

**FOR  
AGENDA**

SM/10/68

March 22, 2010

To: Members of the Executive Board

From: The Acting Secretary

Subject: **Global Financial Stability Report—Executive Summary and Chapter I**

Attached for consideration by the Executive Directors is Part II (Executive Summary and Chapter 1) of the *Global Financial Stability Report*, which is tentatively scheduled for discussion on **Monday, April 5, 2010**.

Questions may be referred to Mr. Brockmeijer (ext. 38551) and Mr. Dattels (ext. 37938) in MCM.

This report will be revised for publication in light of the Executive Board discussion. An edited version of the Executive Summary and Chapter I will be published on the IMF's external website, in preparation for the press conference scheduled for Tuesday, April 20, 2010, in Washington, D.C. If Executive Directors have additional comments, they may notify Mr. Dattels by **noon on Thursday, April 8, 2010**.

This document will shortly be posted on the extranet, a secure website for Executive Directors and member country authorities.

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# INTERNATIONAL MONETARY FUND

## Global Financial Stability Report—Executive Summary and Chapter I

Prepared by the Monetary and Capital Markets Department  
(In consultation with other departments)

Approved by José Viñals

March 22, 2010

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## LIST OF ACRONYMS

ABS	Asset-backed security
Ex-Japan	Excluding Japan
BIS	Bank for International Settlements
CCPs	Central counterparties
CDS	Credit default swap
CEE	Central and Eastern Europe
CGFS	Committee on the Global Financial System
CIS	Commonwealth of Independent States
CMBS	Commercial mortgage-backed security
CPSS	The Committee on Payments and Settlement Systems
CRE	Commercial real estate
DTA	Deferred tax asset
ECB	European Central Bank
EM	Emerging markets
EMBIG	Emerging Markets Bond Index Global
EMEA	Europe, Middle East, and Africa
ETF	Exchange-traded fund
EU	European Union
Euribor	Euro Interbank Offered Rate
FCI	Financial conditions index
FDI	Foreign direct investment
FDIC	Federal Deposit Insurance Corporation
FHA	Federal Housing Administration
FROB	Fondo de Reestructuración Ordenada Bancaria
GDP	Gross domestic product
GFSM	Global Financial Stability Map
GFSR	Global Financial Stability Report
G-3/G-4	Group of Three/Four
GRAI	Global risk aversion index
GSE	Government-sponsored enterprise
HAMP	Home Affordable Modification Program
IFRS	International Financial Reporting Standards
IG	Investment grade
HY	High yield
IOSCO	International Organization of Securities Commissions
iTraxx	Tradable indices of credit default swaps
iTraxx SovX	Tradable indices of sovereign credit default swaps
IMF	International Monetary Fund
Libor	London Interbank Offered Rate

LSAP	Large-scale asset purchase program
MBS	Mortgage-backed security
MSCI	Morgan Stanley Capital International
NBER	National Bureau of Economic Research
NPL	Nonperforming loan
OECD	Organization for Economic Co-operation and Development
OIS	Overnight indexed swap
REER	Real effective exchange rate
Repo	Repurchase agreement
RMBS	Residential mortgage-backed security
RWA	Risk-weighted assets
SEE	Southeastern Europe
SIFMA	Securities Industry and Financial Markets Association
SIV	Special Investment Vehicle
SME	Small- and medium-sized enterprises
TA	Tangible assets
TCA	Tangible common equity
Tier 1	Tier 1 capital
TITF	Too-important-to-fail
U.S. GAAP	U.S. Generally Accepted Accounting Principles
VIX Index	Chicago Board Options Exchange Volatility
WEO	World Economic Outlook

## EXECUTIVE SUMMARY

*Risks to global financial stability have eased as the economic recovery has gained steam, but concerns about advanced country sovereign risks could undermine stability gains and prolong the collapse of credit. Without more fully restoring the health of financial and household balance sheets, a worsening of public debt sustainability could be transmitted back to banking systems or across borders. Hence, policies are needed: (1) to reduce sovereign vulnerabilities, including through communicating credible medium-term fiscal consolidation plans; (2) to ensure the ongoing deleveraging process unfolds smoothly; and (3) to decisively move forward to complete the regulatory agenda so as to move to a safer, more resilient, and dynamic global financial system. For emerging market countries, where the surge in capital inflows has led to fears of inflation and asset price bubbles, a pragmatic approach using a combination of macroeconomic and prudential financial policies is advisable.*

1. With the global economy improving (see April 2010 *World Economic Outlook—WEO*), risks to financial stability have subsided. Nonetheless, the deterioration of fiscal balances and the rapid accumulation of public debt have altered the global risk profile. Vulnerabilities now increasingly emanate from concerns over the sustainability of sovereigns' balance sheets. In some cases, the longer-run solvency concerns could translate into short-term strains in funding markets as investors require higher yields to compensate for potential future risks. Such strains can intensify the short-term funding challenges facing advanced country banks and may have negative implications for a recovery of private credit. These interactions are covered in Chapter 1 of this report.
2. Banking system health is generally improving alongside the economic recovery, continued deleveraging, and normalizing markets. Our estimates of bank writedowns since the start of the crisis through 2010 have been reduced to \$2.3 trillion from \$2.8 trillion in the October 2009 *Global Financial Stability Report* (GFSR). As a result, bank capital needs have declined substantially, although segments of banking systems in some countries remain capital deficient, mainly as a result of losses related to commercial real estate. Even though capital needs have fallen, banks still face considerable challenges: a large amount of short-term funding will need to be refinanced this year and next; more and higher quality capital will likely be needed to satisfy investors in anticipation of upcoming more stringent regulation; and not all losses have been written down to date. In addition to these challenges, new regulations will also require banks to rethink their business strategies. All of these factors are likely to put downward pressure on profitability.
3. In such an environment, the recovery of private sector credit is likely to be subdued as credit demand is weak and supply is constrained. Households and corporates need to reduce their debt levels and restore their balance sheets. Even with low demand, the ballooning sovereign financing needs may bump up against limited credit supply, which could contribute to upward pressure on interest rates (see Section D of Chapter 1) and increase



funding pressures for banks. Small and medium-sized enterprises are feeling the brunt of the reluctance of banks to lend. Thus, policy measures to address supply constraints may still be needed in some economies.

4. In contrast, some emerging market economies have experienced a resurgence of capital flows. Strong recoveries, expectations of appreciating currencies, as well as ample liquidity and low interest rates in the major advanced countries form the backdrop for capital inflows to Asia (ex-Japan) and Latin America (see Section E of Chapter 1 and Chapter 4). While the resumption of capital flows is welcome, in some cases this has led to concerns about the potential for inflationary pressures and asset price bubbles, which could compromise monetary and financial stability. However, with the exception of some local property markets, there is only limited evidence of this actually happening so far. Nonetheless, current conditions warrant close scrutiny and early policy action so as not to compromise financial stability. Chapter 4 discusses a range of options, suggesting that capital inflows are less problematic if exchange rates are flexible and capital outflows are liberalized.

### **Main policy messages**

5. To address sovereign risks, credible medium-term fiscal consolidation plans that command public support are needed. This is the most daunting challenge facing governments in the near term. Plans should be made transparent, with contingency measures if the degradation of public finances is greater than expected. Better fiscal frameworks and growth-enhancing structural reforms will help ground public confidence that the fiscal consolidation process is consistent with long-term growth.

6. In the near term, the banking systems in a number of countries still require attention so as to reestablish a healthy core set of viable banks that can get private credit flowing again. Policies need to focus on the “right sizing” of a vital and sound financial system. While deleveraging has occurred mostly on the asset side of banks’ balance sheets, funding and liability-side pressures are coming to the fore. Further efforts to address a number of weak banks are still necessary to ensure a smooth exit from the extraordinary central bank support of funding and liquidity. The key will be for policymakers to ensure fair competition consistent with a well-functioning, safe, banking system. While certain central banks and governments may need to continue to supply some support, others should stand ready to reinstate it, if needed, to avert funding market disruptions.

7. Looking further ahead, the regulatory reforms need to move forward expeditiously after being adequately calibrated, and be introduced in a manner that accounts for the current economic and financial conditions. It is already clear that the reforms to make the financial system safer will entail more and better quality capital and improvements in liquidity management and buffers. These micro-prudential measures will help remove excess capacity and restrict a build-up in leverage. While the direction of the reforms is clear, the magnitude

is not. Furthermore, questions remain about how policymakers will deal with the capacity of too-important-to fail institutions to harm the financial system and to generate costs for the public sector and its taxpayers. In particular, there will be a need for some combination of *ex ante* preventive measures as well as improved *ex post* resolution mechanisms. Resolving the present regulatory uncertainty will help financial institutions better plan and adapt their business strategies.

8. In moving forward with regulatory reforms to address systemic risks, care will be needed to ensure that the combination of measures strikes the right balance between the safety of the financial system and its innovativeness and efficiency. One possible way to improve the safety of the system is to assign capital charges on the basis of an institutions' contribution to systemic risk. Chapter 2 presents a methodology to construct such a capital surcharge based on financial institutions' interconnectedness—essentially charging systemically-important institutions for the externality they impose on the system as a whole—that is, the impact their failure would have on others. The methodology relies on techniques already employed by supervisors and the private sector to manage risk. Other regulatory measures, of course, are also possible, such as those discussed in Section F of Chapter 1, and merit further analysis. Moreover, a tax or levy on financial institutions related to some measure of systemic risk also has the potential to improve financial stability by discouraging excessive risk taking.

9. As important as the *types* of regulations to put into place is the question of *who* should do it. Chapter 2 also asks whether some recent reform proposals that charge existing regulators with monitoring the build-up of systemic risks would help to mitigate such risks. The chapter notes that once a regulator has a mandate to oversee systemically-important institutions, there is a tendency for it to be more lenient toward this set of institutions, since they would cause even more damage to the system if they were to fail. The chapter finds that a unified regulator—one that oversees liquidity and solvency issues—removes some of the conflicting incentives that results from the separation of these powers, but nonetheless is still softer on systemically important institutions than on those that are not. To truly address systemic risks, regulators need additional tools explicitly tied to their mandate to monitor systemic risks—altering the structure of regulatory bodies is not enough.

10. Another approach to improving financial stability is to beef up the infrastructure underling financial markets to make them more resilient to distress of individual financial institutions. One of the major initiatives is to move over-the-counter derivatives contracts to central counterparties (CCPs) for clearing and settlement. Chapter 3 examines how such a move could lower systemic counterparty credit risks, but notes that once contracts are placed in a CCP it is essential that the risk management standards are high and back-up plans to prevent a failure of the CCP itself are well designed. In the global context, strict regulatory oversight, including a set of international guidelines, is warranted. Such a set of guidelines is currently being crafted jointly by the International Organization of Securities Commissions (IOSCO) and the Committee on Payments and Settlement Systems (CPSS).

11. The chapter also notes that while moving over-the-counter derivative contracts to a CCP will likely lower systemic risks related to these instrument, such a move will be associated with transition costs resulting from the need to post large amounts of additional collateral at the CCP. This calls for a gradual transition. Given these costs, however, the incentive to voluntarily move contracts to the safer environment is low and will probably need regulatory encouragement, e.g., by raising capital charges on derivative exposures that remain on dealers' balance sheets.

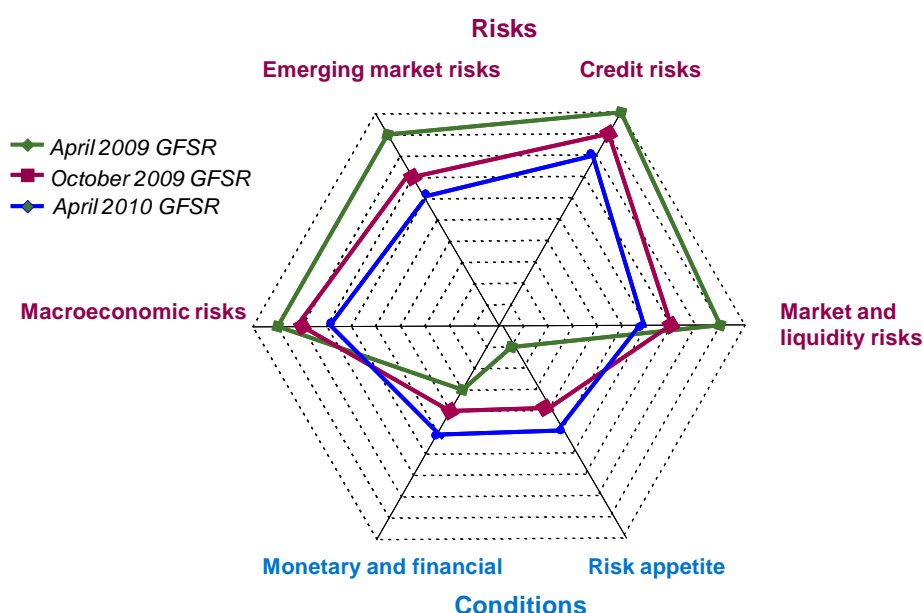
12. In sum, the future financial regulatory reform agenda is still a work-in-progress, but will need to move forward with at least the main ingredients soon. The window of opportunity for dealing with too-important-to-fail institutions may be closing and should not be squandered, all the more so because some of these institutions have become bigger and more dominant than before the crisis erupted. Policymakers need to give serious thought and careful deliberation about what makes these institutions systemically important and how their risks to the financial system can be mitigated.

## CHAPTER I. RESOLVING THE CRISIS LEGACY AND MEETING NEW CHALLENGES TO FINANCIAL STABILITY<sup>1</sup>

### A. How Has Global Financial Stability Changed?

*The health of the global financial system has improved since the October 2009 GFSR, as illustrated in our global financial stability map (Figure 1.1).<sup>2</sup> However, risks remain elevated, due to the still-fragile nature of the recovery and the ongoing repair of balance sheets. Concerns about sovereign risks could also undermine stability gains and take the credit crisis into a new phase, as we begin to reach the limits of public sector support for the financial system and the real economy.*

**Figure 1.1. Global Financial Stability Map**



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

13. *Macroeconomic risks* have eased as the economic recovery takes hold, aided by policy stimulus, the turn in the inventory cycle, and improvements in investor confidence. The baseline forecast in the *World Economic Outlook* for global growth in 2010 has been raised significantly, following a sharp rebound in production, trade, and a range of leading

<sup>1</sup> This chapter was written by a team led by Peter Dattels and comprised of Sergei Antoshin, Alberto Buffa di Perrero, Phil de Imus, Joseph Di Censo, Martin Edmonds, Ivan Guerra, Vincenzo Guzzo, Kristian Hartelius, Geoffrey Heenan, Silvia Iorgova, Hui Jin, Matthew Jones, William Kerry, Vanessa Le Lesle, Andrea Maechler, Rebecca McCaughrin, Paul Mills, Ken Miyajima, Christopher Morris, Jaume Puig, Narayan Suryakumar, and Morgane de Tollenaere.

<sup>2</sup> Annex 1.1 details how indicators that compose the rays of the map in Figure 1.1 are measured and interpreted. The map provides a schematic presentation that incorporates a degree of judgment, serving as a starting point for further analysis.

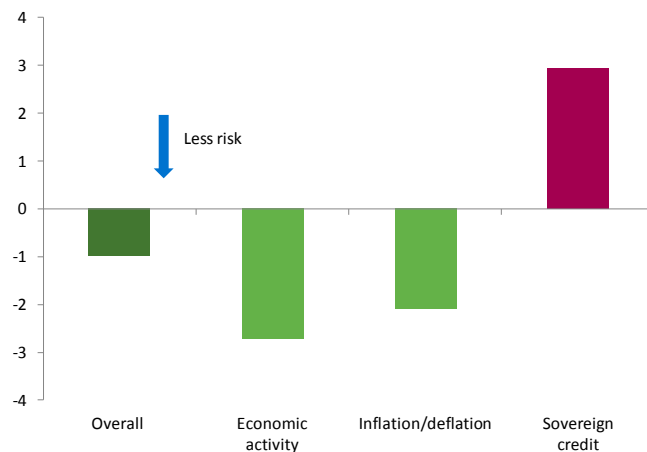
indicators. The improving growth outlook has reduced dangers of deflation, while inflation expectations remain contained as output gaps remain large. But, as the *World Economic Outlook* suggests, the recovery is multi-speed and fragile, with many advanced economies that are coping with structural challenges expected to recover more slowly than emerging markets. The need to address the consequences of the credit bubble has led to sharply higher sovereign risks amid a worsened trajectory of debt burdens (Figure 1.2).

14. With markets less willing or able to support leverage—be it on bank or government balance sheets—sovereign credit risk premiums have more recently widened across mature economies with fiscal vulnerabilities. Longer-run solvency concerns have, in some cases, telescoped into short-term strains in funding markets that can be transmitted to banking systems and across borders. The management of sovereign credit and financing risks therefore carries important consequences for financial stability in the period ahead (see Section B).

15. Quantitative- and credit-easing policies, extraordinary liquidity measures, and government-guaranteed funding programs have helped improve the functioning of short-term money markets and allowed a tentative recovery in some securitization markets. As a result, *monetary and financial conditions* have eased further, as market-based indicators of financial conditions largely reversed the sharp tightening seen earlier in the crisis, with the exception of Japan.

**Figure 1.2. Macroeconomic Risks in the Global Financial Stability Map**

(Changes in notches since October 2009 GFSR)



Source: The indicators included in our assessment of macroeconomic risks (see Annex 1.1.) are: IMF's WEO growth projections, G-3 confidence indices, OECD leading indicators, implied global trade growth (economic activity); mature and emerging market country breakeven inflation rates (inflation/deflation); and advanced country general government deficits and sovereign CDS spreads (sovereign credit).

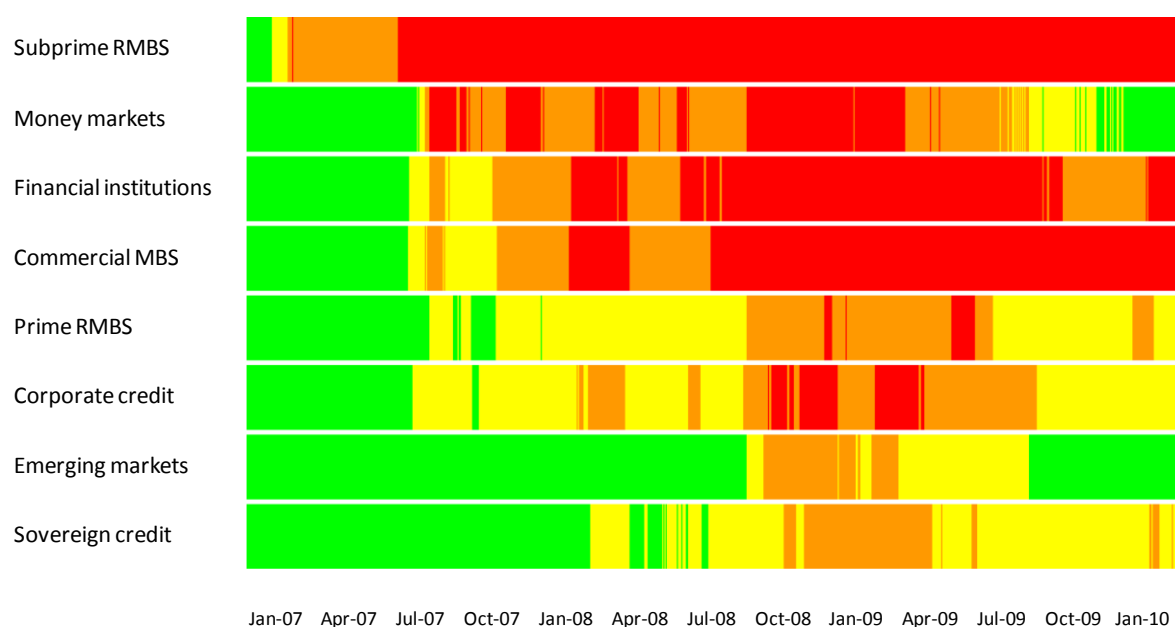
16. Supported by these more benign financial conditions, private sector *credit risks* have improved. Our estimates of global bank writedowns have declined to \$2.3 trillion from \$2.8 trillion in the last GFSR, reducing aggregate banking system capital needs. However, pockets of capital deficiency remain in segments of some countries' banking systems, especially where exposures to commercial real estate are high. Banks face new challenges due to the slow progress in stabilizing bank funding and the likelihood of more stringent future regulation, leading banks to reassess business models as well as raise further capital and de-risk balance sheets. Bank distress may resurface in banks that have remained dependent on central bank funding and government guarantees (see Section C).

17. The overall credit recovery will likely be slow, shallow, and uneven. The pace of tightening in bank lending standards has slowed, but credit supply is likely to remain

constrained as banks continue to delever. Private credit demand is likely to rebound only weakly as households restore their balance sheets. Ballooning sovereign financing needs may bump up against limited lending capacity, potentially helping to push up interest rates (see Section D) and increasing funding pressures on banks. Policy measures to address supply constraints may therefore still be needed in some economies.

18. *Emerging market risks* have continued to ease. Capital is flowing to Asia (ex-Japan) and Latin America, attracted by strong growth prospects, appreciating currencies, and rising asset prices, and pushed by low interest rates in major advanced economies, as *risk appetite* continues to recover. Rapid improvements in emerging market assets have started to give rise to concerns that capital inflows could lead to inflationary pressure or asset price bubbles. So far there is only limited evidence of stretched valuations—with the exception of some local property markets. However, if current conditions of high external and domestic liquidity and rising credit growth persist, they are conducive to over-stretched valuations arising in the medium term (see Section E).

**Figure 1.3. The Crisis Remains in Some Markets as Others Return to Stability**



Source: IMF staff estimates.

Note: The heat map measures both the level and 1-month volatility of the spreads, prices, and total returns of each asset class relative to the average during 2003-06 (i.e., wider spreads, lower prices and total returns, and higher volatility). The deviation is expressed in terms of standard deviations. Green signifies a standard deviation under 1, yellow 1-4 standard deviations, orange 4-9, and red greater than 9. MBS = mortgage-backed security; RMBS = residential mortgage-backed security.

19. *Market and liquidity risks* have fallen and asset prices have continued to recover across a range of asset classes (Figure 1.3). However, progress remains fragile as the stabilization of core banking systems is still tentative, sovereign concerns are rising, and monetary policy is set to normalize.

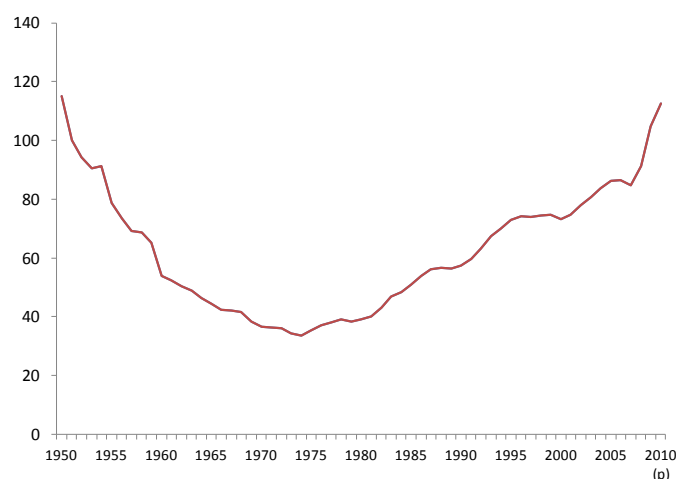
## B. Could Sovereign Risks Extend the Global Credit Crisis?

*The crisis has led to a deteriorating trajectory for debt burdens and sharply higher sovereign risks. With markets less willing to support leverage—be it on bank or sovereign balance sheets—and with liquidity being withdrawn as part of policy exits, new financial stability risks have surfaced. Initially, sovereign credit risk premiums increased substantially in the major economies most hit by the crisis. More recently, spreads have widened in some highly indebted economies with underlying vulnerabilities, as longer-run public solvency concerns have telescoped into strains in sovereign funding markets that could have cross border spillovers. The subsequent transmission of sovereign risks to local banking systems and feedback through the real economy threatens to undermine global financial stability.*

20. The crisis has increased sovereign risks and exposed underlying vulnerabilities. Cyclical deterioration in fiscal positions and stimulus expenditures have pushed up sovereign indebtedness, while lower potential growth has worsened debt dynamics. For example, G7 sovereign debt levels as a proportion of GDP are nearing 60-year highs (Figure 1.4). Higher debt levels have the potential for spillovers across financial systems, and to impact on financial stability. Some sovereigns have also been vulnerable to refinancing pressures that could telescope medium-term solvency concerns into short-term funding challenges (Figure 1.5).

21. Table 1.1 shows a range of vulnerability indicators for advanced countries that captures their current fiscal position, reliance on external funding, and banking system linkages to the government sector.<sup>3</sup> The table highlights not only the economies that had credit booms and subsequent busts, but also those economies whose underlying vulnerabilities have

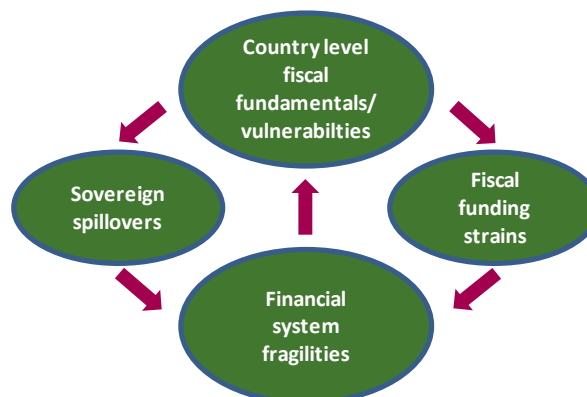
**Figure 1.4. Sovereign Debt to GDP in the G-7**  
(In percent)



Sources: IMF, *World Economic Outlook* database.

Note: Average using PPP GDP weights.

**Figure 1.5. Sovereign Risks and Spillover Channels**



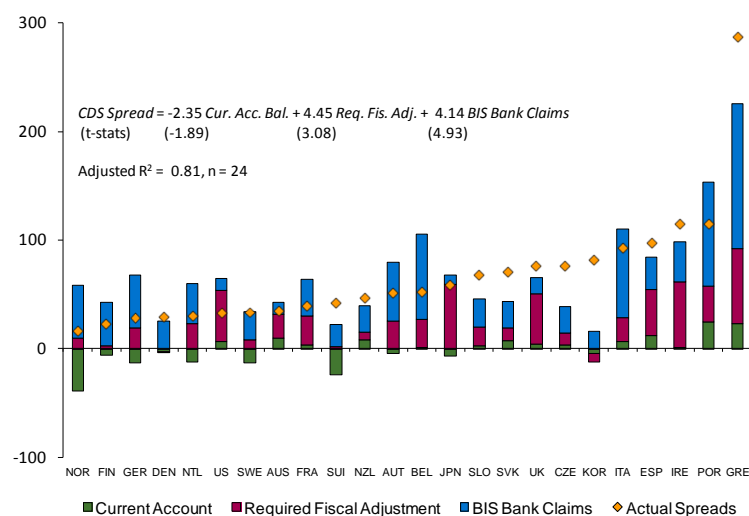
<sup>3</sup> Reliance on foreign bank financing is measured by the consolidated claims on an immediate borrower basis of BIS reporting banks on the public sector as a proportion of GDP.

come into greater focus, and which are perceived as having less flexibility—economically or politically—to address mounting debt burdens.<sup>4,5</sup>

*The crisis has driven up market prices of sovereign risk.*

22. The vulnerabilities outlined in Table 1.1 are being priced in to market assessments of sovereign risk. A cross-sectional regression over 24 countries indicates that higher current account deficits and greater required fiscal adjustment are correlated with higher sovereign credit default swap (CDS) spreads (Figure 1.6).<sup>6</sup> In addition, BIS reporting banks' consolidated cross-border claims on each country's public sector as a proportion of GDP help to explain spreads, especially for those countries with wider spreads, such as Greece, Portugal, and Italy.<sup>7</sup>

**Figure 1.6. Contributions to Five-Year Sovereign CDS Spreads**  
(In basis points)



Sources: BIS; and IMF staff estimates.

<sup>4</sup> It should be noted that near-term risks associated with Japan's elevated public debt are low due to a number of Japan specific features, including high domestic savings, low foreign participation in the public debt market, strong home bias, and stable institutional investors (Tokuoka 2010).

<sup>5</sup> For a more in depth review of fiscal vulnerabilities see IMF 2010b.

<sup>6</sup> Estimates of required fiscal adjustment are drawn from IMF 2010c. These estimates are based on illustrative scenarios, in which the structural primary balance is assumed to improve gradually from 2011 until 2020; thereafter, it is maintained constant until 2030. The last column shows the primary balance path needed to stabilize debt at the end-2012 level if the respective debt-to-GDP ratio is less than 60 percent; or to bring the debt-to-GDP ratio to 60 percent in 2030. Illustrative scenarios for Japan are based on its net debt, and assume a target of 80 percent of GDP. For Norway, maintenance of primary surpluses at their projected 2012 level is assumed. The analysis is illustrative and makes some simplifying assumptions: in particular, beyond 2011, an interest rate–growth rate differential of 1 percent is assumed, regardless of country-specific circumstances..

<sup>7</sup> As at early March, the regression significantly under-predicted Greek spreads, which arguably reflected heightened liquidity concerns and policy uncertainty not captured in the model.



