the primary driver behind the recent compression in spreads (Figure 1.7).

Asset price pressures are likely to grow further over time in the presence of abundant global liquidity. The fourth section of the chapter focuses on the United States and discusses the potential consequences for the mispricing of credit risk, riskier positioning by weaker pension and insurance companies, and higher liquidity risk. It also examines the potential spillovers through an acceleration of capital flows into emerging market economies. Without measures to address medium-term vulnerabilities and rein in credit excesses when they appear, a prolonged period of low interest rates could lay the ground for new financial stability risks. Eventually, an unexpected and rapid rise in risk-free rates could trigger substantial market volatility and repricing. Fair-value estimates for U.S. Treasury yields have already increased in the past six months on the back of reduced tail risks (Figure 1.8).

In sum, if progress on addressing the above risks and medium-term challenges were to stall, the recent rally in global markets could prove unsustainable. Pressures in the euro area periphery from a sizable

debt overhang—as much as one-fifth of the debt of nonfinancial listed firms—together with broken credit transmission channels keep costs high. Credit continues to contract (by 5 percent since the outbreak of the crisis), starving the vital small and medium-sized enterprise (SME) sector of financing and blocking economic recovery, while worsening bank balance sheets. Furthermore, progress in returning banks to full health to support recovery is uneven: a further $1.5 trillion in EU bank deleveraging may lie ahead as banks need to adjust business models, reduce reliance on wholesale funding, and rebuild buffers.[2] In the United States, accommodative monetary policies are bringing about an intended shift toward risky assets. But could this go too far? Evidence suggests that corporate underwriting standards are weakening at an early stage, even though leverage is still two-thirds below prior cyclical peaks.

As discussed in the fifth section of the chapter, in emerging market economies with capital inflows advancing and external conditions favorable, releveraging is occurring at a rapid pace in some areas, along with riskier forms of borrowing. A prolonged

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[2]This is based on the baseline scenario in the October 2012 GFSR, under which large EU banks were projected to reduce assets by $2.8 trillion during 2011:Q3–2013:Q4, adjusting for the progress in bank deleveraging observed up to 2012:Q3 ($1.3 trillion). See the section on Banking Challenges.

Figure 1.5. Global Equity Valuations, by Country
(In z-scores)
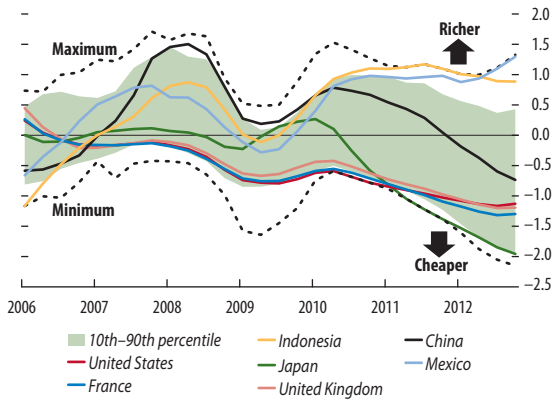
Sources: Bloomberg L.P.; IBES; and IMF staff estimates.

Note: Based on unweighted average of z-scores of price-to-book (P/B) and forward price-to-earnings (P/E) ratios. The z-scores represent the deviation from the period average expressed in the number of standard deviations. Values above zero denote richer valuations relative to historical averages, while those below zero denote cheaper valuations. P/B and P/E ratios are monthly series beginning in 1996 and 1987, respectively, or earliest available.

Figure 1.6. Property Price Valuations
(In z-scores)
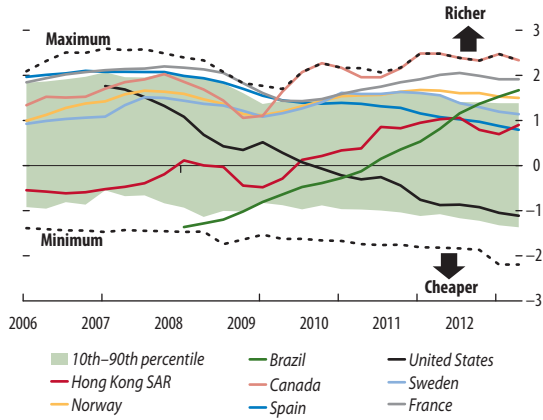
Sources: Organization for Economic Cooperation and Development; and IMF staff estimates.

Note: Based on unweighted average of price-to-rent ratio (PRR) and price-to-income ratio (PIR). The z-scores represent the deviation from the period average expressed in the number of standard deviations. Values above zero denote richer valuations compared with historical averages, while those below zero denote cheaper valuations. PRR and PIR are quarterly series beginning in 1970, or earliest available.

Figure 1.7. Hard-Currency Debt Valuations in Emerging Market Economies
(In basis points)
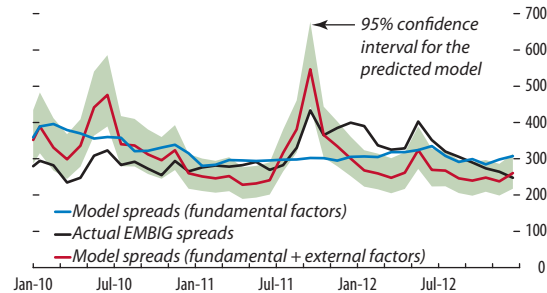
Sources: Bloomberg L.P.; JPMorgan Chase; PRS Group; and IMF staff estimates.

Note: The EMBIG index is the benchmark hard-currency government debt index for emerging market economies. External factors for the model include the VIX, the federal funds rate, and the volatility of federal funds. Fundamental factors are political, economic, and financial risk ratings published by the PRS Group. The estimation uses a panel regression with fixed effects for the period January 1998 to December 2012.

Figure 1.8. U.S. Sovereign Debt Valuations
(In percent)
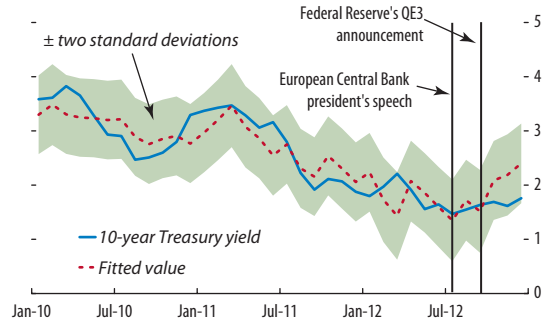
Sources: Bloomberg L.P.; Haver Analytics; and IMF staff estimates.

Note: The 10-year Treasury yield is estimated as a function of domestic macroeconomic factors (business conditions, inflation, and the budget deficit); international factors (custody holdings by foreign central banks and GDP-weighted average of European credit default swaps as a proxy for safe-haven flows); and bond volatility to capture a risk premium. The equation is estimated for the period from August 2007 to December 2012

period of low rates could result in increased vulnerabilities, raising the risk of market instability when rates do eventually rise.

Against this backdrop, the final section of the chapter on Policies for Securing Financial Stability and Recovery discusses further policy actions needed to prevent the crisis from moving to a more chronic phase, marked by a deterioration of financial conditions and recurring bouts of financial instability as reforms fall short. Avoiding this fate will require addressing weaknesses in private and public sector balance sheets, widening credit channels, and strengthening the financial system. Together, these policies will reduce the reliance on supportive monetary policies and facilitate a speedier normalization of central bank policies. But in the interim, policymakers will need to be vigilant to ensure that pockets of excesses linked to the search for yield do not become systemic.

The Euro Area Crisis: Acute Risks Have Declined, Much Work Lies Ahead

Acute short-term stability risks have declined in the euro area on the back of strong policy action. Prices and liquidity conditions in sovereign, bank, and corporate debt markets have improved dramatically, and issuance has soared. However, medium-term risks remain, reflecting a weak economic outlook, persistent fragmentation, and structural challenges. Some banks in the euro area periphery remain challenged by deleveraging pressures, still-elevated funding costs, deteriorating asset quality, and weak profits.[3] Corporations in the periphery are directly affected by bank deleveraging, cyclical headwinds, and their own debt overhangs. Against this backdrop, more work needs to be done in the short term to improve bank and capital market functioning, while moving steadily toward a full-fledged banking union.

Policy actions have greatly reduced near-term perceptions of tail risk.

The ECB's announcement of the Outright Monetary Transactions (OMT) program—together with the

[3]In this GFSR, the euro area periphery consists of Cyprus, Greece, Ireland, Italy, Portugal, and Spain, except as noted.

Figure 1.9. Target2 Balances and Sovereign Bond Yields

- Periphery Target2 balances (net, left scale)
- Periphery 2-year spreads over Germany (reverse scale, right scale)
- Periphery 10-year spreads over Germany (reverse scale, right scale)
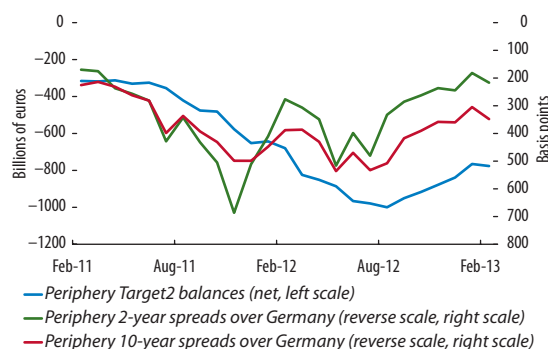
Sources: Bloomberg L.P.; Euro Crisis Monitor; and Haver Analytics.
Note: Spreads are weighted by nominal GDP, and Target2 balances are cumulative. Spreads for Ireland are constructed using the generic Irish government nine-year bonds.

decision to support additional debt relief for Greece and agreement on the Single Supervisory Mechanism (SSM)—has greatly reduced redenomination tail risks. In response, external investors have moved from short to long positions on the periphery.[4] Though market liquidity conditions are not yet back to normal, they have improved. Correspondingly, the spread of short-term (two-year) periphery sovereign bonds over German bunds has fallen back toward January 2011 levels (Figure 1.9). The relief for short-term debt markets provided by the OMT pledge has been partly transmitted further along the curve. Still, markets continue to reflect medium-term challenges: the long-term (10-year) spread has reversed only about half of its previous widening, while Target2 imbalances are declining at a slower pace, with about one-fifth of the previous widening reversed so far.

Private funding markets have reopened for periphery borrowers.

The reduction in perceived risks was felt in credit markets more broadly, benefiting even some lower-tier

[4]During 2012:Q3, the foreign investor share in total government debt in Italy and Spain stabilized at about 35 percent and 30 percent, respectively. Although foreign banks continued to reduce exposures to Italian and Spanish government debt, the process slowed down considerably in 2012:Q3. At the same time, foreign nonbanks started to increase their holdings of Italian and Spanish bonds. Even so, the foreign share is still estimated to be far below the levels seen in mid-2011, before market pressures emerged.

Figure 1.10. Periphery Euro Area Banks' Bond Issuance and CDS Spreads

Sources: Bloomberg L.P.; Dealogic; and IMF staff estimates.
Note: In self-funded deals, the issuer is the sole underwriter. CDS = credit default swaps.

Figure 1.11. Italy and Spain: Nonfinancial Firms' Change in Bank Credit and Net Bond Issuance
(Billions of euros; three-month moving average)

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

Figure 1.12. Foreign Investor Share of General Government Debt
(In percent)

Sources: IMF, World Economic Outlook database; national sources; and IMF staff estimates.
Note: For all countries, government debt refers to general government debt on a consolidated basis. The shaded area is a hypothetical scenario for 2013 that assumes that domestic banks and nonbanks keep their sovereign exposure unchanged.

However, the "virtuous dynamic" prompted by the OMT program has slowed, while adverse events could still revive market stress.

Although investors and officials appear comfortable that the ECB's OMT remains a virtual program, this dynamic could change. In particular, political developments could complicate implementation, as underscored by the uncertainty surrounding the election outcome in Italy. And while prospects for sovereign financing in 2013 have brightened, net financing needs remain challenging for some countries. Assuming that domestic investors keep exposures to their own sovereigns constant (as some of them indicated), foreign investors will need to continue to increase their allocations to sovereign bonds to facilitate government financing at more moderate yields (Figure 1.12).

Furthermore, there are concerns that if growth and fiscal outturns in the periphery do not improve, or if progress on euro area architecture reform stalls, recent improvements in market conditions could be reversed. A lasting improvement in growth and fiscal trajectories across the periphery hinges on the successful implementation of structural reforms. Some market participants are concerned that progress on this front could fall short if political support for reform wanes. In part reflecting medium-term risks, forward curves suggest market concerns about the durability of the

periphery companies. The demand for bank debt has strengthened, compressing spreads and prompting a surge in issuance (Figure 1.10). More than €32.7 billion (gross) was issued by banks and other firms in January 2013 alone.[5] Of this amount, lower-tier bank and corporate issuers accounted for about one-fourth.[6] Some larger Italian and Spanish companies have used the surge in bond issuance to replace bank loans (Figure 1.11), while some banks have started to repay LTRO funds early.

[5]Excluding bank self-funded issues, that was the strongest month since the run in February 2012 in the wake of the ECB's longer-term refinancing operations (LTROs). Figure 1.10 distinguishes between self-funded, where the issuer is the sole underwriter, and regular debt issues.

[6]This includes all issuers from Cyprus, Greece, Ireland, and Portugal, and high-yield issuers from Italy and Spain.

Figure 1.13. European Sovereign Bond Spreads, Current and Implied by Forward Curve
(In basis points over German benchmark)

France two-year yield spread
France two-year spread, forwards
Spain two-year yield spread
Spain two-year spread, forwards
Italy two-year yield spread
Italy two-year spread, forwards
Belgium two-year yield spread
Belgium two-year spread, forwards

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

Figure 1.14. Asset Performance, March 15–April 2, 2013
(Percent change)

German government bond yields (–)
U.S. Treasury yields (–)
Spanish government bond yields (–)
Italian government bond yields (–)
French financial stocks
Italian bank stocks
Spanish bank stocks
Russian bank stock: VTB
Greek bank stocks
Greek government bond yields (–)
Periphery bank CDS (–)
Core bank CDS (–)
Slovenian 8-year government bond yields (–)
Cypriot CDS (–)
Cypriot 7-year government bond yields (–)

Sources: Bloomberg L.P.; and IMF staff estimates.
Note: CDS = credit default swap. Yields are for 10-year tenors unless otherwise specified. Percent changes in CDS spreads and bond yields are reversed.

spread compression at the short end of the periphery yield curve (Figure 1.13) and no further declines in 10-year periphery sovereign spreads.[7]

The potential for contagion from developments in Cyprus is an important reminder of the fragility of market confidence. Although the adverse reaction to increased risk has not been intense in all markets, there was a renewed flight to safe assets and a selloff in some euro area assets (Figure 1.14). The clearest impact has been on those markets with direct links to Cyprus—notably Greek government bonds and Greek and Russian bank stocks. Slovenian government bonds were also affected. Other effects have included higher funding costs for euro area periphery banks and a selloff in euro area bank equities. The impact of recent events on periphery euro area sovereign spreads was limited, likely reflecting the existence of backstops (including the ECB's OMT). Although it is too early to tell whether these developments have led to a persistent increase in the cost of uninsured funding for banks in countries with weak sovereigns, the experience of Cyprus reaffirms the need to make sustained progress

[7]Consensus forecasts do not suggest that the near-term inflation outlook for Italy or Spain is notably higher than for Germany.

with banking union—especially Single Supervision, a common resolution authority, and a common deposit guarantee scheme—as emphasized in the October 2012 GFSR, in the recent EU FSAP, and in the final section of this chapter.

More work needs to be done to address legacy issues and medium-term vulnerabilities, lest the crisis become mired in a more chronic phase.

Despite substantial improvements in funding conditions, fragmentation between the core and the periphery persists. Although the divergence between wholesale funding costs for core and periphery borrowers has partially reversed, the gap has not fully closed. This partly reflects investor concerns about the quality of bank assets and increased asset encumbrance (Figure 1.15): issuance of covered bonds and other asset-backed securities declined in the past year, while some banks in the periphery have seen a marked rise in the cost of collateral-backed debt issuance (Figure 1.16). While the previous declines in foreign investors' claims on periphery sovereigns have begun to reverse (see Figure 1.12), the cross-border banking market in the euro area remains deeply fragmented (Figure 1.17). Some of the retrenchment in cross-border bank claims may be encouraged by regulatory ring-fencing (see the section on Banking Challenges).

Fragmentation, in turn, impairs *credit transmission* to the real economy. Recent market improvements

Figure 1.15. Proportion of System Balance Sheets Encumbered
(Percent of bank assets, end period)
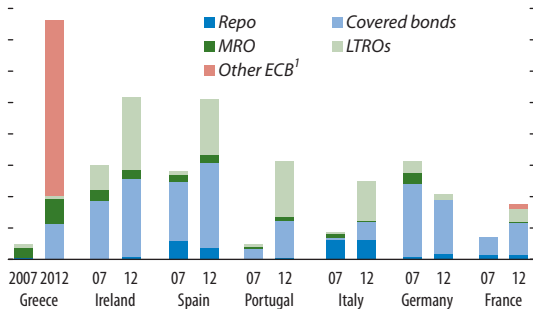
Sources: European Central Bank; European Covered Bond database; and IMF staff estimates.
Note: LTROs = longer-term refinancing operations; MRO = main refinancing operations.
[1]Includes fine tuning, Multilateral Fund, and emergency liquidity assistance.

Figure 1.16. Periphery Banks' Covered Bond Issuance and Spreads
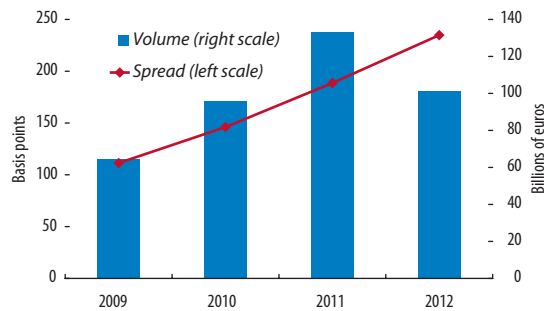
Sources: Dealogic; and IMF staff estimates.
Note: Spreads are weighted by a bank's share in the total volume of euro issuance.

are only just beginning to feed through to the cost and availability of credit for productive sectors of the periphery economies. The differences between periphery and core in terms of bank lending rates and corporate borrowing costs continue to persist, as bank repair is still incomplete and funding costs are higher for banks and sovereigns in the periphery. Credit to the real economy remains restrained (especially in the periphery and to SMEs), reinforcing divergence in economic outcomes (Figures 1.18 and 1.19).

Private nonfinancial sector deleveraging could impede the recovery and raise financial strains, as corporations face high debt burdens in an environment of lower growth and higher interest rates.

Figure 1.17. Selected EU Banks' Foreign Claims on Banking Sectors, June 2011–September 2012
(Percent change)

	French Banks	German Banks	Italian Banks	Spanish Banks	U.K. Banks
Euro area periphery	−28	−39	−34	−20	−34
Core euro area	−9	3	−5	18	−26
United Kingdom	−32	11	27	−53	
Other European advanced economies	−16	5	−31	44	−22
United States	−61	−2	−4	5	−30
Japan	−66	−11	−100	−21	11
Other advanced economies	−58	−48	−26	−30	−18
Emerging EMEA	−21	11	6	2	24
Emerging Latin America	12	−32	−80	18	−16
Emerging Asia	−47	−21	−75	−15	5
Total	−30	−5	−10	−15	−19

Sources: Bank for International Settlements, International Banking Statistics, Table 9E: Consolidated foreign claims and other potential exposures—ultimate risk basis; and IMF staff estimates.
Note: EMEA = Europe, the Middle East, and Africa.

The transmission mechanism is still impaired and credit conditions remain weak in the periphery.

Credit growth rates continue to diverge between the core and periphery countries (Figure 1.20), with periphery credit falling at a similar pace to the baseline scenario outlined in the October 2012 GFSR (Figure 1.21). This weakness in periphery lending is arguably due to credit supply constraints—as banks face balance sheet pressures—combined with low demand from potential borrowers (given the anemic economic environment and, in many cases, with balance sheets burdened by high debt levels).

Disentangling the demand-side from the supply-side drivers of credit developments is not straightforward.[8] The relationship between credit demand and supply is complex (Figure 1.22). For example, cutbacks in credit supply raise the cost of borrowing and lead to lower demand. Furthermore, both supply constraints and falling demand can adversely affect the real economy, which in turn can lower demand and tighten supply further. A weaker economic outlook can also worsen the quality of bank and borrower balance sheets, further affecting the supply and demand for credit.

[8]For example, an IMF (2012b) report on Italy and the Bank of Italy (2012) report found that while the slowdown in credit growth reflected both supply and demand, supply constraints were dominant in 2011, and demand came to the fore in 2012.

Figure 1.18. Changes in Interest Rates on New Bank Loans, December 2010–January 2013
(In basis points)
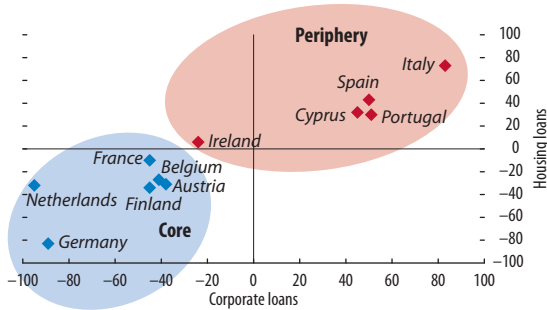
Sources: Haver Analytics; and IMF staff estimates.

Figure 1.19. Corporate Real Interest Rates and GDP Growth, February 2013
(In percent)
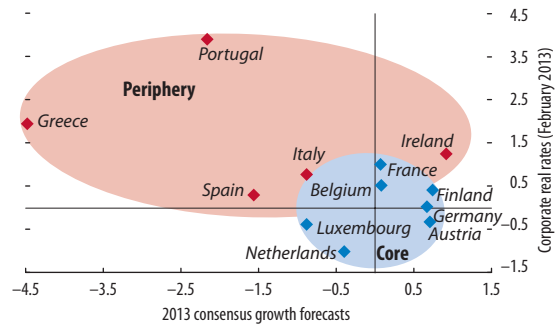
Sources: Bank of America Merrill Lynch; Consensus Economics; and IMF staff estimates.

Note: Corporate rates are ex-post, inflation-adjusted yields of all corporate bonds for each country included in the Bank of America Merrill Lynch European corporate master index.

Figure 1.20. Bank Lending to the Nonfinancial Private Sector
(In percent, year-over-year)
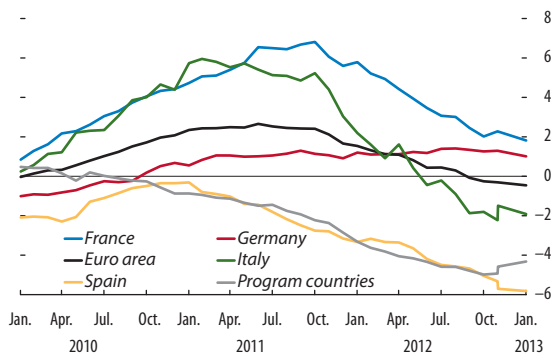
Sources: Haver Analytics; and IMF staff estimates.

Note: Chart adjusted for securitizations. Program countries are Greece, Ireland, and Portugal.

Figure 1.21. Euro Area Periphery Bank Credit
(Percentage change, cumulative since September 2011)
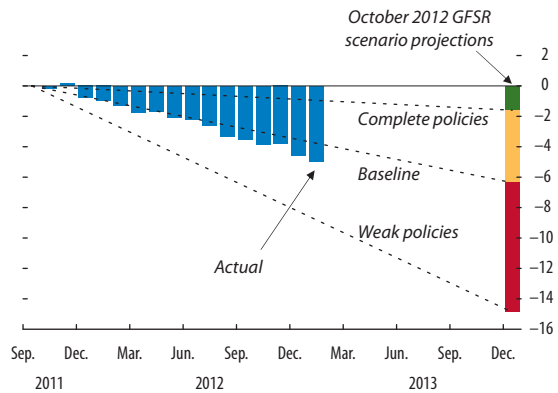
Sources: Haver Analytics; and IMF staff estimates.

Note: Ireland, Italy, Portugal, and Spain, adjusted for securitizations.

Figure 1.22. Interaction between Credit Demand and Supply
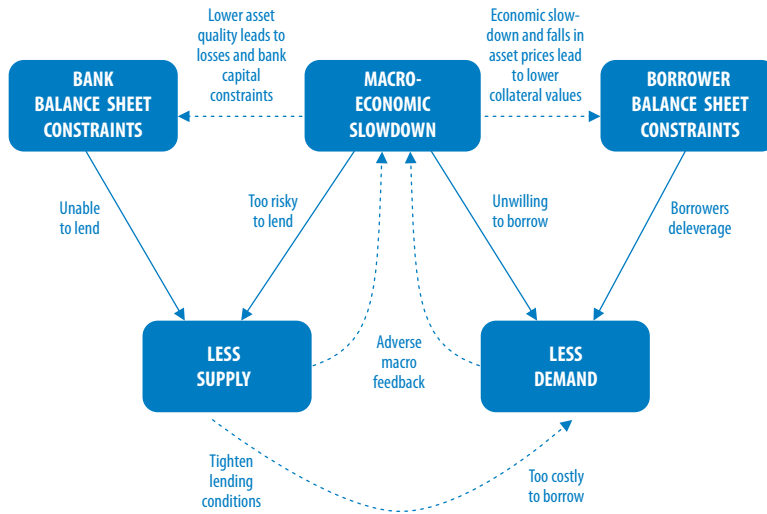
Source: IMF staff.

But even if demand were seen as driving the weakness in credit, barriers to supply would need to be removed so that banks do not hold back the economic recovery once it takes hold.[9] In any case, there is some evidence to suggest that credit supply is tight in the periphery.

- *Interest rates* on new bank lending are significantly higher in the periphery than in core countries (Figure 1.23). This divergence reflects, in part, the increased margin that banks require to compensate them for the greater risk of lending in the periphery. But it also reflects the increased cost of new funding as institutions have made less use of official funding and have competed both among themselves and with retail sovereign debt holders for term deposits. The increase in term deposits comes at a price, as interest rates on them are higher than those on sight deposits.

Figure 1.23. Interest Rate on New Lending and Decomposition of New Bank Funding Rate
(In percent, six-month moving average)
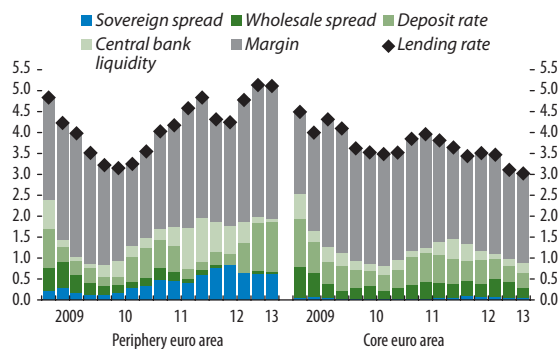
Sources: Bloomberg L.P.; Haver Analytics; and IMF staff estimates.
Note: Interest rates on lending and funding are weighted by the amount of new business (the contributions of funding components are shown in the chart). The sovereign spread is the five-year sovereign yield over bunds. The interest rate on new lending is to the nonfinancial private sector.

[9]For example, the Financial Policy Committee of the Bank of England has recently recommended that banks strengthen their capital buffers (which were found by the March 2013 Asset Quality Review to be overstated by about £50 billion) so that banks could sustain credit and absorb losses in the event of further stress. The finding that banks' balance sheet weaknesses (e.g., weak capital buffers in absolute terms or relative to a target level) have a significant negative effect on their supply of loans has been confirmed in a number of studies.

Figure 1.24. Euro Area Bank Lending Conditions for Firms
(Net percentage balance and factor contributions)
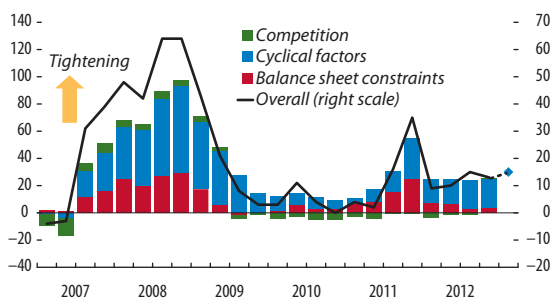
Sources: European Central Bank; Haver Analytics; and IMF staff estimates.
Note: Balance sheet constraints are capital, access to financing, and liquidity position. Cyclical factors are general economic activity, industry outlook, and collateral needs.

- *Lending surveys* also provide evidence: The recent euro area bank lending survey shows a continued tightening in bank lending conditions (Figure 1.24), as well as a further weakening in demand for loans. However, separate surveys of the SME sector suggest that supply constraints are binding for some firms. Figure 1.25 shows that there has been an increase through 2011–12 in the proportion of Italian and Spanish SMEs that wanted a bank loan but did not obtain most or all of the credit for which they had applied.

For the euro area core, "macro risk" is the main driver of recent credit conditions, as ECB policies

Figure 1.25. Met and Unmet Demand for Bank Credit for Small and Medium-Sized Enterprises
(Percent of respondents)
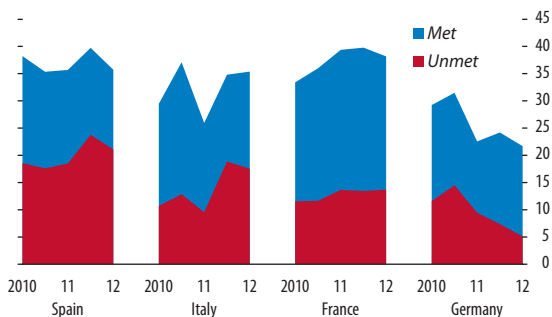
Sources: European Central Bank (2012); and IMF staff estimates.
Note: Unmet demand is the percentage of respondents that apppplied for a loan and did not get all or most of the requested amount.

Figure 1.26. Spread of Interest Rates on New Loans to SMEs over ECB Policy Rate
(In basis points)
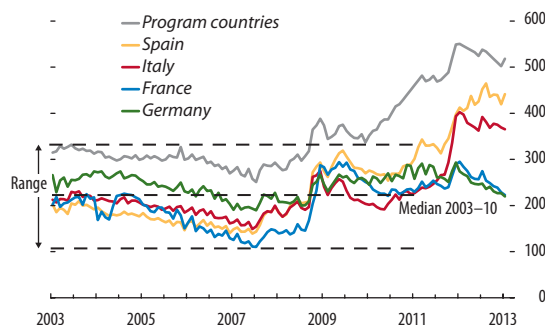
Source: Haver Analytics; and IMF staff estimates.
Note: ECB = European Central Bank; SMEs = Small and medium-sized enterprises. Interest rate on new corporate loans with a value of €1 million or less. Program countries are Greece, Ireland, and Portugal.

have substantially reduced banks' balance sheet constraints and their cost of funding.

The high cost and restricted supply of credit to SMEs impede recovery.

The combination of high bank funding costs and increased risk premiums on lending has impaired the credit transmission mechanism. For example, interest rates on new periphery SME loans are now priced at spreads over the ECB policy rate that are significantly higher than in the past (Figure 1.26). Loan originations for SMEs have also been falling more sharply than for large firms, suggesting that SMEs are bearing the brunt of the reduction in bank credit. This is particularly worrisome given that SMEs typically lack access to capital markets.[10]

The debt overhang poses challenges for the corporate sector.

Firms in the euro area periphery have built a sizable debt overhang during the credit boom, on the back of high profit expectations and easy credit conditions (Figures 1.27A and 1.27B).[11] While the construction

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[10]The latest SME survey by the ECB shows that only 2 percent of SMEs in the euro area use bond markets.

[11]The *debt overhang* is defined in the literature as a debt burden that generates such large interest payments that it prevents firms from undertaking profitable investment projects that would

Figure 1.27A. Corporate Debt
(Four-quarter moving average, 2002:Q1 = 100)

Figure 1.27B. Corporate Debt in Percent of GDP
(Four-quarter moving average)
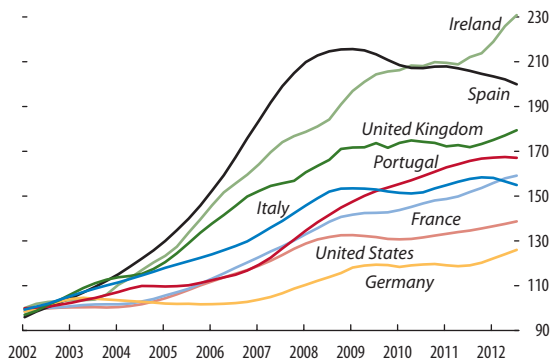
Sources: Central bank flow of funds data; and IMF staff estimates.
Note: Debt for the entire corporate sector in each country. Gross debt figures include securities other than shares, loans, and other accounts payable. Intercompany loans and trade credit can differ significantly across countries. Consolidated debt levels are significantly lower for some countries, especially those with a strong presence of multinational companies with large intercompany loans.

sectors in Ireland and Spain were at the epicenter of the crisis, the increase in leverage was broad-based across the periphery. Firms in these countries now face the challenge of reducing the debt overhang in an environment of lower growth and higher interest rates, in part related to financial fragmentation in the euro area.

In this report, we assess the effects of high corporate leverage on both debt servicing and debt repayment capacity over the medium-term. (The methodology is described in Annex 1.1.) While measures of debt servicing capacity, such as interest coverage ratios, help detect immediate or short-term risks, measures of debt sustainability, based on net free cash flows, help assess medium- and longer-term risks.[12] We conduct a cross-country analysis of the corporate sector based on a sample of listed firms.[13] The firm-specific data allow us to identify a weak tail in the sample, highlighting vulnerabilities not detected in aggregate data.

The main conclusion of the analysis is that the weak tail of firms with high and unsustainable leverage is sizable in the periphery, mainly in Portugal and Spain, calling for continued vigilance by supervisors on bank asset quality.[14] Debt sustainability is defined as the capacity of firms to generate sufficient cash flows over the medium term to at least keep the debt level stable, while maintaining current levels of capital expenditures and dividend payments. If a firm is in the weak tail, this does not mean that it will default on its debt, rather it will need to take measures (such as cutting operating costs, dividends and capital expenditures) to bring its debt down to a sustainable level. A comparison of vulnerability indicators between the sample of listed firms and the entire corporate sector suggests that the risks highlighted in the exercise are likely to be greater in the broader corporate sector, including in Italy, as SMEs are often hampered by high debt levels, low profitability, and higher funding costs (Table 1.1).

The ability of firms to service debt—measured by the interest coverage ratio—is much weaker in the periphery than in the core (Figure 1.28). These stresses are already showing up in fast rising corporate NPLs at banks in the periphery.

enable them to organically reduce debt over time. The size of the debt overhang is estimated as the required debt reduction such that interest expense declines and net free cash flows become positive.

[12]Net free cash flows is defined as operating cash flows before interest minus interest expense net of taxes minus capital expenditures and minus dividends.

[13]The sample includes about 1,500 publicly traded companies, with average coverage of 30 percent of the corporate sector by assets.

[14]In Spain, construction companies are included in the sample and are partly responsible for the sizable weak tail. The risks for bank asset quality are mitigated by the fact that most of the real estate loans of the weakest (Group 1 and Group 2) banks have been transferred to the SAREB.

Table 1.1 Selected Euro Area Countries: Vulnerability Indicators in the Corporate Sector
(2011 or latest available; in percent)

	France		Germany		Ireland		Italy		Portugal		Spain	
	sample	system	sample	system	sample	system	sample	system	sample	system	sample	system
Leverage												
liabilities/assets	66	…	67	…	58	…	67	…	73	67	70	57
debt/assets	27	…	30	…	30	…	35	33	47	37	41	41
Profitability												
EBIT/assets	6.2	…	6.5	…	7.9	…	6.0	…	5.4	3.2	5.9	3.8
net income/equity	8.5	…	11.2	…	11.0	…	4.0	1.2	7.9	3.2	9.0	…
Interest coverage ratio (ICR)												
EBIT/interest expense												
percent of debt with ICR <1	6	…	9	…	12	…	20	31	14	36	7	40
percent of firms with ICR <1	9	…	8	…	41	…	16	23	32	24	31	35

Source: Central bank data; and IMF staff estimates.

Note: EBIT = earnings before interest. "System" denotes the highest level of coverage available from national central banks. "Sample" denotes listed firms. The shading is used only for those countries and indicators where a comparison is possible. System data for Spain are unconsolidated.

In our forward-looking exercise of debt sustainability, we project net free cash flow over the medium-term. Net free cash flows are forecasted based on assumptions on GDP growth and interest rates under the World Economic Outlook (WEO) baseline, the euro area upside, and the euro area downside scenarios (see the April 2013 *World Economic Outlook*). Financial fragmentation measured by interest rates in this exercise is substantially reduced in Portugal under the WEO baseline and in other periphery countries under the euro area upside scenario.

The weak tail of highly leveraged firms with projected negative net free cash flows is substantially larger in some periphery countries than in the core, particularly in Portugal and Spain (Figure 1.29).

The size of the debt overhang is particularly large in Italy, Portugal, and Spain. To achieve non-negative net free cash flows in the medium-term, corporate leverage in these countries would have to be reduced by 6–10 percent of assets under the baseline and to converge to the levels in the core under the downside scenario with continued fragmentation and lower growth (Figure 1.30).

The above analysis underscores the urgent need for restructuring and consolidation in the periphery corporate sector, where a range of measures will be needed to smooth deleveraging (Figure 1.31). While large diversified companies may sell assets—including foreign units—to reduce leverage, potential profitable sales are likely to negatively affect their revenues and earnings going forward. Furthermore, additional cuts in operating costs, dividends, and capital expenditures may also

be required, posing additional risks to growth and market confidence. Thus, a move to the upside scenario with reduced fragmentation and productivity gains from restructuring will be critical to lower funding costs and support orderly deleveraging. In special cases, where the debt overhang issue is systemic, a mandatory suspension of dividends can be considered as a policy option, as well as principal reduction workouts.[15]

In addition, the strains in the corporate sector may further undermine bank asset quality. While the recently conducted EU-wide and national bank stress testing exercises have helped strengthen capital buffers, continued bank supervisory vigilance is needed. Second-round effects from lower capital expenditures and higher unemployment may lead to an increase in a wider range of NPLs, including mortgages.

More work lies ahead.

Sustaining confidence in the euro area and further reducing financial fragmentation is essential for maintaining financial stability and supporting economic recovery. This will require advancing steadily toward banking union and completing the remainder of the euro area reform agenda. Furthermore, given the interrelated challenges of weak banks and weak non-financial firms, it is important to put in place a comprehensive set of policies (1) to facilitate consolidation

[15]Periphery countries are already taking steps to address high corporate leverage—including through strengthened corporate insolvency frameworks, initiatives to promote non-bank credit and tax measures to reduce debt bias.

The debt overhang leads to limited capacity to service debt.

Figure 1.28. Share of Firms with High Leverage and Low Interest Coverage Ratio, 2011
(In percent of debt of all sample firms)
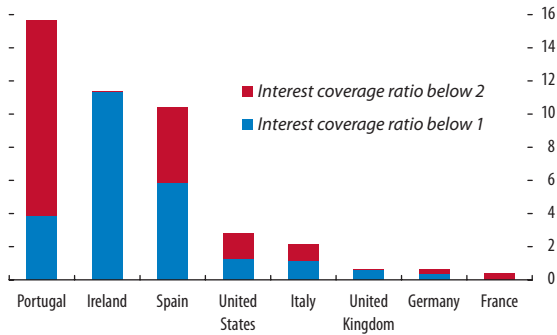
Sources: Worldscope; and IMF staff estimates.
Note: EBITDA = earnings before interest, taxes, depreciation, and amortization. High leverage is defined as leverage above 30 percent, which corresponds to pre-credit-boom levels in the periphery and current debt levels in the core. Firms with no debt or interest expense are not included in the calculations. The interest coverage ratio is defined as EBITDA divided by interest expense.

Restoring debt repayment capacity in the periphery could require reducing leverage to levels in the core.

Figure 1.30. Required Reduction in Leverage Under Different Scenarios
(Debt in percent of assets of all sample firms; 2011 and projections over 2013–18)
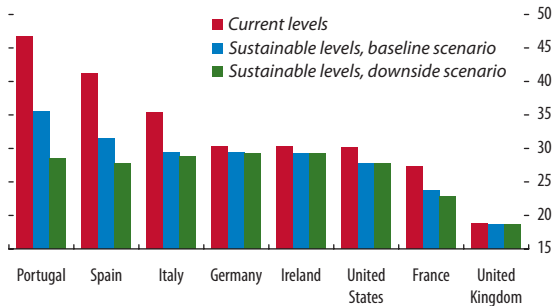
Sources: Worldscope; and IMF staff estimates.
Note: Firm-specific net free cash flow (NFCF) is projected on the basis of assumptions on growth and interest rates under the World Economic Outlook baseline and the euro area downside scenarios. Sustainable leverage levels are determined on a firm-level basis. For firms with high leverage and negative NFCF, sustainable leverage levels are defined as the levels at which firms achieve zero NFCF. For the rest of the sample, leverage levels are unchanged. The differences between the 2011 and sustainable leverage levels represent the required reduction in aggregate debt as a percent of assets.

The weak tail of listed firms is large in some periphery countries.

Figure 1.29. Share of Firms with High Leverage and Negative Net Free Cash Flow
(In percent of assets of all sample firms; baseline projections; 2013–18 averages)

Sources: Worldscope; and IMF staff estimates.
Note: Net free cash flow (NFCF) is operating cash flow before interest expense minus interest expense net of taxes minus capital expenditures minus dividends. Firm-specific NFCF is projected on the basis of assumptions on growth and interest rates under the World Economic Outlook baseline.

Cuts in operating costs and dividends will be needed to mitigate cutbacks in capital expenditures, but a move to the upside scenario with reduced fragmentation will be critical.

Figure 1.31. Required Cuts in Capital Expenditures to Stabilize Debt of Euro Area Periphery Firms with High Leverage and Negative Net Free Cash Flow
(In percent of capital expenditures of all firms; projections over 2013–18)
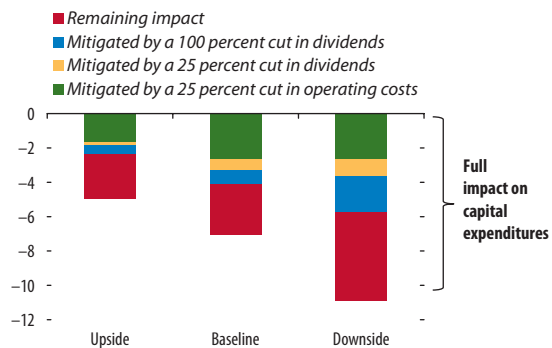
Sources: Worldscope; and IMF staff estimates.
Note: Firm-specific net free cash flow (NFCF) is projected on the basis of assumptions on growth and interest rates under the World Economic Outlook baseline, euro area upside, and euro area downside scenarios. Cumulative cutbacks in capital expenditures are calculated for firms with high leverage and negative NFCF as the decline in capital expenditures necessary to achieve zero NFCF by 2018. Furthermore, sensitivity analysis is performed to estimate the impact on the decline in capital expenditures if: (1) operating costs are reduced by 25 percent and (2) dividends are reduced by 25 percent and by 100 percent.

and restructuring of the corporate sector in countries where businesses suffer from debt overhang; (2) to support healthy firms that are facing credit constraints (in part due to banking sector weaknesses); and (3) to complete banking sector repair. These policies are discussed in detail in the final section of this chapter.

Banking Challenges: Deleveraging, Business Models, and Soundness

Healthy banks support economic recovery. But five years after the start of the crisis, banking systems are still in different stages of balance sheet repair, with U.S. banks most advanced and some European banks requiring further significant adjustment. A number of banks in the euro area periphery, in particular, face significant structural challenges and cyclical headwinds—elevated funding costs, deteriorating asset quality and weak profitability—that are impairing their ability to support economic recovery. While immediate pressures are less acute for other European banks, the process of balance sheet de-risking and deleveraging is not complete and further progress is needed.

Banks in the United States and Europe have taken significant steps to restructure their balance sheets, but progress has been uneven.

Banking systems are at different stages of the balance sheet repair process. While European and U.S. banks have substantially increased their regulatory capital ratios (Figure 1.32), leverage and reliance on wholesale funding remain relatively high in the core euro area banks (Figure 1.33).

Figure 1.34 plots the rankings of large banking systems based on the four balance sheet indicators of loss absorption capacity, asset quality, profitability, and reliance on wholesale funding. The closer a banking system is to the center, the more adjustment it still needs to undertake, compared to the other banking systems shown in the figure.[16]

[16]Detailed assessments of individual countries' financial systems and supervisory frameworks are carried out in the context of the IMF's Financial Sector Assessment Program (FSAP), www.imf.org/external/NP/fsap/fsap.aspx.

Figure 1.32. Bank Core Tier 1 and Wholesale Funding Ratios, 2008:Q4 to 2012:Q3
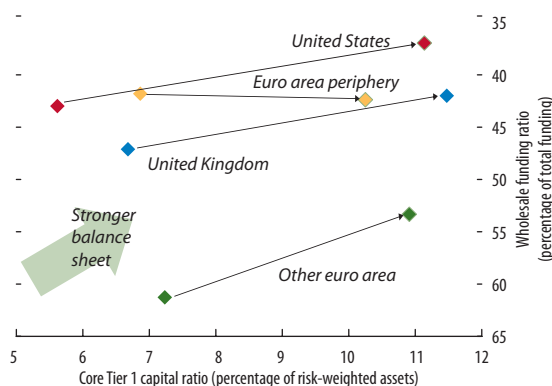
Sources: SNL Financial; and IMF staff estimates.
Note: Euro area periphery = Cyprus, Greece, Ireland, Italy, Portugal and, Spain. Wholesale funding is debt, repo, and interbank deposits. Total funding is wholesale funding plus customer deposits.

Figure 1.33. Bank Leverage and Wholesale Funding Ratios, 2008:Q4 to 2012:Q3
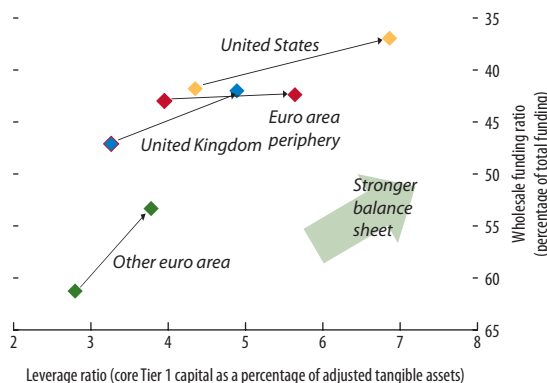
Sources: SNL Financial; and IMF staff estimates.
Note: For European banks, tangible assets are adjusted by subtracting derivative liabilities, but some differences in accounting definitions may remain. Wholesale funding is debt, repo, and interbank deposits. Total funding is wholesale funding plus customer deposits.

Figure 1.34. Ranking of Banking Systems Based on Banks' Balance Sheet Indicators, 2012:Q3
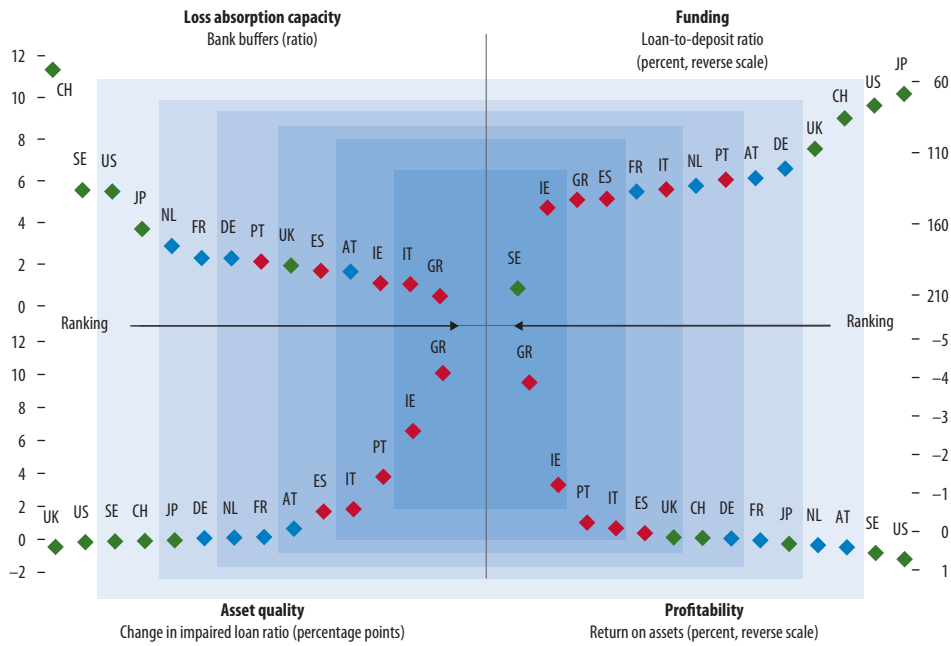
Sources: Bloomberg L.P.; SNL Financial; and IMF staff estimates.

Note: AT = Austria; CH = Switzerland; DE = Germany; ES = Spain; FR = France; GR = Greece; IE = Ireland; IT = Italy; JP = Japan; NL = Netherlands; PT = Portugal; SE = Sweden; UK = United Kingdom; US = United States. The closer a banking system is to the center of the figure, the more balance sheet adjustment it needs to undertake. Rankings are based on the aggregate position for a large sample of banks headquartered in each country (more than 90 percent of the banking system in most cases) as of 2012:Q3 or as of the latest available data before then. Bank buffers are the ratio of core Tier 1 capital and loan loss reserves to impaired loans as reported in banks' financial statements. The loan-to-deposit ratio is gross loans as a percentage of deposits (for Italy and Spain, adjusted for retail debt). Change in the impaired loan ratio is the annual change in impaired loans as a percentage of gross loans. Return on assets is average annualized retained earnings over the past year as a percentage of tangible assets minus derivatives. See footnotes 17 and 18 in the main text.

Many periphery euro area banking systems remain relatively weak as buffers are low relative to reported impaired loans, asset quality continues to deteriorate, and profitability is poor.[17,18] Some of these issues are being tackled through programs supported by the ECB, the European Commission, and the IMF

[17]Collateral can be an additional buffer, but data on collateral are typically not publicly disclosed, realization in crisis times is uncertain, and valuation practices differ across countries and banks. These factors also hamper comparisons of additional loss absorption capacity due to collateral buffers.

[18]Cross-country comparisons of nonperforming loans are complicated by differences in definitions. The GFSR uses impaired loans as reported in banks' financial statements. While European banks follow IAS/IFRS accounting rules, their reporting of impaired loans may be influenced by prudential requirements. Taking the case of Italy, for example, the impaired loans reported by banks are broadly defined and include four categories: doubtful (or bad), substandard, restructured, and past due. If one were to focus on the top five banks and use bad loans only, which is the most narrow definition, Italy's rankings in asset quality and loss absorption capacity (Figure 1.34) would improve by one notch.

(Greece, Ireland, and Portugal), through system-wide reforms supported by the European Stability Mechanism (Spain), or through targeted financial sector action aimed at increasing provisions, improving bank efficiency, and strengthening capital and funding plans, where needed (Italy).[19] These banking systems are likely to see further pressure on asset quality amid poor economic growth. However, contingency buffers to cover additional stress have been included under the programs: some banking systems have been recapitalized (Portugal, Spain), while others are expected to receive further capital injections (Greece).

In other banking systems—including in Sweden, the United Kingdom, and a number of core euro

[19]The IMF FSAP for Spain was completed in June 2012 (IMF, 2012a), and more information is available in the Second Progress Report (IMF, 2013b). The IMF FSAP for Italy is ongoing (the press release of the Italy FSAP mission can be found at imf.org/external/np/sec/pr/2013/pr1394.htm).

area countries—asset quality is stable, but certain balance sheet weaknesses remain. In some of these banking systems, buffers against impaired loans are not as strong as in their peers (Austria, the United Kingdom); in others (core euro area, Sweden), leverage and reliance on wholesale funding are still relatively high.[20] While major U.K. and core euro area banks have been actively de-risking and deleveraging—as is discussed below—more needs to be done to complete the repair of their balance sheets. Moreover, some segments in the core euro area banking system (e.g., Landesbanks) are still in need of restructuring and consolidation.[21]

A third group of banking systems shown in Figure 1.34—including those of Japan, Switzerland, and the United States—is in a relatively better position. The loss absorption capacity is higher, asset quality is more stable, and reliance on wholesale funding is lower. Nonetheless, these banking systems still face a number of challenges related to future profitability and business models, as is discussed later in this section.

Profitability and asset quality will be further pressured by the weak economic environment.

While funding conditions have improved (see the section on the Euro Area Crisis), concerns about asset quality and profitability have moved to the forefront. A prolonged period of low interest rates will likely put pressure on banks' pre-provision profits.[22] Net interest margins (NIMs) of many advanced economy banks have been on a declining path for a number of years (Figure 1.35), with pressures from low policy rates becoming more acute for banks that offer fixed-rate savings products to customers. NIMs of the periphery banks have been relatively stable throughout 2012, having been supported by the interest income from their LTRO-funded holdings

Figure 1.35. Average Net Interest Margins
(In percent)

Sources: Bloomberg L.P.; and IMF staff estimates.
Note: Euro area core = Austria, France, and Germany. Euro area periphery = Italy and Spain. Net interest margin is in percent of average interest earning assets.

of sovereign bonds. Although some U.S. banks have been able to offset NIM pressures by writing back some of their loan loss reserves (as asset quality continued to improve), there will be less scope for this strategy in the future.

The weak economic environment is likely to lead to further worsening in asset quality, and the resulting larger provisions may absorb an increasingly large share of already weak operating earnings (Figures 1.36 and 1.37). Banks that are more exposed to economies with poor growth prospects are more vulnerable to a further deterioration in asset quality. Figure 1.38 plots a measure of bank buffers against the growth forecast of economies to which they are exposed. Some banks (mainly from the euro area periphery) have both low levels of buffers and exposures to weak economies, making them most vulnerable to a downturn. In some cases, the asset quality concerns are exacerbated by the fact that banks are holding hard-to-value assets (for example, commercial real estate exposures).[23]

Furthermore, litigation risks continue to be a headwind to earnings for major banks in Europe and the United States. The LIBOR scandal and several other high profile fines and lawsuits related to compliance failures and misselling allegations continue to weigh on banks' profits. In the United States, banks continue to work through legacy mortgage

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[20]These concerns were flagged by the Bank of England (2012) and in the FSAPs for France (IMF, 2012d) and Sweden (IMF, 2011b): the IMF FSAP for Austria is ongoing.

[21]See the FSAP for Germany (IMF, 2011a).

[22]For example, in the recent Dodd-Frank stress test in the United States (released on March 7, 2013), a prolonged period of low interest rates was the key driver of the low pre-provision net revenues of U.S. banks (Board of Governors of the Federal Reserve System, 2013).

[23]Some of these assets have been moved to asset management companies (for example, in the case of Spain).

Figure 1.36. Impaired Loans in Selected EU Countries
(2008:Q4 = 100)
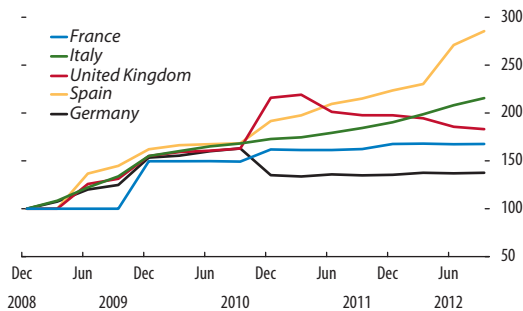
Sources: SNL Financial; and IMF staff estimates.
Note: Ratio of the stock of impaired loans to the stock of gross loans. The definition of impaired loans differs across countries. See footnote 18 in the main text.

Figure 1.37. EU Banks' Asset Quality and Profitability
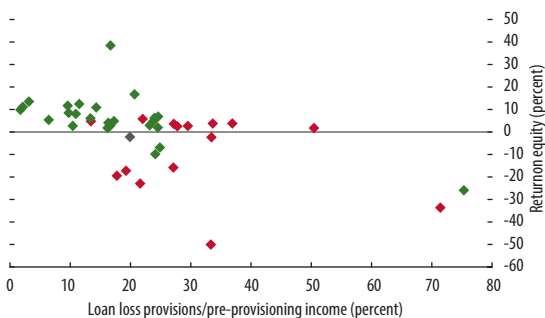
Sources: Bloomberg L.P.; and IMF staff estimates.
Note: The sample consists of large EU banks. Red diamonds are banks in Italy, Portugal, and Spain; green diamonds are banks in Austria, Denmark, France, Germany, Hungary, Poland, Sweden, and the United Kingdom.

issues that have resulted in litigation and mortgage repurchase liabilities.

Uncertainty over asset valuations and risk weights is reinforcing investor concerns.

Bank asset quality and capital adequacy tend to be scrutinized by investors, especially when the economy is weak. If these are hard to ascertain from reported data, for example, due to differences in disclosure in financial statements, investors demand higher risk premiums, which further raises bank funding costs. Two major issues are of concern:

- First, regulators and market participants are concerned that some banks may be engaging in

lender forbearance.[24] In some cases, this is done to smooth the recognition of impaired loans, especially if banks have low profits and thin capital buffers, or where legal frameworks make it difficult to resolve problem loans. Even if it ultimately benefits both the lender and the borrower, lender forbearance can make it difficult to assess the quality of assets and to estimate the full scale of potential losses and required provisions and capital.

- Second, there are significant uncertainties around the calculation of risk-weighted assets. Analysts have long felt that the dispersion of risk weights across banks is too wide to be fully explained by accounting, regulatory, and business model differences. Figure 1.39 also suggests that average risk weights for banks vary significantly for any given riskiness of balance sheets, as proxied by loan and trading losses. Indeed, the Basel Committee on Banking Supervision recently found that the full scope of the market risk-weight dispersion cannot be explained by publicly available information (BCBS, 2013).[25] Other regulatory studies of risk weights on banking books have reached similar conclusions.[26]

Cyclical and structural pressures force banks to change their funding models . . .

Although large institutions continue to play a dominant role in the global banking system, markets and regulators are putting pressure on banks

[24]According to the European Banking Authority (2013a), "forbearance, though not universal, is widespread" (p. 3). The Bank of England (2012) also expressed concerns that banks were forbearing on loans and that this may have contributed to doubts about the valuation of bank assets; those doubts could in turn act as a drag on credit supply, and ultimately aggravate credit risks currently being contained by forbearance.

[25]The study highlighted two main sources of dispersion: (1) variations in the models used by banks and (2) differences in supervisory practices, including the use of supervisory multipliers.

[26]In its interim report on the consistency of risk-weighted assets in the banking book, the European Banking Authority (EBA, 2013b) said that about half of the variation between banks' risk-weighted assets is justified by differences in balance sheet structures and/or regulatory approaches (standardized versus internal ratings-based [IRB] approach), the rest is attributed to differences in risk parameters applied under the IRB approach. The EBA concluded that further bottom-up analysis is necessary to assess the reasons behind such discrepancies.

Figure 1.38. Buffers at Individual EU Banks
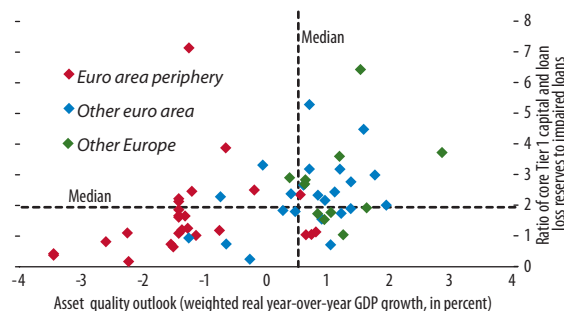
Sources: Bank for International Settlement (BIS); European Banking Authority; SNL Financial; and IMF staff estimates.

Note: Asset quality outlook refers to 2012–13 real GDP growth in countries where the bank has exposures, weighted by the level of those exposures. Exposure data was taken from the European Banking Authority, updated using information from BIS international statistics. The lines show the median values from the sample. The vertical axis is limited to a ratio of 8 to aid presentation; three banks from "other euro area" and "other Europe" have buffers that are higher.

Figure 1.39. Bank Risk-Weights and Impairments, Average for 2008–11

Sources: SNL Financial; and IMF staff estimates.

to become smaller, simpler, and more focused on servicing their home markets. Banks are altering the liabilities side of their balance sheet to reduce their use of wholesale, short-term, and cross-border funding. This is in response to: (1) the wholesale funding runs during the crisis; (2) the higher cost of wholesale funding, particularly where there is the prospect of bailing-in senior debt holders; (3) Basel III liquidity requirements (which favor more stable funding sources); and (4) the increased incidence of regulatory ring-fencing of bank liquidity and capital along national lines (in part because of the slow progress in establishing robust cross-border resolution frameworks). For U.S. banks, strong deposit growth and weak loan demand have helped to reduce their reliance on wholesale funding. For some European banks, where reliance on wholesale funding is much higher (see Figure 1.34), these structural pressures are more acute.

Some internationally active banks are increasingly aiming to match their assets and liabilities on a country-by-country basis in a move to make their subsidiaries self-funded over time, which in a number of cases is encouraged by regulators. This trend has been playing out at a faster pace in the euro area, in part because of concerns about redenomination risk, but it is also happening in other advanced economies, and the trend is viewed as hard to reverse, which can potentially increase and entrench financial fragmentation. Furthermore, the transition to this new cross-border banking model may add to

deleveraging pressures. For many banks, matching assets and liabilities on a country-by-country basis means that they would have to close larger deposit funding gaps (Figure 1.40). One way of closing the gaps is by raising deposits or other funding locally; another way is by reducing lending. Encouragingly, recent trends suggest that foreign subsidiaries of large EU banks (notably those operating in eastern Europe) have been fairly successful in raising local deposits.

In addition to greater regulatory scrutiny over intragroup cross-border transfers, new regulations are being put in place that require affiliates of foreign banks to hold more capital and liquidity locally. For example, the Federal Reserve has recently released proposals to require operations of foreign banks to establish a holding company structure over all bank

Figure 1.40. Deposit Funding Gaps of Foreign Subsidiaries of Large EU Banks
(In percent of loans)
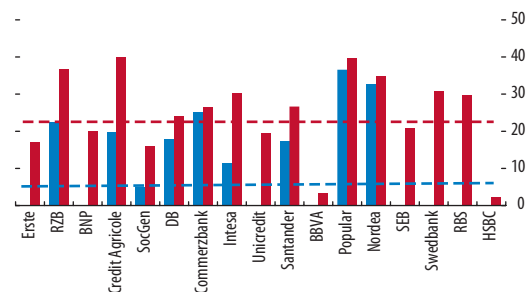
Sources: Bankscope; SNL Financial; and IMF staff estimates.

Note: Deposit funding gap is the difference between loans and deposits; blue bars show the gaps computed using aggregate loans and deposits of foreign subsidiaries of each bank; red bars are sums of gaps computed for each of the subsidiaries; the dotted lines show sample averages for blue and red bars. Data are as of end-2011 or latest available.