**Table 1.1. Sovereign Vulnerability Indicators**

(Percent of GDP, unless otherwise indicated)

	Fiscal and Debt Fundamentals				External Funding		Banking System Linkages			Sovereign Credit Rating <sup>6</sup>		Sovereign CDS Spreads (bps) <sup>6,9</sup>		10-year Swap Spreads (bps) <sup>6,10</sup>	
	Gen. Govt. Structural Deficit <sup>1,2</sup>	Gross Gen. Govt Debt <sup>1</sup>	Net Gen. Govt Debt <sup>1</sup>	Gen. Govt. Securities < 1 yr. remaining maturity <sup>3</sup>	Gen. Govt. Debt Held Abroad <sup>4</sup>	Current Account Balance <sup>1</sup>	Domestic Banks' claims on General Government (in percent of banks' assets)	BIS Reporting Banks' Consolidated Claims on Public Sector <sup>5</sup>	(notches above speculative grade/outlook) <sup>7</sup>	Rating Changes (since 6/30/07) <sup>8</sup>	5 year	CDS Curve Slope (5yr - 1yr)	Change since 9/30/2009		
Australia	4.9	20.7	5.8	3.9	4.3	-4.2	2.3	1.2	2.7	9/Stable	None	36	14	-49	13
Austria	4.3	70.7	60.5	6.1	58.5	1.8	15.1	4.0	13.2	10/Stable	None	52	26	20	5
Belgium	4.3	100.1	91.1	22.1	65.0	-0.5	21.3	6.2	19.0	9/Stable	None	52	24	31	13
Canada	3.0	82.5	32.0	14.4	14.1	-2.1	18.6	8.9	4.6	10/Stable	None	n.a.	n.a.	-21	-10
Cyprus	6.1	61.7	n.a.	n.a.	n.a.	-10.8	26.9	3.3	8.7	6/Stable	4 up/0 down	n.a.	n.a.	n.a.	n.a.
Czech Republic	2.0	37.6	n.a.	25.5	9.6	-1.7	14.3	12.4	5.9	5/Stable	2 up/0 down	77	37	59	-62
Denmark	n.a.	52.0	3.1	4.4	18.0	1.1	8.3	1.7	6.2	10/Stable	None	30	19	-21	-2
Finland	1.4	49.7	n.a.	11.7	35.9	2.4	4.7	2.0	9.6	10/Stable	None	23	18	-8	-12
France	4.5	84.3	74.5	16.9	48.7	-1.9	18.5	4.6	8.0	10/Stable	None	40	16	10	5
Germany	3.8	76.7	68.6	15.5	40.3	5.4	20.6	6.7	11.8	10/Stable	None	29	14	-20	3
Greece	8.9	126.0	106.0	15.8	99.0	-9.8	17.5	8.5	32.3	3/Stable	0 up/8 down	287	-43	293	194
Iceland	6.8	131.8	88.3	n.a.	n.a.	1.9	n.a.	n.a.	18.2	0/Neg	0 up/11 down	442	-202	n.a.	n.a.
Ireland	8.2	78.7	48.0	3.2	46.9	-0.6	5.8	0.6	8.9	8/Neg	0 up/7 down	115	20	114	-4
Israel	0.3	81.3	76.7	n.a.	14.5	4.0	4.7	7.1	1.1	5/Stable	3 up/0 down	117	55	-5	0
Italy	4.0	117.9	115.3	23.9	56.0	-2.8	29.1	11.9	19.9	7/Stable	None	94	14	60	7
Japan	7.8	229.4	115.9	48.7	13.7	2.8	69.2	21.8	1.9	8/Neg	0 up/1 down	59	45	-8	6
Korea	-0.5	34.8	n.a.	12.4	3.0	1.9	6.8	4.2	4.0	5/Stable	1 up/0 down	82	31	33	-43
Luxembourg	n.a.	19.3	n.a.	n.a.	n.a.	12.1	7.4	0.2	27.5	10/Stable	None	n.a.	n.a.	n.a.	n.a.
Malta	4.1	71.1	n.a.	n.a.	4.3	-4.1	28.8	4.0	3.1	5/Stable	1 up/0 down	n.a.	n.a.	n.a.	n.a.
Netherlands	5.2	64.2	46.0	15.8	46.2	5.0	10.8	2.8	8.9	10/Stable	None	30	19	7	5
New Zealand	2.9	30.7	3.4	4.9	12.9	-3.7	5.5	2.8	5.9	9/Neg	0 up/1 down	47	21	-13	27
Norway	7.6	56.1	-146.1	12.1	27.5	16.4	n.a.	n.a.	11.9	10/Stable	None	17	12	-62	-19
Portugal	7.1	85.0	80.6	12.8	60.5	-10.4	10.3	3.2	23.2	7/Neg	0 up/4 down	116	-17	72	35
Singapore	1.9	87.2	n.a.	21.8	n.a.	22.0	n.a.	n.a.	3.8	10/Stable	None	n.a.	n.a.	n.a.	n.a.
Slovak Republic	n.a.	34.3	n.a.	3.5	12.4	-3.3	19.0	21.7	5.9	6/Stable	2 up/0 down	70	37	-70	31
Slovenia	4.4	35.2	n.a.	n.a.	19.6	-1.4	11.0	7.3	6.2	8/Stable	None	68	37	-65	-31
Spain	7.3	65.6	56.2	12.1	26.9	-5.3	20.6	6.3	7.2	9/Neg	0 up/2 down	99	16	51	19
Sweden	0.8	43.1	-16.2	4.2	19.3	5.4	4.2	1.4	6.2	10/Stable	None	33	21	-19	-1
Switzerland	0.1	39.5	39.0	4.5	3.8	10.1	n.a.	n.a.	5.0	10/Stable	None	42	23	-52	-3
United Kingdom	8.5	80.2	73.6	6.4	17.9	-1.9	15.2	2.6	3.6	10/Neg	0 up/1 down	77	40	14	41
United States	9.0	92.6	66.5	17.9	24.7	-2.9	8.1	5.4	2.7	10/Stable	None	33	11	-4	12

Sources: Bloomberg L.P. Bank for International Settlements; Joint External Debt Hub; IMF, International Financial Statistics database, World Economic Outlook database, Monetary and Financial Statistics database, and IMF staff estimates

<sup>1</sup> Based on latest WEO projections for 2010.

<sup>2</sup> Structural balance refers to the cyclically adjusted balance adjusted for nonstructural elements beyond the economic cycle, including temporary financial sector and asset price movements as well as one-off, or temporary, revenue or expenditure items. Calculated as a percentage of potential GDP. Figure for Norway is the nonoil structural deficit as a proportion of mainland potential GDP.

<sup>3</sup> Sum of domestic and international government securities with less than one year outstanding maturity as presented in the *BIS Quarterly Report*, divided by WEO projection for 2010 GDP.

<sup>4</sup> Most recent data for externally held general government debt (from Joint External Debt Hub) divided by 2009 GDP. New Zealand data from Reserve Bank of New Zealand.

<sup>5</sup> BIS Reporting banks' international claims on the public sector on an immediate borrower basis for third quarter 2009 divided by 2009 GDP.

<sup>6</sup> As of March 9, 2010.

<sup>7</sup> Based on average of long term foreign currency debt ratings of Fitch, Moody's and Standard & Poor's agencies, rounded down. Outlook is based on the most negative of the three agencies.

<sup>8</sup> Sum of rating changes (including outlook changes, but excluding credit watches) for long term foreign currency debt ratings by the Fitch, Moody's and Standard & Poor's agencies.

<sup>9</sup> CDS contracts are denominated in U.S. dollars, except for the Czech Republic, Iceland and United States, which are denominated in euros

<sup>10</sup> Swap spreads are shown here as government yields minus swap yields, the opposite of market convention.

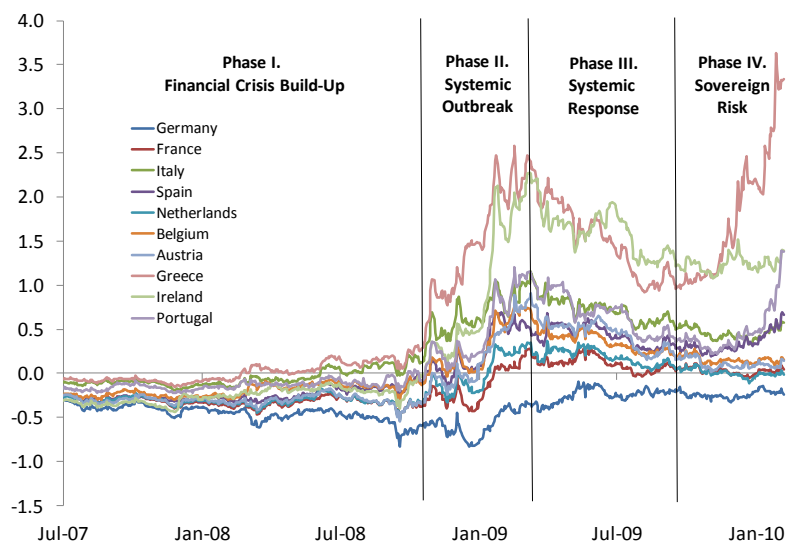
*Sovereign risks have come to the fore in the eurozone.*

23. The global financial crisis triggered several phases of unprecedented volatility in European government bond and swap markets (Figure 1.7).<sup>8</sup> To chart the evolving nature of risk transmission among euro zone sovereigns, a model of swap spreads was estimated that takes account of joint probabilities of default, global risk aversion and fiscal fundamentals (Box 1.1).

24. In the early stages of the crisis, the increase in global risk aversion benefited core sovereigns such as France and Germany, while spreads widened for sovereigns (Figure 1.7) perceived to be more risky. After Lehman's collapse, countries weighing adversely on other sovereigns were those that had financial systems that were hit hard by the financial crisis (Austria, Belgium, Ireland and the Netherlands). As sovereigns stepped in with public balance sheets to support banks, this was followed by a general narrowing of swap spreads as fears of systemic crisis subsided and global risk aversion fell. However, more recently, the source of spillovers has shifted to economies with weaker fiscal outlooks and financial strains, with these tensions most evident in Greece.

**Figure 1.7. The Four Stages of Crisis**

*(Ten-year sovereign swap spreads, in percent)*



Source: Bloomberg L.P.

*The recent turmoil in the eurozone also demonstrated how weak fiscal fundamentals coupled with underlying vulnerabilities can manifest themselves as short-term financing strains.*

25. In the presence of outsized deficits and an unsustainable debt trajectory, heavy reliance on external demand for government obligations and large concentrated debt rollover requirements can shorten the timeline for addressing solvency challenges. Unlike local demand sources, nonresident buyers are naturally more attuned to sovereign risk and inclined to step back from further purchases in times of market stress. A debt profile with concentrated maturities also introduces “trigger dates” around which policymakers must navigate. These hurdles can constrain policy options and increase the likelihood of stand-offs

<sup>8</sup> Swaps are used as a numeraire to compare sovereign credit risk across multiple countries. Swap spreads refer to the yield differential between a specific maturity government bond and the fixed rate on an interest-rate swap with an equivalent tenor.

developing between the government and investors demanding higher risk premiums. Ultimately, an unresolved solvency crisis amid high near-term refinancing needs and political uncertainty could limit access to public debt capital markets.

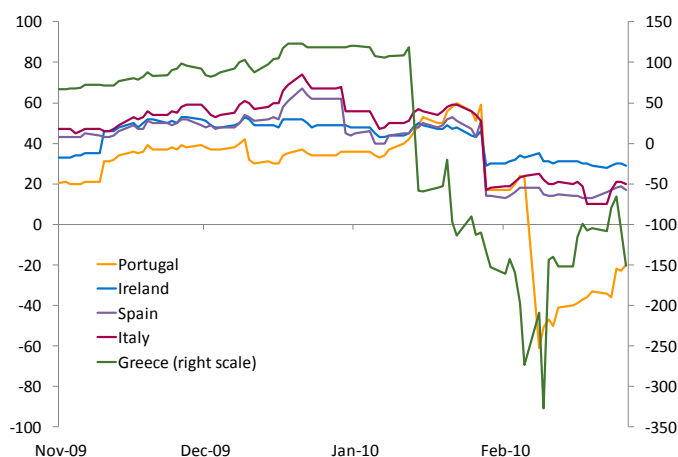
*Financial channels can amplify sovereign risks.*

26. Insufficient collateral requirements for sovereign counterparties in the over-the-counter swap market can transmit emerging concerns about the credit risk of a sovereign to its counterparties. In contrast to most corporate clients, dealer banks often do not require highly-rated sovereign entities to post collateral on swap arrangements.<sup>9</sup> Dealers may attempt to create synthetic hedges for this counterparty risk by selling assets that are highly correlated with the sovereign's credit profile, sometimes using short-term credit default swaps (CDS) (so-called "jump-to-default" hedging).

27. This hedging activity from uncollateralized swap agreements can put heavy pressure on the sovereign CDS market as well as other asset classes. For instance, heavy demand for jump-to-default hedges can quickly push up the price of short-dated CDS protection. With bond dealers also trying to offset some of the sovereign risk in their government bond inventory, many European sovereign CDS curves departed from their normal upward sloping configuration to significant flattening or outright inversion (Figure 1.8). Greece's sovereign CDS curve inverted in mid-January as the funding crisis accelerated and jump-to-default hedging demand increased; Portugal's CDS curve inverted two weeks later. These pressures can easily spill over into the domestic bond market and push yields higher.

**Figure 1.8. Sovereign Credit Default Swap Curve Slopes**

*(Five-year CDS spread minus one-year, in basis points)*



Source: Bloomberg L.P.

28. Yet sovereign CDS markets are still sufficiently shallow, especially in one-year tenors, that a large gross notional swap exposure may prompt a dealer to look to other, more liquid asset classes for a potential hedge for its exposure to sovereigns.<sup>10</sup> Proxies such as corporate credit, equities, or even currencies are commonly used, putting pressure on other

<sup>9</sup> Collateral requirements represent the most commonly used mechanism for mitigating credit risk associated with swap arrangements by offsetting the transaction's mark-to-market exposure with pledged assets.

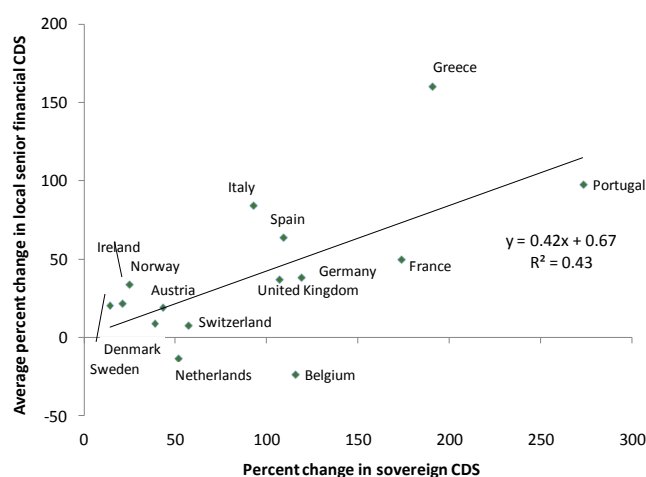
<sup>10</sup> Gross sovereign default protection is \$2 trillion in notional value, just 6 percent of the \$36 trillion global government bond market. The more relevant net exposure (true economic transfer in case of default) represents only 0.5 percent of government debt, at \$196 billion notional amount.

asset classes. If swap arrangements with sovereigns were adequately collateralized, there would be no need for such defensive hedges and there would be less potential for volatility to spread from swaps to other markets.<sup>11</sup>

*Sovereign crises can widen and cross borders as they spread to the banking system.*

29. Due to the close linkages between the public sector and domestic banks, deteriorating sovereign credit risk can quickly spill over to the financial sector (Figure 1.9). On the asset side, an abrupt drop in sovereign debt prices generates losses for banks holding large portfolios of government bonds. On the liability side, bank wholesale funding costs generally rise in concert with sovereign spreads, reflecting the long-standing belief that domestic institutions cannot be less risky than the sovereign. In addition, the perceived value of government guarantees to the banking system will erode when the sovereign comes under stress, thus raising funding costs still higher. Multiple sovereign downgrades could precipitate increased haircuts on government securities or introduce collateral eligibility concerns for central bank or commercial repos.<sup>12</sup>

**Figure 1.9. Sovereign Risk Spilling over to Local Financial CDS, October 2009 to February 2010**



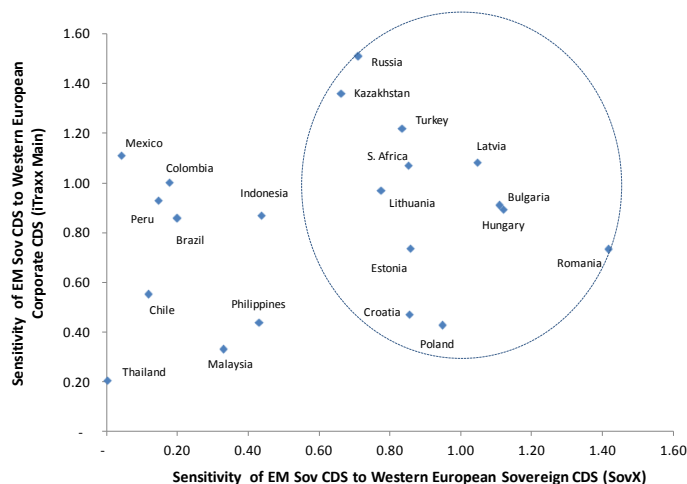
Sources: Bloomberg L.P.; and IMF staff estimates.

<sup>11</sup> There is also potential for stricter collateral requirements among dealers, and between dealers and monoline insurers, and highly rated corporates and banks.

<sup>12</sup> Bank earnings also potentially suffer from heightened sovereign credit risk. Sovereign ratings downgrades can increase banks' risk-weighting for government debt holdings; fiscal and monetary tightening can lead to asset quality deterioration; and higher taxes can directly reduce bank profitability.

30. Financial sector linkages can transmit one country's sovereign credit concerns to other economies. As higher domestic government borrowing in a country crowds out private lending, multinational banks may withdraw from cross-border banking activities. Likewise, other economies that are heavily reliant on international debt borrowing or on banks from countries under significant sovereign stress could be viewed as susceptible to financial sector instability. Though several emerging market economies displayed a greater sensitivity to euro area credit risk premiums since October 2009, those countries with high financial sector linkages (either cross-border banking or to global capital markets) proved more sensitive to sovereign risk than to corporate credit risk. (Figure 1.10).

**Figure 1.10. Regional Spillovers from Western Europe to Emerging Market Sovereign CDS, October 2009 to February 2010**



Sources: Deutsche Bank; and IMF staff estimates.

Note: Sensitivities of sovereign CDS captured by regression betas estimated from daily spread changes between Oct. 2009 to Feb. 2010 in joint regression, using the ITraxx Main index and a reweighted SovX-Western Europe index that matches geographic profile of ITraxx Main.

31. Thus, the skillful management of sovereign risks is essential for maintaining financial stability and preventing an unnecessary extension of the crisis.

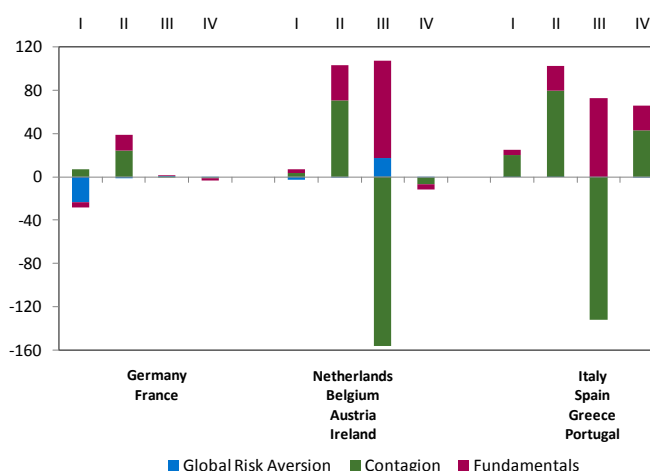
### Box 1.1. Explaining Swap Spreads and Measuring Risk Transmission among Euro Zone Sovereigns<sup>13</sup>

What factors most affected swap spreads during the four phases of the crisis (outlined in first figure) and how did sovereign risk transmission evolve during these phases? A model of swaps spreads based on measures of sovereign risk, global risk aversion, and country-specific fiscal fundamentals was estimated to shed light on this question (Annex 1.10). The second figure summarizes the results of the model. It shows that during the initial phase of the crisis, the increase in global risk aversion helped lower swap spreads in core sovereigns as investors sort the relative safety of these bonds. However, as the crisis progressed, spreads widened in other sovereigns, driven by worsening fundamentals and spillovers. In recent months, spreads have continued to widen in those countries with the greatest fiscal pressures (Greece, Italy, Portugal, and Spain).

#### Crisis Chronology



#### Contributions to Swap Spreads by Credit Phase (Average of changes in swap spreads in basis points)



Source: IMF staff estimates

<sup>13</sup> This box was prepared by Carlos Caceres, Vincenzo Guzzo, and Miguel Segoviano.

Sovereign risk transmission between two countries was derived from sovereign CDS spreads using the methodology developed by Segoviano (2006). Essentially, this measure represents the probability of distress in one sovereign given the distress in another. In order to determine whether the nature of risk transfer had changed, these joint probability of distress were averaged over each of the four phases of the crisis.

### Contributions to Euro Area Distress Dependence, October 2008 - March 2009

(percentage point contribution to total distress probability)

Contribution From:											
Contribution to:	Germany	France	Italy	Spain	Netherlands	Belgium	Austria	Greece	Ireland	Portugal	Total
	Germany	9.9	12.0	11.1	13.7	9.4	15.8	8.4	11.1	8.7	100
	France	7.7	11.8	9.7	17.4	8.9	18.0	7.8	11.4	7.3	100
	Italy	6.3	8.6	10.8	14.7	8.9	19.2	9.9	13.9	7.8	100
	Spain	6.5	8.6	13.3	14.3	8.5	18.6	9.0	14.1	7.1	100
	Netherlan	6.9	10.1	13.3	11.5	10.6	17.3	8.9	12.3	9.0	100
	Belgium	6.1	8.1	11.3	9.2	14.8	19.0	9.4	14.5	7.5	100
	Austria	5.7	7.9	14.1	12.6	11.4	10.6	11.8	14.4	11.5	100
	Greece	5.3	7.0	12.8	10.5	11.0	9.5	18.4	16.1	9.3	100
	Ireland	5.4	7.2	13.3	11.6	11.7	10.5	18.2	12.5	9.6	100
	Portugal	5.8	7.6	11.6	9.0	12.8	8.4	21.0	9.8	13.8	100
	Total <sup>1</sup>	5.6	7.4	11.4	9.6	12.2	8.5	16.7	8.8	12.3	7.7

Source: IMF staff estimates.

<sup>1</sup> Weighted average percentage point contribution to all other countries.

During the systemic phase of the crisis, the main sources of risk transfer—shown by the sum of the percentage contributions in the last row—were Austria, Ireland, Italy, and the Netherlands. In other words, the euro zone members that faced the greatest concerns regarding their financial systems transmitted the most sovereign risk to other countries.

In contrast, during the latest sovereign crisis phase, Greece, Portugal, and, to a lesser extent, Spain and Italy became the main contributors to inter-sovereign risk transfer (see second table), reflecting the shift in market concerns from financial sector vulnerabilities to fiscal vulnerabilities.

### Contributions to Euro Area Distress Dependence, October 2009 - February 2010

(percentage point contribution to total distress probability)

		Contribution From:										
Contribution to:		Germany	France	Italy	Spain	Netherlands	Belgium	Austria	Greece	Ireland	Portugal	Total
	Germany		12.0	11.1	13.4	4.8	7.4	6.9	19.8	6.2	18.3	100
	France	5.6		13.4	14.8	6.0	8.1	7.7	18.2	8.0	18.3	100
	Italy	4.0	10.4		16.4	3.3	6.8	7.2	24.2	7.2	20.5	100
	Spain	4.3	10.2	14.4		3.3	7.0	7.4	23.9	8.4	21.1	100
	Netherlands	4.5	13.2	10.2	12.2		8.0	5.3	22.1	3.3	21.2	100
	Belgium	4.3	10.3	10.9	12.9	4.6		7.6	22.6	8.1	18.8	100
	Austria	3.7	8.7	10.8	12.5	3.0	7.0		26.5	6.0	21.8	100
	Greece	4.1	7.5	14.2	15.7	4.2	7.8	10.5		15.7	20.3	100
	Ireland	3.1	7.7	9.9	12.8	2.0	6.8	5.9	31.3		20.6	100
	Portugal	4.2	8.5	13.7	15.7	4.6	7.4	10.0	23.6	12.3		100
	Total <sup>1</sup>	3.7	8.3	11.0	12.7	3.4	6.5	7.0	21.4	8.1	18.0	

Source: IMF staff estimates.

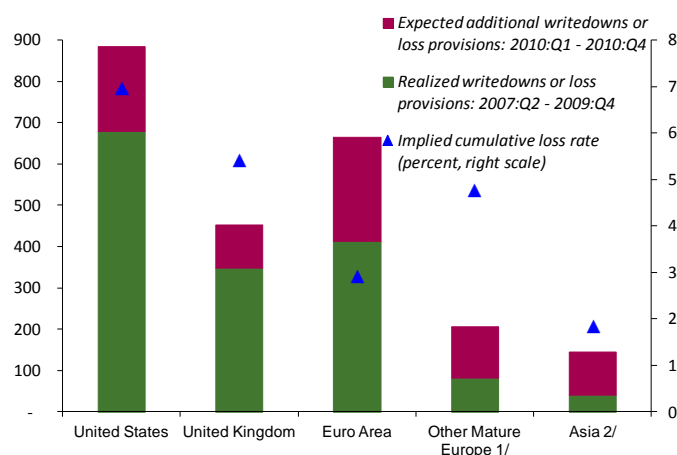
<sup>1</sup> Weighted average percentage point contribution to all other countries.

### C. The Banking System: Legacy Problems and New Challenges

*The global banking system is coping with legacy problems and further challenges from the deleveraging process. Improving economic and financial market conditions have reduced expected writedowns and bank capital positions have improved substantially. But some segments of country banking systems remain poorly capitalized and face significant downside risks. Slow progress on stabilizing funding and addressing weak banks could complicate policy exits from extraordinary support measures, and the tail of weak institutions in some countries risks having “zombie banks” that will act as a deadweight on growth. Banks must reassess business models, raise further capital, shrink assets, and de-risk balance sheets. Policymakers will need to ensure that this next stage of the deleveraging process unfolds smoothly and leads to a safe, competitive, and vital financial system.*

32. Since the last GFSR, total estimated bank writedowns and loan provisions between 2007 and 2010 have fallen from \$2.8 trillion to \$2.3 trillion. Of this amount, around two-thirds (\$1.5 trillion) had been realized by the end of 2009 (Table 1.2 and Figure 1.11). As we have said previously, these estimates are subject to considerable uncertainty and considerable range of error.<sup>14</sup> Differences between writedowns projected and realized reflect a number of factors, including the future path of delinquencies, differences in accounting conventions and reporting lags across regions, and the pace of loss recognition. In the current environment of near-zero interest rates, banks also face strong incentives to extend maturities and prevent delinquent loans from being reported as nonperforming.<sup>15</sup>

**Figure 1.11. Realized and Expected Writedowns or Loss Provisions for Banks by Region**  
(In billions of U.S. dollars unless indicated)



Source: IMF staff estimates.

<sup>1</sup>Includes Denmark, Iceland, Norway, Sweden, and Switzerland.

<sup>2</sup>Includes Australia, Hong Kong SAR, Japan, New Zealand, and Singapore.

<sup>14</sup> See Box 1.1 of the October 2009 Global Financial Stability Report: *Uncertainty Surrounding Loan Loss Estimates*. This highlighted the data limitations, measurement errors from consolidation, cross-country variations, and changes in accounting standards.

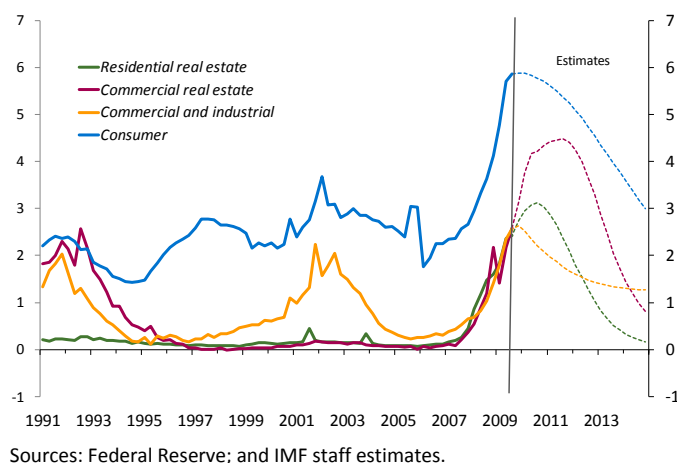
<sup>15</sup> Differences in the speed of realization of writedowns or loss provisions between the euro area and the United States may reflect: a lag in the credit cycle in the euro area; the higher proportion of securities on U.S. banks' balance sheets; accounting differences between International Financial Reporting Standards (IFRS) and U.S. Generally Accepted Accounting Principles (U.S. GAAP); time lags between data collection and publication by national supervisors; and differences in the frequency of reporting.



*Expected writedowns from loans have declined with the improved economic outlook, but further deterioration lies ahead.*

33. For U.S. banks, estimated loan writedowns and provisions for 2007-10 were revised down by \$66 billion to \$588 billion after growth turned positive and house prices stabilized in the second half of 2009 (Table 1.2). Nevertheless, serious mortgage delinquencies and foreclosures continue to rise, as unemployment stabilizes at a high level and almost one-quarter of mortgage borrowers have negative housing equity. Loan charge-off rates are expected to peak between 2009 and 2011 depending on the asset class (Figure 1.12).

**Figure 1.12. U.S. Loan-Charge-Off Rates**  
(In percent of total loans)



34. For euro area banks, improvements in GDP growth and unemployment forecasts have brought down estimated total loan writedowns and provisions by \$38 billion to \$442 billion since the last GFSR. Total loan loss provisions are now expected to have peaked at 1.0 percent in 2009 and decline to 0.7 percent this year. Corporates in the euro area proved more resilient than expected as they adjusted their capital expansion/working capital requirements, and reduced labor costs through the use of flexible working arrangements. Larger corporates also issued record amounts of debt in capital markets.

35. For U.K. banks, estimated loan loss provisions have been revised down by \$99 billion to \$398 billion, reflecting improvements in expected losses on residential mortgages. The projected mortgage loss provision rate for the first half of 2009 (1.9 percent), is significantly below that projected in the last GFSR (2.7 percent). However, CRE has deteriorated more rapidly than anticipated with peak-to-trough price declines of around 40 percent now expected, notwithstanding some signs of a recent uptick in prices in some segments.<sup>16</sup>

<sup>16</sup> New loans became more leveraged in the run-up to the crisis (often nonamortizing) and, as leases terminate in the next few years, many owners are unlikely to find new tenants.

**Table 1.2. Estimates of Global Bank Writedowns by Domicile (2007-2010), as of January 2010**  
(In billions of U.S. dollars)

	Estimated Holdings	Estimated Writedowns October 2009 GFSR	Estimated Writedowns January 2010	Implied Cumulative Loss Rate (Percent) October 2009	Implied Cumulative Loss Rate (Percent) January 2010	Share of Total (Percent) January 2010
<b>U.S. Banks</b>						
<i>Loans</i>						
Residential mortgage	2,981	230	204	7.7	6.8	23.0
Consumer	1,115	195	180	17.5	16.2	20.4
Commercial mortgage	1,114	100	87	9.0	7.8	9.8
Corporate	1,104	72	65	6.6	5.9	7.4
Foreign1	1,745	57	53	3.3	3.0	5.9
Total for Loans	8,059	654	588	8.1	7.3	66.5
<i>Securities</i>						
Residential mortgage	1,495	189	166	12.7	11.1	18.8
Consumer	142	0	0	0.0	0.0	0.0
Commercial mortgage	196	63	48	32.0	24.5	5.4
Corporate	1,115	48	17	4.3	1.5	1.9
Governments	580	0	0	0.0	0.0	0.0
Foreign1	975	71	66	7.3	6.7	7.4
Total for Securities	4,502	371	296	8.2	6.6	33.5
<b>Total for Loans and Securities</b>	<b>12,561</b>	<b>1,025</b>	<b>885</b>	<b>8.2</b>	<b>7.0</b>	<b>100.0</b>
<b>U.K. Banks</b>						
<i>Loans</i>						
Residential mortgage	1,636	47	27	2.9	1.6	5.9
Consumer	423	66	64	15.7	15.1	14.0
Commercial mortgage	344	39	41	11.2	12.1	9.1
Corporate	1,828	83	63	4.5	3.4	13.8
Foreign1	2,514	261	203	10.4	8.1	44.6
Total for Loans	6,744	497	398	7.4	5.9	87.5
<i>Securities</i>						
Residential mortgage	225	27	11	12.0	5.0	2.5
Consumer	58	4	2	7.4	2.8	0.4
Commercial mortgage	51	12	8	23.5	15.0	1.7
Corporate	258	25	7	9.5	2.7	1.5
Governments	360	0	0	0.0	0.0	0.0
Foreign /1	672	39	29	5.8	4.4	6.4
Total for Securities	1,625	107	57	6.6	3.5	12.5
<b>Total for Loans and Securities</b>	<b>8,369</b>	<b>604</b>	<b>455</b>	<b>7.2</b>	<b>5.4</b>	<b>100.0</b>
<b>Euro Area Banks</b>						
<i>Loans</i>						
Residential mortgage	4,530	47	44	1.0	1.0	6.6
Consumer	675	27	25	4.0	3.8	3.8
Commercial mortgage	1,272	40	37	3.1	2.9	5.6
Corporate	5,018	85	79	1.7	1.6	11.9
Foreign1	4,500	282	256	6.3	5.7	38.4
Total for Loans	15,994	480	442	3.0	2.8	66.4
<i>Securities</i>						
Residential mortgage	966	130	104	13.5	10.8	15.7
Consumer	271	5	8	1.9	2.8	1.1
Commercial mortgage	264	62	40	23.5	15.0	6.0
Corporate	1,316	22	0	1.7	0.0	0.0
Governments	2,146	0	0	0.0	0.0	0.0
Foreign1	1,943	113	72	5.8	3.7	10.8
Total for Securities	6,907	333	224	4.8	3.2	33.6
<b>Total for Loans and Securities</b>	<b>22,901</b>	<b>814</b>	<b>665</b>	<b>3.6</b>	<b>2.9</b>	<b>100.0</b>
<b>Other Mature Europe Banks2</b>						
<i>Loans</i>						
Total for Loans	3,241	165	134	5.1	4.1	86.0
Total for Securities	729	36	22	4.9	3.0	14.0
<b>Total for Loans and Securities</b>	<b>3,970</b>	<b>201</b>	<b>156</b>	<b>5.1</b>	<b>3.9</b>	<b>100.0</b>
<b>Asia Banks3</b>						
<i>Loans</i>						
Total for Loans	6,150	97	84	1.6	1.4	73.5
Total for Securities	1,728	69	30	4.0	1.8	26.5
<b>Total for Loans and Securities</b>	<b>7,879</b>	<b>166</b>	<b>115</b>	<b>2.1</b>	<b>1.5</b>	<b>100.0</b>
Total for all Bank Loans	40,189	1,893	1,647	4.7	4.1	72.4
Total for all Bank Securities	15,491	916	629	5.9	4.1	27.6
<b>Total for Loans and Securities</b>	<b>55,680</b>	<b>2,809</b>	<b>2,276</b>	<b>5.0</b>	<b>4.1</b>	<b>100.0</b>

Sources: Bank of International Settlements (BIS); Bank of Japan; European Securitization Forum; Keefe, Bruyette & Woods; U.K. Financial Services Authority; U.S. Federal Reserve; and IMF staff estimates.

Note: Domicile of a bank refers to its reporting country on a consolidated basis, which includes branches and subsidiaries outside the reporting country. Bank holdings are latest available data at time of publication. Mark-to-market declines in securities pricing are as of end-August.

1Foreign exposures of regional banking systems are based on BIS data on foreign claims. The same country proportions are assumed for both bank holdings of loans and securities. For each banking system, the proportion of exposure to domestic credit categories is assumed to apply to overall stock of foreign exposure.

2Includes Denmark, Norway, Iceland, Sweden and Switzerland.

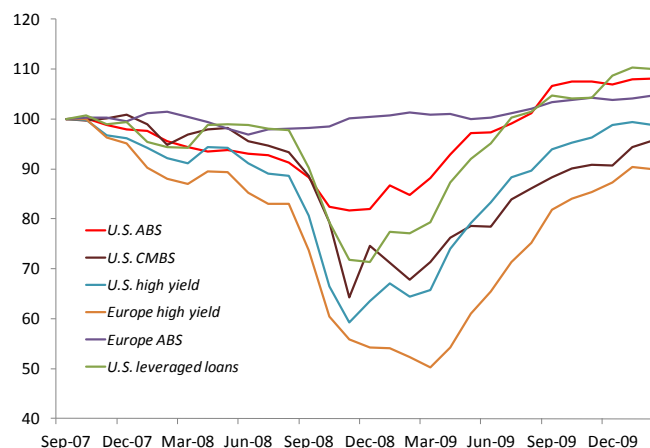
3Includes Australia, Hong Kong SAR, Japan, New Zealand and Singapore.

*Financial healing and market normalization have led to a substantial improvement in securities prices, further pushing down overall writedown estimates.*

36. Estimated global securities writedowns in banks have dropped by \$287 billion to \$629 billion as a result of improvements in market pricing of liquidity and risk premia across the range of corporate, consumer, and real estate securities held by banks (Figure 1.13). The largest reduction in writedowns is in corporate securities, while improvements in real estate-related securities were more uneven. For example, in the United States, prices of (private label) residential mortgage-backed securities (RMBS) remain under pressure. In Europe, top-rated U.K. RMBS prices recovered strongly in the latter half of 2009, but Spanish RMBS markets reflect the still-weakening housing market.

**Figure 1.13. Global Securities Prices**

(Rebased, Q3 2007 = 100)



Sources: Barclays Capital; European Securitization Forum; Markit; and IMF staff estimates.

*In aggregate, bank capital positions have improved substantially . . .*

37. Capital ratios of aggregate banking systems have improved substantially since the last GFSR (Table 1.3). Banks have continued to raise private capital, and in some cases a pick-up in earnings in 2009 has helped to bolster capital. Writedowns on securities reported by United States and United Kingdom banks have now exceeded current estimates, though some euro area banks will incur further securities writedowns. With greater loss realization across most areas and lower writedowns ahead, projected writedowns are mostly covered by earnings for the aggregate banking system.

**Table 1.3 Aggregate Bank Capital Positions**

(In billions of U.S. dollars, unless shown)

	United States (ex-GSEs)	Euro Area	United Kingdom	Other Mature Europe <sup>1</sup>
<b>Estimated Capital Positions at end-2009 : Q4</b>				
Total reported writedowns (to end-2009: Q4) <sup>2</sup>	680	415	355	82
Total capital raised (to end-2009: Q4)	329	256	222	55
Tier 1/RWA capital ratios, in percent	11.3 (+1.5)	9.1 (+1.1)	11.5 (+2.3)	8.5 (+0.3)

Source: IMF staff estimates.

Note: Capital raising includes government injections net of repayments. Capital ratios reflect those repayments. Figures in parentheses reflect percentage point changes since end-2008. All figures are under local accounting conventions and regulatory regimes, making direct comparisons between countries/regions impossible.

GSE = Government-sponsored enterprise. Tier 1 = Tier 1 capital; RWA = Risk-weighted Assets

<sup>1</sup> Denmark, Iceland, Norway, Sweden, and Switzerland.

<sup>2</sup> Reported writedowns do not include estimated writedowns on loans for 2009.

... but some segments of country banking systems remain poorly capitalized and face significant downside risks.

38. The aggregate picture masks considerable differentiation within segments of banking systems, and there are still pockets where capital is strained; where risks of further asset deterioration are high; and/or which suffer from chronically weak profitability.

**Table 1.4 U.S. Bank Capital Needs**  
(In billions of U.S. dollars, through 2011)

	Four largest banks (by assets)	Investment/processing banks	Regional banks	Other banks <sup>2</sup>	Total
Expected addition to retained earnings <sup>1</sup>	14	34	4	-20	32
Capital required to reach:					
8 percent Tier 1/RWA	0	0	0	35	35
10 percent Tier 1/RWA	0	0	1	52	53

Source: IMF staff estimates.

Note: Rows may not sum due to rounding. RWA = risk-weighted assets.

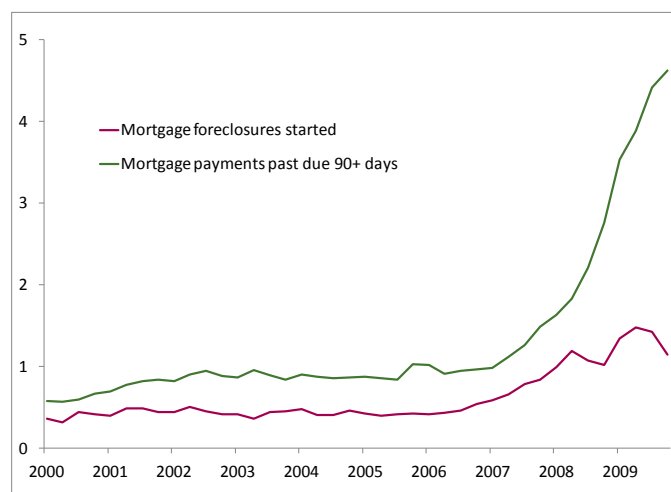
<sup>1</sup> Expected addition to retained earnings is net pre-provision earnings less writedowns, taxes and dividends.

<sup>2</sup> Other banks include all banks not in the other three categories.

39. In the United States, real estate exposures still represent a significant downside risk. The regional banks with heavy exposure to real estate need to raise capital (Table 1.4).<sup>17</sup> Some 12 institutions have CRE exposure in excess of four times TCE.<sup>18</sup> In addition, the mortgage government-sponsored enterprises (GSEs) have already received \$128 billion of capital from the Treasury to end-2009 and analysts' estimates of total capital likely to be needed stretch to over \$300 billion, highlighting that in the United States a substantial proportion of mortgage credit risk and capital shortfall has been transferred to the government through placing the GSEs under conservatorship.<sup>19</sup>

**Figure 1.14. U.S. Mortgage Market**

(In percent of total mortgage loans, seasonally adjusted)



Source: Mortgage Bankers Association.

<sup>17</sup> Foreign institutions operating in the United States are generally lightly capitalized and reliant on capital support from foreign parents. A move towards requiring more localized capital holdings by foreign operations from regulators would entail substantial capital injections from their parents (principally European banks).

<sup>18</sup> \$1.4 trillion of CRE loans are due to rollover in 2010-14, almost half of which are now in negative equity (Standard & Poor's, 2010, *Industry Outlook: The Worst May Still Be Yet To Come For U.S. Commercial Real Estate Loans*, February; Congressional Oversight Panel, 2010, *Commercial Real Estate Losses and the Risk to Financial Stability*, Washington D.C., February 10).

<sup>19</sup> This does not include the likely recapitalization of the Federal Housing Administration (FHA), whose reserves are well below the two per cent level mandated by Congress. While it has tightened some lending standards for low quality borrowers and raised insurance fees, the FHA is caught between the objectives of propping up the housing market and rebuilding its reserves.

40. Further pressure on real estate markets may lie ahead. The ‘shadow housing inventory’ continues to rise as lenders retain ownership of foreclosed property and forbear on seriously delinquent borrowers (as shown by the rising gap between 90-day+ delinquencies and foreclosure starts in Figure 1.14). The ending of foreclosure moratoria, house purchase tax incentives, and the Fed’s agency MBS purchases could trigger another drop in housing prices.<sup>20</sup> In addition, a mortgage principal modification program (or the passage of so-called ‘cramdown’ legislation) would precipitate significant additional losses on both first- and second-lien loans, prompting further RMBS downgrades.<sup>21</sup>

41. Concerns in real estate lending also present a challenge in some euro area economies. In Spain, loans to property developers are the most vulnerable. Banks’ repossessions of troubled real assets have increased sharply over the last 2 years. Problem assets comprised of nonperforming loans and repossessions are projected to reach 10 percent of total loans at commercial banks and 12 percent at savings banks (cajas), although reserves and earnings provide substantial cushions against potential losses. Overall, the Spanish banking system under our baseline case is likely to withstand the consequences of the crisis, but under our adverse scenario, gross drain on capital could reach €5 billion and €17 billion at commercial and savings banks, respectively. (See Table 1.5 and Annex 1.3). These estimates are subject to considerable uncertainty and are relatively small in relation to both overall banking system capital, and importantly, the funds set aside under the resolution and recapitalization program set up by the government under the FROB of €99 billion. However, the existing FROB scheme to finance restructurings currently is scheduled to expire by June 2010; therefore it is important that the resolution and restructuring processes financed through the FROB materialize before that date.

**Table 1.5. Spain: Estimated Impact of the Crisis on Bank Capital**  
(In billions of Euros)

	Commercial banks	Savings banks	Commercial banks	Savings banks
	<i>Baseline Scenario</i>		<i>Adverse-Case Scenario</i>	
Net impact on capital	0	0	0	-2
Gross impact on capital	-1	-6	-5	-17
Tier 1 capital (end-2009)	99	78	99	78

Source: IMF staff estimates.

<sup>20</sup> The 5 million foreclosure (and short-sale) backlog now represents one year’s total sales. The U.S. Treasury Home Affordable Modification Program (HAMP) is rapidly qualifying mortgage borrowers for trial payment modifications, but these are proving slow to convert into permanent modifications, and the program shows little sign of fundamentally changing housing market dynamics.

<sup>21</sup> Monoline insurers that have guaranteed RMBS may be forced into bankruptcy if losses continue to mount. Counterparties with unhedged, unwritten-off positions to those monolines, or those unable to replace hedges, would face additional market losses.

42. While the overall health of German banks has improved since the peak of the crisis, banks may still face substantial writedowns on both their loan books and securities holdings, and the pace of realization has been uneven across the different categories of banks. Among main banking categories, Landesbanken have the highest loan writedown rate.<sup>22</sup> Commercial banks, Landesbanken, and other banks still hold relatively large amounts of structured products, which results in particularly high writedown rates on their overall securities holdings. Strong capital positions at end-2009 and advanced writedown realization by commercial banks ensure their adequate capitalization (Table 1.6 and Annex 1.4). In contrast, Landesbanken, other banks, and, to a lesser degree also savings banks, are yet to incur a substantial part of total estimated writedowns and are projected to have a net drain on capital. Raising additional capital could prove particularly difficult for the Landesbanken, many of which remain structurally unprofitable and thus vulnerable to further distress. The impending withdrawal of the government's support measures could intensify these vulnerabilities, stressing the need for expedited consolidation and recapitalization in this sector.

**Table 1.6. Germany: Writedowns and Bank Capital**  
(In billions of U.S. dollars, unless otherwise shown)

	Commercial Banks	Landesbanken and Savings Banks	Other Banks <sup>1</sup>	Total
<b>Estimated Writedowns<sup>2</sup></b>				
<i>Implied Cumulative Loss Rates (in percent)</i>				
Total Loans	4	6	3	4
Total Securities	21	7	17	12
<b>Total Writedowns (2007 - 2010)</b>	<b>137</b>	<b>147</b>	<b>42</b>	<b>326</b>
Total Reported and Estimated Writedowns at end-2009 <sup>3</sup>	140	100	21	261
Tier 1/RWA at end 2009	11.0	7.9	8.3	8.6
Expected Writedowns (Q1:Q4 2010) <sup>4</sup>	-3	47	21	..
of which, Loans:	19	27	4	..
of which, Securities	-22	20	16	..
Net Drain on Capital <sup>5</sup>	-27	22	14	36
Tier 1 Capital at end 2009 <sup>6</sup>	184	155	45	200

Source: IMF staff estimates.

Note: Foreign-exchange rate assumed: 1EUR=1.4USD.

<sup>1</sup> Other banks include credit co-operatives.

<sup>2</sup> Loss rates and writedowns for securities are averages of our baseline and adverse case estimates (details in the annex 1.4). The average securities writedowns are used to determine capital needs.

<sup>3</sup> The reported loan losses include estimates for 2009, while those for securities are as reported in Sept 2009.

<sup>4</sup> A negative sign indicates a write-up.

<sup>5</sup> Capital surpluses in one sector are not included in the total capital drain for the banking system.

<sup>6</sup> Tier 1 capital levels for 2009 are estimated, due to reporting lags at some banks. Tier 1 capital for the overall system excludes the Tier 1 capital for sectors that have a capital surplus.

*Central and South Eastern European banking systems should be able to absorb the near term peak in nonperforming loans, but are very vulnerable to weaker economic growth.*

43. All banking system remain susceptible to downside economic scenarios and this is especially so in central and eastern Europe. NPL ratios appear likely to peak during 2010 in the region (see Box 1.2), and banks appear sufficiently capitalized to absorb the baseline increase. However, another acceleration in NPL formation, were a weaker economic scenario to unfold, would leave banks significantly weakened and ill-prepared to absorb losses. As experience from previous crises shows, NPLs ratios typically remain elevated for several years after the onset of a crisis, and coverage ratios of loss provisions to NPLs have already fallen to an average of about 65 percent in the CEE region, from pre-crisis levels of about 90 percent.<sup>23</sup>

<sup>22</sup> Landesbanken are regionally oriented. Their ownership is generally divided between the respective regional savings banks associations on the one hand and the respective state governments and related entities on the other. The relative proportions of ownership vary from institution to institution.

<sup>23</sup> The NBER Debt Enforcement Database (Djankov *et al.*, 2008), based on an international survey of bankruptcy attorneys, indicates that the average recovery rate on corporate NPLs in the CEE region should be around 35 percent, with significantly lower recovery rates for some countries. Market estimates of recovery

## Box 1.2. Nonperforming Loans in Central and Eastern Europe - Is it Different This Time?<sup>24</sup>

*At what levels and when could we expect nonperforming loan ratios to peak in Central and Eastern Europe, based on experience from previous economic downturns?*

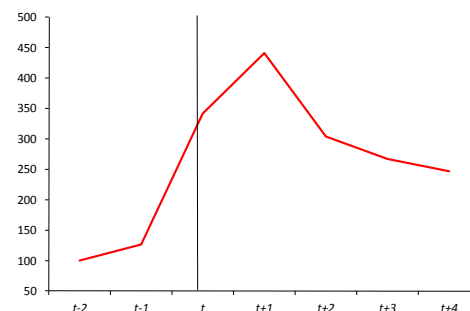
Nonperforming loans (NPLs) have increased substantially in the Central and Eastern Europe (CEE) region since the onset of the global financial crisis. This box presents a top-down framework for assessing the deterioration in bank asset quality and analyzing NPLs under different scenarios, based on historical experience in emerging markets.<sup>25</sup>

The estimation sample consists of annual data between 1994 and 2008 for Asian and Latin American countries, as well as South Africa and Turkey.<sup>26</sup> The data reveal that emerging market NPL ratios tend to rise rapidly in a crisis, and remain more than twice as high as before the initial shock for more than four years (first figure). The technical details on the data and the estimations are given in Annex 1.2.

*Nonperforming loans in the CEE region have developed largely in line with patterns observed in previous emerging market downturns.*

Simulations for the CEE region starting in 2008 indicate that bank asset quality has developed largely as would be expected based on historical experience in emerging markets, considering the size of the GDP shocks that hit the CEE region.<sup>27</sup> The model-based projections fairly accurately predict the increase in NPL ratios across sub-regions in the CEE during 2009, with the largest increase predicted in the Baltic countries and the smallest in

### Historical Dynamics of Emerging Market NPL Ratios Around Large Increases in Period $t$



Source: IMF staff estimates.

Note: Average of indices for Argentina, Chile, Colombia, Dominican Republic, Indonesia, Malaysia, Philippines, Turkey, and Uruguay.

rates on mortgages in the region range between 40 and 80 percent, depending on the extent to which real estate prices have declined and how well the debt collection process functions.

<sup>24</sup> This box was prepared by Kristian Hartelius.

<sup>25</sup> The approach taken is to estimate coefficients for the relationship between GDP growth, exchange rate movements, and the ratio of NPLs to total loans for countries outside Central and Eastern Europe (CEE), and then project NPL ratios for the CEE region based on those coefficients. The approach has the advantage of overcoming data limitations in NPL time-series for the CEE region, and can serve as a complement to country-specific bottom-up stress tests.

<sup>26</sup> The countries included in the estimation sample are Argentina, Chile, Colombia, the Dominican Republic, Indonesia, Malaysia, Mexico, Peru, the Philippines, South Africa, Taiwan Province of China, Thailand, Turkey, Uruguay, and Venezuela.

<sup>27</sup> Although foreign bank ownership and foreign currency lending reached extreme levels in the CEE in the run-up to the current crisis, they were also important elements in many emerging market crises in the past two decades, which enables the model to explain the European data relatively well.



the CE-3 countries (second figure).<sup>28</sup> However, the model simulations envisage sharp currency depreciations in response to the large negative GDP shocks that have hit most countries in the CEE region. This explains why the model over-predicts the increase in NPL ratios, especially in the Baltic countries, as CEE exchange rates have successfully been stabilized on the back of international policy coordination and financial backstops.<sup>29</sup>

*Simulations suggest that NPL ratios will peak during 2010 in most CEE countries, under the WEO baseline scenario for GDP growth.*

The simulations indicate that most of the increase in NPL ratios have occurred during 2009, but suggest that bank asset quality will improve only gradually in 2011 for most countries, even if GDP growth recovers during 2010 as projected in the *World Economic Outlook*. In the CIS, the simulations suggest a decline in the NPL ratio by the end of 2010 on the back of a more vigorous projected economic recovery. However, loans that have been restructured may turn up in the official NPL statistics with a delay, when interest rates are normalized and rolling over of NPLs becomes more costly in terms of interest revenue foregone, which could mean that reported asset quality in the CIS may also continue to deteriorate in 2010.

*In a weaker growth scenario, NPL ratios would continue to increase substantially in 2010.*

In an adverse scenario where GDP is 4 percentage points lower than the WEO baseline in 2010 and 2 percentage points lower in 2011, the simulations indicate that NPL ratios would increase by around one-third during 2010 in all sub-regions except the CIS, and would remain elevated in 2011.

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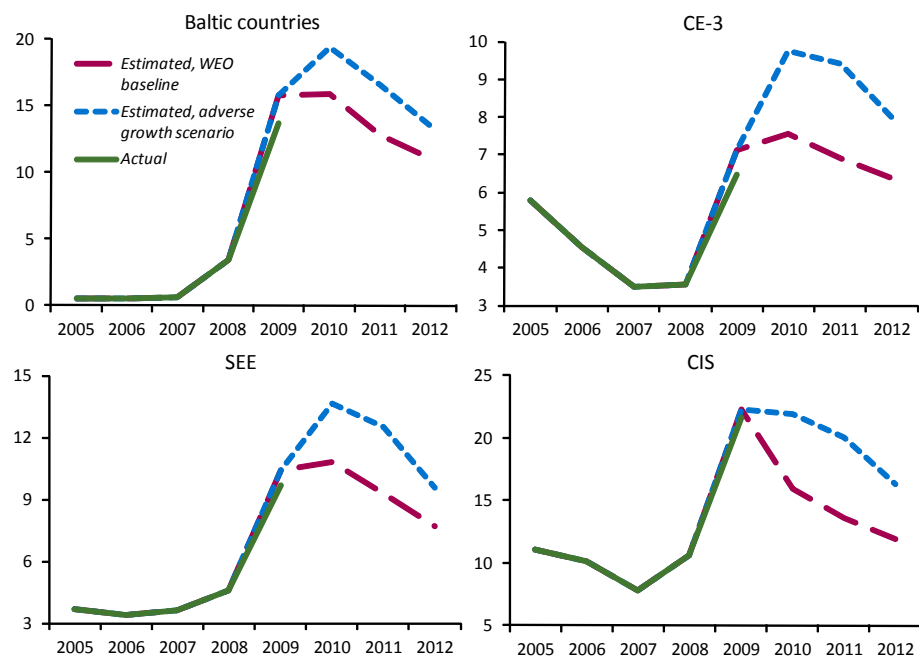
<sup>28</sup> The group labeled Baltics comprises Estonia, Latvia, and Lithuania. The group labeled CE-3 comprises the Czech Republic, Hungary, and Poland. The group labeled SEE comprises Bulgaria, Croatia, and Romania, whereas the group labeled CIS comprises Russia and Ukraine.

<sup>29</sup> As noted in Annex 1.5, the model predictions fit the Baltic data better, when controlling for actual exchange rate developments.



## Simulated Average Nonperforming Loan Ratios

(In percent)



Source: IMF staff estimates.

CE-3 = Czech Republic, Hungary, and Poland. CIS = Russia and Ukraine; SEE = Bulgaria, Croatia, Romania, and Serbia.

*While banks are still coping with legacy problems, they now face significant challenges ahead suggesting the deleveraging process is far from over.*

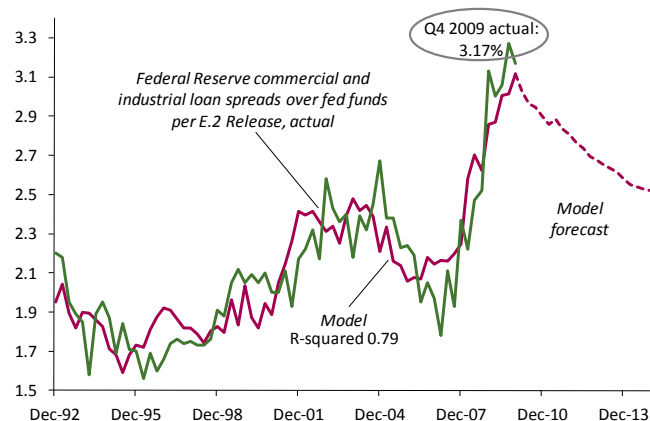
44. Deleveraging has so far been driven mainly from the asset side as deteriorating assets have hit both earnings and capital. Going forward, however, it is likely to be influenced more by pressures on the funding or liability side of bank balance sheets, and as new regulatory rules act to reduce leverage and raise capital and liquidity buffers.

45. The new regulatory proposals—enhanced Basel II—point the direction in which banks must adjust. The proposals will greatly improve the quality of the capital base, strengthen its ability to absorb losses, and reduce reliance on hybrid forms of capital. The quantitative impact study that will help calibrate the new rules is ongoing and final rules are to be published before end-2010, with a view to implementation by 2012. The outcome seems likely to be significant pressure for increases in the quality of capital, a further de-risking of balance sheets, and reductions in leverage. Once known—and possibly earlier—markets will re-rate banks on their perceived ability to achieve the new standards. Prudent bank managements should therefore continue to build buffers of high quality capital now in anticipation of the more demanding standards.

*Few banks can expect retained earnings alone to lift them to the new capital standards . . .*

Some banks are confident that they will be able to raise prices to maintain their recent high returns on equity, but history suggests they may struggle to do so. To assess this, U.S. bank lending rates were regressed on a number of macroeconomic and structural variables.<sup>30</sup> The results suggest that the wide margins and pricing power banks have enjoyed in recent quarters is likely to dissipate as the yield curve flattens (Figure 1.15).

**Figure 1.15. Banks' Pricing Power - Actual and Forecast**  
(In percent)



Sources: Federal Reserve; Federal Deposit Insurance Corporation; and IMF staff estimates.

<sup>30</sup> Using quarterly Federal Reserve and FDIC data covering the period from 1992, an equation of the form:

$$S = 1.2 + 0.096 (0.000) \text{ steepness} + 2.36 (0.000) \text{ conc} - 0.048 (0.001) \text{ credgrowth}$$

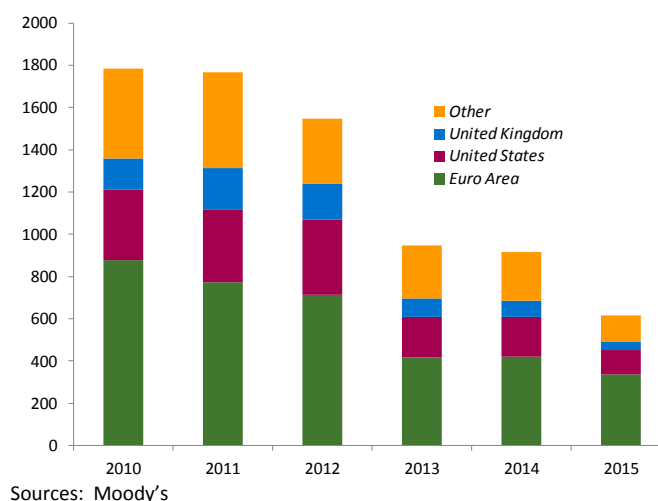
explained 79 percent of the movement, where  $S$  is the spread over the Fed funds rate; *steepness* is the steepness of the U.S. Treasury yield curve between 3 months and 10 years; *conc* is an index of U.S. banking system concentration constructed from FDIC data, *credgrowth* is the growth of credit to the private sector as shown in Figure 1.30 below, and the figures in parentheses after each coefficient indicate significance after applying Newey–West autocorrelation correction.

46. For the few banks that have significant capital markets operations, investment banking revenues are unlikely to provide the bonanza they did in 2009, as interest rates and exceptional liquidity conditions normalize and competition returns. Some corporate issuance in 2009 was precautionary to take advantage of low historical rates, and is unlikely to be repeated. The decline is unlikely to be fully offset by a rise in mergers and acquisition activity. At the same time, the move to central counterparty clearing of many contracts that were previously traded over-the-counter (at relatively wide spreads) could put downward pressure on one important revenue stream for the larger banks.

*... and funding pressures are set to mount, pushing up costs.*

47. The April GFSR cautioned that large banks generally needed to extend the maturity of their debt. However, they have seemingly been deterred by the historically high spreads at which they would issue, and the availability of ample, cheap central bank funding. The wall of refunding needs is now bearing down on banks even more than before, with nearly \$5 trillion of bank debt due to mature in the coming 36 months (Figure 1.16). This will coincide with heavy government issuance and follow the removal of central bank emergency measures. In addition, banks will have to refinance securities they structured and pledged as collateral at various central bank liquidity facilities that are ending.

**Figure 1.16. Bank Debt Rollover by Maturity Date**  
(In billions of U.S. dollars)



48. Banks must move further to reduce their reliance on wholesale markets as part of the deleveraging process. The investor base for bank funding instruments has been permanently impaired as special investment vehicles (SIVs) and conduits have collapsed, and banks are significantly less willing to fund one another unsecured. Central banks have provided a substitute with their liquidity facilities, but extraordinary support is set to be scaled back over time. This could put pressure on spreads, and particularly in those markets where the large retained securities portion of bank assets highlights the continuing disruption of mortgage securitization markets, as in the United Kingdom and Spain (Figure 1.17).<sup>31</sup> A significant portion of these securities are being funded through the Bank of England and European Central Bank facilities. In contrast, the U.S. Federal Reserve has purchased securities outright—largely through the quantitative easing program—and has thus assisted banks

<sup>31</sup> Irish banks also have significant refinancing requirements. Perilously thin margins mean that the additional cost of funding is likely to consume a substantial proportion of earnings over the next few years, according to some market analysts.

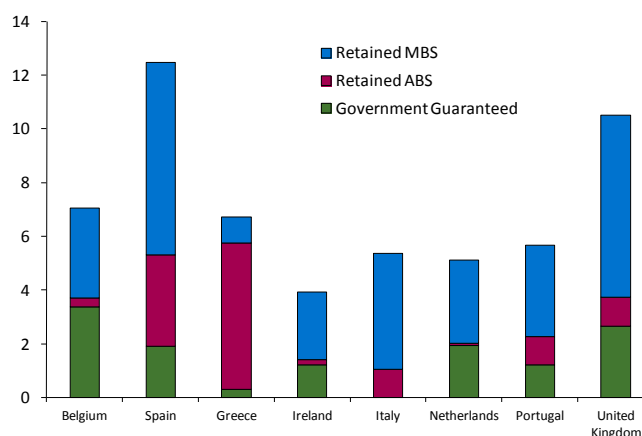
through a more durable asset transfer process.

49. If banks fail to shrink their assets to reduce their need for funding or pay for term wholesale funding, they will inevitably be competing for the limited supply of deposit funding (Figure 1.17).<sup>32</sup>

50. Indeed, there are already signs that deposit funding is becoming more expensive. The funding spread—the difference between what banks pay for deposits and what they could earn on those deposits in the LIBOR market—is already heavily negative in the United States and United Kingdom. Even in the euro area, where the funding spread has typically been a positive 175 basis points in normal times, it has now turned negative (Figure 1.18). As a result, even though spreads on assets have widened further in recent months, bank top-line profitability is under pressure in all these regions.<sup>33</sup>

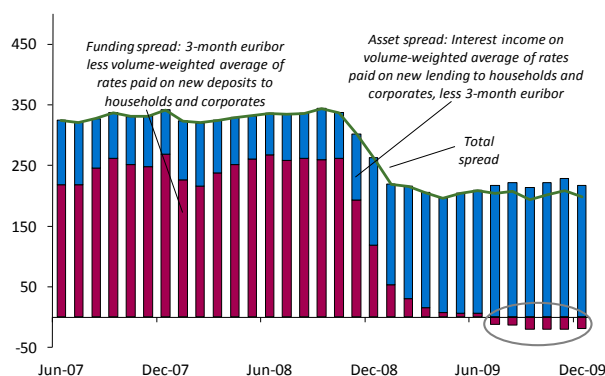
**Figure 1.17: Liabilities That Could Test Market Appetite for Bank Debt as They Need to be Refinanced**

*(As percent of national banking systems deposits)*



Sources: Autonomous Research; European Central Bank; and IMF staff estimates.

**Figure 1.18. Euro Area Banking Profitability**  
*(In basis points, on volume-weighted new business, excluding overdrafts)*



Sources: Autonomous Research; and IMF staff estimates.

<sup>32</sup> See Autonomous Research, 2009

<sup>33</sup> In the euro area, the total spread on new business is at roughly half its level of a year ago.