Figure 1.41. Average Return on Equity, and Cost of Equity
(In percent)
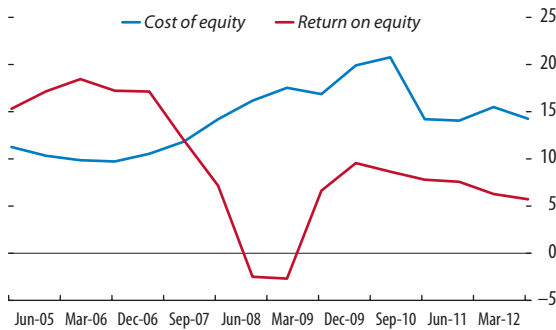
Source: Bloomberg L.P.
Note: The cost of equity is derived using the Capital Asset Pricing Model (CAPM). The sample consists of global systemically important banks.

Figure 1.42. Ratio of Equity Price to Tangible Book Value, April 2013

Source: Bloomberg L.P.

and nonbank subsidiaries operating in the United States. These holding companies will be subject to the same capital and liquidity requirements as U.S. bank holding companies. These measures may cause some European banks to rethink the scale of their operations in the United States.

. . . and to rationalize their business mix.

Regulatory changes (Basel 2.5, Basel III, and structural measures aimed at prohibiting or ring-fencing risky activities—Vickers, Volcker, Liikanen), as well as market pressures, are forcing banks to focus on fewer and less capital-intensive business lines. Pressures to raise the return on equity, which remains below the average cost of equity (Figure 1.41), and raise market valuations, which are still well below historical averages (Figure 1.42), are forcing banks to concentrate on cutting costs, exiting business lines where they do not have critical mass, and enhancing fee and commission income.[27] Recent examples suggest that such a strategy is rewarded by shareholders.[28]

[27]Several structural measures introduced or contemplated by regulators (see the section on Policies for Securing Financial Stability and Recovery) are effectively discouraging proprietary trading. The profitability of banks engaged in investment banking activities may thus become more reliant on customer flows and hence on their market share.

[28]UBS's stock price rose 18 percent in two days following the announcement that it was cutting 10,000 jobs and exiting the fixed income business; Citigroup and Barclays made similar moves.

Operational restructuring by banks to increase efficiency, while a welcome development, could still have negative consequences as banks pull out of certain activities. Fewer players in any given market entails higher concentration risk. It also means that market liquidity could decline, or would at least be dependent on a smaller number of banks, potentially exacerbating asset volatility particularly in a crisis.

As a result, European banks continue to de-risk and deleverage their balance sheets.

Large EU banks have continued to reshape their balance sheets via capital raising, liability management and asset reduction, with cutbacks in total assets broadly on track with the baseline scenario described in the October 2012 GFSR. This has helped to strengthen banks' financial positions, as discussed, and also confirms that the worst-case outcome (as in the weak policies scenario of the October 2012 GFSR) has been avoided thanks to swift policy responses. Table 1.2 shows changes in bank balance sheets from 2011:Q3 to 2012:Q3 in gross terms (only those banks that cut back assets) and in net terms (all banks, including those that increased assets) and compares them to the October 2012 GFSR deleveraging estimates, which are used here as a benchmark.[29]

[29]The GFSR deleveraging exercise focused on instances where banks were expected to cut back assets due to structural and cyclical pressures. The exercise did not aim to produce estimates of balance sheet expansions, which are typically driven by bank-specific considerations. Nonetheless, the possibility that expansion at stronger banks may offset the shrinkage at weaker banks was discussed. The difference between gross and net numbers in

Table 1.2. Deleveraging Progress, 2011:Q3–2012:Q3
(In trillions of U.S. dollars)

	Banks with Deleveraging Plans		Banks with Projected Deleveraging Due to Other Factors		Banks with No Projected Deleveraging		Overall Position		October 2012 GFSR Scenarios (2011:Q3–2013:Q4)			Progress against GFSR Baseline
	Gross	Net	Gross	Net	Gross	Net	Gross [a]	Net	Complete	Baseline [b]	Weak	[a]/[b] (in percent)
Tangible assets (less derivatives)	−0.8	−0.7	−0.2	0.3	−0.0	0.0	−1.0	−0.4	—	—	—	—
Tangible assets (less derivatives and cash)	−1.0	−0.9	−0.2	0.1	−0.0	−0.0	−1.3	−0.9	−2.3	−2.8	−4.5	46
Risk-weighted assets	−0.4	−0.3	−0.3	−0.2	−0.0	−0.0	−0.7	−0.6	−0.8	−1.0	−1.9	71

Sources: SNL Financial; and IMF staff estimates.

Note: For a sample of 58 large EU banks (see the April 2012 GFSR for a description of the sample). Gross shows the results for banks in the sample that cut back balance sheets. Net shows the change for all banks in the sample. The table is rounded to the nearest 0.1 trillion.

Figure 1.43. GFSR EU Bank Deleveraging Scenarios
(In trillions of U.S. dollars)
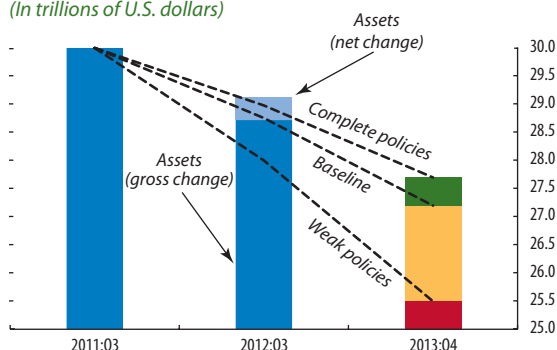
Sources: SNL Financial; and IMF staff estimates.
Note: For a sample of 58 large EU banks. The gross change in assets shows only banks that have cut back their balance sheets. The net change shows all banks. Excludes cash, derivatives, and intangible assets. See the October 2012 GFSR for a description of the scenarios.

Figure 1.44. Large EU Banks: Contributions to Change in Balance Sheets 2011:Q3–2012:Q3
(In percent)
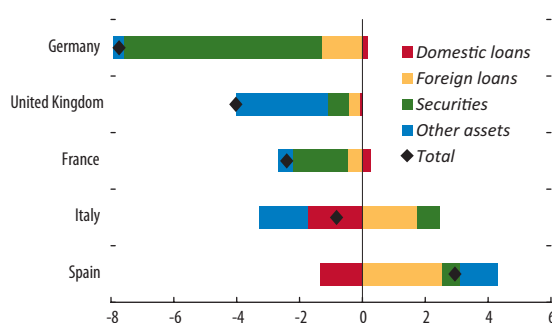
Sources: Bank financial statements; SNL Financial; and IMF staff estimates.
Note: Based on consolidated data for a sample of large banks headquartered in each country. Excludes cash, derivatives, and intangible assets. Domestic loans exclude mergers.

Tracking progress on a gross (net) basis, large EU banks have cut back assets in line with the baseline (complete) policies scenario of the October 2012 GFSR, while they have reduced their risk-weighted assets in line with the weak (baseline) policies scenario (see Table 1.2 and Figure 1.43). This is because banks have concentrated on (1) reducing capital-intensive (high-risk-weight) businesses; (2) steering loan portfolios to those with lower risk weights; (3) holding greater liquidity buffers of cash

Table 1.2 shows the extent to which this has been the case in the sample of large EU banks. It should also be noted that the key metric for assessing the impact on the real economy in the April 2012 and October 2012 issues of the GFSR was the provision of credit, not change in bank assets. The estimates of credit supply were constructed on a country-by-country basis taking into account diverging credit trends between sample and out-of-sample banks (consistent with net concept).

and government bonds with zero risk weights; and in some cases, (4) optimizing risk-weight models.[30]

So far, asset cutbacks have been undertaken mostly by banks with publicly announced deleveraging plans (including those under the EU state-aid rules) and have mostly involved assets other than loans (Figure 1.44). Banks that had their plans drawn up prior to the LTROs (and hence before the announcement of the OMT) have not scaled them back following the easing in market conditions that followed these events, and some banks announced new plans (see Annex 1.2 for details).

[30]The decline in risk-weighted assets would likely have been larger if risk-weights on the trading book had not been raised (under Basel 2.5) at the same time as banks cut back their positions.

However, banks have reduced their balance sheets in very different ways. Some have focused on asset disposals. For example, German banks created noncore units to gradually wind down legacy assets (trading, commercial real estate, shipping and public finance exposures); French banks completed their 2011 adaptation plans to reduce U.S. dollar funding needs and commercial and investment banking exposures, and also sold their Greek subsidiaries; U.K. banks have largely reduced noncore assets (trading portfolios and loans in Ireland, the United Kingdom, and the United States), and large Italian and Spanish banks reduced domestic lending, while expanding foreign loans (mainly in emerging market economies where deposit levels have grown) and domestic government bond holdings. In addition, Italian banks have reduced other assets.

As banks continue to reduce their balance sheets, in addition to cutting back non-core assets, banks may need to restructure or shrink their loan books, which may be more challenging. As the credit quality of loan books continues to deteriorate, especially in the euro area periphery, banks with relatively low capital buffers will be less able to crystallize losses, and therefore, less able to reduce the drag from impaired assets on new lending. Furthermore, the lack of a well-functioning market for distressed bank assets may force banks to reduce their loan books by rolling off rather than selling loans, and in some cases forbear by amending the terms of nonperforming loans, which could consume capital and put a drag on banks' ability to extend new loans to productive sectors.

As European banks have reduced foreign lending, other banks with stronger balance sheets have stepped in to fill in the gap.

Asian and North American banks' foreign claims continued to grow (Figure 1.45). For example, Japanese banks' foreign credit recovered steadily in 2010; the growth was concentrated in syndicated lending in Asia, where they were well positioned to capture market share as European banks reduced their exposures. As a result, foreign exposures of the top three Japanese banks rose to almost 20 percent of their loan book.

Figure 1.45. Banks' Foreign Claims on All Regions
(Year-over-year change, in percent)
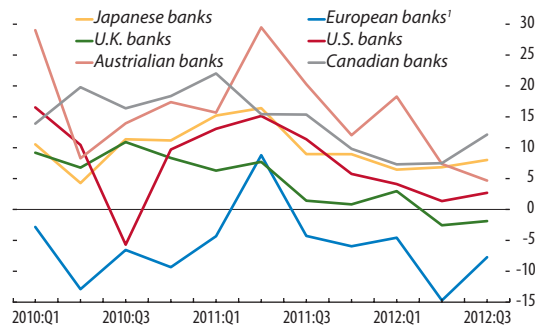
Sources: Bank for International Settlements.
[1]European banks excludes U.K. banks.

The foreign expansion of Japanese banks has increased their reliance on external funding, which involves foreign currency liquidity risk that has to be managed. Foreign credit provided by Japanese banks is denominated largely in dollars. And although Japanese banks have raised additional foreign currency funding in the form of retail or corporate deposits, they also had to raise this funding in wholesale markets or rely on the swap market to swap yen deposits into dollars. The Japanese banking system's external funding position—the difference between its foreign assets and liabilities—has thus increased to $1.6 trillion (Figure 1.46). In contrast, the Australian, U.K., and U.S. systems all have substantial net surplus positions, while other European banks have cut their funding position from $1.5 trillion to below zero by

Figure 1.46. Net Foreign Assets Position
(In billions of U.S. dollars)
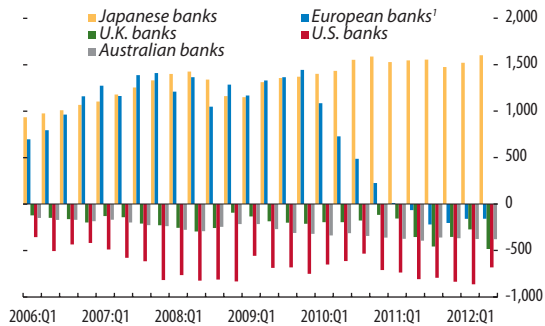
Sources: Bank for International Settlements.
Note: Foreign claims minus foreign liabilities (excluding transactions with related foreign offices).
[1]European banks excludes U.K. banks.

reducing their U.S. dollar lending. Japanese banks' relatively large external funding position exposes them to shocks to the availability, maturity, and cost of foreign currency funding. That said, Japanese banks have shown resilience to such shocks in the past and are limiting the liquidity risks by matching the maturities of external assets and liabilities and by holding highly liquid foreign government securities.

Healthy banks are needed to support recovery.

Past GFSRs have warned about the risks of European bank deleveraging being either too large, too fast, or too concentrated in a few sectors or economies. Policy actions have helped to mitigate those risks, and European banks have made progress in de-risking and deleveraging their balance sheets; but the process is not complete. Policymakers need to encourage financial institutions to continue deleveraging in a "healthy" and growth-friendly manner, that is, by raising equity levels as well as by cutting business lines that are no longer viable.

Moreover, given the risk of a prolonged economic slowdown, the necessary adjustment may be delayed. Banks with weak capital buffers may be more reluctant to recognize losses, causing them to restrain lending to viable firms, which would reinforce weakness in the corporate sector and lead to further deterioration of credit quality of bank loans. Hence, a comprehensive set of policies is needed to address *both* weak banks and weak non-financial firms (as discussed in the section on the Euro Area Crisis).

Outside Europe, banks are also under pressure to change their business models to improve profitability. New financial stability risks (related to rapid cross-border expansions, increased concentration in certain markets, and shift of certain financial intermediation activities from banking sector to nonbank sector) may emerge as a result of these changes and require monitoring.

Rising Stability Risks of Accommodative Monetary Policies

Highly accommodative and unconventional monetary policies in advanced economies are providing

Figure 1.47. Global Mutual Fund and Exchange-Traded Fund Flows
(Cumulative, in billions of U.S. dollars)
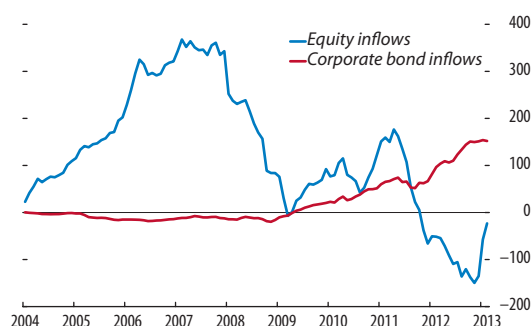
Sources: EPFR Global; and IMF staff estimates.

essential support to aggregate demand, but there is growing tension between these policies and future risks to financial stability.[31] Vulnerabilities are growing in U.S. credit markets while pension and insurance companies are under increased strain, moving into higher-risk assets. Reduced market liquidity could amplify the effects of any future increase in risk-free rates. Monetary policy needs to stay highly accommodative to meet macroeconomic goals, but macroprudential and other tools should be employed in a measured manner to lean against undesirable credit excesses.

Monetary policy easing has pushed beyond conventional means in the effort to counter a weak recovery. In several advanced economies, asset purchases and commitments to a long duration of low interest-rate policies have supplemented traditional policy easing. This approach has been essential to support the recovery.

As intended, these policies are generating a substantial rebalancing of private investor portfolios toward riskier assets. This trend is dominated by corporate credit markets and amplified by constrained net supply of fixed income instruments, after accounting for central bank purchases (Figures

[31]This section evaluates the financial stability risks from unconventional policy through the lens of credit misallocation in nonbank sectors in advanced economies and spillovers to emerging market economies, while Chapter 3 includes an empirical analysis of the impact on bank soundness. Also see Chapter 3 in the April 2013 *World Economic Outlook*.

Figure 1.48. Net Issuance of Fixed-Income Securities
(In billions of U.S. dollars)
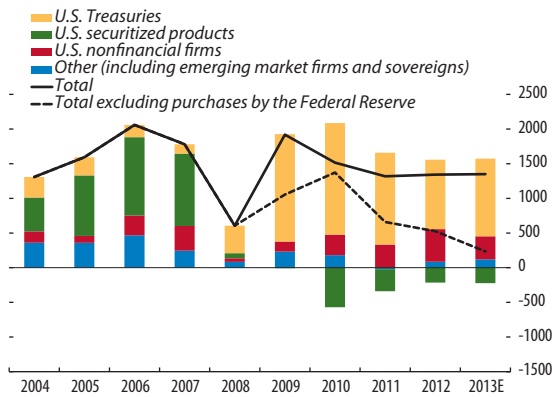
Sources: Federal Reserve; government sources; JPMorgan Chase; Morgan Stanley; and IMF staff estimates.

Note: Issuance assumptions for 2013 are based on market consensus; asset purchase projections are based on guidance provided by the Federal Open Market Committee at their September and December 2012 meetings.

Figure 1.49. U.S. Fixed Investment Spending versus Internal Cash Flow
(In percent)

Sources: Federal Reserve; Haver Analytics; and IMF staff estimates.

Figure 1.50. U.S. Nonfinancial Corporate Bond Issuance and Equity Buybacks
(In percent of GDP)

Sources: Federal Reserve; Haver Analytics; and IMF staff estimates.

Note: Previous cycle scaled by the ratio of GDP in the current cycle to GDP in the previous cycle.

1.47 and 1.48). Ultra-low short-term interest rates have reduced the cost of debt for corporate borrowers, enabling firms to lengthen their debt maturity profiles and rendering debt servicing ratios more favorable, even at higher debt loads. This comes at a time when traditional valuations of corporate credit show little signs of excess. These developments are healthy, desirable elements of the monetary transmission mechanism.

But other elements of the current credit cycle do not fit a healthy stylized situation. Capital spending remains depressed relative to cash flows (Figure 1.49). Corporate bond issuance is more elevated than usual at this point of the cycle and is increasingly geared toward less-productive uses, such as funding equity buybacks (Figure 1.50). Balance sheet leverage is steadily rising on the back of higher debt levels and slowing earnings (Figure 1.51). Yield-enhancement through financial leverage and weaker underwriting standards are also increasingly prevalent, and in some cases are back to prior cycle peaks.

These trends are most relevant to the United States, where unconventional monetary policy has been forceful; the credit cycle is more advanced; capital markets are deeper and play a larger role in credit intermediation; the spillover effects to emerging markets may be significant; and potential upside

economic risks could lead to a faster normalization in monetary policy.[32]

These elements may not pose imminent systemic risk, but they bear close monitoring. A prolonged

[32]In other advanced economies with accommodative monetary policies, firms are either using a more typical blend of equity and bond financing at this early stage of the cycle or are squarely focused on balance sheet repair and leverage reduction (see the previous section on The Euro Area Crisis). By contrast, in emerging market economies, the decline in corporate borrowing costs has, as in the United States, led to a surge in bond financing, which is also a departure from previous cycles in those economies.

Figure 1.51. U.S. Nonfinancial Firms' Credit Fundamentals

Strong liquidity conditions and record low yields have kept interest expenses in check . . .

Liquidity: Cash-to-Debt Ratio

■ High yield
■ Investment grade
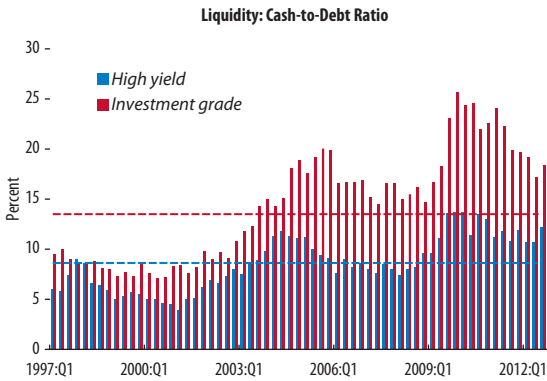
. . .while debt management has reduced near-term refinancing risk.

High-Yield Debt Maturity Profile

■ As of December 2010
■ As of December 2012
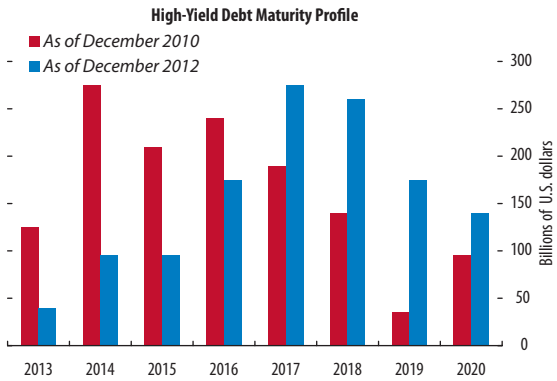
However, corporate leverage is on the rise . . .

Leverage: Gross Debt-to-EBITDA Ratio
(100 = start of cycle)

—— 1997:Q1   —— 2000:Q4   —— 2007:Q4   —— Current cycle (2011:Q4)

Quarters from start of cycle
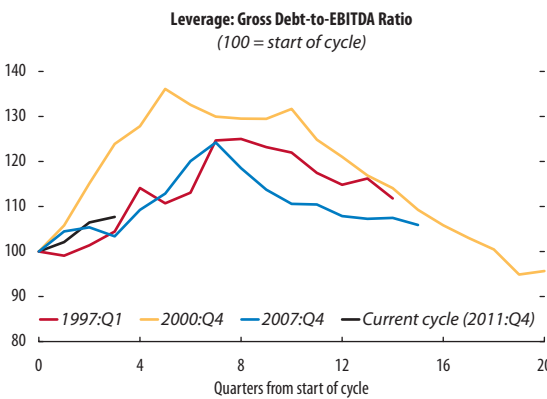
. . . partly because debt is growing while earnings growth is slowing.

Profitability
(Year-over-year percent change)

—— EBITDA
—— Capital expenditures
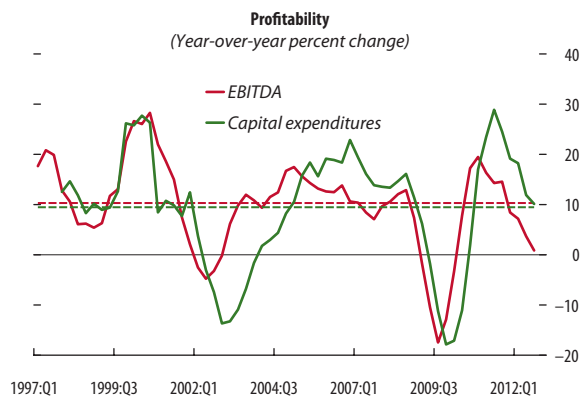
Signs of weakening underwriting standards are on the rise . . .

High-Yield Covenant-Lite Loans

■ Covenant-lite loan issuance (left scale)
—— Share of institutional leveraged loans (right scale)
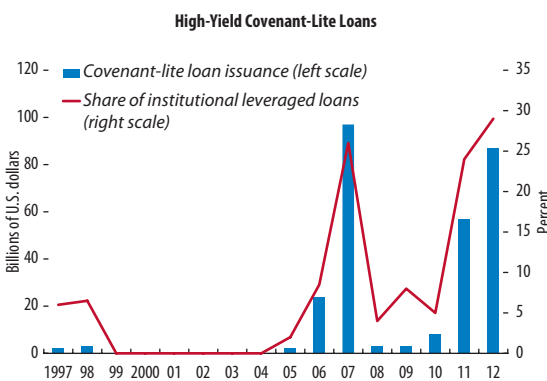
. . . and, if they persist, pose upside risks to default rates.

U.S. High-Yield Default Rate

extension of weak underwritng standards

baseline
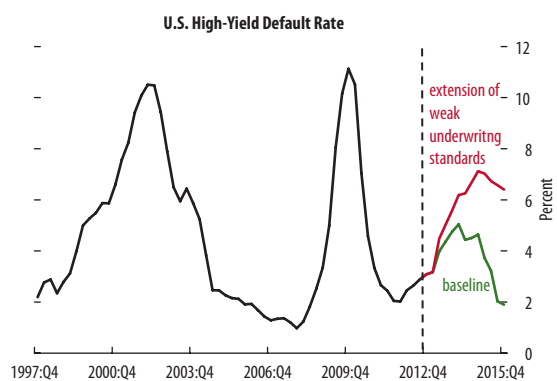
Sources: Bloomberg L.P.; Citigroup; Federal Reserve; JPMorgan Chase; Moody's; Morgan Stanley; S&P LCD; and IMF staff estimates.
Note: EBITDA = earnings before interest, taxes, depreciation, and amortization. Dashed lines represent long-term averages. Covenant-lite (cov-lite) loans are loans in which borrowers are not obliged to meet quarterly maintenance criteria. For default rate projections in the bottom right panel, the baseline assumes that a falloff in cov-lite issuance starts in 2014:Q3, with lending standards tightening in 2014 and a baseline growth trajectory. The weak scenario assumes that cov-lite issuance continues at the current pace of $15 billion per quarter through end-2014 before abating, accompanied by a further weakening in bank lending standards through end-2015 and a weaker growth trajectory.

period of low interest rates may create incentives to increase leverage beyond manageable levels, extend the decay in underwriting standards, and reinforce the search for yield.

Four channels of instability are emerging from the protracted period of low interest rates and suppressed market volatility:

1. *Growing medium-term vulnerabilities:* Despite the strong starting point for credit fundamentals, corporate credit risk has the potential to be mispriced. Nonfinancial corporate balance sheet leverage is rising, and investor demand for yield-enhancement is increasingly evident in the decline of underwriting standards and growing demand for financial leverage. A sharp rise in risk tolerance among various asset managers could add to these vulnerabilities.

2. *Rise in risk-free rates:* There is little to derail current trends, and the rise in leverage appears manageable in an environment of low debt service and sustained earnings. However, the risk is skewed toward future higher government bond yields. Unconventional monetary easing has lowered short-term interest-rate expectations and term premiums to rock-bottom levels. A sharp rise in risk-free rates could expose credit vulnerabilities.

3. *Illiquidity could act as an amplifier:* The impact on credit markets has the potential to be amplified by market illiquidity. The shift in broker-dealer business models to reduce credit inventories means that a tightening of credit conditions could have a larger-than-usual market impact.

4. *Spillovers to emerging market economies:* In emerging markets, corporate borrowers who have recently more heavily focused on U.S. dollar issuance may be vulnerable to a reversal in favorable credit trends.

Credit fundamentals are at a good starting point, but recent trends point to future risks.

The decline in corporate borrowing costs and the rise in demand for credit are consistent with broader, strong fundamentals (see Figure 1.51). Corporate

liquidity—cash holdings relative to debt—is high, interest expenses are near cycle lows relative to earnings, and the debt maturity profile has been extended to reduce near-term refinancing risk.

But there are reasons for being vigilant. Higher borrowing in an environment of slower earnings growth is boosting corporate leverage, reversing the post-crisis trend of maintaining conservative balance sheets. Other evidence that points to a weakening of corporate credit conditions includes: an easing in financing terms (e.g., covenant-light loans are back to prior cycle high levels and payment-in-kind, perpetual, and hybrid bond issuance has also risen), a rising share of issuance proceeds being used to pay special dividends and fund share buybacks (rather than to finance corporate investment), growth in weaker quality and lower-rated credit issuance, and a loosening in bank lending conditions (see Figure 1.51). The strong starting point in corporate balance sheets helps to mitigate the effects of the more recent trend toward weaker underwriting standards. As a result, default rates in the current cycle are expected to be relatively modest (see Figure 1.51). However, a further extension or intensification of these recent developments could set the stage for future credit deterioration, in turn extending and exacerbating the default cycle, particularly if it is accompanied by a rising rate scenario with less benign macro conditions.

Is corporate credit risk appropriately priced?

Fundamental fair value models suggest that the decline in corporate risk is justified, and corporate bond spreads are wider than past long-term averages and levels reached during the two preceding credit cycles (Table 1.3). But valuation metrics based on historical norms may also be misleading due to the unusually low level of risk-free rates and volatility (suppressed in part by ultra-accommodative monetary policy). Indeed, both nominal and real current bond yields are at historically low *levels* and are well below the lows reached in the past two credit cycles.

Other price-based measures also suggest that investors are not getting compensated for additional risk. For instance, yield scaled by corporate

Table 1.3. U.S. Nonfinancial Corporate Bonds: Yields, Spreads, and Valuations
(In percent)

	Yield on IG Corporate Bonds	IG Yield per Unit of Leverage	IG Spread to Treasuries	Yield on HY Corporate Bonds	HY Yield per Unit of Leverage	HY Spread to Treasuries
End-2012	2.7	1.3	1.4	6.1	1.6	5.0
Last two credit cycles[1]	6.1	3.9	0.8	7.9	3.4	2.7
Fair value model (IMF)[2]	. . .	2.9[3]	1.1	. . .	2.5[3]	5.9

Sources: Bloomberg L.P.; Citigroup; Bank of America Merrill Lynch; and IMF staff estimates.

Note: IG = investment-grade; HY = high-yield.

[1]Refers to average levels prevailing in Feburary 2007 and April 1998.

[2]The investment-grade corporate credit model is based on the difference between the yield-to-worst on nonfinancial corporate bonds and the comparable yield on U.S. Treasuries. Determinants include proxies for underlying credit fundamentals, systemic stress, and wealth effects. The high-yield model is based on option-adjusted spreads and includes default rates and a measure for liquidity and volatility as determinants.

[3]Represents long-term average.

leverage is at its lowest level in recent history for both investment-grade and high-yield issuers.[33] (A low yield-to-leverage ratio is analogous to a high price-earnings ratio in equity markets.) Similarly, the weakening in covenants has not been accompanied by higher yields, suggesting either reduced compensation for risk or other offsetting nonprice features (e.g., stronger capital structure, better credit fundamentals). In short, while not uniform, some metrics appear to show increasingly indiscriminate credit pricing as underwriting conditions have weakened.

The search for yield may eventually increase the demand for financial leverage and push risks to the nonbank sector.

The low-yield environment may also encourage the use of financial leverage—borrowing against assets that are generating current income—to enhance yield. Leverage can be provided either directly through financial intermediaries, such as via financing of repos (repurchase agreements), or indirectly through embedded leverage in financial instruments. Over-exuberant financial engineering and the use of embedded leverage was an important trigger for the global financial crisis of 2007–09. Financial leverage has been less prominent in the search for yield at least at this stage. One reason is that tighter regulations increase the constraints on

[33]*Leverage* is defined as the ratio of median gross debt to EBITDA (earnings before interest, taxes, depreciation, and amortization).

Figure 1.52. U.S. Primary Dealer Repo Financing
(In billions of U.S. dollars)
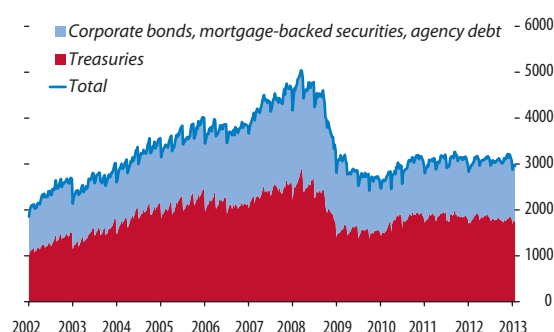
Sources: Federal Reserve; Haver Analytics; and IMF staff estimates.

the balance sheets of banks and broker-dealers, thus making them less willing to provide loans (Figure 1.52). Another reason is the residual effects of the massive underperformance of mortgage structured products during the financial crisis.

Nonetheless, the potential shift in the way that leverage is provided deserves more attentive monitoring. In their search for higher returns, investors have selectively returned to certain types of structural leverage, via leveraged loans, collateralized loan obligations, and structured notes, which fared well during the crisis (Figure 1.53).[34] Mortgage real estate investment trusts (REITs) have also emerged as an important alternative intermedi-

[34]Leveraged loans are taken out by highly indebted companies that are either unrated or rated no higher than BB+ and that may have difficulty directly tapping the high-yield corporate bond market.

Figure 1.53. Global Issuance of Leveraged Loans and Collateralized Debt Obligations
(In billions of U.S. dollars)
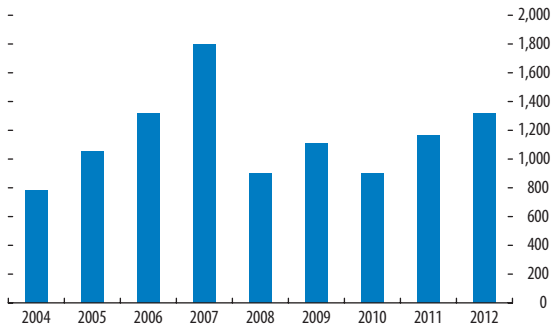
Sources: Bloomberg L.P.; Credit Suisse; Dealogic; and IMF staff estimates.

Figure 1.54. Risk Tolerance for Weakest 10 Percent of U.S. Public Pension Funds

Sources: Boston College Center for Retirement Research; and IMF staff estimates.
Note: Size of bubble represents allocation to alternative investments; 2011 is 25.5 percent.

ary in the secondary mortgage market.[35] A further potential concern is the opportunistic provision of leverage by nonbank intermediaries operating outside of the regulatory perimeter as they seek to fill the void left entities that are more balance sheet-constrained.[36]

Gamble for resurrection: pension funds and insurers could add to vulnerabilities.

Slow-moving risks are also emerging for some types of asset managers amid an extended period of low interest rates. This is apparent for U.S. public defined-benefit pension plans, which have suffered from weak asset returns. Funding of those programs has deteriorated substantially in the past decade, from being fully funded in 2001 to an estimated shortfall of 28 percent as of end-2012.[37] Risks are slow to build, as the issue for pension plans is *solvency* rather than liquidity (in contrast to most banking crises).[38]

U.S. public pension funds—particularly the lowest-funded ones— have responded to the low–interest-rate environment by increasing their risk exposures (Figure 1.54). At the weakest funds, asset allocations to alternative investments grew substantially to about 25 percent of assets in 2011 from virtually zero in 2001, translating into a larger asset-liability mismatch and exposing them to greater volatility and liquidity risks.[39]

Life insurance companies face a similar dilemma, as low interest rates create asset-liability mismatches and diminish net interest margins. Low interest rates mean that insurers face the prospects of investing in lower-yielding assets as bonds mature. On the liability side, long-term fixed-rate legacy products are costly because minimum guarantee rates cannot be easily reduced. The effect is a compression in net interest margins, that is, a reduction in the difference between returns on underlying investments and rates that insurance companies pay to policyholders. To counter the effects of lower rates, life insurers have engaged in liability management operations.[40] But because the limits to

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[35]Residential mortgage REITs get short-term funding in the repo market to purchase mortgage-backed securities in the secondary market. Leverage is usually around 10 times.

[36]For instance, nonbank financial intermediaries with large amounts of high-quality assets may seek to engage in liquidity or maturity transformation (e.g., though securities lending or repos).

[37]The 28 percent figure uses state and local planning assumptions, which are virtually unchanged over the period. This rise is driven by poor asset performance relative to defined obligations.

[38]For the 10 percent of the U.S. individual public pension plans that are the least-funded, annual benefit payments are less

than 10 percent of pension market assets, suggesting it will be many years before a crisis or insolvency event.

[39]Alternative investments cover a broad range of investment strategies and structures that fall outside the boundaries of traditional asset categories of equities, bonds, and cash, and include, for instance, private equity, hedge funds, and financial derivatives.

[40]For instance, they have lowered rates on legacy products where possible, curtailed interest-sensitive products, sought to

Figure 1.55. Net Interest Margins and Investment in Risky Assets by U.S. Insurance Companies
(In percent)
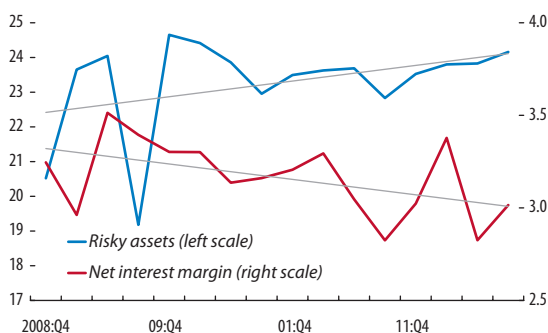
Sources: Company reports; SNL Financial; and IMF staff estimates.
Note: Risky assets are defined as lower-rated corporates, alternative assets, equities, and commercial real estate loans as a share of total investments.

Figure 1.56. U.S. Treasury Sell-Off Episodes
(In percent)

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

most of these measures have already been reached, insurance companies have migrated into higher-risk, less-liquid assets (Figure 1.55).

Capital shortfalls do not appear to be an immediate risk, as the industry has built excess liquidity and capital buffers since the crisis. But a protracted period of low rates could depress interest margins further and erode capital buffers, potentially driving insurance companies to further increase their credit and liquidity risk. At the same time, life insurers operate with significant balance sheet leverage and are thus exposed to credit shocks.

The "gamble for resurrection" in response to solvency risk, asset-liability mismatches, or diminishing net margins applies more broadly to insurance companies and pension funds operating in a low interest rate environment. A re-risking via changes in business models or asset allocation needs to be closely monitored.

A shock to the risk-free rate could potentially expose vulnerabilities and destabilize credit markets.

A sharp, unanticipated rise in risk-free rates could expose vulnerabilities that are currently masked by low interest rates and ample liquidity. Despite the reduction in tail risks and improvement in economic

data, markets are currently not pricing in any meaningful rise in interest rates.

We evaluate a potential U.S. Treasury bond market correction based on an expectations-hypothesis model, where long-term interest rates are estimated as a function of expected short-term interest rates over a two-year forward-looking horizon. We isolate past episodes of U.S. Treasury bond corrections back to the mid-1980s.[41] Not surprisingly, a rise in expected short-rates is the dominant factor that explains past bond sell-offs (Figure 1.56). More recently, however, there has been a substantial compression of the term premium that has contributed to a larger portion of the decline in bond yields, in concert with the stronger commitment to a longer period of low policy rates.

What would a bond correction look like now? We consider two illustrative scenarios: one based on the historical sensitivity of long-term yields to a change in expected short rates and the average term premium of past bond corrections; and a second based on a higher beta and lower term premium consistent with the more recent period (Table 1.4).[42]

In the first scenario, a 1.5 percentage point rise in expected short rates, consistent with past bond corrections, drives bond yields to 3.4 percent from the current 2.0 percent. The second scenario illustrates that the bond market could also be more vulner-

renegotiate terms, and sold blocks of business to private equity funds.

[41]A *correction* is defined as a rise in 10-year Treasury yields of more than 1.6 standard deviations over a three-month window.
[42]See the April 2013 *World Economic Outlook*, Chapter 1.

Table 1.4. Scenarios for U.S. Treasury Bond Market Corrections

	Level of Expected Short Rates (percent)	Rise in Short Rates from Current Level (percent)	Beta to Short Rates	Term Premium (percent)	10-Year Yield (percent)
Based on historical bond market corrections	0.5	1.5*	0.9	1.6	3.4
Past bond corrections with latest parameters	0.5	1.0	2.9	0.5	4.8

Source: IMF staff estimates.

Note: 10-year yields = beta x expected short rate + term premium. In the first scenario, the 10-year yield (3.4 percent) is the beta (0.9) multiplied by expected short rates (0.5 percent + 1.5 percent) plus the term premium (1.6 percent). The expected short rate is an average of quarterly three-month interest-rate futures two years ahead. The beta to short rates and the term premium is the average estimate of a rolling 3-month regression during past bond market corrections. The current beta and term premium are estimates at end-January.

*The average increase in expected short rates in past bond market corrections is 1.5 percent. We apply the change to the current level of short rates, which is well below historical norms. These scenarios capture only the initial phase of a bond market correction.

able than th*e* norm. The sensitivity of bond yields to short rates has increased substantially. Even a modest 1.0 percentage point rise in expected short rates can generate a more material increase in yields, to 4.8 percent.[43] A rise in the term premium to historical norms—as a result of sovereign risk or other factors—is an additional source of potential pressure (1.1 percentage points in this example).

Drawing from historical experience is challenging, given the unique features of the current cycle. Also, context is important—a benign trigger such as a more rapid economic recovery that results in a faster-than-expected rise in interest rates would likely have less destabilizing effects, and policy officials would aim to manage a more gradual rise. Systemic stability risks would likely be greater if, instead, interest rates remain low for a more protracted period. This would allow for a further decay in credit conditions and increasing vulnerability to a faster-than-expected rise in yields, coupled with rising sovereign risk premiums or weaker potential growth (see the scenarios in the April 2013 *World Economic Outlook*). Where historical experience does provide guidance is on the speed of the rise in bond yields being a key consideration for stability risks. A faster increase would have important direct and indirect consequences, including, for instance, greater risk of a sudden stop or reversal of capital flows to emerging market economies; destabilizing losses in large, leveraged nonbank credit channels sensitive to interest rate risk, such as mortgage REITs; and asset-liability mismatches in the banking system and elsewhere.

[43]In their baseline scenario, Carpenter and others (2013) contemplate a rise in 10-year yields of roughly 300 basis points over a three-year period.

Figure 1.57. U.S. High-Yield Corporate Spread and Liquidity and Volatility
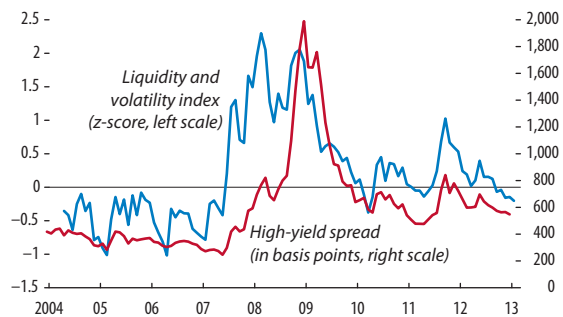
Sources: Bank of America Merrill Lynch; Bloomberg L.P.; Citigroup; and IMF staff estimates.
Note: Liquidity and volatility index is based on swaption volatility, swap spreads, and equity-implied volatility.

Credit risk can be amplified by poor liquidity.

Furthermore, the decline in U.S. corporate bond market liquidity could amplify the vulnerabilities in credit markets in the event of a sharp rise in government bond yields.[44] Illiquidity is currently being masked by low rates, strong asset performance, and the one-way nature of inflows to corporate bond markets. The effects of the decline in liquidity could become evident once those dynamics reverse, potentially raising volatility, increasing funding costs for issuers, straining other credit channels, and discouraging longer-term investment plans. This is especially relevant for the high-yield sector, where liquidity and volatility are important determinants of spreads (Figure 1.57).

[44]See the October 2012 GFSR (Chapter 2, Box 2.6) for details on depressed corporate bond trading liquidity.

Figure 1.58. Holdings of U.S. Corporate Bonds, by Investor Type
(In billions of U.S. dollars)
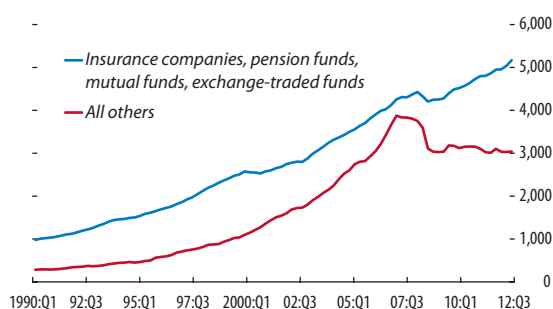
Sources: Federal Reserve; and IMF staff estimates.
Note: Household holdings were excluded to reduce the incidence of double-counting.

It is also relevant for asset managers who have increased their corporate bond exposure significantly since 2008 (Figure 1.58). Increased exposure does not in itself pose a stability risk. On the contrary, increased holdings of corporate bonds by tradition-ally long-term investors with greater capacity to absorb liquidity risk (owing to less liquid liabilities) may enhance stability. But in an environment of rising rates and with greater volatility, rising balance sheet leverage combined with large recent purchases at very low yields and growing margin pressures could prove to be a toxic mix. The result could be forced asset sales (or unforced sales due to valuation losses) that further compound margin pressures and erode capital buffers.

Against this backdrop, policymakers need to monitor developments closely and stand ready to counter excesses early on.

Tension is building between the ongoing need for extraordinary monetary policy accommoda-tion and credit markets that are maturing more quickly than in typical cycles. High unemployment and low inflation may justify an accommodative monetary policy stance. But other tools need to be employed to counteract undesirable excesses in credit. Increased surveillance and macroprudential tools, such as countercyclical buffers to lean against rising leverage, are essential to manage undesired credit expansion.

The most immediate risk for nonbank financial intermediaries is complacency toward the slow-moving nature of liability loss recognition. Pension funds need to engage in active liability management operations without delay, which can most likely be achieved by restructuring benefits, extending work-ing years, and gradually increasing contributions to close funding gaps. Insurance companies need to proceed with the disposal of legacy products to reduce margin pressure and limit duration mis-matches on new products.

An undesired buildup of excesses in broader asset markets is a potential risk over the medium term. Asset reallocations of institutional investors to alternative asset managers, excess cash holdings by those asset managers, the decline in underwriting standards, and the sharp rise in bond valuations are all intertwined. Constraining those potential excesses is a financial stability imperative.

Emerging Markets: A Low-Rate Bonanza or Future Woes?

The potential for capital inflows to persist or accelerate, partly driven by low interest rates and higher risk appetite in advanced economies, raises the possibility of too much money chasing too few emerging market assets. At present, balance sheets within emerging markets appear generally sound, but a continuation of current trends would likely lead to an increase in financial stability risk. Emerging market assets could also prove vulnerable to changes in the external environment, notably an eventual rise in global rates amid heightened uncertainty. A further concern is that favorable current market conditions may lead to complacency in managing growing domestic financial stability challenges.

Emerging markets have benefited from capi-tal inflows, but could low rates and low vola-tility result in too much of a good thing?

Emerging market economies reap substantial benefits from capital inflows, which in general allow them to increase productive investment, extend financing terms, and reduce interest rate costs. But too rapid or imbalanced inflows often bring vulner-

abilities that can include accumulations of foreign liabilities and potentially rapid increases in domestic credit and asset prices.[45]

With interest rates remaining low, institutional fixed-income investors, such as insurance companies and pension funds, are increasing exposures to higher-risk investments, supporting demand for emerging market sovereign and corporate bonds, and pushing up inflows.[46]Amid this search for yield, capital inflows may have become more sensitive to interest rate differentials (adjusted for volatility) between developed and emerging market economies (Figure 1.59).

Has the supply of emerging market assets risen to match the increase in demand? Although issuance of bonds has increased sharply over the past four years, this has, in part, substituted for the decline in syndicated loans, as European banks came under deleveraging pressure. Overall, the net new supply of assets from emerging markets to international markets was lower in 2012 than two years earlier (Figure 1.60). One important consequence of this relatively slow supply growth has been the growing share of foreign investors in key emerging market asset classes, such as sovereign bonds (Figure 1.61).

What emerging market vulnerabilities could arise as a consequence? While emerging markets benefit from favorable external financing conditions, including through reduced borrowing costs and a wider range of financing sources, excess borrowing could increase risks over the medium term. Higher corporate leverage may raise susceptibility to an adverse growth or interest rate shock, while a rise in foreign currency borrowing could increase exposure to currency or foreign financing shocks. At the same time, the crowding-in of foreign investors could lead to an asset price bubble, with prices becoming increasingly sensitive to external conditions. Inflows and low foreign interest rates may thus compound a buildup in

domestic vulnerabilities, including in credit markets. Moreover, the favorable external environment might breed complacency among policymakers facing domestic financial stability challenges. Each of these possibilities is examined in turn.

How much have emerging market corporate debt fundamentals deteriorated?

A combination of higher bond financing with relative stagnation in equity issuance (Figure 1.62) has increased debt-equity ratios and thus corporate leverage in emerging markets. Countries that have experienced the largest increases in debt-to-equity ratios since 2007 (Turkey, the Philippines, China, Brazil, Thailand, Chile) are, in general, those that started with the highest ratios, although Korea, Mexico, and Indonesia moved in the opposite direction (Figure 1.63).

In some countries in emerging Asia, the increase in corporate debt-to-equity ratios appears related to strong domestic growth and low real interest rates, with much new debt contracted to finance infrastructure investments. There is some concern that floating-rate or short-maturity loans could represent a vulnerability when policy rates start to rise. Foreign exchange corporate borrowing generally plays a lesser role in emerging Asia (Figure 1.64), but the rise in corporate debt-to-equity ratios in Brazil appears closely related to higher issuance of foreign-currency-denominated bonds. Nevertheless, Brazilian firms appear to have a lower degree of overall foreign-currency exposure (including exposure through derivatives) than they did at the time of the Lehman crisis in 2008. Turkish firms, in turn, have increased leverage considerably over the last four years as borrowing from the local banking system rose from 16 percent to 28 percent of GDP. While this borrowing is collateralized and is done by firms with strong balance sheets, the rapid increase and resulting leverage warrant careful monitoring.

Overall, there has been some increase in foreign-currency funding. During the past five years, total foreign-currency borrowing by emerging market businesses increased by about 50 percent.[47] In many markets the share of corporate foreign-currency debt

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[45]After an acceleration of portfolio flows into dedicated emerging market funds around the start of the year, flows have moderated in recent weeks.

[46]Even moderate changes in portfolio allocations by institutional investors can be significant. A 2 percent increase in the portfolio share allocated to foreign assets by U.S. pension funds, from 13 to 15 percent, would result in an additional $230 billion in outflows, or about one-half of total net capital inflows to emerging market economies in 2012 (of course, not all of the additional outflow would go to emerging market economies).

[47]Cross-border loans plus foreign-currency-denominated bonds.

Flows to emerging markets have risen with risk-adjusted interest rate differentials . . .

Figure 1.59. Net Capital Flows to Emerging Markets
(In percent, 12-month rolling sums)
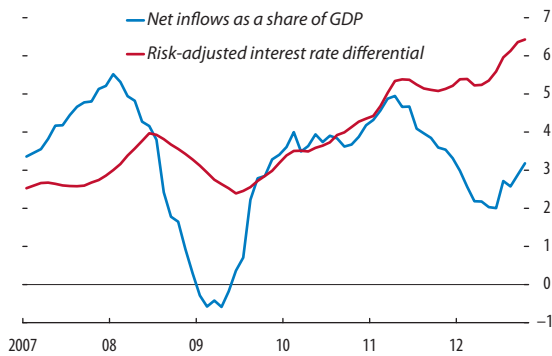
Sources: Bloomberg L.P.; CEIC; and IMF staff estimates.

. . . but the supply of emerging market assets is not keeping up with the new demand . . .

Figure 1.60. Selected Emerging Market Bond, Equity, and Loan Issuance
(In billions of U.S. dollars)
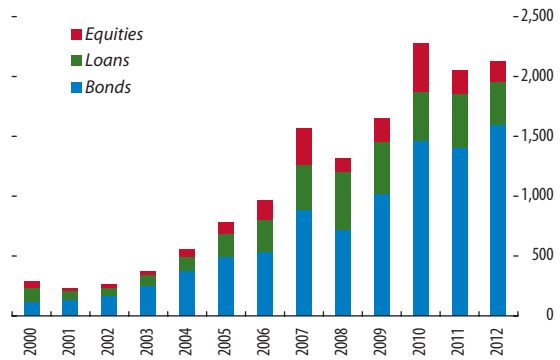
Source: Dealogic.

. . . resulting in higher foreign ownership share in some key markets . . .

Figure 1.61. Nonresident Holdings of Domestic Sovereign Debt
(In percent)
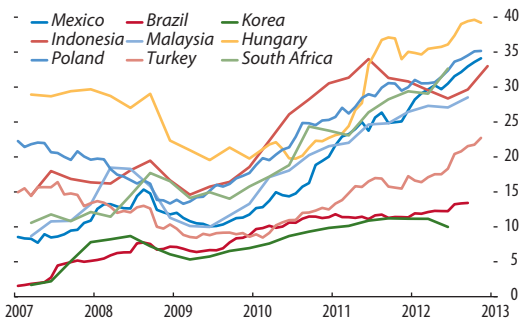
Sources: asianbondsonline.adb.org; national authorities; and IMF staff estimates.

. . . even as corporate issuers step in to fill some of the gap.

Figure 1.62. Emerging Market Nonfinancial Corporate Issuance
(In billions of U.S. dollars)
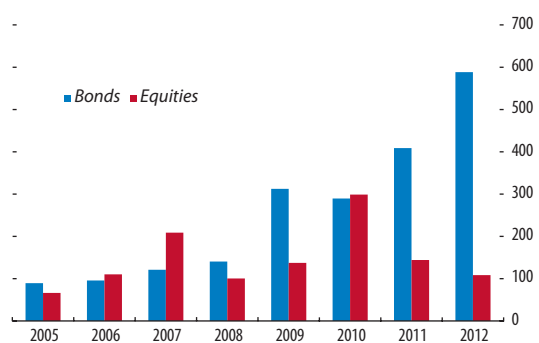
Source: Dealogic.

Corporate leverage has risen for some of the more leveraged countries . . .

Figure 1.63. Emerging Market Nonfinancial Corporate Leverage, 2007 and 2012
(In percent, debt-to-equity)
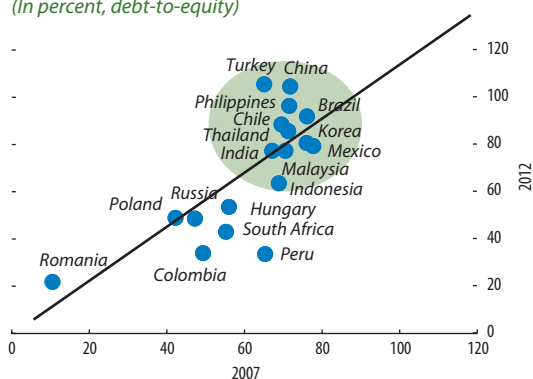
Sources: Bank for International Settlements; CEIC; Dealogic; and IMF staff estimates.

. . . with foreign-exchange-denominated debt also rising in some cases.

Figure 1.64. Foreign-Exchange-Denominated Debt of Nonfinancial Corporations in Emerging Markets
(In percent of GDP)
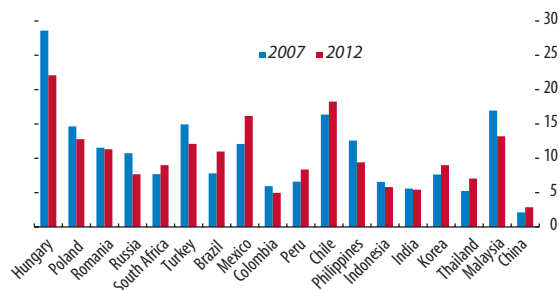
Sources: Dealogic; and IMF staff estimates.

Some riskier sectors are leading the charge . . .

Figure 1.65. Emerging Market Corporate Issuance, by Type of Issuer
(In billions of U.S. dollars)
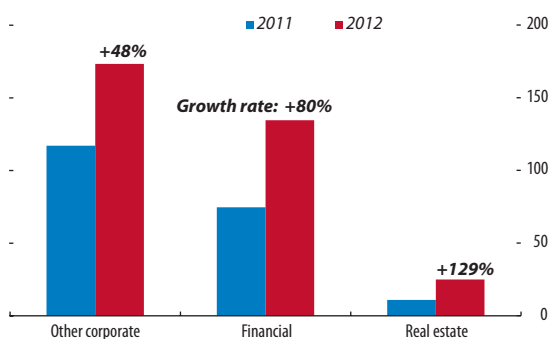
Source: JPMorgan Chase.

. . . with leverage rising for Asia's most leveraged firms.

Figure 1.66. Corporate Leverage in Asia, excluding Japan
(Ratio of total liabilities to common equity, percent)
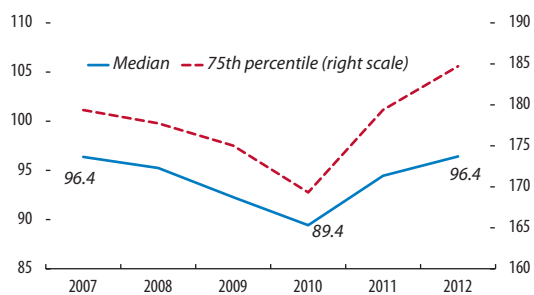
Sources: CreditEdge; and IMF staff estimates.
Note: Leverage ratio is computed for a balanced sample of 3,836 nonfinancial companies in China, Hong Kong SAR, India, Indonesia, Korea, Malaysia, the Philippines, Singapore, Taiwan Province of China, Thailand, and Vietnam.

Figure 1.67. Interest Coverage Ratio for Emerging Market Firms
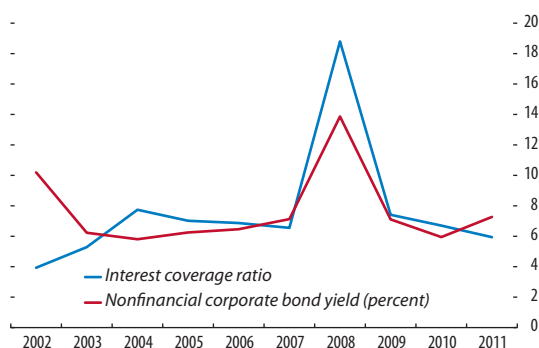
Sources: Bloomberg L.P.; Cap IQ; and IMF staff estimates.

Figure 1.68. Hard Currency and Local Currency Sovereign Bond Issuance
(In billions of U.S. dollars)

Source: Dealogic.

in GDP remained substantial or even rose, amid large increases in dollar-based GDP (see Figure 1.64). This trend has been complemented, in some cases, by a move away from issuing equity, which is essentially a domestic-currency liability, and toward issuing bonds denominated in foreign currency (see Figure 1.62).

On top of the broad-based increases in debt-to-equity ratios and foreign currency debt, some of the more speculative sectors, such as real estate companies, have seen issuance more than double in the past year. Issuance by financials has also risen more sharply than that by nonfinancial firms (Figure 1.65). A more detailed examination of the distribution of firms in Asia—excluding Japan—reveals sharper increases for the most leveraged firms (Figure 1.66).[48] While interest coverage appears healthy on average, firms may be vulnerable to earnings or interest rate shocks (Figure 1.67). At the same time, as discussed in Box 1.1, which looks at the case in China, for many highly leveraged firms, the ratio of earnings to interest expenditures has begun to decline.

At present, corporate debt ratios and foreign-currency liabilities do not appear excessive on a historical basis (see Figure 1.64). But if current trends continue, corporate balance sheets could face increasing strains over time. As an illustration, should debt-equity ratios continue to rise at the same pace over the next two years as they have over the past two, the aggregate ratio for the most

leveraged quarter of Asian businesses would climb from 185 to 200 percent, while that for the group of leveraged Latin American businesses would rise from 260 to 300 percent. The figures in each case would exceed recent highs (registered in 2008), but would still be below debt-to-equity ratios for U.S. high-yield issuers, which currently average about 370 percent.[49] Similarly, extending the past year's pace of growth in foreign currency debt over the next two years would bring the ratio of corporate foreign-currency-denominated debt to GDP from 10 to 12 percent for emerging markets excluding China. At such levels, financial stability risks would rise, and emerging market corporations would become significantly more susceptible to adverse shocks, such as from earnings weakness or sudden interest and exchange rate movement.

Sovereign borrowers can benefit from low rates and widening international market access, but caution is warranted.

Low global rates, low volatility, and rising risk appetite have provided increased market access for a wider range of sovereign borrowers, which is certainly welcome (Figure 1.68). Foreign purchases of portfolio assets (mainly sovereign bonds and equities) in several "frontier" markets, including African markets such as Ghana, Nigeria, and Zimbabwe,

[48]See Box 1.4 of the April 2011 GFSR.

[49]These debt-to-equity ratios are calculated by IMF staff using historical data provided by Bank of America Merrill Lynch.

Box 1.1. What Has China's Lending Boom Done to Corporate Leverage?

Real bank lending in China has grown at double digits over the past several years, pushing the stock of loans to 130 percent of GDP by end-2012. A broader measure of credit—including trust loans, corporate bonds, and a few other sources of debt finance—has even climbed as high as 172 percent of GDP. Although much recent new lending has gone to local government entities, the corporate sector remains the largest borrower.

Leverage of the typical listed company has risen but still appears relatively contained. Based on firm-level data, the median company had financial liabilities not exceeding 55 percent of total assets at end-June 2012, up 5 percentage points since 2003 (Figure 1.1.1). Data for a somewhat broader, but shorter, panel of firms paint a similar picture. Despite strong credit growth, many companies have managed to contain their gearing, thanks in part to years of strong profits and modest payout ratios.

Averages, however, do not tell the whole story. Some companies have geared up considerably, with debt to total assets above 80 percent for the top decile of firms, representing an increase of 10 percentage points since 2003. The industrials, materials, utilities, and real estate sectors have had the fastest increase in leverage (Figure 1.1.2), notably on the part of large companies, which tend to enjoy easier access to credit.

Note: Prepared by André Meier and Changchun Hua.

Figure 1.1.2. Median Ratio of Debt to Total Assets, by Sector
(In percent)
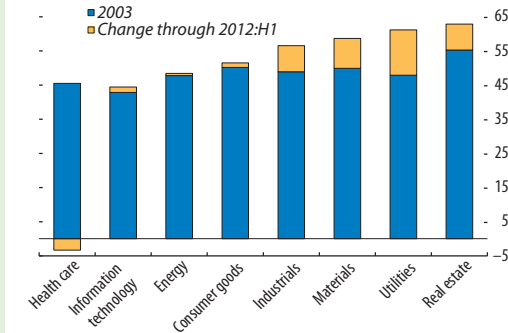
Sources: WIND; and IMF staff calculations.
Note: Computed for a balanced panel of 1,348 nonfinancial companies with data availability for the entire sample period.

Moreover, corporate profits have failed to keep pace with the rise in interest burdens. For a balanced panel of some 900 listed companies, the median ratio of earnings to interest expenditure fell to 2.4 by mid-2012, down from 4.4 nine years earlier (Figure 1.1.3). This decline reflects not only the rise in debt burdens but also the recent weakening in corporate profits. To the extent that this weakening was cyclical, a recovery should be expected. However, some sectors are likely to face persistently less favorable business conditions, as they grapple with excess capacity or rising input costs. Consequently, financial strains could become more apparent over time.

Figure 1.1.1. Ratio of Debt to Total Assets in Listed Chinese Companies, 2003–12
(In percent)

Sources: WIND; and IMF staff estimates.
Note: Computed for a balanced panel of 1,348 nonfinancial companies with data availability for the entire sample period.

Figure 1.1.3. Ratio of EBIT to Interest Expenditure in Listed Chinese Companies, 2003–12
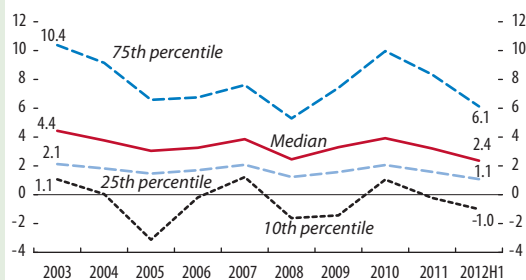
Sources: WIND; and IMF staff calculations.
Note: EBIT= earnings before interest and taxes. Computed for a balanced panel of 917 nonfinancial companies with data availability for the entire sample period.

surged in 2012, in some cases reaching new highs.[50] Nonetheless, the rise in dollar borrowing, including from a growing number of lower-rated issuers, suggests that developing economies need to remain mindful of their dollar exposures. A related danger is that indiscriminate demand from foreign investors could lead to policy complacency, postponing needed adjustments of large (and growing) external imbalances (e.g., Ukraine and Hungary).

External shocks could prompt a substantial increase in emerging market financing rates.

Emerging market sovereign and corporate issuers have benefited greatly from favorable external conditions over the past four years, with spreads for foreign-currency-denominated debt narrowing by an average of 400 basis points since end-2008. Our bond pricing model indicates that stimulative U.S. monetary policy and lower global risk (itself partly attributable to the actions of advanced economy central banks) together account for virtually all of the spread reduction in the emerging market bond index (Figure 1.69).[51] The benefits arising from the external environment have extended to domestic markets, as shown by a second pricing model (Figure 1.70) that gauges the determinants of local currency bond yield. While domestic conditions—including the policy rate—are shown in this model to play a major role, foreign inflows are identified as the single largest factor behind the large decline in local currency yields.

But what would happen if external conditions were to deteriorate? Foreign currency bond spreads are especially vulnerable to tightening in external conditions, to the extent that a combined 300 basis points effective tightening in U.S. monetary policy and 3 standard deviation rise in volatility

[50]In 2012, hard currency issuance rose by 37 percent while low rates led to issuance by high-yield and debut issuers: Bolivia (4.9 yield at issue), Paraguay (4.6 percent in January 2013), Romania (6.5 percent), Ukraine (7.8 percent), Serbia (6.6 percent in September 2012 and 5.5 percent in November 2012), and Zambia (5.6 percent).

[51]The striking result that domestic conditions appear to have had little impact on spread tightening largely reflects the strong policy position of many emerging market economies before the crisis.

Figure 1.69. EMBI Global Spread Tightening (December 2008–12): Decomposition
(In basis points)
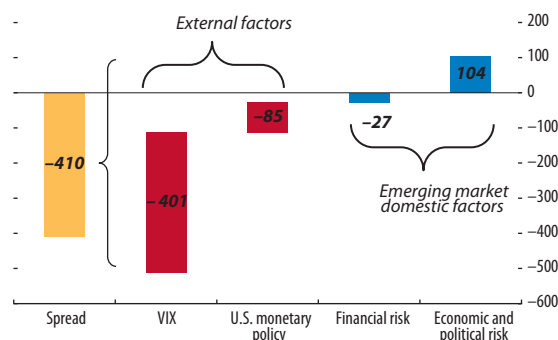
Source: IMF staff estimates.

Figure 1.70. Local Yield Tightening in Emerging Market Economies (December 2008–12): Decomposition
(In basis points)
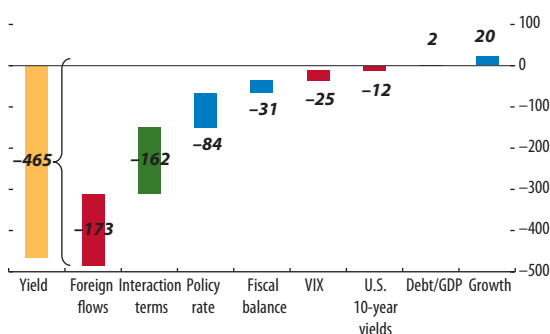
Source: IMF staff estimates.
Note: The interaction terms arise from the non-orthogonality of the explanatory variables (due to collinearity).

(VIX) would wipe out the spread tightening gains of the last four years (Figure 1.71). (However, a scenario of strong global growth together with rising rates and a normalization of volatility would have a more subdued effect, as improving domestic conditions would offset some of the tightening in external conditions.) Even for local currency debt, reflecting the expanded role of foreign investors, a net sale by foreigners of 20 percent of their bond holdings would push up yields by almost 100 basis points on average, all else held constant (Figure 1.72). Many emerging markets, it appears, still face external constraints on their ability to borrow, particularly during bouts of reduced global risk appetite.

Figure 1.71. Impact of Shocks on EMBI Global Spreads
(In basis points)
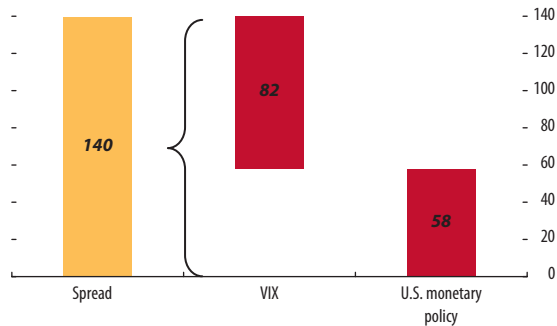
Source: IMF staff estimates.
    Note: Shocks are a one standard deviation increase in the VIX, a 100 basis point rise in the federal funds rate, and a 25 basis point increase in the volatility of the federal funds rate.

Domestic financial stability challenges are rising, partly spurred by external conditions . . .

Several countries face stability risks from continued strong credit growth, asset price appreciation, weaker bank balance sheets, and deteriorating asset quality. Supportive monetary policy and strong private demand have bolstered domestic credit in emerging markets, pushing credit-to-GDP ratios to record highs in a number of countries in emerging Asia and Latin America. On average, bank credit expanded by 13 percent and 11 percent in Latin America and Asia, respectively, over the past year, more than twice as fast as in Eastern Europe (Figure 1.73).[52] Capital inflows have played a role in this trend. Faced with appreciation pressures from inflows, authorities in some countries have opted to keep monetary conditions looser than they otherwise would have, for fear of becoming major carry trade destinations. While the overall credit-to-GDP ratio for emerging markets, at about 70 percent on average, remains well below the 145 percent average for advanced economies, rapid growth in this ratio has often proved to be as destabilizing as having a high ratio overall.[53]

Household borrowing accounts for much of the overall increase in credit in Latin America, where many consumers have only recently gained access to credit markets (Table 1.5). However most of the total stock of credit to households in this region is not

[52]Excluding Russia and Turkey.
[53]See Annex 1.1 of the September 2011 GFSR.

Figure 1.72. Impact of Shocks on Local Emerging Market Yields
(In basis points)

Source: IMF staff estimates.
    Note: Shocks are a five percentage point increase in the VIX, a 50 basis point rise in U.S. 10-year yields, and a 20 percent reduction in foreigners' holdings of local debt (as a share of outstanding debt).

Figure 1.73. Domestic Credit Growth, 2006–12
(In percent)
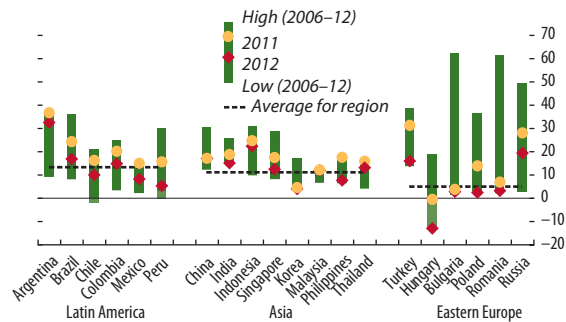
Source: IMF, International Financial Statistics database.

in mortgages but in nonmortgage consumer lending, typically for large durable goods such as cars. In emerging Europe, mortgage lending accounts for a much larger share of total credit, but there has been an across-the-board slowdown in all types of lending in the region. Credit growth in Asia has focused on corporate lending, consistent with the increase in corporate debt-equity ratios in the region, but there are still pockets of rapid growth in consumer lending.

Asset prices have moved up with the steady growth in credit, although no region is showing clear evidence of bubbles. Reflecting the growth in credit to households, house prices have continued to rise in Brazil, Hong Kong SAR, and Malaysia, even after adjusting for CPI inflation (Figure 1.74).[54] In

[54]The property price index in Brazil is limited to prime locations.

Table 1.5. Distribution of Bank Lending and Nonperforming Loans

Region	Share of Total Loans (in percent)			Share of Gross NPLs (in percent)		Sectoral Gross NPL Ratio (in percent)	
	Household	of which: Mortgages	Corporate	Household	Corporate	Household	Corporate
Asia	27.5	17.7	48.9	21.9	57.1	1.4	1.7
Latin America	34.4	12.9	53.1	47.3	45.9	5.4	3.5
Eastern Europe	46.4	27.7	50.0	36.5	47.7	6.6	8.3

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

Note: NPL = nonperforming loan.

[1]The figures are average values computed from the largest banks in each of the sample countries within the regions. Sample countries include Brazil, Chile, China, Hong Kong SAR, Hungary, India, Korea, Poland, Russia, Singapore, and Thailand. "Household" comprises mortgages and other consumer credits. Sectoral gross NPL ratio is computed as gross nonperforming lending to sector x/total lending to sector x.

Figure 1.74. Consumer Price Index-Adjusted Residential Property Prices, 2006–12
(Percent change)
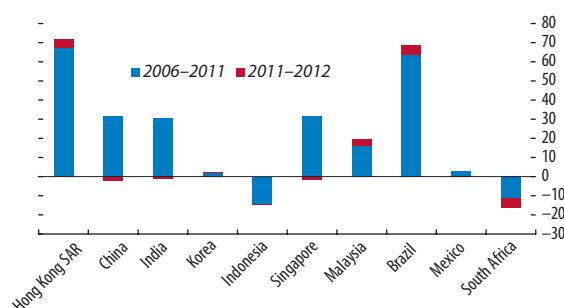
Source: IMF, Corporate Vulnerability Utility database.

Figure 1.75. Gross Nonperforming Loan Ratios, 2010–12
(In percent)
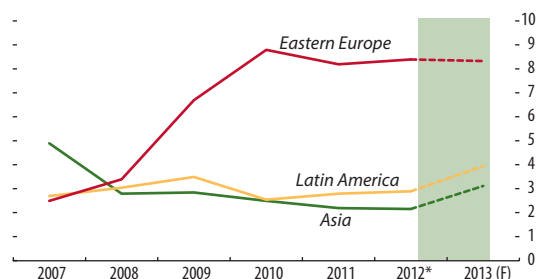
Sources: Bankscope; Bloomberg L.P.; IMF, Financial Soundness Indicators, International Financial Statistics, and World Economic Outlook databases.
Note: Based on median forecast results from panel vector autoregression in a baseline scenario.

response to these developments, Hong Kong SAR, Malaysia, and Singapore have introduced fresh measures to curtail market exuberance and further reinforce financial buffers. In Korea, with the encouragement of the authorities, banks have scaled back some credit operations, responding to above-trend house price growth with a small decrease in overall mortgage loans outstanding.

As typically occurs after a sustained period of strong credit growth, some asset quality deterioration has begun to appear, even as nonperforming loan rates remain low on a historical basis. Some major emerging market economies, including Brazil, India, and Mexico, have seen upturns in delinquency rates for certain types of loans.[55] While many countries have

been active in adopting more stringent impaired loan recognition standards, there are concerns about asset restructuring practices and lax definition of distressed assets in some cases (Figure 1.75). The resulting risk of underestimating true asset quality problems appears particularly relevant in China and India.[56]

Despite the balance sheet expansion and moderate upturn in nonperforming loan rates, bank capital levels remain generally adequate. However, in every region (but especially in eastern Europe) there is a substantial subset of banks that may not be prepared to absorb

[55]Based on the recent Financial System Stability Assessment (FSSA) for Brazil, some segments of the household sector may already be under stress. Similarly for India, FSSA findings suggest that rapid credit growth and a slower economy will likely put pressure on banks' asset quality.

[56]In China, concerns remain focused on exposures toward local government financing vehicles, but this must be weighed against the over-provisioning (some 300 percent) of recognized NPLs. In India, slowing growth and project delays have led to an increase in restructured assets, amounting to about 6 percent of total loans. In the 2008 cycle, 15 to 20 percent of similar loans turned nonperforming. Nonetheless, recent annual trends show that on average, 8.5 percent restructured loans slipped into the nonperforming category.

Table 1.6. Credit and Asset Market Indicators for Selected Emerging Markets and Other Countries

2012	Net Portfolio Investment	Credit Growth	Asset Prices (Equities and Housing)	Banking Sector	Corporate Sector
Asia					
China		△			
Hong Kong SAR	△	▽			
India	▽				
Indonesia	▽				△
Korea	▽	▽		△	▽
Malaysia	▽			▽	▽
Philippines	△	▽			
Singapore		▽		▽	▽
Thailand	▽		△		△
Latin America					
Brazil	△	▽			
Mexico	▽	▽			▽
Chile	△	△	. . .		△
Colombia	△	△	△		▽
Eastern Europe and Others					
Bulgaria	△				△
Hungary	△				
Poland	▽	▽	▽		△
Russia	△	△		△	
South Africa	▽	△		▽	
Turkey		▽		▽	▽

▮ First Quartile	△ Increase from 2011
▮ Between First and Second Quartile	▽ Decrease from 2011
▮ Between Second and Third Quartile	*Otherwise, no changes relative to 2011
▮ Above Third Quartile	

Sources: Bankscope; Bloomberg L.P.; IMF, Financial Soundness Indicators, Corporate Vulnerability Utility, International Financial Statistics database; JPMorgan Chase; and IMF staff estimates.

Note: The estimates are based on adjusted z-scores of the indicators in 2012 relative to their past 12 years since 2001, represented in four distinct 25th percentiles. Net portfolio investment is measured in percent of GDP. Credit growth refers to the annual growth in banking sector credit/GDP. Asset prices are computed based on real house price index and equity market price-to-book-value ratio; the banking sector indicator is derived from banks' gross NPL ratios and returns on assets; and the corporate health indicator comprises corporate debt-to-equity ratio and returns on equity.

losses from negative shocks (Figure 1.76). Even Asia's relatively high capital ratios could come under strain if growth disappoints, or, alternatively, if additional capital is required to fund rapid balance sheet expansion.

The heatmap (Table 1.6) summarizes the latest trends, highlighting overall credit growth in Asia, and, to a lesser extent, Latin America, the general increase in asset prices, and, in the case of several markets, the increase in debt on corporate balance sheets.

Shadow banking systems may pose additional challenges over the medium term.

Looking beyond the data available on the formal financial system, informal evidence across a number of emerging markets points to rising risks from credit

Figure 1.76. Banks' Loss-Absorbing Buffers by Region
(In percent of risk-weighted assets)
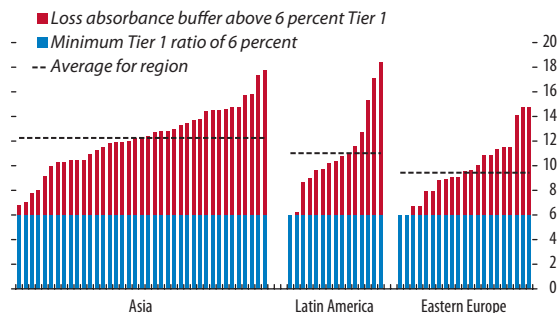
Sources: Bankscope; Bloomberg L.P.; and IMF staff estimates.
Note: Loss-absorbing buffers defined as excess loan loss provisions over impaired loans plus Tier 1 capital above Basel III regulatory requirements.

Figure 1.77. China: Growth Rate of Credit, by Type
(In percent, year-over-year)
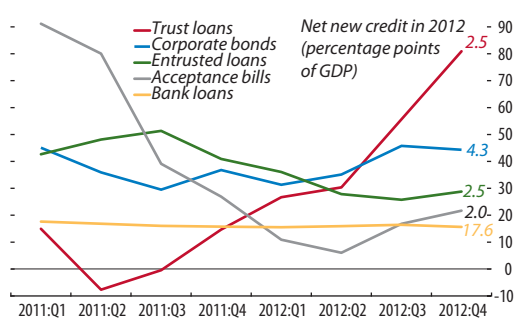
Sources: CEIC; Haver Analytics; and IMF staff estimates.
Note: Official data on entrusted loans (i.e., intercorporate loans brokered by banks), trust loans (i.e., loans extended by trust companies), and undiscounted acceptance bills cover only flows, i.e., net new credit. Stocks are computed by cumulating historical flows from 2002 onwards, using end-2001 = 0 as a starting point.

supplied outside bank balance sheets—sometimes described as "shadow banking." Such nontraditional lending activities include the use of pawnbrokers as a tacit source of credit, advances on cross-border wage remittances, some microcredit activities, and the use of alternative "wealth management products." China clearly stands out as having large credit creation outside the formal banking system. The striking trend toward disintermediation, previously flagged in Box 1.5 of the September 2011 GFSR and Box 2.7 of the October 2012 GFSR, has accelerated in recent months. Of the 15 trillion renminbi ($2.4 trillion) in net new credit extended during 2012, some 40 percent came from nontraditional sources, notably trust funds and the corporate bond market, which expanded at high double-digit rates (Figure 1.77).

Growth in these market segments reflects regulatory arbitrage—agents finding ways to bypass restrictions on loan growth and deposit remuneration—as well as deliberate efforts by the authorities to liberalize and diversify the financial system. This diversification improves access to financial services, but it also raises fresh concerns about financial stability, as many of the new funding channels remain linked to the banking system, and most have yet to be tested in a time of market stress.

An extension of recent trends would impair financial stability in emerging markets.

Lower interest rates and favorable external financing conditions have eased risks and sup-

ported growth in emerging markets, but prolongation of such conditions will likely lead to the buildup of vulnerabilities and potential instability. In responding to this environment, emerging market countries need to guard against the accumulation of too much leverage in corporate and household balance sheets, while ensuring that bank capital buffers are adequate to withstand shocks and capital flow reversals. This may require the imposition, for example, of limits on growth of very rapidly expanding credit segments. In certain circumstances, capital flow measures may be appropriate, although they should not substitute for warranted macroeconomic adjustment. At the same time, cross-border coordination of policies can help to mitigate the riskiness of capital flows. Finally, supervisors should carefully monitor sources of potential instability in the shadow banking system.

Policies for Securing Financial Stability and Recovery

Policymakers have gained ground in addressing financial system vulnerabilities. Acute liquidity stresses have abated and financial conditions have improved. But further policy actions are needed to address balance sheet weaknesses in the private sector and ensure credit channels are open, to support economic recovery and avoid falling into a more chronic crisis phase. The regulatory reform agenda remains incom-plete, and consistent implementation remains a priority.

Further strengthening of bank balance sheets and business models is needed to improve banks' capacity and willingness to lend.

Banks in advanced economies have made significant progress in restructuring their balance sheets, but progress has been uneven. Country systems are at different stages of repair, reflecting both the extent to which they have addressed legacy problems and the cyclical pressures they currently face. The current low valuations of bank equities reflect these difficulties, but also signal investor uncertainty about the book valuations of bank assets, banks' calculations of risk-weighted assets, and the risks of lender forbear-

ance. The persistence of large-scale losses and failures of significant banks underscores the need for a thorough external review of bank asset valuations.

In the euro area, reviews of bank asset valuations need to be combined with mechanisms to remove bad loans from impaired bank balance sheets, with European Stability Mechanism (ESM) financing if needed. Banks should restructure loans, but within strict criteria, transparent disclosure, and adequate classification and provisioning. This will also require intensive monitoring by supervisors to ensure that the restructurings are done on this basis. Following the recent example of Spain's SAREB, after independent reviews by external parties, state-sponsored asset management companies (AMCs) or other mechanisms could be established to warehouse and manage the stock of badly impaired assets in a controlled manner, with robust provisioning requirements giving banks the incentive to value and write-down impaired and non-performing loans. The process will require banks to raise capital to absorb accelerated losses, with burden-sharing by junior creditors if needed, before any recourse is made to the ESM.

The establishment of the euro area Single Supervisory Mechanism (SSM) provides an opportunity to bolster trust in banks as supervisory responsibility for large and intervened banks is transferred to the ECB. Maximizing the opportunities presented by this reform requires fast and sustained progress toward an effective SSM alongside other elements of banking union. A Single Resolution Mechanism should become operational at around the same time as the SSM becomes effective and needs to be accompanied by agreement on a time-bound roadmap to set up a single resolution authority, and a euro area deposit guarantee scheme, with common fiscal backstops. Proposals to harmonize minimum capital requirements, resolution, common deposit guarantee schemes, and insurance supervision frameworks at the EU level should be implemented promptly. Modalities and governance arrangements for ESM direct recapitalization of banks should also be clarified. Without these reforms, bank creditworthiness will remain inexorably tied to that of the home sovereign and, as confirmed by events in Cyprus, constrained sovereigns may not be able to underwrite an impaired bank's liabilities.

In the United States, banks have announced a number of measures aimed at reducing operating expenses and restructuring business lines, but progress so far has been slow, and valuations would suggest that investors are still awaiting credible measures to sustainably improve returns. Investors remain concerned about the opacity of more complex business models as systemic banks housing significant broker-dealer operations continue to trade at lower multiples than monoline banks with clearer lines of business. The challenges posed by the changes in bank business models will require close surveillance, and dealing with too-big-to-fail banks remains a key issue. The U.S. authorities should persevere with the reform of money market mutual funds to curtail the chance that the authorities would be forced into systemic support in a future crisis.

Regulation is at a crossroads—the reform agenda needs to be completed and then consistently implemented.

As with the restructuring of banks, the reform of financial sector regulations has progressed but the process remains incomplete. In part, the implementation of reforms has rightly been phased in to avoid making it harder for banks to lend while regaining their strength. But the delay also reflects the difficulty in agreeing key reforms, due to concerns about banks' ability to contend with structural challenges against the backdrop of low growth.

Delay in implementing needed reforms is not only a source of continued vulnerability, but also results in regulatory uncertainty, which in turns delays key business decisions in the financial sector, potentially worsening credit and market dislocation. It also fosters the proliferation of uncoordinated initiatives to directly constrain banking activity in different jurisdictions and ring-fencing of operations (Table 1.7). These various initiatives all reflect the political imperative to act on financial sector vulnerabilities, but arguably without a comprehensive consideration of the costs and benefits as well as their spillovers. Care should be taken lest these initiatives become inconsistent with the efforts to harmonize minimum global standards and thus hamper, rather than complement, the effectiveness of the G20 reform agenda.

Table 1.7. Comparing Proposals for Structural Reform

	Liikanen group report	United Kingdom	United States
Holding company with banking and trading subsidiaries	Permitted	Permitted	Not permitted
Deposit taking institution dealing as principal in securities and derivatives[1]	Not permitted (but other group companies may do so)	Not permitted (but other group companies may do so)	Not permitted
Deposit taking institution investing in hedge funds and private equity	Not permitted (but other group companies may do so)	Not permitted (but other group companies may do so)	Not permitted
Deposit taking institution providing market making services	Not permitted (but other group companies may do so)	Not permitted (but other group companies may do so)	Permitted
Deposit taking institution's non-trading exposures to other financial intermediaries	Unrestricted	Restricted	Unrestricted
Higher loss absorbency rule[2]	Yes, via leverage ratio for trading business that exceeds size threshold	Yes, as add-on to the conservation buffer for U.K. ring-fenced bank	For SIBs with substantial U.S .footprint
Size threshold for application	Yes; applies to all banks with trading books larger than €100 billion, or trading assets more than 15–25 percent of balance sheet	Yes; applies to all banks with deposits greater than £25 billion and to all building societies	No
Enacted into law	No	Scheduled for completion by 2015	Yes
Implementing regulations finalized?	No	No	No

Source: IMF staff.

[1]U.S. federal government and agency securities, debt and securities issued by U.S. state and municipal governments and government-sponsored enterprises, and derivatives on these securities are exempt from proprietary trading restrictions of the Volcker rule.

[2]The Dodd-Frank Act subjects U.S. banks with assets in excess of $50 billion to more stringent prudential requirements. Similar requirements have been proposed, under the recent Intermediate Holding Company proposal, for non-U.S. banks with more than $50 billion in global assets that have a systemically important presence in the United States.

Policymakers must therefore take decisive action to restructure weak banks and encourage the build-up of the new capital and liquidity buffers on an internationally consistent basis. The new international banking rules—Basel III—need to be implemented; and further work is needed on the too-big-to-fail problem, over-the-counter derivatives reform, accounting convergence, and shadow banking regulation. The recommendations of the Enhanced Disclosure Task Force—a private sector group formed under the auspices of the Financial Stability Board (FSB) to improve financial reporting by banks—should become a global standard embraced by banks and national authorities. Better disclosures, including higher transparency and prudent and consistent valuation of risk-weighted assets, will go a long way to improve market discipline and restore confidence in banks' balance sheets.

The capability to resolve financial institutions without severe disruption to the financial system and cost to taxpayers is critical. The FSB is promot-ing the establishment of effective resolution regimes that allow for the orderly exit of unviable banks. The IMF is advising countries—global financial centers in particular—to swiftly adopt resolution regimes, including effective cross-border agreements for handling a failure and to require a minimum amount of liabilities that can be "bailed in" during resolution. The recent joint initiative by the U.S. Federal Deposit Insurance Corporation and the Bank of England to coordinate contingency plans for winding down failing cross-border banks is welcome; other financial centers should join this initiative.

Without greater urgency towards international cooperation in agreeing a comprehensive approach to bank restructuring, the danger of deadweight bank balance sheets will weigh on recovery. And implementation of unilateral national measures may result in a situation where the net benefits accrue nationally but the costs are borne elsewhere.

From a financial stability perspective, it is important that the level and structure of compensa-

tion align incentives with prudent risk-taking and ultimately with performance. Major financial centers should adopt FSB guidelines on compensation, including deferral of remuneration, gradual vesting of commitments, and clawback arrangements.

The flow of credit to solvent small and medium-sized enterprises needs to be improved.

Lending to the SME sector in Italy and Spain is shrinking rapidly. While credit demand is constrained by heightened uncertainty over the macro outlook and debt overhangs, any supply constraints to SME financing should be addressed as a priority to ensure that the financial system is able to play its role in facilitating economic recovery. This can be supported in the short term by:

- *Easing the cost of bank lending to SMEs* in the euro area by allowing a broader set of loans to be used as collateral for ECB financing purposes, with applying more moderate haircuts. This can be facilitated through national central banks, making greater use of their capability to rate the credit quality of SME loans, and also potentially run a credit register in the absence of private alternatives. In addition, European Investment Bank or national development bank assistance can be used to guarantee trade credit or SME working capital.[57]

- *Ensuring that legal and commercial regimes for loan collection are effective.* Lenders in many countries confront serious delays in repossessing security in the event of default.[58] Policymakers should ensure that legal processes and arbitration mechanisms are available to expedite loan work-outs in an orderly fashion.

- *Ensuring that distressed assets are properly valued to facilitate their sale, restructuring, or write-off.* Supervisors need to require objective impairment recognition that gives prudential considerations

to provisioning while adhering to recognized accounting standards.

- *Reducing government payment arrears* to inject working capital directly into local economies. The backlog of unpaid government liabilities is a notable problem in Greece, Italy, and Spain–particularly at the regional and municipal levels. Spain has partially addressed the issue through a central government initiative to cut regional government payment delays, and Italy has announced a new initiative to accelerate the payment of €40 billion of general government arrears.

Greater access to capital market access by SMEs needs to be promoted.

To counteract the impact of EU bank deleveraging on SME finance, nonbank channels can be encouraged by ensuring that legal, accounting, and market infrastructures are sufficiently developed for firms and SMEs to issue commercial paper and high yield debt, and to raise equity. Authorities can bolster the confidence of nonbank investors and lenders by establishing transparent and reliable accounting standards, enhanced disclosures, a stable tax regime, and reliable court processes to expedite collateral recovery.[59]

Policymakers should also further the restoration of private securitization channels. This will require a realistic risk-based assessment of capital requirements for banks to originate and insurers to hold structured securities. Current EU proposals for capital required on structured assets under Solvency II render them effectively uneconomic for insurers to hold. Also, sufficient transparency of the underlying structures is needed to address investor and rating agency concerns. For instance, in Europe, the introduction of Prime Collateralized Securities (PCS) is a market-led initiative to assign a label to securitization issues meeting predefined best practice standards.[60] The label will be assigned only to securitizations backed by asset classes that have performed well during the recent

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[57]The United Kingdom has introduced a Funding for Lending Scheme. The aim of the scheme is to boost the incentives for banks and building societies to lend to U.K. households and nonfinancial companies.

[58]Greece, Ireland, Italy, and Portugal are examples of countries where the expected time to recover collateral is generally more than two years, compared with more reasonable time frames of two years or less in Belgium, the Netherlands, and the United Kingdom (see Fitch Ratings, 2013).

[59]For example, nonbank investors could be dissuaded from buying Italian mortgages, given the 8 to 10 years required to foreclose on a property.

[60]The PCS initiative is promoted by the Association for Financial Markets in Europe (AFME). Encouragingly, Commerzbank has recently sold a new type of covered bond backed by SME loans.

crisis and are of direct relevance to the real economy, including residential mortgages and SME loans.

Private debt overhangs need to be reduced to complement the clean-up of bank balance sheets . . .

One reason for the failure of advanced economies to respond to substantial monetary and fiscal stimulus as vigorously as hoped is that household and corporate sectors in many countries remain heavily indebted. Such overhangs need to be addressed by tackling both the stock of past debt and the flow of new financing. More effort is needed to facilitate the work out and collection of defaulted debt. Key will be strengthening lenders' ability and willingness to recognize and negotiate effective workouts, including as appropriate debt write-downs and debt-for-equity swaps.

As noted, the corporate debt overhang is particularly large in some euro area peripheral economies. This can be mitigated through the sale of foreign assets by larger firms, but further reductions in operating costs, dividends, and capital expenditures may also be required, posing additional risks to growth and market confidence. Hence, a resolution of euro area fragmentation is critical to lowering funding costs and effecting an orderly corporate deleveraging. In particular cases, the suspension of dividends may be considered as a policy option, along with loan principal reductions.

. . . and prevent credit excesses from becoming systemic.

Monetary policy in major economies is committed to continued substantial easing for several years into the current expansion. Chapter 3 argues that the unconventional policies used by the major central banks pose little risk to liquidity in the affected markets and have generally supported banks' health (though there is some evidence of a delay in balance sheet repair). That said, underwriting standards are being relaxed at a much earlier stage of the cycle than usual in some credit markets. Accordingly, systemic risks could arise sooner, from less traditional sources, and spill over from the United States to emerging market economies. Accordingly, financial regulation and supervision will need to play a proactive role in this cycle at both the macro- and

microprudential levels. Restraining a rapid rise in leverage and encouraging prudent underwriting standards will remain key objectives.

Policymakers in emerging market economies are increasingly faced with a very difficult balancing act.

The persistence of favorable financing terms available to emerging market borrowers may lay the foundation for future stability challenges. Rising corporate leverage and increased foreign exchange exposure raise an economy's vulnerability to sudden movements in interest and/or exchange rates. To a lesser extent, banks appear to be in a similar situation; they are benefiting from favorable interest rate spreads and strong capital ratios, while being potentially vulnerable to impairments in asset quality and, in some cases, shocks from informal credit channels. Policymakers must remain vigilant to guard against the buildup of financial system risks emanating from potential deterioration in banks' asset quality and disruptive short-term capital flows.

If macroeconomic policy is determined with respect to the domestic economic cycle, macroprudential policies may need to be deployed to smooth the credit cycle and prevent the excessive buildup of leverage and illiquidity. Prudential measures have been tightened in several countries throughout 2012—including China, Hong Kong SAR, and Singapore—but further fine-tuning may be needed to bolster financial stability including the imposition of limits on the growth of very rapidly expanding credit segments and constraints on banks' unhedged foreign exchange borrowing. Policymakers may also need to consider the adoption of dynamic capital buffers while robust recognition of impaired loans (in accordance with international standards) will ensure adequate write-offs of troubled loans early in the credit cycle. Countries with a high ratio of household debt to GDP, such as Korea and Malaysia, should focus on measures to keep this ratio in check. Nevertheless, since macroprudential measures may be slow or uncertain in their effects, capital flow management measures may also be needed to mitigate the build-up of risks. Cross-border coordination among countries that generate and receive large capital flows can also play an important role in mitigating the riskiness of such flows.

Annex 1.1. Corporate Debt Sustainability in Europe

In this exercise, we analyze debt sustainability in the European corporate sector defined as firms' ability to generate non-negative net free cash flows over the medium term.[61]

Macro Data on Corporate Debt

Corporate leverage is significantly higher in the euro area periphery than in other advanced economies. Central bank flow of funds data covering the entire corporate sector shows that corporate debt increased significantly across Europe during the last decade, except in Germany (see Figure 1.27, panels a and b). The increase in debt was particularly marked in the periphery, resulting in significantly higher leverage as measured by debt-to-GDP and debt-to-equity ratios (Table 1.8).

Recent Developments in Corporate Fundamentals

High frequency data for large investment-grade firms show that fundamentals of firms in the periphery continue to deteriorate relative to the core. While leverage of firms in the core has remained stable during the last decade, leverage of firms in the periphery has increased steadily (Figure 1.78, panel a). Interest coverage ratios are also significantly lower for firms in the periphery than for those in the core (Figure 1.78, panel b). Firms in the periphery have benefited to a lesser extent from monetary easing due to remaining fragmentation, while profit growth remains much weaker than during the credit boom (Figure 1.78, panel c). The implications of weaker fundamentals of large firms in the periphery are also evident in their capital expenditures, which have failed to recover. In contrast, capital expenditure growth in core companies has recovered to pre-Lehman Brothers highs, without a discernible effect from the euro area sovereign crisis (Figure 1.78, panel d).

Note: Prepared by Sergei Antoshin, Yingyuan Chen, and Jaume Puig.
[61]The medium term corresponds to the *World Economic Outlook* forecast horizon, 2013–18.

Table 1.8. Nonfinancial Corporate Debt and Leverage

		Gross Debt (percent of GDP)	Debt over Equity (percent)
Euro area	Greece	75	237
	Ireland	291	135
	Italy	115	140
	Portugal	157	154
	Spain	180	152
	Belgium	187	52
	France	157	78
	Germany	95	134
	Euro area	138	107
Rest of the world	United Kingdom	118	88
	United States	89	82
	Canada	61	48
	Japan	136	176

Source: National central banks flow of funds data.

Note: Based on Table 2.1 in the October 2012 GFSR. Cells shaded in red indicate a value in the top 25 percent of a pooled sample of all countries shown from 1990 through 2010 (or longest sample available). Green shading indicates values in the bottom 50 percent; yellow is in the 50th to 75th percentile. Gross debt figures include securities other than shares, loans, and other accounts payable. Intercompany loans and trade credit can differ significantly across countries. Consolidated debt levels are significantly lower for some countries, especially those with a strong presence of multinational companies with large intercompany loans.

Sample

Data Description

The analysis of corporate debt sustainability presented in this GFSR focuses on firm-level annual data from Worldscope. The sample from Worldscope includes about 1,500 publicly traded companies, with average coverage of 30 percent of the corporate sector by assets in the euro area and the United States (Table 1.9). Using disaggregated data allows us to uncover vulnerabilities

Table 1.9. Nonfinancial Corporate Database Coverage

	Number of Firms	Total Assets (billions of euros)	Percent of total[1]
France	193	2,293	29
Germany	191	1,873	36
Ireland	36	43	4
Italy	109	863	34
Portugal	41	132	22
Spain	92	695	21
Unted Kingdom	314	1,952	n.a.
United States	797	12,413	29

Source: Worldscope.

[1]In percent of financial and nonfinancial assets of the entire corporate sector, based on central bank flow of funds data, and staff estimates. The comparatively low percentage for Ireland reflects the large multinationals operating in the country that are not publicly listed on the Irish stock exchange.

Figure 1.78. European Investment-Grade Corporate Fundamentals

a. Gross Leverage
(Debt-to-EBITDA, four-quarter moving average)

■ Periphery ■ Other

b. Interest Coverage
(EBITDA to interest expense, four-quarter moving average)

■ Periphery ■ Other

c. Profitability
(EBITDA, year-on-year, in percent, four-quarter moving average)

— Periphery — Other

d. Capital Expenditure
(Year-on-year, in percent, four-quarter moving average)
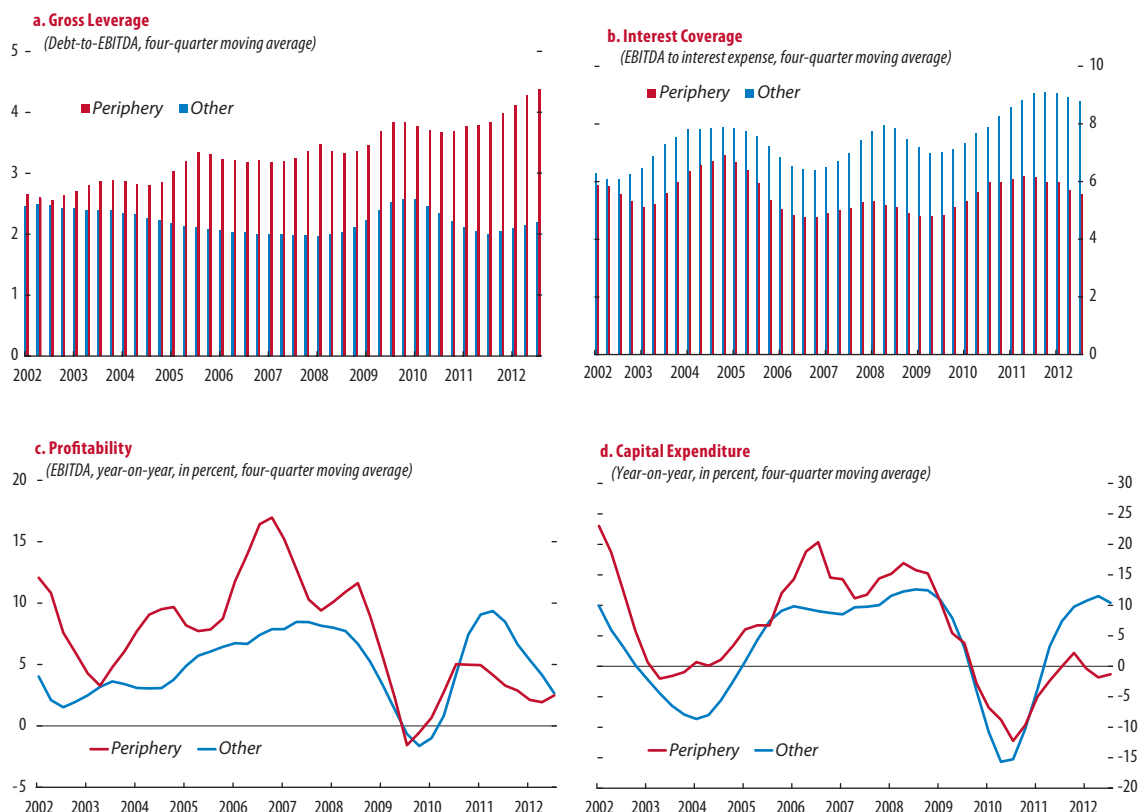
— Periphery — Other

Source: Morgan Stanley.
Note: EBITDA = earnings before interest, taxes, depreciation, and amortization. Periphery = Cyprus, Greece, Ireland, Italy, Portugal, and Spain; Other = Austria, Belgium, Denmark, Finland, France, Germany, Iceland, Luxembourg, the Netherlands, Norway, Sweden, Switzerland, and the United Kingdom.

in the weak tail of businesses beyond those evident from aggregate flow of funds data. Data limitations prevent extending the analysis on firm-level data to the entire corporate sector for all countries considered in the exercise.

The sectoral breakdown of the sample by country shows that all the major sectors, in particular indus-

trials, are well represented in each country (Table 1.10).

Main Developments in Sample Companies

Leverage of publicly traded corporations in the sample increased most significantly in Portugal and Spain during the last decade. While the increase was

Table 1.10. Corporate Sectoral Breakdown within the Sample
(In percent of assets)

	Consumer	Energy, Utilities, Materials	Industrials	IT, Telecom, Health Care
France	28	38	18	16
Germany	44	27	11	19
Ireland	32	42	19	7
Italy	17	55	17	11
Portugal	7	55	18	19
Spain	5	48	26	21
United Kingdom	14	68	10	8
United States	19	37	20	25

Figure 1.79. Developments in Publicly Listed European Companies

a. Leverage
(In percent, debt-to-assets)

France
Ireland
Portugal
Spain (construction)
Germany
Italy
Spain (excluding construction)

b. Operating Cash Flow before Interest
(In percent of assets)

France — Germany — Ireland — Italy — Portugal — Spain

c. Average Interest on Debt
(In percent)

France — Germany — Ireland — Italy — Portugal — Spain

d. Corporate Bond Yields
(In percent)

France — Germany — Ireland
Italy — Portugal — Spain

e. Rates on New Loans
(In percent)

France — Germany — Ireland
Italy — Portugal — Spain

f. Capital Expenditures
(In percent of assets)

France — Germany — Ireland
Italy — Portugal — Spain

Sources: Bloomberg L.P. (panel d); European Central Bank and Haver Analytics (panel e); and Worldscope (panels a, b, c, and f).

most marked in the construction sector in Spain, the increase in leverage was more generalized in Portugal (Figure 1.79, panel a). Publicly traded corporations now face the challenge of servicing and repaying debt in an environment of lower profitability (Figure 1.79, panel b). Large firms benefited from lower

policy rates after the Lehman crisis, but the effects on funding costs of increased fragmentation as a result of the euro area crisis started to be felt in 2011 (Figure 1.79, panel c). While the OMT helped bring down corporate bond yields and bank loan rates in late 2012 (Figure 1.79, panels d and e), these are

still higher than in the core. As highlighted by the analysis of corporate debt sustainability presented in the report, additional cuts in capital expenditures needed to restore debt repayment capacity in the weak tail of the sector could continue to pose headwinds to the recovery (Figure 1.79, panel f).

Comparison of Vulnerability Indicators for the System and the Sample

Strains in the entire corporate sector in the periphery are likely to be greater than in the sample. The vulnerability indicators shown in Table 1.8 demonstrate that leverage ratios are similar in the system and in the sample, profitability is lower in the system, and the weak tail measured by either profitability or debt at risk is greater in the system.

Framework

Corporate debt sustainability is defined as the capacity of firms to generate net free cash flows (NFCF) to at least keep the debt level stable or reduce it over the medium term (2013–18). NFCFs are operating cash flows after capital expenditures and dividends.

Net Free Cash Flow = Operating Cash Flow before Interest – Interest Expense after Taxes – Capital Expenditures – Dividends

$$\frac{\text{Net Free Cash Flow}}{\text{Assets}} = \underbrace{\frac{\text{Operating Cash Flow before Interest}}{\text{Assets}}}_{\text{(1) Operational profitability}}$$

$$- \underbrace{\frac{\text{Interest Expense after Taxes}}{\text{Debt}}}_{\text{(2) Interest Rate}} \times \underbrace{\frac{\text{Debt}}{\text{Assets}}}_{\text{(3) Leverage}} - \underbrace{\frac{\text{Capital Expenditures}}{\text{Assets}}}_{\text{(4) Investment}} - \underbrace{\frac{\text{Dividends}}{\text{Assets}}}_{\text{(5) Dividends}}$$

We focus our analysis of debt sustainability on the weak tail of firms with high starting leverage and negative projected NFCFs. If starting leverage is high and NFCF is projected to be negative over the medium term, firms would be unable to reduce leverage without taking mitigating measures to improve their cash generating capacity. We define high leverage as companies with higher than 30 percent debt-to-assets ratio, in line with current

leverage ratios in the core and pre-boom ratios in the periphery.

Scenarios and Forecasts

We project NFCFs of publicly traded firms based on World Economic Outlook (WEO) projections of GDP growth and interest rates under baseline, downside, and upside scenarios. For a sensitivity analysis, we employ a variety of other shocks that usually correspond to the maximum plausible outcomes of either corporate decisions or policy actions: such as a shift to the euro area upside scenario with significantly reduced fragmentation and productivity gains, a 25 percent cumulative cut in operating costs over the medium term due to restructuring, and a 25 percent cut in dividends or a permanent elimination of dividends in the periphery.[62]

1. Operating cash flows before interest are projected based on GDP growth under the WEO scenarios. We estimate sector- and country-specific, country-specific, and panel regressions where operating cash returns are regressed on GDP growth.

2. Interest rates are projected assuming equal shares of bank and bond financing for the sample of publicly traded companies, with one third of the debt stock assumed to be refinanced every year. Yields on corporate bonds are projected based on WEO assumptions for sovereign bond yields and on historical pass-throughs to corporate bond yields. Interest on new bank loans is projected based on market pricing of policy rate expectations; for periphery countries, gradual tightening in spreads over the policy rate is assumed based on historical pass-through from changes in sovereign spreads.

3. Leverage is kept constant as the focus of our analysis is on assessing the sustainability of current leverage levels given projected trends in profitability and interest rates.

4. Capital expenditures and dividends are also kept constant for the weak tail as the focus of our

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[62] Dividends declined 50–60 percent during the last cyclical downturn for the sample. During the current cycle, dividends have already fallen 40–50 percent, implying an additional decline of only 10 percent. Thus, the assumed permanent reduction of 25 percent in dividends since is sizable, and a suspension or a moratorium on dividends would be unprecedented.

analysis is on assessing the capacity of firms to maintain current levels of investment and retribution of equity holders.[63]

Computations of Vulnerability Indicators

The Interest Coverage Ratio

To assess the ability of businesses to service debt, the interest coverage ratios (ICR) used in Figure 1.28 are calculated for the latest data point in the sample.

$$ICR = \frac{\text{Earnings before interest, taxes, depreciation, and amortization (EBITDA)}}{\text{Interest Expense}}$$

The weak tail of corporations according to the ICR is calculated as the share of debt at firms with both the leverage ratio above 30 percent and the ICR below 1 (currently unable to service debt) and the ICR below 2 (likely unable to service debt under plausible negative shocks).[64]

The Weak Tail Based on NFCF

To assess the ability of firms to repay debt, we project NFCFs (used in Figure 1.29) over the medium term. The weak tail of publicly traded companies with limited capacity to repay debt is defined as those that have relatively high starting leverage levels—above 30 percent—and are projected to have negative NFCF over the medium term under the baseline scenario.

[63] This is a conservative assumption, as growth in capital expenditure at the aggregate level should be consistent with GDP growth projections.

[64] Rating agencies estimate that coverage ratios around 2 are broadly consistent with B ratings, which suggests about 20 percent probability of default over a five-year horizon.

Debt Overhang

The size of the debt overhang (used in Figure 1.30) can be estimated from the difference between the current leverage ratio and the "prudent" leverage ratio. The "prudent" leverage ratio is derived by setting NFCF equal to zero and working out the leverage ratio (item 3 in the formula), given projections of our variables in the NFCF formula. Different "prudent" leverage levels are calculated under baseline and downside WEO scenarios implying different medium-term projections for profitability and financing costs.

Effectively, the "prudent" leverage ratio reduces interest expense to a sufficiently low level to prevent negative NFCFs that would result in explosive debt path. Higher than "prudent" leverage levels imply that, given the projected cost of debt, firms are unable to (1) generate positive NFCFs over the medium term; (2) maintain current levels of capital expenditures to prevent negative contributions to growth; and (3) pay dividends consistent with a stable equity investor base. Firms in this situation are expected to either sell assets to repay debt, or to improve their cash flows through a combination of durable cutbacks in operating costs, capital expenditures, and/or dividends. Each of these options at the aggregate level has implications for employment, potential growth, and equity markets.

The Impact on Capital Expenditures

For the weak tail of firms with negative cash flows and high leverage, we compute the necessary reduction in capital expenditures to achieve zero NFCF and stabilize debt. To estimate the full impact (used in Figure 1.31), capital expenditures are reduced to the extent that net free cash flows reach zero or capital expenditures are fully collapsed. The partial effects on capital expenditures are calculated when other mitigating measures are used as well (cuts in operating costs, cuts in dividends). The necessary reduction in capital expenditures is estimated for the three WEO scenarios.

Annex 1.2. European Bank Deleveraging Plans: Progress So Far

Major European banks with preannounced restructuring (deleveraging) plans have made significant progress in shedding noncore and legacy assets (Figure 1.80 and Table 1.11). Most banks identified certain assets as noncore subject to run-offs, based on a combined set of criteria, including competitive advantage, profitability, and risk weights. These assets mainly included corporate and investment banking (CIB) exposures, the euro area periphery exposures, real estate loans, and legacy trading portfolios.

Note: Prepared by Nada Oulidi.

Figure 1.80. Progress in Deleveraging Plans across Sample Banks, 2012
(In percent)

- Market RWAs risk reduction: trading portfolio
- Mortgage and CRE loan reduction (U.K. and Irish exposures)
- Creation of new non-core units (run-offs): CRE/shipping/public finance loans
- U.S. dollar asset reduction
- Sale of Greek subsidiaries
- CIB assets/RWAs reduction
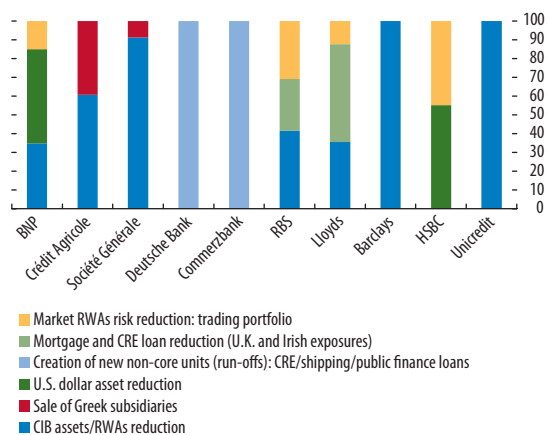
Sources: IMF staff estimates.
Note: CIB = corporate and investment banking; CRE = commercial real estate; RWAs = risk-weighted assets.

Table 1.11. Progress on Deleveraging/Restructuring Plans of Selected European Banks, as of End-2012 or Latest Available

Bank	Date[1]	Reasons	Objectives	Progress so Far
Erste Group		Compliance with Basel III	Reduce non-core assets (structured products and specific loan segments).	Completed restructuring plans through a reduction of RWAs by €2.3 bn and a reduction in loans and CDS positions.
BNP Paribas	2011	Reducing dependence on USD funding, and compliance with Basel III	Reduce USD funding needs by $65 bn, reduce CIB RWAs by $45 bn, add 100 bps of additional common equity Tier 1 to reach 9% fully loaded Basel III CET1 ratio.	Completed adaptation plan. Reduced USD funding needs by €65 billion in April 2012 through the sale of reserve-based lending activity in the U.S., trading book, and sale of loans. Reduced CIB RWAs by €45 bn through selective loan origination and disposals of assets. Reduced an additional €13 bn in RWAs through decreased market risks. Sold 29% stake in Klepierre (commercial real estate company (CRE)) and Egypt subsidiary. RWAs were reduced by approximately €70 bn in total.
Credit Agricole	2011	Reducing dependence on USD funding, and compliance with Basel III	Improve loan-to-deposit ratio, reduce liquidity needs in specialized financial services and CIB (disposal of loan portfolios in financing activities by > €7.5 bn), dispose of CDO, U.S. RMBS portfolio to reduce RWA by €17 bn, dispose of correlation book to reduce RWA by €31 bn.	Completed adjustment plan. Disposed of loan portfolios in financing activities, CDOs, U.S. RMBS, and correlation books, contributing to a reduction of €31 bn in RWAs. Signed the contract for the sale of its Greek subsidiary Emporiki to Alpha bank. Emporiki has a balance sheet of over € 20 bn. The transaction is expected to reduce RWAs by around €18 bn. Liquidity needs decreased by a total of €51 bn.
Societe Generale	2011	Reducing dependence on USD funding, and compliance with Basel III	Improve capital ratios. Reduce legacy and non investment grade assets and sell CIB loans.	Sold €36 bn in CIB and legacy assets. CIB RWAs declined by around €26 bn compared to a target of €30 bn. Completed sale agreement of Greek subsidiary Geniki (balance sheet of around € 2.5 bn), U.S. subsidiary TCW, and Egyptian subsidiary (balance sheet of €8 bn). These subsidiaries are self funded and the decision to sell them is for capital generation purposes. Scaled down origination of CRE, export finance, and shipping loans that are USD funded.
Deutsche Bank	2012	Compliance with Basel III	Reach fully loaded Basel III CT1 ratio of 8% by 2013 Q1 and 10% by 2015 Q1. Transfer €122 bn of assets (Basel III RWAS of €125 bn), mostly legacy investment banking positions, to a non-core unit of which €45 bn RWAs will be reduced before 2013 Q2.	New plan.

(continued)

Table 1.2.1. Progress on Deleveraging/Restructuring Plans of Selected European Banks, as of End-2012 or Latest Available *(continued)*

Bank	Date[1]	Reasons	Objectives	Progress so Far
Commerzbank	2009	State-aid rules	The bank announced 2 plans: the first one in 2009 aimed at winding down over time all activities in commercial real estate, shipping and public finance, running down asset backed finance and portfolio restructuring units, selling Eurohypo, and meeting the 2011 EBA capital requirement through RWA optimization. The second plan announced in September 2012 breaks down assets into core and non-core (€130 bn) and aims at winding down Eurohypo. Announced job cuts of 4,000-6,000 to meet profit targets.	Sold minority interest in Russian subsidiary and agreed to sell majority shareholdings in Ukrainian subsidiary. Decreased proportion of short-term wholesale funding and completed funding plan for the year, by mid-year.
Unicredit	2011	Compliance with Basel III	Improve funding profile (loan to funding ratio, funding gap, deposit inflows, ability to tap wholesale funding), improve capital (increase Basel III capital, comply with the 2011 EBA capital requirement, improve RWA through deleveraging and RWA optimization), refocus business in CIB and CEE (CIB run-offs to decrease RWA, new origination in CIB subject to risk adjusted capital efficiency rule, CIB focus on core activities and selective portfolio review). Ring fence 11% of June 2011 group RWAs (€48 bn) for run-off, including a CIB RWA run off portfolio of €35 bn to be completed by 2015. Reduce costs (branch network reshaping and FTE reduction, other cost control actions).	CIB RWAs were reduced by €11 bn through reductions in loans and ring-fenced portfolio. Medium-long term funding reduced by €31 bn in 2012. Funding gap declined by €42 bn due to an increase in deposits and a decline in loans. Sale of 9.1% stake in Pekao (Poland) was completed.
Santander	2011	Compliance with the 2011 EBA capital requirement	Sales of stakes in Latin American subsidiaries. In U.K., reallocate assets from mortgage to corporate loans.	Completed an IPO of up to 25% of Mexico operations in 2012 Q3, sold 4.4% stake in Santander Brasil, 100% of Columbian businesses, and 8% of Chilean unit.
BBVA	2011	Compliance with the 2011 EBA capital requirement	Increase retained earnings, RWA optimization, and balance sheet management.	Sold stake at Mexico pension fund manager for €1.74 bn.

RBS	2008	EU state-aid rules	Reduction of non-core assets from peak assets of £258 bn to £40 bn by end-2013.	Non-core asset run-down continued in 2012, declining by £36 bn. Funded non-core assets declined by £200 bn since 2008 as of December 2012. mainly through reductions in leveraged and structured finance, commercial real estate, securitizations, corporate loans and asset finance. Total funded non-core assets remaining to be sold amount to £58 bn.
HSBC		Compliance with Basel III	Sale of non-core assets in North America, improvement of capital ratios.	Sold US card and retail services business, resulting in a $26 bn fall in credit risk RWAs in 2012. There are also two significant portfolios currently being run down. Sold or agreed to sell a number of new businesses including a recent sale of $7.4 bn stake at Ping An (China's second largest insurer). U.S. RWAs reduced by a further $9 bn and market risk RWAs declined by $19 bn from reductions in positions.
Barclays	2013	Compliance with Basel III	Restructure Barclays European retail and corporate operations. Reposition Barclays European and Asian Equities and Investment Banking Division businesses. Close the Structured Capital Markets business unit. Reduce RWAs by £75 bn by 2015. Reduce operating expenditures by £1.7 bn and cut 3,700 Jobs.	New plan.
Lloyds	2008	EU state-aid rules	"Reduction of non-core assets to <£70 bn by end 2014. The non-core portfolios consist of businesses which deliver below-hurdle returns, which are outside the group's risk appetite or may be distressed, are subscale or have an unclear value proposition, or have a poor fit with the group's customer strategy.	Non core assets were reduced by €42 bn to €98.4 bn by end- 2012 and Lloyds is expecting further non-core asset reduction of at least €20 bn in 2013 with more than 50% in non-core retail assets. Most sales were in Irish exposures, CRE, and trading portfolios.

¹Date when the plan was first announced.

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A NEW LOOK AT THE ROLE OF SOVEREIGN CREDIT DEFAULT SWAPS

Summary

The debate about the usefulness of sovereign credit default swaps (SCDS) intensified with the outbreak of sovereign debt stress in the euro area. SCDS can be used to protect investors against losses on sovereign debt arising from so-called credit events such as default or debt restructuring. SCDS have become important tools in the management of credit risk, and the premiums paid for the protection offered by SCDS are commonly used as market indicators of credit risk. Although CDS that reference sovereign credits are only a small part of the sovereign debt market ($3 trillion notional SCDS outstanding at end-June 2012, compared with $50 trillion of total government debt outstanding at end-2011), their importance has been growing rapidly since 2008, especially in advanced economies.

With the growing influence of SCDS, questions have arisen about whether speculative use of SCDS contracts could be destabilizing. Such concerns have led European authorities to ban uncovered, or "naked," purchases of SCDS protection referencing European Economic Area sovereign debt obligations, that is, banning purchases in which there is no offsetting position in the underlying debt. The prohibition is based on the view that, in extreme market conditions, such short selling could push sovereign bond prices into a downward spiral, which would lead to disorderly markets and systemic risks, and hence sharply raise the issuance costs of the underlying sovereigns.

The empirical results presented in this chapter do not support many of the negative perceptions about SCDS. In particular, spreads of both SCDS and sovereign bonds reflect economic fundamentals, and other relevant market factors, in a similar fashion. Relative to bond spreads, SCDS spreads tend to reveal new information more rapidly during periods of stress, though not typically at other times. The use of SCDS as proxy hedges for other types of credit risks (notably for financial and nonfinancial corporate bonds) means that spillovers to other markets are inevitable. Whether SCDS markets propagate contagion is difficult to assess since the risks embedded in SCDS cannot be readily isolated from those in the financial system. However, SCDS markets do not appear to be more prone to high volatility than other financial markets. While there are some signs that SCDS overshoot their predicted value for vulnerable European countries during periods of stress, there is little evidence overall that such excessive increases in countries' SCDS spreads cause higher sovereign funding costs.

Overall, the evidence here does not support the need to ban purchases of naked SCDS protection. Such bans may reduce SCDS market liquidity to the point where these instruments are less effective as hedges and less useful as indicators of market-implied credit risk. In fact, in the wake of the European ban, SCDS market liquidity already seems to be tailing off, although the effects of the ban are hard to distinguish from the influence of other events that have reduced perceived sovereign credit risk. In any case, concerns about spillovers and contagion effects from SCDS markets could be more effectively dealt with by mitigating any detrimental outcomes from the underlying interlinkages and opaque information. Hence, efforts to lower risks in the over-the-counter derivatives market, such as mandating better disclosure, encouraging central clearing, and requiring the posting of appropriate collateral, would likely alleviate most SCDS concerns.

The impact of sovereign credit default swaps (SCDS) on the stability of financial markets is the subject of heated debate. SCDS are analogous to insurance: in exchange for a fee paid to the seller, they provide protection to buyers from losses that may be incurred on sovereign debt resulting from a "credit event." Credit events include failure to pay interest or principal on, and restructuring of, one or more obligations issued by the sovereign.[1] Many view these swaps as useful market-based risk indicators and valuable hedging instruments. Others consider them to be speculative tools—suggesting their prices do not reflect underlying fundamentals or actual risks and they can therefore unduly raise funding costs for governments, threatening fiscal sustainability and exacerbating market tensions.

Evaluating these contrasting positions requires a clear exposition of the issues and empirical evidence. Sovereign debt and rollover requirements remain large in a number of key countries (see the April 2013 *World Economic Outlook*), and elevated sovereign risk in many advanced economies is likely to drive up the demand for hedging instruments (see Chapter 3 in the April 2012 GFSR). Investors who require appropriate instruments to manage sovereign risk as well as sovereign debt issuers themselves increasingly need to know whether SCDS markets can accommodate hedging needs efficiently while providing reliable information.

This chapter aims to guide the regulatory and policy discussion regarding the usefulness and financial stability implications of SCDS by focusing on some key questions:

- Are SCDS spreads as good as credit spreads derived from government bonds in reflecting the macroeconomic fundamentals that characterize sovereign risk?[2]
- Are SCDS markets as efficient as sovereign cash bond markets in rapidly pricing-in new information?
- Are SCDS markets more likely than other financial markets to be destabilizing?

Overall, we find that SCDS spreads provide indications of sovereign credit risk that reflect the same economic fundamentals and market conditions as the underlying bonds, with little indication that they raise sovereign funding costs. Hence, SCDS can provide a useful hedge to offset sovereign credit risk and can thereby enhance financial stability. In terms of their performance as market indicators relative to bond spreads, SCDS tend to adjust more rapidly to new information during periods of stress, though not typically at other times. For a few countries, we find some evidence that, during the latest period of stress, SCDS spreads moved more than would normally be expected. SCDS can propagate risks and exacerbate systemic events due to their linkages with other markets; but so, too, can other financial assets, which makes it difficult to isolate their independent influences. Finally, as regards policy, the results do not justify the recent ban imposed in Europe on uncovered purchases of SCDS, as it may result in unintended consequences that could negatively affect market liquidity and cause dislocations in other markets. The regulatory reforms underway for over-the-counter (OTC) derivatives generally represent a better avenue to countering any deleterious effects of SCDS markets.

In the remainder of the chapter, we discuss the structure of SCDS markets; provide empirical evidence regarding the main questions; examine key regulatory issues, focusing on bans on uncovered purchases of SCDS protection; and summarize and provide policy recommendations.

Note: This chapter was written by Brenda González-Hermosillo (team leader), Ken Chikada, John Kiff, Hiroko Oura, and Nico Valckx, with contributions from Jorge A. Chan-Lau, Dale Gray, and Heiko Hesse. Research support was provided by Yoon Sook Kim.

[1]Restructuring events include interest or principal reductions and postponements, subordination of creditor rights, and redenominations into a nonpermitted currency, and are binding on all holders of the restructured obligations. Permitted currencies are euros or the legal tender of a G7 country or currency issued by a member country of the Organization for Economic Cooperation and Development (OECD) rated AAA/Aaa by Fitch, Moody's, or Standard and Poor's.

[2]An SCDS spread is the effective annual cost of the protection it provides against a credit event, expressed as a percent of the notional amount of protection. A credit spread on a government bond is the difference between its yield to maturity and that of an otherwise similar "riskless" benchmark fixed-income instrument.

Overview of CDS Markets: The Rise of SCDS

SCDS developed in response to the need to use flexible instruments to hedge and trade sovereign credit risks.[3] Three main purposes are:

- *Hedging.* Owners of sovereign debt buy SCDS to protect themselves against losses arising from a default or other credit event affecting the value of the underlying debt. SCDS are also used widely in so-called proxy hedging, that is, to hedge risks of other assets (such as those of domestic banks or utility companies) whose value is correlated with the creditworthiness of the sovereign.[4]

- *Speculating.* SCDS contracts can be used to buy (or sell) protection on a naked basis—that is, without an offsetting position in the underlying reference assets—to express a negative (or positive) opinion about the credit outlook of the issuer of the underlying bonds. Hence, although SCDS and other CDS are often called "default insurance," they clearly differ from traditional insurance in that the purchasers need not own or have a financial interest in the reference asset. Expressing an opinion about prospective changes in the creditworthiness of a sovereign entity can be executed using other markets (e.g., interest rate futures, cash bond markets, and other derivatives), but they reflect other types of risks in addition to sovereign credit risk.

- *Basis trading.* SCDS are used to profit from pricing differences between SCDS and the underlying debt obligations by taking offsetting positions in the two ("basis trading"). This strategy is based on the principle that CDS can be used to replicate the cash flows of underlying obligations. In this regard, when CDS spreads are narrower than the credit spreads of the underlying debt (i.e., the "basis" is negative), arbitragers may be able to profitably buy the obligations and buy CDS protection—and vice versa if the basis is positive. In theory, the basis should always be close to zero as a result of this arbitrage activity, but in practice there are various costs and frictions that can alter

[3]Annex 2.1 provides a primer on the SCDS market.
[4]For example, an investor can mitigate the market risk of a corporate equity holding if it has a high negative correlation with SCDS spreads referencing the debt of the country in which the firm is domiciled.