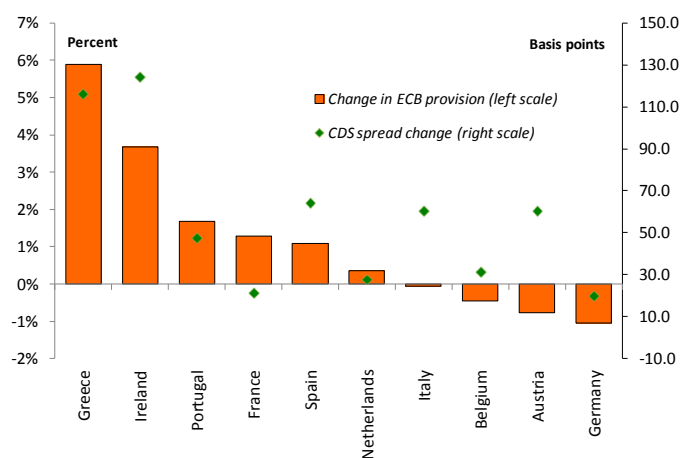
*Slow progress on stabilizing funding and addressing weak banks could complicate policy exits from extraordinary support measures.*

51. The planned exit from extraordinary liquidity measures may be complicated by the need for banks generally to extend the maturity of their liabilities and by the presence of a tail of weak banks in the system. Although LIBOR-OIS spreads have narrowed, there are ample other signs that money markets have yet to return to normal functioning. The contributions of LIBOR and EURIBOR panel banks to their respective benchmarks remain more dispersed than before the crisis; credit lines for medium-sized banks, and banks that required substantial public support, have generally not yet been reinstated; and turnover in the repo market for any collateral other than higher-rated sovereign paper remains low.

52. Although substantially improved, there are lingering signs that some institutions remain dependent on central bank liquidity facilities. National central bank data (Figure 1.19) suggest a number of euro area banks have increased their reliance on ECB funding over recent quarters, suggesting their demand is to meet genuine funding needs rather than simply to finance attractive carry trades. Some widening of both financial and sovereign CDS spreads is likely as the withdrawal of extraordinary ECB measures draws nearer. In the United States, borrowing at the Federal Reserve's discount window has fallen steadily but remains well above pre-crisis levels.<sup>34</sup>

**Figure 1.19. Net ECB Liquidity Provision and CDS Spreads**

*(Changes 12/1/2006 to 10/1/2009)*



Sources: Bloomberg L.P.; and euro area national central banks.

Note: Net liquidity provisions are expressed as a percent of bank total assets, while the diamonds reflect the change in sovereign credit default swap (CDS) spreads between December 1, 2006 and October 1, 2009.

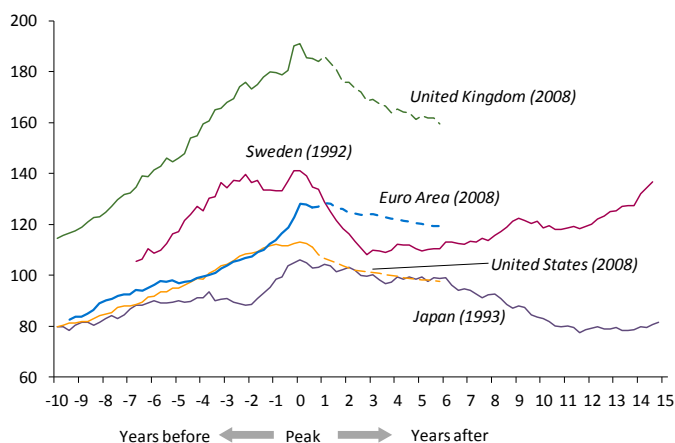
<sup>34</sup> In February, the Federal Open Market Committee decided to increase the rate charged to banks borrowing at the discount window by 25 basis points to 0.75 percent.

### *What does this mean for financial policies?*

53. The consequence of these deleveraging forces will be to highlight the extent of overcapacity in the financial system as costs rise, push up competition for stable funding sources, and intensify pressure on weak business models (Figure 1.20). Thus, policy will need to ensure that this next stage of the deleveraging process unfolds smoothly and ends in a safe, vital, and more competitive financial system. This will include addressing too-important-too-fail institutions in order to ensure fair pricing power throughout the financial system and to guard against rising concentration as the size of financial systems shrinks (see Annex 1.2).

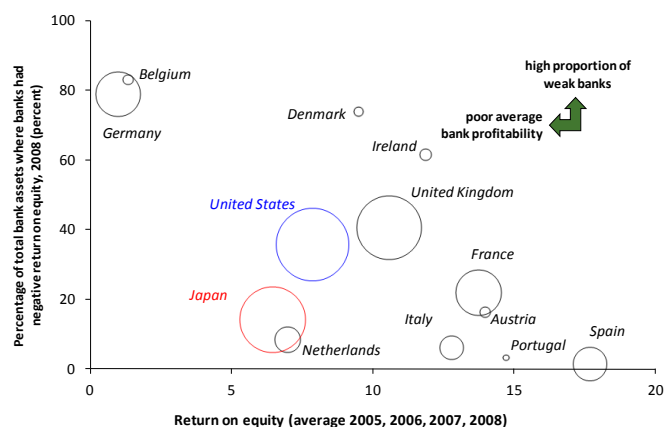
54. The viability of weaker segments of banking systems is likely to come into question given new regulations, deleveraging forces, and the withdrawal of extraordinary central bank support facilities. In a number of countries, a significant part of the banking system lacks a viable business model, or suffers from chronic unprofitability. In the case of the European Union, the need for rationalization of the sector can be seen in the striking variability of banking returns (Figure 1.21). The German system, for example, suffers from weak overall profitability, and a large tail of unprofitable banks—primarily the nation’s landesbanks. Moreover, care will be needed to ensure that TITF institutions in all jurisdictions do not use the funding advantages their systemic importance gives them to consolidate their positions even further.

**Figure 1.20. Bank Credit to the Private Sector**  
(In percent of nominal GDP)



Sources: Haver Analytics; and IMF staff estimates. Note: Dashed lines are estimates. Year of credit peak in parenthesis.

**Figure 1.21. Bank Return on Equity and Percentage of Unprofitable Banks, 2008**  
(In percent)



Sources: Bankscope; EU Banking Supervision Commission; Federal Deposit Insurance Corporation; and IMF staff estimates.

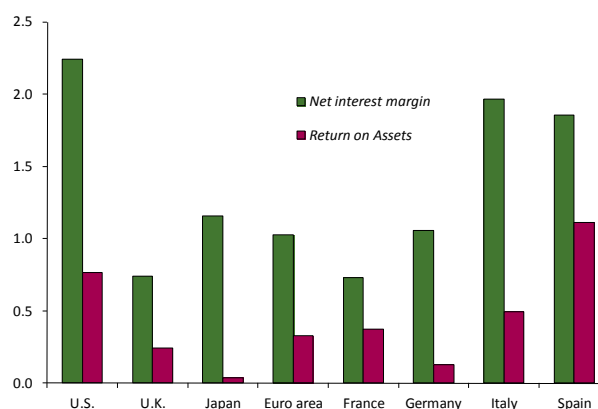
Note: Size of circle corresponds to relative size of bank loan stock at end-2008. Return on equity is as defined by the Banking Supervision Committee (BSC) of the European System of Central Banks in each of its reports. Some countries were reporting under national accounting standards in the earlier BSC reports. For United States and Japan, return on equity is net income divided by total equity according to FDIC and Bankscope data respectively.

55. If excess banking capacity is maintained, the costs are felt across the whole economy and are not just limited to support costs faced by taxpayers. Weak banks normally compete aggressively for deposits (on the back of risk-insensitive and underpriced deposit insurance), wholesale funding, and scarce lending opportunities, so squeezing margins for the whole system. Unless tightly constrained, institutions that are either government-owned, or have explicit or implicit government backing, have also demonstrated a tendency to invest in risky assets of which they have little experience—some of the German *landesbanks* being only the latest examples—so adding to systemic risks and the likelihood of future bail-outs.

56. Japan presents a telling example of the challenges banks face in a crowded sector, amid low growth, and muted or negative inflation. Deflationary pressures and exceedingly low nominal rates provide little room for interest margins, leaving banks increasingly pressed to maintain profitability. Over the past 20 years, the average return on bank assets has been negative. Low returns on assets make it hard for banks to rely on loan revenues to absorb credit losses and volatility in the values of equity holdings make bank balance sheets procyclical (Figure 1.22).<sup>35</sup> Tangible equity at the largest banks is low, and is likely to be further pressurized by the latest Basel proposals. Options for improving profitability—taking greater market risks, offshore expansion, higher lending margins, or balance sheet shrinkage—all have their difficulties, both economically and politically. The Japanese experience of recent sub-potential growth must, in part, be due to the constraints banks face in credit intermediation to the private sector. Other countries should act strenuously to avoid a similar outcome.

**Figure 1.22. Banking System Profitability Indicators**

*(In percent, average 2001-08)*



Sources: Bankscope and IMF staff estimates. Note: different industry structures and accounting conventions make comparison across countries/regions difficult.

<sup>35</sup> During downturns banks deduct all unrealized losses on “available-for-sale” equity securities—including cross-shareholdings—from Tier 1 capital, while during upturns, the large internationally active banks can include 45 percent of equity-related unrealized gains toward Tier 2 capital.

## D. Risks to the Recovery in Credit

*The credit recovery will be slow, shallow, and uneven. Credit supply remains constrained as banks continue to repair balance sheets. Notwithstanding the weak recovery in private credit demand, ballooning sovereign needs may bump up against supply. Policy measures to address capacity constraints, along with the management of fiscal risks, should help to relieve pressures on the supply and demand for credit.*

*Credit availability is likely to remain limited . . .*

57. Two years ago, the GFSR described the possibility that credit growth might drop to zero in the major economic areas affected by the crisis, as has now happened. For example, in the United States, real credit growth has fallen sharply when compared with past recessions (Figure 1.23).<sup>36</sup>

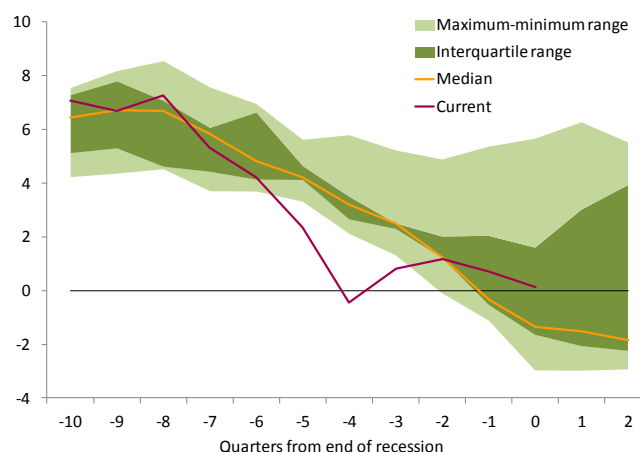
58. The last few rounds of bank lending surveys, however, have indicated that lending conditions are tightening at a slower pace, and in some sectors, have already begun to register an outright easing.

Figure 1.24 indicates that credit growth has lagged lending conditions by around four quarters, suggesting that the worst of the credit contraction may be over.

Nevertheless, as discussed in Section C, it is likely that bank credit will continue to be weak as balance sheets remain under strain and funding pressures increase. Banks' reluctance to lend is evident in still-elevated borrowing costs and strict lending terms (for example, stringent covenants and short maturities) in some sectors.

**Figure 1.23. Real Nonfinancial Private Sector Credit Growth in the United States**

(In percent, year-on-year)



Sources: Haver Analytics; National Bureau of Economic Research; and IMF staff estimates.

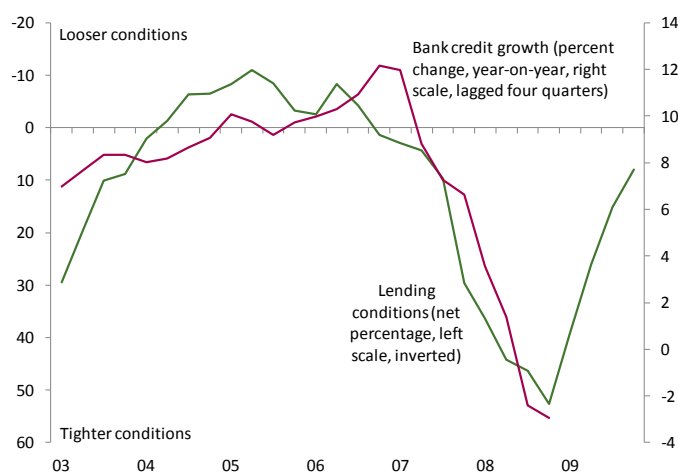
Note: The chart compares recent real nonfinancial private sector credit growth to that in past recessions, from 1970 to 2001.

<sup>36</sup> In Japan, total bank credit growth did not increase to the same extent as in the United States and Europe during the pre-crisis period, and, by the same token, has not experienced as significant a credit withdrawal. For this reason Japan is not included in our credit projections.



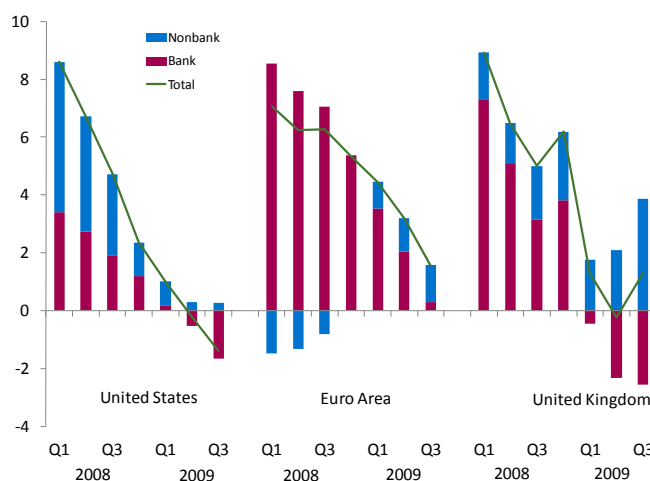
59. Companies have increasingly drawn on nonbank sources of credit in recent quarters as banks have tightened credit supply (Figure 1.25).<sup>37</sup> However, nonbank credit has only provided a partial substitute for bank lending and total credit growth has fallen. In general, in addition to households, SMEs tend to be largely reliant on bank lending and so still face credit constraints. Furthermore, the supply of credit that has been available from central banks during the crisis is set to wane this year.<sup>38</sup> Central bank commitments imply a further \$350 billion of securities purchases in the euro area, United Kingdom and United States, in total, compared with around \$1.8 trillion in 2009. So even though we expect nonbank capacity to increase over the next two years, as economies start to recover, total credit supply, including bank lending, is set to recover slowly (Figure 1.26).

**Figure 1.24. Average Lending Conditions and Growth in the Euro Area, United Kingdom, and United States**



Sources: Haver Analytics; national lending surveys; and IMF staff estimates.

**Figure 1.25. Contributions to Growth in Credit to Nonfinancial Private Sector Credit Growth (In percent, year-on-year)**



Sources: Haver Analytics; and IMF staff estimates.

<sup>37</sup> The nonbank sector—primarily insurance companies, pension funds, mutual funds, and foreign central bank reserve managers—plays an important role in supplying credit to the economy, for example through purchases of corporate and government debt securities. There are two main channels through which this can occur. First, a portion of households' and companies' savings can provide credit, either directly through investments in debt securities or indirectly through investments made on their behalf by asset managers. The second channel occurs through the investment of foreign savings in debt issued in other economies.

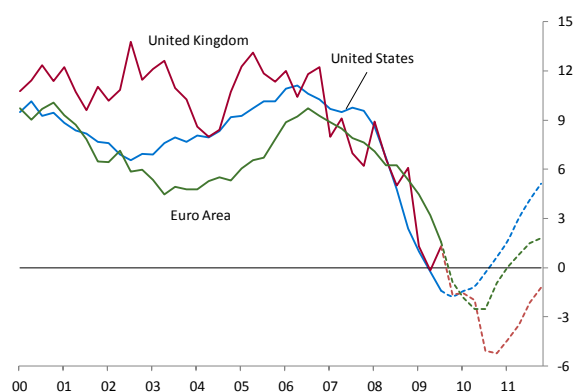
<sup>38</sup> Annex 1.8 discusses the impact of large-scale asset purchase programs on the cost of credit.

... and sovereign needs are set to dominate credit demand ...

60. Sovereign issuance surged in 2009 to record levels in all three regions as crisis-related interventions and fiscal stimulus packages led to an unprecedented increase in government borrowing requirements (Figure 1.27). Government borrowing will remain elevated over the next two years, with projected financing needs for both the euro area and the United Kingdom well above our previous expectations in the October 2009 *GFSR*. Burgeoning public sector demand risks crowding out private sector credit if funds are diverted to public sector securities. In addition, as discussed in Section II, a rise in sovereign risk premia could raise private sector borrowing costs.

**Figure 1.26. Nonfinancial Private Sector Credit Growth**

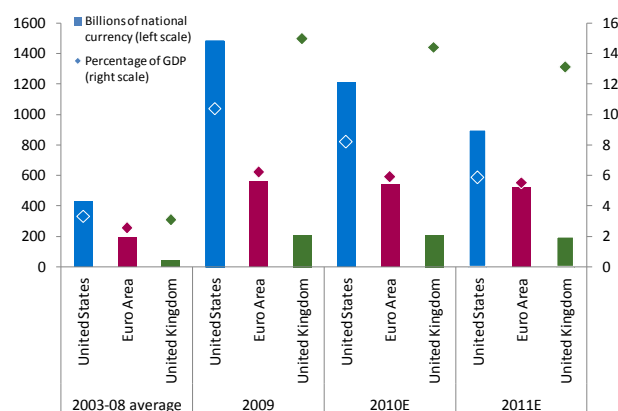
(In percent, year-on-year)



Sources: Haver Analytics; and IMF staff estimates.

Note: The dotted lines shows projected credit growth. If credit demand is estimated to exceed capacity, after meeting sovereign borrowing needs, then credit is assumed to be constrained by available capacity, including the impact of government and central bank policies.

**Figure 1.27. Total Net Borrowing Needs of Sovereign Sector**



Sources: National authorities; and IMF staff estimates.

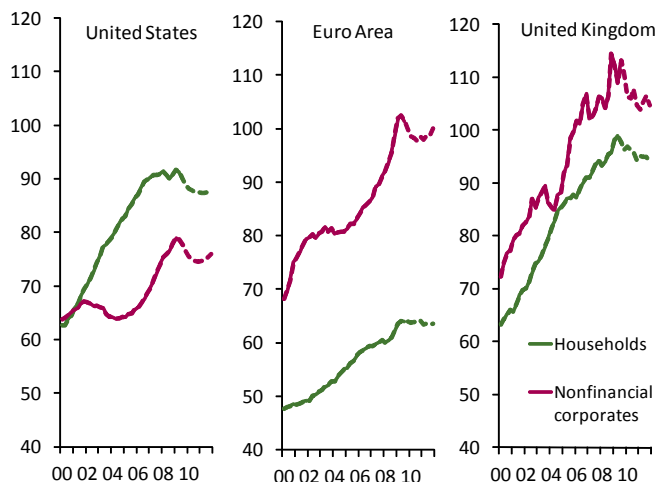
61. Notwithstanding these risks, private sector demand growth is likely to remain subdued as households and corporates restore balance sheets. The need for private sector deleveraging varies across region and sector (Figure 1.28). For instance, in the United States, households are at the beginning of the deleveraging process, while nonfinancial companies have less of a need to reduce leverage. By contrast, in the euro area and the United Kingdom, nonfinancial corporate debt as a share of GDP is much higher, having experienced a rapid run-up during the pre-crisis period. This, together with the increase in household leverage, means that the United Kingdom's nonfinancial private sector debt, at over 200 percent of GDP, is one of the highest among mature economies.<sup>39</sup>

<sup>39</sup> McKinsey Global Institute estimates (2010). Only Spain's nonfinancial private sector leverage ratio is higher, at 221 percent of GDP, which compares with 193 percent in Switzerland, 174 percent in the United States, 163 percent in Japan, 154 percent in France, 138 percent in Canada, 128 percent in Germany, and 121 percent in Italy.

... which is likely to result in financing gaps.

62. Updating the analysis of credit demand and supply in the October 2009 GFSR suggests that *ex ante* financing gaps will remain in place for all three regions in 2010 (Table 1.7).<sup>40</sup> As in the last GFSR, the gap in the United Kingdom, at around 11 percent of GDP, is set to be the largest as weak bank capacity struggles to keep up with surging sovereign issuance. We expect financing gaps of about 2 percent of GDP in the euro area in 2010, and a similar gap in the United States in 2010, which is closed by remaining commitments under the quantitative easing program.<sup>41</sup>

**Figure 1.28. Credit to GDP**  
(In percent)



Source: Haver Analytics; and IMF staff estimates.

Note: Dotted lines show projections.

63. At face value, *ex ante* financing gaps imply that either borrowing needs to be scaled back to equalize the lower supply, or that market interest rates will need to rise. Any increases in interest rates, however, are unlikely to be uniform and certain sectors, such as SMEs and less creditworthy borrowers, may face higher borrowing costs. In particular, given the surge in public sector borrowing and expected deleveraging by the banking sector, upward pressure on interest rates may well be greater in the United Kingdom than in the euro area or the United States.

64. Overall, the authorities should carefully assess the implications of their policy actions and exit strategies, as well as their timing, on the quantity of credit available to support the economic recovery. The implementation of measures to manage fiscal risks and limit rises in public sector credit demand, along with policies to address weaknesses in the banking system – such as strengthening support for securitization markets, as discussed in the October 2009 GFSR – will help alleviate pressures in the credit market. Central bank support measures, including purchases of securities, may still be needed in some cases to offset the retrenchment in credit capacity.

<sup>40</sup> The *ex ante* financing gap is the excess of projected financing needs of the public and private nonfinancial sectors relative to the estimated credit capacity of the banks and the nonbank financial sector. There can only be an *ex ante* gap, as *ex post*, a rise in interest rates and/or other rationing will bring credit demand and supply into balance.

<sup>41</sup> Annex 1.7 explains the methodology used to estimate the financing gap and compares the latest projections for 2010 with those in the October 2009 GFSR.

**Table 1.7. Projections of Credit Capacity for and Demand from the Nonfinancial Sector**

	2010		2011	
	Amount	Growth	Amount	Growth
<b>Euro Area</b>				
<b>Total credit capacity available for the nonfinancial sector</b>	<b>570</b>	<b>2.9</b>	<b>920</b>	<b>4.6</b>
of which capacity provided by banks	-90	-0.9	110	1.1
of which capacity provided by nonbanks	660	6.7	810	7.7
<b>Total credit demand from the nonfinancial sector</b>	<b>760</b>	<b>3.9</b>	<b>1,040</b>	<b>5.1</b>
of which demand from the private sector	100	0.9	410	3.4
of which demand from the public sector	660	8.7	630	7.7
<b>Credit surplus (+)/shortfall (-) to the nonfinancial sector</b>	<b>-190</b>		<b>-120</b>	
<b>Memo: Central bank and government committed purchases<sup>1</sup></b>	<b>30</b>		<b>-</b>	
Credit surplus (+)/shortfall (-) in percentage of GDP	-2.1		-1.3	
<b>United Kingdom</b>				
<b>Total credit capacity available for the nonfinancial sector</b>	<b>40</b>	<b>1.2</b>	<b>170</b>	<b>4.5</b>
of which capacity provided by banks	-30	-1.3	20	0.8
of which capacity provided by nonbanks	70	5.3	150	10.3
<b>Total credit demand from the nonfinancial sector</b>	<b>220</b>	<b>5.5</b>	<b>340</b>	<b>8.0</b>
of which demand from the private sector	10	0.3	140	4.5
of which demand from the public sector	210	22.3	200	17.4
<b>Credit surplus (+)/shortfall (-) to the nonfinancial sector</b>	<b>-180</b>		<b>-170</b>	
<b>Memo: Central bank and government committed purchases<sup>1</sup></b>	<b>10</b>		<b>-</b>	
Credit surplus (+)/shortfall (-) in percentage of GDP	-12.4		-11.2	
<b>United States</b>				
<b>Total credit capacity available for the nonfinancial sector</b>	<b>1,740</b>	<b>5.2</b>	<b>2,490</b>	<b>7.1</b>
of which capacity provided by banks	-30	-0.4	280	3.3
of which capacity provided by nonbanks	1,770	7.2	2,210	8.3
<b>Total credit demand from the nonfinancial sector</b>	<b>2,070</b>	<b>5.9</b>	<b>2,520</b>	<b>6.8</b>
of which demand from the private sector	420	1.7	1,290	5.3
of which demand from the public sector	1,650	15.0	1,230	9.7
<b>Credit surplus (+)/shortfall (-) to the nonfinancial sector</b>	<b>-330</b>		<b>-30</b>	
<b>Memo: Central bank and government committed purchases<sup>1</sup></b>	<b>360</b>		<b>-</b>	
Credit surplus (+)/shortfall (-) in percentage of GDP	-2.2		-0.2	

Sources: National authorities; IMF, World Economic Outlook database; and IMF staff estimates.

Note: Amount is in billions of local currency units rounded to the nearest ten. Growth is in percent.

<sup>1</sup>This includes committed purchases of debt issued by both public and private sectors, which is considered to be extra credit capacity provided by central banks and governments for the whole nonfinancial sector.

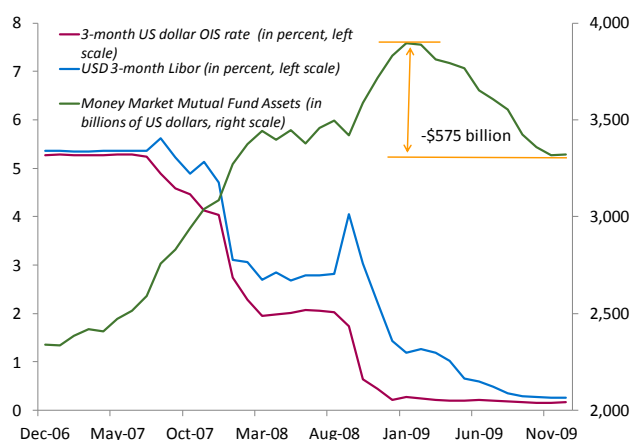
## E. Assessing Capital Flows and Bubble Risks in the Post Crisis Environment<sup>42</sup>

*Prospects for strong growth, appreciating currencies, and rising asset prices are pulling capital flows into Asia Pacific (ex-Japan) and Latin American countries, while push factors—particularly low interest rates in major advanced economies—are also key. Against this backdrop, this section assesses the drivers of recent capital flows, and both the near- and medium-term prospects of systemic asset price bubbles forming. It finds no evidence of systematic bubbles in advanced and emerging market countries and across asset classes in the near-term. However, if the current environment of low interest rates, abundant liquidity, and capital flows persist, history suggests that bubbles could form in the medium-term.*

65. Last year saw a welcome recovery in capital flows towards emerging markets and other advanced economies. “Pull factors” such as relative growth differentials, appreciating currencies, and rising asset prices are driving the resurgence. The flows have been targeted to countries perceived by investors to have better cyclical and structural growth prospects, like Brazil, China, India, and Indonesia, as well as their trading and financial partners, including commodity-exporters.

66. However, “push factors”, such as low interest rates in major advanced economies and much-improved funding market conditions, are also key drivers of capital flows.<sup>43</sup> Low policy rates have encouraged investors to shift their precautionary cash holdings into riskier assets. For example, U.S. money market mutual fund assets have fallen by over half a trillion dollars since March 2009, as central bank policy and operations helped to put downward pressure on broader money market interest rates and risk premiums (Figure 1.29).

**Figure 1.29. Low Short-Term Interest Rates Are Driving Investors Out of Cash**



Sources: Bloomberg L.P.; and Investment Company Institute.

67. When taken together, these push and pull factors may create a conducive environment for future asset price appreciation, and this, in turn, has heightened concerns about asset price bubbles forming. The surge in portfolio inflows also raises concerns about vulnerabilities to

<sup>42</sup> Chapter 4 of this GFSR provides an overview of the global liquidity expansion, its effects on receiving countries, and options available to policymakers in response to surges in capital inflows. The chapter also discusses the effectiveness of different types of capital controls.

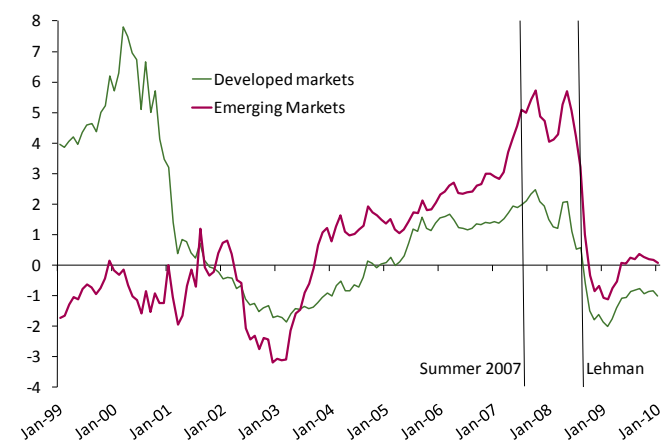
<sup>43</sup> This reflects the extraordinarily low monetary policy rates of the G4 central banks (Bank of England, Bank of Japan, European Central Bank, and Federal Reserve) and their generous liquidity providing operations, which has led to low interest rates, money market risk premiums, and excess liquidity. Chapter 4 finds strong links between global liquidity expansion and asset prices in capital flow recipient countries.

sudden stops, once global monetary and liquidity conditions are tightened or if risk appetite were to diminish.

*Further flows could emerge as the crisis has led investors to reconsider the balance of risk and return in emerging and other advanced economies.*

68. The crisis has altered perceptions about risk and return in mature relative to emerging markets. Perceptions of sovereign credit risks have moved in favor of emerging markets and some other advanced economies, primarily due to unfavorable debt dynamics in the major advanced economies and southern Europe (see section II). In contrast, the average credit rating of issuers in JPMorgan's Emerging Market Bond Index improved to the lowest investment grade rating during the crisis, reflecting upgrades to some emerging market sovereigns, notably Brazil. Additionally, emerging market equities continued to register higher volatility-adjusted returns than developed markets during and after the fall of 2008 (Figure 1.30).

**Figure 1.30. Emerging Market Returns Better on a Volatility-Adjusted Basis**  
(In percent)



Note: Volatility-adjusted returns = three-year rolling log returns / three-year historical standard deviation of returns.

Sources: Bloomberg L.P.; MSCI Barra; and IMF Staff estimates.

69. The favorable performance of EM assets relative to mature market assets has prompted growing interest by global investors in raising their asset allocations to emerging markets and other advanced economies. For example, retail investors and hedge funds are adding to their emerging market portfolios in the near term, facilitated by the increasing development of exchange-traded funds (ETFs) – targeting emerging markets broadly and countries like Brazil and China.<sup>44</sup> In debt markets, the outstanding stock of emerging market debt has grown to over \$7 trillion, compared to under \$2 trillion in the mid- to late-1990's, and benchmark bond indices are garnering greater acceptance by institutional investors.<sup>45</sup>

<sup>44</sup> In 2009, global ETF assets with dedicated exposure to emerging market equities increased 130 percent, compared to 24 and 52 percent, respectively, for North American and European equities, according to Blackrock, one of the leading provider of ETFs.

<sup>45</sup> Peiris, S., 2010 and CGFS Paper No. 28, June 2007. Also, JPMorgan estimates that total assests under management benchmarked to its family of emerging market debt indices increased 19 percent in 2009 to about \$280 billion.