Figure 2.1. Credit Default Swap (CDS) Contracts, Gross Notional Amounts Outstanding
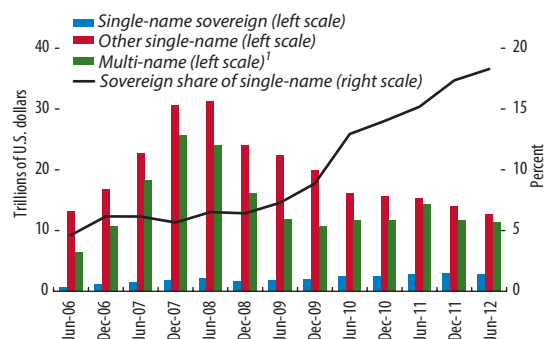
Sources: Bank for International Settlements; and IMF staff calculations.
[1]A contract with a reference entity that is more than one name, as in portfolio or basket CDS or CDS indices.

the profitability of these transactions (Annexes 2.1 and 2.2).

SCDS are a small but rapidly growing part of the CDS market, which began in earnest in the early 2000s.[5] Initially, some avenues for hedging or trading the credit risk of sovereigns were provided by Brady bond futures contracts (for three countries—Argentina, Brazil, and Mexico) on the Chicago Mercantile Exchange (CME).[6] Some argue that the rise of SCDS probably contributed to the demise of these contracts in October 2001 by providing a superior and more flexible hedging alternative (Skinner and Nuri, 2007). By end-June 2012, the gross notional amount of SCDS outstanding was about $3 trillion, versus $27 trillion in CDS as a whole (Figure 2.1).[7] However, the size of the SCDS market has increased noticeably since 2008, while other CDS markets have fallen off. The post-2008 surge likely relates to the need to hedge derivative counterparty credit risk exposure that had to be more fully disclosed under new accounting rules that came into effect in 2006 (see below). Table 2.1 shows the ranking of selected CDS reference

[5]The Bank for International Settlements (BIS) did not begin collecting comprehensive CDS statistics until 2004. The CDS market was purported to have begun in the early 1990s, initially on corporate debt.
[6]Brady bonds were sovereign bonds that had been exchanged for previously defaulted bank loans to those sovereigns and which had partial collateral in the form of set-aside foreign reserves or guarantees.
[7]Based on latest available data, released in November 2012 (BIS, 2012).

Table 2.1. Rankings of CDS Amounts Outstanding
(In billions of U.S. dollars)

Gross Notional Amounts Outstanding

Rank		End-2008	Rank		End-2010	Rank		End-2012
Top 10			**Top 10**			**Top 10**		
1	Turkey	165	1	Italy	267	1	Italy	388
2	Italy	158	2	Brazil	160	2	Spain	212
3	Brazil	126	3	Turkey	135	3	France	177
4	Russia	98	4	Spain	132	4	Brazil	156
5	Morgan Stanley	79	5	Mexico	111	5	Germany	154
6	Goldman Sachs	76	6	Russia	96	6	Turkey	137
7	Mexico	74	7	GE Capital	96	7	Mexico	117
8	GE Capital	74	8	Germany	80	8	Russia	109
9	GMAC	74	9	Bank of America	80	9	Korea	85
10	Merrill Lynch	72	10	JPMorgan Chase	80	10	Japan	79
Below Top 10			**Below Top 10**			**Below Top 10**		
14	Spain	67	12	Greece	77	14	Portugal	71
48	Greece	37	14	Portugal	69	15	United Kingdom	71
150	Portugal	26	24	United Kingdom	61	30	Ireland	51
262	Ireland	18	44	Ireland	46	124	United States	23
377	United Kingdom	14	50	Japan	41			
592	Japan	7	291	United States	16			
740	United States	5						

Net Notional Amounts Outstanding

Rank		End-2008	Rank		End-2010	Rank		End-2012
Top 10			**Top 10**			**Top 10**		
1	Italy	18	1	Italy	26	1	Italy	21
2	Spain	14	2	France	18	2	Brazil	17
3	GE Capital	12	3	Spain	17	3	France	16
4	Brazil	10	4	Brazil	15	4	Germany	15
5	Germany	10	5	Germany	15	5	Spain	13
6	Deutsche Bank	9	6	GE Capital	12	6	Japan	10
7	Greece	7	7	United Kingdom	12	7	GE Capital	9
8	Morgan Stanley	7	8	Portugal	8	8	Mexico	8
9	Russia	6	9	Mexico	8	9	United Kingdom	8
10	Goldman Sachs	6	10	Austria	7	10	China	8
Below Top 10			**Below Top 10**			**Below Top 10**		
13	Portugal	5	11	Greece	6	12	Turkey	7
16	Turkey	5	12	Turkey	6	15	Russia	5
20	Ireland	5	13	Japan	6	20	Portugal	4
25	Mexico	4	27	Ireland	4	26	United States	3
92	United Kingdom	3	28	Russia	4			
222	Japan	2	40	United States	3			
322	United States	1						

Sources: Depository Trust and Clearing Corporation (DTCC); and IMF staff calculations.

Note: CDS = credit default swaps. Shaded cells indicate advanced (⬛) and emerging market (⬛) economies' sovereign CDS.

[1]DTCC reports only the top 1000 CDS names; outstanding amounts for Greek sovereign CDS are no longer reported.

entities since 2008, illustrating the increasing role of SCDS. However, SCDS remain a small fraction of total government debt outstanding ($50 trillion at end-2011).[8]

[8]Total government debt outstanding (IMF, World Economic Outlook database) is an aggregate of the general government debt of 55 countries that had SCDS notional amounts outstanding in the Depository Trust and Clearing Corporation trade repository database.

Before the global financial crisis, the SCDS market consisted largely of contracts on sovereigns of emerging market economies because investors viewed those issuers as having higher and more variable credit risk. However, since end-2009, the deterioration in the perceived safety of the sovereign debt of advanced economies and rising hedging demands have boosted activity in SCDS referencing

those economies.[9] Such activity rose first for SCDS referencing the euro area periphery countries, then the core (particularly Germany), and then Japan and the United Kingdom, with some of the countries serving as proxy hedges or as safe haven trades (Table 2.1). Nonetheless, as of end-2011, trading in SCDS (gross notional amounts outstanding) tended to be a larger proportion of the underlying government debt for emerging market economies (19 percent) than for advanced economies (3 percent).

Gross notional amounts provide a convenient measure of market size, but net notional amounts (after subtracting the value of the collateral posted) represent the maximum economic transfer if a credit event transpires. The net notional amount represents a counterparty's nominal amount of credit risk exposure to a particular entity at any given time, considering offsetting transactions.[10] Gross notionals far exceed net notionals because of the market practice of reducing or reversing positions by using offsetting transactions rather than by terminating contracts or transferring them to other parties. However, gross notional amounts outstanding are also useful in gauging the risk arising from interconnections among the contract holders ("counterparty risk"), particularly during periods of stress, since the entire value of all the contracts associated with a given counterparty would be at risk if that counterparty failed.

Dealer banks (global systemically important financial institutions or G-SIFIs) dominate the buy and sell sides of the SCDS markets largely because of their market-making activities and risk management of their exposures to sovereigns. A high level of market concentration could potentially lead to market dysfunction when the dominant dealers are under stress.[11] Dealer banks are exposed to sovereigns because of their direct holdings of sovereign debt as well as the counterparty credit risk associated with

their derivatives trades with sovereigns, the effective values of which they have been obliged to disclose since 2006.[12] Sovereigns traditionally have not agreed to post collateral to cover the mark-to-market risks of their OTC positions in interest rate and cross-currency swaps and other derivatives; therefore, dealer banks have credit exposures on these OTC contracts when sovereigns owe money on them. SCDS can therefore provide dealer banks with a convenient hedge. The amount of SCDS trading by dealer banks that facilitates transactions compared with the amount for hedging their own sovereign risk is not discernible from existing data.[13] Non-dealer banks and securities firms are the next most important group of buyers and sellers of SCDS protection, followed by hedge funds, but the SCDS activity of all these is much smaller than that of dealer banks (BIS, 2012).

A given type of institution has no consistent role as either buyer or seller of SCDS protection. Subtracting notional amounts outstanding sold from notional amounts bought by the dealer banks provides a rough measure of the positions for their counterparties. On this basis, other banks and securities firms have been net sellers of SCDS protection, thereby taking credit risk and earning premiums (Figure 2.2). Many of these banks also own sovereign debt and are hence "doubling up" on this type of credit exposure. Hedge funds have been prominent net buyers of SCDS protection since 2010, but they were sellers before then. It is not possible to discern from publicly available data whether the protection is meant to cover risks of existing debt holdings or are uncovered (naked) to profit from expected spread widening. Moreover, hedge fund prominence appears larger in SCDS than in other CDS holdings. The use of SCDS by other investors, including nonfinancial institutions, appears much more limited, although anecdotal evidence suggests that some large asset

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[9]The perceived safety of sovereign debt of advanced economies is discussed in Chapter 3.

[10]An even better metric would include the risk mitigation impact of any collateral posted, but these data are unavailable.

[11]Fitch Ratings (2011) reports that the top 10 U.S. and European financial institutions constitute about 80 percent of all CDS trade counterparties. However, the 2011 EU Capital Exercise conducted by the European Banking Authority indicates that exposures of large European banks to SCDS (protection sales) are minuscule when compared with their exposures to sovereign debt.

[12]The International Accounting Standards Board IAS 39 and, in the United States, the Financial Accounting Standards Board FAS 157 phased in a mandate (between 2006 and 2007) for fuller disclosure of counterparty credit risk, in the form of "credit value adjustments" (CVAs).

[13]The prominence of outstanding SCDS referencing Italy may reflect dealers' hedging their counterparty risk associated with large uncollateralized OTC interest rate and cross-currency swap transactions with the government of Italy.

Figure 2.2. Nondealer Buyers and Sellers of Credit Default Swap Protection: Net Positions by Counterparty
(In percent)
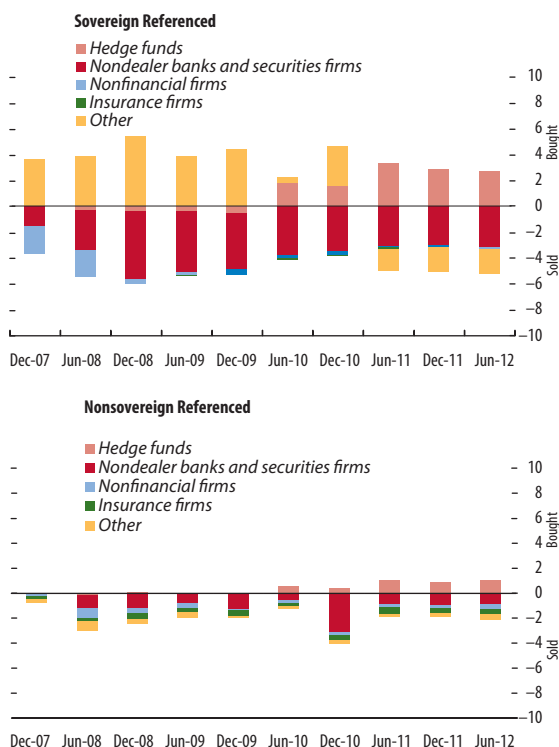
Sources: Bank for International Settlements; and IMF staff calculations.
Note: For a detailed definition of dealer banks, see BIS (2012). "Other" comprises financial institutions such as mutual funds and central counterparties. Net positions are calculated as (notional amounts bought minus notional amounts sold)/(gross notional amounts outstanding), where gross notional amounts outstanding is calculated as an average of total notional amounts bought and sold. By construction of the statistics, net position for dealer banks is close to zero.

managers (including some mutual funds) are active participants.[14]

Measures of market liquidity in the SCDS market indicate the following:

- According to data from the Depository Trust and Clearing Corporation (DTCC), SCDS transactions volumes vary widely by reference entity and tend to be concentrated in contracts referencing larger emerging market economies and economies experiencing financial stress.

[14]A survey by the IMF (see Chapter 2 of the September 2011 GFSR) also found that the use of CDS by most long-term institutional investors (mainly pension funds and asset managers) was considerably less than their use of other derivatives products, such as futures contracts and interest rate swaps.

- During 2010 and 2012, on average, the number of trades was larger in high-stress periods, when SCDS spreads were relatively elevated.
- In general, market liquidity in SCDS (proxied by narrow bid-ask spreads) has been higher for those referencing emerging market economies than for those referencing advanced economies; the difference probably reflects the fact that the SCDS market was largely represented by emerging market sovereigns before the crisis. However, liquidity for SCDS referencing advanced economies began improving after 2008 with higher volumes (Figure 2.3).

What Drives SCDS Spreads and How Do They Relate to Other Markets?

Some view SCDS markets, especially relative to underlying bond markets, as more prone to specula-

Figure 2.3. Liquidity Indicators in the Sovereign Credit Default Swaps (SCDS) Market
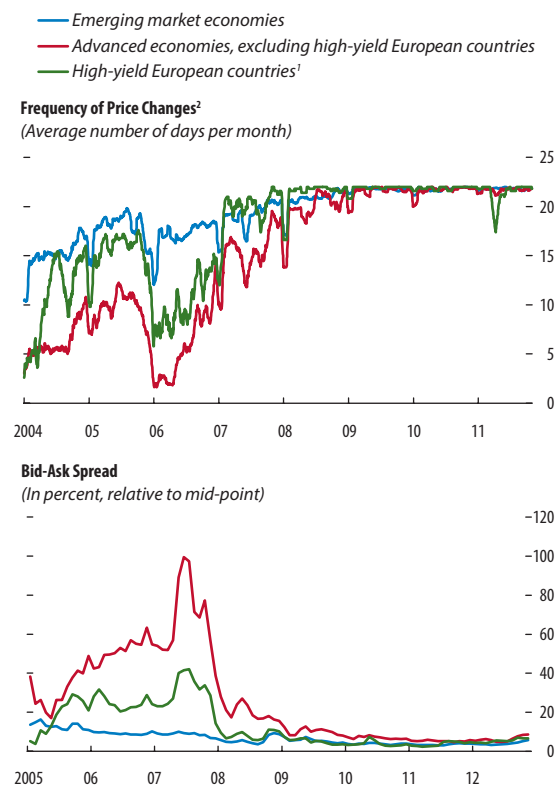
Sources: Bloomberg, L.P.; and IMF staff calculations.
Note: See Table 2.3 for the list of countries.
[1]Greece, Ireland, Italy, Portugal, and Spain.
[2]Number of days per month on which the SCDS price changed from the previous day, averaged across countries.

tion and opacity and disassociated from economic fundamentals. These views are given plausibility, for instance, by seemingly excessive volatilities of SCDS spreads relative to spreads in government bond markets in some countries (Figure 2.4).[15]

We examine these views by analyzing the drivers of SCDS spreads relative to those influencing government bond spreads, by investigating the dynamic relationships between the two, and by assessing the prognosis for contagious linkages to other markets.[16] Presumably, both SCDS spreads and bond spreads respond to economic fundamentals, market microstructure factors, and global financial market factors (see Annex 2.2 and Tables 2.3 and 2.4 therein for a description of the sample countries, framework, results, variables, and sources).[17] If SCDS spreads indeed indicate that SCDS are more speculative than government bonds, we might find that SCDS spreads are not explained by economic fundamentals to the same extent as government bonds and that they are instead driven more by financial market factors than are bonds.[18]

Determinants of Spreads on SCDS and Government Bonds

The fundamental economic factors that drive spreads for SCDS and government bonds are gener-

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[15]The large spike shown for Japan in the bottom panel of Figure 2.4 is largely driven by the unusually low volatility in its sovereign bond market, as yields have been close to zero for an extended period of time.

[16]SCDS spreads and bond spreads represent appropriate measures for comparing SCDS and government bonds. For advanced economies, bond spreads are constructed as bond yields minus the interest swap rate (i.e., fixed rate for floating LIBOR rate); for individual emerging market economies, they are the EMBI spreads. Use of these measures is motivated by arbitrage trading actually undertaken in markets that identically match the cash flows of the two sides of the trade (see Figure 2.13, in Annex 2.1).

[17]Credit ratings were not included in the list of independent variables because they reflect fundamental factors (see Chapter 3 of the October 2010 GFSR), and adding credit ratings to other fundamental variables is likely to cause multicollinearity problems (see Hartelius, Kashiwase, and Kodres, 2008). Moreover, rating agencies have started to use SCDS spreads when they determine their own ratings, introducing reverse causality from SCDS spreads to ratings.

[18]The wide range of countries used here distinguishes this study from earlier ones that focus on emerging market economies and from more recent ones whose data primarily focus on advanced euro area economies (Table 2.3).

Figure 2.4. Volatility of Sovereign Credit Default Swap (SCDS) Spreads and Sovereign Bond Spreads
(Standard deviation 2008-12)
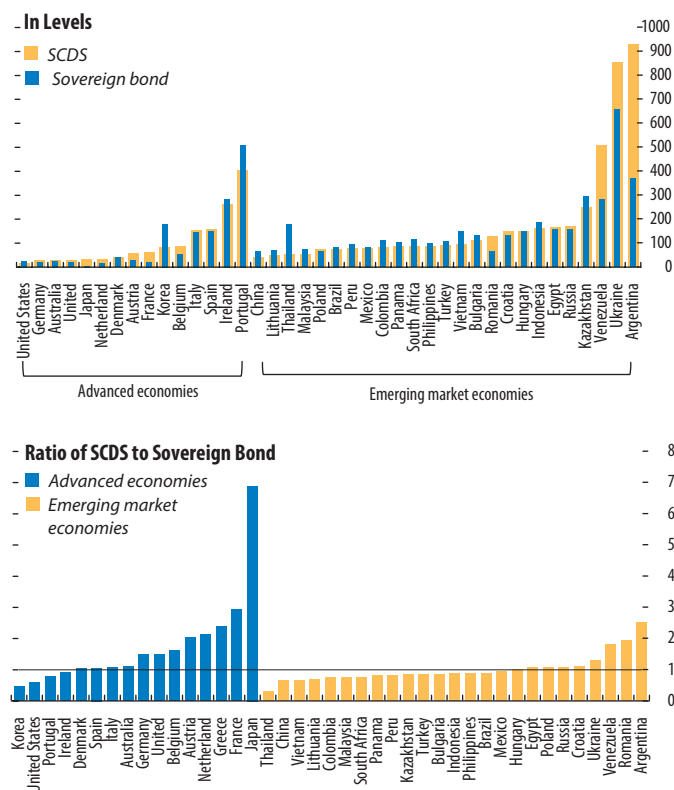
Sources: Bloomberg L.P.; and IMF staff calculations.
Note: For sovereign bond spreads, JPMorgan Asia credit indices are used for Korea and Thailand; EMBI Global indices are used for other emerging market economies; and Bloomberg L.P.'s constant maturity yields minus swap spreads are used for other advanced economies. See Table 2.4 for the definition of SCDS and bond spreads.

ally the same, suggesting that both types of instrument reflect sovereign risk according to the empirical evidence provided in Figure 2.5, and in Table 2.5 in Annex 2.2:[19]

• Government debt, GDP growth, and, to a lesser extent, foreign reserves are significant economic factors for spreads for both instruments, and the magnitudes of the effects for SCDS and government bonds are comparable.

• There is some evidence that a weaker financial sector (proxied by lower bank returns on assets) adds to sovereign risk in both SCDS and government bond

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[19]Broadly similar results are obtained for groups of advanced and emerging market economies estimated separately, and for differences rather than levels.

Figure 2.5. Determinants of Sovereign Credit Default Swap (SCDS) Spreads and Bond Spreads, October 2008–September 2012
(Relative sizes of factors)
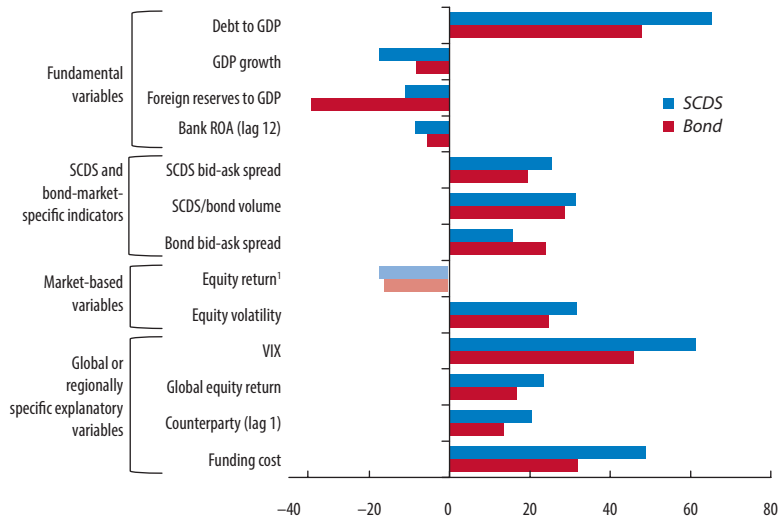
Source: IMF staff estimates.
Note: ROA = return on assets; VIX = implied volatility on S&P 500 index options. For explanation of the variables, see Table 2.4. Relative sizes computed as coefficients from full country panel estimation multiplied by one standard deviation of each explanatory variable (averaged across countries). Results based on Table 2.5. Relative size is significant at the 90 percent confidence level or greater, except as noted.
[1]Not statistically significant .

markets, especially during periods of stress.[20] Box 2.1 illustrates how the connection between sovereigns and the financial sector can run in both directions.

Market microstructure characteristics are also influential in both markets:
- Larger bid-ask spreads for SCDS and government bonds (i.e., lower liquidity) are associated with higher levels of spreads for both SCDS and government bonds. This could happen if liquidity in the markets for SCDS and government bonds is correlated,[21] or if this measure reflects some elements of underlying sovereign credit risk common to both SCDS and government bonds.[22]

- Larger SCDS trading volume (relative to government bonds) is associated with higher spreads for SCDS and their reference bonds. This could imply that trading volume surges when the need to hedge or the desire to speculate is higher because of higher credit risks. In most markets, improvements in liquidity with larger volumes are associated with lower CDS spreads.[23]

The relationship with variables representing general financial market conditions is also similar across the SCDS and government bond markets:
- There is evidence that SCDS are more sensitive than government bonds with respect to market risk factors, although the difference between the two is not statistically significant, especially in terms of the VIX and funding costs.

[20]This is in line with Diekman and Plank (2012), who emphasize the role of risk transfer from the financial sector to sovereigns for SCDS pricing.
[21]Calice, Chen, and Williams (2013) find similar effects, which they interpreted as liquidity spillovers between CDS and bond markets.
[22]Supplemental analysis confirms that SCDS and government bond bid-ask spreads increase when perceived sovereign risk (lagged SCDS or bond spread) rises.

[23]Supplemental analysis confirms that SCDS volumes relative to government bonds outstanding increase when perceived sovereign risk (lagged SCDS or government bond spreads) rises.

Box 2.1. Interconnectedness between Sovereigns and Financial Institutions

A network analysis performed in a contingent claims analysis framework shows how SCDS and sovereign credit risk endanger financial stability via two-way risk transmission between sovereigns and financial institutions.

Risks can be transmitted in both directions between sovereigns and financial institutions through several well-known channels. Banks are exposed to sovereign risks through their holdings of sovereign bonds and through the influence of the sovereign's funding costs on their own funding costs. In the other direction, explicit and implicit government guarantees and potential fiscal costs of recapitalization transmit bank risk to the sovereign. Such two-way feedback between the sovereign and financial institutions can create a destabilizing spiral if risks arise in one or the other.

Strong evidence supports the claim that implicit and explicit government backing for banks depresses bank CDS spreads to levels below where they would be in the absence of government support. Bank creditors are thus beneficiaries of implicit and explicit government guarantees, but equity holders are not. Contingent claims analysis (CCA), which uses bank equity market information together with balance sheet data, can estimate credit risk indicators and infer a fair-value CDS spread (FVCDS) for financial institutions.[1] The FVCDS is an estimate of the spread without implicit or explicit government support and thus identifies its effect.

The extent to which sovereign risk is linked to banks varies across countries, with correspondingly varied implications for financial stability and the effective use of proxy hedging of sovereign risk with bank CDS. The average bank CDS tracked the SCDS in the periphery euro area countries from 2007 to 2012 (Figure 2.1.1). During the earlier part of the crisis, in 2008–09, observed bank CDS spreads were somewhat lower than FVCDS because of the depressing effect of implicit and explicit

government guarantees on observed CDS, especially during times of stress. After 2010, however, bank FVCDS remained lower than both the observed bank CDS and SCDS as high sovereign spreads spilled over, increasing bank CDS. For banks in countries with low sovereign spreads, such as core euro area countries, the ratio of bank FVCDS to sovereign spreads was around 20 times sovereign CDS in 2008–09, declining to 10 in 2010–11, showing a decrease in the implicit guarantees and less integration between sovereign and bank risks.[2] If the ban on naked SCDS protection encourages market participants to use bank-referenced CDS as a proxy for SCDS, hedges may be less effective in countries where the correlations between the sovereign and the bank are likely to be lower (as seen in the core euro area countries).

By integrating network models using CCA risk indicators between sovereigns and selected types of financial institutions (banks and insurance companies), we can gauge how, when, and how

[2]Similarly, SCDS may be affected by explicit and implicit support from international institutions or by special purpose vehicles guaranteeing sovereign debt, such as the European Financial Stability Facility, but quantifying the impact is not yet possible.

Figure 2.1.1. Measures of Sovereign Credit Risk for Euro Area Periphery Countries
(In basis points, average, five-year spreads)
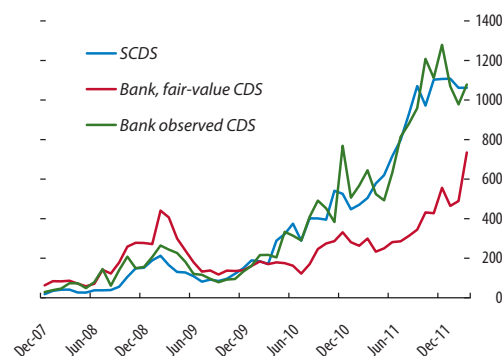
Sources: Bloomberg L.P.; Moody's Analytics; and IMF staff estimates.
Note: CDS = credit default swap; SCDS = sovereign credit default swap. Euro area periphery countries are Greece, Ireland, Italy, Portugal, and Spain.

Note: Prepared by Dale Gray.
[1]The FVCDS are calculated and reported by Moody's Analytics (2011) using CCA. See related work: the April 2009 GFSR (Chapter 3); Gray and Jobst (2011); Schweikhard and Tsesmelidakis (2012); and Billio and others (2012, and forthcoming).

Box 2.1 *(continued)*

strongly sovereign risks are transmitted to financial institutions and vice versa.[3] An examination of 17 sovereigns (15 in the EU plus the United States and Japan), 63 banks, and 39 insurance companies shows that from 2003 to 2005 the proportion of significant connections to sovereigns from financial institutions was greater, whereas the reverse (connections *from* sovereigns to institutions) was dominant from mid-2009 to 2012 (Figure 2.1.2). Significant connections are those at a 99 percent confidence level or higher using a Granger causality test. This suggests that risks embedded in SCDS cannot be readily isolated from the risk of the financial system and that a holistic approach to both sectors is required.

[3]Network models using correlation and Granger causality relationships are based on the approach described in Billio and others (2012). The indicators used are expected loss ratios derived from sovereign SCDS and from bank and insurance FVCDS (see Billio and others, forthcoming).

Figure 2.1.2. Interconnectivity Measures: Financial Institutions, to and from Sovereigns
(In percent, monthly average over three-year rolling window)
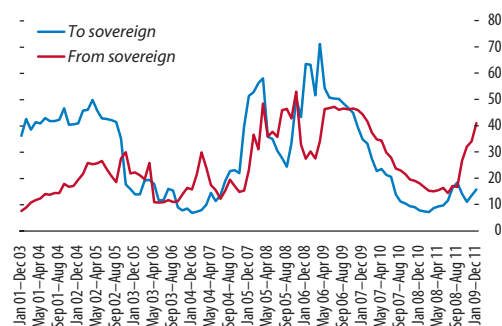
Source: Billio and others (2012).
Note: Interconnectivity measures based on 17 sovereigns, 63 banks, and 39 insurance companies. Percent of significant connections to sovereigns from financial firms and from financial firms to sovereigns.

Looking specifically at periods of stress (see inter-action terms in Table 2.5), there is some evidence that the SCDS and government bond markets react to different economic fundamentals and microstructure proxies, but mostly in the same direction as during the nonstress periods.[24]

Which Market Leads: SCDS or Government Bonds?

We also examine whether SCDS or government bonds adjust relatively faster to new information by analyzing lead-lag relationships between SCDS spreads and government bond spreads.[25] Thus, the price leadership of SCDS would be superior if SCDS markets are faster than government bond markets at eliminating pricing differences from the long-run equilibrium relation between SCDS

spreads and government bond spreads. Specifically, SCDS markets are relatively faster in incorporating new information when the Hasbrouck statistic is greater than 0.5, and bond markets are faster if the statistic is less than 0.5.[26]

Using this definition, our analysis shows that the information value of SCDS has become more important but varies across countries and over time.[27] Across countries, SCDS incorporate information faster as SCDS liquidity increases (Figure 2.6), as one would expect in well-functioning, efficient markets. Over time, the degree of price leadership is quite volatile. That said, a few observations are worth noting:

- SCDS markets processed information faster in emerging market economies in the early crisis

[24]The periods of stress are determined by a Markov switching model technique that detects when the VIX (the implied volatility of the S&P 500 index options) is in the highest one-third of the volatility distribution (see González-Hermosillo and Hesse, 2011).

[25]The literature refers to this as "price discovery" power, to denote the relative information value of the market in question.

[26]Hasbrouck (1995) and Gonzalo and Granger (1995) quantified how fast various related markets adjust to a new equilibrium, and the measures used in each paper are closely related. In practice, the results in the two papers are very similar and therefore only the statistic from Hasbrouck is reported here.

[27]This is in line with the literature on price discovery. See, for example, Augustin (2012).

Figure 2.6. Sovereign Credit Default Swap (SCDS) Price Leadership and Liquidity, March 2009–September 2012
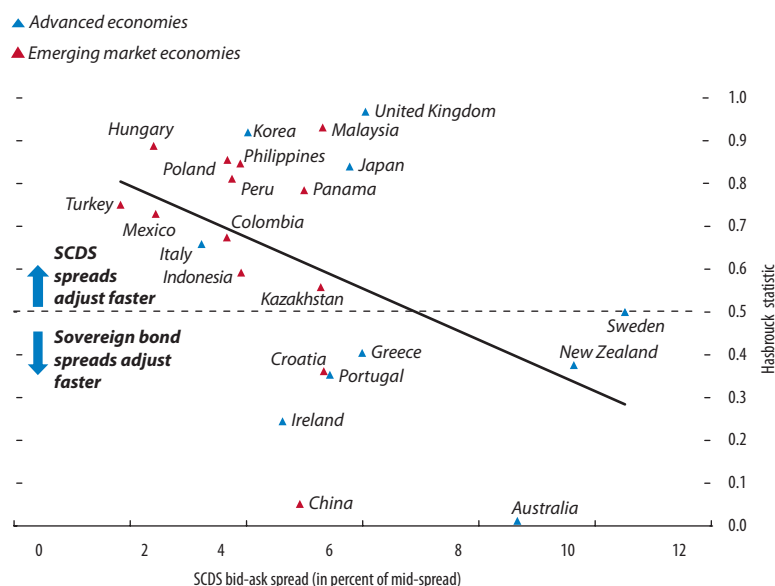
Sources: Bloomberg L.P.; and IMF staff estimates.

Note: Hasbrouck statistic shows whether SCDS or sovereign bond markets move faster to incorporate news: when the statistic is higher than 0.5, SCDS lead the price discovery process; otherwise bonds lead. Statistics are estimated at the country level using a vector error correction model.

period (2006–08) and then again in the most recent period (Figure 2.7).[28]

- In advanced economies, SCDS seemed to move faster than bonds around crisis times.
- Euro area countries show patterns that are broadly similar to those of other EU countries, including a notable decline in the power of SCDS price leadership since mid-2011. This could reflect the market's anticipation of plans for banning naked short SCDS sales in the EU, or central bank interventions in the sovereign bond markets, or simply the dissipation of any informational processing advantage for the SCDS market.[29]

[28]Because activity in SCDS markets in advanced economies began in earnest only in the current crisis, comparisons across advanced and emerging market economies during earlier periods is not possible.

[29]See the section below on effects of regulations and policy initiatives, and Box 2.2.

Are SCDS Markets More Prone To Be Destabilizing than Other Markets?

Concerns about excessive SCDS volatility and contagion across countries partly underpin policies attempting to limit SCDS trading (discussed in the next section). Hence, it is useful to examine measures that identify spillovers and those that might suggest SCDS move more than warranted using known explanatory factors. Also useful is an examination about whether such overshooting raises the borrowing costs of the underlying sovereign issuer.

Indeed, there is evidence of significant co-movement of SCDS spread volatilities across some countries in the euro area, especially during periods of stress. The effect can be seen by determining the residual volatility of SCDS spreads of selected euro area countries (i.e., the volatility for each country not explained by factors specific to that country) and then decomposing that residual into common market factors (VIX and TED spread) and the spillover effects from the SCDS volatility of other euro area countries (Figure 2.8). For Germany,

Figure 2.7. Time-Varying Price Leadership Measures of Sovereign Credit Default Swaps (SCDS)
(Hasbrouck statistic)

Advanced and Emerging Market Economies

— Advanced economies
— Emerging market economies

European Union

— Euro area
— Non-euro area
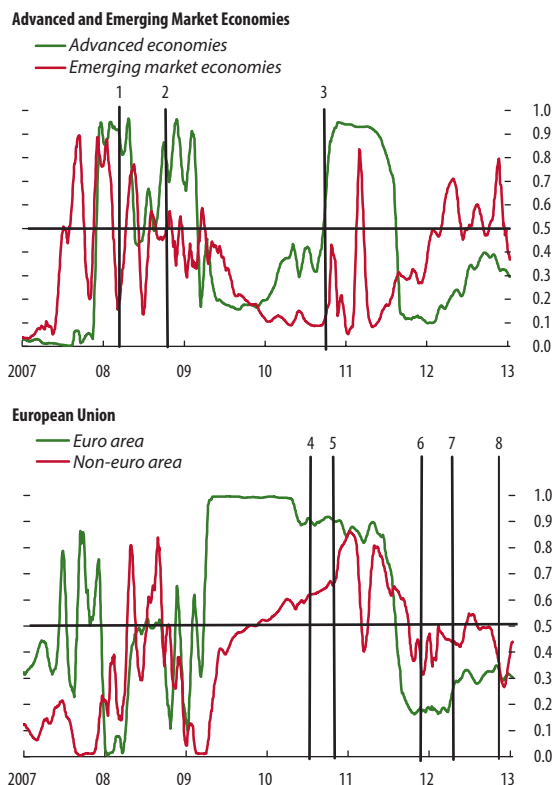
Sources: Bloomberg, L.P.; and IMF staff estimates.

Note: The Hasbrouck statistic shows whether SCDS or sovereign bond markets move faster to incorporate news: when the statistic is higher than 0.5, SCDS lead the price discovery process; otherwise, bonds lead. Statistics are estimated from a panel vector error correction model using rolling two-year windows of daily data. Resulting series are smoothed using a one-month moving average. Vertical lines indicate events related to the global financial and sovereign debt crisis (upper panel) and to the EU's ban on naked short sales of SCDS instruments (lower panel) as follows:
1. Bear Stearns collapse (March 14, 2008).
2. Lehman Brothers bankruptcy (September 15, 2008).
3. EU debt crisis intensifies in October 2010 ahead of Ireland's financial aid request.
4. European Commission consultation on short selling (June 14, 2010).
5. European Commission short selling regulation proposed, banning naked short sales and SCDS protection sales (September 15, 2010).
6. European Parliament adopts short selling regulation (November 15, 2011).
7. Final Version of EU short selling regulation published (March 24, 2012).
8. EU short-selling regulation becomes effective (November 1, 2012).

most of the volatility that is not explained by Germany's own country-specific factors is driven by volatility in the SCDS for Italy and Spain, with other EU periphery countries under stress (Greece, Ireland, and Portugal) having a comparatively small effect.[30] For Spain, almost

[30]Germany's SCDS are often viewed by markets as instruments to hedge systemic risk, or general concerns, in the euro area (Credit Suisse, 2012).

Figure 2.8. Sovereign Credit Default Swaps (SCDS): Decomposition of Volatility Factors for Germany, Italy, and Spain, February 2009–October 2012
(In percent)

■ VIX   ■ Spain   ■ Italy   ■ Greece
■ TED spread   ■ Portugal   ■ Ireland   ■ Germany
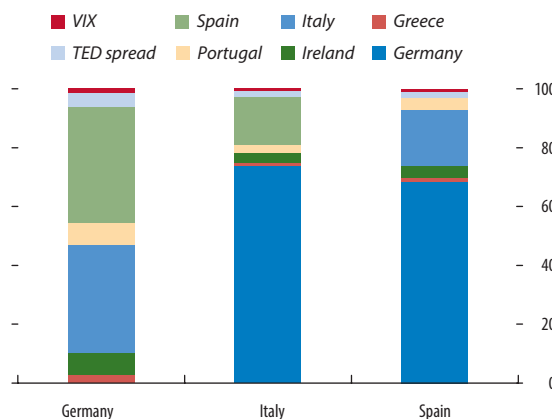
Source: IMF staff estimates.
Note: VIX = implied volatility on S&P 500 index options. Figure shows decomposition of SCDS volatility that is not explained by own (or idiosyncratic) factors.

three-fourths of its residual volatility is driven by Germany's SCDS, while Italy's volatility is also a significant contributor (almost 20 percent), with the other factors having a much smaller impact. Roughly the same results hold for Italy, where Germany and Spain are large contributors and other factors less so.[31]

In general, the question of whether SCDS markets are more likely to be contagious than other markets is difficult to answer because the interconnections across many markets are high. The most critical set of interconnections has probably developed among sovereigns and financial institutions, quite apart from the development of SCDS markets per se. Indeed, risks embedded in SCDS cannot be readily isolated from the risks of the financial system; a more integrated analysis of both sectors is required (see Box 2.1).

Yet, many researchers have found that other financial asset markets, not merely those for SCDS, tend to exhibit high and correlated volatility during

[31]The results are based on a stochastic volatility model and standard GARCH specifications using daily data; see González-Hermosillo and Johnson (forthcoming). Beirne and Fratzscher (2013) also find evidence of sharp and simultaneous increases (which they term "herding contagion") in sovereign yields across countries at certain times and among a few markets.

Figure 2.9. Markov-Switching ARCH Model of VIX, European TED Spread, and Sovereign Credit Default Swap (SCDS) Indices
(Probability of being in high-volatility state)
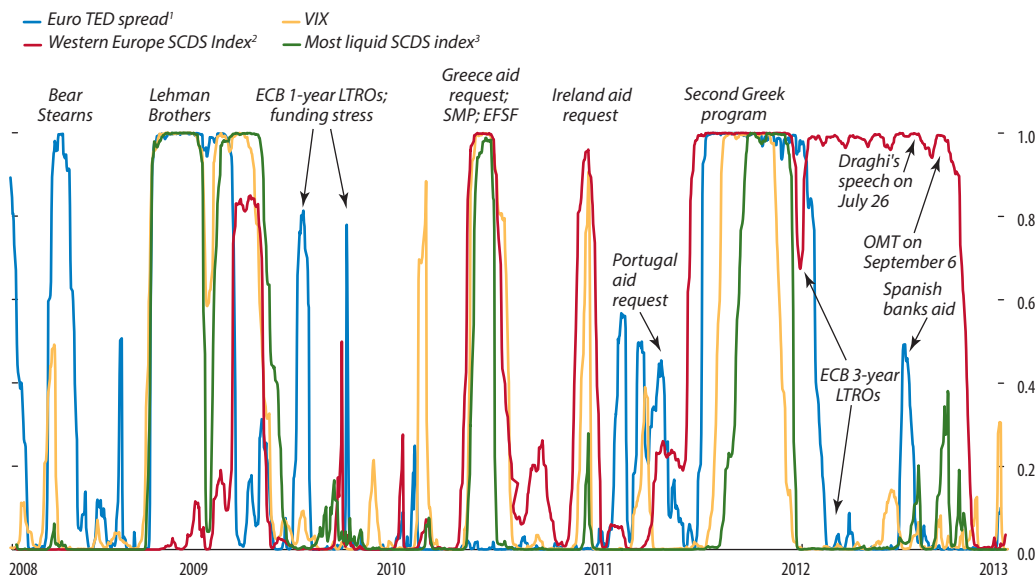
Sources: Bloomberg L.P.; Markit; and IMF staff estimates.
Note: ECB = European Central Bank; EFSF = European Financial Stability Facility; LTRO = longer-term refinancing operations; OMT = outright monetary transactions; SMP = Securities Market Programme; VIX = implied volatility on S&P 500 index options.
[1]Spread between yields on three-month euro LIBOR and on the three-month German government bill.
[2]Average five-year ITRAXX SCDS spread of 12 western European countries (Austria, Belgium, Denmark, France, Germany, Ireland, Italy, the Netherlands, Portugal, Spain, Sweden, and the United Kingdom).
[3]Average five-year ITRAXX CDS spread of the 20 most liquid sovereign names (Austria, Brazil, China, Colombia, Croatia, France, Germany, Italy, Japan, Korea, Malaysia, Mexico, Peru, Poland, Qatar, Russia, South Africa, Spain, the United Kingdom, and the United States).

periods of systemic stress.[32] Using a statistical model to detect periods of high volatility among four commonly watched market indices (including the Western Europe SCDS index), we too find that since 2008 several periods of stress have been characterized by high volatility among all four of the indices (Figure 2.9).[33] The main exception was in the first eight months of 2012, during the most severe bout of turbulence in Europe, when the Western Europe SCDS index was the only one of the four to remain in a state of high volatility—a situation that abated only after the establishment of the European Central Bank's (ECB's) Outright Monetary Transactions (OMT) program. Based on the probability of being in a high volatility state, the results suggest that the three other markets decoupled from the Western

Europe SCDS index in early 2012, as they were more sensitive to the policy moves represented by the second Greek program and the introduction of the ECB's three-year longer-term refinancing operation (LTRO).

Claims of overshooting are not unfounded, as there is some evidence of overshooting in SCDS and sovereign bond markets for a few European countries during the height of the European debt crisis. Reexamining the model discussed above for SCDS and government bond spreads, we ask how well the model predicts SCDS and government bond yields during the period when the European crisis deepened (July 2011 through September 2012).[34] Spreads on SCDS (and, to a lesser extent, on bonds) overshot the model's predictions for

[32]See, for example, Forbes and Rigobon (2002); Dungey and others (2011); and Forbes (2012).
[33]The estimated ARCH Markov regime-switching volatility model is described in González-Hermosillo and Hesse (2011).

[34]Predictions are calculated using the parameters reestimated from the base models in Table 2.5 using data from October 2008 to June 2011 for 14 advanced economies, including those in the euro area, where concerns about overshooting were most concentrated.

Figure 2.10. Overshooting and Undershooting of Sovereign Credit Default Swaps (SCDS) and Sovereign Bond Markets
(Standardized average prediction error for July 2011–September 2012)
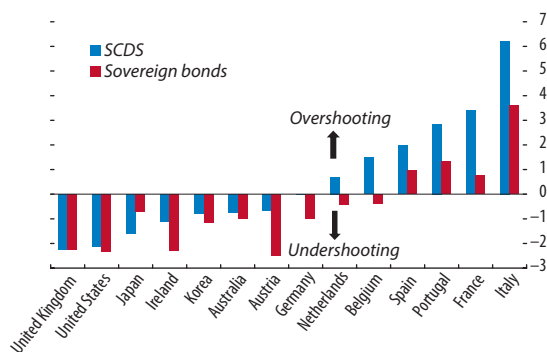
Source: IMF staff estimates.
Note: Ratio of the average out-of-sample prediction errors relative to the standard deviation of in-sample residuals. The in-sample estimation uses the results of the base model (as shown in Table 2.5) for 14 advanced economies during October 2008–June 2011.

the relatively more distressed European countries (Italy, France, Portugal, Spain, and Belgium) and undershot the model for the other nine countries, most of which are not in the euro area (Figure 2.10). Hence, during the height of the European debt crisis, SCDS (and government bond) spreads in more vulnerable European countries rose above the level that can be explained by the changes in the fundamental and market drivers considered in our model. Some of the reason for the overshooting behavior in SCDS and government bond markets may also reflect illiquidity in these markets during periods of acute stress.

Despite concerns that overshooting leads to higher borrowing costs for governments, we do not find strong and pervasive evidence of such effects. To examine the concern, we perform a Granger causality test using the SCDS and the bond residuals from the base model. This allows us to formally test the timing relationships between the measures of overshooting spreads in the two markets after controlling for the effects from com-

mon drivers.[35] If we find that SCDS residuals generally lead government bond residuals and not vice versa, this would be consistent with the view that the overshooting of SCDS spreads artificially increases sovereign funding costs. The results (Table 2.2) show that this may be the case for a couple of countries in our sample (Italy and the United States) but not for the majority of the advanced economies examined. Bond residuals also have a unidirectional impact on SCDS in the cases of Austria, France, the Netherlands, and Portugal, suggesting that bond market overshooting influences the SCDS markets. Overall, the evidence is mixed, and there is no consistent pattern for periphery European countries. Therefore, we do not find support for the view that, on average, increases in SCDS spreads generally increase the cost of sovereign bond funding for these countries.

Summary

In sum, the empirical results do not support many of the negative perceptions about SCDS relative to their underlying sovereign bond markets, although there is some evidence of overshooting for euro area countries during periods of stress. A battery of tests suggests that:

- Both SCDS and government bond spreads exhibit similar and significant dependence on key economic fundamentals, and both are similarly influenced by financial market risk factors.

[35]To better capture the dynamics in advanced economies, the base model in Table 2.5 is reestimated using data for 14 advanced economies rather than for all 33 countries. SCDS and bond residuals are highly correlated, and adding SCDS (bond) residuals (contemporaneous or lagged) to the base model for bonds (SCDS) produces statistically significant positive coefficients while appreciably raising the explanatory power of the models. This seems to indicate that there are other common drivers that are not in the model but that are relevant for explaining both SCDS and bond spread dynamics.

Table 2.2. Lead-Lag Relationship between Sovereign Credit Default Swaps (SCDS) and Bond Residuals

	SCDS Granger cause Bonds	SCDS do not Granger cause Bonds
Bonds Granger cause SCDS	Korea, Spain	Austria, France, Netherlands, Portugal
Bonds do not Granger cause SCDS	Italy, United States	Australia, Belgium, Germany, Ireland, Japan, United Kingdom

Source: IMF staff estimates.
Note: SCDS = sovereign credit default swaps. Based on Granger causality test. Residuals from base model estimation (as shown in Table 2.5) for 14 advanced economies.

- New information seems to be incorporated faster in SCDS markets than in sovereign bond markets during periods of stress despite wide differences across countries in normal times. Generally, the more liquid the SCDS market, the more rapidly it incorporates information relative to bond markets.

- Overall, SCDS markets do not appear to be particularly more prone to high volatility than other financial markets.

- However, there is evidence of significant co-movement of SCDS spread volatilities across some countries and signs of overshooting for some vulnerable European countries during the height of the debt crisis.

- There is no pervasive evidence that the unexplained portion of SCDS spreads (part of which could be attributable to speculative activities) leads to increases in sovereign funding costs.

- Whether SCDS markets are more likely to propagate shocks than other markets is unclear because the risks embedded in SCDS cannot be readily isolated from the risks of the financial system.

Effects of SCDS Regulations and Policy Initiatives on Financial Stability

Several regulatory and policy initiatives are under way that have affected, or are likely to affect, the functioning of SCDS markets and their implications for financial stability. Evidence presented above casts doubt on the idea that SCDS markets unduly influence underlying bond markets, but some regulations are aimed at limiting the use of SCDS contracts—the most prominent being the EU's ban on naked short selling that was announced on March 24, 2012, and went into effect on November 1, 2012 (Box 2.2).[36] The ban is likely to increase the cost of SCDS trading, as are other new regulations such as those associated with broader reforms of OTC derivatives designed to make markets safer. The

relative merits of the ban and the broader reforms of OTC derivatives are discussed below.

The EU ban on SCDS naked protection buying is part of a regulatory effort to harmonize EU short selling and CDS trading rules. Underpinning it is a view that "in extreme market conditions there is a risk that short selling can lead to an excessive downward spiral in prices leading to a disorderly market and possible systemic risks" (European Commission, 2010a, p. 3). In general, the benefits of bans on short positions—to stabilize financial markets, support prices, or contain credit spreads—have not been empirically verified in studies of other bans. Bans on short selling in equity markets are generally viewed as merely reducing market liquidity, hindering price discovery, and increasing price volatility (Beber and Pagano, 2013).

However, using theoretical models, some researchers show that a ban on uncovered CDS could help remove behavior that leads to instability. For example, Che and Sethi (2012) use a theoretical model to show that when naked CDS protection buying is allowed, there is greater volatility in borrowing costs and scenarios could develop in which borrowers would not be able to roll over their maturing debt. In addition, the analysis conducted here of the relative efficiency with which news is incorporated into prices in euro area countries found that SCDS markets generally incorporate new information faster than bond markets during periods of turbulence. Some researchers interpret this lead-lag relationship as indirect evidence that SCDS drive up the cost of government funding (bond yields) and cause fiscal sustainability problems (Palladini and Portes, 2011; and Delatte, Gex, and López-Villavicencio, 2012). However, results from Granger causality tests based on the residuals from a more full-fledged panel model suggest that this relationship is only discernible for two advanced economies in our sample (Table 2.2).[37]

The impact report from the European Commission (2010b) assessed the possibility of imposing

[36]On November 15, 2011, the European Parliament formally adopted the proposed regulation, the final version of which was passed on March 14, 2012, and published on March 24, 2012. On June 29 and July 5, 2012, the European Commission published various technical standards, and on November 1, 2012, the bans applicable to all relevant trades executed after March 25, 2012, went into effect.

[37]See Ashcraft and Santos (2009); and Subrahmanyam, Tang, and Wang (2011) for evidence that CDS trading increased the cost of funding for some companies because of "empty-creditor" problems (i.e., insured lenders lose incentives to monitor borrower performance or to renegotiate). There is no similar empirical study for sovereign issuers.

Box 2.2. The European Union's Ban on Buying Naked Sovereign Credit Default Swap Protection

The European Union's ban on naked short selling and naked SCDS protection buying is summarized and compared with the similar but temporary ban of 2010/11 in Germany.

The EU regulation "Short Selling and Certain Aspects of Credit Default Swaps" went into effect on November 1, 2012. Its purported aim is to harmonize fragmented short selling rules and regulations with respect to sovereign debt and CDS across the European Economic Area (the 27 countries of the EU plus Iceland, Liechtenstein, and Norway). In particular, it seeks to reduce the risks of negative price spirals for sovereign debt and settlement failures caused by uncovered (naked) short selling and CDS protection buying.

The regulation applies to debt issued by all 30 EEA countries, including their agencies and their regional, local, and municipal governments.[1] However, according to the European Securities and Markets Authorities, the naked SCDS ban applies to all market participants, including those outside the EEA. Also, the regulation applies only to transactions executed after March 25, 2012. Implementation and enforcement is delegated to the relevant country authorities, but enforcement will be difficult (see Annex 1.2 in the October 2010 GFSR).

Under the regulation, market participants can buy protection referencing EEA sovereign debt only if they hold the issuer's debt or if they have exposures that are "meaningfully" correlated with the

relevant sovereign debt at the time of execution.[2] Transactions that do not meet these conditions are permitted only if they are related to market-making activities and primary-dealer operations.[3]

The ban is similar to the temporary naked CDS ban in effect in Germany from May 19, 2010, to March 31, 2011, except that the current ban appears to be seen as a permanent measure. In the German case, the policy covered all euro area sovereigns, but it applied only to transactions concluded in Germany, and the exceptions were not as clear-cut as those in the current ban. The ban resulted in reduced liquidity in the market for SCDS referencing the debt of Greece, Ireland, Italy, Portugal, and Spain. In contrast, SCDS market volatility declined for all contracts referencing euro area countries, whereas volatility usually increases during bans on short sales in equity markets.

The German ban was accompanied by prohibitions against naked short positions in the underlying sovereign debt and in corporate equities, as is the new EU ban, although the German ban was temporary and applied only to the shares of major financial institutions.

Note: Prepared by John Kiff.

[1] Agencies include the European Investment Bank and may include special-purpose vehicles such as the European Financial Stability Facility.

[2] To meet the "correlation" exemption, the hedged exposure must be to an entity in the same country, and the amount of protection bought must be proportional to the delta-adjusted size of the exposure. The correlation criteria can be satisfied by a quantitative or qualitative test or by an analytic proof (e.g., by showing that the exposure is to an entity whose fortunes are significantly dependent on the relevant sovereign). The quantitative test is satisfied if the adjusted Pearson's correlation coefficient between the value of the exposure and the referenced sovereign debt over the previous 12 months is at least 70 percent.

[3] However, the exemption does not apply to the other activities of market makers and primary dealers.

temporary bans. In particular, it found some evidence that "circuit breakers" provided a cooling-off period for investors to reassess intrinsic value. On the other hand, some of the studies they reviewed found that circuit breakers merely lengthened the period over which the pent-up (large) price movements would occur while interfering with market liquidity. Pu and Zhang (2012) found similar effects for the 2010–11 temporary German ban on naked SCDS protection buying. Moreover, determining a priori the optimal

time for officials to call for a temporary suspension of trade in OTC markets is difficult, especially without the exchange-trading platforms in place whereby trading can be physically halted. Given the number of countries involved in the SCDS market, it may be unclear which body would call for a halt. Although the European Markets in Financial Instruments Directive (MiFID) as it currently stands is well able to deal with abusive trading practices, including any that regulators deem important to SCDS markets, the

Figure 2.11. Sovereign Credit Default Swaps: Net Notional Amounts Outstanding, Selected EU Countries
(November 11, 2011 = 100, weekly data)
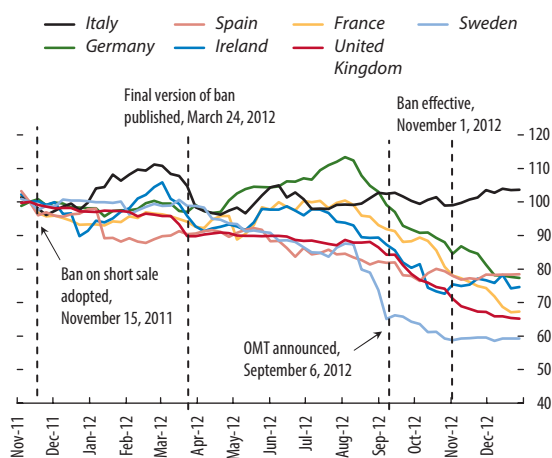
Sources: Depository Trust and Clearing Corporation; and IMF staff calculations.
Note: OMT = Outright Monetary Transactions.

results of the forthcoming review by the European Securities and Markets Authority may reduce the perceived neeed for the trading ban.

Since March 2012, when the European Parliament adopted the final version of the rules banning naked SCDS protection buying, market liquidity has declined for SCDS referencing European Union sovereigns, although not clearly because of the ban. Net notional outstandings had already fallen off ahead of November 1, 2012, the starting date for enforcement of the ban, perhaps because short positions, including proxy positions, were unwound early (see France and Germany in Figure 2.11). Notably, net outstandings of contracts referencing Italy have remained fairly steady, possibly because banks have related sovereign counterparty hedging activity.[38] Discussions with some market participants indicate that they are removing positions even if they are covered; they fear that the hedging rules are so vague that they may be viewed as speculating even if they are not. The drop in market liquidity (and a narrowing of many of the euro area SCDS spreads) has coincided with other events, notably policy announcements such as the OMT, which may have reduced the

[38]According to market sources, Italy has substantial uncollateralized interest rate swap, swaption, and cross-currency swap positions with a number of banks. Such banks are purportedly using Italy-referenced SCDS to hedge the counterparty risk on these contracts.

demand for insurance (Figure 2.12). Given the confluence of events, the reduced SCDS market liquidity cannot be unequivocally interpreted as evidence that the ban has impaired the SCDS market.

With lower SCDS liquidity, market participants could be expected to substitute less liquid proxies such as bank-referenced CDS and government bond futures contracts for SCDS in their hedging and trading strategies. Box 2.3 outlines how a hypothetical impairment of the SCDS market could force a migration of trading and affect different types of countries. In general, hedging using the "next best" market (bank and some corporate CDS contracts and bond futures) is likely to be more expensive and less precise. While the recent ban is more likely to affect smaller advanced economies (where SCDS are a larger proportion of underlying bonds), ultimately, this could reduce investor interest in the underlying bond market of many countries, raising the costs of debt issuance there. However, it is encouraging that the European Securities and Markets Authority is in the process of evaluating the effects of the regulation, and will present the results of its investigations to the European Parliament by June 30, 2013. Furthermore, there are provisions in the regulation that allow European authorities to suspend the ban in the event it is found to be reducing market liquidity unduly.

A route that will make the SCDS market safer without disenfranchising specific types of participants is the push to clear all standardized OTC derivatives contracts through central counterparties (CCPs). The higher costs that will be incurred by the move to CCPs are balanced by the benefits that central clearing could bring to reduce counterparty risk by enforcing robust risk management standards, the multilateral netting of positions, and the sharing of extreme losses. These costs will be borne by all participants, not just those that take certain types of positions. Clearing members are required to cover their negative mark-to-market positions by the daily posting of collateral ("variation margin") and to post "initial margin" to cover potential losses in excess of their posted variation margin in the event of their own default. Moreover, members must contribute to a default fund to cover extreme losses arising from their own default or that of other clearing members.

Although the movement of contracts to CCPs is likely to reduce risks in OTC derivatives markets

Figure 2.12. Market Liquidity Measures before and after Ban on Short Sales of Sovereign Credit Default Swaps (SCDS)
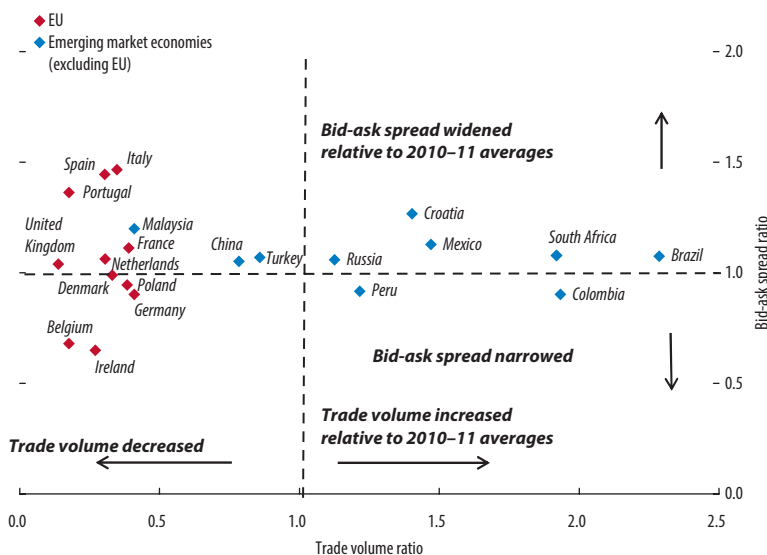
Sources: Bloomberg L.P.; Depository Trust and Clearing Corporation; and IMF staff estimates.
Note: The vertical axis is the ratio of an average bid-ask SCDS spread in November–December 2012 to that in 2010–11. The horizontal axis is the ratio of new trades in November–December 2012 to new trades in 2010–11.

generally, SCDS are more difficult to clear than other derivatives—so far the SCDS of only four reference countries are cleared in CCPs.[39] The reason that CCPs are reluctant to clear SCDS is their concern about "wrong-way" risks, a term referring to the fact that the posted initial margin and the default fund contributions would be in dollars or euros or in government securities denominated in those currencies. Such securities are the same as those underlying most of the SCDS contracts. So distress of a sovereign would create a vicious cycle (a realization of the wrong-way risk) by impairing the value of the collateral while at the same time increasing the risk in the SCDS contract, which would require more such collateral to be posted. In any case, according to recent proposals being considered by the European Parliament, European sovereigns and their agencies will be exempt from the requirement that

their trades be moved to CCPs, leaving their counterparties with continuing counterparty risks when money is owed to them.

An alternative to moving SCDS to CCPs would be to require margin posting by all counterparties to bilateral OTC SCDS transactions. While variation margin is currently transferred between most bank-dealer counterparties, the posting of initial margin is not currently the market norm.[40] Regulations requiring all financial firms and systemically important nonfinancial entities to post initial and variation margin on non-centrally cleared transactions are currently being developed by standard setters (BCBS-IOSCO, 2013). They will likely help lower counterparty risks and help protect both parties in case one of them reneges on the contract, but they will also increase the cost of using the SCDS

[39]Almost all CDS central clearing is done through the U.S. and European facilities of Intercontinental Exchange Inc. (ICE); and according to the Financial Stability Board (2012), only 12 percent of outstanding CDS contracts are centrally cleared, virtually all of them dealer-to-dealer transactions. Among all SCDS, the four referencing sovereigns currently cleared are Argentina, Brazil, Mexico, and Venezuela.

[40]According to the ISDA (2012a) margin survey, 93.4 percent of CDS transactions are subject to collateral posting requirements versus 71.4 percent on all OTC derivatives. The survey does not distinguish between initial and variation margin requirements, but the ISDA (2012b) analysis of the costs of imposing initial margin requirements suggests that few market participants post initial margin.

Box 2.3. What Could Be the Impact of the Demise of SCDS?

To assess a hypothetical scenario in which SCDS markets are effectively shut down, it is useful to examine the benefits and costs of SCDS markets and of potential substitutes.

Why is buying naked SCDS protection economically useful and what are the alternatives?

Naked SCDS protection buying is economically equivalent to short selling the underlying bonds. In both cases, trades are usually profitable if the likelihood of a credit event increases. Also, both provide useful functions by increasing the liquidity of the underlying markets (Beber and Pagano, 2013). In addition, both CDS protection buying and short selling keep prices from reflecting the activity of only the most optimistic market participants.

In general, SCDS are more efficient than short sales as a means of trading on, or hedging against, negative credit events. Short selling requires a sufficient quantity of bonds that can be borrowed and deep repurchase agreement (repo) markets in which to borrow them. Only a handful of advanced economies have such repo markets (Australia, France, Germany, Japan, the Netherlands, the United Kingdom, and the United States). Particularly for countries experiencing stress, short selling demand can sometimes overwhelm the supply of bonds available to lend. Moreover, such loans may be recalled at any time so, unlike with SCDS, positions cannot be locked in over longer terms.

Other alternatives include government bond futures contracts and proxies such as the CDS of large financial corporations and utilities. However, government bond futures contracts are available on only a handful of sovereigns, and bond futures embed both credit and interest rate risk, whereas SCDS isolate credit risk. Although the interest rate risk of a futures contract can be mostly offset using interest rate swaps, such transactions will increase operational risks and require the posting of additional safe assets as collateral (see Chapter 3 in the April 2012 GFSR). The problem with proxy-hedging sovereign risk using the CDS of large financial firms or utilities is that these markets are generally

Table 2.3.1. Relative Size of Sovereign and Bank Credit Default Swaps Markets
(In billions of U.S. dollars, net notional amounts)

	July 2012	December 2012	Change
France			
SCDS	23.3	15.7	−7.6
Bank CDS	7.1	6.3	−0.8
Germany			
SCDS	22.1	15.3	−6.8
Bank CDS	6.2	6.6	0.4
Italy			
SCDS	20.4	21.3	0.9
Bank CDS	6.4	5.9	−0.5
Spain			
SCDS	13.6	12.7	−1.0
Bank CDS	5.2	5.0	−0.3
United Kingdom			
SCDS	10.9	8.2	−2.7
Bank CDS	10.0	10.5	0.5

Sources: Depository Trust and Clearing Corporation; and IMF staff calculations.

Note: Net notionals demonstrate the risk exposures in both markets relevant for hedging effectiveness. Bank CDS are contracts referencing the following large banks: for France, BNP Paribas, Crédit Agricole, and Société Générale; for Germany, Deutsche Bank and Commerzbank; for Italy, Banca Monte dei Paschi di Siena, Banca Popolare di Milano, Intesa Sanpaolo, and UniCredito; for Spain, BBVA, Banco de Sabadell, Banco Santander, and Bankia; and for the United Kingdom, Barclays, HSBC, Lloyds TSB, Standard Chartered, and Royal Bank of Scotland.

not big enough, plus their usage could involve other unwanted risks (Table 2.3.1). Any meaningful transfer of risk from SCDS to financial CDS markets is likely to further strengthen the connectivity between these two markets—in contrast to the goal of other policies. Also, other, more opaque and customized OTC derivative contracts, such as total return swaps, could serve as alternatives to SCDS.[1]

What would happen to the market for the underlying bonds if SCDS contracts ceased to exist?

For advanced economies, especially larger economies and those perceived to be safe, SCDS markets are generally small compared with the underlying government debt outstanding, indicating that the demise of the SCDS market would have little effect on the underlying bond market. However, SCDS gross notional amounts are large relative to underlying government debt for many emerging market

Note: Prepared by Brenda González-Hermosillo, Ken Chikada, and John Kiff.

[1]A total return swap is a derivative in which the variable payments are based on the return of an underlying asset.

Box 2.3 *(continued)*

Figure 2.3.1. Country Credit Ratings and Ratio of Outstanding Sovereign Credit Default Swaps (SCDS) to Government Debt, 2011
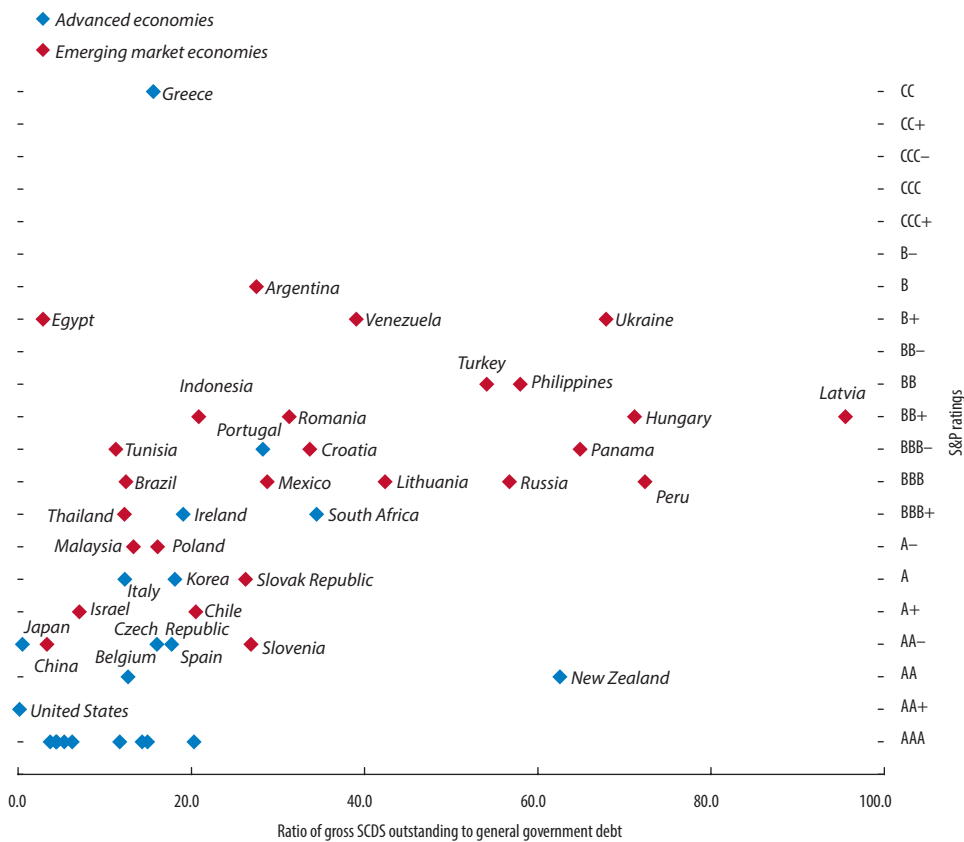
Sources: IMF, World Economic Outlook and International Financial Statistics databases; Standard and Poor's; and IMF staff estimates.
Note: Countries rated AAA, in order of the ratio of gross SCDS outstanding to general government debt, are the United Kingdom, Germany, Norway, the Netherlands, France, Australia, Sweden, Finland, Denmark, and Austria.

economies and some European countries (Figure 2.3.1, horizontal axis).

Generally, prohibiting the purchase of naked SCDS protection could permanently impair SCDS markets, as trading would exclude a set of participants that help provide liquidity and balance to markets—a complete ban on SCDS contracts would be even more dire.[2] However, the effects of a loss of

liquidity and pricing influence will likely depend on the type of country. For example, some advanced economies have substitute markets through which negative sovereign credit risk views can be expressed. However, in many emerging market economies, such alternatives are unavailable, so the loss of SCDS as a hedging instrument could have negative consequences for other credit markets, including the underlying bond markets, and could raise issuance costs. In addition, SCDS dealers that hedge their counterparty risk on their other derivative transactions with sovereigns would face higher costs on such hedging activities.

[2]Beber and Pagano (2013), studying bans on short selling around the world, concluded that they were detrimental for market liquidity and may not have the intended effect of supporting market prices.

market. However, sovereigns and their agencies may be exempt from margin posting on bilateral and centrally cleared trades (BCBS-IOSCO, 2013).[41]

In summary, in an effort to remove destabilizing speculation, the likely effects of the ban on naked short selling are a continuing drop in volumes and liquidity, which could harm the hedging role of SCDS markets. Less liquidity is likely to lead to more proxy hedging and higher spillovers to other markets—potentially with the unintended consequence of reducing financial stability. Whether the ban restrains speculation that could be related to overshooting, and hence to unstable market conditions, remains to be seen. The policy of moving OTC derivatives to CCPs appears a concrete method of making the SCDS market safer. Although, in the short term, the cost of posting initial margin would be high, it is expected to have positive stability implications in the medium term, as counterparty risks would be lowered and transparency potentially improved. However, the exemption of sovereign counterparties from posting collateral is problematic, as it continues to leave dealer banks exposed to sovereign default risks that they will likely hedge with the purchase of SCDS protection.

Conclusions and Policy Implications

The findings in this chapter suggest conclusions and policy implications in the following areas:
- *Role of SCDS as generally reliable market indicators.* When examined relative to their comparable bond spreads, SCDS spreads are approximately equivalent as indicators of sovereign credit risk—reflecting the same economic fundamentals and other market factors. SCDS markets appear to incorporate information faster than bond markets during periods of stress, but this is not always the case at other times.
- *Financial stability implications.* SCDS can be used to hedge sovereign credit risks, thus enhancing financial stability. However, like other instruments, SCDS may be prone to spillovers dur-

ing periods of stress (especially given their use as proxy credit hedges for other financial and nonfinancial institutions). Our analysis suggests that this threat is no more tied to SCDS markets than to the underlying bond markets; indeed, both may be destabilizing during periods of stress, as contagious forces are present across all financial market assets during these periods. We find evidence of overshooting using the model-based predicted values for some euro area countries' SCDS spreads during the most recent period of distress, though the tendency was not widespread.
- *Role of government and regulation.* Governments and regulators have the opportunity to improve the functioning of SCDS and of CDS markets more generally.
  - Cases in point are recent efforts, in line with the G20 regulatory agenda, to require counterparties to post initial margin on bilateral trades or move them to CCPs (where such margin requirements would be lower). While costly in the short term, such improvements in risk management could yield benefits in the longer term by lessening counterparty risks and reducing the potential for spillovers from sovereign credit events.
  - The recent European ban on purchasing naked SCDS protection appears to move in the wrong direction. While the effects of the ban are hard to distinguish from the influence of other policy announcements, the prohibition may have already caused some impairment of market liquidity. And the ban may yet cause some important buyers of SCDS net protection, including those not targeted by the ban, to withdraw from the market; if so, SCDS market liquidity will likely be further reduced and hedging costs raised. The effects of the ban on speculation, hedging costs, and the information value of SCDS remain to be seen, but they bear scrutiny as evidence accumulates.
  - More broadly, as an apparently permanent measure, the ban may fundamentally impair the functioning of the SCDS market by generating alternative trading schemes or the transfer of risk to other markets that may be less transparent. Even temporary trading bans have been found to be of only limited usefulness and to

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[41]That said, if sovereigns and their agencies are not obliged to post collateral, their European bank counterparties may get relief from the new Basel III capital requirements for counterparty credit risk on transactions with those entities. As far as we know, no other jurisdictions are considering such relief.

have many of the negative consequences of permanent ones.

- o The concerns that SCDS can overshoot fundamentals or cause contagion in other markets would be better addressed by mechanisms to temporarily halt trading, such as "circuit breakers" with bright-line criteria for triggering and lifting such halts. Granted, imposing temporary trading halts in an OTC market, as opposed to an exchange trading environment, is particularly difficult, as there is no formal trading platform. But enforcing a ban, which requires identifying institutions that maintain uncovered short positions, is also quite difficult although upcoming reporting requirements for short positions should help.

- *Data gaps.* While it may be inappropriate to release detailed information about individual counterparty SCDS positions to the public, macroprudential supervisors should be able to access these data. Such information may enable them to assess risks to financial stability and circumvent, or at least anticipate, channels for contagion. To the degree that uncertainty about exposures and interconnec-

tions can be lessened through the public release of some aggregated or masked information, potential contagion and overshooting (among the motivations for the ban on uncovered SCDS protection) could be diminished.

Overall, SCDS markets help enhance financial stability by providing a mechanism to hedge sovereign risks. We find no evidence to support the concern that SCDS markets may be less effective than government bond markets in reflecting economic fundamentals, and we find little evidence that the SCDS market is any more destabilizing than other financial markets. That said, we find some evidence of SCDS overshooting in a few euro area countries during the most recent period of stress. Spillovers to other countries' SCDS markets and the ongoing linkages between domestic banks and sovereigns also exist within the context of CDS markets, as they do more generally. Recent efforts to address the underlying, fundamental nature of these connections would be more productive than placing restrictions on the SCDS market that can limit and distort its role as "messenger."

Annex 2.1. A Primer on Sovereign Credit Default Swaps

CDS are bilateral agreements to transfer the credit risk of debt obligations of "reference entities"—corporations (financial and nonfinancial), sovereigns, and other legal entities such as securitization special-purpose vehicles. Purchasers of CDS are protected against losses relating to predefined credit events (such as failure to pay) during the term of the contract in return for premium payments to the protection seller.[42] If a credit event occurs, the premium payments terminate and the contract is settled; settlement consists of the protection seller paying an amount equal to the contract notional value minus the value of "deliverable" debt obligations issued by the reference entity ("recovery value").[43]

To illustrate, suppose that CDS protection could be purchased for a spread of 100 basis points per year until contract termination. If it terminates with a credit event, and the recovery value is 20 percent of par, the protection seller would pay 80 percent of the notional value to the protection buyer. The recovery value is based on the value of a reference asset as determined after the credit event; the types and characteristics of the reference assets are contractually specified, with protection buyers effectively determining specifically which of them is used and ultimately the recovery price used to settle the contracts.[44]

Note: Prepared by Ken Chikada, John Kiff, and Hiroko Oura.

[42]Before 2009, the annual premium paid by the protection buyer was equal to the CDS par spread—the spread at which the discounted present value of the periodic premium payments is equal to the expected present value of the settlement amount in case of a credit event. Starting in 2009, the protection buyer pays an annual premium that has been fixed at one of several standard levels (25, 100, 300, 500, and 1,000 basis points) plus or minus an upfront payment to compensate for the difference between the par spread and the fixed premiums. The SCDS spreads used in the chapter's empirical work are the par spreads (Willemann, Leeming, and Ghosh, 2010).

[43]The protection buyer also pays premiums accrued since the previous payment to the protection seller. Also, CDS used to usually settle physically through the delivery of defaulting obligations to the protection seller in exchange for an amount equivalent to the CDS' notional value. They are now mostly settled via a two-stage auction-based CDS protocol to produce fair and unbiased recovery values to feed into cash, not physical, settlements.

[44]In the two-stage auction referred to above, participants who are selling bonds will deliver the cheapest of the bonds designated as eligible by the International Swaps and Derivatives Association's Determination Committee. See Andritzky and Singh (2006)

Since June 2005 there have been 103 CDS credit events but only two SCDS credit events with publicly documented settlements.[45] The most recent SCDS event was the March 2012 Greece debt exchange, which serves as an example of the potential complexity of SCDS credit event triggering and settlement (Box 2.4). Concerns about European banks rumored to be large sellers of Greek debt protection (and the losses they could potentially suffer) led to various tactics by international authorities to delay SCDS settlement triggering.[46] The SCDS contracts were eventually triggered and rumors shown to be unfounded, but the episode led some to question the usefulness of SCDS.

CDS can be used to take unfunded short (or long positions) in the reference obligations by buying (or selling) protection. Also, traders try to exploit pricing differences between CDS and underlying reference bonds by taking offsetting positions, called "basis trading." For example, suppose that a five-year par bond with a 5 percent coupon could be funded over

and Ammer and Cai (2011) for more on this potentially valuable cheapest-to-deliver option that drives the auction recovery price.

[45]Of the sovereign credit events and restructurings since June 2005, when information on CDS settlements became available, only the credit events for Ecuador in 2008 and Greece in 2012 resulted in CDS settlements. According to various market sources, at least three other credit events may have triggered CDS settlements (Belize in 2006, Seychelles in 2008, and Jamaica in 2010). In addition, according to Das, Papaionnou, and Trebesch (2012), there have been 26 sovereign restructurings since June 2005.

[46]Legislation was adopted to effectively "retrofit" collective action clauses (CACs) to €177 billion of old Greek government bonds (GGBs) on February 24, 2012, in case voluntary participation would not be high enough. The retrofitted CACs allowed bondholders with one-third of the aggregated outstanding principal of old GGBs to bind all bondholders to the restructuring. In contrast, typical CACs apply only to a specific bond series, and require a supermajority to change the bond terms, allowing investors with large positions to block a restructuring of that series. The Greek retrofit law did not allow any bond series to drop out and the aggregate nature of the CAC made blocking unlikely. To protect the ECB and national central banks, their bond holdings were swapped for new bonds with identical terms but different serial numbers, to ensure that they would not be covered by any debt exchange. Since bondholders were not legally subordinated, the SCDS were not triggered. Gelpern and Gulati (2012) argue that a credit event may have been triggered earlier if the issuance of new bonds to the ECB for the express purpose of excluding them from a restructuring had been recognized as subordination. A more "textualist" reading of the CDS contracts in this case blurred the trigger criteria, but this may have been needed to reconcile competing demands of the authorities and market participants.

Box 2.4. The Greece Debt Exchange and Its Implications for the SCDS Market

The March 2012 Greek debt exchange was the largest sovereign restructuring event in history. About €200 billion of Greek government bonds (GGBs) were exchanged for new GGBs. Holders of old GGBs who had SCDS protection on them recovered roughly the par value of their holdings, but the uncertainties of the process cast doubts on the viability of SCDS as a hedging tool. An industry-led initiative is rethinking the settlement process of SCDS credit events.

Two main factors determine the effectiveness of CDS protection: (1) whether the event responsible for the losses triggers the CDS payout and (2) if it is triggered, whether the payout offsets the losses. On the surface, the Greek SCDS settlement went according to plan. A restructuring event was called on March 9, and the ensuing March 19 settlement yielded SCDS payouts roughly in line with losses incurred in the debt exchange.

Many market participants regarded the outcome a fortunate coincidence because the payout could have been much smaller than the losses on the old GGBs. The exchange removed all outstanding old GGBs *before* the CDS settlement, thus requiring the new GGBs to be accepted as deliverable obliga-

tions. Luckily, the new GGBs were trading at about 22 percent of par going into the CDS settlement, the same price at which the old GGBs were trading before the exchange; hence, the payout matched the losses on the old GGBs. Nevertheless, the uncertainty surrounding the payout of the CDS contracts eroded market confidence in SCDSs.

However, if markets had viewed the exchange as supportive of Greece's debt sustainability, the market value of the new GGBs would have been higher than that of the old bonds. In this case, the SCDS payout would not have covered the losses caused by the exchange. As a result, the International Swaps and Derivatives Association (ISDA) is looking at ways to alter standard CDS documentation to deal with such situations.

One proposal is to settle by delivering a package of new instruments in proportion to the instruments they replace (see Duffie and Thukral, 2012). In this case, every €100 of Greek SCDS would have been exchanged for €31.5 of new GGBs, €15.0 of European Financial Stability Facility-guaranteed notes, and €31.5 of GDP warrants. With the new GGBs trading at about 22 percent of par, this package, excluding the value of the warrants, would have also been worth about 22 percent of par—€31.5 of the new GGBs at 22 percent plus €15 of the guaranteed notes.

Note: Prepared by Jorge A. Chan-Lau and John Kiff.

the full five years at a fixed 4 percent.[47] That would produce expected annual cash inflows of 100 basis points (500 − 400 basis points). For the CDS–bond "basis" to be zero, the CDS referencing that bond must also be trading at 100 basis points (Figure 2.13).[48] Also, if a credit event occurs, the bond and CDS basis package would suffer identical losses.[49]

[47]In order to achieve fixed-rate funding, the bonds are typically funded in the repo market on a floating-rate basis and swapped into fixed rates over the full term using interest rate swaps.

[48]If there is no credit event, the package and the reference obligation both return par value. In the example, if there is a default, the CDS package returns zero percent of par (the par value of the riskless investment minus the 100 percent of notional CDS protection payment), which is identical to the reference obligation recovery value.

[49]The transaction in Figure 2.13 assumes zero recovery of principal upon a credit event.

When the basis is positive, selling CDS protection and covering it by short selling reference bonds can be profitable. When the basis is negative, it can be arbitraged by buying the bonds and buying CDS protection. These actions should narrow the basis. In practice, the basis is seldom zero due to factors such as transactions costs, funding and counterparty risks, the protection buyer's cheapest-to-deliver option, currency mismatches between the CDS and reference bonds, and nonpar bonds used as reference bonds (Figure 2.14). However, a nonzero SCDS basis may also reflect obstacles to arbitrage in combination with differential reactions of SCDS and bond markets to economic and market developments (O'Kane, 2008).

Measuring the risks of SCDS contracts turns on the differences between gross notional amounts outstanding and net notional amounts. Most

Figure 2.13. Constructing the Arbitrage Trade between Credit Default Swaps (CDS) and Bonds
(In millions)

CDS Cash Flows

Sell a five-year CDS contract for a notional value of 100 millon at 100 basis points. Cash flows without default.

Equivalent Bond Cash Flows

Borrow 100 million at 4.0 percent and buy a five-year bond with 5 percent coupon at par. Cash flows without default.

Sell a five-year CDS contract for a notional value of 100 million at 100 basis points. Cash flows with default at year 5.

Borrow 100 million at 4.0 percent and buy a five-year bond with 5 percent coupon at par. Cash flows with default at year 5.

Source: IMF staff.

SCDS data are collected and disbursed using these concepts.

Gross notional values are calculated on a per-trade basis. For example, if Bank A sells $100 of CDS protection to Bank B, the gross notional amounts (the transactions highlighted in orange in the following table) and net notional amounts are reported as $100.

	Gross Sold	Gross Bought	Net Sold	Net Bought
Bank A	−100		−100	
Bank B		100		100
Total	−100	100	−100	100

If Bank A hedges its position by buying $100 of CDS protection on the same reference entity from Bank C (the transactions highlighted in blue in the

following table), the total gross notional amount rises to $200 but the net notional amount remains at $100. The $100 number is a relevant metric of risk transfer, but $200 is relevant as a counterparty risk metric because, although Bank A is "flat" (no exposure), Banks B and C remain exposed to the risk of Bank A defaulting on its contractual obligations.

	Gross Sold	Gross Bought	Net Sold	Net Bought
Bank A	−100	100		
Bank B		100		100
Bank C	−100		−100	
Total	−200	200	−100	100

Trade compression and "tear ups" can be used to reduce gross notional amounts by canceling offsetting

Figure 2.14. Difference between Sovereign Credit Default Swap Spreads and Sovereign Bond Spreads, Selected Countries
(In basis points, average for 2008–12, five-year tenors)
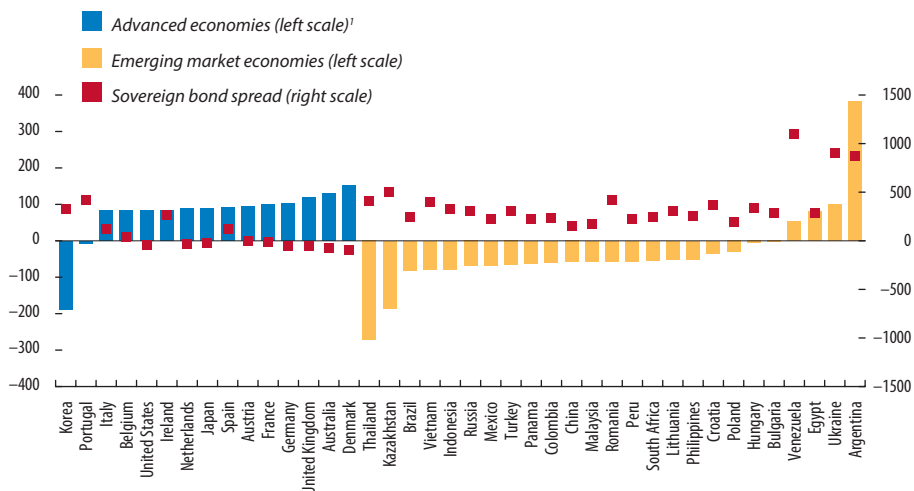
Sources: Bloomberg L.P.; and IMF staff calculations.

Note: For sovereign bond spreads, the JPMorgan Asia credit indices are used for Korea and Thailand; EMBI Global indices are used for other emerging market economies; and Bloomberg L.P.'s constant maturity yields minus swap spreads are used for other advanced economies. A similar relationship holds if the EMBI yield-swap rate is used for emerging market conomies.

[1]Excluding Greece, where the average basis is more than 1300 basis points.

redundant contracts. In this case Bank A can transfer ("novate") to Bank B its contractual obligations to Bank C as shown in the table below, bringing gross notional amounts in the system back to $100.

	Gross Sold	Gross Bought	Net Sold	Net Bought
Bank B		100		100
Bank C	−100		−100	
Total	−100	100	−100	100

In reality, a proliferation of these redundant offsetting trades has created large gaps between gross and net notional amounts. That said, compression operations are limited, as some transfers do not work on account of counterparty limits and restrictions, or the offsetting trades are not quite perfect matches (for example, the same reference entity but different contractual terms) and only dealers (and not end users) take part in the operations.

Annex 2.2. Technical Background: Determinants of SCDS Spreads and Bond Spreads

When comparing SCDS and bond markets, research papers often compare SCDS spreads to bond spreads instead of bond yields.[50] Bond spreads for most advanced economies are measured by the difference between bond yields and interest swap rates, as in Fontana and Scheicher (2010).[51] For emerging market economies, we use the EMBI spread, as in Chan-Lau and Kim (2005). The results are robust if EMBI yields minus swap rates are used instead.

Data

We examine a wide range of countries (Table 2.3) that have meaningful data on SCDS and government bond spreads and other variables used in the analysis. The sample includes both advanced and emerging market economies (33 in total), whereas most previous analyses use one or the other.[52] We use data from October 2008, when the liquidity (bid-ask spread) for SCDS in the advanced economies improved appreciably and DTCC started to provide volume data. For most advanced economies, SCDS contracts reference domestic government bonds, and hence we use their domestic government bond yields. For advanced economies whose SCDS contracts reference external government bonds (e.g., Korea, New Zealand, Sweden,), we use their external bond yields if possible (Korea) or drop them from

the analysis. For emerging market economies the SCDS contracts reference their external debt, and we take their external bond spreads from JPMorgan indices (EMBI or the JPMorgan Asia Credit Index).

Determinants of the Spreads

We estimate panel models regressing SCDS spreads and government bond spreads (y_i) on various economic and financial explanatory variables (Xi) listed in Table 2.4 using monthly data. If SCDS markets are more speculative or more influenced by financial market conditions than bond markets, we should see smaller or insignificant coefficients (β) for economic fundamentals variables and larger and more significant coefficients for market and global variables in the SCDS model than in the bond model.

Base model $y_i = \alpha_i + \beta X_i + \varepsilon_i$ for country i (2.1)

We selected the explanatory variables that are frequently used in the literature on sovereign risk (Table 2.4).[53]

- *Macroeconomic fundamental variables.* The model includes countries' debt-to-GDP ratios, real GDP growth rates, and international reserves. The first variable would be expected to increase spreads, whereas the latter two would reduce them. In addition, lagged return-on-assets (ROA) of the country's banking sector is included to reflect the possible risk transfer effects from the banking sector to sovereigns (higher bank ROA should reduce the expected contingent liability to the government and lower sovereign risks), as in Diekman and Plank (2012).
- *Market microstructure indicators.* We also include market liquidity (bid-ask spreads) and volume measures (net SCDS volumes outstanding in percent of sovereign debt outstanding). Low

Note: Prepared by Hiroko Oura; based on Oura and Valckx (forthcoming).

[50]Augustin (2012) provides a comprehensive overview of SCDS literature.

[51]Some studies examine euro area countries by looking at bond spreads vis-à-vis German bunds (e.g., Palladini and Portes, 2011), but that approach precludes including Germany in the analysis and complicates bond spread measurements for other advanced economies outside of the euro area such as Japan, the United Kingdom, and the United States. Discussions with market participants suggest that they use measures very similar to ours (i.e., asset swap spreads), taking interest rate swap rates as the relevant funding cost for arbitrage trading. Asset swap spreads and our measures have a high correlation (close to 1).

[52]Beirne and Fratzscher (2013) study a similar sample but with more focus on contagion across countries, taking SCDS and bonds as alternative measures of sovereign risk.

[53]Early studies (Edwards, 1984, 1986; and Boehmer and Megginson, 1990) established the role of fiscal and macro fundamentals for credit spreads. Others emphasized that market factors such as risk appetite, risk premiums, and liquidity are also important (Duffie, Pederson, and Singleton, 2003; Baek, Bandopadhyaya, and Du, 2005; Remolona, Scatigna, and Wu, 2008; Hartelius, Kashiwase, and Kodres, 2008; Pan and Singleton, 2008; Caceres, Guzzo, and Segoviano, 2010; and Alper, Forni, and Gerard, 2012).

Table 2.3. List of Countries Included in Empirical Studies[1]

Countries Used in Panel Estimations			Countries Used in Price Discovery Estimations and Stylized Fact Section										
				Advanced Economies (AE)					Emerging Market Economies (EM)				
All (33)	Advanced Economies (14)	Emerging Market Economies (19)	All (40)	All AE (15)	Euro Area (9)	Core Euro Area (5)	Other Euro Area (4)	Non-Euro Area (6)	All EM (25)	European EM (9)	Other EM (16)	EU (16)	Non-EU (24)
Argentina	Australia	Argentina	Argentina	Australia	Austria	Austria	Ireland	Australia	Argentina	Bulgaria	Argentina	Austria	Argentina
Australia	Austria	Brazil	Australia	Austria	Belgium	Belgium	Italy	Denmark	Brazil	Croatia	Brazil	Belgium	Australia
Austria	Belgium	Bulgaria	Austria	Belgium	France	France	Portugal	Japan	Bulgaria	Hungary	China	Bulgaria	Brazil
Belgium	France	China	Belgium	Denmark	Germany	Germany	Spain	Korea	China	Lithuania	Colombia	Denmark	China
Brazil	Germany	Colombia	Brazil	France	Ireland	Netherland		United Kingdom	Colombia	Poland	Egypt	France	Colombia
Bulgaria	Ireland	Egypt	Bulgaria	Germany	Italy			United States	Croatia	Romania	Indonesia	Germany	Croatia
China	Italy	Hungary	China	Ireland	Netherlands				Egypt	Russia	Kazakhstan	Hungary	Egypt
Colombia	Japan	Indonesia	Colombia	Italy	Portugal				Hungary	Turkey	Malaysia	Ireland	Indonesia
Egypt	Korea	Kazakhstan	Croatia	Japan	Spain				Indonesia	Ukraine	Mexico	Italy	Japan
France	Netherlands	Malaysia	Denmark	Korea					Kazakhstan		Panama	Lithuania	Kazakhstan
Germany	Portugal	Mexico	Egypt	Netherlands					Lithuania		Peru	Netherlands	Korea
Hungary	Spain	Peru	France	Portugal					Malaysia		Philippines	Poland	Malaysia
Indonesia	United Kingdom	Philippines	Germany	Spain					Mexico		South Africa	Portugal	Mexico
Ireland	United States	Poland	Hungary	United Kingdom					Panama		Thailand	Romania	Panama
Italy		Russia	Indonesia	United States					Peru		Venezuela	Spain	Peru
Japan		South Africa	Ireland						Philippines		Vietnam	United Kingdom	Philippines
Kazakhstan		Thailand	Italy						Poland				Russia
Korea		Turkey	Japan						Romania				South Africa
Malaysia		Ukraine	Kazakhstan						Russia				Thailand
Mexico			Korea						South Africa				Turkey
Netherlands			Lithuania						Thailand				Ukraine
Philippines			Malaysia						Turkey				United States
Poland			Mexico						Ukraine				Venezuela
Portugal			Netherlands						Venezuela				Vietnam
Russia			Panama						Vietnam				
South Africa			Peru										
Spain			Philippines										
Thailand			Poland										
Turkey			Portugal										
Ukraine			Romania										
United Kingdom			Russia										
United States			South Africa										
			Spain										
			Thailand										
			Turkey										
			Ukraine										
			United Kingdom										
			United States										
			Venezuela										
			Vietnam										

Note: Greece excluded; including it tremendously affects the estimated parameters in estimations owing to substantial jumps in credit default swap (CDS) spreads and bond spreads since 2011. Greek sovereign CDS spread and bond spread rose from about 1,000 and 1,100 basis points, respectively, at end 2010 to a peak of over 25,000 and 6,000 basis points in March 2012.

[1]Countries are included only when CDS and referenced bond yields are available from mid-2008 (Croatia, Denmark, Lithuania, and Romania are excluded). Some countries are excluded because of missing explanatory variables: Panama (equity prices), Venezuela (equity prices), and Vietnam (CDS volume).

Table 2.4. List of Variables Used in Regression Analysis

Variables	Definition	Original Frequency	Method of Frequency Conversion	Data Source
Dependent variables				
SCDS spread	Five-year sovereign CDS spread, in basis points.	Daily	Period average	Bloomberg L.P.
Bond spread[1]	Advanced economies: five-year generic government bond yield from Bloomberg – (five-year fixed-for-floating [LIBOR]) interest swap rate. Emerging market economies: five-year EMBI spread for each EMBI member country. Country-specific spreads from JPMorgan Asia Credit indices for Korea and Thailand. In basis points.	Daily	Period average	Bloomberg L.P.
Basis	Sovereign CDS spread – bond spreads, in basis points.	Daily	Period average	Bloomberg L.P.
Country-specific explanatory variables				
Fundamental variables				
Debt-to-GDP ratio	Gross general government debt in percent of GDP.	Annual	Cubic spline	IMF, WEO
GDP growth	Real GDP growth rate, in percent.	Annual	Cubic spline	IMF, WEO
Ratio of foreign reserves to GDP	International reserves minus gold, in percent of GDP.	Monthly	Period average	IMF, IFS
Bank ROA	Market-capitalization-weighted average return on assets for the financial sector in each country, in percent.	Annual	Cubic spline	IMF, CVU[2]
SCDS and bond market-specific indicators				
SCDS bid-ask spread	Sovereign CDS bid-ask spread in percent of mid spread.	Daily	Period average	Bloomberg L.P.
Bond bid-ask spread	Government bond bid-ask yield in percent of mid yield. Available only for countries where the CDS contract references domestic bonds (i.e., advanced economies excluding Korea). Values for other countries are set at zero.	Monthly	Period average	Bloomberg L.P.
Sovereign CDS/bond volume	Notional amount for outstanding sovereign CDS contracts (net of offsetting contracts) in percent of government debt outstanding.	Weekly	Period average	DTCC; WEO
Central bank operation	Central bank bond purchase amount per period, in percent of government bond outstanding. Available only for euro area countries (ECB), Japan, the United Kingdom, and the United States. For euro area economies, the variable is calculated as total bond purchase by ECB/country-specific government bond outstanding. Values are set at zero for the other economies.	Weekly	Period sum	Central bank websites
Market-based variables				
Equity return	Annualized return of MSCI country equity index (U.S. dollars). Calculated net of MSCI Global Equity Index (residual from linear regression), in percent, in order to avoid multicollinearity issues.	Monthly	Period average	Bloomberg L.P.; IMF staff estimates
Equity volatility	Volatility estimated by GARCH (1,1) using (gross) returns of MSCI country equity index (U.S. dollars). Calculated net of the GARCH (1, 1) estimated volatility for MSCI Global Equity Index (residual from linear regression), in percent, in order to avoid multicollinearity issues.	Monthly	Period average	Bloomberg L.P.; IMF staff estimates
Global or region-specific explanatory variables				
VIX	Implied volatility on S&P 500 index options.	Daily	Period average	Bloomberg L.P.
High stress	High market stress period, measured by the probability that the VIX is in a high volatility state (out of three possible states), estimated by a regime-switching framework (Gonzalez-Hermosillo and Hesse, 2011).	Daily	Period average	Bloomberg L.P.; IMF staff estimates
Global equity return	Annualized return in excess of one-month U.S. Treasury yields, in percent.	Monthly	Period average	Bloomberg L.P.
Counterparty	Average CDS spreads for 12 CDS dealer banks (Bank of America, Barclays, BNP Paribas, Citi, Credit Suisse, Deutsche Bank, Goldman Sachs, HSBC, JPMorgan, Royal Bank of Scotland, Société Générale, and Wells Fargo). Calculated net of VIX (residual from linear regression) in basis points in order to avoid multicollinearity issues.	Monthly	Period average	Bloomberg L.P.; IMF staff estimates
Funding cost	Three-month LIBOR-OIS spread, in basis points. In own currency for advanced economies, excluding Korea, and in U.S. dollars for emerging market economies and Korea.	Daily	Period average	Bloomberg L.P.

Source: IMF staff.

Note: AE = advanced economies; CDS = credit default swaps; CVU = Corporate Vulnerability Utility; DTCC = Depository Trust and Clearing Corporation; ECB = European Central Bank; EM = emerging market economies; IFS = IMF, International Financial Statistics database; OIS = overnight indexed swap; ROA = return on assets; WEO = IMF, World Economic Outlook database.

[1]For all AE (except for Korea) in the panel sample, sovereign CDS contracts reference domestic bonds, hence domestic government bond yields are used to calculate corresponding bond spreads. For all EM and Korea, sovereign CDS contracts reference external debt, hence JPMorgan's EMBI country-specific spreads are used (country-specific spreads from JPMorgan's Asia Credit indices are used for Korea and Thailand). AE, EM definitions follow IMF, WEO classification of countries and groups.

[2]CVU: an internal database at the IMF constructed using market data from DataStream and company financial statement data from Worldscope.

market liquidity (i.e., high bid-ask spreads) is expected to increase SCDS spreads. The impact of volume is ambiguous: spreads increase with volume if more trading takes place when sovereign risk and demand for insurance are high but decrease if more trading improves market liquidity (e.g., as the SCDS market develops).

- *Country-specific market variables and global variables.* Positive domestic or international equity returns should be associated with better economic performance and lower SCDS spreads. Higher uncertainty and risk aversion (higher country-specific equity volatility and VIX—the implied volatility on S&P 500 index options) should raise SCDS spreads. Higher counterparty risk (proxied by lagged average CDS spreads of major dealer banks) should reduce SCDS spreads, as it reduces the value of SCDS protection sold by financial firms (Arce, Mayordomo, and Pena, forthcoming; and Chan-Lau, 2008). Higher funding costs (LIBOR-OIS spreads and repo haircuts) could make it more expensive to buy reference bonds, and higher margin requirements could reduce the supply of SCDS protection sales, thereby raising spreads. Some of these variables are highly correlated, which may cause multicollinearity problems. Therefore, we use country-specific equity returns net of global equity returns, country specific equity volatility net of global equity volatility, and counterparty risk net of VIX.[54]

We also estimate a variation of the base model to examine different sensitivities to each explanatory variable during distressed time periods. We proceed by including interaction terms constructed by multiplying a high market stress indicator by the explanatory variables (X_i). Our measure of high stress, based on González-Hermosillo and Hesse (2011), is the probability (ranging from 0 to 1) that VIX is in a high volatility regime (see Figure 2.9).

$$\text{Variation } y_i = \alpha_i + \beta X_i + \gamma HighStress \cdot X_i + \varepsilon_i \quad (2.2)$$

Models are then estimated with and without cross-section and time fixed effects, using robust or clustered standard errors. They are estimated both in levels and

[54]For instance, we use residuals of a simple ordinary least squares regression of country-specific equity returns on global equity returns. See Table 2.4 for details.

in differences as a robustness check, as in Diekman and Plank (2012), to account for possible unit roots or for unobserved cross-section-specific effects. The results are broadly consistent with each other, and the level results are used in Figure 2.5 and Table 2.5.

Determinants of the "SCDS-Bond Basis"

The SCDS-bond basis is usually positive for most advanced economies and negative for most emerging market economies.[55] This is because spreads on advanced economy government bonds are negative given that their sovereign yields are generally lower than their comparable interbank rates, which are used to calculate the bond spread, while SCDS spreads are always positive (see Figure 2.14). The opposite is true for emerging market economies whose bond spreads are in foreign currency and are calculated relative to the corresponding maturity U.S. Treasury bonds. At the same time, generalized periods of distress were reflected in notable jumps in the basis for both advanced and emerging market economies.

We estimate a panel model similar to equations (2.1) and (2.2) with the same explanatory variables but with the SCDS-bond basis as the dependent variable (see Table 2.6 for results). The role of central bank purchases is also explored. In general, the results for the SCDS-bond basis should reflect the relative effects of the various factors on the SCDS spreads and government bond spreads. The effects of factors would have a positive effect if SCDS markets are more sensitive to the factor than are government bond markets. Similarly, an opposite sign is expected if the government bond market is the more sensitive. Regarding market microstructure factors, all else remaining constant, liquid SCDS markets would reduce SCDS spreads and hence lower the basis.[56] In

[55]For purposes of the model estimated here, the basis is the difference between the CDS spread and bond spread, which is equivalent to the basis measure described in Annex 2.1.

[56]See Arce, Mayordomo, and Pena (forthcoming); Ammer and Cai (2011); and Chan-Lau (2008). Ammer and Cai (2011) also show that the option for protection buyers to deliver a wide range of bonds, allowing them to choose the cheapest, leads to a positive basis because protection sellers charge a higher premium to account for the possibility of being delivered less valuable bonds.

Table 2.5. Summary of Estimation of Monthly Drivers for Sovereign Credit Default Swap (SCDS) Spreads and Bond Spreads, October 2008–September 2012

	Expected Sign		CDS, Level			Bond, Level		
				Estimation: With High Stress[2]			Estimation: With High Stress[2]	
	SCDS	Bond	Estimation: Base Model[1]	Direct Impact	High-Stress Interaction term	Estimation: Base Model[1]	Direct Impact	High-Stress Interaction term
Country-specific explanatory variables								
Fundamental variables								
Debt-to-GDP ratio	+	+	12.73***	13.32***	−0.64	9.26***	9.76***	−1.17*
GDP growth	−	−	−6.70***	−10.03***	11.49	−2.64*	−4.23***	0.41
Ratio of foreign reserves to GDP	−	−	−6.93*	−5.13	−1.73*	−19.82***	−18.14***	0.33
Bank ROA (lag 12)	−	−	−7.15*	−4.01	−21.79**	−4.54**	−3.75**	−11.22
SCDS and bond market-specific indicators								
SCDS bid-ask spread	+	+/−	10.78***	16.54***	-4.31	8.23***	14.18***	−6.73**
SCDS/bond volume	+/−	+/−	45.16***	48.26***	6.30	41.05***	40.56***	5.44
Bond bid-ask spread, selected advanced economies[3]	+/−	+	37.33***	26.18***	13.25	56.86***	47.62***	17.10*
Market-based variables								
Equity return	−	−	−0.22	−0.29**	0.14	−0.20	−0.29***	0.24
Equity volatility	+	+	1.16***	−0.01	1.68*	0.91***	−0.01	1.38***
Global and region-specific explanatory variables								
VIX	+	+	5.22***	−0.59	8.00**	3.83***	0.25	6.49**
Global equity return	−	−	0.32*	−0.47*	0.97**	0.23*	−0.33**	0.71**
Counterparty (lag 1)	−	+/−	0.31***	−0.05	0.23	0.18**	−0.07	0.30
Funding cost	+	+	1.03**	4.19***	−3.86***	0.63**	2.77***	−2.71***
Adjusted R-squared[4]			0.67	0.68		0.77	0.78	

Source: IMF staff estimates.

Note: ROA = return on assets; VIX = implied volatility on S&P 500 index options. This table summarizes the results of the fixed-effects panel estimation on monthly drivers for SCDS and bond spreads using level data. + and − indicate the sign of expected coefficients. ***, **, and * denote statistical significance at the 1 percent, 5 percent, and 10 percent levels of confidence based on clustered standard errors. For explanation of the variables, see Table 2.4.

[1]Model estimates for 33 advanced and emerging market economies. See Table 2.3 for the list of countries.

[2]This estimation includes the interaction term for high-stress periods. The results are shown in two columns: "Direct Impact" shows the coefficients for explanatory variables on their own, and "High-Stress Interaction Term" shows the coefficients for high-stress period indicator multiplied by explanatory variables (see the text). High-stress periods are identified as the ones in the highest one-third of the volatility distribution for VIX using a Markov-Switching approach. See Figure 2.9.

[3]Bond bid-ask spreads are available only for advanced economies using domestic bond yields, except for Korea, which is an advanced economy following the World Economic Outlook classification, but whose SCDS references external debt.

[4]In the high-stress estimation, the adjusted R-squared applies to both the direct impact and high-stress interaction terms.

contrast, in several advanced economies, programs of the central bank to purchase government bonds lower their government bond yields, widening it (see IMF, forthcoming). Since these market features might affect advanced economies differently from emerging market economies, these two groups are estimated separately.

The expected relationships for the variables are as follows:

- *Factors limiting arbitrage.* Higher counterparty risk and funding costs could reduce the basis, as the impact of counterparty risk should fall more on SCDS as an OTC derivatives contract, and the impact of funding costs should fall more on bonds that make it more expensive to borrow cash for trading. Larger SCDS (bond) bid-ask spreads should increase (decrease) basis as lower liquidity in the market should primarily bid up spreads in that specific market. The impact of volume is ambiguous.

- *Factors creating differential reactions between the markets.* For the analysis of basis, we introduce bond purchase operations by central banks, as such purchases are expected to reduce bond spreads below SCDS spreads. The coefficients for other variables (fundamentals and markets), together with the results from spread determinants analysis, should indicate which market reacts more to economic and market developments. For example, if both SCDS spreads and bond spreads show positive and significant signs vis-à-vis the debt-to-GDP ratio, and the bond market reacts more than (about the same as)

SCDS, its coefficient in basis regression should be negative (insignificant). Making the assessment in combination with determinants analysis is critical because a negative or insignificant coefficient may also reflect insignificant or unreasonable estimates in both SCDS and bond spread analysis.

The regression analysis of the SCDS-bond basis shows that, overall, the SCDS market is not more sensitive than the government bond market to the factors evaluated (Table 2.6). For some factors, the SCDS spreads react more; for some others, the reverse; and for still other factors, no statistical relationship is detected at all.

- For the full sample of countries and the sample of emerging market economies, SCDS react more than bonds to some economic fundamental factors but less to others.

- On the other hand, the SCDS-bond basis appears to be only weakly related to financial market risk factors.[57]

- The SCDS-bond basis is significantly related to specific forces in the SCDS and government bond market microstructures. However, for advanced economies, higher SCDS bid-ask spreads reduce the basis, suggesting that less SCDS market liquidity has a larger effect on bond spreads than on SCDS spreads. This result is somewhat counterintuitive, as usually one would expect market liquidity to have a larger effect on the underlying market.

During stress periods, the SCDS market appears to react more than the bond market, but mostly for emerging market economies.

[57]This is in line with other studies, including Fontana and Scheicher (2010) and Arce, Mayordoma, and Pena (forthcoming).

Table 2.6. Summary of Estimation Results on Drivers for Basis, October 2008–September 2012

	Expected sign	Full Sample			Advanced Economies			Emerging Market Economies		
		Estimation: Base Model[1]	Estimation: With High Stress[2]		Estimation: Base Model[1]	Estimation: With High Stress[2]		Estimation: Base Model[1]	Estimation: With High Stress[2]	
			Direct Impact	High-Stress Interaction term		Direct Impact	High-Stress Interaction term		Direct Impact	High-Stress Interaction term
Country-specific explanatory variables										
Fundamental variables										
Debt-to-GDP ratio	+/–	3.31**	2.95***	0.77**	-2.12***	-2.33***	0.15	17.50***	15.00***	2.81***
GDP growth	+/–	-4.92***	-4.62***	8.52**	16.48***	3.89***	8.97***	-5.12**	-5.11***	13.14**
Ratio of foreign reserves to GDP	+/–	19.06***	17.16***	-2.70**	28.81***	31.88***	-2.30**	14.09***	11.48***	-1.81**
Bank ROA (lag 12)	+/–	-3.67*	-0.55	-8.95**	-0.56	-2.41**	-3.48	-5.61**	-1.95	-9.66*
SCDS and bond market-specific indicators										
SCDS bid-ask spread, EM	+	39.65***	37.04***	7.98	...	...	...	59.59***	51.13***	-5.69
SCDS bid-ask spread, AE	+	1.62	-1.53	4.32	-4.60***	-4.12***	-0.41	...	...	...
SCDS/bond volume, EM	+/–	-3.62	-1.53	3.60	...	...	...	9.13**	10.33*	6.19**
SCDS/bond volume, AE	+/–	58.58***	39.28***	14.94	11.69	14.99	-9.17	...	...	...
Bond bid-ask spread, AE excluding Korea[3]	–	-12.64***	-15.79***	-4.41	-9.39**	-9.90*	1.89	...	...	...
Central bank operation, selected AE[4]	+	2.51**	0.14	-1.03	2.79**	2.57	0.27	...	...	...
Market-based variables										
Equity return	+/–	-0.05	0.01	-0.14	-0.02	-0.01	-0.04	-0.14	-0.11	0.11
Equity volatility	+/–	0.18	-0.14	0.36	0.09	0.45***	-0.41**	0.07	-0.29	0.52
Global and region-specific explanatory variables										
VIX	+/–	...	0.04	-0.32	...	0.02	1.39	...	-2.27	-0.46
Global equity return	+/–	...	-0.13	0.04	...	-0.12*	0.27***	...	-0.41*	0.39
Counterparty (lag 1)	–	...	0.12	0.15	...	0.49***	-0.32**	...	0.01	-0.14
Funding cost	+	...	1.05***	-0.94**	...	0.41**	-0.14	...	1.58*	-1.68**
Adjusted *R*-squared[5]		0.55	0.55		0.79	0.77		0.52	0.51	

Source: IMF staff estimates.

Note: AE = advanced economies; EM = emerging market economies; ROA = return on assets; VIX = implied volatility on S&P 500 index options. The table summarizes the results of the fixed-effects panel estimation on drivers for the "basis" (SCDS-bond spreads) using monthly level data. + and – indicate the sign of expected coefficients. ***, **, and * denote statistical significance at the 1 percent, 5 percent, and 10 percent levels of confidence based on robust standard errors for the base model and on clustered standard errors for the other models. Cells with "..." indicate that the variables are not part of the model. For explanation of the variables, see Table 2.4.

[1]Model estimates for 33 advanced and emerging market economies. See Table 2.3 for the list of countries.

[2]This estimation includes the interaction term for high-stress periods. The results are shown in two columns: "Direct Impact" shows the coefficients for explanatory variables on their own, and "High-Stress Interaction Term" shows the coefficient for high-stress period indicator multiplied by explanatory variables (see text). High-stress periods are identified as the ones in the highest one-third of the volatility distribution for VIX using a Markov-Switching approach. See Figure 2.9.

[3]Bond bid-ask spreads area available only for countries using domestic bond yields. Korea is an advanced economy following WEO definition. However, their SCDS references Korea's external debt.

[4]Countries that have central bank bond purchase operation data, including euro area countries, Japan, the United Kingdom, and the United States.

[5]In the high-stress estimation, the adjusted *R*-squared applies to both the direct impact and high-stress interaction terms.

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DO CENTRAL BANK POLICIES SINCE THE CRISIS CARRY RISKS TO FINANCIAL STABILITY?

Summary

Major central banks have taken unprecedented policy actions following the financial crisis. In addition to keeping interest rates low for a prolonged period, they have taken a host of unconventional measures, including long-term liquidity provision to banks in support of lending, as well as asset purchases to lower long-term interest rates and to stabilize specific markets, such as those for mortgages.

Although the objectives differ somewhat across central banks, these policies have generally aimed to support the macroeconomy (by avoiding deflation and depression) and address short-term financial stability risks. Using econometric and other evidence, this chapter finds that the interest rate and unconventional policies conducted by the central banks of four major regions (the euro area, Japan, the United Kingdom, and the United States) appear indeed to have lessened vulnerabilities in the domestic banking sector and contributed to financial stability in the short term. The prolonged period of low interest rates and central bank asset purchases has improved some indicators of bank soundness. Central bank intervention mitigated dysfunction in targeted markets, and large-scale purchases of government bonds have in general not harmed market liquidity. Policymakers should be alert to the possibility, however, that financial stability risks may be shifting to other parts of the financial system, such as shadow banks, pension funds, and insurance companies. The central bank policy actions also carry the risk that their effects will spill over to other economies.

Despite their positive short-term effects for banks, these central bank policies are associated with financial risks that are likely to increase the longer the policies are maintained. The current environment shows signs of delaying balance sheet repair in banks and could raise credit risk over the medium term. Markets may be alert to these medium-term risks, as central bank policy announcements have been associated with declines in some bank stocks and increases in yield spreads between bank bonds and government bonds. Central banks also face challenges in eventually exiting markets in which they have intervened heavily, including the interbank market; policy missteps during an exit could affect participants' expectations and market functioning, possibly leading to sharp price changes.

Even though monetary policies should remain very accommodative until the recovery is well established, policymakers need to exercise vigilant supervision to assess the existence of potential and emerging financial stability threats, and they should use targeted micro- and macroprudential policies where possible to mitigate such threats to allow greater leeway for monetary policy to support the macroeconomy. Macroprudential policies—which may include robust capital standards; improved liquidity requirements; and well-designed, dynamic, forward-looking provisioning—should be implemented in a measured manner, as needed. The crisis has shown that corrective policies enacted after the risks materialize may be too late to contain damage to financial stability. As the experience with some macroprudential policies is relatively limited, their effectiveness should be carefully monitored. In the meantime, the unconventional monetary policy actions should continue, as they have, to keep financial stability goals in mind.

The central banks of the largest advanced economies have taken unprecedented measures to combat the deepest and most prolonged period of recession and financial instability since the 1930s. These measures include an extended period of very low interest rates as well as so-called unconventional policies—providing long-term liquidity to banks to support the flow of credit, lowering long-term rates through bond purchases, and stabilizing specific markets such as mortgage lending.[1] Central banks have also issued "forward guidance," in which they announce an intention to maintain an accommodative stance for an extended period. We will refer to the combination of exceptionally low policy interest rates and unconventional policy measures as "MP-plus" to indicate that these policies go beyond conventional monetary policy in terms of tools and objectives.

The objectives of MP-plus are to benefit not only the macroeconomy but also financial stability. By providing liquidity to banks and buying specific assets, MP-plus directly mitigates short-term instability in financial markets and vulnerabilities in the domestic banking sector. In addition, MP-plus also indirectly limits stress in the financial sector to the extent that it succeeds in preventing a sharper economic downturn. By encouraging economic activity through its easing of credit conditions, MP-plus can help strengthen private and public balance sheets and thus make a more durable contribution to financial stability. Such benefits may result, for instance, if firms take advantage of lower longer-term rates by extending the maturity profile of their debt.

However, MP-plus may have undesirable side effects, including some that may put financial stability at risk. Ample bank liquidity may raise credit risk at banks by compromising underwriting and loan

quality standards, and it may encourage a delay in necessary balance sheet repair and bank restructuring. Likewise, low interest rates encourage other financial institutions, including pension funds, insurance companies, and money market mutual funds, to increase risk by "searching for yield." A search for yield can help push the market value of some assets beyond their fundamental value ("bubbles") or drive an excessive increase in balance sheet leverage. In some cases, risks may stem not from the unconventional policies themselves but from the difficulties in exiting from them. Where central banks intervened in markets to mitigate instability, their presence may affect market functioning or mask continuing vulnerabilities, complicating exit and raising the potential for policy missteps.

This chapter aims to bring empirical evidence to bear on some of the financial stability effects of MP-plus. It defines and quantifies the MP-plus policies of four major central banks—the Federal Reserve, the European Central Bank (ECB), the Bank of Japan (BOJ), and the Bank of England (BOE)—and then identifies possible risks to domestic financial stability and to the financial health of banks. Banks are the focal point of the chapter because they are naturally leveraged and, as a whole, they are the most systemically important financial institutions in the advanced economies that are actively using MP-plus policies. The potential effects on pension funds and insurance companies and evidence of emergent bubbles are covered in Chapter 1. The risk that central bank measures will have macroeconomic and financial stability effects abroad is an important topic that deserves careful analysis; to keep the scope of this chapter manageable, it is not covered here, but it is examined in Chapter 1 and in an IMF paper on unconventional monetary policy (IMF, forthcoming).[2]

In the areas it examines, the chapter finds few immediate financial stability concerns associated with MP-plus. So far, it appears to have increased some measures of bank soundness; and in markets where central banks have become major players, their intervention either has not appreciably affected market liquidity or it has corrected market dysfunction. However, the longer

[1]Examples of the unconventional policies are quantitative easing by the Federal Reserve, the Funding for Lending Scheme by the Bank of England, and the announcement of the Outright Monetary Transactions of the European Central Bank. The Bank of Japan implemented a program of quantitative easing in the early 2000s and—along with other unconventional policy measures—again in the aftermath of the global financial crisis.

[2]Also see previous IMF publications for the effect on pensions and insurance (for example, Chapter 2 of the September 2011 GFSR) and spillovers (Chapter 4 of the April 2010 GFSR).

that MP-plus policies remain in place, a number of potential future risks are likely to increase, including heightened credit risk for banks, delays in balance sheet repair, difficulties in restarting private interbank funding markets, and challenges in exiting from markets in which central banks have intervened. The markets may be alert to these medium-term risks, since the analysis finds evidence of an increase in the medium-term risk of bank default after MP-plus announcements.

Policymakers should use micro- and macroprudential policies where possible to counter the financial stability risks that may be emerging over the medium term. Implementing such policies in a measured manner, as needed, would allow MP-plus greater leeway to support price stability and growth while protecting medium-term financial stability. However, the exceptional nature of current monetary policies and the relatively untested macroprudential tools in many countries make this uncharted territory for policymakers, and the effectiveness of the policy mix should be carefully monitored.

With a focus on financial stability, the chapter will not address the timing or modalities of the exit from MP-plus, although Box 3.1 notes some financial stability risks that may arise with exit. The chapter will also not assess the current and future economic effectiveness of unconventional monetary policies. These topics are covered in IMF (2010a) and IMF (forthcoming) respectively.

MP-Plus: An Overview

After the start of the financial crisis in 2007, central banks in major advanced economies undertook a number of MP-plus measures.[3] These measures can be classified into four groups (with some overlap between groups):

- *Prolonged periods of very low interest rates,* sometimes combined with forward guidance on the length of time for which rates are expected to remain low;
- *Quantitative easing* (QE), which involves direct purchases in government bond markets to reduce yield levels or term spreads when the policy rate is at or close to the lower bound;

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[3]Annex 3.1 lists the various announcements of MP-plus measures since the start of the financial crisis.

- *Indirect credit easing* (ICE), in which central banks provide long-term liquidity to banks (sometimes with a relaxation in access conditions), with the objective of promoting bank lending; and
- *Direct credit easing* (DCE), when central banks directly intervene in credit markets—such as through purchases of corporate bonds or mortgage-backed securities—to lower interest rates and ease financing conditions (and possibly mitigate dysfunction) in these markets.

MP-plus measures were taken with both macroeconomic and financial stability objectives in mind, with the mix depending, in part, on the mandates of specific central banks. The financial stability objectives are the subject of this chapter. Box 3.2 summarizes IMF (forthcoming), which looks at the macroeconomic effects of unconventional monetary policies.

These operations have led to a fundamental change in the size and composition of central bank balance sheets. Total assets have increased significantly, mostly in the form of government securities, bank loans, equities, and mortgage-backed securities (Table 3.1 and Figure 3.1). These shifts entailed specific (and new) risks for central banks, including credit and market risks. Unless they are adequately managed, including through enhanced loss-absorbing capacity, these risks (or perceptions about them) may affect the ability of central banks to perform their mandated roles and their credibility. If balance sheet assets are managed poorly, they could affect financial stability, as discussed later in this chapter.

Outlined below are some risks that are, or might become, associated with MP-plus—not all of them are currently evident—along with recommendations for corresponding policy responses. The next sections will examine the extent to which some of these risks are emerging today—in specific financial markets as well as in financial institutions—and which of them may become more pronounced over the medium term. The descriptions below are meant to provide the full scope of potential channels through which financial stability could be affected—some of these channels are examined below, others in Chapter 1. These effects focus on domestic institutions and markets; as noted above, other IMF publications address the important potential spillovers to other economies.

Table 3.1. Asset Holdings of Major Central Banks Related to MP-Plus, 2008–12

	Dec-08	Dec-09	Dec-10	Dec-11	Oct-12	Reasons
Bank of England (in billions of pounds)						
Liquidity (longer term)[1]	170	24	17	10	11	Provide adequate bank refinancing
Asset Purchase Facility						
Gilts	. . .	188	198	249	375	Raise nominal spending in order to meet inflation target by affecting level and shape of yield curve
Corporate bonds	. . .	1.55	1.12	0.65	0.03	Improve liquidity in corporate credit
Commercial paper	. . .	0.43	0.00	0.00	. . .	
Funding for lending	. . .	. . .	. . .	. . .	4.4[2]	Encourage lending to the real economy
Memorandum items: Total assets	238	238	247	290	414	
GDP	1,441	1,402	1,467	1,516	1,548	
Bank of Japan (in trillions of yen)						
Liquidity (new stimulus)	...	...	24.8	32.0	29.0	Ease financing conditions
Other outstanding loans and repo	39.9	42.3	18.8	7.5	3.7	
Asset purchases						
Commercial paper	...	...	0.1	2.0	1.5	Reduce market rates and risk premiums across various types of financial assets and combat deflation risks
Corporate bonds	...	...	0.1	1.5	2.9	
Government bonds and bills	...	...	1.2	5.6	28.4	
ETFs, REITs	...	...	0.02	0.9	1.6	
Memorandum items: Total assets	123	123	129	143	150	
Total sovereign holdings	63.1	72.0	76.7	90.2	107.6	
GDP	501	471	482	471	477	
European Central Bank (in billions of euros)						
Short-term liquidity	226	81	249	160	117	Maintain sufficient bank intermediation and provide longer-term bank financing
Long-term liquidity	617	669	298	704	1059	
Asset purchases						
Covered bonds (CBPP)	...	29	61	62	70	Sustain key bank funding channel
Government bonds (SMP)	...	...	75	213	208	Maintain/restore European Central Bank policy rate transmission
Memorandum items: Total assets	2,043	1,852	2,004	2,736	3,047	
GDP	9,242	8,922	9,176	9,421	9,503	
Federal Reserve (in billions of U.S. dollars)						
Short-term liquidity						
Loans and repo	274[3]	86	45	9	1.2	Provide adequate short-term bank funding
U.S. dollar swaps	554	10	0.08	100	12.5	Provide adequate funding for foreign exchange operations
Long-term liquidity						Provide adequate long-term bank funding against MBS and ABS collateral
TALF	. . .	0.30	0.67	0.81	0.86	
Asset purchases						
Agency MBS	. . .	908	992	837	852	Support housing finance
Agency debt	20	160	147	104	82	Support GSEs
Treasury securities	476	777	1016	1672	1651	Affect level and shape of yield curve
Memorandum items: Total assets	2,241	2,237	2,423	2,928	2,832	
GDP	14,292	13,974	14,499	15,076	15,653	

Sources: Central banks' websites; Haver Analytics; and IMF staff estimates.

Note: ABS = asset-backed securities; CBPP = Covered Bond Purchase Programme; ETFs = exchange traded funds; GSEs = government-sponsored enterprises; MBS = mortgage-backed securities; REITs = real estate investment trusts; SMP = Securities Market Programme; TALF = Term Asset-Backed Securities Loan Facility.

[1]Zero short-term liquidity provision over the sample period outstanding at end-December 2008.

[2]Includes use of Extended Collateral Term Repo and Long-Term Repos.

[3]Includes 28-day transactions under the TSLF (Treasury Securities Lending Facility) of about $190 billion.