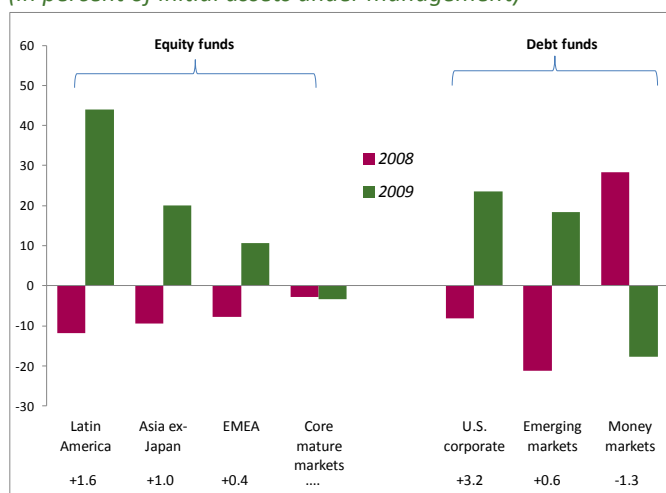
70. However, recent surveys indicate that institutional investors' home bias has only changed in a gradual fashion over the years.<sup>46</sup> Some estimate that emerging market equities account for just 5 to 9 percent of global equity exposures, far lower than their share of global market capitalization of 12 percent, and the 27 percent share implied by a GDP-weighted global equity index.<sup>47</sup> Nevertheless, even small shifts in portfolio allocations could translate into significant capital inflows to emerging markets and other advanced economies. They also could add to market volatility and test an individual market's capacity to absorb inflows, especially if flows are concentrated to particular assets or in a short period of time.

### *Portfolio flows have rebounded strongly*

71. Strong portfolio equity flows into emerging markets and other advanced economies in 2009 primarily reflect a recovery trade from the deep retrenchment in 2008. For example, 2009 inflows into equity mutual funds in Asia (excluding Japan) only just matched 2008 outflows. Latin America was the only region where 2009 inflows exceeded 2008 outflows by a wide margin. (Figure 1.31). In general, regions viewed as having lower growth prospects and structural challenges are receiving smaller inflows. For example, equity funds with exposure to Europe, Middle East, and Africa recovered less than one-half of the outflows in 2008, and funds continued to flow out of major advanced economy equity funds. Within these broad regions, however, some countries have experienced a rapid surge in portfolio inflows, e.g., Brazil was responsible for a large portion of flows to Latin America.

**Figure 1.31. Cumulative Retail Net Flows to Equity and Debt Funds**

*(In percent of initial assets under management)*



Sources: Emerging Portfolio Fund Research, Inc.; Investment Company Institute; and IMF staff calculations.

Note: Numbers underneath bars represent ratio of net flows in 2009 to those in 2008. "+"("−") when net inflows turned positive (negative) in 2009 from negative (positive) in 2008. EMEA represents Europe, Middle East, and Africa. Core mature markets include Japan, United States, and Western Europe. U.S. corporate represents inflows into U.S. mutual funds investment primarily in corporate debt.

<sup>46</sup> Studies by MSCI Barra indicate that home bias has only gradually been reduced over the last decade. Most institutional investors tend to partition domestic from international equity allocations, with few using a more global approach to asset allocation.

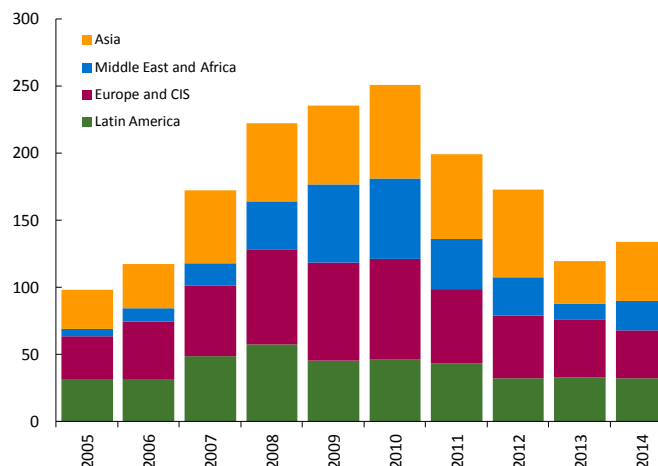
<sup>47</sup> According to MSCI's all-country world investable and GDP-weighted indices.



72. Investor flows into global corporate and emerging market external bonds and notes have also been strong in 2009, reflecting the reopening of global credit markets and an expected compression in credit spreads after extreme default scenarios were priced in at the height of the crisis.<sup>48</sup> Inflows into U.S. investment grade and high yield funds in 2009 were multiples above their 2008 outflows, but those to emerging market debt funds had not yet fully recovered (Figure 1.36). Even though emerging market external debt issuance reached a record of over \$200 billion, part of this issuance was required to meet the large refinancing needs that were highlighted in the last GFSR. Indeed, emerging market corporates and banks still face refinancing needs of about \$450 billion for foreign currency-denominated debt over the next two years, with a concentration of maturities this year (Figure 1.32).

**Figure 1.32. Refinancing Needs for Emerging Markets and Other Advanced Economies Remain Significant**

*(In billions of U.S. dollars)*



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

Notes: Repayment of principal and coupon on bonds and principal only on foreign currency loans. Asia=China, India, Indonesia, Malaysia, Korea; Latin America=Argentina, Brazil, Chile, Mexico; Europe and CIS=Hungary, Kazakhstan, Poland, Russia, Turkey, Ukraine; Middle East and Africa=South Africa, United Arab Emirates. CIS=Commonwealth of Independent States.

73. Although portfolio flows were strong in 2009, other investments, which includes cross-border bank lending, and direct investments have not recovered to the same extent. This reflects the persistent deleveraging by mature market banks and the still tepid desire by firms for cross-border mergers and acquisitions and green field development. For example, the non-portfolio, non-FDI category of the capital accounts of Brazil, Korea, and Russia remained negative in the data available for 2009, and FDI remains subdued in Korea and Russia.<sup>49</sup>

### *But have portfolio flows caused asset prices to reach excessive valuations?*

74. Compared with prior crisis episodes, asset prices have moved along a broadly similar recovery path (Figure 1.33). For example, the price of emerging market equities in real terms

<sup>48</sup> At the height of the crisis, for example, investment grade corporate bonds were trading at credit spreads that only previously had been priced into high yield bonds, and overall credit spreads were affected by the stress in market functioning which elevated trading liquidity risk premiums.

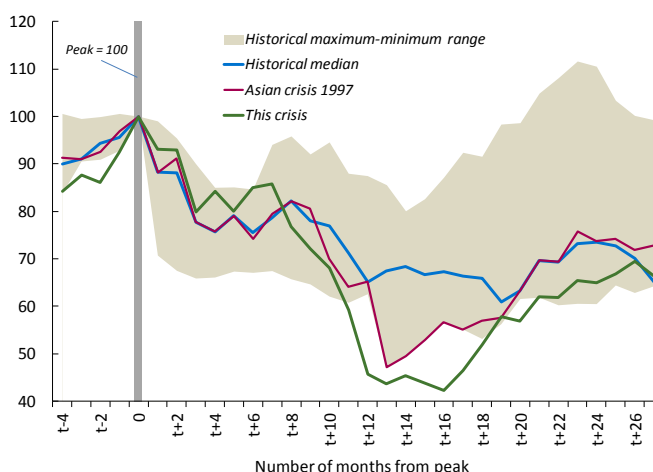
<sup>49</sup> Bank lending is recovering more slowly than portfolio flows. There was a 24 percent decline in the gross issuance of emerging market and other advanced economies syndicated loans in 2009, and a still negative net change in combined exposures of BIS reporting banks to countries in Europe, Middle East, and Africa. In contrast, BIS exposures to Latin America and Asia increased in Q3 2009 (the latest available data, after falling sharply during the height of the crisis).



has recovered to the median level of historical correction episodes. Also, the depth of the trough and the pace of recovery during the Asian crisis were similar to those during the current crisis.

75. A few asset classes have attracted particular attention—equity and property prices, local sovereign yield and external sovereign credit spreads—but we find little evidence that bubbles have formed in these segments in the near-term (Table 1.8).<sup>50</sup> For advanced economies, equity valuations appear stretched in Ireland, according to forward-looking indicators, but this is due largely to sharp downward revisions in earnings projections. Forward-looking valuations are generally below the peaks prior to the collapse of Lehman Brothers as well as the bursting of U.S. tech bubble in 2000. There are also few signs of overvaluation in local sovereign debt markets (with the exception of Japan), including in mature economies where official bond purchase programs have been pursued after controlling for monetary and financial conditions.<sup>51</sup>

**Figure 1.33. Emerging Market Real Equity Prices: Historical Corrections**  
(Pre-correction peak=100)



Source: Bloomberg L.P.; IMF, World Economic Outlook (WEO); and IMF staff estimates.

Note: Median, max, and min based on five correction episodes following peaks in July 90, August 94, July 97 (Asian crisis), February 00, and March 02, but excluding this crisis that started in October 2007, and are based on the MSCI Emerging Markets Index.

<sup>50</sup> We assess equity valuations based on forward and backward looking price multiples as well as a dividend discount model, which relies on longer-term expectations of earnings and real yields. Several valuation ratios were used to assess property price valuation, while different econometric approaches were employed to gauge valuation of fixed income assets.<sup>50</sup> Mature market valuations are also assessed, as emerging market assets often trade in close relation.

<sup>51</sup> To assess the value of local sovereign debt in selected mature and emerging economies, local government yields have been modeled using a set of standard domestic factors representing monetary policy stance, fiscal conditions, economic activity, as well as external factors. It does use domestic savings or the microstructure of specific bond markets as explanatory variables, which may be particularly relevant for some countries like Japan. See Tokuoka (2010).

76. In credit markets, the narrowing of spreads appears to be consistent with macroeconomic fundamentals and reduced risk aversion in Europe, though the extent of credit spread compression is somewhat greater than model predictions in the United States. Emerging market sovereign external credit spreads appear broadly consistent with fundamentals. In the foreign exchange markets, the recent pick up in cross-border financial flows to emerging economies has not led to substantial changes in real effective exchange rates, as countries have generally preferred to build up reserves in response to inflows.<sup>52</sup>

77. There are some valuation hotspots in a few countries that have attracted significant portfolio investment. For example, in two Latin American countries, twelve-month forward price-to-earnings ratios exceed historical averages by 1.5 standard deviations or more. There are also signs that property prices may be stretched in some Asia Pacific countries with price-to-rent and/or price-to-income ratios 1.5 or more standard deviations beyond historical averages.<sup>53</sup> Box 1.3 takes a closer look at the Asia Pacific real estate markets, where housing prices and transaction volumes have surged to very high levels. However, these are primarily occurring in the high-end market.

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<sup>52</sup> See April 2010 WEO for a more detailed discussion of exchange rates.

<sup>53</sup> A cautionary note, these real estate ratios can also be driven by larger relative movements in the denominator not just the numerator, and high ratios may also still reflect the high valuation built up between 2003 and 2007 that are still in the process of correction. So, it is key to analyze real estate markets at a country-specific level. In the context of this table, the indicators allows us to make comparisons across countries and guide us to where further analysis may be required.

**Table 1.8. Asset Class Valuations***(Z score)*

	Equity			Residential Real Estate		Local Sovereign Yield	Local Corporate Credit	External Sovereign Credit
	Backward-looking	Forward-looking		Price to rent	Price to income			
		Shorter horizon	Longer horizon					
Asia								
Australia	-0.3	0.0	-2.1	1.9	1.5	-0.1	...	...
China	0.6	-0.1	...	1.9	-1.4	...	...	...
Hong Kong SAR	0.3	0.6	...	2.1	2.0	...	...	...
India	0.8	0.7	...	0.2	0.4	-1.0	...	...
Indonesia	1.1	0.2	...	-1.3	-1.3	-0.6	...	-0.5
Japan	-1.8	-1.1	-2.6	-1.9	-2.0	1.6	...	...
Korea	0.6	-0.6	...	0.6	-0.8	-0.6	...	...
Malaysia	0.0	-0.4	...	-1.8	-0.9	0.5	...	0.2
Philippines	-0.2	0.0	...	-0.9	-1.3	0.8	...	0.2
Thailand	-0.1	...	...	-2.7	-2.3	-0.5	...	...
Taiwan POC	-0.2	-0.8	...	0.3	-1.0	...	...	...
Europe, Middle East and Africa								
Austria	-1.0	-0.7	-0.1	-1.2	-0.3	...	0.4	...
Belgium	0.4	0.3	-0.3	1.0	1.4	...	0.4	...
Czech Republic	-0.4	-0.8	...	0.6	1.6	-0.2	...	...
Denmark	0.4	0.2	...	1.5	1.0	...	...	...
France	-1.8	-0.7	-1.1	2.2	1.7	0.0	0.4	...
Germany	-0.7	-1.0	-1.3	-1.7	-1.6	0.1	0.4	...
Greece	-0.4	-1.4	...	-1.9	-0.7	0.9	0.4	...
Hungary	-0.2	0.0	...	...	-1.1	0.6	...	-1.3
Ireland	-0.9	2.1	0.9	1.1	0.8	-0.7	0.4	...
Israel	0.0	-0.6	...	-0.6	1.0	...	...	...
Italy	-1.0	-1.0	-0.6	1.0	0.6	-0.7	0.4	...
Netherlands	0.0	-0.4	-1.0	1.5	1.4	...	0.4	...
Norway	-0.4	-0.5	...	1.9	1.3	...	...	...
Poland	-0.8	0.1	...	-0.4	-1.0	-0.7	...	-0.2
Portugal	-1.3	-0.4	...	...	...	-0.5	0.4	...
Russia	-0.2	-0.4	...	-1.1	-0.3	-2.9	...	0.5
South Africa	0.1	0.2	...	-0.1	0.2	-1.1	...	0.7
Spain	-0.9	-0.9	0.2	1.5	1.4	0.7	0.4	...
Sweden	-0.1	0.0	0.2	2.6	0.8	...	...	...
Switzerland	-0.8	-0.6	0.9	...	...	...	...	...
Turkey	-0.1	0.3	...	...	...	1.4	...	0.3
United Kingdom	-0.4	-0.8	-0.9	1.1	1.4	-0.2	...	...
Americas								
Argentina	0.1	...	...	-1.5	-0.4	-0.3	...	...
Brazil	0.8	1.8	...	...	...	0.1	...	0.1
Canada	-0.5	-0.2	0.4	1.9	1.3	-0.2	...	...
Chile	1.3	0.7	...	...	...	-1.7	...	0.4
Colombia	1.2	1.9	...	-2.0	1.5	-0.7	...	0.0
Mexico	0.4	1.2	...	...	...	...	...	0.3
Peru	0.7	0.2	...	...	...	-2.4	...	0.7
United States	-0.6	-0.6	-0.1	1.3	-0.4	0.5	1.8	...

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

Note: A z score represents the deviation of latest observation from either the period average or model value expressed in the number of standard deviations. Green signifies less than 1.5 standard deviations above, orange 1.5-2 standard deviations above, and red greater than 2 standard deviations above. Backward-looking equity valuation is calculated as the unweighted average of z scores of dividend yield and price to book. Forward-looking equity valuation represents z score of 12-month forward price to earnings (shorter horizon) and z score of dividend discount model estimates (longer horizon). Valuation of local sovereign yields, local corporate spreads, and external sovereign spreads are based on z score of the deviation from econometric model value. For methodologies see Annex 1.9.

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**Box 1.3. Asian Residential Real Estate Markets: Bubble Trouble?<sup>54</sup>**

Asian real estate markets rebounded quickly in the second half of 2009 from their 2008 downturn, distinguishing this region from the other parts of the world (first figure). While much of the world continued to grapple with the housing bust, housing prices and transaction volumes surged in certain eastern Asian economies (notably China, Hong Kong SAR, Korea, and Singapore) and recovered in closely-linked advanced economies (Australia and New Zealand).<sup>55</sup> In particular, prices for high-end properties in major metropolitan areas exceeded their 2008 peaks, gradually spilling over to the broader market. This development echoes the rally in other risky assets such as regional equities and bonds.

The rebound has been mainly driven by unprecedented policy measures to mitigate the impact of the global financial crisis and the ensuing return of risk appetite. First, mortgage rates are at historical lows as central banks around the globe have cut policy rates. Second, reviving real estate loan growth helped pull the markets out of the trough (second figure), especially in China. Third, governments in China and Korea introduced housing-related tax initiatives in late 2008 to revive domestic real estate markets. Last, capital inflows have played an important role. In Singapore, foreigners and companies accounted for 12.5 percent of the third-quarter home purchases in 2009, rising from 8 percent in the previous quarter. In Hong Kong SAR, an influx of buyers from mainland China pushed prices up, especially for luxury apartments.

Metrics of affordability are mixed, but on balance suggest that valuations risk becoming stretched (third and fourth figures). Although the average price-to-income index for the eastern Asian economies has risen only modestly, the price-to-rent index is elevated. As typically happens in housing bubbles, many purchasers may have been buying in the expectation of price appreciation, rather than simply for dwelling purposes.

The booming Asian real estate markets may pose risks to financial stability as banks are increasingly vulnerable to a price correction (fifth figure).<sup>56</sup> In addition, because the majority of mortgage loans in Asian economies carry floating rates, the widely-anticipated rate hikes in the region will increase the burden on household balance sheets.<sup>57</sup> Moreover, as many municipality budgets in China tend to rely heavily on revenue from land sales, a real estate market downturn may put their fiscal situation into question.<sup>58</sup>

In light of these potential risks, authorities in the region have taken measures to cool real estate markets, including tighter requirements on mortgage lending, increasing land supply, and re-imposition of higher transaction taxes. The average loan-to-value ratio of new mortgage loans in Hong Kong SAR has dropped significantly from its peak in June, and banks in mainland China have started to tighten their mortgage criteria. Furthermore, growth rates of transaction values in these booming markets all slowed down sharply in December (sixth figure). However, the declines may have been contaminated by seasonality close to the year-end, and transactions had accelerated earlier as buyers rushed to take advantage of the stimulus measures before their expiration. Therefore, the full-fledged effects of the cooling measures are still to be seen in the coming quarters.

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<sup>54</sup> Prepared by Deniz Igan and Hui Jin. Heejin Kim provided data support.

<sup>55</sup> India does not appear to exhibit the same dynamics, as housing market conditions remain soft in most regions.

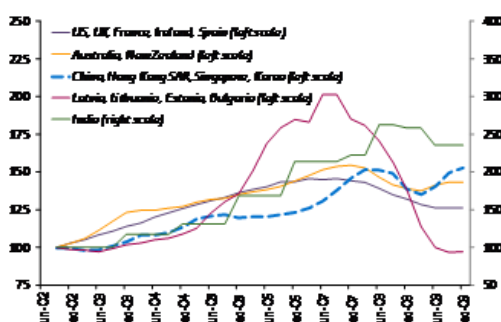
<sup>56</sup> It should be noted that these economies are only modestly levered with an average 45 percent mortgage-to-GDP ratio, compared to the 77 percent average of the advanced economies in the first figure. In addition, bank exposures to the property sector generally remain within regulatory limits. However, the increasing exposure to real estate is a worrisome trend.

<sup>57</sup> This applies more to China and Korea given the heterogeneity of monetary policy mandates in different Asian economies.

<sup>58</sup> Revenue from land sales in 2009 was estimated to be about one third of total revenue in major cities in China.

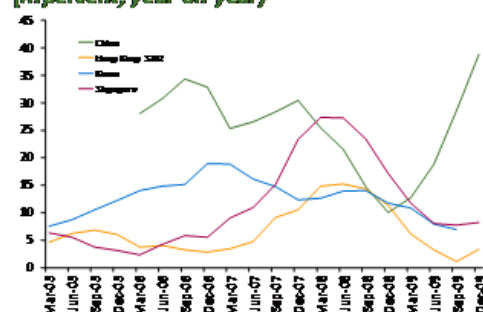
The authorities may also need to fine-tune their policies in response to new market developments, to maintain a delicate balance between leaning against housing bubbles and ensuring a solid economic recovery.

### Real House Prices



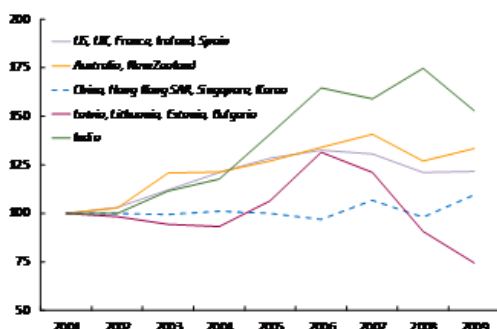
Sources: OECD; Global Property Guide; and national authorities.  
Note: Indices started in June 2002.

### Real Estate Loan Growth (In percent, year-on-year)



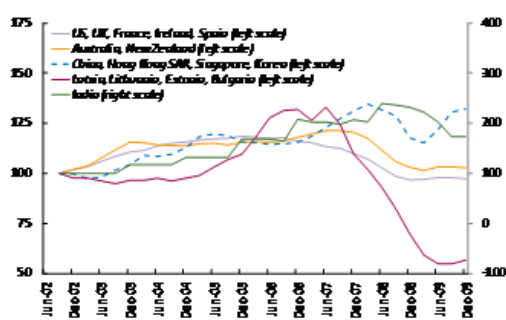
Sources: CEC; national authorities; and IMF staff estimates.

### Price-to-Income Ratio Indices



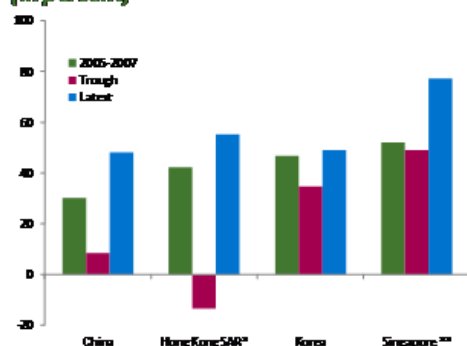
Sources: OECD; and national authorities.  
Note: The indices started in 2001.

### Price-to-Rent Ratio Indices



Sources: OECD; and national authorities.  
Note: The indices started in September 2007.

### Real Estate Loans as a Portion of Net New Bank Lending (In percent)

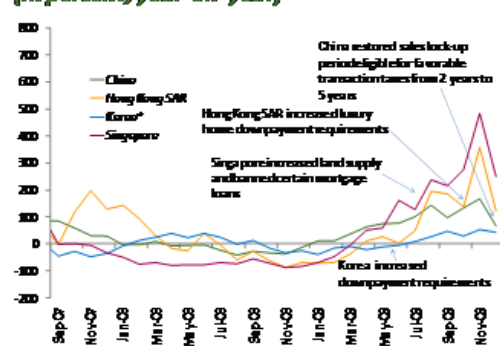


Sources: CEC; national authorities; and IMF staff estimates.  
Note: Real estate loans include construction loans and mortgages. Trough was in 2008 for Korea and Singapore and in 2009Q1 for China and Hong Kong SAR. Latest was in 2009Q3 for Korea and 2009Q4 for other economies.

\* Net new bank lending in Hong Kong SAR was negative in 2009, real estate loans in the year are presented as a share of quarterly average of 2008 net new bank lending.

\*\* Net new bank lending in Singapore was negative in the first quarter of 2009, data for this quarter represent real estate loans as a share of quarterly average of 2009 net new bank lending.

### Transaction Value Growth in Response to Measures to Cool the Real Estate Market (In percent, year-on-year)



Sources: CEC; national authorities; and IMF staff estimates.

Note: Korean data represent units of transactions. Measures shown in the figure are the first major cooling policies announced by these Asian economies.

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**Box. 1.4. Could Conditions in Emerging Markets be Building a Bubble?<sup>59</sup>**

There is a growing body of literature that suggests banking crises often result from the build-up of financial imbalances.<sup>60</sup> These imbalances develop over a number of years through a simultaneous boom in asset prices and credit. Rapid credit growth *alone* or the development of an asset price bubble *by itself* may not create vulnerabilities. It is the *coexistence* of credit and asset price booms that increase the likelihood of future financial stress. This is because at some point, if the boom turns to bust, the economy will be left saddled with large debts backed by assets with falling value. As the recent crisis has shown, a vicious circle of falling asset prices and reductions in leverage can form, potentially leading to widespread instability in the financial system. Such a financial crisis is likely to be associated with a deep and protracted slowdown in economic activity, particularly if there is distress in the banking sector.<sup>61</sup>

One common way of assessing the development of imbalances is to create a set of indicators that measure the deviation of key variables from their trend. This method is used to capture the cumulative process whereby imbalances build-up steadily over time. The first figure shows that in the years before past episodes of financial stress, a strong increase in credit relative to its trend was associated with a rise in asset prices and growth in portfolio capital inflows. Interestingly, credit appears to stay at a high level even after asset prices have started to fall sharply. This may be because only a small proportion of loans will mature or default at any point in time so the level of credit will decline relatively slowly. It could also reflect companies drawing-down previously agreed precautionary credit lines, as happened during the 2007-09 global financial crisis.

More recently, there is some evidence to suggest that asset price pressures may be building in some emerging markets. The second figure shows the deviation in trend for credit, portfolio capital inflows and asset prices in Brazil, Russia, India, and China. This shows that, following the latest boom and bust where all three series rose and fell sharply, there has been a resumption of a build-up in capital flows, particularly in China and India. In addition, credit did not fall back as sharply as the other two indicators in 2008 and remains high relative to trend, albeit lower than the peak in 2008. If credit remains at this level and if portfolio flows continue to build, this could create conditions in which asset prices could boom and, over time, potentially lead to the development of financial system vulnerabilities.

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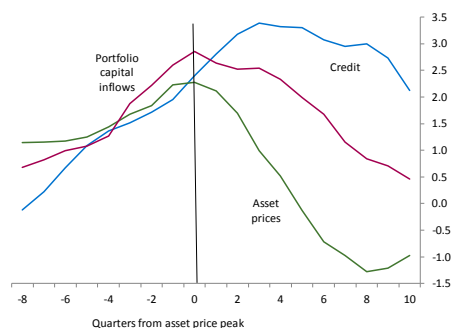
<sup>59</sup> This box was prepared by William Kerry.

<sup>60</sup> See for example: Borio and Lowe (2002); Borio and Drehmann (2008); Alessi and Detken (2009); and Gerdesmeier, Reimers and Roffia (2009).

<sup>61</sup> Chapter 4 of the October 2008 *WEO* discusses this in more detail.

## Assets Prices, Credit and Capital Flows in Past Crises

(In standard deviations from mean)

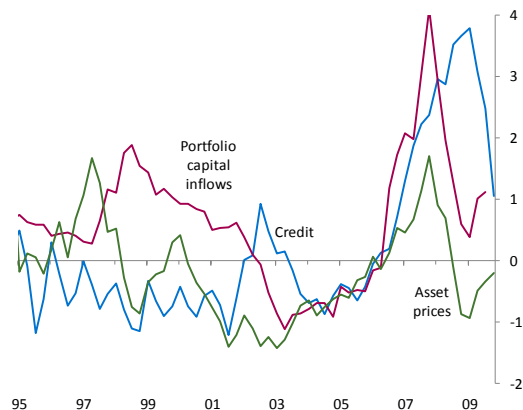


Sources: Haver Analytics; national authorities; and IMF staff estimates.

Note: The chart shows the average deviation in real asset prices, real private credit and real cumulative capital flows for developed countries in the early 1990s and around the 2007-9 Global Credit Crisis, as well as for south-east Asian countries (excluding Japan) around the 1997 crisis. The data shown are a four quarter moving average of a z-score calculated over the period 1991-2005.

## Assets Prices, Capital Flows and Credit in Brazil, Russia, India, and China

(In standard deviations from mean)



Sources: Haver Analytics; national authorities; and IMF staff estimates.

Note: Chart shows the deviation in the series from their estimated trend. The series are the average for Brazil, Russia, India and China, where figures are available. All data are in real terms. The figures are shown as a z-score calculated over the period 1991-2005.

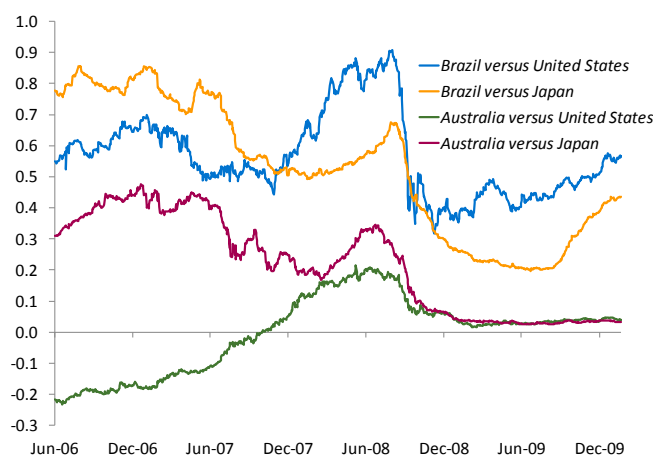
*Rising asset prices and portfolio flows have coincided with some pickup in leverage.*

78. The financial flows in 2009, especially to emerging markets and other advanced economies, have primarily been attributed to portfolio reallocation by unlevered institutional and retail investors. Leveraged investors, such as hedge funds, remain smaller and less leveraged than before the financial crisis, but they have recouped a significant amount of their crisis-related losses in 2009. With \$2.1 trillion under management at the end of 2009, the hedge fund universe has returned to three-quarters of its pre-crisis peak.

79. Additionally, the available evidence suggests that the incentives for “carry trade” have increased steadily over the past year, but they are yet to reach the high levels of 2006 and 2008.

For Australia carry trade indicators have not changed significantly since late-2008 (Figure 1.34).<sup>62</sup> Furthermore, mature market banks’ willingness to lend is only gradually improving, and the growth of domestic bank credit in most emerging market and other advanced economies is only beginning to turn around. The exception is in China, where credit growth soared through mid-2009 and remains at a fast pace, although decelerating (Figure 1.35).

**Figure 1.34. The Incentives for Foreign Currency Carry Trades are Recovering**



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

Note: Indicator = One-year swap spread differentials + change in exchange rate divided by the historical one-year volatility of that total return.

<sup>62</sup> The carry trade indicator used is the difference between one-year swap rates between the investment and funding currencies, divided by the one-year volatility implied in exchange rate options. This attempt to capture both expectations of short-term rates in a forward horizon and changes in pricing of risk and risk appetite in the currency market.

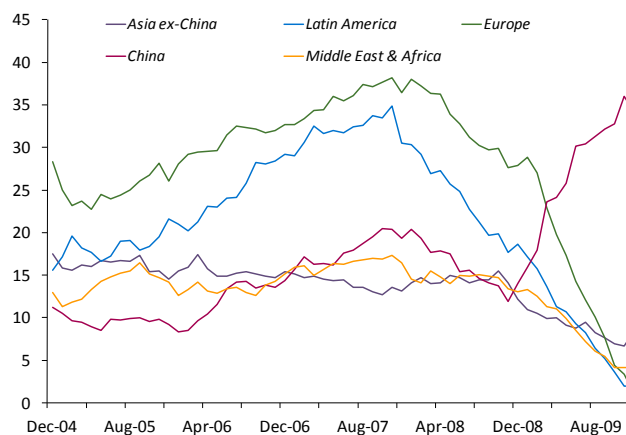


### *What could put asset prices on a bubble trajectory?*

80. Although there is only limited evidence of stretched valuations across countries in the near-term, current conditions could give rise to potential for bubbles to form in the medium-term. Typically, for bubbles to have a systemic impact requires substantial overvaluation in several risk assets for a protracted period that is supported by excessive leverage, often in the form of concentrated bank lending (see Box 1.4). Indeed, the abundant liquidity that remains within advanced country banking systems, if unlocked, has the potential to boost the prices of risk assets, unless carefully monitored and controlled.

**Figure 1.35. Emerging Markets: Bank Credit Private Sector**

*(Year-on-year change, in percent)*



Source: IMF staff estimates.