- *Prolonged periods of low interest rates* can affect the profitability and solvency of financial institutions. A flattening of the yield curve puts pressure on banks' interest margins, and low interest rates increase the net present value of liabilities of pension funds and life insurance companies. Low-yielding assets may induce excessive risk taking in a search for yield, which may manifest itself in asset price bubbles. The low opportunity cost of funds and reduced net interest margins may also give banks incentives to delay the cleanup of their balance sheets and reduce pressure on authorities to demand vigorous bank restructuring. Low interest rates could also encourage pockets of excessive releveraging—in banks, which

Figure 3.1. Changes in Central Bank Balance Sheets, 2006–12
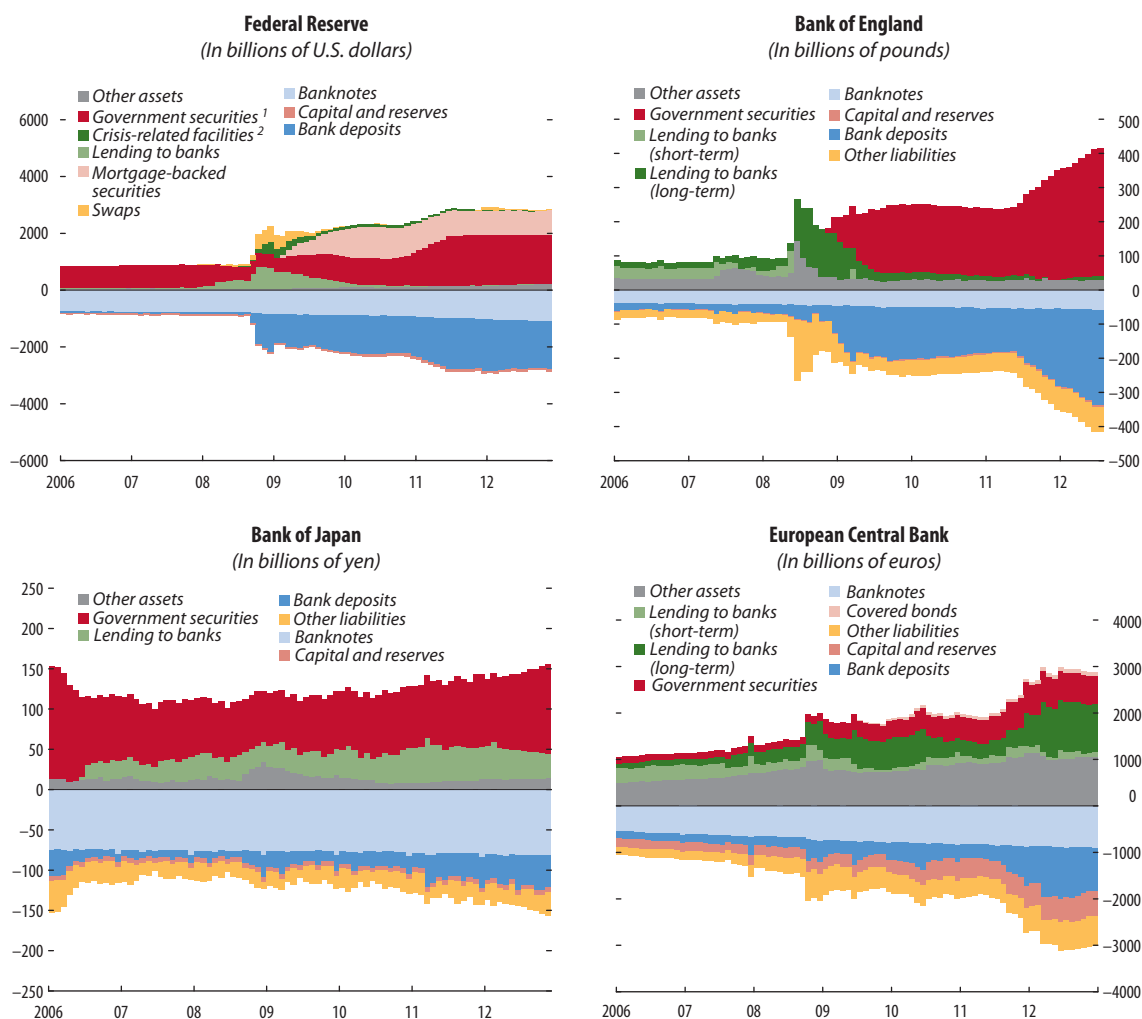
Sources: Haver Analytics; national central banks; and IMF staff estimates.
Note: Government bonds purchased under the Bank of England's quantitative easing (QE) program are held by a separate subsidiary, which is financed by loans from the Bank of England (under "other assets"). Reported here are the amounts purchased under the asset purchase facility (the corresponding loan amount is subtracted from "other assets").
[1]Including agency securities.
[2]Special-purpose vehicles, commercial paper, and money-market-related assets.

are naturally leveraged, but also in the nonfinancial corporate or household sectors. Banks will require vigilant risk-based supervision, capital requirements should be adjusted to account for the true riskiness of loan portfolios and other assets, and well-designed dynamic and forward-looking provisioning should be implemented (see Wezel, Chan-Lau, and Columba, 2012).

• *Quantitative easing* could exacerbate shortages of safe assets (although the policy intention is, in part, to encourage investment in riskier, more

productive assets).[4] As with indirect credit easing, the large increases in bank liquidity associated with QE could make financial institutions addicted to central bank financing (since central bank intermediation of interbank funds shifts

[4]The availability of safe assets could decline through increased central bank holdings (as a result of QE purchases) and through the increased encumbrance of assets, as banks post more collateral at central banks to obtain funding. The latter is encouraged as central banks relax collateral rules. See also Chapter 3 of the April 2012 GFSR.

Box 3.1. Financial Stability Risks Associated with Exit from MP-Plus Policies

In considering the risks to financial stability of exit from MP-plus, it is useful to distinguish between two aspects, namely, an exit from low policy rates and the sale of central banks' accumulated inventory of assets, most of which are debt securities.

In the current cycle, as in previous ones, the central bank will need to raise interest rates at some point to safeguard price stability. But the need to sell assets to tighten policy is less evident—central banks could simply hold them to maturity and use other policy tools; but other concerns, including political considerations, may still prompt asset sales. Hence, the challenges and risks of both types of exit must be anticipated and managed, especially since the use of MP-plus policies is uncharted territory for policymakers.[1]

The main financial stability risks of exit are associated with an unexpected or more-rapid-than-expected increase in interest rates, especially at the longer end of the yield curve. Hence, when the time comes to tighten financing conditions for banks and the economy, central banks would likely aim for an anticipated and gradual increase in interest rates, giving economic agents time to adjust. A disorderly increase or an overshooting—perhaps as a result of shifts in market sentiment—would make adjustment to the new financial environment much more difficult, heightening the risks listed below.

Many MP-plus policies are unprecedented, and they have now been in place for a relatively long time. It is therefore even more important than during a normal tightening cycle that exit strategies are well communicated to the general public as well as to markets, financial institutions, and other central banks. The risks below also underline the importance of efforts to ensure that bank soundness and market liquidity are restored as soon as possible to minimize the financial stability threats of a future exit from MP-plus.

Risks associated with increasing interest rates include the following:

- *Banks and other financial institutions may incur capital losses on fixed-rate securities.* While the evidence suggests that a rise in interest rates increases net interest margins for banks, improving their profitability over time, losses on fixed-rate securities available for sale are immediate. In the short term, therefore, weakly capitalized banks could suffer. For financial institutions with long-term liabilities, such as pension funds, capital losses may be offset by a decrease in the net present value of liabilities.
- *Credit risk for banks may increase.* Higher interest rates could weaken loan performance, especially if the rise is in response to an inflation threat rather than improved economic circumstances.
- *Spillovers to other countries or markets may occur.* Shifting expectations of the path of future interest rates can lead to financial flows between markets and countries that could be sudden and potentially disruptive, especially if the timing of tightening differs across central banks.

Risks associated with asset sales include the following:
- *Shifts in market sentiment may lead to sharp increases in yields.* Uncertainty about the necessity or willingness of central banks to sell their large portfolios of government bonds and other assets could lead to shifts in market sentiment when central bank asset sales materialize.
- *Policy missteps may disrupt markets.* If central banks sell assets before underlying market vulnerabilities are addressed, dysfunction could resurface. This risk is heightened in markets where central banks hold a large share of outstanding securities or played an important market-making role, especially if ongoing market dysfunction is now masked by central bank intervention.
- *Banks may face funding challenges.* Just as the counterpart of purchases of assets by central banks was an increase in banks' excess reserves, the counterpart of asset sales would likely be a decline in banks' excess reserves. This disintermediation of interbank liquidity by the central bank would have to be offset by a revival of private interbank markets. If this market is not fully restored, some banks could face funding challenges.

Note: Prepared by S. Erik Oppers and Nico Valckx.
[1]See IMF (2010a) for a description of the principles underlying exit strategies; IMF (forthcoming) presents some further thoughts on the topic.

Box 3.2. The Macroeconomic Effectiveness of MP-Plus

Central banks have deployed a variety of unconventional measures during the crisis. But is there a limit to their effectiveness in case of a potentially prolonged downturn?

A forthcoming IMF publication, "Unconventional Monetary Policies: Recent Experience and Prospects," addresses three questions about unconventional monetary policies. First, what policies were tried, and with what objectives? Second, were policies effective? And third, what role might these policies continue to play in the future?

Central banks in key advanced economies adopted a series of unconventional monetary policies with two broad goals. The first was to restore the functioning of financial markets and intermediation. The second was to provide further monetary policy accommodation at the zero lower bound of policy interest rates. These two goals are clearly related, as both ultimately aim to ensure macroeconomic stability. But each relies on different instruments: the first on targeted liquidity provision and private asset purchases, and the second on forward guidance and bond purchases.

These policies largely succeeded in achieving their domestic goals, and were especially effective at the time of greatest financial turmoil. Market functioning was broadly restored, and tail risks declined significantly. Policies also decreased long-term bond yields, and in some cases credit spreads. Some evidence also suggests that these policies encouraged growth and prevented deflation, although this conclusion is less clear-cut, given the long lags and unstable relations between variables, and the unresolved question of what would have happened without central bank policy intervention.

Unconventional monetary policies had a mixed effect on the rest of the world. Early policy announcements buoyed asset prices globally, and likely benefited trade. Later announcements had smaller effects and increased capital flows to emerging markets, with a shift to Latin America and Asia. Sound macroeconomic policies can help manage these capital flows. Yet, when flows become excessive, with the risk of sudden reversals, they can give rise to policy strains in recipient countries.

Looking ahead, unconventional monetary policies may continue to be warranted if economic conditions do not improve or if they worsen. Yet, bond purchases in particular seem to exhibit diminishing effectiveness, and their growing scale raises risks. A key concern is that monetary policy is called on to do too much, and that needed fiscal, structural, and financial sector reforms are delayed.

Note: Prepared by Tommaso Mancini-Griffoli.

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credit risk away from the private parties), delaying balance sheet repair and the restoration of an interbank market. Improved liquidity risk management in banks and implementation of Basel III liquidity requirements can help ease some of these risks (see Chapter 2 of the April 2011 GFSR).

- *Indirect credit easing* could make financial institutions dependent on long-term central bank (that is, public sector) financing, delaying the restoration of private sources of funding and providing incentives to allocate bank credit toward borrowers that qualify for the associated lending program. Some of these borrowers might not otherwise qualify for loans, thereby weakening underwriting standards, with potential adverse effects on longer-term loan performance and

hence on the future health of banks. These risks to loan performance should be acknowledged by banks and their supervisors, and appropriate forward-looking provisions should be made**.**

- *Direct credit easing* could introduce distortions to prices and market functioning if central banks become the dominant buyer in markets in which they intervene. These distortions could emerge with rising expectations of an imminent central bank exit and could under certain circumstances lead to large price swings and other dysfunction. Banks may be hurt by these price swings if they hold large volumes of securities traded in these markets. Supervisors should be cognizant of these potential risks, which banks should be required to address.

Some of these risks are closely connected to the intended policy objectives. For example, although central bank intervention may distort market dynamics or functioning in a way that may have negative implications for financial stability, drawing investors (back) into intervened markets may in fact have been the intended goal of the policy. This highlights the care with which the potential threats to financial stability need to be evaluated.

Effects of MP-Plus on Markets

Money and Interbank Markets

The prolonged period of low interest rates increases risks in money markets, including through developments in money market mutual funds (MMMFs). With interest rates remaining near zero in the maturities at which MMMFs are permitted to invest, these institutions are experiencing very low (in some cases zero or negative) returns that in many cases fail to cover the costs of fund management. As a consequence, U.S. MMMFs have raised credit risk modestly (within the confines of regulatory restrictions), engaged in more overnight securities lending, granted fee waivers, and turned away new money.

The fundamental problem is that to become profitable the MMMF industry needs to shrink further, and the risk is that it may do so in a disorderly fashion. For example, another run on MMMFs may occur if downside credit risks materialize or securities lending suddenly halts, fueling investors' fear of MMMFs "breaking the buck" (that is, failing to maintain the expected stable net asset value). Once started, a run may accelerate because investor guarantees that were established in the wake of the Lehman Brothers bankruptcy have been removed, and the Dodd-Frank Act precludes the Federal Reserve from unilaterally stepping in to provide liquidity to the sector.[5] Although the assets

[5]The U.S. Treasury Department introduced the Temporary Guarantee Program, which covered certain investments in MMMFs that chose to participate in the program and has now expired. The Federal Reserve created an Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility, through which it extended credit to U.S. banks and bank holding companies to finance their purchases of high-quality asset-backed commercial paper from MMMFs.

of MMMFs are already shrinking in the low interest rate environment as investors seek higher returns elsewhere, an outright run would be undesirable and could have systemic consequences if the funding that these institutions provide to banks—directly and through overnight securities lending—dries up.

Central bank interventions in the interbank markets were a response to a significant reduction in interbank lending activity that mostly resulted from increased sensitivity to counterparty risk. With indirect credit easing policies, central banks made longer-term funds available at fixed low rates and softened collateral rules, aiming to avoid a severe credit contraction. This form of credit easing lowered interbank spreads during the crisis, especially in the euro area and Japan. By partially replacing the interbank market, central banks play a crucial role in the distribution of bank funding in some areas.

From a money-market perspective, risks stem not so much from central bank intervention itself as from a misstep in the eventual withdrawal from the market. If central banks exit from interbank markets before underlying conditions are addressed and the private bank funding market is fully restored, renewed strains could resurface, with the costs of short-term bank financing turning significantly higher for some banks. These risks are difficult to quantify because central bank intervention may mask the dysfunction it was designed to address. A decomposition of interbank spreads may offer some insights (Figure 3.2). Central bank liquidity no longer appears to significantly affect interbank market spreads in the United States and the United Kingdom. This could indicate that future central bank exit from these markets would not affect interbank spreads there. In the euro area and Japan, however, central bank intervention ("Central bank liquidity" in Figure 3.2) appears to continue to mask more elevated interbank market spreads due to increased sensitivity to counterparty risk ("Bank risk" in Figure 3.2). This could be an indication that spreads could increase if and when central banks withdraw bank liquidity, although the gradual decline of such liquidity in Japan over the past year (see Figure 3.1) does not appear to have led to significantly increased yield spreads.

Figure 3.2. OIS Counterparty Spread Decompositions
(Three-month LIBOR-OIS spread, in basis points)
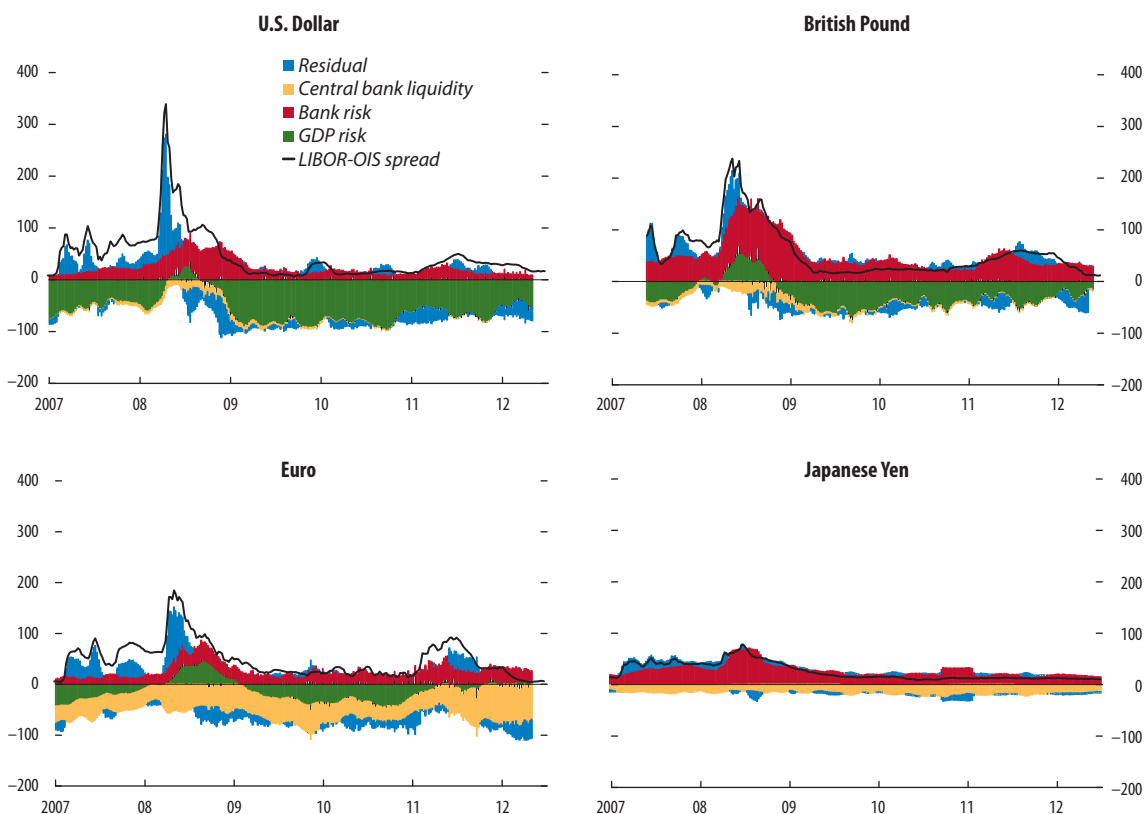
Sources: Bloomberg L.P.; Datastream; JPMorgan Chase; and IMF staff estimates.
Note: CDS = credit default swaps; LIBOR = London interbank offered rate; OIS = overnight indexed swap; PMI = Purchasing Managers' Index. Decomposition based on least-squares regressions of weekly LIBOR-OIS spreads on a constant (not shown), indicators of growth risk (PMI-based GDP tracker), sovereign risk (changes in sovereign CDS spread; the Sovx Western Europe Index for the euro area; sovereign CDS spreads for the United Kingdom and the United States), bank risk (major bank equity index historic 90-day volatility), and central bank liquidity (liquidity provision to banks as a percent of banking sector assets). Higher growth, increased central bank liquidity, lower bank volatility, and sovereign risk all tend to reduce LIBOR-OIS spreads. The sovereign risk contribution is not shown, as it is very small relative to the other factors in the regression.

Mortgage and Corporate Securities Markets

Direct credit easing by the major central banks through interventions in mortgage and corporate bond markets have attempted to improve liquidity and lower interest rates for borrowers in these markets. During 2009 and the first half of 2010, the Federal Reserve purchased close to $1 trillion in mortgage-backed securities (MBS) to support the U.S. housing market and alleviate pressures on the balance sheets of U.S. banks. It made a new commitment to buy MBS in September 2012 in an effort to lower mortgage interest rates further and spur credit extension (Figure 3.3). In two purchase programs, the ECB bought a total nominal amount of €76.4 billion of covered bonds, and the BOE bought up to £1.5 bil-

lion in corporate bonds. The BOJ also maintains a limited program to purchase corporate bonds, real estate investment trusts (J-REITs), and exchange-traded funds (corporate stocks).

Some central banks have made extensive purchases in these markets. While geared toward clear objectives, these programs may mask continuing underlying distortions, and their removal may pose policy challenges. The programs of the Federal Reserve and ECB appear to have reduced yields as intended (see Figure 3.3; and IMF, forthcoming).[6] In particular, the purchases of the

[6]In addition, an analysis (not reported here) of Federal Reserve interventions in MBS markets and ECB interventions in euro area covered bond markets (controlling for other risk factors) confirms the significant effect on yields of these MP-plus policies.

Figure 3.3. Central Bank Intervention in Real Estate Securities Markets
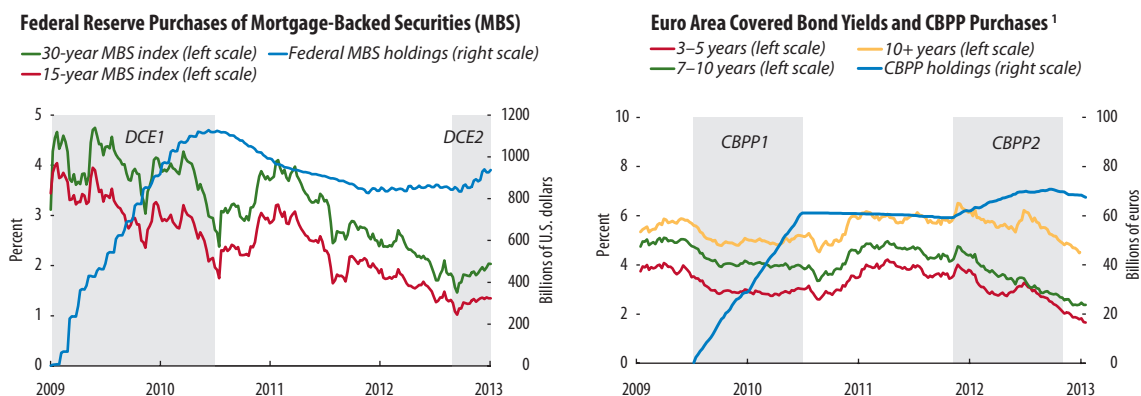
Sources: European Central Bank; Federal Reserve; JPMorgan Chase; and IMF staff estimates.
Note: DCE = direct credit easing; CBPP = Covered Bond Purchase Programme. Shaded areas show different periods of DCE and CBPP purchases.
[1]Covered bond yields refer to euro area Pfandbriefe indices.

Federal Reserve have made it a major market player, holding 20 percent of outstanding MBS.[7] Central bank intervention in these markets does not in itself threaten financial stability (indeed, it was designed to safeguard it), but it does raise policy risk surrounding a future exit. While the presumption may be that central banks should not and would not exit before underlying conditions permit, the large current role of central banks may mask underlying vulnerabilities in the private market that may be difficult to assess. An inadvertently premature exit could have an adverse impact on market liquidity and prices if it turns out that underlying market conditions have not improved.

Government Bond Markets

The Federal Reserve, BOE, and BOJ bought government bonds in quantitative easing programs with the main goal of lowering long-term interest rates. The analysis in IMF (forthcoming) found that these policies were broadly effective in reducing interest rates in these markets. Forward guidance has also kept yields on government bonds low. The longer the guidance is in place, however, the more complacent markets may

[7]In the euro area, although the ECB holds only 5 percent of outstanding covered bonds, it also played a large role in the primary market, purchasing about 10 percent of covered bond issuance in 2009, 5.5 percent in 2010, and nearly 4 percent in 2012. Covered bonds are also increasingly issued and retained by banks for use as a high-quality collateral source for accessing ECB lending facilities.

become about the implicit promise of intervention. So far, studies have suggested that the Federal Reserve's interventions have not impaired market functioning (Fleming and Mizrach, 2009; Engle and others, 2012). Market indicators appear to support this conclusion: overall, in the United Kingdom and the United States, the price impact of trade was relatively stable during periods of central bank asset purchases, and in Japan it appears to have fallen (Figure 3.4). With the possible exception of the first round of QE by the Federal Reserve, correlations between central bank purchases of government bonds and liquidity indicators such as price volatility, turnover, and the price impact of trade are generally small (Figure 3.5).

Through its Securities Market Programme (SMP), the ECB temporarily sought to support sovereign bond markets in periphery euro area countries that showed signs of dysfunction. The Outright Monetary Transactions program (OMT), announced in September 2012, also aims at supporting targeted sovereign bond markets by reducing risk premiums on these targeted securities.[8] Yields on periphery sovereign bonds have declined significantly since the announcement of the OMT, even though the program has not yet been activated.

The increasing share of government bonds held by central banks may present risks to financial stability.

[8]The ECB's indirect credit easing through three-year liquidity operations in late 2011 and early 2012 are also seen to have improved liquidity conditions in some euro area sovereign bond markets.

Figure 3.4. Central Bank Holdings of Domestic Government Securities and Market Liquidity, by Maturity
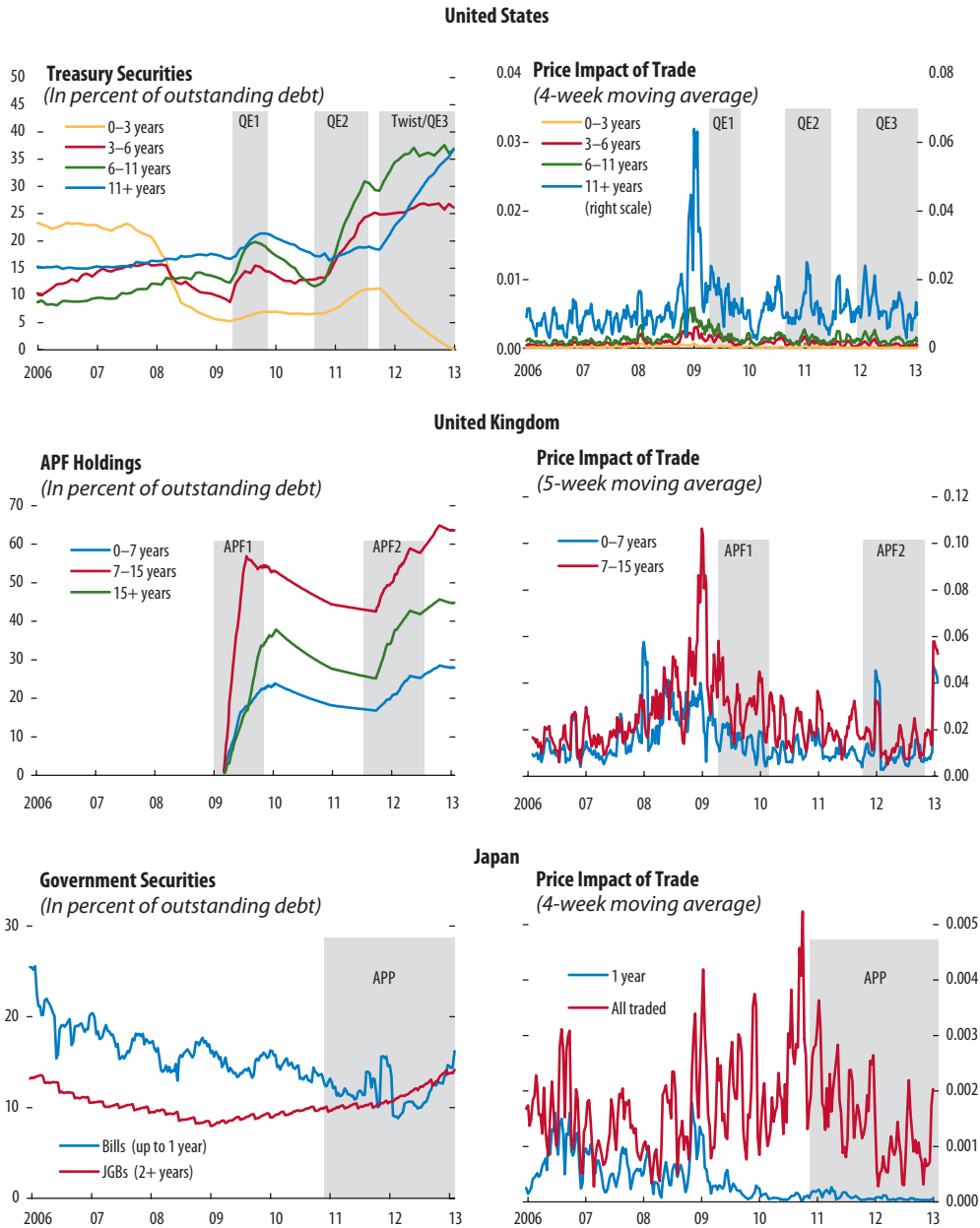
United States

United Kingdom

Japan

Sources: Bank of England; Bank of Japan; Bloomberg L.P.; Datastream; Federal Reserve Bank of New York; Japan, Ministry of Finance; Japan Securities Dealers Association (JSDA); JPMorgan Chase; U.K. Debt Management Office; U.S. Treasury; and IMF staff estimates.

Notes: APF = Asset Purchase Facility (Bank of England); APP = Asset Purchase Program (Bank of Japan); JGBs = Japanese government bonds; QE = quantitative easing (Federal Reserve). Left panels are central banks' holdings of domestic government securities. QE1, March–October 2009; QE2, August 2010–June 2011; QE3, October 2011–present. APF1, March 2009–January 2010; APF2, October 2011–October 2012. APP, November 2010–present. Right panels show the price impact of trade, an indicator of market liquidity, defined as the weekly percentage price change (in absolute terms) divided by the weekly trading volume. Impact data are weekly for the United States and the United Kingdom, and at a 10-day frequency for Japan, interpolated from JSDA monthly data.

Figure 3.5. Correlations between Central Bank Holdings of Government Securities and Market Liquidity, by Maturity of Holdings
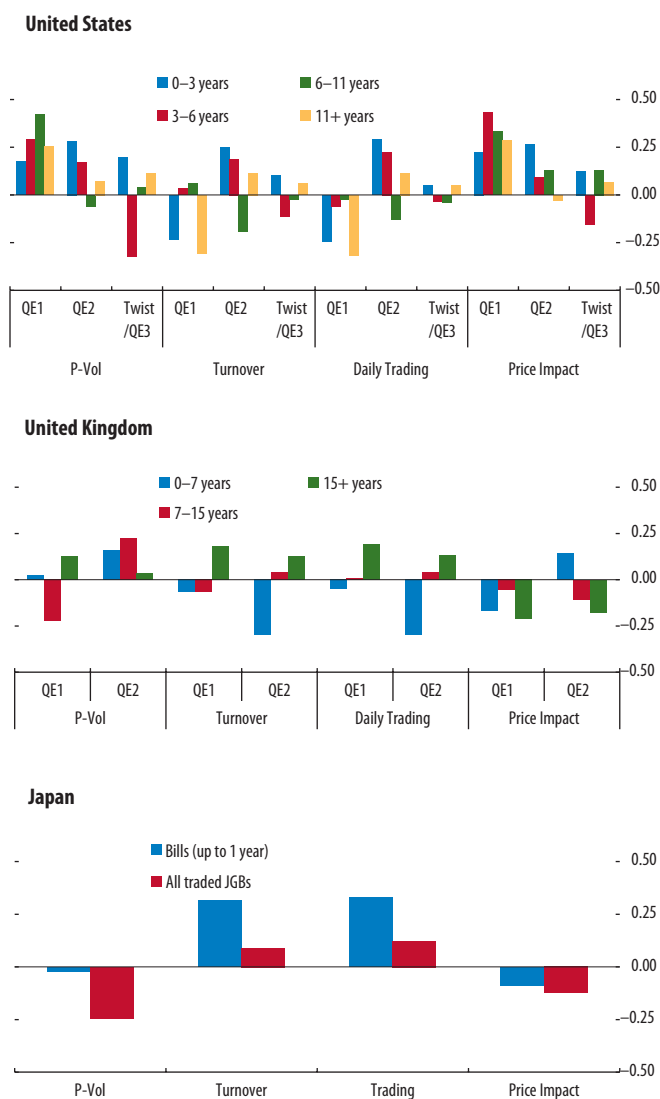
United States

United Kingdom

Japan

Sources: Bank of England; Bank of Japan; Bloomberg L.P.; Datastream; Federal Reserve Bank of New York; Japan, Ministry of Finance; Japan Securities Dealers Association (JSDA); JPMorgan Chase; U.K. Debt Management Office; U.S. Treasury; and IMF staff estimates.

Note: JGBs = Japanese government bonds; P-Vol = conditional bond return volatility (see discussion below); QE = quantitative easing. Figures show correlations between central bank holdings of government securities (as a percent of outstanding debt by maturity segment) and four indicators of liquidity in the government bond market during periods of active quantitative easing . P-Vol is estimated from daily data (log first differences), with an exponential Garch(1,1) process, allowing for asymmetric leverage effects. Trading is the average daily trading volume during a particular week. Turnover is weekly trading volume divided by the outstanding stock of debt (by segment). Price impact is the weekly percentage price change (in absolute terms) divided by the weekly trading volume. For Japan, turnover and trading data are interpolated from JSDA monthly volumes to tri-monthly periods.

The Federal Reserve and the BOJ now each hold some 10 percent of their respective governments' debt, the BOE holds 25 percent, and the ECB holds an estimated 5 percent to 6 percent of the outstanding sovereign debt of Italy and Spain. The shares of Federal Reserve and BOE holdings of longer-dated sovereign bonds are even higher at more than 30 percent. The central banks' large holdings could affect market expectations. Once economic conditions warrant the withdrawal of monetary stimulus, markets may anticipate that central banks will switch from buying government bonds to actively selling them, and political pressure may be exerted to move the monetary authorities in that direction. Such expectations could sharply drive up yields.[9] Therefore, it will be important that, well in advance of the need for tightening, central banks communicate the circumstances in which a tightening may occur and clarify that tightening need not imply outright selling of bonds from the central bank's balance sheet.[10] To the extent that large holdings of government bonds could result in large implicit or explicit losses for central banks (if the securities are marked to market or sold before maturity), it will be important to have arrangements in place that ensure adequate capital or indemnification for losses (Box 3.3).

Effects on Other Markets

Markets that are not directly targeted by MP-plus policies may nonetheless be affected. Credit easing, quantitative easing, and commitments to prolonged low policy interest rates may trigger flows into other mature asset markets (corporate bonds, equities, commodities, secondary currencies, and even housing). While encouraging a certain degree of risk taking is indeed the purpose of many MP-plus policies, they could unintentionally lead to pockets of excessive search for yield by investors and to exuberant price developments in certain markets, with the potential

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[9]In 1994, the Federal Reserve caught market participants off guard by suddenly raising policy rates, causing turmoil in bond markets and especially in the agency MBS market, where investors insufficiently understood prepayment risks.

[10]The implications of government bond holdings on commercial banks' balance sheets are discussed in the final section of the chapter.

Box 3.3. Balance Sheet Risks of Unconventional Policy in Major Central Banks

Risks on balance sheets of central banks have increased since the start of the crisis, with potential negative consequences for their financial strength and independence.

Enhanced liquidity provision, relaxation of collateral rules, and sizable asset purchases have led to increases in the absolute size of central bank balance sheets, an increase in the duration and diversity of assets, and a decline in asset quality. These changes pose risks, including:

- Implicit or explicit valuation losses as a result of a rise in interest rates;
- Declines in operating income when central banks increase their holdings of long-dated securities with low coupon interest rates; and
- Possible impairment losses on assets with credit risk.

The extent to which the various central banks are exposed to these risks differs, depending on the scope and nature of their unconventional policies (which themselves may be influenced by a central bank's risk tolerance). The Federal Reserve, Bank of England (BOE), and Bank of Japan (BOJ) purchased large quantities of bonds to lower long-term yields and support economic activity, whereas the European Central Bank (ECB) mainly expanded the provision of liquidity to support bank funding (see Table 3.1).

- The Federal Reserve holds a large portfolio of Treasury securities and mortgage-backed securities (16 percent of GDP at end-2012), and it has extended the maturity of its holdings of Treasury securities considerably over time: its modified duration—a measure of interest rate sensitivity—increased from about 2¾ before the crisis to nearly 8 most recently. This means that a 1 percent increase in interest rates would reduce the portfolio's market value by 8 percent; and taking into account bond price convexity, the drop in market value would correspond to a capital loss of about 4 percent of the Federal Reserve's total assets.
- The BOJ and BOE are also subject to interest rate risk given their sizable government bond holdings (about 24 percent of GDP each at end-2012). A 1 percent increase in interest rates

could result in a loss of about 1¾ percent of total assets for the BOJ and 6½ percent for the BOE.[1] For the BOJ, this figure could increase on further implementation of its Asset Purchase Program. In addition, the BOJ is also subject to market risk from its holdings of private assets.[2]

- The ECB increased its lending exposure to banks in euro area periphery countries from 20 percent of total refinancing operations in 2006 to about two-thirds in 2012, which raised its credit risk profile. These risks are mitigated to a considerable extent by collateral requirements. The ECB is also exposed, but to a lesser extent, to credit and interest rate risks arising from holdings of covered bonds and periphery sovereign bonds.

Central banks can mitigate these risks in various ways.

- Shorten asset duration so that seigniorage income matches central bank policy expense (for example, central banks could negotiate an asset swap with national treasuries to boost income).
- Increase the share of higher-yielding assets—this would most easily be accomplished by purchasing such assets during exit from MP-plus.
- Increase capital buffers to cover potential losses, through profit retention or capital injection. For example, even before most of its interventions, the ECB doubled its subscribed capital to €10.8 billion at end-2010. Similarly, in 2011, the BOJ retained profits in excess of legal requirements to build up capital reserves.
- Adjust haircut requirements to reflect changes in the quality of collateral.
- Secure a full indemnity from national treasuries for losses associated with MP-plus. For example, the BOE's Asset Purchase Facility is fully indemnified by its Treasury, and therefore the BOE does not face associated financial risks.

Note: Prepared by Kotaro Ishi, Raphael Lam, Kenneth Sullivan, and Nico Valckx.

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[1]The BOE's exposures are kept off-balance-sheet in the BOE Asset Purchase Facility Fund.

[2]The BOJ's holdings of private sector securities are small and thus pose relatively limited balance sheet risk despite occasional unrealized losses. The BOJ does not face substantial credit risk on its lending facility, as it requires pooled collateral. The BOE's Funding for Lending Scheme also entails some credit risk, albeit only a limited amount given the small size of the program.

Box 3.3 *(continued)*

The extent to which these different measures can be used by central banks differs, depending on risk exposure and tolerance, institutional setup, and economic and financial circumstances.

In addition, the extent to which these holdings represent risks and are being recognized depends on accounting rules and how central banks intend to use the securities. If they intend to hold the securities to maturity, potential capital losses will not be realized if interest rates rise (although interest income would be below markets rates until maturity). The Federal Reserve, the ECB, and the BOJ value their holdings of securities at amortized costs, although in certain circumstances they are required to take on "impairments" if values drop substantially. In contrast, the BOE uses mark-to-market accounting for government bonds and other securities. The current ECB portfolios are held to maturity (and therefore not subject to marking to market) but a possible future Outright Monetary Transactions portfolio would be marked to market. However, in all cases, market participants will likely impute the values of central bank holdings of securities to evaluate their overall safety and soundness. It behooves central banks, therefore, to manage their risks in a transparent and consistent fashion.

Experience in some jurisdictions (mostly emerging market economies) has shown that central banks can execute their monetary policy functions while experiencing large losses (or even while having negative net worth), but such situations may nevertheless threaten their independence and credibility. Historical evidence shows that financially weak central banks are prone to government interference (Stella, 2008; and Stella and Lönnberg, 2008), thereby potentially undermining their policy performance. The extent to which independence is compromised by financial weakness would depend crucially on other safeguards for independence that are in place for a particular central bank.

for bubbles. Chapter 1 evaluates various potential transmission mechanisms. The sharp rise in investor demand for credit products, combined with constrained supply, is supporting a substantial decline in corporate borrowing costs. In turn, investors are accommodating higher corporate leverage and weaker underwriting standards to enhance yield. Some components of the credit market, such as loans with relaxed covenants, are experiencing more robust growth than in the last credit cycle (see Chapter 1).[11]

Although not analyzed here, the potential spillover effects of MP-plus to other economies are important. MP-plus could affect financial stability in liquidity-receiving economies via three main channels: excessive currency movements, domestic asset price bubbles, and sudden stops once the global liquidity is unwound. IMF (forthcoming) explores actual and potential spillover effects from MP-plus. Early MP-plus announcements, which strengthened market and financial stability in the advanced economies, buoyed asset prices globally and led to the appreciation of currencies of emerging market economies. These announcements mostly drew money back to the United States, while later announcements sent money to emerging markets, though with more muted effects on asset prices. More broadly, aggregate capital inflows to emerging market economies have mostly returned to their ample precrisis levels. Nevertheless, Chapter 1 finds that pockets of potential risk in some countries with more persistent capital inflows are raising the possibility of excesses in some important segments of emerging market economies. For example, a unique feature of the current cycle is that corporations in such economies have increased foreign-currency debt financing in place of local-currency equity. While these debt levels are not yet threatening, conditions are in place for a less favorable outcome if the trend continues.[12]

Effects of MP-Plus on Financial Institutions

To quantify the effects of MP-plus on the soundness of domestic financial institutions, the analysis here will

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[11]These effects are covered in the September 2011 GFSR and in the forthcoming IMF paper. See also BIS (2012b).

[12]Spillovers are also discussed in the April 2010 GFSR, as well as in IMF (2012b) and BIS (2012a).

focus on banks. Healthy banks are critical to financial stability and to effective monetary policy transmission, as the recent financial crisis has shown. Risks in banks are also potentially heightened because leverage is part of their business model. MP-plus affects banks directly through various channels, including by providing liquidity, lowering bank funding costs (through low interest rates), and supporting asset prices (through central bank asset purchases).[13] MP-plus also has important indirect benefits for banks: by supporting economic activity, it increases the demand for loans and lowers credit risk in bank loan portfolios.

The effect of MP-plus on bank risk and its relation to financial stability should be evaluated carefully. One of the macroeconomic goals of MP-plus is arguably to encourage banks to contribute to economic growth by clearing troubled assets from their balance sheets and making more loans to sound borrowers (a "risky" activity). Financial stability would be threatened only if risk taking by banks was excessive and worsened their financial health. To evaluate financial stability effects, it is therefore necessary to look beyond narrow measures of bank risk to broad measures that would indicate a weakening of bank soundness, such as the z-score and bank default risk.[14]

The analysis uses three complementary approaches to assess the effects of MP-plus on banks. The first is an event study, which is based on the idea that any effects of MP-plus policy initiatives on bank soundness (including bank default risk and performance) should immediately be reflected in changes in bank stock prices, since the stock price is a risk-adjusted discounted value of future bank income streams. Similarly, any effects of MP-plus on bank default risk should immediately be reflected in bank bond spreads. Relating a measure of MP-plus policy actions to these market indicators at the time of an MP-plus policy announcement can therefore offer some insight into market participants' current view of their impact.

The second approach furthers the understanding of the channels of impact on banks by using bank-level data. It relates indicators of monetary policy to mea-

sures of banks' financial health, including profitability, risk taking, and the status of balance sheet repair.

The third approach focuses on a possible rise in interest rate risk in banks—a potential consequence of the prolonged period of low interest rates. It examines two main channels through which banks are affected by increases in interest rates: net interest income and the value of fixed-rate securities (mainly government bonds).

Event Study

The event study analyzes the effect of MP-plus policy announcements on domestic bank stock prices and bank bond spreads. A complication is that announcements may be partly expected and priced into the markets before the actual announcement. Any measured effect on bank stock prices and bank bond spreads may therefore seem muted when compared with the announced measures. These prices would react only to new information, that is, the unexpected or surprise element of the announcement. Bernanke and Kuttner (2005) and Gürkaynak, Sack, and Swanson (2005) show that the surprise element of monetary policy announcements can be measured by changes in forward rates at the time of announcement.[15] These changes, representing the surprise element of the announced policies, could then be related to changes in bank stock prices and bank bond spreads to gauge their perceived impact on bank health.

The event study used here gives an indication of the *market perception* of the effects on banks' equity of the announced policies. Regressions of bank stock returns on the policy surprise measure—the change in interest rate futures—yield the following results (Table 3.2):
- Bank stock prices are not affected by a surprise easing of monetary policy in the United States; but in the United Kingdom, bank stocks fall 6.6 basis

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[13]For a more thorough treatment of the various channels of transmission of MP-plus, see IMF (forthcoming).

[14]The z-score is a standard measure of bank soundness that is inversely related to a bank's probability of insolvency; see Laeven and Levine (2008) as well as the notes to Table 3.7 in Annex 3.2.

[15]The one-year-ahead futures rate is used to measure the monetary policy surprise (see notes to Table 3.2 for details) to capture both the contemporaneous part of monetary policy announcements (the target policy rate) and any expected near-term future developments (for example, forward guidance). With the short-term interest rate approaching zero in later years, the movements in the one-year-ahead futures rate may be limited and thus may affect the coefficients in the regressions for the MP-plus period. Partly for this reason, surprises are allowed to have differential effects between the conventional and MP-plus periods.

Table 3.2. Results from Event Study Regressions[1]

United States				
	Effect on Bank Stock Return MSCI Bank Stock Index (Daily returns, in percent)	Effect on Financial Sector Credit Risk Financial Sector Bond–Government Bond Spread[2] (Daily changes, in basis points)		
		1–3 year	3–5 year	5–7 year
Effect of a surprise monetary easing, per basis point	—	0.078***	0.087***	0.075**
Additional effect of MP-plus easing, per basis point	—	—	—	—
Constant	—	—	—	—
Change in constant, MP-plus events	—	—	—	—
Number of observations	103	103	103	103
R-squared	0.085	0.066	0.090	0.044
Euro Area				
	Effect on Bank Stock Return MSCI Bank Stock Index (Daily returns, in percent)	Effect on Financial Sector Credit Risk Financial Sector Bond–Government Bond Spread[2] (Daily changes, in basis points)		
		1–3 year	3–5 year	5–7 year
Effect of a surprise monetary easing, per basis point	−0.056**	0.126***	0.154***	0.130***
Additional effect of MP-plus easing, per basis point	−0.129**	0.156*	—	—
Constant	—	—	—	—
Change in constant, MP-plus events	—	—	—	—
Number of observations	156	156	156	156
R-squared	0.187	0.212	0.215	0.121
United Kingdom				
	Effect on Bank Stock Return FTSE All Share (Bank) Index (Daily returns, in percent)	Effect on Financial Sector Credit Risk Financial Sector Bond–Government Bond Spread[2] (Daily changes, in basis points)		
Effect of a surprise monetary easing, per basis point	−0.066***	0.071***		
Additional effect of MP-plus easing, per basis point	—	—		
Constant	—	—		
Change in constant, MP-plus events	—	—		
Number of observations	138	138		
R-squared	0.089	0.033		

Sources: Bank of America Merrill Lynch; Bloomberg L.P.; and IMF staff estimates.

Note: ***, ** and * indicate that estimated coefficients are significant at the 1 percent, 5 percent, and 10 percent level, respectively. — indicates that the coefficient was not significant at the 10 percent level; these coefficients are not reported in the table. The conventional policy period is from January 2000 through July 2007, and the MP-plus period is restricted to events after the Lehman Brothers collapse through October 2012. For the United States, the sample excludes September 12, 2001. A surprise monetary easing is measured by the change in the one-year-ahead three-month Eurodollar futures rate for the United States, the equivalent Euribor futures rate for the euro area, and the equivalent Sterling futures rate for the United Kingdom.

[1]For ease of interpretation, coefficients are reported so that a positive coefficient indicates a rise in returns or the bond spread as a result of monetary easing.

[2]All maturities are used for the United Kingdom because short-term spreads are not available. Adjusted for any options of corporate bonds, such as early retirement.

points per basis point of surprise monetary easing. These effects are the same for conventional easing and for MP-plus easing. In the euro area, bank stocks fall 5.6 basis points per basis point of surprise conventional easing and an *additional* 12.9 basis points per basis point of MP-plus easing.

- The markets see the risk of future bank default rising as a result of a surprise monetary easing, indicated by an increase in the spread between medium-term bank bonds and government bonds over various maturities. Each basis point of surprise easing increases these spreads by between

0.071 and 0.154 basis point, depending on the country and the specific maturity of the bonds. This effect is the same for conventional easing and for MP-plus in most cases, although there is weaker evidence of an additional rise in the spread of 0.156 basis point for a surprise 1 basis point MP-plus easing in the euro area.

In sum, the market perceives monetary easing in general as neutral or negative for bank health (as measured by bank stock prices), and considers it as increasing bank default risk in the medium term.

The perceptions for conventional easing are generally not different from those for MP-plus measures. This finding is surprising in that it runs counter to the financial stability objectives of policymakers. It may be an indication that even though policies have aimed at supporting the macroeconomy and fostering financial stability in the short term, they may nevertheless carry risks for bank soundness over the medium term. Moreover, if the market believes that central banks have superior information on economic conditions, a surprise easing may be seen as signaling that the central bank believes that conditions are worse than the market perceived, leading to a fall in bank stocks immediately after the announcement.[16]

Bank-Level Data Analysis

The second approach to investigating the effects of MP-plus on bank soundness is to use bank-level data to measure financial health. Whereas the event study looked at market perceptions of bank soundness and risk, this approach uses a panel regression methodology that directly relates indicators of monetary policy to various measures of bank soundness—bank profitability, risk taking, and efforts toward balance sheet repair. The required data are available for relatively few banks in the euro area, Japan, and the United Kingdom, making a conclusive analysis for them more difficult. The analysis therefore focuses on the United States. The monetary policies considered cover conventional as well as unconventional measures.[17]

The results from bank-level data analysis need to be interpreted with caution. The analysis uses the monetary policy variables as independent variables, assuming they "cause" the changes in the bank soundness indicators. However, the central bank actions since 2007 have been partly *in response to* problems in banks, so they may not be truly inde-

pendent. The analysis made adjustments to work around this problem and to better capture the effects of MP-plus on bank soundness (see Annex 3.2). In addition, by using data only for the United States, the analysis covers the banks where improvements in soundness have been most evident.

Another issue is that, besides the influence of monetary policy, bank balance sheets have been affected by fiscal, financial, and other factors over the period. The regressions therefore also include variables controlling for output growth, fiscal policies, and stress in the financial system (see Annex 3.2). Still, the analysis may not be able to fully capture the direct effects of MP-plus policies on banks if those policies manage to raise economic growth and thereby indirectly benefit the financial health and riskiness of banks.

The estimated effects of MP-plus on banks' income statements and balance sheets are mixed. The analysis calculates the effects of (1) monetary easing itself, (2) a sustained period of easing, and (3) an expansion of the central bank balance sheet (Table 3.3).[18] The analysis suggests that over the sample period, MP-plus has not appreciably affected the profitability of banks and may reduce some measures of risk in banks over the medium term; but it also suggests that MP-plus may be delaying balance sheet repair by banks, thereby potentially offsetting the risk reduction effects. Specifically:

- On risk taking, the analysis shows that MP-plus policies appear to be achieving their intended effects, with banks increasing their risky assets in response to the prolonged period of low interest rates (an indicator of MP-plus shown in the second group of rows in Table 3.3).[19] The low interest rates have also tended to decrease leverage (increase equity over total assets), but although it is statistically significant, the effect is so small as to be economically insignificant.

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[16]In Japan (not included in our event study), the January 22, 2013, Joint Statement by the government and the BOJ has been associated with increases in bank stock prices. While these developments are too recent for a full analysis, the explanation for this opposite result may be that the announced policies have been seen as increasing the likelihood of ending deflation and improving economic prospects in general, benefiting banks and thereby buoying bank stocks.

[17]See Annex 3.2 for details on the estimation methodology and Table 3.7 for detailed results.

[18]The calculation of the effects reported in Table 3.3 uses the statistically significant estimated coefficients reported in Annex 3.2, Table 3.7.

[19]The first result is consistent with findings in previous empirical studies on the precrisis period, which showed a significant association between low interest rates and bank risk taking (De Nicolò and others, 2010; Altunbas, Gambacorta, and Marqués-Ibañez, 2010; and Dell'Ariccia, Laeven, and Suarez, 2013).

Table 3.3. Marginal Effect of MP-Plus on Banks

	Net Interest Margin (In percent of average earning assets)	Risk-Weighted Assets/Total Assets (In percent)	Capital Adequacy Ratio (Equity to Risk-Weighted Assets)[1] (In percent)	Z-score	Equity Ratio (Equity /Total Assets) (In percent)	Loan Loss Provisions/ Total Loans (In percent)
Sample mean	3.750	73.552	13.656	32.265	9.730	0.212
1. A 100-basis-point decrease in the Taylor gap						
Short-term effect (after a quarter)	−0.019	...	...	0.717	0.055	0.012
Effect after two years[2]	−0.070	...	...	3.510	0.250	0.035
Long-term effect[2]	−0.079	...	...	4.878	0.322	0.037
2. More quarters of very loose monetary policy[3]						
Short-term effect of one more quarter of very loose policy	...	0.880	−0.163	1.293	...	...
Effect of one more year	...	7.713	−1.432	11.165	...	...
3. An increase in central banks' assets by 1 percent of GDP						
Short-term effect (after a quarter)	−0.013	...	...	0.251	...	−0.023
Effect after two years[2]	−0.048	...	...	1.229	...	−0.067
Long-term effect[2]	−0.054	...	...	1.707	...	−0.070

Source: IMF staff estimates.

Note: The table reports the marginal effects of a change in each of the monetary policy variables on banks, assuming all other variables remain constant. The effects are computed from the coefficients on the monetary policy variables in Table 3.7 that are statistically significantly different from 0 at the 5 percent threshold.

[1] The capital adequacy ratio (CAR), defined here as equity over risk-weighted assets (RWA), was not considered as a dependent variable in the panel regressions. Yet translating the effects on RWA/total assets into effects on the CAR allows for a more intuitive interpretation of the results. The effect on the CAR is computed by assuming that only the composition of assets changes (change in RWA), not the total assets, nor the total equity. This assumption is implicit in the regression since we control for the equity ratio on the right-hand side. Capital adequacy ratio = equity/RWA = (equity/total assets)/(RWA/total assets). Then the percent change in CAR (ΔCAR/CAR) is approximately equal to the percent change in the equity ratio (assumed to be zero) minus the percent change in the RWA/total assets ratio. The reported short-term effect (ΔCAR) is computed as minus the marginal effect on RWA/total assets multiplied by the average CAR (13.656 percent), divided by the average RWA-to-total-assets ratio (73.552 percent).

[2] The effects after two years and the long-term effects are computed taking into account the fact that the dependent variables are highly persistent (see coefficients on the lagged dependent variables in Table 3.7). For example, while the immediate effect of a 100-basis-point decrease in the Taylor gap on the z-score is equal to 71.7*(1 − 0.853^8)/(1 − 0.853) = 351 basis points, and the long-term effect (over an infinite horizon) reaches 71.7/(1 − 0.853) = 487.8 basis points.

[3] By "very loose monetary policy," we mean a policy rate below the Taylor rate (i.e., a negative Taylor gap). The effect of one more year of very loose monetary policy is computed by compounding the effect of one additional quarter of negative Taylor gap and adding the compounded effects of additional quarters. For instance, the effect of one more year of very loose monetary policy on the z-score equals 1.293*[(1 − 0.853^4) + (1 − 0.853^3) + (1 − 0.853^2)]/(1 − 0.853) + 1.293 = 11.165.

- On profitability, low policy rates and the increase in central bank assets have had a negative effect on banks' net interest margin, but the effect is again so small as to be economically insignificant.[20] This effect is the result of two opposing effects: low rates reduce funding costs for banks; but over time, revenues from new loans and fixed income securities also decline, offsetting the decline in funding costs.

- The benign developments in bank profitability are confirmed by the effect of MP-plus on bank z-scores. The z-score is an indicator of soundness that combines a bank's profitability and capitalization, and it appears to have increased as a result of the prolonged period of low interest rates and the expansion of central bank balance sheets. Although these developments in profitability and capitalization show no immediate deterioration in bank soundness, these measures do not reflect all components of bank health.

- A measure of loan performance suggests that some aspects of MP-plus may be delaying balance sheet repair by banks. Increased central bank assets (an indicator of MP-plus shown in the third group of rows in Table 3.3) tend to reduce loan-loss provisions. This may point to the risk that the ample liquidity provided by central banks is giving banks an incentive to evergreen (roll over) nonperforming loans instead of recording losses in their profit and loss accounts. An alternative view is that with MP-plus supporting economic activity, these loans are more viable and hence need fewer provisions.[21] A delay in balance sheet repair could be one reason for the market expectations of an increase in bank default risk over time that was found in the event study.

- The analysis does not find evidence that MP-plus affects different kinds of banks differently. The effects of MP-plus do not appear to depend on bank asset size, or the ratio of equity to total assets, or whether they are global systemically important banks.[22]

Interest Rate Risk in Banks

Banks are affected by an increase in interest rates mainly through the interest rate spread between their lending and borrowing (the net interest margin) and through their holdings of securities and derivatives. Indirect effects on loan performance also play a role. These effects can work in opposite directions, and the net effect of an increase in interest rates can be positive or negative for banks, depending on the maturity structure of their balance sheets and other factors.

Estimates from a variety of sources suggest that—other things equal—an increase in interest rates would have a positive effect on the net interest income of banks. An analysis in BIS (2012a, Chapter 4) shows a positive relationship between the short-term interest rate and the net interest margin of banks in 14 major advanced economies. The slope of the yield curve also has a positive effect. Research by Federal Reserve economists comes to a similar conclusion for U.S. banks (English, Van den Heuvel, and Zakrajšek, 2012). U.S. banks themselves estimate that a rise in interest rates would increase their net interest income (Figure 3.6).

Interest rate increases can, however, also expose banks to losses since they reduce the market value of fixed-income assets (including government bonds), particularly if rates rise suddenly and unexpectedly. Such losses on government bonds are larger in a low-interest environment (see Table 1.4 in Chapter 1).[23] A hypothetical increase in interest rates from 2 percent to 4 percent would generate losses of 16 percent on the market value of a 10-year bond (Table 3.4). A Value-at-Risk analysis assesses banks' exposure to interest rate shocks on their trading portfolio. For U.S. banks, such an analysis shows a decline in

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[20]The sign of the effect is in line, however, with other evidence that has found a positive relationship between the level of interest rates and net interest margins, as discussed in the next section.

[21]While the analysis for the United States would support both explanations, previous studies have found evidence for delays in balance sheet repair in Japan starting in the 1990s (Peek and Rosengren, 2003; Caballero, Hoshi, and Kashyap, 2008).

[22]In the regressions, interaction terms between these variables and the MP-plus variables were generally insignificant. The regression results including these interaction terms are not reported in Table 3.7.

[23]Bonds held in the "available for sale" category on a bank's balance sheet would suffer mark-to-market losses, but if they are in the "held to maturity" category, the losses would be unrealized and not recognized in the profit and loss statements. Market participants typically "see through" this accounting convention to estimate such losses.

Figure 3.6. Interest Rate Risk as Reported by U.S. Banks

Effect on Banks' Net Interest Income of a Gradual Rise in Interest Rate of 200 Basis Points
(Weighted average, in percent of baseline forecast)

Interest Rate Value-at-Risk
(Weighted average, in millions of U.S. dollars)
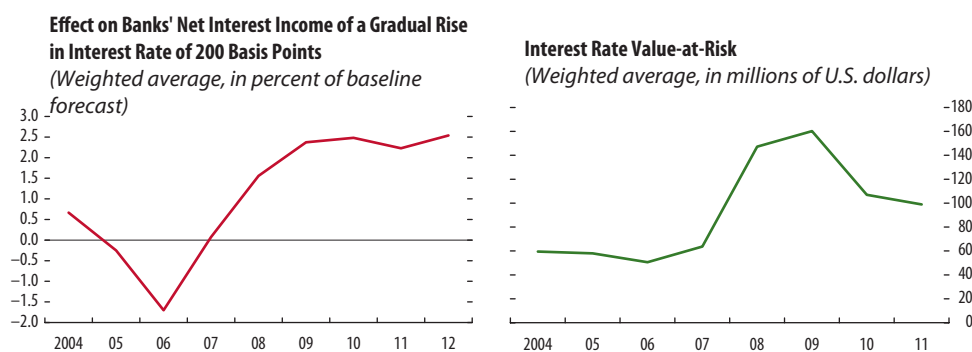
Sources: Bloomberg L.P.; SNL Financial; and IMF staff estimates.

interest rate risk in their trading books, although that risk remains above its precrisis level (Figure 3.6).

Banks in Japan have a larger exposure to domestic sovereign debt than those in any other advanced economy (Figure 3.7; see also IMF (2012a) and the October 2012 GFSR). The BOJ (2012) notes that regional banks in Japan in particular are especially vulnerable to the risks of these large holdings: according to the BOJ, a 100-basis-point increase in interest rates across the yield curve would lead to mark-to-market losses of 20 percent of Tier 1 capital for regional banks and 10 percent for the major banks.

Holdings of sovereign debt by banks in Italy and Spain are also relatively high and have risen substantially since the beginning of the crisis. The Bank of Italy (2012) reports that a 200-basis-point increase in interest rates would cost Italian banks 7.7 percent of their capital through a combination of increases in net interest earnings and a fall in the value of their government bond holdings. Mitigating the risk of

capital losses at Italian and Spanish banks is the fact that rates on their domestic sovereign bonds have been high recently because of elevated risk premiums on these bonds, and the premiums have recently been declining; a continued decline could offset to some extent the effects of a rise in policy interest rates.

Corporate bond holdings could also generate losses if interest rates rise, especially given the compressed yield spreads witnessed recently. However, bank holdings of corporate bonds are relatively low. In the fourth quarter of 2012, U.S. depository institutions held only 5.3 percent of their assets in corporate and foreign bonds (Board of Governors of the Federal Reserve System, 2013). Data from the ECB show that euro area banks hold 4.9 percent of assets in bonds issued by nonfinancial corporations and other nonbanks (excluding sovereign debt) and only 1 percent of total assets in bonds issued by nonfinancial corporations alone. Banks in the United Kingdom hold 4.1 percent and 0.3 percent, respectively, of their assets in securities associated with these same categories. Banks in Japan hold bonds in industrial corporations amounting to only 1.7 percent of assets. Given these small holdings, the associated interest rate risk is likely limited.

Effects of interest rate increases could also be felt indirectly through loan performance. Customers that have borrowed from banks at variable rates may find it more difficult to adjust: a sharp rise in interest rates could therefore raise nonperforming loan rates and the credit risk of banks. The extent

Table 3.4. Calculated Losses on a 10-Year Bond as a Result of a Rise in Interest Rates

	Coupon Yield on Bond		
	2 percent	4 percent	6 percent
Interest Rate Increases by	Final Bond Price		
1 percent	91	92	93
2 percent	84	85	87

Source: IMF staff estimates.

Note: Numerical example is based on a 10-year bond. Initial bond price is 100.

Figure 3.7. Bank Holdings of Government Debt in Selected Economies
(In percent of banking sector assets)
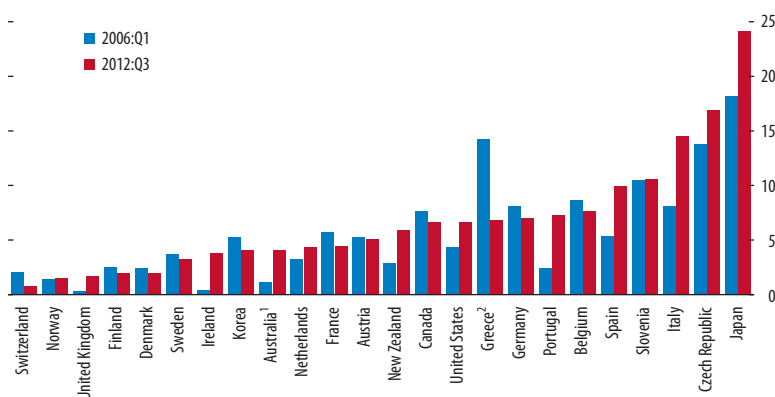
Sources: Central banks' and national regulators' websites; IMF, *International Financial Statistics* (IFS); and IMF staff estimates.
Note: Data on quarterly government debt holdings of domestic banks are taken from Arslanalp and Tsuda (2012). Government debt is defined as general government gross debt on a consolidated basis and includes securities other than shares, loans and other short-term debt (not included elsewhere). Bank assets refer to IFS' other depository corporations.
[1]Australia data refer to 2012:Q2.
[2]The value of government debt holdings of Greek banks fell from 12.4 percent in 2011:Q4 to 8 percent in 2012:Q1, as a result of an official debt restructuring.

to which banks are affected by these losses also depends on the rationale that is moving the central bank to increase interest rates. For instance, if the cause is related to adverse supply shocks, the effect on banks may be larger than if it is related to an improving economic situation; banks and their borrowers would perform better in the latter case and thus be in a better position to absorb losses.[24]

The potential for capital losses on holdings of fixed-rate securities and loans in the short term can be significant, even though the net effect of interest rate increases would be positive for banks over the medium term. The positive effect of higher net interest income accumulates over time, offsetting the more immediate capital losses incurred predominately by banks with significant trading operations.[25]

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[24]The effect of MP-plus on inflation is discussed in Chapter 3 of the April 2013 *World Economic Outlook*.
[25]Recent stress tests performed by the Federal Reserve on participating bank holding companies (BHCs) in compliance with the Dodd-Frank Act showed that trading and counterparty credit losses of the 6 BHCs with significant trading activities amounted to $97 billion, 21 percent of total losses of all 18 BHCs and 27 percent of the total losses of the 6. The severely adverse scenario comprised adverse changes to several factors and included an increase in the 10-year Treasury yield of 100 basis points. These

Also, the positive effect on the net interest margin is important, since interest makes up well over half of bank income (some 80 percent in the United States and about two-thirds in the euro area, for example). Indeed, English, Van den Heuvel, and Zakrajšek (2012) report that interest rate changes affect bank profitability mainly through the effect on net interest income. This is in line with the finding summarized in Figure 3.6 that U.S. banks have decreased their interest rate risk since the peak of crisis.

Conclusions and Policy Implications

MP-plus has involved the unprecedented intervention of major central banks in various asset markets, including sovereign and corporate bond markets, markets for asset backed securities, and—indirectly—money and interbank markets. Banks have been affected by the prolonged period of very low nominal and real interest rates, by central bank asset purchases (through liquidity and price effects), and by direct liquidity support.

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factors were imposed over the course of nine quarters. See Table 4 in "Dodd-Frank Act Stress Test 2013" (Federal Reserve Board, 2013) for more details.

The analysis finds little evidence that MP-plus has given rise to a serious immediate degradation of financial stability (Table 3.5). Overall, the effects of MP-plus are associated with improved bank soundness in the short term, a result in line with the financial stability objectives of policymakers. In addition, in some markets where central banks play a large role (including in interbank markets and in some sovereign bond markets in the euro area), MP-plus has been carried out in response to dysfunction; in those cases, central bank actions can be seen as preventing a worsening of market functioning.

Over the medium term, however, MP-plus may be generating risks that have not yet become evident in banks. Forward-looking indicators may be showing that the market is alert to these risks, with MP-plus (and conventional monetary easing) hurting bank stocks in some countries and increasing market perceptions of bank default risk. The main risks associated with MP-plus over the medium term are that:

- *Balance sheet repair in banks may be delayed.* There is some evidence that unconventional central bank measures may be supporting a delay in balance sheet cleanup in some banks, with MP-plus having a negative effect on loan provisioning. The current environment may also be encouraging banks to evergreen loans rather than recognize them as non-performing, as noted in Bank of England (2012), with banks providing borrowers with flexibility to meet their obligations during periods of stress until economic conditions improve. But it is difficult to identify weak but ultimately viable borrowers, and such evergreening may be keeping nonviable firms alive; their demise when rates rise could affect the quality of the loan portfolio over the medium term. Indeed, the Bank of England (2012) suspects that loan forbearance partly explains the recent low corporate insolvency rate in the United Kingdom.

- *An eventual rise in interest rates may hurt some banks.* Banks in several countries are holding large amounts of government bonds. A rise in interest rates upon exit from MP-plus could lead to actual losses on banks' bond holdings held in the available-for-sale category.

- *Exit from markets where central banks still hold substantial amounts of securities may be challenging.* Central banks are holding large amounts

of certain assets, particularly government bonds and securities linked to real estate. Expectations of central bank sales of these large holdings could lead to market disruptions, especially if the desired policy stance shifts quickly. The rapid repricing of bonds can result in losses for bond holders (both banks and central banks). These challenges highlight the importance of a well-planned and clearly articulated communications strategy for central bank exit from such markets.

- *The volume and efficiency of interbank lending may adjust to new, lower levels based partly on a reevaluation of counterparty risks.* With many banks now relying to a significant extent on central bank liquidity and banks withdrawing resources and skills from interbank lending activities, it may be difficult to restart these markets.

As the recovery proceeds and banking system risks begin to rise, MP-plus measures should be accompanied by micro- and macroprudential policies where needed, supported by robust data provision by financial institutions and vigorous risk-based supervision.[26] These risks are slow moving and may be masked by the near-term benefits of crisis-related measures, making it crucial that they be addressed promptly with prudential measures. The precrisis period has shown that corrective policies implemented after the risks reveal themselves may be too late to contain financial stability challenges.

Policies should be implemented in a measured manner, focused on areas showing rising vulnerabilities. Therefore, authorities should assess where pockets of vulnerabilities exist and quantify their systemic importance. For this, more robust data encompassing a larger share of the financial system are key. For example, more comprehensive bank-level data would allow the above assessment of the impact of various MP-plus measures to be replicated for countries besides the United States. These analyses should help identify which prudential measures are most suitable to deal with those risks. To the extent that risks are identified in specific financial institutions, these measures would have a microprudential focus. If the risks are affecting the financial system more broadly (systemic risks), the measures would

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[26]For essential elements of good supervision, see IMF (2010b).

Table 3.5. Risks from MP-Plus and Mitigating Policies

Type of MP-Plus Policy	Associated Potential Risk	Risk Assessment	Evidence	Mitigating Policies
Prolonged periods of low interest rates	Pressure on the profitability and solvency of financial institutions	Low	Bank profitability currently not affected, but could decline over time	Robust capital requirements
	Excessive risk taking ("search for yield")	Low	May be indicated by medium-term increase in bank default risk	Vigilant risk-based supervision, robust capital requirements
	Evergreening, delay in balance sheet repair	Medium	May be indicated by decline in loan-loss provisions and increase in medium-term bank default risk	Vigorous pursuit of balance sheet repair
Quantitative easing	Dependence on central bank financing	Medium	Central bank liquidity is lowering spreads in interbank market in Japan and euro area	Improved liquidity risk management in banks, implementation of liquidity requirements, design of systemic liquidity risk mitigants
Indirect credit easing	Dependence on public sector financing	Medium	Central bank liquidity is lowering spreads in interbank market in Japan and euro area	Improved liquidity risk management in banks, implementation of liquidity requirements, design of systemic liquidity risk mitigants
	Distortion of allocation of credit, possibly weakening underwriting standards	Low	May be indicated by medium-term increase in bank default risk	Vigilant risk-based supervision, dynamic forward-looking provisioning, robust capital requirements
	Delay in balance sheet repair	Medium	May be indicated by medium-term increase in bank default risk	Vigorous pursuit of balance sheet repair
	Reinforcement of bank–sovereign links	Medium	Banks in some euro area countries have invested a larger share of assets in government bonds	Vigorous pursuit of balance sheet repair, robust capital requirements
Direct credit easing	Distortion in prices and market functioning	Low	Little evidence that central bank intervention has distorted prices or market functioning	Address associated market risks in banks

Source: IMF staff.

come from the macroprudential toolkit.[27] The appropriate measures should then be implemented in a measured manner that accounts for the importance of these risks and their likely evolution over time. Additionally, policymakers should be cognizant of the challenges of combining macroprudential and monetary policies, which have been explored in IMF (2013).

The following tools and policies can be useful in mitigating specific risks:

- *Well-designed dynamic and forward-looking provisioning,* supported by strong credit risk analysis and robust bank capitalization, should be employed to offset a rise in credit risk for banks resulting from delays in balance sheet repair (including evergreening).

- *Balance sheet repair and bank restructuring* should be vigorously pursued by supervisors (including through asset quality reviews), and low interest rates should not be allowed to cause delays. It is crucial that banks be able to function effectively again under more normal, postcrisis conditions. Future exit from MP-plus will involve interest rate increases that might challenge the soundness of banks with unviable loans or large quantities of assets that have been supported by central bank interventions in their markets. The completion of balance sheet repair in banks is a clear prerequisite for avoiding conflicts between monetary policy objectives and financial stability objectives upon exit from MP-plus.

- *Countercyclical bank capital rules* should be used to address market risks (including from potential asset price declines in markets targeted by MP-plus) and potential declines in bank profitability. Market risks would also be mitigated if the process of central bank exit is accompanied by strong public communications: explanations of the circumstances under which a tightening may occur and clarification that policy tightening need not imply sales of bonds by central banks.

- *Robust and forward-looking liquidity requirements* (such as the new liquidity coverage ratio under Basel III) that take into account systemic effects can address banks' funding challenges (including those posed by central bank exit from interbank

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[27]For an overview of macroprudential policy tools, see Lim and others (2011).

intermediation). Risks of investor runs against MMMFs, exacerbated by low interest rates, should also be addressed, preferably through a move to variable net asset values, or—if stable net asset values are maintained—through more bank-like prudential regulation for these funds.

One reason for the failure of current bank portfolio measures to register these risks is that they may be shifting to the nonbank financial sector. Authorities should be alert to the possibility that risks may be shifting to other parts of the financial system not examined here, such as shadow banks, pension funds, and insurance companies (see Chapter 1). To avoid further encouragement of those shifts, more vigilant supervision of banks should be accompanied by enhanced supervision of other financial institutions. Although data collection is improving, a formal examination of leveraged nonbank financial institutions is still hindered by incomplete data, and market intelligence and other qualitative tools should be used to observe buildups of vulnerabilities outside the regulated sectors.

Even if the sales of central bank holdings are, as they should be, consistent with the desired stance of monetary policy, sensitive to market functioning, and well communicated, they could be complicated by shifts in market sentiment. Market interest rates may not respond symmetrically when the central bank switches to being a seller, particularly if the central bank underestimates the ability of markets to absorb the increased supply. A change in the risk sentiment of private bond investors may raise interest rates more quickly than they declined and, in extreme cases, could lead to market disruption. Central banks may be forced to retain a larger stock of government bonds on their balance sheets to prevent the yield curve from steepening too rapidly. A scenario of rapid interest rate increases could also expose central banks to realized losses on securities that they decide to sell. If central banks are to retain flexibility in setting future monetary policy objectives, it may be useful for them to recognize and address the risk of potential losses now, partly by ensuring that they have an appropriate loss-absorbing capacity.

In sum, implementing micro- and macroprudential policies that address potential adverse side

effects on financial stability over the medium term would allow greater leeway for MP-plus policies to focus on macroeconomic goals. MP-plus appears to have contributed to financial stability, as intended, but risks associated with it will likely strengthen the longer it is maintained. Moreover, risks may be shifting to other parts of the financial system not examined here, such as pension funds and insurance companies. Chapter 1 examines how the solvency of such institutions is increasingly strained by a long period of low returns on assets and how the strain may be encouraging the observed rise in allocations

to riskier asset classes such as alternative investments. Where appropriate, micro- and macroprudential policies for banks and other financial institutions, as well as careful planning of the exit from MP-plus, can be used to mitigate future conflicts between macroeconomic and financial stability objectives. As the experience with macroprudential policy tools is relatively limited, however, authorities should vigilantly monitor their effectiveness and stand ready to adjust the macroeconomic policy mix. Therefore, MP-plus should also continue, as it has, to keep financial stability goals in mind.

Annex 3.1. Key MP-Plus Announcements since 2007, by Central Bank

U.S. Federal Reserve

Date	Event	Characteristics	Assets/Maturity/Amount	Announcement	Type of MP-Plus
11/25/2008	Official	Start of program	GSE direct obligations: $100 billion MBS: $500 billion	The Federal Reserve will purchase up to $100 billion in agency debt and up to $500 billion in MBS. The Federal Reserve announces the creation of the Term Asset-Backed Securities Loan Facility (TALF).	DCE
12/1/2008	Speech	Expressed intention		Chairman Bernanke states that the Federal Reserve "could purchase longer-term Treasury or agency securities … in substantial quantities."	QE
12/16/2008	FOMC	Policy rate cut Forward guidance		The Federal Open Market Committee (FOMC) established the target range of the policy rate between 0 percent and 0.25 percent. The FOMC "anticipates … exceptionally low levels of the federal funds rate for some time." It also "stands ready to expand its purchases of agency debt and mortgage-backed securities … is also evaluating the potential benefits of purchasing longer-term Treasury securities."	Low i
1/28/2009	FOMC	Expressed intention		The FOMC "is prepared to purchase longer-term Treasury securities."	QE
3/18/2009	FOMC	Forward guidance Program expansion	MBS: $750 billion Agency debt: $100 billion Treasuries: $300 billion	The FOMC "anticipates … exceptionally low levels of the federal funds rate for an extended period." It will also purchase MBS, agency debt, and longer-term Treasury securities over the next six months.	DCE QE Low i
8/12/2009	FOMC	Program contraction	Treasuries	The FOMC "decided to gradually slow the pace" of Treasury purchases and removed "up to" language with reference to Treasury purchases limit.	QE
9/23/2009	FOMC	Program contraction	MBS	The FOMC "decided to gradually slow the pace" of MBS purchases and removed "up to" language with reference to agency MBS purchases limit.	DCE
11/4/2009	FOMC	Program contraction	Agency debt: $175 billion	The FOMC "will purchase … about $175 billion of agency debt" and removed "up to" language with reference to agency debt limit.	DCE
3/16/2010	FOMC	Keep policy		The FOMC decided to keep the policy stance against some dissent: "Voting against the policy action was Thomas M. Hoenig, who believed that continuing to express the expectation of exceptionally low levels of the federal funds rate for an extended period was no longer warranted because it could lead to the buildup of financial imbalances and increase risks to longer-run macroeconomic and financial stability."	General MP-plus
8/10/2010	FOMC	Expressed intention	Longer-term Treasuries	The Federal Reserve will reinvest "principal payments from agency debt and agency mortgage-backed securities in longer-term Treasury securities."	QE
8/27/2010	Speech	Expressed intention	Longer-term Treasuries	Chairman Bernanke announced that "additional purchases of longer term securities … would be effective in further easing financial conditions."	QE
9/21/2010	FOMC	Expressed intention		The FOMC "is prepared to provide additional accommodation if needed."	General MP-plus

Date			Asset/Maturity/Amount	Announcement	Type of MP-Plus¹
11/3/2010	FOMC	Program expansion	Treasuries: $600 billion	The FOMC "intends to purchase a further $600 billion of longer-term Treasury securities by the end of the second quarter of 2011, a pace of about $75 billion per month."	QE
8/9/2011	FOMC	Forward guidance		This is the first time that the FOMC states explicitly the duration of the low rate policy: "The Committee currently anticipates that economic conditions—including low rates of resource utilization and a subdued outlook for inflation over the medium term—are likely to warrant exceptionally low levels for the federal funds rate at least through mid-2013."	Low i
9/21/2011	FOMC	Start of program	Buy longer-term Treasuries: $400 billion Sell short-term Treasuries: $400 billion	The FOMC "intends to purchase, by the end of June 2012, $400 billion of Treasury securities with remaining maturities of 6 years to 30 years and to sell an equal amount of Treasury securities with remaining maturities of 3 years or less."	QE
12/13/2011	FOMC	Keep policy		The FOMC decided to keep the policy stance against some dissent (Evans did not vote).	General MP-plus
1/25/2012	FOMC	Forward guidance		The FOMC states that the federal funds rate is likely to remain exceptionally low through late 2014.	Low i
6/20/2012	FOMC	Continue program		The FOMC "decided to continue throughout the end of the year its program to extend the average maturity of its holdings of securities."	QE
8/31/2012	Speech	Expressed intention		Jackson Hole Speech: "The Federal Reserve will provide additional policy accommodation as needed to promote a stronger economic recovery and sustained improvement in labor market conditions in a context of price stability."	General MP-plus
9/13/2012	Official	Start of program Forward guidance	MBS: $40 billion per month	The FOMC will purchase $40 billion MBS a month—open-ended. The Federal Reserve will also continue to maintain extremely low interest rates until at least mid-2015.	DCE Low i
12/12/2012	FOMC	Change forward guidance	Linked to economic indicators	The exceptionally low range for the federal funds rate will be appropriate at least as long as the unemployment rate remains above 6½ percent, inflation between one and two years ahead is projected to be no more than a half percentage point above the Committee's 2 percent longer-term goal, and longer-term inflation expectations continue to be well anchored.	Low i
European Central Bank					
Date			**Asset/Maturity/Amount**	**Announcement**	**Type of MP-Plus¹**
8/9/2007			Fine-tuning liquidity operations	The ECB provides liquidity to permit orderly functioning of the money market. From August 9–14 it injects €335 billion into the euro area banking system.	ICE
8/22/2007			Three-month €40 billion longer-term refinancing operation (LTRO)	The ECB announces supplementary liquidity-providing LTRO.	ICE
3/28/2008				The ECB introduces six-month LTROs and supplementary three-month LTROs.	ICE

(continued)

Annex 3.1. Key MP-Plus Announcements since 2007, by Central Bank (*continued*)

European Central Bank

Date	Assets/Maturity/Amount	Announcement	Type of MP-Plus
10/8/2008	Fixed-Rate Full Allotment (FRFA) introduced	The ECB decides to carry out weekly refinancing operations with a fixed-rate tender procedure with full allotment (FRFA).	ICE
5/7/2009	One-year LTRO	Press conference announces three one-year FRFA liquidity-providing operations (in June, September, and December 2009).	ICE
5/7/2009	Covered bonds subject to collateral rules	Covered Bond Purchase Programme (CBPP) announced for €60 billion, one-year program (details followed in June 2009, launched July 6, 2009).	CE
12/3/2009	Indexation of one-year LTRO	Start of phasing out of exceptional liquidity policy: one-year LTRO at full allotment, but rate indexed over life of LTRO.	
3/4/2010	Indexation of six-month LTRO, variable three-month LTRO	Further phasing out of liquidity measures: three-month LTRO at variable rate and six-month LTRO at indexed rate.	
5/9/2010	Sovereign bonds	Securities Market Programme (SMP) launched to ensure depth and liquidity in dysfunctional market segments (government bonds).	CE
7/28/2010	Effective January 1, 2011	Collateral rules tightened (revised haircuts, asset category rankings).	ICE
3/3/2011		The ECB continues Main Refinancing Operations (MROs) as FRFA for as long as necessary.	ICE
8/7/2011	Italian/Spanish sovereign bonds	SMP relaunched for Italy and Spain, acknowledging progress made by these countries on fiscal reform, but conditional on continued reforms.	CE
10/6/2011	Covered bonds subject to collateral rules, 10.5-year maximum maturity	CBPP2 announced for €40 billion, one-year program (November 2011–October 2012; detailed on November 3, 2011).	CE
12/8/2011	Three-year LTRO, December 20, 2011, and February 28, 2012	The ECB announced two three-year LTROs, reduced the reserve ratio from 2 percent to 1 percent, and expanded collateral availability, at the discretion of national central banks (NCBs).	ICE
2/9/2012	Specific national eligibility criteria and risk control measures apply	The ECB approves eligibility criteria for additional credit claims from seven NCBs.	ICE
8/2/2012	Maturity between one and three years. Bonds of EFSF/ESM program countries.	The ECB will start "outright transactions in secondary sovereign bond markets aimed at safeguarding an appropriate monetary policy transmission and the singleness of the monetary policy."	CE
9/6/2012	No ex ante size limits	Technical features of Outright Monetary Transactions (OMT) released, including strict and effective conditionality.	CE
9/6/2012	Ease collateral rules	Suspension of minimum ratings for OMT countries. Accept debt instruments in Japanese, U.K., and U.S. currency issued/held in the euro area.	ICE/CE

Bank of Japan

Date	Characteristics	Announcement	Type of MP-Plus
12/1/2009	Start of program	Introduction of the fixed-rate funds-supplying operation against pooled collateral.	ICE
5/21/2010	Start of program	Introduction of the fund-provisioning measure to support strengthening the foundations for economic growth.	ICE
10/5/2010	Forward guidance	The Bank "will maintain the virtually zero interest rate policy until it judges, on the basis of the understanding of medium- to long-term price stability."	Low i
10/28/2010	Start of program	Establishment of the Asset Purchase Program.	QE DCE

Date	Action	Details	Description	Type
3/14/2011	Increase	Japanese government bonds (JGBs): 0.5 trillion yen; Treasury bills: 1.0 trillion yen; Commercial paper (CP): 1.5 trillion yen; Corporate bonds: 1.5 trillion yen; Exchange-traded funds (ETFs): 0.45 trillion yen; Real estate investment trusts (J-REITs): 0.05 trillion yen	Increase in the size of the Asset Purchase Program, mainly risk assets.	QE DCE
8/4/2011	Increase	JGBs: 2 trillion yen; Treasury bills: 1.5 trillion yen; CP: 0.1 trillion yen; Corporate bonds: about 0.9 trillion yen; ETFs: about 0.5 trillion yen; Fixed-rate funds-supplying operation against pooled collateral: 5 trillion yen; J-REITs: about 0.01 trillion yen	Increase in the size of the Asset Purchase Program.	QE DCE
10/27/2011	Increase	JGBs: 5 trillion yen	Increase in the size of the Asset Purchase Program.	QE
2/14/2012	Increase	JGBs: 10 trillion yen	The Bank further "enhances monetary easing" and increases the size of the Asset Purchase Program.	QE
4/27/2012	Increase	JGBs: 10 trillion yen; Fixed-rate funds-supplying operation against pooled collateral: reduction of 5 trillion yen	Increase in the size of the Asset Purchase Program and decrease of 5 trillion yen in the Bank's fixed-rate funds-supplying operation against pooled collateral with a six-month term.	QE
7/12/2012	No net increase	Treasury bills: 5 trillion yen; Fixed-rate funds-supplying operation against pooled collateral: reduction of 5 trillion yen	The Bank "decided to adopt the following measures with the view to proceeding with the aforementioned monetary easing in a continuous manner by steadily increasing the amount outstanding of the Asset Purchase Program."	QE
9/19/2012	Increase	JGBs: about 5 trillion yen; Treasury bills: about 5 trillion yen	Increase of 10 trillion yen in the size of the Asset Purchase Program.	QE
10/30/2012	Start of program		Introduction of fund-provisioning measure to stimulate bank lending.	ICE
10/30/2012	Increase	JGBs: about 5 trillion yen; Treasury bills: about 5 trillion yen; CP: about 0.1 trillion yen; Corporate bonds: about 0.3 trillion yen; ETFs: about 0.5 trillion yen; J-REITs: about 0.01 trillion yen	Increase of 11 trillion yen in the size of the Asset Purchase Program.	QE DCE
12/20/2012	Increase	JGBs: about 5 trillion yen; Treasury bills: about 5 trillion yen	Increase of 10 trillion yen in the size of the Asset Purchase Program.	QE
1/22/2013	Increase	JGBs: about 2 trillion yen per month; Treasury bills: about 10 trillion yen per month	Introduced the "price stability target" and will introduce the "open-ended asset purchasing method" under the Asset Purchase Program (from 2014).	QE

(continued)

Annex 3.1. Key MP-Plus Announcements since 2007, by Central Bank (*continued*)

				Bank of England	
Date	Event	Characteristics	Assets/Maturity/Amount	Announcement	Type of MP-Plus
1/19/2009		Expressed intention		The chancellor of the Exchequer announces that the Bank will set up an asset purchase program.	General MP-plus
1/29/2009	Report	Program established		Asset Purchase Facility established.	General MP-plus
2/11/2009		Strong indication		Inflation Report and associated press conference give strong indication that QE is likely.	QE
3/5/2009	MPC	Start of program	Gilts: £75 billion; 5–25 years	The Monetary Policy Committee (MPC) announces it will purchase £75 billion of assets over three months; conventional bonds likely to constitute the majority of purchases, restricted to bonds with residual maturity between 5 and 25 years.	QE
5/7/2009	MPC	Program expansion	Gilts: £50 billion	The MPC announces that the amount of QE asset purchases will be extended by a further £50 billion to £125 billion.	QE
8/6/2009	MPC	Program expansion	Gilts: £50 billion; three or more years	The MPC announces that QE asset purchases will be extended to £175 billion, and the buying range will be extended to gilts with a residual maturity greater than three years.	QE
11/5/2009	MPC	Program expansion	Gilts: £25 billion	The MPC announces that QE asset purchases will be extended to £200 billion.	QE
2/4/2010	MPC			The MPC announces that QE will be maintained at £200 billion.	
10/6/2011	MPC	Program expansion	Gilts: £75 billion	An increase of £75 billion in size of asset purchases.	QE
2/9/2012	MPC	Program expansion	Gilts: £50 billion	An increase of £50 billion in size of asset purchases.	QE
7/5/2012	MPC	Program expansion	Gilts: £50 billion	An increase of £50 billion in size of asset purchases.	QE
7/12/2012	News release	Announcement of program		Funding for Lending Scheme (FLS) is announced, which is designed to boost lending to the real economy.	ICE

Sources: Respective central banks; news reports; and IMF staff estimates.

Note: EFSF = European Financial Stability Facility Mechanism; ESM = European Stability Mechanism; GSE = government-sponsored enterprise; MBS = mortgage-backed securities. Definition of type of MP-plus: CE = credit easing; DCE = direct credit easing; Low I = a prolonged period of low interest rates; ICE = indirect credit easing; QE = quantitative easing.

[1]Entities in this column conform to the classification in this chapter although the ECB's objective for these measures was primarily to support the transmission of monetary policy.

Annex 3.2. Estimation Method and Results for the Panel Regressions

Bank-level panel regressions were used to investigate the channels through which MP-plus policies can affect banks. Three channels were considered: bank profitability, risk taking by banks, and efforts toward balance sheet repair.

Bank profitability is measured by the net interest margin, defined as net interest income (on a fully taxable-equivalent basis if available) as a percent of average earning assets. Risk taking is proxied by three variables: (1) the ratio of risk-weighted assets to total assets, in which risk-weighted assets are a weighted sum of a bank's assets with weights determined by the riskiness of each asset according to banking regulations and the bank's internal models; (2) the z-score, defined as the ratio of the return on assets plus the ratio of equity over total assets, divided by the standard deviation of asset returns over 12 quarters (the z-score is inversely related to a bank's probability of insolvency, and thus a higher z-score is interpreted as lower bank risk); and (3) the equity ratio, defined as the ratio of equity to total assets. Efforts toward balance sheet repair are proxied by the ratio of the provisions for possible losses on loans and leases (excluding provisions for possible losses on real estate owned) to total (gross) loans.

The stance of monetary policy is captured by the difference between the policy rate and the rate given by a standard Taylor (1993) rule (the "Taylor gap"). For robustness, an average of four estimates of the Taylor rate was used (see Table 3.6 and Figure 3.8). When the Taylor gap indicates that the interest rate should be below zero, the central bank may choose to employ unconventional measures (such as QE).

In the regressions, such measures are summarized by the change in the ratio of central bank assets to GDP. In addition, the regressions include a measure of the length of time during which the policy rate stayed below the Taylor rule rate over the previous five years to represent prolonged periods of exceptionally low interest rates (in itself an unconventional measure).

To deal with possible endogeneity issues, several adjustments were used. First, by using a one-period lag of most explanatory variables, the analysis reduces the extent to which the results measure a response of the central bank to problems in banks. Also, the regressions were estimated using the Arellano-Bover/Blundell-Bond system generalized method of moments estimator (Arellano and Bover, 1995; and Blundell and Bond, 1998) to further alleviate endogeneity issues. The number of lags used (and hence the number of instruments) varies according to the dependent variable and the sample size. Finally, by including time dummies, the analysis takes into account some of the direct effects of the crisis on bank soundness. Another potential issue is that bank risk characteristics and central bank balance sheets (one of our measures of MP-plus) tend to have little variability during normal times, giving the regression less power to find a statistical relationship between the variables. However, the movements in these variables during the crisis have been more pronounced and hence likely provide some statistical power to measure the effects.

The dataset consists of quarterly balance sheet data for listed U.S. commercial banks from the SNL Financial database and U.S. macroeconomic data over the period 2007:Q3–2012:Q3. The full sample includes data for 614 banks. Because all variables

Table 3.6. Specification of Taylor Rule

	Long-Run Real Interest Rate	Inflation Objective	Weight on Inflation Deviation	Inflation Deviation	Weight on Output Gap	Output Gap
1	Growth rate of potential output	2 percent	1.5	Current inflation − 2 percent	0.5	WEO estimate
2	Growth of H-P trend of real GDP	2 percent	1.5	Current inflation − 2 percent	0.5	Deviations from H-P trend
3	Growth rate of potential output	2 percent	0.5	Current inflation − 2 percent	0.5	WEO estimate
4	Growth of H-P trend of real GDP	2 percent	0.5	Current inflation − 2 percent	0.5	Deviations from H-P trend

Source: IMF staff estimates.

Note: H-P trend = Hodrick-Prescott filter trend; WEO = World Economic Outlook database. The table indicates the four versions of the Taylor rule equation that were used in the panel regressions. The general specification is the following: Taylor rule = Long-Run Real Interest Rate + Inflation Objective + Weight * Inflation Deviation + Weight * Output Gap.

Figure 3.8. Various Measures of the Taylor Gap in the United States
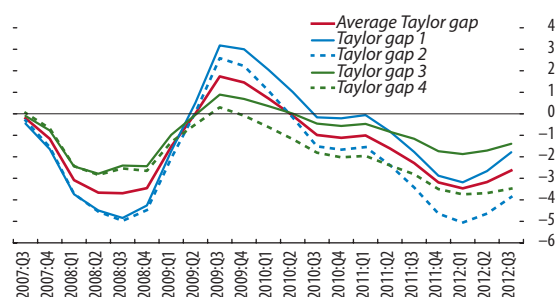
Source: IMF staff estimates.
Note: For definition of Taylor gaps, see text.

are not available for all banks in every period, the sample composition varies depending on the variable of interest. We exclude observations that are three standard deviations away from the sample mean. For each regression, the panel is balanced by keeping only banks for which data are available for every quarter over the estimation period. Results are reported in Table 3.7.

The econometric specification is the following:

$$x_{i,t} = a_1 x_{i,\ t-1} + a_2 MonetaryPolicyIndicators_t$$
$$+ a_3 BankSpecificFactors_{i,t}$$
$$+ a_4 OtherControlVariables_t + \varepsilon_{i,t}$$

where

Table 3.7. Results of the Panel Regressions

	Net Interest Margin (In percent of average earning assets)	Risk-Weighted Assets/Total Assets (In percent)	z-score	Equity Ratio (Equity /Total Assets) (In percent)	Loan Loss Provisions/ Total Loans (In percent)
Lagged dependent variable	0.760***	0.868***	0.853***	0.829***	0.672***
Lagged difference (policy rate minus Taylor rate) (in percent)	0.019***	0.169	−0.717***	−0.055***	−0.012***
Number of quarters with negative Taylor gaps over the last five years	0.021	0.880***	1.293**	0.076*	−0.007
Lagged change in central bank's assets to GDP (in percent)	−0.013***	−0.058	0.251**	0.004	−0.023***
Lagged real growth	0.004	0.122**	−0.008	0.032***	−0.030***
Lagged cyclically adjusted government balance to GDP (in percent)	−0.024	−0.372**	−0.959**	−0.067*	−0.002
Lagged equity-to-total-assets ratio (in percent)	0.005	0.032			−0.004
Lagged bank size (log assets)	0.027	−0.506**	−1.308	−0.003	0.008
Global systemically important bank (dummy variable)	−0.245	1.064	8.331*	−0.528	−0.428*
Chicago Board Options Exchange Market Volatility Index (VIX)	0.00	−0.015	−0.269***	−0.001	0.004***
Number of observations	7220	5240	6360	7720	5880
Number of banks	361	262	318	386	294
Observations per bank	20	20	20	20	20
Number of instruments	338	148	292	336	235
Sargan test (p-value)	0.31	0.53	0.26	0.19	0.29
Test for zero autocorrelation in first-differenced errors (p-value)					
Order 1	0.00	0.00	0.00	0.00	0.00
Order 2	0.94	0.13	0.38	0.46	0.00[1]

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

Note: ***, **, * = statistically significant coefficients at the 1, 5, and 10 percent levels.

Risk-weighted assets are a weighted sum of a bank's assets, with weights determined by the riskiness of each asset. The z-score is the ratio of the return on assets plus the ratio of equity over total assets, divided by the standard deviation of asset returns. It is inversely related to a bank's probability of insolvency. A higher z-score is thus interpreted as lower bank risk.

The Taylor gap is the difference between the policy rate and the rate given by a standard Taylor (1993) rule. Different estimates of the Taylor gap (see text) produce different results (magnitude, sign, and significance). To reduce bias that may result from using any specific estimate of the Taylor gap, we use an average of four possible measures of the Taylor rate. Cyclically adjusted government balances are annual series from the October 2012 *Fiscal Monitor*. The coefficients on the time dummies are not reported.

Each regression is estimated using the Arellano-Bover/Blundell-Bond system GMM estimator. Instruments for the differenced equation are the second and further lags of all variables in the regression, except for the loan loss provisions ratio regression (see below). The number of lags (and hence the number of instruments) used varies according to the dependent variable and the number of banks in the sample. The first lag of the difference of each variable is used for the level equation.

[1]Because the test does not accept the null hypothesis of zero autocorrelation at order 2, we use lags three and higher as instruments in the differenced equation and the second lag of the difference of each variable for the level equation.

- $x_{i,t}$ denote variables of bank i at time t, that is, the net interest margin, the ratio of risk-weighted assets to total assets, the z-score, the leverage ratio, and the ratio of loan loss provisions to total loans.
- *MonetaryPolicyIndicators$_t$* represents Taylor rule residuals (the Taylor gap), the number of quarters during which residuals are negative over the previous five years, and the change in the ratio of central bank assets to GDP. The Taylor gap and the change in the ratio of central bank assets to GDP are lagged by one period to address endogeneity issues.
- *BankSpecificFactors$_{i,t}$* corresponds to individual bank characteristics: equity ratio, log asset size, and a dummy for banks that are on the Financial Stability Board's list of global systemically important banks. Both the equity ratio and the asset size variables are lagged by one period. The regressions for leverage and the z-score do not include the equity ratio, which is used as the dependent variable in the leverage regression and is a component of the z-score.
- *OtherControlVariables$_t$* comprises the real growth rate, to control for the business cycle; the ratio of the cyclically adjusted government balance to GDP (from the September 2012 Fiscal Monitor), to control for fiscal policy; and the VIX, to control for the stress in the financial system. We also include time dummies.

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GLOBAL FINANCIAL STABILITY REPORT
STATISTICAL APPENDIX, APRIL 2013

This presentation complements the main text of the *Global Financial Stability Report* (GFSR) with data on financial developments in regions and countries as well as in selected sectors.

Unless otherwise noted, the data reflect information available up to January 31, 2013. The data come for the most part from sources outside the IMF. Although the IMF endeavors to use the highest quality data available, it cannot be responsible for the accuracy of information obtained from independent sources.

Please note that effective with the April 2011 issue, the IMF's Statistics Department assumed responsibility for compiling the Financial Soundness Indicators tables, and they are no longer part of this appendix. However, these tables will continue to be linked to the GFSR Statistical Appendix on the IMF's public website.

Effective with the April 2013 issue, the database and filtering criteria for the external private financing tables 4, 5, 6, and 7 were changed. Consequently, there was a significant break in the data reported in previous issues.

The following symbols and conventions have been used in this appendix:

- . . .   to indicate that data are not available;
- —   to indicate that the figure is zero, or less than half the final digit shown, or the item does not exist;
- –   between years and months (for example, 2008–09 or January–June) to indicate the years or months covered, including the beginning and ending years or months;
- /   between years (for example, 2008/09) to indicate a fiscal or financial year.

"Billion" means a thousand million; "trillion" means a thousand billion.

"Basis points" refers to hundredths of 1 percentage point (for example, 25 basis points is 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.

Table of Contents

Figure 1. Major Net Exporters and Importers of Capital in 2012

Economies That Export Capital[1]

Other economies[2] 21.3%
Germany 14.8%
China 13.3%
Saudi Arabia 11.0%
Korea 2.7%
Taiwan Province of China 3.1%
Singapore 3.2%
Qatar 3.4%
Japan 3.7%
Netherlands 4.0%
Norway 4.4%
Kuwait 4.9%
Russia 5.1%
Switzerland 5.3%

Economies That Import Capital[3]

Other economies[4] 29.7%
United States 37.4%
Brazil 4.3%
Australia 4.4%
France 4.9%
Canada 5.3%
United Kingdom 6.7%
India 7.3%
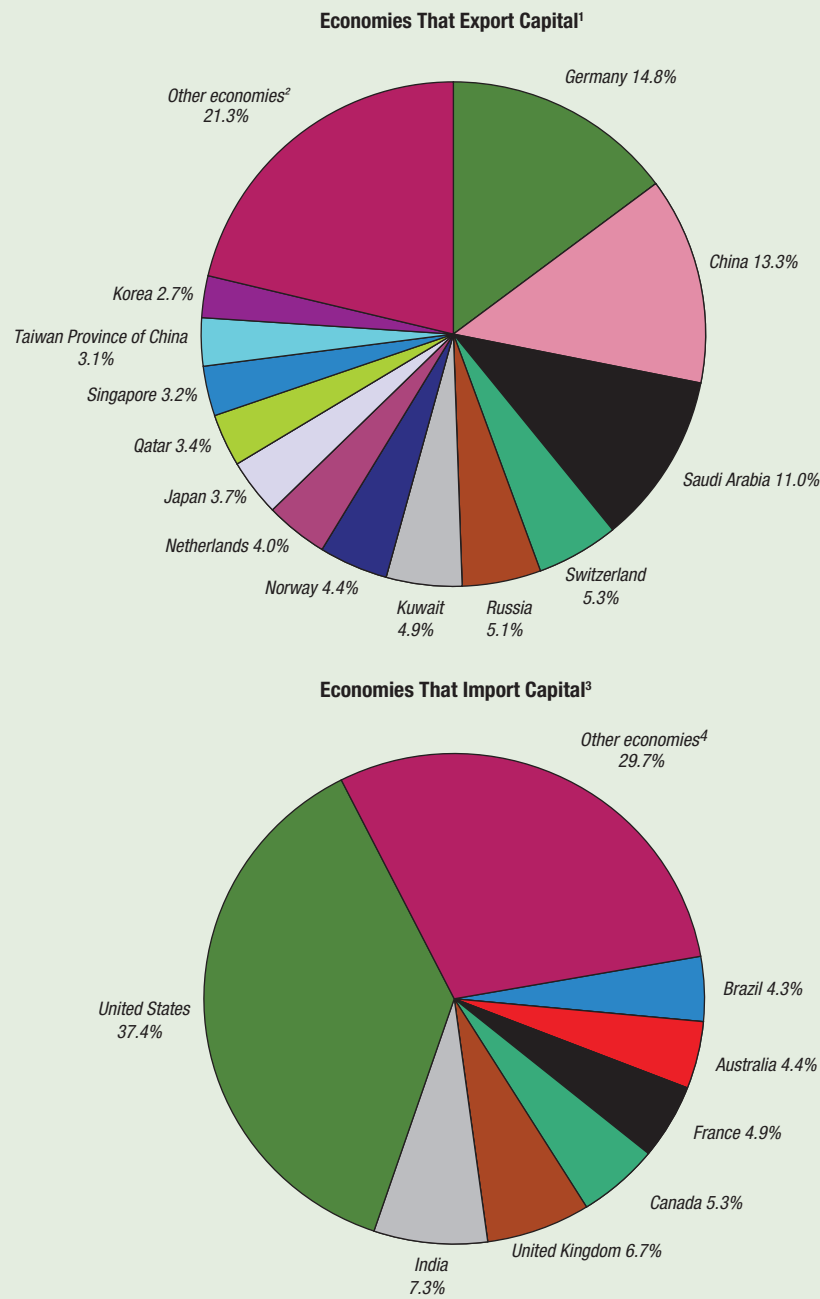
Source: IMF, World Economic Outlook database as of April 2, 2013.
[1]As measured by economies' current account surplus (assuming errors and omissions are part of the capital and financial accounts).
[2]Other economies include all economies with shares of total surplus less than 2.7 percent.
[3]As measured by economies' current account deficit (assuming errors and omissions are part of the capital and financial accounts).
[4]Other economies include all economies with shares of total deficit less than 4.3 percent.

Figure 2. Sovereign Credit Default Swap Spreads
(Five-year tenors, in basis points)
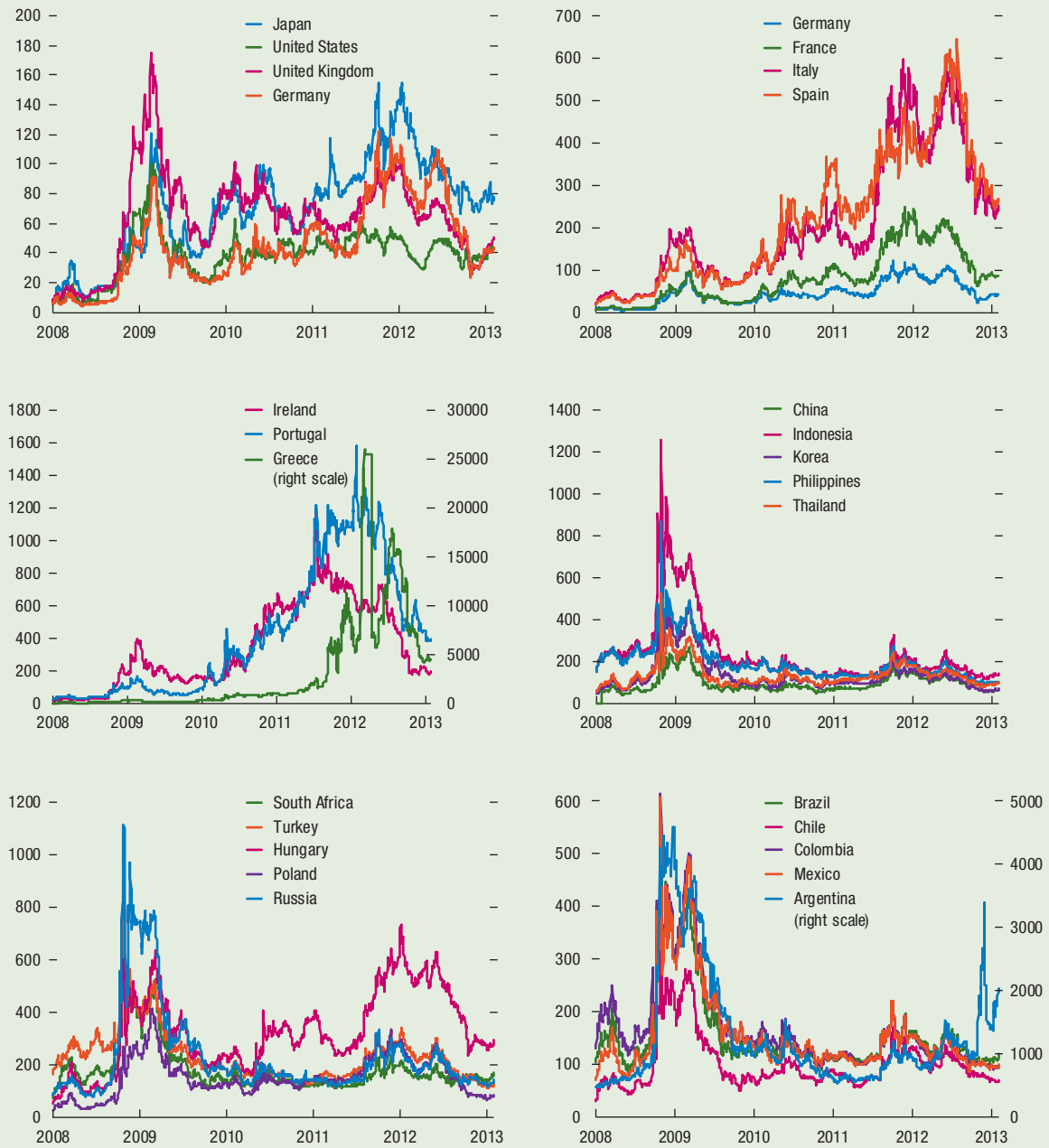
Source: Bloomberg L.P.

Figure 3. Selected Credit Default Swap Spreads
(Five-year tenors, in basis points)

Sovereigns by Region
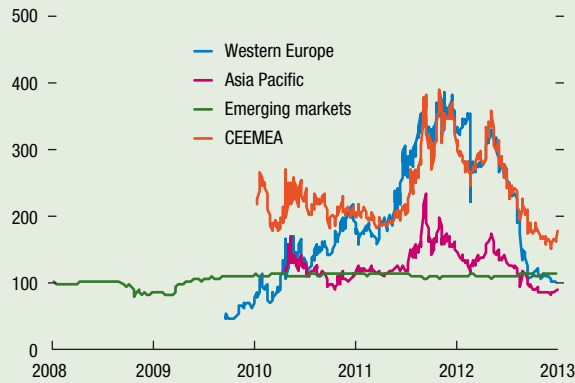
Corporates by Credit Quality
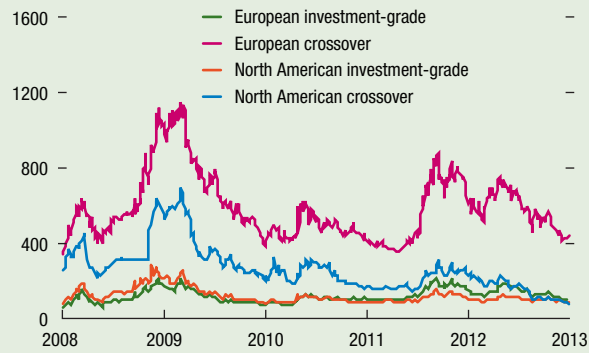
Banks by Region

Sources: Bloomberg L.P.; and Datastream.
CEEMEA = Central and Eastern Europe, Middle East, and Africa.

Figure 4. Selected Spreads
(In basis points; monthly data)

Repo Spread[1]

Commercial Paper Spread[2]

Swap Spreads[3]

United States

Euro area

Japan
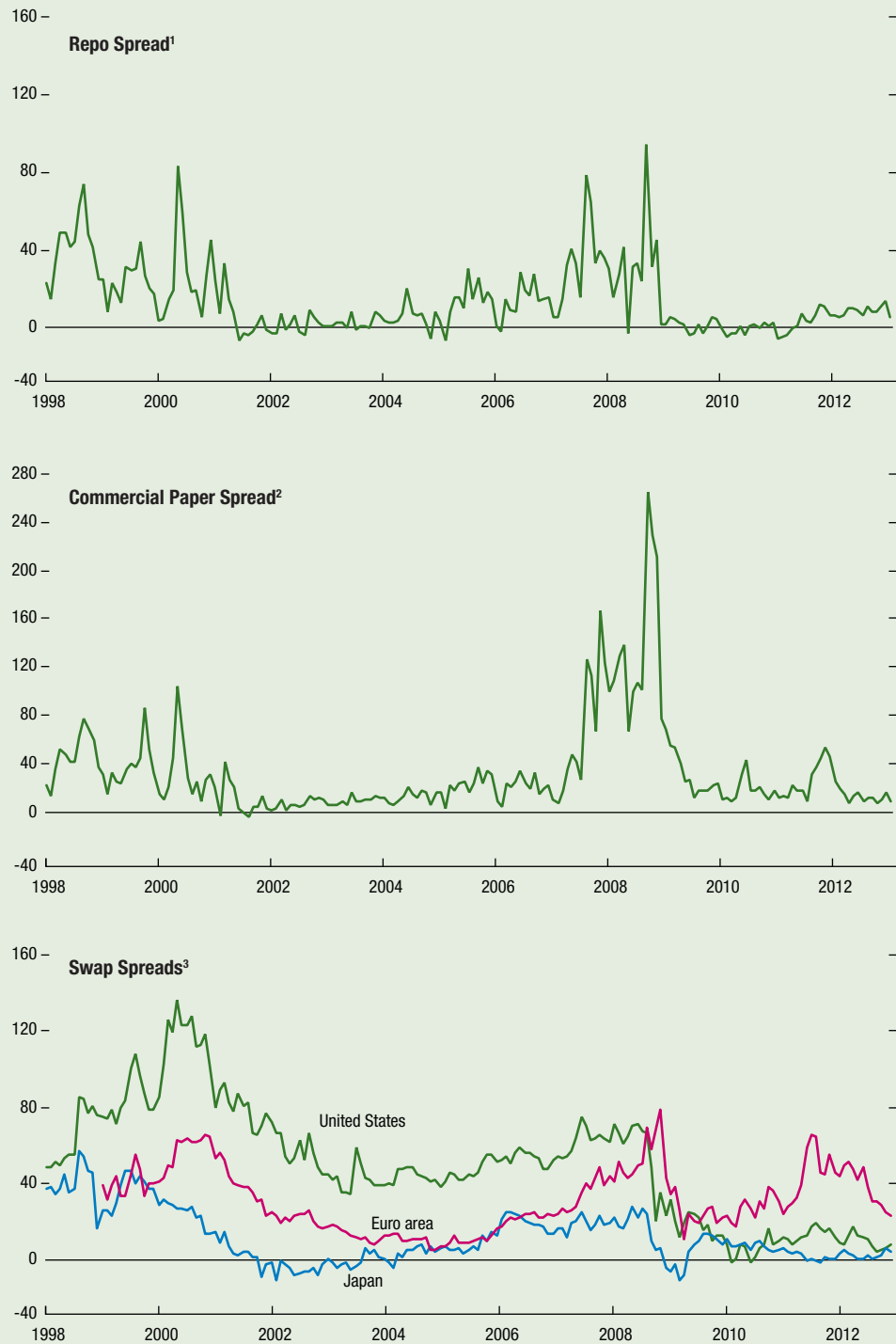
Sources: Bloomberg L.P.; and Bank of America Merrill Lynch.
[1]Spread between yields on three-month U.S. Treasury repo and on three-month U.S. Treasury bill.
[2]Spread between yields on 90-day investment-grade (financial and nonfinancial) commercial paper and on three-month U.S. Treasury bill.
[3]Spread over 10-year government bond.

Figure 5. Implied Volatility Indices
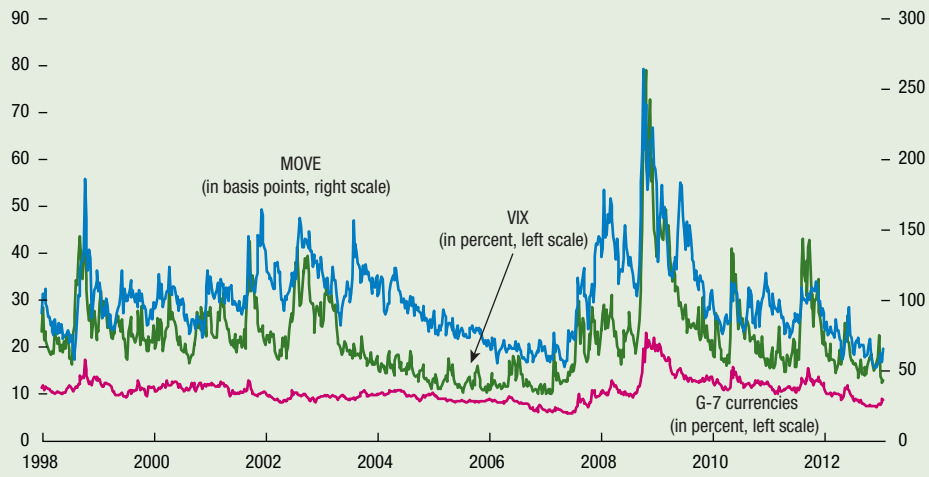
Source: Bloomberg L.P.
Note: VIX = Chicago Board Options Exchange volatility index on the Standard & Poor's 500 and denotes equity volatility. MOVE = Bank of America Merrill Lynch Option Volatility Estimate index and denotes one-month Treasury options volatility. G-7 currencies = VXY index from JPMorgan Chase & Co. and denotes G-7 foreign exchange volatility.

Figure 6. United States: Corporate Bond Market
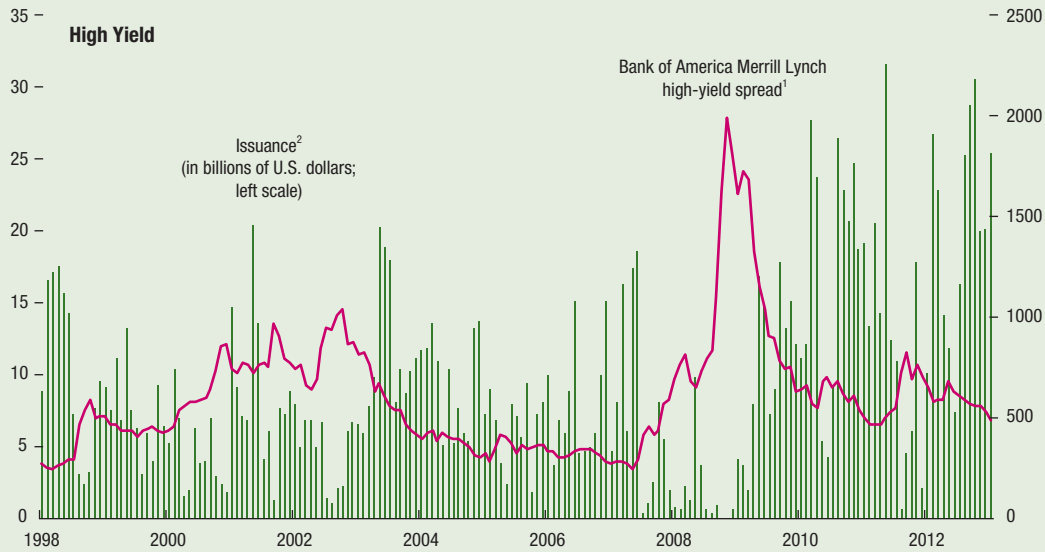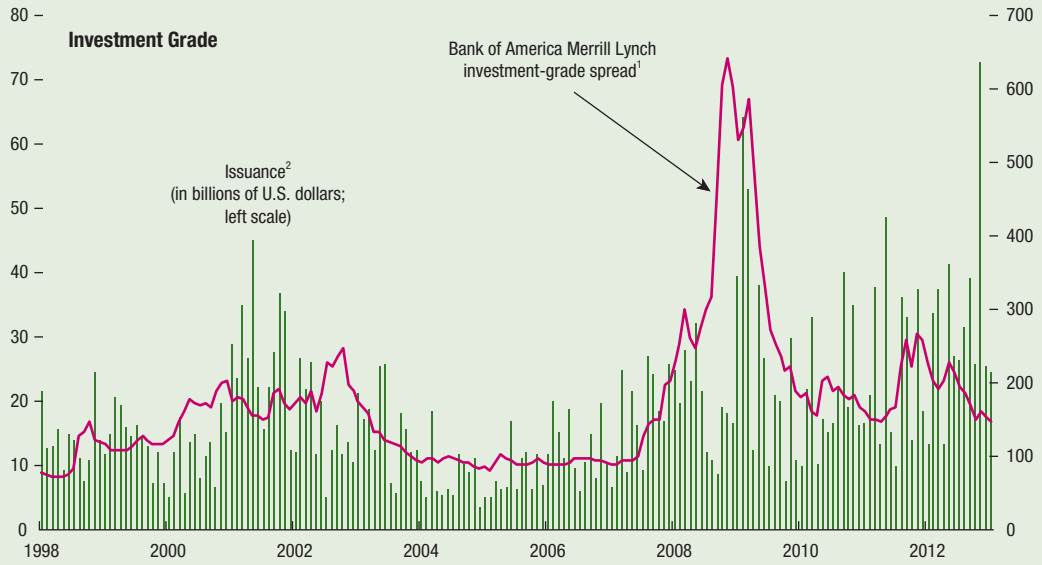
Sources: Board of Governors of the Federal Reserve System; and Bank of America Merrill Lynch.
[1]Option-adjusted spread; in basis points; right scale.
[2]Gross issuance.

Figure 7. Euro Area: Corporate Bond Market

Investment Grade

Bank of America Merrill Lynch investment-grade spread[1]

Issuance[2]
(in billions of U.S. dollars; left scale)

High Yield

Bank of America Merrill Lynch high-yield spread[1]

Issuance[2]
(in billions of U.S. dollars; left scale)
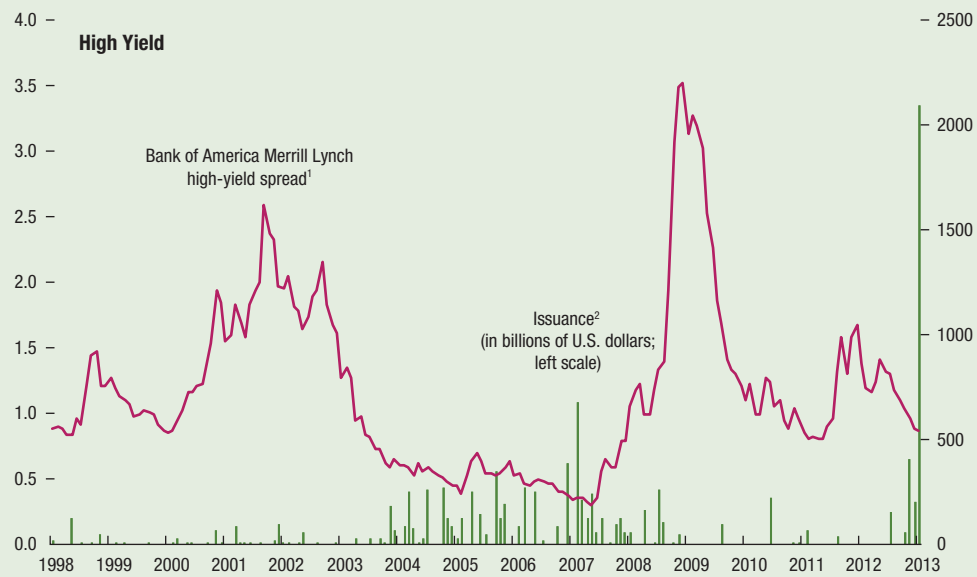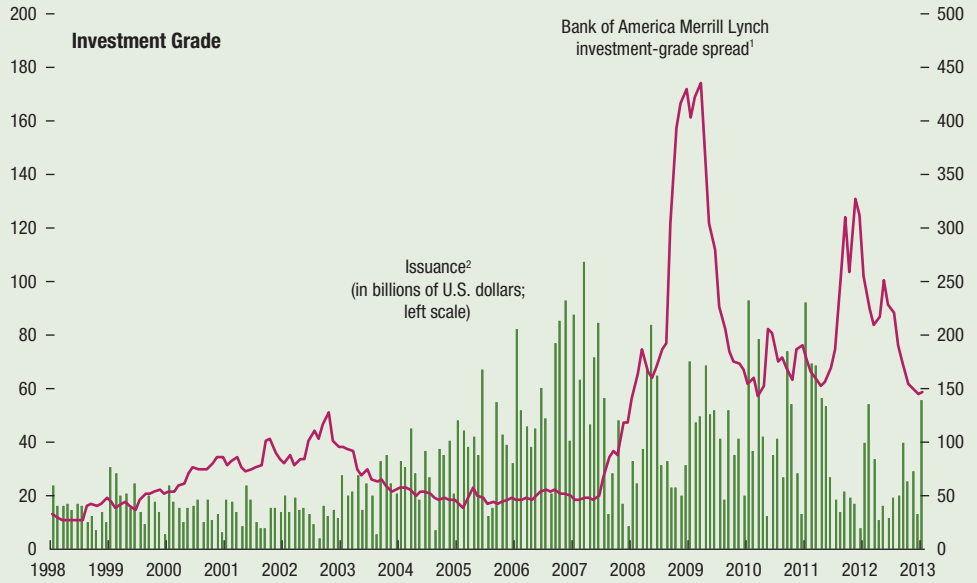
Sources: DCM Analytics; and Bank of America Merrill Lynch.
[1]Option-adjusted spread; in basis points; right scale.
[2]Gross issuance.

Figure 8. United States: Commercial Paper Market

Discount Rate Spread[1]
(In basis points; weekly data)

Amount Outstanding
(In billions of U.S. dollars; monthly data)

Nonfinancial
(left scale)

Asset-backed
(right scale)

Financial
(right scale)

Source: Board of Governors of the Federal Reserve System.
[1]Difference between 30-day A2/P2 and AA nonfinancial commercial paper.

Table 1. Selected Indicators on the Size of the Capital Markets, 2011
(In billions of U.S. dollars unless noted otherwise)

	GDP	Total Reserves Minus Gold[2]	Stock Market Capitalization	Debt Securities[3] Public	Private	Total	Bank Assets[4]	Bonds, Equities, and Bank Assets[5]	Bonds, Equities, and Bank Assets[5] (*In percent of GDP*)
World	70,220.6	10,650.6	47,089.2	44,622.1	53,766.0	98,388.1	113,735.2	259,212.5	369.1
European Union[1]	16,410.9	468.0	8,530.2	10,807.9	20,740.5	31,548.5	43,464.6	83,543.4	509.1
Euro area	13,107.1	316.7	4,586.6	8,872.2	16,104.0	24,976.2	30,529.6	60,092.5	458.5
North America	16,856.8	202.6	17,552.8	14,092.7	21,854.5	35,947.2	18,252.2	71,752.2	425.7
Canada	1,781.1	65.7	1,912.1	1,217.9	1,028.4	2,246.3	3,617.3	7,775.7	436.6
United States	15,075.7	136.9	15,640.7	12,874.7	20,826.2	33,700.9	14,634.9	63,976.5	424.4
Japan	5,897.0	1,258.2	3,540.7	12,790.6	2,578.7	15,369.3	13,497.1	32,407.0	549.5
Memorandum items:									
EU countries									
Austria	418.4	11.0	85.3	243.7	427.6	671.3	1,312.4	2,068.9	494.5
Belgium	514.6	17.9	209.8	451.0	650.0	1,101.0	1,430.2	2,740.9	532.6
Denmark	333.7	81.7	192.8	159.3	712.1	871.4	1,160.9	2,225.1	666.8
Finland	263.7	7.9	145.5	104.3	135.8	240.1	633.7	1,019.2	386.6
France	2,778.1	48.6	1,412.4	1,806.8	3,597.8	5,404.6	9,053.6	15,870.5	571.3
Germany	3,607.4	66.9	1,184.5	2,064.9	3,253.9	5,318.8	5,216.4	11,719.8	324.9
Greece	290.2	1.2	33.8	356.7	308.0	664.7	431.8	1,130.3	389.5
Ireland	221.2	1.4	108.4	111.2	637.2	748.4	820.6	1,677.5	758.3
Italy	2,196.3	49.2	459.7	2,196.5	2,227.5	4,424.0	3,136.6	8,020.2	365.2
Luxembourg	59.3	0.9	67.6	5.2	95.2	100.4	1,027.4	1,195.4	2,015.6
Netherlands	837.6	20.3	243.9	420.6	1,964.7	2,385.3	2,922.6	5,551.8	662.8
Portugal	238.0	2.0	66.1	170.9	363.6	534.5	669.3	1,269.9	533.6
Spain	1,479.6	32.8	543.0	871.3	2,417.3	3,288.6	3,653.4	7,485.0	505.9
Sweden	538.6	44.0	484.4	163.1	697.8	860.9	757.3	2,102.5	390.4
United Kingdom	2,431.5	79.3	3,266.4	1,613.4	3,225.8	4,839.2	11,016.9	19,122.5	786.4
Newly industrialized Asian economies[6]	2,094.6	1,212.6	4,975.4	857.8	1,134.2	1,992.1	4,538.2	11,505.7	549.3
Emerging market economies[7] of which:	25,451.8	6,943.7	9,771.0	5,289.6	3,950.7	9,240.2	26,526.3	45,537.5	178.9
Asia	11,305.6	4,054.2	4,985.5	2,634.2	2,393.0	5,027.2	18,418.7	28,431.4	251.5
Latin America and the Caribbean	5,633.7	740.1	2,221.4	1,674.1	1,064.4	2,738.5	3,409.1	8,369.0	148.6
Middle East and North Africa	2,906.6	1,105.7	788.0	104.5	138.2	242.7	1,741.0	2,771.6	95.4
Sub-Saharan Africa	1,225.3	175.8	581.0	142.0	112.8	254.8	591.5	1,427.3	116.5
Europe	4,380.5	867.9	1,195.1	734.8	242.2	977.0	2,366.0	4,538.1	103.6

Sources: World Federation of Exchanges; Bank for International Settlements (BIS); IMF, International Financial Statistics (IFS) and World Economic Outlook databases as of April 2, 2013; ©2003 Bureau van Dijk Electronic Publishing-Bankscope; Board of Governors of the Federal Reserve System, *Flow of Funds*; and Bloomberg L.P.