81. Expansionary financial conditions could fuel asset price inflation, potentially setting off an upward cycle of asset prices and credit through a financial accelerator mechanism.<sup>63</sup> The challenge of managing the consequences capital flows is particularly acute for countries with limited exchange rate flexibility. Such regimes may exacerbate the impact of capital flows on local liquidity conditions, while attracting inflows on expectations of future currency appreciation.<sup>64</sup>

82. Policymakers have responded to the rising capital flows, but continued vigilance is needed as current conditions remain supportive of further inflows. Governments have started to lean against increasing asset price pressures by beginning to remove some of the support to the financial system with the aim of reining in high credit growth. Thus, close monitoring and a variety of macro-prudential actions are warranted to help ensure that leverage and concentration do not reach excessive levels. Chapter 4 discusses the policy options and previous experience in addressing capital inflows. It notes that there have been varying degrees of success with different types of measures and controls to mitigate their impact on asset prices and inflation.

<sup>63</sup> Higher global liquidity tends to boost equity inflows to emerging markets and domestic asset valuation, particularly when the receiving country's exchange rate regime is not flexible. See Chapter 4.

<sup>64</sup> N'Diaye, P. (2009) examines the impact of U.S. monetary policy and operation on Hong Kong SAR.

## F. Policy Implications

*The health of the global financial system has improved, and the world has avoided a full-blown depression. However, risks remain elevated, due to the still-fragile nature of the recovery and the ongoing repair of balance sheets. Attention has shifted toward sovereign risks that could undermine stability gains and take the credit crisis into a new phase, as we begin to reach the limits of public sector support for the financial system and the real economy. Bank funding pressures are emerging as the key risk from the ongoing deleveraging process, and may replace capital as the dominant constraint on the normalization of credit. To maintain the momentum in the reduction of systemic risks, and to prepare for exits from extraordinary policy support, further action is required of policymakers in several key areas.*

***Careful management of sovereign risks is essential for financial stability in the period ahead.***

83. Sovereign risks have been transformed in a number of important ways. As the public sector stepped in to support financial institutions, distinctions between sovereign and private liabilities have been blurred and public exposure to private risks has increased. Channels of transmission among weaker mature sovereign credits have been revealed. Regional and global financial stability could be threatened if sovereign shocks are transmitted to banking systems and across borders. Thus, deteriorating fiscal fundamentals need to be credibly addressed.

84. In most cases, the success of ambitious fiscal adjustment that is required to reduce government debt to sustainable levels will depend on securing broad political support. Plans for medium-term fiscal consolidation should be developed and made public, including contingency measures if the deterioration in public finances is greater than predicted. Where necessary, these should be combined with a strengthening of fiscal institutions and improvement in public debt management frameworks. Other structural reforms to improve external competitiveness and growth prospects may also be necessary. Major economies in particular should be vigilant in maintaining medium-term fiscal discipline, to avoid the risks of ratings downgrades and higher interest rates, which could spill over to other countries as well as increasing funding costs for domestic banks and corporates.

85. Even as these reforms are implemented, risks will remain high in the short-term and countries will remain susceptible to macroeconomic shocks and shifts in market sentiment. Immediate steps should therefore be taken to reduce the potential for the telescoping of longer-term sovereign credit risks into short-term financing concerns. For instance, near-term refinancing risks could be mitigated by issuing more longer-maturity public debt and considering exchange offers to reduce near-term pressures. This will provide additional time for medium-term structural reforms to take effect.

86. In addition, authorities should endeavor to remove unnecessary transmission channels of sovereign risk through the financial markets, such as uncollateralized swap arrangements and embedding credit ratings in statutory guidelines. Even though sovereign CDS may at times influence underlying bond markets, particularly during periods of distress, banning “naked shorts” would be ineffective and difficult to enforce. The focus of policymakers

should be on using already-existing CDS data sources to monitor markets, and continuing to improve the market's operational infrastructure. Policymakers should continue to push to move bilateral over-the-counter (OTC) derivative contracts on to central counterparties (CCPs), and to advocate more consistent and uniform collateral practices on bilateral contracts. This would reduce the need to use sovereign CDSs as synthetic hedges against private-sector counterparty risk, and possibly reduce idiosyncratic spread volatility in the sovereign CDS market. These reforms would also promote global financial stability, while allowing market mechanisms to determine the ultimate usage of sovereign CDS.

*Policymakers need to ensure that this next stage of the deleveraging process unfolds smoothly and results in a safer, competitive, and vital financial system.*

87. Bank deleveraging has been driven mainly from the asset side, as mounting losses have prompted banks to reduce exposures to riskier assets. Going forward, however, the deleveraging process will be dominated by pressures on the funding or liability side of bank balance sheets. New regulatory rules will act to reduce leverage and raise capital and liquidity buffers. While the key banking systems most affected by the crisis likely now have sufficient capital, in aggregate, to meet expected future losses, there is significant variation across individual institutions within these systems. Some have a weak tail of thinly capitalized institutions that are highly dependent on cheap central bank funding. These impaired institutions compete for funding with more profitable and better-capitalized institutions, thereby squeezing margins and limiting the ability of healthier banks to finance their loan portfolios. If left unaddressed, this could ultimately act as a brake on the recovery of credit.

88. Going forward, funding pressures are likely to intensify for banks, as the wall of shorter-duration debt issued during the crisis matures, as banks compete with sovereigns to issue longer-dated debt, as central banks reduce their extensive liquidity support—thereby returning lower-quality collateral to banks—and as banks compete more aggressively for deposits to meet new liquidity requirements. Swift restructuring and resolution of nonviable institutions and restructuring of those with a commercial future is thus a vital component of the deleveraging process. This will help to ensure that once public support measures are removed, a healthy core of viable financial institutions remains, able to withstand normal competitive forces and resume lending. Measures to restructure and resolve weak institutions also facilitate the withdrawal of extraordinary support measures and the normalization of central bank liquidity facilities. The sooner weakened institutions recognize losses and are either resolved, restructured, or recapitalized by existing or new investors, the sooner the financial system can return to health.<sup>65</sup> Continuing to strengthen the capital base will also help prepare the financial system for timely implementation of the more stringent requirements of the new enhanced Basel II and other changes to the capital adequacy framework. At the same time, greater clarity is needed in defining the new financial system

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<sup>65</sup> Too little competition can be as damaging as too much: a balance needs to be struck in which competition is sufficient to deliver innovative and competitive financial services that support growth, but is not so intense that it depresses returns for the entire financial sector. In general, “zombie banks”—those that have lost their *raison d'être*, but are kept in existence for political reasons or by regulatory forbearance—engage in little innovation that is supportive of growth, but depress profits for the sector, and ultimately threaten financial stability.

framework, including financial sector taxation, to give banks more certainty over their future business models. These measures will need to be taken in conjunction with addressing the issue of “too-important-to-fail” (TITF) institutions, to avoid further concentration, and to restore healthy and fair competition.

*Policies may still be needed to ensure adequate flows of credit to the private sector.*

89. Credit availability is likely to remain limited as banks continue to reduce leverage. Notwithstanding the weak recovery in private credit demand as households restore balance sheets, ballooning sovereign financing needs may bump up against supply constraints and exacerbate funding pressures, further constraining credit supply. This is particularly a possibility for the United Kingdom. Accordingly, central bank support measures, including purchases of securities, may be still needed to offset the retrenchment in credit capacity by the bank and nonbank sectors in selected cases. Strengthening support for the recovery of securitization markets may also be necessary (see October 2009 GFSR). Furthermore, targeted support to ensure adequate lending to the SME sector may warranted in some economies.

*Emerging market policymakers will need to deploy a wide range of policy tools to address the challenges arising from capital inflows.*

90. The strong rebound in emerging market capital inflows, while welcome, is leading to concerns over inflationary pressures or asset price bubbles in receiving countries. Although there is only limited evidence at this time of stretched valuations across countries—with the exception of some local property markets—current conditions of high external and domestic liquidity, and rising credit growth have the potential to stoke inflation and give rise to bubbles over a multi-year horizon. In addition to macro-policy adjustment (including measures supporting exchange rate appreciation), possible policy tools include liquidity management operations to mop up domestic liquidity; prudential tools to restrict banks’ ability to fuel a credit boom and restrict a build-up of excessive leverage; and asset price tools to target specific asset prices and markets. Chapter 4 discusses the use of capital controls as part of the macro-prudential policy mix.

*Addressing too-important-to-fail banks is critical for restoring market discipline and insulating sovereign balance sheets.*

91. Excess capacity in the financial system and significant concentration of power in “too-important-to-fail” (TITF) institutions remain to be addressed as the financial system undergoes further deleveraging. Market discipline and fair competition will be supported by addressing the significant advantages in funding markets enjoyed by TITF institutions.<sup>66</sup> This

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<sup>66</sup> U.S. data highlight that the largest banks generally entered the crisis with the lowest capital ratios while enjoying a lower cost of funding, suffered the greatest losses, and enjoyed the most government support and subsidy. Crisis mergers have meant that the top four banks have sharply increased their asset size relative to GDP and other bank assets (see Annex 1.6).

is critical to avoid even greater concentration as the financial system shrinks.<sup>67</sup> Importantly, to protect sovereign balance sheets and to reduce the risks of recurrence, such institutions must be required to have stronger capital and liquidity buffers plus robust risk management systems and capacities. Policymakers must also reduce the potential and actual moral hazard associated with TITF institutions.

92. There have been a number of policy instruments proposed to address the problem (see Box 1.5) but little consensus on which are most advantageous. Available options range from higher capital requirements linked to systemic importance, to imposing limits on the size and scope of institutions, with regulatory authorities tailoring their approach to reflect specific country circumstances. Whatever option is chosen, the simple metric of effectiveness will be whether TITF institutions reduce their contribution to systemic risk and do so in a matter that is internationally consistent. The window of opportunity for real reform of TITF institutions is rapidly closing, so policymakers should take bold steps to ensure this topic stays on the reform agenda, and meaningful progress is made.

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<sup>67</sup> In the EU, the Commission's Competition Directorate is requiring banks as a condition of significant state aid to cancel or defer coupons on preferred shares and hybrid instruments and dispose of banking units and subsidiaries to reduce concentration and encourage entry into banking markets. While not fully addressing the TITF problem, this process goes some way towards redressing the moral hazard consequent upon crisis assistance. The absence of a similar a process in the United States, Japan, and Switzerland leaves such sovereigns more exposed to contingent liabilities from more concentrated banking systems than otherwise.

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### Box 1.5. Proposals to Address the Problem of “Too-Important-To-Fail” Financial Institutions

“Too-important-to-fail” (TITF) firms are those believed to be so large, interconnected, or critical to the workings of the wider financial system or economy that their disorderly failure would impose significant costs on third parties. This status engenders expectations that, if failure were threatened, the authorities would be forced to prevent their collapse, thereby shielding creditors from loss, reducing borrowing costs, and encouraging additional leveraged risk-taking by TITF firms. The policy response to the financial crisis—entailing selective bailouts favoring TITF firms and assisted mergers—has exacerbated this already serious moral hazard problem in the United States and Europe. Proposals made by the Basel Committee on increased capital for market risk and liquidity requirements and improvements to clearing infrastructure (see Chapter 3) would reduce systemic risk. In addition, a range of policy responses has been suggested to address the specific issue of TITF institutions and are under consideration by the Financial Stability Board:

**Tougher supervisory standards for TITF firms:** An element in the U.S. Administration’s proposal for systemic firms is for regulators to require tougher minimum capital, liquidity, and risk management requirements, effectively under Pillar 2 of the Basel framework. This has the advantage of flexibility but relies on regulators identifying sources of systemic risk accurately while maintaining robust independence from TITF firms.

**Resolution mechanisms (TITF insolvency regimes; ‘living wills’):** The crisis highlighted the absence of legal powers in many jurisdictions to intervene in, or wind-up, troubled TITF institutions in an orderly way outside standard bankruptcy procedures. Such mechanisms are vital to give credibility to the threat of failure. Requiring the preparation of ‘living wills’ by TITF firms would force their boards to understand the complexities of their legal structures while providing some assistance to regulators in insolvency. Unless a robust cross-border resolution regime for TITF firms can be implemented, jurisdictions may seek the safer option of resolving subsidiaries they host rather than allow cross-border branching of TITF entities.

**Additional capital requirements linked to systemic risks:** In addition to the higher levels of better quality capital for internationally active banks proposed by the Basel Committee, additional requirements could be calibrated to penalize firms’ attributes that make them TITF. Chapter 2 illustrates how systemic-risk based capital surcharges can be made operational. Such requirements should be set to motivate TITF firms to divest activities and shrink assets to raise their RoE, while favoring new entrants and greater competition.

**Taxes or levies to pay for costs of resolving TITF entities:** While initially intended to clawback the costs of crisis bailout, such taxes could be used to encourage TITF firms to reduce systemic risks. To fully address the problem, such taxes or levies would need to be calibrated to exceed the cost of capital benefit that TITF firms derive from their status. Some large banks have supported paying levies towards an explicit resolution fund. If any such fund were to be constituted, it would have to observe principles that do not promote moral hazard. Such principles should ensure that in the event of a failing TITF firm, there is appropriate burden sharing so that shareholders lose their investment, unsecured creditors incur losses through haircuts, and management is replaced.

**Limits on market share or asset size:** To confine TITF firms to a manageable size for crisis management and competition purposes, additional capital requirements and leverage ratios could be combined with caps on relative market share (as with the United States 10 percent limit on insured deposits), balance sheet size, or counterparty exposures. Such basic rules-of-thumb prevent TITF firms arbitraging risk-based measures and recognize the need to cap sovereign risk posed by the failure of any one firm.

**Restrictions on activities:** Some recent proposals have included the exclusion of own-account proprietary trading from all institutions with access to deposit insurance and lender-of-last resort facilities (to address existing conflicts of interest, moral hazard, and skewed competition – the ‘Volcker rule’). To avoid unintended consequences, “proprietary trading” would need to be carefully defined to exclude market-making, hedging, and client-driven trading activities. Also, insured deposits could be held in balance sheets that are bankruptcy-remote from commercial and investment banking activities (‘narrow banking’).

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### Annex 1.1. Global Financial Stability Map: Construction and Methodology<sup>68</sup>

The further improvements in global financial stability and underlying conditions are illustrated in our global financial stability map (Figure 1.1). The changes in indicators are highlighted in Figure 1.36 and the specific indicators used are noted in Table 1.9. The rest of this annex outlines key features of the global financial stability map (GFSM) and reviews its experience through the crisis.

The global financial stability map (GFSM) was designed to assess the risks and conditions that impact financial stability.<sup>69</sup> The GFSM is intended to provide a summary, graphical representation of the Fund's assessment of financial stability, capturing a diverse range of potential sources of instability, contagion among different segments of financial markets, and nonlinearities in the underlying factors. The philosophy underpinning the GFSM is that financial stability cannot be distilled into a single indicator, and is better understood by separating the underlying risks and conditions that could give rise to a systemic threat. The aim is to extract diagnostically-useful information from economic and financial metrics, supplemented by judgment based on market intelligence and the Fund's assessment of risks.

The GFSM tracks four broad risks and two underlying conditions considered relevant for financial stability and the Fund's remit in supporting financial stability.

Macroeconomic risks affect financial stability through various channels—three elements are captured here. The global growth outlook underpins income—the borrower's ability to pay and overall market perceptions of credit risk. Inflation/deflation risk can destabilize fixed income markets and impact real debt burdens and is thus a source of financial stability risk. Sovereign risk results from unsustainable fiscal paths, and rising debt burdens can be a significant source of financial instability, potentially culminating in a sovereign default.

Emerging market risks capture underlying fundamentals in emerging markets—and are therefore closely related to macroeconomic risks described above, but conceptually separate as they focus only on emerging markets—and vulnerabilities to external shocks. Indicators include models that translate economic, financial and political variables into a sovereign external credit risk spread. Underlying indicators of credit and inflation performance capture risks related to financial policies and are leading indicators of future vulnerabilities. Market perceptions of corporate credit risks are also included.

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<sup>68</sup> This annex was prepared by Peter Dattels, Ken Miyajima, Rebecca McCaughrin, and Jaume Puig (see forthcoming IMF working paper “Can you Map Financial Stability?”)

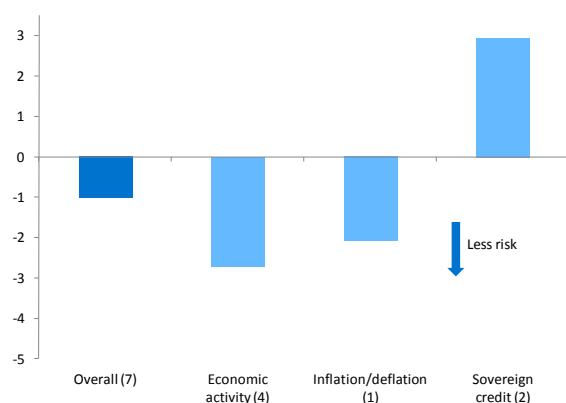
<sup>69</sup> The GFSM was first introduced in the April 2007 *Global Financial Stability Report (GFSR)*.



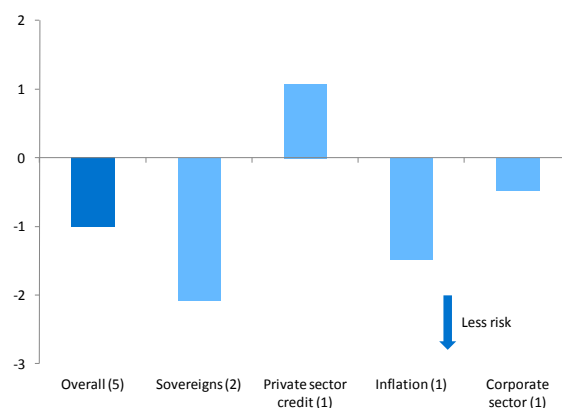
## Figure 1.36. All Risks to Global Financial Stability and its Underlying Conditions Have Improved

*(In notch changes since the October 2009 GFSR)*

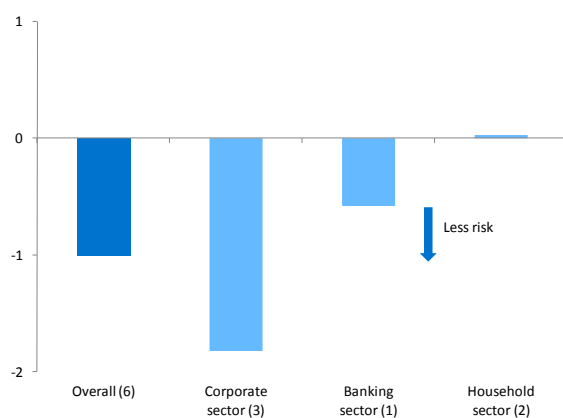
Macroeconomic risks receded as economic activity recovered and deflationary pressures eased; but fiscal concerns increased



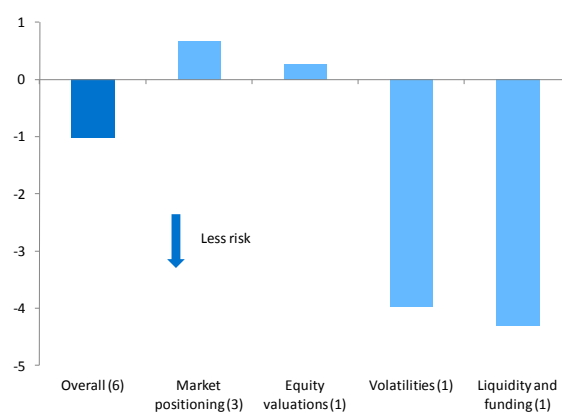
Emerging market risks fell supported by better fundamentals, but domestic credit growth continued to decelerate



Credit risks eased benefiting from macro-financial linkages, but remain high as households need to delever

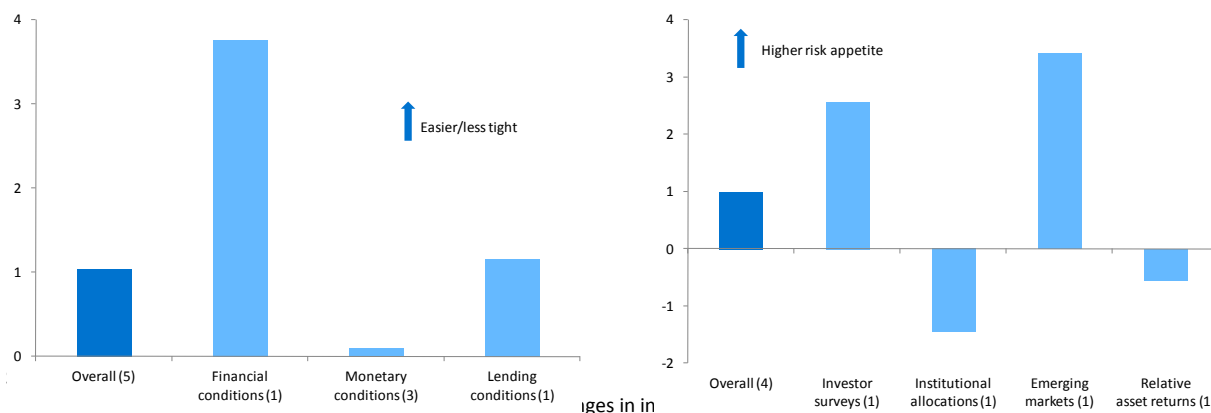


Market and liquidity risks eased as liquidity conditions improved and volatility declined



Monetary and financial conditions improved as markets rallied and monetary policy remained supportive

Risk appetite increased on increased risk-taking relative to benchmark and appetite for EM assets



the number of individual indicators within each sub-category of risks and conditions. For lending standards, a positive value represents a slower pace of tightening or faster pace of easing.

Credit risks measure credit stress in household and corporate balance sheets. Indicators attempt to capture risks in both banking and nonbanking systems. Risks in core financial institutions and contagion are assessed using models based on credit derivatives. Pressures in corporate debt markets are captured using delinquency rates and expected defaults. Market risks assess the potential for heightened pricing risks that could result in spillovers and/or mark-to-market losses, while liquidity risks measure stress in funding markets as well as liquidity conditions in secondary markets. These indicators highlight potential for vulnerabilities that arise from excessive leverage—risks that markets might correct abruptly and risks that a liquidity or funding crisis could spill over and impact markets more broadly, including credit risks.

Monetary and financial conditions gauge the stance of monetary policy and the cost and availability of funding. Measures include short-term real interest rates, as well as estimates of excess liquidity. The willingness and capacity of banks to lend is a key input as is the market-based indicator of financial conditions.

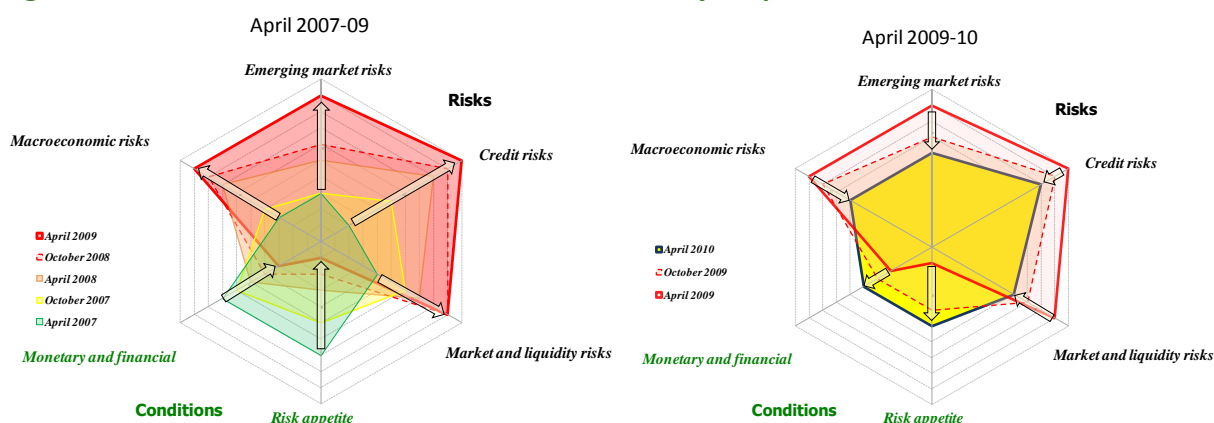
Risk appetite gauges the willingness of investors to increase (or shed) risk. Such “animal spirits” can greatly influence spread developments as well as market and liquidity risks. Gauges of risk appetite include survey- and market-based measures of risk appetite, as well as normalized flows into emerging markets.

The choice of specific indicators to assess these risks and conditions is guided by their relevance and various practical considerations. The indicators within each ray of the GFSM should be sufficient to capture potential sources of risk, but limited in number to avoid overlaps and canceling out of pertinent indicators. The indicators should be sufficiently forward looking to have predictive powers for a 6-24 month window. A balance of economic, market- and survey-based indicators, as well price and quantity measures is sought to achieve these aims (Table 1.9). The indicators should be of relatively high frequency and have sufficient history to provide enough information through (in)stability cycles. The reliability of the indicators is periodically assessed and adjustments are made so that the GFSM adequately captures underlying risks and conditions at any given time.

Current conditions and risks are summarized in a scale of 0 to 10, with higher values signifying higher risks and easier conditions relative to their respective historical norms. Assessments of the contemporaneous values of the indicators are made relative to their own history in terms of percentile rankings.<sup>70</sup> To construct the GFSM, we first determine the percentile rank of the current level of each sub-indicator relative to its history.<sup>71</sup> The individual indicator rankings are aggregated into each of the six rays of the GFSM using equal weights. Judgment and technical adjustment are often used to attach greater importance to a particular set of indicators based on risks considered to be most relevant at a given time. In particular, technical adjustment is used when events that surpass historical experience raise (lower) some associated risk or condition indicators to the highest (lowest) level. The final choice of positioning on the GFSM represents the best judgment of IMF staff.

The GFSM tracked well broad developments during the global financial crisis which culminated in 2009 (Figure 1.37).<sup>72</sup>

**Figure 1.37. Evolution of the Global Financial Stability Map 2007-09**



Source: IMF staff estimates.

Note: Away from the center signifies higher risks, easier monetary and financial conditions, and higher risk appetite.

**Monetary and Financial Conditions:** The GFSM signaled very easy conditions from 2003 to 2006, suggesting the potential for a build-up of large imbalances ahead of the crisis. The pairing of relatively easy monetary and financial conditions and high levels of risk appetite reinforced this signal.

<sup>70</sup> The GSM raises early-warning signals when risks are excessively low and conditions loose, gauged against historical norms. During crises, the GFSM generally captures the worsening of risks and conditions contemporaneously (IMF working paper “Can you map financial stability?”).

<sup>71</sup> Moving averages are often used for higher frequency data to extract the trend and identify inflection points.

<sup>72</sup> The description of the GFSM’s results before its introduction in the April 2007 GFSR is based on a reconstruction of the model’s results with past observations for the indicators used in the October 2009 GFSR (IMF working paper “Can you map financial stability?”).

**Risk Appetite:** This set of indicators captured the rise in levels of risk appetite in the run-up to the crisis, as well as the sharp contraction in risk appetite from very high levels ahead of the crisis.

**Macroeconomic Risks:** Indicators signaled exceedingly low perceptions of risks at the onset of the crisis, and captured deteriorating conditions throughout the crisis as well

**Emerging Market Risks:** These indicators suggested very low perceptions of risks in 2005-07, and a realization of risks only in late-2008 following the collapse of Lehman Brothers. This reflected the fact that the crisis originated in mature markets and the relatively resilient position of emerging markets was only threatened once the financial crisis spread to cross-border funding channels and the real economy.

**Credit Risks:** Perception of risks increased from very low levels prior to the global financial crisis, signaling rising risks of a credit bubble and strains at the core of the financial system.

**Market and Liquidity Risks:** This set of indicators tracked the rise in risks to financial stability throughout the crisis period, reaching its highest level after the collapse of Lehman Brothers. Some of the sub-indicators on market positioning also pointed to increased high risk-taking ahead of the crisis in mid-2007.

**Table 1.9. GFSR Indicators**

<b>Monetary and Financial</b>	
Monetary conditions	G-7 real short rates G-3 excess liquidity Growth in official reserves
Financial conditions	Financial conditions index
Lending conditions	G-3 lending conditions
<b>Risk Appetite</b>	
Investor survey	Merill Lynch investor risk appetite survey
Institutional allocations	State Street investor confidence index
Emerging market assets	Emerging market fund flows
Relative asset returns	Global risk appetite index <sup>1</sup>
<b>Macroeconomic Risks</b>	
Economic activity	<i>World Economic Outlook</i> global growth risks G-3 confidence indices OECD leading indicators Implied global trade growth
Inflation/deflation	Global breakeven inflation rates
Sovereign credit	Mature market sovereign CDS spreads Advanced country general government balance <sup>2</sup>
<b>Emerging Market Risks</b>	
Sovereigns	Fundamental EMBIG spread Sovereign credit quality
Private sector credit growth	GDP-weighted credit growth
Inflation	Median inflation volatility
Corporate sector	Corporate spreads
<b>Credit Risks</b>	
Corporate sector	Global corporate bond index spread Credit quality composition of corporate bond index Speculative-grade corporate default rate forecast
Banking sector	Banking stability index
Household sector	Consumer and mortgage loan delinquencies Household balance sheet stress
<b>Market and Liquidity Risks</b>	
Market positioning	Hedge fund estimated leverage Net noncommercial positions in futures markets Common component of asset returns
Equity valuations	World implied equity risk premia
Volatilities	Composite volatility measure
Funding and liquidity	Funding and market liquidity index

Source: IMF staff estimates. For a detailed description of each indicator, see Annex 1.1. of October 2009 GFSR.

1/ The Credit Suisse GRAI introduced in the April 2010 GFSR is the slope of a cross-sectional regression of mature and emerging market country equity and government bond excess returns over cash as the dependent variable, and 12-month volatilities of these assets as the independent variable.

2/ This indicator introduced in the April 2010 GFSR is the GDP-weighted average of WEO projections of advanced country general government balances in 2010 and 2011.

## Annex 1.2. Assessing Proposals to Ban “Naked Shorts” in Sovereign CDS<sup>73</sup>

*Strains in Greek government bond markets have been partly blamed on speculative positioning through buying sovereign CDS protection. This has highlighted the need for further investigation and led to a discussion of the merits of a ban on “naked shorts.” Even though sovereign CDS may at times influence underlying bond markets, particularly during periods of distress, banning “naked shorts” would be ineffective and difficult to enforce. In addition, “naked shorts” may be hard to define and such bans may hamper legitimate financial activity. Instead, transparency and collateral practices in CDS markets could be substantially improved to reduce risks.*

After a decade of static market share relative to the broader CDS market, sovereign CDS underwent a rapid expansion in 2009 and into 2010. Gross sovereign CDS notional leapt 31 percent (versus a 4 percent increase in total CDS gross outstanding) (Table 1.10). The more relevant sovereign net notional exposure increased 23 percent compared with a 10 percent contraction in total net notional positions.<sup>74</sup> The number of sovereign CDS contracts also grew more than twice as fast as the entire market.

**Table 1.10. Ten Largest Largest Sovereign CDS**  
(In billions of U.S. dollars, as of February 5, 2010)

	<u>Gross Notional</u>		<u>Net Notional</u>	
	(dollar billions)	(percent)	(dollar billions)	(percent)
Italy	223.8	35	24.8	40
Spain	102.0	46	14.5	23
Germany	61.5	47	12.9	27
Brazil	141.5	28	11.6	16
Portugal	60.1	105	9.4	72
Austria	41.5	80	9.4	87
Greece	79.8	99	8.8	24
France	44.8	76	8.6	45
Mexico	104.0	44	6.4	37
Ireland	34.2	77	6.0	36
Total sovereign	2,174.3	31	196.1	23
Total CDS	15,026.7	4	1,281.4	-10

Sources : The Depository Trust & Clearing Corporation; and IMF staff estimates.

*Sovereign CDS has unlikely exerted a significant influence on government bond markets, for Greece or other sovereigns...*

The size of the sovereign CDS market and amount of net protection sold are negligible compared to government debt outstanding. For the market as a whole, gross sovereign default protection is \$2 trillion in notional value, just 6 percent of the \$36 trillion global government bond market. By contrast, corporate CDS are roughly equivalent in size to the global corporate bond market.

Net exposure represents only 0.5 percent of government debt, at \$196 billion notional amount. Among the twenty largest sovereign CDS markets, the share of net notional CDS outstanding to government debt averages 2 percent and does not exceed 7 percent in any country (Figure 1.38).

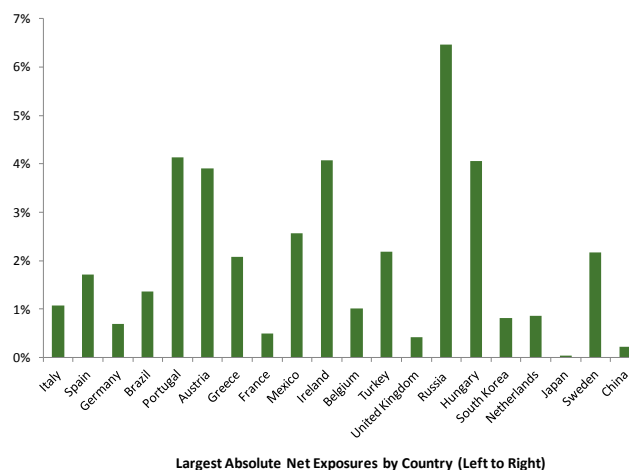
<sup>73</sup> Prepared by Joe Di Censo and Manmohan Singh.

<sup>74</sup> Gross notional is the sum of CDS contracts bought. The aggregate net notional exposures shown herein reflect the net amount of protection bought for all net purchasers of CDS. This net exposure represents the maximum economic transfer in the event of default.

*Could the tail (CDS spreads) wag the dog (bond yield spreads)?*

In normal market conditions, CDS tend to move in tandem with bond yield spreads, as arbitrage conditions link the bond and derivatives markets.<sup>75</sup> But in periods of funding stress and poor bond liquidity, CDS can decouple from bond yield spreads and might even lead the bond market. A simple test is to ask whether changes in sovereign CDS today influence—i.e., are correlated positively with—bond yield spreads tomorrow (Figure 1.39). In the case of Greece, the correlation of both instruments with changes one or more days ahead was generally nil or slightly negative, except during the peak points of the crisis as bond market liquidity evaporated.<sup>76 77</sup>

**Figure 1.38. Net Notional CDS Outstanding as a Share of Total Government Debt (In percent)**



Sources: Bank for International Settlements; The Depository Trust & Clearing Corporation; and IMF staff estimates.

Sovereign CDS markets can be prone to distortions because of relatively shallow liquidity. For instance, banks often attempt to create synthetic hedges for counterparty risk to sovereigns due to low (or nonexistent) collateral requirements. When looking for assets that are highly correlated with the sovereign's credit profile, banks resort to short-term CDS (so-called "jump-to-default" hedging). This hedging activity from uncollateralized swap agreements can distort the sovereign CDS market as well as other asset classes. For instance, heavy demand for jump-to-default hedges can quickly push up the price of short-dated CDS protection and cause sovereign CDS curves to invert, as happened in Greece and Portugal.

<sup>75</sup> In this discussion, the bond yield spread refers to the yield differential between Greek government debt and equivalent maturity German bunds.

<sup>76</sup> In contrast, contemporaneous changes in Greek CDS and cash spreads were positively correlated (0.27).

<sup>77</sup> The difficulty of shorting bonds in order to sell CDS protection and arbitrage the bond-derivative basis suggests that CDS may actually "pull" bond yield spreads tighter, rather than "push" them wider. Assuming risk neutrality, any CDS premium should equal the cash credit spread of a par fixed-coupon bond of the same maturity. If the CDS spread exceeded the credit yield spread, an investor could sell CDS in the derivatives market and synthetically replicate that position by shorting a par fixed-coupon bond (on the same reference entity with the same maturity as the swap's tenor) and invest the proceeds in a like-maturity risk-free security. In reality, shorting bonds is difficult. So CDS moving the cash market wider is less likely than the reverse scenario of bond yield spreads "pulling" CDS tighter.

These pressures can easily spill over into the domestic bond market and contribute to higher bond yields, especially for new debt issues.

The influence of sovereign CDS on government bond markets, minor in normal conditions and possibly greater under periods of stress, cannot be separated from the inefficacy of an outright ban on “naked shorts.” As discussed later in the policy section, more productive reforms would be using already-existing CDS data sources to monitor markets and continuing to improve the market’s operational infrastructure.

### *“Naked shorts” in sovereign CDS should not be banned*

Some argue that the very premise of CDS as a financial insurance product is inherently flawed and should be more tightly regulated. Buyers of CDS protection do not need an “insurable interest” to acquire protection (promoting adverse incentives) and non bank sellers are not regulated or required to hold loss reserves (false sense of protection). In other words, CDS is an insurance-like product without insurance-like supervision.

This debate fails to consider an asset in the broader portfolio context and the nature of economic exposure. The correlation of risk factors defines economic exposure, not just ownership of a specific asset. As such, a portfolio manager may have an “insurable interest” in shorting an asset because of the portfolio’s risk exposures, even if that asset is not included in the portfolio. Sovereign CDS is not only “credit insurance,” but another tradeable instrument in the risk management tool kit.

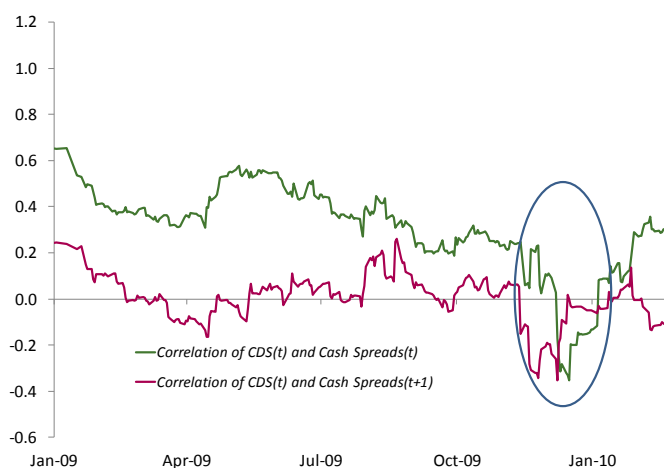
### *Speculation or hedging?*

Recent activity in CDS relates more to concerns about counterparty or broad portfolio hedging than to sovereign default credit protection for holders of the underlying government bonds.

**Counterparty hedging:** As mentioned above, large banks generally do not require highly-rated sovereign entities to post collateral for swap arrangements, introducing a significant unhedged counterparty exposure.<sup>78</sup>

<sup>78</sup> Collateral requirements represent the most commonly used mechanism for mitigating credit risk associated with swap arrangements by offsetting the transaction’s mark-to-market exposure with pledged assets. Yet most sovereigns and foreign provinces/municipalities do not post collateral. This practice is due primarily to the lack of legal clarity surrounding enforcement of collateral rights against sovereigns.

**Figure 1.39. Correlation of Daily Changes in Five-Year Greek CDS and Bond Yield Spreads**



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



**Hedging country corporate exposure:** Bank risk managers often aggregate individual corporate credit risks into acceptable country exposures that necessitate mitigation if breached. Sovereign CDS can offset those exposures by providing country-level risk diversification.

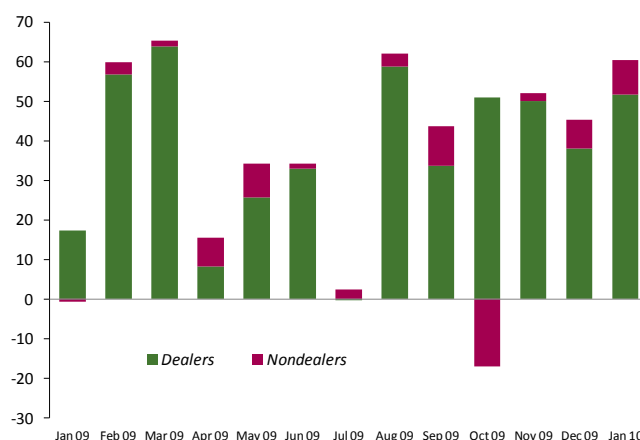
**Proxy Hedging:** Investors also use sovereign CDS as a hedge against existing equity or corporate bond positions. This proxy hedge introduces basis risk (the sovereign's profile could improve as the corporate's worsens), but may be preferable due to greater liquidity or cheaper cost. Market sources cited such proxy hedgers as significant buyers of Greek sovereign CDS because individual Greek bank CDS were less liquid.

**Hedging portfolio liquidity and market risk:** A risk manager may desire to reduce daily portfolio value-at-risk (VaR) by looking for an uncorrelated macro hedge to the underlying debt or equity positions. Buying short-dated sovereign CDS protection could accomplish that objective much in the same way as a long gold position reflects a safe-haven bet.

**Macro hedging and speculation:** Macro funds are reportedly turning to sovereign CDS to express directional views on economic fundamentals and offset overall portfolio risk, especially via the new sovereign CDS indices. Yet since the launch of the iTraxx SovX last year, the overall index has traded between 2-8 bps tighter than the intrinsic spread of the 15 underlying sovereigns CDS. This negative basis points to demand for individual-name CDS remaining stronger than demand for tradeable sovereign CDS indices, suggesting that macro hedging is not a major mover of sovereign CDS markets.

**Dealers represent about 90 percent of the sovereign CDS market and are net sellers of credit protection, according to the DTCC.** By implication, this means that investors (real money and hedge funds) are net buyers of protection. Trading motivations cannot be entirely discerned from the DTCC classifications, but most dealer flows likely relate to hedging as part of market making activities. From a risk management perspective and business rationale, dealers are less inclined to take large directional bets in CDS. Nondealers generated just 15 percent of January's trading in sovereign CDS and even less in November-December (Figure 1.40).

**Figure 1.40. Sovereign CDS Volumes, January 2009 to January 2010**



Source: The Depository Trust & Clearing Corporation.

### *A “naked shorts” ban would not work*

The current discussion of a ban for “naked shorts” in sovereign CDS presupposes that regulators can arrive at a working definition of legitimate and illegitimate uses of these products. A general definition of “naked shorts” remains quite elusive for both market participants and regulators, reflecting the wide spectrum of activity that can constitute covered versus naked positions.

An outright ban on “naked shorts” in sovereign CDS would also be ineffective and inconsistent with wider ramifications for financial markets.

**Not effective:** Given that most sovereign CDS flows likely reflect hedging activity, an outright ban would merely prompt substitution to another asset correlated with sovereign risk. The most direct method would be to short the underlying bond, simply transferring more pressure to the cash market. Alternatively, to the extent that proxies are available (such as local equities, corporate CDS, or currency), pressure is transmitted to related markets, such as Greek bank equities or CDS. The short-selling bans on bank equities seemed to provide little relief to bank share prices.

**Easily circumvented:** “Creative” financial engineering could replicate default protection in another form. Alternatively, CDS business can be rerouted off-shore or to dealers in another regulatory jurisdiction.

**Inconsistent regulatory practice:** Treating sovereign CDS differently than corporate CDS or any defensive derivative strategy introduces regulatory inconsistencies. After all, why consider sovereign CDS differently than corporate CDS or shorting bonds overall?

Section F. explores appropriate measures for greater sovereign CDS transparency and mechanisms to reduce banks’ reliance on them for hedging purposes.

### Annex 1.3. Assessment of the Spanish Banking System<sup>79</sup>

*This annex attempts to estimate the impact of the financial crisis on the Spanish banking sector, looking separately at commercial banks and savings banks (cajas). We find that the overall Spanish banking system under our baseline case is likely to withstand consequences of the crisis, despite severe economic deterioration. Under our adverse case scenario, three years of earnings are projected to cover future losses for the commercial banking sector, leaving the capital base intact, but the savings banking sector is projected to have a net drain on capital. Furthermore, the country's banking system is highly differentiated in terms of holdings of bad loans and distressed real assets. After accounting for this cross-bank differentiation, small gross drain on capital is expected in both commercial and savings banks under the baseline. Under our adverse case scenario, gross drain on capital is estimated at €5 billion for commercial banks and €17 billion for savings banks. These estimates compare against Tier 1 capital of €99 billion and €78 billion for commercial and savings banks, respectively.*

The pace of house price deterioration and the extent of broad economic downturn in Spain have been more severe than in the euro area, on average. These developments have led many commentators to question whether the Spanish banking sector's provisions are sufficient to withstand potential losses.

The analysis is divided in two parts: in the first part we estimate the net impact of current and expected losses of Spanish commercial and savings banks on their earnings stream over the 2010-12 period under our baseline and adverse-case scenarios; in the second part, we examine cross-bank differentiation in terms of real asset repossessions and assess what share of the system may need additional capital.<sup>80</sup>

The first part of the analysis benefitted from collaboration with the Bank of Spain. Spain has pioneered the use of dynamic provisions since 2000 to mitigate credit pro-cyclicality. This helped Spanish credit institutions to accumulate a significant buffer of loan loss provisions by the beginning of the crisis.<sup>81</sup> Box 1.6 explains how losses from nonperforming loans are forecasted.

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<sup>79</sup> The annex was prepared by Sergei Antoshin and Narayan Suryakumar. This annex draws extensively upon A. Giustiniani "The Spanish Banking Sector" (SM/09/40, February 12, 2009) and subsequent works.

<sup>80</sup> The 3 year horizon corresponds to the period over which most of loans are completely written off under the Spanish accounting rules. Mortgages are written off over 6 years, which leaves the possibility of using earnings after 2012 to absorb losses.

<sup>81</sup> See, Spain—Staff Report for the 2008 Article IV Consultation, SM/09/34, Box 1.

### Box 1.6. Estimating Potential Losses from Nonperforming Loans<sup>82</sup>

In this exercise, we assume that potential losses are equal to:

$$\text{Current and future losses} = \text{Flows of Provisions in 2010-2012} = \text{Flows of Provisions in 2010} + \text{Expected Losses after 2010}$$

In turn, *Expected Losses after 2010* are estimated as *additional* provisions after 2010 that are necessary to cover expected losses in excess of accumulated loan loss reserves as of 2010:

$$\text{Expected Losses after 2010} = \max(0, \text{NPL in 2010} \times \text{LGD} - \text{Stock of Provisions in 2010}),$$

where *NPL* is the stock of nonperforming loans, and *LGD* is the cumulative loss given default ratio over the next 2 years.

The impact of losses on earnings, taking into account loan loss reserves, is calculated as follows:

$$\min(0, -\text{Current and future losses}) = \min(0, \text{Stock of Provisions in 2009} - \text{NPL in 2010} \times \text{LGD})$$

If the impact of losses on earnings is strictly negative, the impact of losses on capital is defined as:

$$\min(0, \text{Earnings in 2010-2012} - \text{Current and future losses}) = \min(0, \text{Earnings in 2010-2012} + \text{Stock of Provisions in 2009} - \text{NPL in 2010} \times \text{LGD})$$

We forecast nonperforming loans based on business cycle variables, loan costs, and house prices. GDP and the unemployment rate are used as business cycle indicators, the 12-month Euro Libor is used for loan costs because it is a common benchmark for mortgages and other loans, and house prices are an indicator for the mortgage and the construction sectors.

The dependent variable is obtained using the logit transformation:

$$npl \equiv \text{LN}(\text{NPL}/(1 - \text{NPL}))$$

Since the dependent variable has a unit root, the regression is estimated in first differences.<sup>83</sup> Real GDP growth is ultimately removed from the regression, because of its collinearity with

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<sup>82</sup> The box was prepared by Sergei Antoshin.

<sup>83</sup> The difference form also implies inertia of NPLs in levels.

the unemployment rate and house prices. As a result, the following specifications (1) and (2) are obtained for commercial banks and savings banks, respectively.

$$D.npl\_c = 0.0474*L2.D.U + 0.0326*L8.D.I - 0.0171*L5.D.H \quad (1)$$

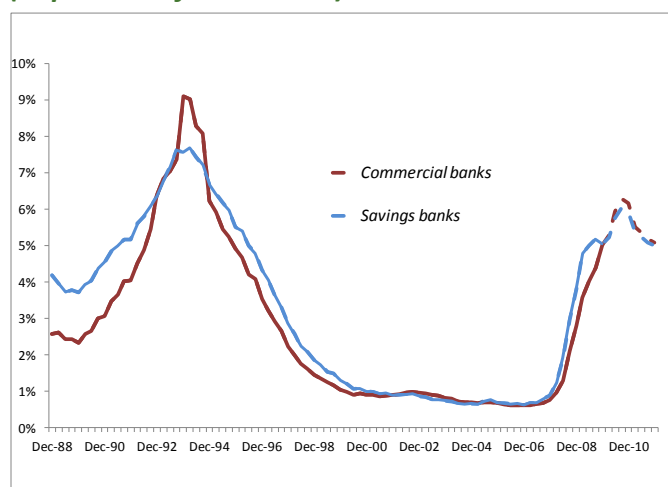
Source	SS	df	MS	Number of obs	80
				F( 3, 77)	9.67
Model	0.3042	3	0.1014	Prob > F	0
Residual	0.8077	77	0.0105	R-squared	0.2736
				Adj R-squared	0.2453
Total	1.1119	80	0.0139	Root MSE	0.1024
D.npl_c	Coef.	Std. Err.	t	P>t	[95% Conf. Interval]
L2D.U	0.0474	0.0148	3.19	0.002	0.0178 0.0770
L8D.I	0.0326	0.0162	2.02	0.047	0.0004 0.0648
L5D.H	-0.0171	0.0060	-2.84	0.006	-0.0290 -0.0051

$$D.npl\_s = 0.0412*L2.D.U + 0.0312*L8.D.I - 0.0124*L5.D.H \quad (2)$$

Source	SS	df	MS	Number of obs	80
				F( 3, 77)	6.8
Model	0.2111	3	0.0704	Prob > F	0.0004
Residual	0.7969	77	0.0103	R-squared	0.2094
				Adj R-squared	0.1786
Total	1.0080	80	0.0126	Root MSE	0.1017
D.npl_s	Coef.	Std. Err.	t	P>t	[95% Conf. Interval]
L2D.U	0.0412	0.0147	2.8	0.007	0.0119 0.0706
L8D.I	0.0312	0.0161	1.94	0.056	-0.0008 0.0632
L5D.H	-0.0124	0.0060	-2.09	0.04	-0.0243 -0.0006

where  $D.$  is the first difference operator,  $L.$  is the lag operator,  $npl\_c$  and  $npl\_s$  are NPLs for commercial and savings banks using the logit transformation above,  $U$  is the unemployment rate,  $I$  is the Libor rate,  $H$  is yearly changes in house prices. The constants are suppressed due to their insignificance. The regressions are estimated over 1987Q4-2009Q4. Forecasts for 2010 are produced using *WEO* for the unemployment rate, while the Libor and house prices work with lags based on historical values.

**Figure 1.41. Spain: Nonperforming Loans**  
(In percent of total loans)



Source: IMF staff estimates.

NPLs at commercial and savings banks are projected to peak at 6.3 percent and 6.0 percent, respectively, in 2010Q3, and then, come down to 5.1 percent and 5.0 percent, respectively, by the end of 2011 (Figure 1.41). The outcomes of forecasts using equations (1) and (2) are dependent on lag specifications. For example, for commercial banks, the selection of different lags resulted in the peak values between 5.5 percent and 7.4 percent, and the presented specification roughly corresponds to our median forecast. The forecasted peaks in NPLs in 2010 are lower than those in the previous crisis episode in 1993-1994, because of much lower interest rates during this crisis (5.3 percent in 2008 vs. 14.3 percent in 1992) and lower unemployment rates (18.8 percent in 2009 vs. 24.6 percent in 1994). The econometric approach does not capture an additional risk factor related the leverage ratio which has dramatically increased over the 10 years of credit boom. Another weakness of the econometric approach comes from the use of historical data which predicts a higher peak for NPLs at commercial banks, based on the historical experience and slowing NPLs at savings banks in 2009.<sup>84</sup>

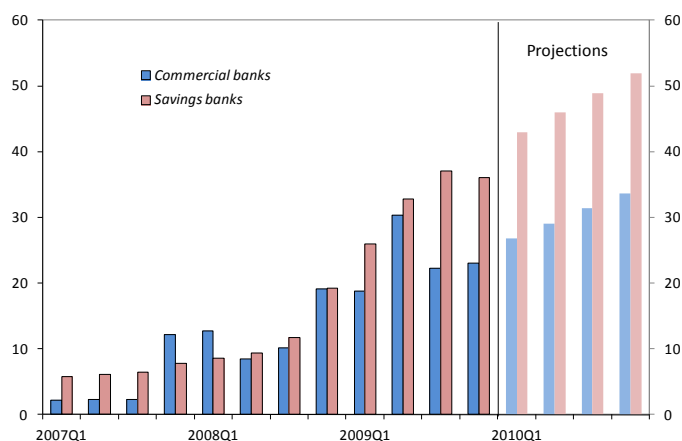
The assumptions about the loss given default ratio (LGD) are derived from previous studies and analyst estimates. The baseline scenario is based on 25 percent LGDs for both commercial banks and savings banks, which correspond to internal estimates of downturn LGDs according to the Bank of Spain's assessment and are in line with other euro-area

<sup>84</sup> As the analysis below shows, we view real asset repossessions as an additional risk factor affecting future losses. When NPLs and repossessions are combined, the share of problem assets in percent of total loans is higher for savings banks.

average LGDs.<sup>85</sup> Losses on securities' holdings are estimated at €4 billion for commercial banks and €1 billion for savings banks.<sup>86</sup>

We also consider the effect of repossessed real assets (Figure 1.42).<sup>87</sup> Over the last two years, given the ailing state of the real estate and the construction sectors, Spanish banks have increased the use of debt-for-property swaps to manage their credit portfolios efficiently, trying to maximize asset value recovery. This practice helps banks in managing of their credit risk portfolios and minimizes losses, provided that property prices stabilize in the medium term and banks can sell those assets at their book value. However, if house price deterioration continues, banks under pressure may need to sell properties within a short period of time, resulting in substantial losses.

**Figure 1.42. Spain: Real Asset Repossessions**  
(In billions of euros)



Source: IMF staff estimates.

Estimates of banks' acquired or repossessed real estate assets vary significantly. Our own estimates are €20 billion and €31 billion for commercial banks and savings banks, respectively, in 2009Q3.<sup>88</sup> Our time series on repossessions are augmented by the Bank of Spain's estimates of €23 billion and €36 billion for 2009Q4. Repossessions surged over the last two years, adding €11 billion of troubled real assets in 2009 to the balance sheet of commercial banks and €21 billion for savings banks. We project that the pace of increases in

<sup>85</sup> The above assumptions often correspond to lower bounds of market estimates.

<sup>86</sup> The methodology for estimating securities' losses is consistent with the approach to the euro area outlined in the previous GFSRs and is based on securities' holdings provided by the Bank of Spain. All of the estimated losses are expected to originate from holdings of foreign securities. The relatively small loss figure can be attributed to the strong improvement in corporate securities prices over the past year and the marginal exposure of both the commercial and savings banks to toxic assets. Banks' holdings of retained ABS and MBS are treated as loans because Spanish banks have retained nearly all the asset-backed securities they have originated over the past two years, in order to use them as collateral in tapping ECB facilities.

<sup>87</sup> This part of the analysis benefitted from the use of data on Spanish banks from Analistas Financieros Internacionales. All estimates are ours.

<sup>88</sup> Repossessions of real assets are calculated as flows between 2007Q2 and 2009Q3 for the sum of item 9 "Activos no corrientes en venta", item 13.2 "Inversiones inmobiliarias", and item 16.1 "Existencias" from the Consolidated Balance Sheets for commercial banks and savings banks, obtained from the banking associations.

repossessions will slow in 2010 to €10 billion for commercial banks and to €20 billion for savings banks. LGDs for repossessed assets are subject to a high degree of uncertainty because the distribution of repossessed assets by type is unknown for the overall system and because it is not likely that banks will recognize losses by selling these assets within the next three years. Since repossessed assets include land and unfinished construction with very high expected loss rates, we assume LGDs of 40 percent and 45 percent, which correspond to lower bounds of market estimates. Spanish banks are required to set aside provisions for repossessed assets, to account for the possible loss in value of that asset depending on the number of years that is maintained on the balance sheet before it is finally realized. We use the Bank of Spain's estimates for stock of provisions for repossessions: €6 billion for commercial banks and €7 billion for savings banks.

Based on the forecasted NPLs and repossessions, and the assumed LGDs, expected losses in excess of end-2009 stock of loan loss provisions are computed in Table 1.11 Under the baseline scenario, stock of provisions at commercial and savings banks exceed expected losses by €10 billion and €12, respectively (line (6) in Table 1.11). Repossessions add €9 billion and €19 billion in expected losses after accounting for provisions for commercial and savings banks, respectively (line (12) in Table 1.11).

Pre-provision net earnings are expected to decline 10 percent each year during 2010-2012, due to a sharp fall in interest income, funding pressures in the medium term, and slowing deposit growth. Despite these declines, banks' earnings stream over the next 3 years will be sufficient to cover those expected losses. In sum, under our baseline scenario, loan loss reserves and earnings are sufficient to fully absorb expected losses for the overall commercial banking and the savings banking sectors.



Our adverse-case scenario corresponds to a double-dip case, with the unemployment rate climbing to 24.5 percent in 2011 (as during the last crisis period in 1994) and house prices falling a further 15 percent yoy in 2010. (The impact of the Libor will take effect only in 2012 due to the lag structure of the estimated forecasting equation). Under these circumstances, NPLs are forecasted to peak in 2011 at 7.8 percent and 7.1 percent for commercial and savings banks, respectively. LGDs for nonperforming loans are assumed at 45 percent for both commercial and savings banks, respectively, and LGDs for repossessed properties are at 55 percent and 60 percent, respectively. The assumed LGDs correspond to upper bounds of analysts' estimates under downturn scenarios. Pre-provision net earnings are expected to drop 25 percent in 2010, 15 percent in 2011, and 15 percent in 2012. We also assume that banks will set aside 10 percent of the current stock of provisions. Under these assumptions, the remaining stock of provisions and earnings at commercial banks are still sufficient to cover future losses. However, the savings banking sector is projected to have net drain on capital of €2 billion (line (16) in Table 1.11).

**Table 1.11. Baseline and Adverse-Case Scenarios**

*(In billions of euros, unless otherwise specified)*

		Commercial banks	Savings banks	Commercial banks	Savings banks
		<i>Baseline Scenario</i>		<i>Adverse-Case Scenario</i>	
✓ (1)	Total loans	798	882	798	882
✓ (2)	Stock of NPL in 2010/2011 <sup>1</sup>	50	53	62	62
✓ (3)	Loan Loss Reserves	23	26	21	23
✓ (4)	LGD for NPLs (percent)	25	25	45	45
✓ (5)	Expected losses from NPL (2)*(4)	-13	-13	-28	-28
✓ (6)	Loan Loss Reserves - Loan Losses (3)+(5)	10	12	-7	-5
✓ (7)	Losses from Securities	-4	-1	-4	-1
	<i>Adding repossessions</i>				
✓ (8)	Repossessions in 2010/2011 <sup>1</sup>	31	48	36	56
✓ (9)	Reserves for repossessions	6	7	6	7
✓ (10)	LGD for repossessions (percent)	40	45	55	60
✓ (11)	Expected losses from repossessions (8)*(10)	-13	-22	-20	-34
✓ (12)	Repossession Reserves - Losses (9)+(11)	-7	-15	-14	-27
✓ (13)	Total Reserves - Total Losses (6)+(7)+(12)	-1	-3	-26	-33
✓ (14)	Pre-provision earnings in 2010-2012	52	39	41	31
✓ (15)	Reserves + Earnings - Total Losses (11)+(12)	51	36	15	-2
✓ (16)	<b>Net impact on capital</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>-2</b>
✓ (17)	<i>Memo: Tier 1 capital (end-2009)</i>	99	78	99	78

Source: IMF staff estimates.

<sup>1</sup> 2010 for the baseline; 2011 for the adverse case.

The results from the first part of the analysis correspond to the overall banking sectors and ignore a high level of differentiation in terms of real asset repossessions and NPLs across banks. In the second part of the analysis, we attempt to estimate what portion of the system may need capital under the baseline and the adverse-case scenarios. We base our analysis on

differentiation in repossessions across banks and extend the same level of differentiation on banks' NPLs which are often unavailable on an individual bank basis, especially for savings banks. NPLs for individual banks are expected to grow twice as slowly as repossessions for the overall system, using the same level of differentiation as in 2009Q3.<sup>89</sup> Individual banks' earnings are assumed to grow at the same rate as the system under the baseline. Table 1.12 shows that the cutoff rates for repossessions in 2010 in percent of customer loans for banks that are projected to have drain on capital are 8.5 percent for commercial banks and 8.4 percent for savings banks in 2010 under the baseline (line (8) in Table 1.12). Gross drain on capital is estimated at €1 billion and €6 billion for commercial and savings banks, respectively, under the baseline (line (17) in Table 1.12). The larger drain on capital for savings banks compared to commercial banks can be explained by weaker earnings of savings banks and a greater proportion of savings banks with very large amounts of repossessions.

**Table 1.12. Calculations of Cutoff Rates for Banks with Drain on Capital**

*(In percent of total loans, unless otherwise specified)*

		Commercial banks	Savings banks	Commercial banks	Savings banks
		<i>Baseline Scenario</i>		<i>Adverse-Case Scenario</i>	
✓ (1)	Total loans	100	100	100	100
✓ (2)	Stock of NPL in 2010/2011 <sup>1</sup>	9.3	7.7	9.2	7.4
✓ (3)	Loan Loss Reserves	2.9	2.9	2.6	2.6
✓ (4)	LGD for NPLs (percent)	50	45	50	45
✓ (5)	Expected losses from NPL (2)*(4)	-4.6	-3.5	-4.6	-3.4
✓ (6)	Reserves - Losses (3)+(5)	-1.8	-0.6	-2.0	-0.7
✓ (7)	Losses from Securities	-0.5	-0.1	-0.5	-0.1
	<i>Adding repossessions</i>				
✓ (8)	<b>Repossessions in 2010/2011<sup>1</sup></b>	<b>8.5</b>	<b>8.4</b>	<b>5.7</b>	<b>6.4</b>
✓ (9)	Reserves for repossessions	0.8	0.8	0.8	0.8
✓ (10)	LGD for repossessions (percent)	60	55	60	55
✓ (11)	Expected losses from repossessions (8)*(10)	-5.1	-4.6	-3.4	-3.5
✓ (12)	Repossession Reserves - Losses (9)+(11)	-4.3	-3.9	-2.6	-2.7
✓ (13)	Reserves - Total Losses (6)+(7)+(12)	-6.6	-4.5	-5.2	-3.6
✓ (14)	Pre-provision earnings in 2010-2012	6.5	4.4	5.1	3.5
✓ (15)	Reserves + Earnings - Total Losses (11)+(12)	-0.2	-0.1	-0.1	-0.1
✓ (16)	Impact on capital	<b>-0.2</b>	<b>-0.1</b>	<b>-0.1</b>	<b>-0.1</b>
✓ (17)	<b>Gross impact on capital (€ bn)</b>	<b>-1</b>	<b>-6</b>	<b>-5</b>	<b>-17</b>
✓ (18)	<i>Memo: Tier 1 capital (end-2009, € bn)</i>	99	78	99	78

Source: IMF staff estimates.

<sup>89</sup> The assumption is based on that repossessions are viewed as the overall risk factor which can also be extended to some degree (in our case, 50 percent) to NPLs. In other words, banks use both repossessions and NPLs to manage credit risks. However, a counter argument can be made that banks that bring real assets onto balance sheets effectively reduce their NPLs. The results of the exercise are likely to change under the inverse relationship assumption, generating a lower estimate for the impact on capital.