[1]This aggregate includes euro area countries, Denmark, Sweden, and the United Kingdom.
[2]Data are from IFS. For euro area, the data also include the total reserves minus gold holdings of the European Central Bank.
[3]Data are from BIS as of July 2012. The data include international and domestic debt securities. For data definition and coverage, refer to the BIS Guide to the International Financial Statistics.
[4]Total assets of domestic commercial banks, including foreign bank's subsidiaries operated domestically. For Austria, the data are from Austrian National Bank. For Ireland, the data are from Central Bank of Ireland. For Luxembourg, the data are from Commission de Surveillance du Secteur Financier. It comprises the assets of commercial, savings, and private banks. For Portugal, the data are from Bank of Portugal.
[5]Sum of the stock market capitalization, debt securities, and bank assets.
[6]Hong Kong SAR, Korea, Singapore, and Taiwan Province of China.
[7]This aggregate comprises the group of emerging and developing economies defined in the *World Economic Outlook*.

Table 2. MSCI Equity Market Indices

	2009	2010	2011	2011	2012 Q1	2012 Q2	2012 Q3	2012 Q4
(Period-on-Period Percent Change)								
Global	**31.5**	**10.4**	**−9.4**	**13.4**	**11.3**	**−6.4**	**6.2**	**2.5**
Emerging Markets Index[1]	**74.5**	**16.4**	**−20.4**	**15.1**	**13.6**	**−10.0**	**7.0**	**5.2**
Latin America	**98.1**	**12.1**	**−21.9**	**5.4**	**14.0**	**−14.3**	**4.3**	**3.4**
Brazil	121.3	3.8	−24.9	−3.5	13.0	−20.0	4.3	2.2
Chile	81.4	41.8	−22.1	5.6	17.1	−10.0	1.1	−1.0
Colombia	76.5	40.8	−7.1	31.6	17.8	−2.5	2.0	12.3
Mexico	53.1	26.0	−13.5	27.1	15.4	−1.9	6.5	5.4
Peru	69.3	49.2	−23.9	15.5	12.3	−4.7	2.7	5.2
Asia	**70.3**	**16.6**	**−19.1**	**18.1**	**13.0**	**−8.3**	**7.7**	**5.8**
China	58.9	2.6	−20.4	18.7	9.9	−7.8	3.9	12.8
India	91.5	14.7	−26.3	27.9	14.9	−1.6	8.6	4.2
Indonesia	90.3	25.8	4.7	8.8	4.9	−6.4	9.2	1.4
Korea	56.6	22.1	−11.5	11.7	12.5	−7.7	6.6	0.9
Malaysia	46.2	19.3	−0.2	6.8	4.3	−1.1	0.5	3.1
Pakistan	89.8	21.4	−12.9	33.5	20.4	−3.6	8.8	5.7
Philippines	55.8	23.5	−3.1	34.7	17.6	1.4	3.0	9.6
Taiwan Province of China	70.7	7.9	−20.3	8.8	11.6	−10.4	11.6	−8.4
Thailand	63.0	36.4	−1.2	26.9	17.7	−3.8	6.6	5.2
Europe, Middle East, & Africa[1]	**63.5**	**20.9**	**−22.6**	**17.7**	**15.4**	**−10.1**	**7.6**	**5.5**
Czech Republic[1]	13.9	−5.9	−6.8	−6.1	3.8	−8.7	6.0	−6.6
Egypt	32.1	15.9	−46.8	52.5	40.7	−5.7	23.4	−6.9
Hungary	71.2	−1.6	−23.7	8.1	12.1	−8.9	7.8	−1.8
Morocco	−10.5	17.2	−16.5	−17.6	1.7	−14.1	−5.1	−0.6
Poland	32.6	16.3	−21.7	19.0	6.7	−0.6	4.0	8.0
Russia	100.3	17.2	−20.9	9.6	18.5	−16.9	9.0	2.1
South Africa	22.2	17.4	0.9	20.6	4.5	−0.1	6.5	8.4
Turkey	86.5	21.5	−22.4	51.7	20.0	0.1	7.4	17.6
Sectors								
Energy	82.1	7.5	−20.1	2.5	12.8	−18.2	10.3	0.7
Materials	74.8	14.7	−23.0	6.4	7.4	−8.1	2.5	5.1
Industrials	56.3	27.1	−30.6	14.9	17.8	−10.9	4.2	5.0
Consumer discretionary	113.0	29.5	−10.4	14.6	11.9	−10.2	9.9	3.8
Consumer staple	66.7	27.6	−1.4	23.0	12.4	−4.2	6.6	7.2
Health care	40.1	25.7	−23.2	31.6	14.7	−1.2	10.8	4.7
Financials	76.6	14.5	−25.6	22.0	13.7	−8.4	6.7	9.7
Information technology	104.7	13.9	−17.1	26.3	21.0	−9.2	9.2	5.4
Telecommunications	21.8	10.9	−8.0	9.6	7.6	−4.4	6.1	0.4
Utilities	51.2	4.9	−16.4	2.4	12.3	−8.3	−1.2	0.6

Table 2 *(concluded)*

| | 2009 | 2010 | 2011 | 2012 | 2012 | | | |
					Q1	Q2	Q3	Q4
					(Period-on-Period Percent Change)			
Developed Markets	**27.0**	**9.6**	**−7.6**	**13.2**	**10.9**	**−5.8**	**6.1**	**2.1**
Australia	30.8	−3.5	−14.9	14.9	6.4	−5.0	7.2	6.0
Austria	34.1	14.8	−35.7	20.7	13.5	−12.6	5.3	15.5
Belgium	49.4	4.6	−9.6	34.0	15.9	3.1	8.3	3.6
Canada	29.7	12.0	−12.2	4.3	3.9	−6.5	6.0	1.3
Denmark	31.0	39.0	−14.3	28.1	13.9	1.4	9.9	0.9
Finland	7.2	7.1	−34.2	10.0	15.8	−23.8	10.6	12.7
France	27.6	−6.7	−19.3	17.7	12.1	−11.0	6.8	10.6
Germany	21.3	6.0	−20.1	27.2	20.5	−14.6	13.9	8.5
Greece	22.6	−46.4	−63.6	−0.8	13.5	−30.8	−1.4	28.1
Hong Kong SAR	55.2	19.7	−18.4	24.4	13.0	−6.4	11.8	5.2
Ireland	9.9	−19.7	11.4	3.8	8.2	−4.7	−2.1	2.9
Israel	51.3	2.2	−29.8	−7.0	8.2	−14.7	5.3	−4.4
Italy	22.6	−17.6	−25.8	8.6	8.9	−14.4	6.8	9.1
Japan	4.4	13.4	−16.2	5.8	10.2	−7.4	−1.8	5.7
Netherlands	37.9	−0.6	−14.4	17.2	8.5	−9.1	8.7	9.2
New Zealand	43.0	3.2	1.1	23.0	13.6	−8.0	12.8	4.3
Norway	82.5	7.4	−12.8	13.7	14.8	−12.9	13.3	0.5
Portugal	35.4	−14.6	−25.7	−0.7	1.6	−21.4	12.8	10.1
Singapore	67.3	18.4	−21.0	26.4	19.1	−5.4	9.3	2.7
Spain	36.5	−25.4	−16.9	−3.3	−4.3	−15.0	9.7	8.4
Sweden	60.2	31.3	−17.8	18.7	13.6	−10.0	10.6	5.0
Switzerland	22.9	9.8	−9.1	17.3	9.1	−7.6	7.7	8.0
United Kingdom	22.3	8.5	−5.4	5.9	3.5	−3.3	2.9	2.8
United States	24.2	13.2	−0.1	13.5	12.2	−3.6	5.8	−0.9

Source: Morgan Stanley Capital International.
Note: Price indices in local currency terms.
[1]The country and regional classifications used in this table follow the conventions of MSCI, and do not necessarily conform to IMF country classifications or regional groupings.

Table 3. Emerging Markets Bond Index: EMBI Global Sovereign Yield Spreads
(basis points)

	2009	2010	2011	2012	2012 Q1	2012 Q2	2012 Q3	2012 Q4
					(End-of-Period Spread Levels)			
EMBI Global	**294**	**289**	**426**	**266**	**342**	**374**	**308**	**266**
Latin America	**355**	**357**	**468**	**326**	**377**	**428**	**369**	**326**
Argentina	660	507	925	991	880	1,088	897	991
Belize	1,177	617	1,391	2,245	1,665	1,691	2,399	2,245
Brazil	189	189	225	140	177	208	162	140
Chile	95	115	172	116	148	167	143	116
Colombia	198	172	191	112	141	158	132	112
Dominican Republic	405	322	597	343	506	488	418	343
Ecuador	769	913	846	826	824	892	743	826
El Salvador	326	302	478	396	453	480	426	396
Jamaica	719	427	637	711	579	640	662	711
Mexico	192	173	222	155	185	202	172	155
Panama	166	162	201	129	153	187	148	129
Peru	165	165	216	114	157	174	125	114
Uruguay	238	188	213	127	173	197	139	127
Venezuela	1,041	1,114	1,258	786	939	1,129	956	786
Europe	**226**	**231**	**440**	**208**	**347**	**353**	**265**	**208**
Bulgaria	179	195	340	94	248	292	124	94
Belarus	…	623	1,164	695	1,019	929	831	695
Croatia	195	298	602	311	502	551	349	311
Georgia	467	504	471	357	397	433	389	357
Hungary	186	345	605	345	578	535	383	345
Kazakhstan	393	324	453	207	293	354	247	207
Lithuania	332	267	447	149	305	318	209	149
Poland	124	151	310	108	205	215	144	108
Romania	…	…	…	235	404	464	362	235
Russia	203	224	364	157	270	294	208	157
Serbia	333	418	601	391	467	553	523	391
Turkey	197	177	385	177	306	304	236	177
Ukraine	989	461	940	632	919	897	722	632
Middle East	**335**	**284**	**439**	**426**	**399**	**474**	**442**	**426**
Iraq	447	314	603	465	548	646	504	465
Jordan	…	…	500	436	374	414	405	436
Lebanon	287	270	384	412	352	420	420	412
Africa	**211**	**329**	**452**	**264**	**348**	**346**	**278**	**264**
Côte d'Ivoire	…	1,154	1,192	473	888	703	563	473
Egypt	(3)	221	607	453	489	531	444	453
Gabon	390	258	422	252	254	330	265	252
Ghana	462	363	534	397	411	504	374	397
Nigeria	…	…	435	261	336	415	345	261
South Africa	149	145	261	163	213	213	176	163
Asia	**206**	**175**	**271**	**165**	**212**	**250**	**187**	**165**
China	64	126	278	146	249	222	171	146
Indonesia	230	183	274	179	210	273	204	179
Malaysia	136	117	178	98	168	174	131	98
Pakistan	688	654	1,274	798	1,147	1,136	976	798
Philippines	206	163	242	121	181	206	144	121
Sri Lanka	382	290	461	342	425	460	352	342
Vietnam	314	323	510	304	340	425	352	304

Table 3 *(concluded)*

	2009	2010	2011	2012	2012 Q1	2012 Q2	2012 Q3	2012 Q4
					(Period-on-Period Spread Level Changes)			
EMBI Global	−430	−6	138	−161	−85	33	−66	−42
Latin America	−391	2	111	−142	−91	51	−59	−43
Argentina	−1,044	−153	418	66	−45	208	−191	94
Belize	−613	−560	774	854	274	26	708	−154
Brazil	−240	0	36	−85	−48	31	−46	−22
Chile	−248	20	57	−56	−24	19	−24	−27
Colombia	−300	−26	19	−79	−50	17	−26	−20
Dominican Republic	−1,200	−83	275	−254	−91	−18	−70	−75
Ecuador	−3,962	144	−67	−20	−22	68	−149	83
El Salvador	−528	−24	176	−82	−25	27	−54	−30
Jamaica	−466	−292	210	74	−58	61	22	49
Mexico	−242	−19	49	−67	−37	17	−30	−17
Panama	−373	−4	39	−72	−48	34	−39	−19
Peru	−344	0	51	−102	−59	17	−49	−11
Uruguay	−447	−50	25	−86	−40	24	−58	−12
Venezuela	−823	73	144	−472	−319	190	−173	−170
Europe	−514	5	209	−232	−93	6	−88	−57
Bulgaria	−495	16	145	−246	−92	44	−168	−30
Belarus	…	…	541	−469	−145	−90	−98	−136
Croatia	…	103	304	−291	−100	49	−202	−38
Georgia	−1,434	37	−33	−114	−74	36	−44	−32
Hungary	−318	159	260	−260	−27	−43	−152	−38
Kazakhstan	−910	−69	129	−246	−160	61	−107	−40
Lithuania	…	−65	180	−298	−142	13	−109	−60
Poland	−190	27	159	−202	−105	10	−71	−36
Romania	…	…	…	…	…	59	−101	−127
Russia	−602	21	140	−207	−94	24	−86	−51
Serbia	−891	85	183	−210	−134	86	−30	−132
Turkey	−337	−20	208	−208	−79	−2	−68	−59
Ukraine	−1,782	−528	479	−308	−21	−22	−175	−90
Middle East	−599	−51	155	−13	−40	75	−32	−16
Iraq	−835	−133	289	−138	−55	98	−142	−39
Jordan	…	…	…	−64	−126	40	−9	31
Lebanon	−507	−17	114	28	−32	68	0	−8
Africa	−559	118	123	−188	−104	−2	−68	−14
Côte d'Ivoire	…	…	38	−719	−304	−185	−140	−90
Egypt	−388	224	386	−154	−118	42	−87	9
Gabon	−796	−132	164	−170	−168	76	−65	−13
Ghana	−1,023	−99	171	−137	−123	93	−130	23
Nigeria	…	…	…	−174	−99	79	−70	−84
South Africa	−413	−4	116	−98	−48	0	−37	−13
Asia	−390	−31	96	−106	−59	38	−63	−22
China	−164	62	152	−132	−29	−27	−51	−25
Indonesia	−532	−47	91	−95	−64	63	−69	−25
Malaysia	−234	−19	61	−80	−10	6	−43	−33
Pakistan	−1,424	−34	620	−476	−127	−11	−160	−178
Philippines	−340	−43	79	−121	−61	25	−62	−23
Sri Lanka	−1,484	−92	171	−119	−36	35	−108	−10
Vietnam	−433	9	187	−206	−170	85	−73	−48

Source: JPMorgan Chase & Co.

Note: The country and regional classifications used in this table follow the conventions of JPMorgan, and do not necessarily conform to IMF country classifications or regional groupings.

Table 4. Emerging Market Private External Financing: Total Bonds, Equities, and Loans

(In millions of U.S. dollars)

	2009	2010	2011	2012	2012 Q1	Q2	Q3	Q4
Total	563,084.1	823,076.3	688,693.8	725,676.0	183,015.4	136,563.0	185,153.6	220,943.9
Sub-Saharan Africa	28,343.2	34,031.8	35,434.8	39,891.4	12,723.5	7,997.5	13,854.3	5,316.1
Angola	2,115.8	4,146.8	2,528.1	3,723.3	58.6	209.3	3,393.2	62.2
Benin	120.0	—	11.0	—	—	—	—	—
Botswana	2,465.0	869.9	255.0	79.7	—	—	—	79.7
Burkina Faso	64.7	—	—	—	—	—	—	—
Cameroon	125.0	—	—	—	—	—	—	—
Cape Verde	—	—	10.0	—	—	—	—	—
Chad	—	—	14.7	—	—	—	—	—
Congo	—	250.0	—	—	—	—	—	—
Congo, Democratic Republic of the	300.0	12.2	169.9	100.0	100.0	—	—	—
Côte d'Ivoire	—	—	—	—	—	—	—	—
Djibouti	—	—	1.2	—	—	—	—	—
Equatorial Guinea	—	—	390.0	600.0	—	—	600.0	—
Eritrea	446.0	—	—	—	—	—	—	—
Ethiopia	240.6	1,007.5	1,694.3	1,497.8	234.5	—	1,263.3	—
Gabon	29.9	157.0	—	408.0	—	58.0	—	350.0
Ghana	1,758.3	2,030.3	5,675.3	6,500.8	3,337.2	1,492.6	1,521.0	150.0
Guinea	—	—	23.0	198.9	198.9	—	—	—
Guinea-Bissau	—	—	60.4	—	—	—	—	—
Kenya	539.5	553.4	646.6	1,404.7	336.2	1.0	966.5	101.0
Liberia	24.5	1,902.5	11.0	24.9	24.9	—	—	—
Madagascar	—	78.8	—	—	—	—	—	—
Malawi	—	—	39.0	—	—	—	—	—
Mali	—	—	53.0	—	—	—	—	—
Mauritania	1,108.0	—	—	—	—	—	—	—
Mauritius	—	—	14.0	240.0	—	—	—	240.0
Mozambique	188.0	155.6	206.9	20.2	—	8.2	12.0	—
Namibia	—	—	490.6	23.2	—	—	23.2	—
Niger	—	20.0	—	15.0	15.0	—	—	—
Nigeria	7,303.7	3,590.3	4,372.3	2,969.9	432.4	1,013.0	1,524.5	—
Rwanda	70.0	14.0	273.9	13.6	13.6	—	—	—
Senegal	248.1	9.5	515.4	—	—	—	—	—
Sierra Leone	—	44.4	65.3	95.3	—	52.0	43.3	—
South Africa	9,779.8	15,921.4	16,133.4	16,071.1	3,872.3	4,713.4	3,425.5	4,059.9
Sudan	—	51.9	—	2,000.0	2,000.0	—	—	—
Tanzania	440.0	398.0	992.1	265.0	—	123.0	—	142.0
Togo	566.9	—	—	2.4	—	—	—	2.4
Uganda	319.0	2,242.5	25.0	225.8	100.0	—	—	125.8
Zambia	90.0	533.0	576.2	3,065.9	2,000.0	327.0	735.8	3.1
Zimbabwe	0.5	42.9	187.0	346.0	—	—	346.0	—
Central and Eastern Europe	31,826.6	70,987.0	81,782.1	68,989.7	15,270.2	11,645.8	15,715.0	26,358.7
Albania	—	405.3	46.6	—	—	—	—	—
Bosnia and Herzegovina	400.6	70.5	92.0	—	—	—	—	—
Bulgaria	6.6	—	18.4	1,344.9	—	—	1,343.3	1.6
Croatia	3,098.8	1,325.8	2,777.2	3,104.0	—	1,885.4	718.6	500.0
Hungary	3,545.9	3,618.1	8,767.0	1,629.2	—	—	1,134.8	494.4
Latvia	3.0	170.7	490.8	2,233.5	994.6	—	—	1,238.9
Lithuania	—	209.7	—	30.2	—	—	—	30.2
Macedonia	243.2	—	32.0	—	—	—	—	—
Montenegro	—	252.8	252.5	—	—	—	—	—
Poland	14,818.5	41,305.9	42,638.3	20,411.6	5,851.9	3,723.4	4,560.5	6,275.9
Romania	100.0	1,698.4	2,381.1	5,588.8	2,503.1	—	1,037.8	2,047.9
Serbia	620.0	—	1,368.6	2,077.3	292.0	—	1,041.8	743.5
Turkey	8,989.9	21,929.9	22,917.6	32,570.3	5,628.7	6,037.0	5,878.2	15,026.3

Table 4 *(continued)*

	2009	2010	2011	2012	2012 Q1	Q2	Q3	Q4
Commonwealth of Independent States	**113,913.9**	**100,140.2**	**112,781.6**	**130,394.4**	**30,267.3**	**17,315.6**	**29,205.6**	**53,605.9**
Armenia	60.9	92.0	143.6	—	—	—	—	—
Azerbaijan	631.4	3,116.0	1,119.1	849.5	502.5	27.0	320.0	—
Belarus	3,278.5	1,692.3	5,008.5	11,008.0	10,000.0	—	—	1,008.0
Georgia[1]	978.2	298.8	820.2	1,066.1	70.0	966.1	—	—
Kazakhstan	16,946.3	5,914.8	3,500.2	7,588.0	2,539.8	633.0	1,097.5	3,317.8
Kyrgyzstan	85.2	5.8	3.0	—	—	—	—	—
Moldova	82.0	10.0	5.0	5.0	—	—	5.0	—
Mongolia[1]	4.4	1,228.6	271.7	3,630.6	1,346.4	479.0	299.0	1,506.2
Russian Federation	85,247.9	79,082.8	86,767.3	94,381.9	15,158.6	12,254.5	21,549.9	45,419.0
Tajikistan	148.2	10.5	8.0	—	—	—	—	—
Turkmenistan	4,032.8	500.2	4,225.0	—	—	—	—	—
Ukraine	2,392.0	8,188.5	10,885.1	8,911.2	275.0	347.0	5,934.2	2,355.0
Uzbekistan	26.1	—	25.0	2,954.0	375.0	2,579.0	—	—
Developing Asia	**154,073.2**	**244,805.4**	**199,041.3**	**222,718.1**	**50,468.0**	**58,267.4**	**56,908.3**	**57,074.4**
Bangladesh	176.9	197.0	226.0	1,686.6	200.0	855.0	150.0	481.6
Bhutan	—	47.4	—	—	—	—	—	—
Brunei Darussalam	—	—	—	353.5	—	—	169.9	183.6
Cambodia	462.7	65.0	591.0	155.8	20.6	83.8	—	51.4
China	61,101.7	1,10,102.3	77,624.0	89,494.2	17,003.1	29,278.2	22,228.0	20,985.0
Fiji	—	—	250.2	—	—	—	—	—
India	31,988.5	63,782.3	50,833.5	44,718.9	13,167.5	4,650.2	13,187.6	13,713.6
Indonesia	19,819.8	24,558.7	28,101.9	29,640.7	8,748.2	10,777.2	4,283.6	5,831.7
Laos	146.0	1,143.2	120.0	241.5	—	—	241.5	—
Malaysia	12,198.4	12,626.7	11,206.0	19,753.0	3,506.1	7,476.7	6,474.8	2,295.4
Maldives	—	—	2.0	16.0	16.0	—	—	—
Marshall Islands	—	660.0	2,026.5	677.9	120.0	180.0	162.0	215.9
Myanmar	—	2,400.0	—	—	—	—	—	—
Pakistan	652.7	516.2	1,128.0	1,499.2	1,166.0	333.2	—	—
Papua New Guinea	14,078.5	—	980.3	222.0	165.0	—	57.0	—
Philippines	8,767.4	12,348.6	8,168.1	9,505.9	3,271.0	2,144.5	1,243.4	2,847.2
Sri Lanka	560.0	1,310.8	1,777.6	2,062.7	62.5	756.7	1,044.1	199.4
Thailand	2,239.7	10,156.6	9,512.4	19,203.8	2,502.7	1,145.5	5,923.8	9,631.9
Vietnam	1,880.7	4,890.6	6,493.7	3,486.3	519.4	586.5	1,742.8	637.8

Table 4 *(concluded)*

	2009	2010	2011	2012	2012 Q1	Q2	Q3	Q4
Middle East and North Africa	**70,485.3**	**102,236.6**	**71,677.0**	**72,878.6**	**16,456.1**	**15,120.6**	**18,318.0**	**22,984.0**
Algeria	17.0	—	—	—	—	—	—	—
Bahrain	3,314.1	5,521.4	2,513.0	2,895.3	453.0	1,693.0	—	749.3
Egypt	3,414.1	15,096.0	7,881.6	2,613.0	2,078.0	240.0	60.0	235.0
Iran	78.7	—	—	—	—	—	—	—
Iraq	—	991.0	831.8	—	—	—	—	—
Jordan	938.0	1,182.9	1,860.0	277.0	7.0	—	—	270.0
Kuwait	1,999.6	3,723.6	1,931.7	1,120.3	—	150.0	—	970.3
Lebanon	1,024.7	2,103.5	2,687.4	2,324.3	1,003.4	—	—	1,320.9
Libya	—	—	40.0	—	—	—	—	—
Morocco	—	1,551.2	64.3	2,085.6	90.0	216.0	300.0	1,479.6
Oman	1,065.6	3,604.9	2,310.5	994.2	87.0	—	801.2	106.0
Qatar	20,345.3	14,025.9	13,900.9	16,355.9	2,006.6	3,755.6	6,868.9	3,724.8
Saudi Arabia	2,178.4	17,419.0	9,627.0	12,576.6	3,186.5	2,669.8	5,256.4	1,463.9
Syria	67.0	—	—	—	—	—	—	—
Tunisia	269.8	206.7	575.6	1,543.4	255.0	500.0	485.0	303.4
United Arab Emirates	35,664.5	36,440.5	26,889.5	29,968.2	7,289.6	5,771.2	4,546.5	12,360.9
West Bank and Gaza	85.0	—	—	125.0	—	125.0	—	—
Yemen	23.7	369.8	563.7	—	—	—	—	—
Latin America and the Caribbean	**164,442.0**	**270,875.4**	**187,977.1**	**190,797.6**	**57,830.4**	**26,209.9**	**51,152.5**	**55,604.8**
Argentina	3,439.1	5,143.8	10,140.8	2,634.8	1,729.1	696.2	179.5	30.0
Barbados	450.0	403.3	—	340.0	—	90.0	250.0	—
Belize	2,500.0	—	—	—	—	—	—	—
Bolivia	280.0	253.0	200.0	500.0	—	—	—	500.0
Brazil	79,766.5	1,53,559.8	76,796.7	72,057.7	28,672.4	11,890.2	14,866.0	16,629.1
Chile	5,388.8	12,465.7	17,430.7	22,714.9	5,049.7	3,821.3	4,747.8	9,096.2
Colombia	8,959.1	5,519.3	16,492.5	11,855.1	4,222.5	944.1	4,845.1	1,843.5
Costa Rica	853.5	31.0	479.0	1,322.4	60.0	262.5	—	999.9
Dominican Republic	531.8	2,418.8	813.2	900.0	200.0	—	—	700.0
Ecuador	430.0	22.0	36.0	—	—	—	—	—
El Salvador	1,485.0	644.1	653.5	1,099.9	—	—	—	1,099.9
Guatemala	46.0	604.0	333.2	1,429.9	196.5	733.5	—	500.0
Guyana	24.8	—	—	—	—	—	—	—
Haiti	149.3	—	—	—	—	—	—	—
Jamaica	1,757.2	1,757.6	1,515.6	1,750.0	250.0	—	1,500.0	—
Mexico	38,336.2	45,401.1	36,578.6	59,814.1	11,857.2	5,367.1	20,945.8	21,644.1
Nicaragua	50.4	185.0	—	—	—	—	—	—
Panama	3,924.6	1,232.1	3,138.2	1,906.7	656.9	450.0	799.8	—
Paraguay	234.0	—	100.0	851.0	—	200.0	151.0	500.0
Peru	5,735.1	9,333.6	4,563.8	10,413.9	4,936.2	1,608.0	2,534.6	1,335.1
Trinidad and Tobago	843.3	93.5	182.5	27.2	—	—	—	27.2
Uruguay	1,195.5	—	3,323.8	720.0	—	—	220.0	500.0
Venezuela	8,061.8	31,807.7	15,199.2	459.9	—	147.0	113.0	199.9

Source: Dealogic.

Note: For inclusion criteria, please see notes for Tables, 5, 6, and 7.

[1]Georgia and Mongolia, which are not members of the Commonwealth of Independent States, are included in this group for reasons of geography and similarities in economic structure.

Table 5. Emerging Market Private External Financing: Bonds

(In millions of U.S. dollars)

	2009	2010	2011	2012	2012 Q1	2012 Q2	2012 Q3	2012 Q4
Total	**163,551.1**	**250,705.7**	**250,345.1**	**357,281.6**	**98,521.0**	**65,320.7**	**90,651.5**	**102,788.4**
Sub-Saharan Africa	**3,709.2**	**4,673.1**	**7,991.8**	**8,306.3**	**1,945.4**	**1,231.6**	**3,924.9**	**1,204.4**
Botswana	—	—	—	79.7	—	—	—	79.7
Namibia	—	—	490.6	—	—	—	—	—
Nigeria	—	—	986.0	350.0	—	—	350.0	—
Senegal	196.1	—	487.9	—	—	—	—	—
South Africa	3,513.2	4,673.1	6,027.3	7,140.8	1,945.4	1,231.6	2,839.1	1,124.7
Zambia	—	—	—	735.8	—	—	735.8	—
Central and Eastern Europe	**21,808.0**	**28,169.1**	**30,357.4**	**50,800.6**	**12,030.5**	**7,062.3**	**12,371.6**	**19,336.1**
Albania	—	405.3	—	—	—	—	—	—
Bulgaria	—	—	—	1,343.3	—	—	1,343.3	—
Croatia	3,098.8	1,238.8	2,748.4	3,104.0	—	1,885.4	718.6	500.0
Hungary	3,545.9	3,518.1	8,752.3	1,629.2	—	—	1,134.8	494.4
Latvia	—	—	490.8	2,233.5	994.6	—	—	1,238.9
Macedonia	243.2	—	—	—	—	—	—	—
Montenegro	—	252.8	252.5	—	—	—	—	—
Poland	11,116.0	11,512.9	7,773.0	16,283.2	4,651.4	3,088.0	3,541.3	5,002.5
Romania	—	1,418.4	2,106.1	5,182.5	2,252.9	—	1,007.8	1,921.9
Serbia	—	—	982.6	1,785.3	—	—	1,041.8	743.5
Turkey	3,804.0	9,822.9	7,251.6	19,239.6	4,131.7	2,089.0	3,584.0	9,434.9
Commonwealth of Independent States	**13,773.1**	**42,733.5**	**31,293.4**	**61,040.8**	**13,712.8**	**8,822.9**	**17,766.3**	**20,738.9**
Azerbaijan	—	—	125.0	500.0	500.0	—	—	—
Belarus	—	1,327.3	800.0	—	—	—	—	—
Georgia[1]	—	248.8	491.2	996.1	—	996.1	—	—
Kazakhstan	2,299.2	4,840.5	1,072.9	2,370.0	—	—	800.0	1,570.0
Mongolia[1]	—	174.0	—	2,979.0	1,180.0	—	299.0	1,500.0
Russian Federation	11,473.9	30,869.5	22,924.6	48,752.9	12,032.8	7,826.8	13,024.5	15,868.9
Ukraine	—	5,273.4	5,879.8	5,442.8	—	—	3,642.8	1,800.0
Developing Asia	**23,037.7**	**45,782.3**	**59,931.0**	**81,610.5**	**17,311.3**	**27,519.3**	**18,366.7**	**18,413.3**
China	2,233.9	18,058.6	31,954.9	39,680.5	7,032.8	15,382.0	6,352.9	10,912.8
Fiji	—	—	250.0	—	—	—	—	—
India	2,140.6	9,045.8	9,307.0	9,760.6	2,369.8	239.7	5,066.8	2,084.4
Indonesia	7,840.6	5,794.1	6,363.9	12,336.4	2,866.2	6,122.3	362.2	2,985.7
Malaysia	5,007.2	2,638.5	4,170.7	8,929.0	1,924.4	4,527.7	2,386.9	89.9
Philippines	5,315.5	6,213.7	4,175.6	3,769.5	2,519.3	—	—	1,250.2
Sri Lanka	500.0	1,000.0	1,000.0	1,500.0	—	500.0	1,000.0	—
Thailand	—	2,046.0	2,622.3	5,387.1	598.9	500.0	3,198.0	1,090.2
Vietnam	—	985.8	86.6	247.5	—	247.5	—	—
Middle East and North Africa	**35,480.0**	**32,376.4**	**26,016.4**	**40,284.3**	**9,507.9**	**7,775.7**	**7,411.8**	**15,588.9**
Bahrain	750.0	2,460.5	1,050.0	2,247.3	—	1,498.0	—	749.3
Egypt	295.6	2,095.3	500.0	—	—	—	—	—
Jordan	—	741.6	—	—	—	—	—	—
Kuwait	493.6	989.3	196.6	820.3	—	—	—	820.3
Lebanon	944.7	1,925.0	2,687.4	2,278.3	957.4	—	—	1,320.9
Morocco	—	1,340.1	—	1,479.6	—	—	—	1,479.6
Oman	—	320.0	—	—	—	—	—	—
Qatar	15,284.0	8,743.5	5,087.7	10,485.1	1,491.1	495.0	5,068.9	3,430.1
Saudi Arabia	990.0	2,586.4	—	3,800.0	1,750.0	1,550.0	—	500.0
Tunisia	—	—	—	1,288.4	—	500.0	485.0	303.4
United Arab Emirates	16,722.2	11,174.8	16,494.7	17,885.4	5,309.4	3,732.8	1,858.0	6,985.3

Table 5 *(concluded)*

| | 2009 | 2010 | 2011 | 2012 | 2012 | | | |
					Q1	Q2	Q3	Q4
Latin America and								
the Caribbean	**65,743.1**	**96,971.4**	**94,755.2**	**115,239.1**	**44,013.1**	**12,908.9**	**30,810.2**	**27,506.9**
Argentina	506.7	4,129.9	2,552.8	1,111.2	900.0	211.2	—	—
Barbados	450.0	403.3	—	250.0	—	—	250.0	—
Bolivia	—	—	—	500.0	—	—	—	500.0
Brazil	25,427.7	40,513.3	38,988.5	51,106.3	24,743.6	6,011.3	10,650.7	9,700.7
Chile	1,976.8	7,522.3	5,795.8	9,631.6	1,591.5	494.5	3,350.6	4,195.1
Colombia	5,922.2	1,939.8	6,374.3	7,342.5	3,112.8	497.2	3,732.5	—
Costa Rica	—	—	250.0	1,262.4	—	262.5	—	999.9
Dominican Republic	—	750.0	777.6	550.0	—	—	—	550.0
El Salvador	800.0	444.1	653.5	799.9	—	—	—	799.9
Guatemala	—	—	—	1,389.9	196.5	693.5	—	500.0
Jamaica	1,042.3	1,083.3	695.2	1,750.0	250.0	—	1,500.0	—
Mexico	17,039.4	27,412.7	20,537.9	31,424.4	10,474.2	3,188.0	8,776.0	8,986.2
Panama	1,324.2	—	1,045.8	797.8	—	—	797.8	—
Paraguay	—	—	100.0	700.0	—	200.0	—	500.0
Peru	2,910.4	6,476.3	2,394.7	6,123.1	2,744.5	1,350.8	1,752.7	275.1
Trinidad and Tobago	843.3	—	175.0	—	—	—	—	—
Uruguay	500.0	—	1,969.8	500.0	—	—	—	500.0
Venezuela	7,000.0	6,296.5	12,444.2	—	—	—	—	—

Source: Dealogic.

Note: Search criteria by deal nationality filtered by international tranche, and excludes money market and short-term bonds, and supranationals. Deal inclusion conforms to the vendor's criteria for external public and private sector syndicated gross issuance, generally excluding bilateral deals, and includes bond issuances by corporations and sovereigns, excluding supranationals, in foreign jurisdictions.

[1]Georgia and Mongolia are not members of the Commonwealth of Independent States, but are included in this group for reasons of geography and similarities in economic structure.

Table 6. Emerging Market Private External Financing: Equities

(In millions of U.S. dollars)

	2009	2010	2011	2012	2012 Q1	Q2	Q3	Q4
Total	**125,319.9**	**246,526.4**	**100,333.2**	**118,475.9**	**18,167.5**	**26,083.5**	**34,688.9**	**39,536.0**
Sub-Saharan Africa	**2,364.7**	**3,569.4**	**2,690.4**	**3,307.1**	**701.7**	**581.8**	**348.0**	**1,675.6**
Botswana	—	44.9	—	—	—	—	—	—
Burkina Faso	64.7	—	—	—	—	—	—	—
Ghana	—	45.5	—	—	—	—	—	—
Kenya	—	—	37.9	21.5	—	—	21.5	—
Madagascar	—	78.8	—	—	—	—	—	—
Mauritius	—	—	14.0	—	—	—	—	—
Niger	—	20.0	—	—	—	—	—	—
Nigeria	64.5	140.3	—	219.9	219.9	—	—	—
Rwanda	—	—	90.9	—	—	—	—	—
South Africa	1,668.6	3,236.4	2,452.7	2,994.4	481.8	581.8	326.5	1,604.3
Tanzania	—	—	23.7	—	—	—	—	—
Togo	566.9	—	—	2.4	—	—	—	2.4
Uganda	—	3.5	—	65.8	—	—	—	65.8
Zambia	—	—	71.2	3.1	—	—	—	3.1
Central and Eastern								
Europe	**3,836.3**	**10,482.8**	**5,980.9**	**6,986.3**	**1,116.5**	**1,395.4**	**1,019.2**	**3,455.3**
Bulgaria	6.6	—	18.4	1.6	—	—	—	1.6
Hungary	—	—	14.7	—	—	—	—	—
Latvia	3.0	—	—	—	—	—	—	—
Lithuania	—	209.7	—	30.2	—	—	—	30.2
Poland	3,702.5	8,827.6	4,865.3	2,911.2	798.5	203.7	1,019.2	889.9
Romania	—	—	—	76.3	50.2	—	—	26.1
Turkey	124.1	1,445.6	1,082.5	3,967.0	267.7	1,191.7	—	2,507.6
Commonwealth of								
Independent States	**8,024.0**	**9,663.7**	**11,517.4**	**10,083.2**	**276.8**	**231.2**	**6,382.7**	**3,192.6**
Armenia	2.4	—	11.6	—	—	—	—	—
Kazakhstan	435.1	309.2	1.3	593.6	—	—	—	593.6
Kyrgyzstan	—	5.8	—	—	—	—	—	—
Mongolia[1]	3.4	683.5	—	81.6	81.6	—	—	—
Russian Federation	7,377.5	8,005.0	11,137.0	9,400.6	195.1	231.2	6,375.2	2,599.0
Ukraine	205.7	660.1	367.5	7.4	—	—	7.4	—
Developing Asia	**78,715.3**	**120,378.1**	**49,045.7**	**67,913.2**	**11,430.7**	**15,805.6**	**18,288.7**	**22,388.2**
Bangladesh	70.5	—	86.0	—	—	—	—	—
Cambodia	—	—	—	155.8	20.6	83.8	—	51.4
China	53,031.2	74,840.9	32,021.6	30,986.1	3,537.8	9,845.2	10,649.2	6,954.1
Fiji	—	—	0.2	—	—	—	—	—
India	17,596.9	26,200.8	8,409.5	14,541.6	5,913.1	1,029.9	1,708.6	5,890.1
Indonesia	1,803.2	8,066.6	3,259.4	3,581.8	401.7	978.3	1,217.3	984.5
Laos	—	111.2	—	241.5	—	—	241.5	—
Malaysia	5,195.2	6,904.9	2,634.2	7,310.2	304.6	2,547.0	2,460.3	1,998.4
Maldives	—	—	—	16.0	16.0	—	—	—
Philippines	466.9	1,783.3	1,047.1	2,735.9	354.3	816.3	1,123.4	441.9
Sri Lanka	—	5.6	—	—	—	—	—	—
Thailand	533.3	2,462.6	1,527.8	8,344.3	882.8	505.2	888.6	6,067.8
Vietnam	18.3	2.1	60.0	—	—	—	—	—

Table 6 *(concluded)*

	2008	2009	2010	2011	2012 Q1	Q2	Q3	Q4
Middle East and								
North Africa	**2,404.4**	**4,377.7**	**414.7**	**5,311.4**	**75.1**	**2,092.1**	**2,457.6**	**686.5**
Bahrain	300.0	1,585.4	—	—	—	—	—	—
Egypt	114.2	1,095.3	—	—	—	—	—	—
Iran	78.7	—	—	—	—	—	—	—
Iraq	—	—	8.5	—	—	—	—	—
Kuwait	91.5	—	—	—	—	—	—	—
Morocco	—	20.8	13.0	—	—	—	—	—
Oman	—	474.8	63.9	357.2	—	—	251.2	106.0
Qatar	952.2	137.5	—	2,073.6	—	1,885.7	—	188.0
Saudi Arabia	639.9	720.8	105.6	2,384.8	34.5	—	2,206.4	143.9
Syria	37.0	—	—	—	—	—	—	—
Tunisia	19.8	86.7	—	—	—	—	—	—
United Arab Emirates	171.0	206.2	223.7	495.8	40.7	206.4	—	248.7
West Bank and Gaza	—	50.3	—	—	—	—	—	—
Latin America and								
the Caribbean	**29,969.0**	**98,054.7**	**30,684.1**	**24,874.8**	**4,566.8**	**5,977.4**	**6,192.9**	**8,137.8**
Argentina	319.4	109.7	4,978.0	60.2	60.2	—	—	—
Brazil	26,123.3	94,356.7	14,339.4	8,549.5	312.7	4,299.2	1,079.9	2,857.7
Chile	92.5	1,308.2	5,238.9	4,319.3	2,176.0	935.3	715.1	492.9
Colombia	921.6	295.5	5,307.2	2,461.5	985.1	346.9	—	1,129.5
Mexico	2,278.2	1,692.7	765.3	8,692.2	700.6	396.0	4,397.9	3,197.7
Panama	—	103.0	41.3	—	—	—	—	—
Peru	234.1	188.9	14.0	792.2	332.2	—	—	460.0

Source: Dealogic.

Note: Search criteria by issuer nationality filtered by initial and follow-on offerings, and international tranche. Deal inclusion conforms to the vendor's criteria for external public and private sector syndicated gross issuance, generally excluding bilateral deals.

[1]Georgia and Mongolia are not members of the Commonwealth of Independent States, but are included in this group for reasons of geography and similarities in economic structure.

Table 7. Emerging Market Private External Financing: Loans
(In millions of U.S. dollars)

	2009	2010	2011	2012	2012 Q1	2012 Q2	2012 Q3	2012 Q4
Total	274,284.0	326,006.6	338,940.2	250,199.5	66,334.6	45,282.2	59,813.1	78,769.6
Sub-Saharan Africa	22,269.2	25,901.3	25,677.3	28,559.0	10,084.0	6,307.4	9,581.5	2,586.1
Angola	2,115.8	4,146.8	2,528.1	3,723.3	58.6	209.3	3,393.2	62.2
Benin	120.0	—	11.0	—	—	—	—	—
Botswana	2,465.0	825.0	255.0	—	—	—	—	—
Burundi	—	15.0	69.5	157.6	7.6	—	—	150.0
Cameroon	125.0	—	—	—	—	—	—	—
Cape Verde	—	—	10.0	—	—	—	—	—
Chad	—	—	14.7	—	—	—	—	—
Congo	—	250.0	—	—	—	—	—	—
Congo, Democratic Republic of the	300.0	12.2	169.9	100.0	100.0	—	—	—
Cote d'Ivoire	—	97.0	855.2	123.3	—	123.3	—	—
Djibouti	—	—	1.2	—	—	—	—	—
Equatorial Guinea	—	—	390.0	600.0	—	—	600.0	—
Eritrea	446.0	—	—	—	—	—	—	—
Ethiopia	240.6	1,007.5	1,694.3	1,497.8	234.5	—	1,263.3	—
Gabon	29.9	157.0	—	408.0	—	58.0	—	350.0
Ghana	1,758.3	1,984.8	5,675.3	6,500.8	3,337.2	1,492.6	1,521.0	150.0
Guinea	—	—	23.0	198.9	198.9	—	—	—
Guinea-Bissau	—	—	60.4	—	—	—	—	—
Kenya	539.5	553.4	608.7	1,383.2	336.2	1.0	945.0	101.0
Liberia	24.5	1,902.5	11.0	24.9	24.9	—	—	—
Malawi	—	—	39.0	—	—	—	—	—
Mali	—	—	53.0	—	—	—	—	—
Mauritania	1,108.0	—	—	—	—	—	—	—
Mauritius	—	—	—	240.0	—	—	—	240.0
Mozambique	188.0	155.6	206.9	20.2	—	8.2	12.0	—
Namibia	—	—	—	23.2	—	—	23.2	—
Niger	—	—	—	15.0	15.0	—	—	—
Nigeria	7,239.2	3,450.0	3,386.3	2,400.0	212.5	1,013.0	1,174.5	—
Rwanda	70.0	14.0	183.0	13.6	13.6	—	—	—
Senegal	52.0	9.5	27.5	—	—	—	—	—
Sierra Leone	—	44.4	65.3	95.3	—	52.0	43.3	—
South Africa	4,598.0	8,011.8	7,653.4	5,935.9	1,445.0	2,900.0	260.0	1,330.9
Sudan	—	51.9	—	2,000.0	2,000.0	—	—	—
Tanzania	440.0	398.0	968.4	265.0	—	123.0	—	142.0
Uganda	319.0	2,239.0	25.0	160.0	100.0	—	—	60.0
Zambia	90.0	533.0	505.0	2,327.0	2,000.0	327.0	—	—
Zimbabwe	0.5	42.9	187.0	346.0	—	—	346.0	—
Central and Eastern Europe	6,182.3	32,335.1	45,443.8	11,202.9	2,123.3	3,188.2	2,324.2	3,567.3
Albania	—	—	46.6	—	—	—	—	—
Bosnia and Herzegovina	400.6	70.5	92.0	—	—	—	—	—
Croatia	—	87.0	28.8	—	—	—	—	—
Hungary	—	100.0	—	—	—	—	—	—
Latvia	—	170.7	—	—	—	—	—	—
Macedonia	—	—	32.0	—	—	—	—	—
Poland	—	20,965.4	30,000.0	1,217.3	402.0	431.8	—	383.5
Romania	100.0	280.0	275.0	330.0	200.0	—	30.0	100.0
Serbia	620.0	—	386.0	292.0	292.0	—	—	—
Turkey	5,061.7	10,661.5	14,583.4	9,363.6	1,229.3	2,756.4	2,294.2	3,083.8

Table 7 *(continued)*

	2009	2010	2011	2012	2012 Q1	2012 Q2	2012 Q3	2012 Q4
Commonwealth of								
Independent States	**92,116.8**	**47,743.1**	**69,970.8**	**59,270.4**	**16,277.8**	**8,261.5**	**5,056.6**	**29,674.5**
Armenia	58.5	92.0	132.0	—	—	—	—	—
Azerbaijan	631.4	3,116.0	994.1	349.5	2.5	27.0	320.0	—
Belarus	3,278.5	365.0	4,208.5	11,008.0	10,000.0	—	—	1,008.0
Georgia[1]	978.2	50.0	329.0	70.0	70.0	—	—	—
Kazakhstan	14,212.0	765.1	2,426.0	4,624.5	2,539.8	633.0	297.5	1,154.2
Kyrgyzstan	85.2	—	3.0	—	—	—	—	—
Moldova	82.0	10.0	5.0	5.0	—	—	5.0	—
Mongolia[1]	1.0	371.0	271.7	570.0	84.8	479.0	—	6.2
Russian Federation	66,396.6	40,208.3	52,705.7	36,228.4	2,930.7	4,196.5	2,150.1	26,951.1
Tajikistan	148.2	10.5	8.0	—	—	—	—	—
Turkmenistan	4,032.8	500.2	4,225.0	—	—	—	—	—
Ukraine	2,186.3	2,255.0	4,637.8	3,461.0	275.0	347.0	2,284.0	555.0
Uzbekistan	26.1	—	25.0	2,954.0	375.0	2,579.0	—	—
Developing Asia	**52,319.9**	**78,645.0**	**90,064.6**	**73,194.4**	**21,726.0**	**14,942.6**	**20,252.9**	**16,272.9**
Bangladesh	106.4	197.0	140.0	1,686.6	200.0	855.0	150.0	481.6
Bhutan	—	47.4	—	—	—	—	—	—
Brunei Darussalam	—	—	—	353.5	—	—	169.9	183.6
Cambodia	462.7	65.0	591.0					
China	5,836.6	17,202.8	13,647.6	18,827.6	6,432.6	4,051.0	5,226.0	3,118.1
India	12,251.1	28,535.7	33,117.0	20,416.7	4,884.7	3,380.6	6,412.2	5,739.1
Indonesia	10,176.0	10,698.0	18,478.7	13,722.5	5,480.3	3,676.6	2,704.2	1,861.4
Laos	146.0	1,032.0	120.0	—	—	—	—	—
Malaysia	1,996.0	3,083.4	4,401.1	3,513.8	1,277.1	402.0	1,627.6	207.1
Maldives	—	—	2.0	—	—	—	—	—
Marshall Islands	—	660.0	2,026.5	677.9	120.0	180.0	162.0	215.9
Myanmar	—	2,400.0	—	—	—	—	—	—
Pakistan	652.7	516.2	1,128.0	1,499.2	1,166.0	333.2	—	—
Papua New Guinea	14,078.5	—	980.3	222.0	165.0	—	57.0	—
Philippines	2,985.1	4,351.6	2,945.4	3,000.6	397.4	1,328.2	120.0	1,155.0
Sri Lanka	60.0	305.2	777.6	562.7	62.5	256.7	44.1	199.4
Thailand	1,706.4	5,648.1	5,362.3	5,472.4	1,021.0	140.3	1,837.2	2,473.9
Vietnam	1,862.4	3,902.8	6,347.1	3,238.9	519.4	339.0	1,742.8	637.8
Middle East and								
North Africa	**32,665.9**	**65,532.8**	**45,245.9**	**27,282.9**	**6,873.0**	**5,252.8**	**8,448.5**	**6,708.6**
Afghanistan	65.0	—	—	—	—	—	—	—
Algeria	17.0	—	—	—	—	—	—	—
Bahrain	2,264.1	1,475.5	1,463.0	648.0	453.0	195.0	—	—
Egypt	3,004.3	11,905.4	7,381.6	2,613.0	2,078.0	240.0	60.0	235.0
Iraq	—	991.0	823.3	—	—	—	—	—
Jordan	938.0	441.3	1,860.0	277.0	7.0	—	—	270.0
Kuwait	1,414.4	2,734.4	1,735.1	300.0	—	150.0	—	150.0
Lebanon	80.0	178.5	—	46.0	46.0	—	—	—
Libya	—	—	40.0	—	—	—	—	—
Morocco	—	190.3	51.3	606.0	90.0	216.0	300.0	—
Oman	1,065.6	2,810.1	2,246.6	637.0	87.0	—	550.0	—
Qatar	4,109.0	5,145.0	8,813.3	3,797.2	515.5	1,375.0	1,800.0	106.7
Saudi Arabia	548.5	14,111.9	9,521.4	6,391.8	1,402.0	1,119.8	3,050.0	820.0
Syria	30.0	—	—	—	—	—	—	—
Tunisia	250.0	120.0	575.6	255.0	255.0	—	—	—
United Arab Emirates	18,771.3	25,059.6	10,171.1	11,586.9	1,939.5	1,832.0	2,688.5	5,126.9
West Bank and Gaza	85.0	—	—	125.0	—	125.0	—	—
Yemen	23.7	369.8	563.7	—	—	—	—	—

Table 7 *(concluded)*

	2009	2010	2011	2012	2012 Q1	Q2	Q3	Q4
Latin America and								
the Caribbean	**68,729.9**	**75,849.4**	**62,537.8**	**50,683.6**	**9,250.5**	**7,323.5**	**14,149.4**	**19,960.2**
Argentina	2,613.0	904.3	2,610.0	1,463.4	768.9	485.0	179.5	30.0
Barbados	—	—	—	90.0	—	90.0	—	—
Belize	2,500.0	—	—	—	—	—	—	—
Bolivia	280.0	253.0	200.0	—	—	—	—	—
Brazil	28,215.5	18,689.8	23,468.7	12,401.9	3,616.1	1,579.8	3,135.5	4,070.6
Chile	3,319.5	3,635.2	6,396.0	8,764.0	1,282.2	2,391.5	682.1	4,408.2
Colombia	2,115.3	3,284.0	4,811.0	2,051.2	124.6	100.0	1,112.6	714.0
Costa Rica	853.5	31.0	229.0	60.0	60.0	—	—	—
Dominican Republic	531.8	1,668.8	35.6	350.0	200.0	—	—	150.0
Ecuador	430.0	22.0	36.0	—	—	—	—	—
El Salvador	685.0	200.0	—	300.0	—	—	—	300.0
Guatemala	46.0	604.0	333.2	40.0	—	40.0	—	—
Guyana	24.8	—	—	—	—	—	—	—
Haiti	149.3	—	—	—	—	—	—	—
Jamaica	714.9	674.4	820.4	—	—	—	—	—
Mexico	19,018.6	16,295.8	15,275.3	19,697.5	682.4	1,783.1	7,771.8	9,460.2
Nicaragua	50.4	185.0	—	—	—	—	—	—
Panama	2,600.4	1,129.1	2,051.1	1,108.9	656.9	450.0	2.0	—
Paraguay	234.0	—	—	151.0	—	—	151.0	—
Peru	2,590.6	2,668.4	2,155.1	3,498.6	1,859.5	257.2	781.9	600.0
Trinidad and Tobago	—	93.5	7.5	27.2	—	—	—	27.2
Uruguay	695.5	—	1,354.0	220.0	—	—	220.0	—
Venezuela	1,061.8	25,511.2	2,755.0	459.9	—	147.0	113.0	199.9

Source: Dealogic.

Note: Search criteria by deal nationality and includes loans by corporations and sovereigns, in hard currencies. Deal inclusion conforms to the vendor's criteria for external public and private sector syndicated gross issuance, generally excluding bilateral deals.

[1]Georgia and Mongolia, which are not members of the Commonwealth of Independent States, are included in this group for reasons of geography and similarities in economic structure.

Table 8. Equity Valuation Measures: Dividend-Yield Ratios

	2008	2009	2010	2011	2012	2012 Q1	Q2	Q3	Q4	10-year average
Emerging Markets	**4.1**	**2.0**	**2.1**	**3.0**	**2.7**	**2.7**	**3.1**	**2.9**	**2.7**	**2.6**
Asia	**4.2**	**1.7**	**2.0**	**2.8**	**2.3**	**2.5**	**2.7**	**2.5**	**2.3**	**2.4**
Europe/Middle East/Africa	**4.3**	**2.2**	**2.1**	**3.2**	**3.5**	**3.1**	**3.7**	**3.6**	**3.5**	**2.7**
Latin America	**4.0**	**2.7**	**2.3**	**3.3**	**3.2**	**2.9**	**3.7**	**3.5**	**3.2**	**2.9**
Argentina	2.7	1.1	1.9	8.4	5.6	9.0	16.8	16.6	5.6	3.0
Brazil	4.6	2.9	2.7	4.1	4.1	3.6	4.9	4.6	4.1	3.6
Chile	2.6	1.6	1.4	2.3	2.1	2.0	2.1	2.2	2.1	2.1
China	3.1	1.9	2.2	3.2	2.9	2.9	3.4	3.2	2.9	2.4
Colombia	2.4	2.8	2.1	2.6	2.9	2.5	4.2	4.1	2.9	2.8
Egypt	6.3	4.8	3.5	5.3	3.5	3.4	3.9	3.2	3.5	3.7
Hungary	4.6	1.3	1.6	2.4	3.5	2.1	3.4	3.1	3.5	2.1
India	1.8	0.9	0.9	1.5	1.3	1.3	1.4	1.3	1.3	1.3
Indonesia	5.4	1.9	2.2	2.4	2.4	2.3	2.8	2.5	2.4	3.0
Jordan	3.4	3.1	2.5	3.1	4.3	3.4	4.5	4.4	4.3	2.7
Malaysia	4.1	2.4	2.3	2.8	2.9	2.8	3.0	2.9	2.9	2.6
Mexico	2.8	2.4	1.6	1.2	1.4	1.1	1.3	1.3	1.4	1.8
Morocco	3.2	4.9	4.3	5.5	4.7	5.4	4.5	4.7	4.7	3.9
Pakistan	12.5	6.4	5.6	8.3	7.1	7.8	7.8	7.5	7.1	6.9
Philippines	4.4	2.2	2.4	2.7	2.0	2.2	2.2	2.2	2.0	2.3
Poland	5.9	3.0	2.5	5.4	5.6	5.1	4.9	6.0	5.6	3.4
Russia	3.5	1.4	1.5	2.4	3.6	2.1	3.8	3.6	3.6	2.0
South Africa	4.5	2.7	2.3	3.2	3.2	3.4	3.5	3.2	3.2	3.1
Sri Lanka	9.8	1.6	1.2	2.2	2.2	2.1	2.7	2.2	2.2	2.6
Thailand	6.5	2.9	2.6	3.3	2.8	3.1	3.2	3.0	2.8	3.4
Turkey	5.8	2.1	2.2	3.3	2.2	2.8	2.7	2.5	2.2	2.8

Source: Morgan Stanley Capital International (MSCI).

Note: The country and regional classifications used in this table follow the conventions of MSCI, and do not necessarily conform to IMF country classifications or regional groupings.

Table 9. Equity Valuation Measures: Price/Earnings Ratios

	2008	2009	2010	2011	2012	2012 Q1	Q2	Q2	Q4	10-year average
Emerging Markets	**8.5**	**20.6**	**14.6**	**10.8**	**12.7**	**11.8**	**11.3**	**12.5**	**12.7**	**14.0**
Asia	**9.4**	**24.3**	**15.2**	**11.4**	**13.2**	**12.8**	**12.3**	**13.3**	**13.2**	**14.9**
Europe/Middle East/Africa	**6.7**	**16.2**	**12.1**	**8.2**	**9.2**	**8.5**	**8.1**	**8.9**	**9.2**	**12.7**
Latin America	**9.0**	**18.3**	**15.9**	**11.8**	**16.4**	**13.4**	**12.8**	**15.3**	**16.4**	**13.8**
Argentina	3.7	8.0	8.8	5.2	3.3	4.7	2.8	3.0	3.3	18.2
Brazil	7.9	17.0	13.8	9.8	14.3	11.4	10.4	13.0	14.3	11.9
Chile	13.3	18.7	21.4	17.2	23.2	19.5	18.8	20.1	23.2	21.9
China	10.3	21.1	14.6	9.4	11.3	10.3	9.5	10.0	11.3	15.2
Colombia	13.4	25.1	23.5	17.2	19.3	18.2	17.0	17.7	19.3	18.7
Egypt	7.1	13.9	17.4	10.3	13.8	14.0	12.9	16.7	13.8	15.6
Hungary	3.7	14.2	12.2	8.7	13.7	12.8	13.3	15.4	13.7	11.3
India	10.5	21.8	22.4	14.4	16.2	16.1	14.8	16.1	16.2	18.4
Indonesia	8.7	16.4	19.0	15.2	16.2	15.8	14.4	16.4	16.2	14.3
Jordan	14.4	15.9	21.3	16.9	11.6	13.5	11.5	11.0	11.6	22.7
Malaysia	10.2	20.3	18.1	16.9	14.8	17.4	16.6	15.8	14.8	16.3
Mexico	12.3	22.7	23.9	21.8	21.5	22.4	22.5	23.8	21.5	17.3
Morocco	26.0	14.3	17.5	14.0	12.3	15.1	12.6	12.6	12.3	20.6
Pakistan	3.8	10.1	9.1	6.2	7.6	7.3	6.7	7.0	7.6	9.5
Philippines	11.7	19.1	17.5	15.8	19.9	18.9	18.8	18.5	19.9	16.7
Poland	7.3	19.3	14.1	8.0	8.7	7.4	7.5	8.2	8.7	9.0
Russia	3.4	15.6	8.3	4.9	5.6	5.5	4.8	5.5	5.6	10.5
South Africa	10.7	16.6	18.9	16.4	15.9	14.4	14.2	14.8	15.9	14.9
Sri Lanka	7.1	77.7	20.5	13.2	14.1	13.8	13.3	14.7	14.1	19.0
Thailand	7.1	19.3	14.8	11.1	15.9	14.3	14.0	16.0	15.9	12.8
Turkey	5.3	12.6	10.8	9.2	12.0	10.7	10.4	11.1	12.0	9.7

Source: Morgan Stanley Capital International (MSCI).

Note: The country and regional classifications used in this table follow the conventions of MSCI, and do not necessarily conform to IMF country classifications or regional groupings.

Table 10. Emerging Markets: Mutual Funds

Net Flows
(In billions of U.S. dollars)

					2012			
	2009	2010	2011	2012	Q1	Q2	Q3	Q4
Bonds	9.5	53.6	16.1	52.1	16.3	7.3	16.4	12.1
Global	9.6	46.5	13.6	50.3	15.7	7.5	16.0	11.0
Asia	0.1	6.8	2.7	1.5	0.4	−0.2	0.4	0.9
Europe/Middle East/Africa	−0.5	−0.2	−1.0	−0.3	−0.2	−0.1	−0.1	0.1
Latin America	0.4	0.4	0.8	0.7	0.3	0.2	0.1	0.1
Equities	83.2	95.6	−46.8	34.7	25.7	−11.8	6.4	14.3
Global	44.2	63.6	−4.7	39.8	22.8	1.6	7.5	7.8
Asia	26.4	22.0	−24.2	−1.1	2.9	−9.1	−2.2	7.3
Europe/Middle East/Africa	1.5	7.3	−7.0	−2.2	0.5	−2.0	0.3	−1.1
Latin America	11.1	2.6	−10.9	−1.8	−0.5	−2.3	0.8	0.2

Net Asset Values
(In billions of U.S. dollars)

					2012			
	2009	2010	2011	2012	Q1	Q2	Q3	Q4
Bonds	88.6	162.4	183.8	286.3	221.1	232.4	265.9	286.3
Global	76.2	141.9	157.3	251.0	192.2	202.9	233.8	251.0
Asia	7.8	14.9	20.5	27.2	21.6	22.7	24.4	27.2
Europe/Middle East/Africa	3.0	3.2	3.0	4.3	3.8	3.5	4.0	4.3
Latin America	1.5	2.4	2.9	3.7	3.5	3.4	3.8	3.7
Equities	709.4	959.1	781.2	953.6	938.9	863.7	943.8	953.6
Global	334.7	477.0	416.5	512.3	502.3	470.5	516.6	512.3
Asia	264.4	338.4	269.5	336.0	317.9	295.2	319.4	336.0
Europe/Middle East/Africa	42.7	62.6	40.1	50.8	55.6	46.4	52.6	50.8
Latin America	67.6	81.1	55.0	54.4	63.0	51.6	55.3	54.4

Source: EPFR Global.
Note: Flows data derive from both traditional and alternative funds domiciled globally with $13 trillion in assets. The country and regional classifications used in this table follow the conventions of EPFR Global and individual fund managers, and do not necessarily conform to IMF country classifications or regional groupings.