Under the adverse case scenario, the cutoff rates for repossessions for banks with drain on capital are lower, so larger portions of the sectors are expected to come under pressure. Gross drain on capital is estimated at €5 billion and €17 billion for commercial and savings banks, respectively (line (17) in Table 1.12).

### **Main Implications**

Our conclusion is that in Spain, a small gross drain on capital is expected in both commercial and savings banks under the baseline. Under our adverse case scenario, gross drain on capital is estimated at €5 billion for commercial banks and €17 billion for savings banks, totaling €22 billion. While these estimates are subject to considerable uncertainty, the sums are relatively small in relation to overall banking system capital, and importantly, represent only about one quarter of the funds set aside under the resolution and recapitalization program set up by the government under the FROB of €99 billion.

However, the existing FROB scheme to finance restructurings currently is scheduled to expire by June 2010 according to European Commission regulation; therefore it is important that the resolution and restructuring processes financed through the FROB materialize before that date.

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## Annex 1.4. Assessment of the German Banking System<sup>90</sup>

*This Annex provides an assessment of potential writedowns on loans and securities, and estimates drains on capital for three major categories of German banks. The results of the exercise show that commercial banks have recognized most of the estimated total writedowns and appear to be adequately capitalized. In contrast, Landesbanken and savings banks, and other banks are yet to record a substantial part of total estimated writedowns, and are expected to have a net drain on capital.*

Our estimation of potential losses and the impact on capital benefited from collaboration with the Bundesbank. The analysis focuses on the three main banking sectors: commercial banks, Landesbanken and savings banks, and other banks. The exercise consists of three parts: econometric forecasting of loan losses, sample-based estimation of securities' writedowns, and the calculation of the impact on capital.

The estimates of losses on loans and securities for the three banking sectors are summarized in the first table.

Two sets of assumptions pertaining to the uncertainty in prices of CDO securities are presented.<sup>91</sup> Our loss estimates for the baseline case show that total bank writedowns for 2007-2010 may reach a combined \$314 billion. Under the adverse case assumptions, the writedowns are estimated at \$338 billion for the overall banking system (Table 1.13).

**Table 1.13. Estimates of German Bank Writedowns by Sector, 2007-10**  
(in billions of U.S. dollars)

	Estimated Holdings	Estimated Writedowns (Baseline)	Estimated Writedowns (Adverse case)	Implied Cumulative Loss Rate (Baseline, in percent)	Implied Cumulative Loss Rate (Adverse, in percent)
<b>Commercial Banks</b>					
Total for Loans	1,765	66	66	4	4
Total for Securities <sup>1</sup>	346	66	77	19	22
<b>Total for Loans and Securities</b>	<b>2,111</b>	<b>132</b>	<b>143</b>	<b>6</b>	<b>7</b>
<b>Landesbanken and Savings Banks</b>					
Total for Loans	1,806	102	102	6	6
Total for Securities	663	41	49	6	7
<b>Total for Loans and Securities</b>	<b>2,470</b>	<b>143</b>	<b>151</b>	<b>6</b>	<b>6</b>
<b>Other Banks</b>					
Total for Loans	557	17	17	3	3
Total for Securities <sup>2</sup>	148	22	27	15	18
<b>Total for Loans and Securities</b>	<b>705</b>	<b>39</b>	<b>44</b>	<b>6</b>	<b>6</b>
<b>All Banks</b>					
Total for Loans	4,128	185	185	4	4
Total for Securities	1,157	129	152	11	13
<b>Total for Loans and Securities</b>	<b>5,286</b>	<b>314</b>	<b>338</b>	<b>6</b>	<b>6</b>

<sup>1</sup> Securities holdings include RMBS, CMBS, CDOs, Consumer ABS, Corporate and Government securities. Loss rates for the RMBS securities average 28 percent, and those for CDO holdings range between 50-70 percent. Given the uncertainty in loss rates for CDOs, we use a range instead of an absolute level. We categorize the lower bound of this range as our baseline scenario and the upper bound as an adverse case, reflecting the CDO price uncertainty. Note: Totals may not exactly match sum due to rounding.

<sup>2</sup> Other banks include credit co-operatives, a bank currently under government support and two other banks

<sup>90</sup> This annex was prepared by Sergei Antoshin and Narayan Suryakumar.

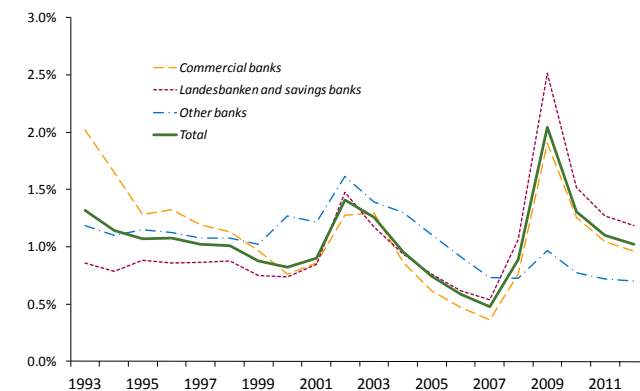
<sup>91</sup> CDO prices are characterized by the highest loss rates across security classes and have a significant impact on the overall estimates of losses on securities. In our baseline case, we assume that loss rates for CDOs are 50 percent, while in the adverse case, they are assumed at 70 percent.

Among the three banking categories, the Landesbanken and savings banks group has the highest loan loss rate, partly because the proportion of Landesbanken<sup>92</sup> in this category. Landesbanken hold 50 percent of the second sector's total loans and are characterized by relatively higher loan loss rates. Securities losses are driven by significant holdings of RMBS and CDO securities, which comprise between 50-70 percent of all structured products held by the three categories. Within the Landesbanken and savings banks group, securities losses are mostly attributed to Landesbanken which hold over 90 percent of structured products and represent 60 percent of total securities holdings in the sector. As further analysis shows, it is the variability in the pace of recognition of these losses that results in different outcomes for the adequacy of capitalization.

### Loan Loss Estimation

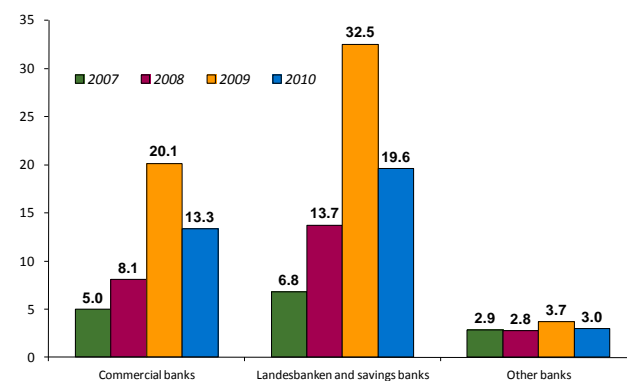
The methodology for loan loss estimation using dynamic panels for the three groups of banks is described in detail in Box 1.7. The forecasts are obtained assuming that bank-specific variables are constant and using *WEO* projections for GDP growth and the market-based forward yield curve slope (Figure 1.43). The overall loan loss rate is estimated to have peaked in 2009 at 2.0 percent and is projected to decline to 1.3 percent in 2010.<sup>93</sup> The 2009 peaks of loan loss rates for commercial and savings banks have exceeded the previous peaks in 2002-03, due to their high

**Figure 1.43. Germany: Loan Loss Rates**  
(In percent of total loans; sample-based)



Source: IMF staff estimates.

**Figure 1.44. Germany: Loan Losses**  
(In billions of euros)



Source: IMF staff estimates.

<sup>92</sup> Landesbanken are regionally oriented. Their ownership is generally divided between the respective regional savings banks associations on the one hand and the respective state governments and related entities on the other. The relative proportions of ownership vary from institution to institution.

<sup>93</sup> The ratio of the overall loss rate in 2009 to the overall loss rate in 2008 is 3.3, which is similar to the respective ratio for our sample of German listed banks whose 2009 loan loss provisions are already publicly available.

sensitivity to GDP growth. Figure 1.44 shows how these provision rates translate into euro losses.

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**Box 1.7. Loan Loss Estimation for Germany<sup>94</sup>**

The data used for loan loss estimation are from supervisory annual reports. The approach to estimation was broadly similar to the one described in the 2009 Bundesbank's Financial Stability Review with modifications to the estimation equation and separate procedures for three banking sectors: commercial banks, Landesbanken and savings banks, and other banks.

The sample used for estimation consists of 117 commercial banks (in 2008) representing 83 percent of total assets in the data set, 440 Landesbanken and savings banks (99.6 percent of total assets), and 1,060 other banks (97 percent of total assets), with the sample of annual observations for 1993-2008.

In order to capture bank-level differentiation in cross-section and time variations, we regress the loan loss rates on its lags, banks' total assets (size effect), the nonperforming loan ratio (a proxy for credit risk), the lending ratio (total loans to total assets), real GDP growth and its lags, the unemployment rate and its lags, and the slope of the yield curve. The final representations are presented below.

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<sup>94</sup> The box was prepared by Sergei Antoshin.

For commercial banks:

$$\text{LN}(\text{LLRATE}_{it}) = 0.2961 * \text{L.LN}(\text{LLRATE}_{it}) - 0.2237 * \text{LN}(\text{SIZE}_{it}) + 0.2255 * \text{LN}(\text{NPL}_{it}) - 11.206 * \text{DGDP}_t + 3.421$$

Fixed-effects (within) regression  
Group variable: banknumber

Number of obs = 1964  
Number of groups = 251

R-sq: within = 0.7467  
between = 0.3659  
overall = 0.2986

Obs per group: min = 1  
avg = 7.8  
max = 15

corr(u\_i, xb) = -0.2214

F(4,1709) = 1259.47  
Prob > F = 0.0000

ln_llrate	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
ln_llrate L1.	.2960753	.015814	18.72	0.000	.2650585	.3270921
ln_size	-.2236672	.0184446	-12.13	0.000	-.2598435	-.187491
ln_nplr	.2254791	.0086229	26.15	0.000	.2085666	.2423916
dgdp	-11.20589	.8472893	-13.23	0.000	-12.86772	-9.544053
_cons	3.421189	.4282224	7.99	0.000	2.581294	4.261085
sigma_u	.84380692					
sigma_e	.35891083					
rho	.8467973	(fraction of variance due to u_i)				

F test that all u\_i=0: F(250, 1709) = 3.30 Prob > F = 0.0000

For Landesbanken and savings banks:

$$\text{LN}(\text{LLRATE}_{it}) = 0.2267 * \text{L.LN}(\text{LLRATE}_{it}) + 0.1797 * \text{LN}(\text{SIZE}_{it}) + 0.2903 * \text{LN}(\text{NPL}_{it}) + 0.1575 * \text{LN}(\text{LR}_{it}) - 11.473 * \text{DGDP}_t - 6.762$$

Fixed-effects (within) regression  
Group variable: banknumber

Number of obs = 7974  
Number of groups = 657

R-sq: within = 0.3387  
between = 0.6048  
overall = 0.4996

Obs per group: min = 1  
avg = 12.1  
max = 15

corr(u\_i, xb) = 0.2388

F(5,7312) = 749.11  
Prob > F = 0.0000

ln_llrate	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
ln_llrate L1.	.2266597	.0110792	20.46	0.000	.2049411	.2483782
ln_size	.1796576	.0164376	10.93	0.000	.1474352	.21188
ln_nplr	.2902758	.0091911	31.58	0.000	.2722586	.3082931
ln_lr	.1574592	.0427033	3.69	0.000	.0737485	.24117
dgdp	-11.47334	.4882527	-23.50	0.000	-12.43045	-10.51622
_cons	-6.761796	.3873411	-17.46	0.000	-7.521097	-6.002496
sigma_u	.38221095					
sigma_e	.40430857					
rho	.47192671	(fraction of variance due to u_i)				

F test that all u\_i=0: F(656, 7312) = 3.18 Prob > F = 0.0000

For other banks:

$$\text{LN}(\text{LLRATE}_{it}) = 0.2014 * \text{L}.\text{LN}(\text{LLRATE}_{it}) + 0.07795 * \text{LN}(\text{SIZE}_{it}) + 0.3277 * \text{LN}(\text{NPL}_{it}) \\ 4.626 * \text{DGDP}_t + 0.0132 * \text{DIFF\_YIELD}_t - 4.331$$

Fixed-effects (within) regression				Number of obs	=	24917
Group variable: banknumber				Number of groups	=	2606
R-sq: within	=	0.2770		obs per group: min	=	1
between	=	0.7726		avg	=	9.6
overall	=	0.5436		max	=	15
corr(u_i, Xb) = 0.5337				F(5, 22306)	=	1708.88
				Prob > F	=	0.0000

ln_llrate	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
ln_llrate L1.	.2014296	.006322	31.86	0.000	.189038	.2138211
ln_size	.0779544	.0124207	6.28	0.000	.0536091	.1022998
ln_nplr	.3276834	.0054503	60.12	0.000	.3170004	.3383663
dgdp	-4.625817	.3994936	-11.58	0.000	-5.408853	-3.842782
diff_yieldp	.0131724	.0056234	2.34	0.019	.0021502	.0241946
_cons	-4.330869	.2684073	-16.14	0.000	-4.856966	-3.804772
sigma_u	.46324348					
sigma_e	.47902067					
rho	.48326077	(fraction of variance due to u_i)				

F test that all u_i=0:	F(2605, 22306) =	2.30	Prob > F = 0.0000
------------------------	------------------	------	-------------------

where  $\text{LN}(\text{LLRATE}_{it})$  is the log of the loan loss rate for bank  $i$  at time  $t$ ,  $L$  is the lag operator,  $\text{LN}(\text{SIZE}_{it})$  is the log of total assets,  $\text{LN}(\text{NPL}_{it})$  is the log of NPLs in percent of total loans,  $\text{LN}(\text{LR}_{it})$  is the log of the total loans-to-total assets ratio,  $\text{DGDP}_t$  is GDP growth, and  $\text{DIFF\_YIELD}_t$  is the slope of the yield curve (10-year minus 1-year). The unemployment rate was insignificant when included together with GDP, and was removed from the final specifications.

## Securities Writedowns

The estimation methodology for securities losses in Germany is similar to that for the euro-area described in the previous GFSRs.<sup>95</sup> The data on holdings of securitized assets was obtained from the central bank's quarterly survey of 18 major banks, and accounted for over 90 percent of all such holdings by German credit institutions. The survey data was broken down into the following asset categories<sup>96</sup>: RMBS, CMBS, Consumer ABS, CDOs, and other securitized products. In order to determine securities' loss rates, we used the CMBS and RMBS price indices from the European Securitisation forum and the euro area Aggregate Corporate benchmark index for corporate securities.

## Expected Writedowns, Earnings, and Capital Requirements

<sup>95</sup> The aggregated balance sheet data, including the composition of the securities holdings, the profit and loss accounts and capital bases for the different banking categories were obtained from the Bundesbank.

<sup>96</sup> The proportion of structured products to total securities holdings is roughly 60 percent for commercial banks, 65 percent for other banks and 18 percent for Landesbanken and savings banks.



Based on supervisory annual reports and our estimates for loans losses for 2009, banks will report \$261 billion in writedowns in 2009 (Table 1.14). Commercial banks had a Tier 1 capital ratio of 11 percent, the highest among the sectors. The pace of loss recognition has varied considerably across

the three categories.

While commercial banks

have recognized all

combined losses on loans

and securities,

Landesbanken and

savings banks are likely to

face an additional

\$47 billion in losses in

2010, and the other

banking category is

expected to record a

further \$21 billion.<sup>97</sup>

Banks' earnings were

stronger in 2009 relative

to the prior crisis years,

supported by the steep yield curve, reviving credit markets, and extensive government

support measures. Going forward, interest income is expected to reverse these gains in 2010,

due to shrinking lending margins. We assume that net interest income will decline 10 percent

in 2010, given a significant flattening of the yield curve. Non-interest income and

expenditures are expected to remain relatively stable, in line with the long-term trend.

Strong capital positions at end-2009 and faster loss recognition had a positive effect on

capital and, thus, capital ratios at commercial banks in 2010. In contrast, the weaker capital

base combined with sizeable losses in 2010 are projected to leave Landesbanken and savings

banks with a net drain on capital of \$22 billion—with a larger portion of the drain residing in

Landesbanken—and other banks will have a net drain of \$14 billion.

**Table 1.14. Germany: Bank Capital, Earnings, and Writedowns**  
(In billions of U.S. dollars, unless otherwise shown)

	Commercial Banks	Landesbanken and Savings Banks	Other Banks <sup>1</sup>	Total
<b>Estimated Capital Positions at end-2009</b>				
Total Reported and Estimated Writedown at end-2009 <sup>2</sup>	140	100	21	261
Tier1/RWA at end 2009, in percent	11.0	7.9	8.3	8.6
<b>Scenario bringing forward expected earnings and Writedowns (Q1:Q4 2010)</b>				
Expected Writedowns (Q1:Q4 2010) <sup>3</sup> (1)	-3	47	21	..
of which, Loans:	19	27	4	..
of which, Securities	-22	20	16	..
Expected net retained earnings through 2010 (2)	24	25	6	..
Net Drain on Capital <sup>4</sup> (3) = (1) - (2)	-27	22	14	36
Tier 1 capital at end 2009 <sup>5</sup>	184	155	45	200

Source: IMF staff estimates.

Note: Foreign-exchange rate assumed: 1EUR=1.4USD

<sup>1</sup> Other banks include credit co-operatives.

<sup>2</sup> The reported loan losses include estimates for 2009, while that for securities are as reported in Sept 2009

<sup>3</sup> Writedowns for securities are averages of our baseline and adverse case estimates. A negative sign indicates a write-up.

<sup>4</sup> Capital surpluses in one sector are not included in the total capital drain for the banking system.

<sup>5</sup> Tier 1 capital levels for 2009 are estimated, due to reporting lags at some banks. Tier 1 capital for the overall system excludes the Tier 1 capital for sectors that have a capital surplus.

<sup>97</sup> The remaining securities losses for savings and other banks are assumed to be recognized through the profit and loss account in 2010. Given that banks need not mark-to-market their entire securities portfolio, our assumption on the impact on earnings and capital is a conservative one.

## Annex 1.5. Analyzing Nonperforming Loans in Central and Eastern Europe Based on Historical Experience in Emerging Markets<sup>98</sup>

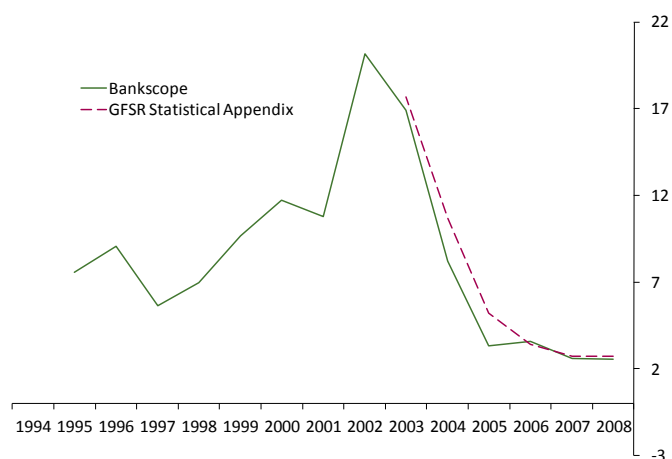
*This annex explains the data sources and the technical details of the estimations presented in Box 1.2.*

### Data

The reason for undertaking a “what if” exercise, rather than estimating coefficients directly for Central and Eastern Europe (CEE), is that Bankscope data on asset quality is sporadic for CEE countries. This is partly because western parent banks report cross-country consolidated statements, and partly because the series are short. For the countries in the estimation sample, however, Bankscope has relatively good coverage and the series are long enough to capture the dynamics of complete credit cycles (Figures 1.45 and 1.46 show examples).

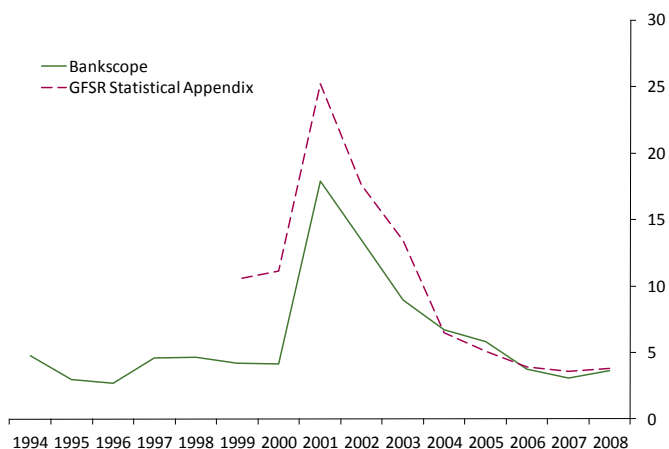
Bank-level data is used to calculate NPL ratios, complemented with official aggregate data for Colombia, the Philippines, and the Dominican Republic. To capture the “true” NPL ratio for each bank, the Bankscope balance sheet category “Total problem loans” is used, as it includes both nonperforming and restructured loans, and then divided by total customer loans. The NPL ratios are aggregated up for each country and checked against the GFSR statistical appendix, as well as for the market share captured by the available data. Care has been taken to exclude series, or end-observations, with definitional

**Figure 1.45. Argentina – NPLs as a Share of Total Loans**  
(In percent)



Source: Bankscope; national authorities; and IMF staff estimates.

**Figure 1.46. Turkey – NPLs as a Share of Total Loans**  
(In percent)



Source: Bankscope; national authorities; and IMF staff estimates.

<sup>98</sup> This annex was prepared by Kristian Hartelius.

changes in the estimation sample, so as to avoid structural breaks in the data. Exchange rates are expressed in local currency per US dollar or euro. Data on real GDP growth and exchange rates are taken from the *WEO* database.

### Modeling and Estimation

The asymmetry in the data around spikes in the NPL ratio, with high persistence in the aftermath of a crisis, leads us to estimate two different model specifications; one using the percent change in NPL ratios, and one using the percentage-point level of NPL ratios. Panel unit root tests do not indicate that the NPL ratios in the sample are nonstationary, but modeling the NPL ratio in percent changes rather than levels increases comparability and scalability of the model predictions, as NPL definitions and levels vary across countries. Furthermore, analysts often consider loan loss provisions on a bank's income statement when moving from asset quality to implications for capitalization, which would be a function of the change in NPLs on the balance sheet. However, a model in changes tends to exaggerate the persistency of shocks when the data is asymmetrical as in the sample, whereas a model using the level of NPL ratios handles the asymmetry better. Both model specifications contain real GDP growth and exchange rate movements expressed in percent changes.

The models are fixed effects Vector Auto Regressions with one lag.<sup>99</sup> The data in the estimation sample is stationary, and the impulse response functions of the two models are shown in figures 1.47 and 1.48, for Cholesky identified shocks. They indicate sound long-term properties, have the expected signs (the figures show responses to positive shocks), and are statistically significant. A negative shock to real GDP growth leads to an increase in the NPL ratio, as does an exchange rate depreciation shock.<sup>100</sup> Notably, even the model using NPL ratios in levels (model 2) indicate that GDP and exchange rate shocks have effects on the NPL ratio that linger for more than 4 years.

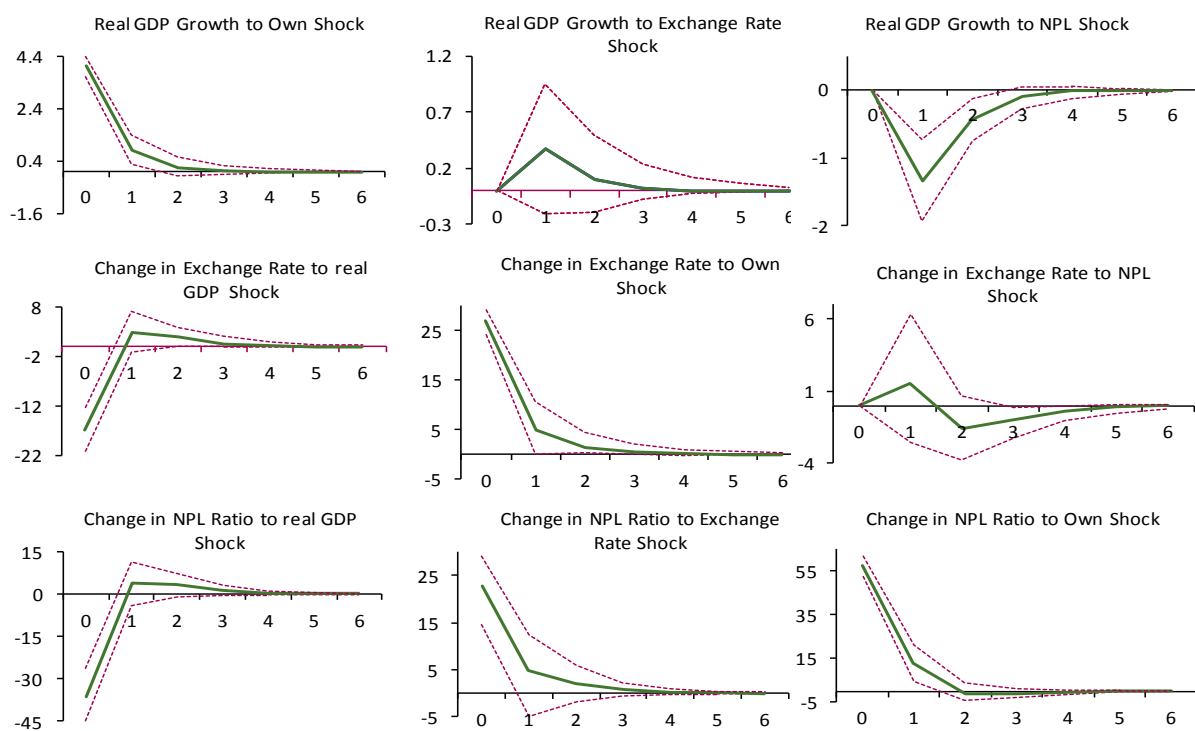
The models produce sensible long-term forecasts for the countries in the estimation sample (not shown). Idiosyncratic factors in certain countries may have led the exchange rate to trend up or down, or may have caused persistent declines or increases in the NPL ratio, over the sample period. Such idiosyncrasies are handled relatively well by country-specific fixed effects when producing out-of-sample forecasts for the countries in the sample. However, for the purpose of applying the models to the CEE region, the models are re-fitted on de-meaned changes in the exchange rate and NPL ratio, so that the estimated fixed effects produce mean reversion to zero in these variables. The estimated impulse responses to shocks remain unchanged in the re-fitted models, whereas the long-term dynamics are steered towards a neutral steady state.

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<sup>99</sup> The code used to estimate the model and produce impulse response functions was written by Inessa Love at the World Bank.

<sup>100</sup> The exchange rate shock studied is orthogonal to the GDP shock.

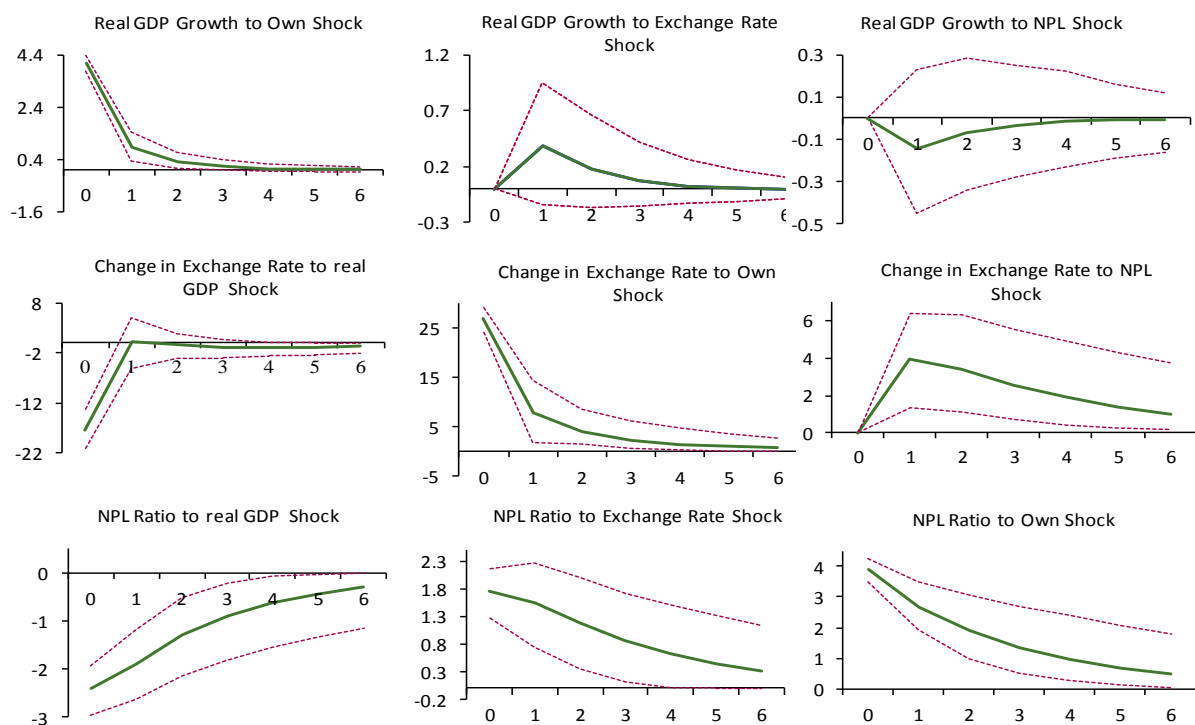
**Figure 1.47. Impulse Response Functions - Model 1**



Source: IMF staff estimates.

Note: Dashed red lines represent 90 percent confidence bands. One standard deviation Cholesky orthogonal shocks.

**Figure 1.48. Impulse Response Functions - Model 2**



Source: IMF staff estimates.

Note: Dashed red lines represent 90 percent confidence bands. One standard deviation Cholesky orthogonal shocks.

## Simulations

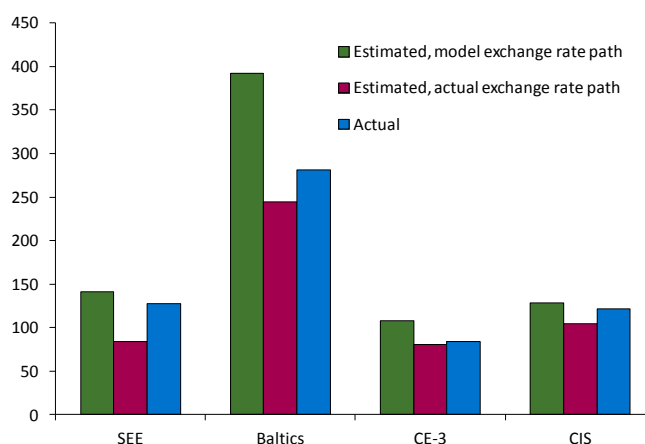
The simulations can be thought of as answering the following question: “What should we expect for NPLs in the CEE region, if bank asset quality and exchange rates respond to GDP shocks as they have typically responded in emerging markets previously, given initial conditions in CEE and the size of GDP shocks that have hit the region?” They are done for both models by applying the estimated coefficients to data for European countries, simulating the models from 2008 and onward.

When applying the models to countries in the CEE region, the cross-country average fixed effects in the sample are used. A real GDP shock in period  $t$  is translated into the models by dividing the difference between the WEO data (or forecast) for period  $t$  and the model prediction for the same period by the standard deviation of GDP shocks in the estimation sample (which is 4 percent). The simulations are based on consecutive shocks, where the dynamic model predictions are updated in each period based on shocks in the previous period.

The simple average of the two model forecasts in each time period is used for final projection purposes. In addition to complementing each other as described above, the two models are biased in opposite directions when forecasting NPL ratios for countries with very high or very low levels of NPLs, meaning averaging across them produces more reliable forecasts.

When controlling for actual exchange rate developments, the model simulations fit the Baltic and the CE-3 data better, but under-predict NPL formation in south eastern Europe and the CIS (Figure 1.49).<sup>101</sup>

**Figure 1.49. Change in NPL Ratio During 2009**  
(In percent)



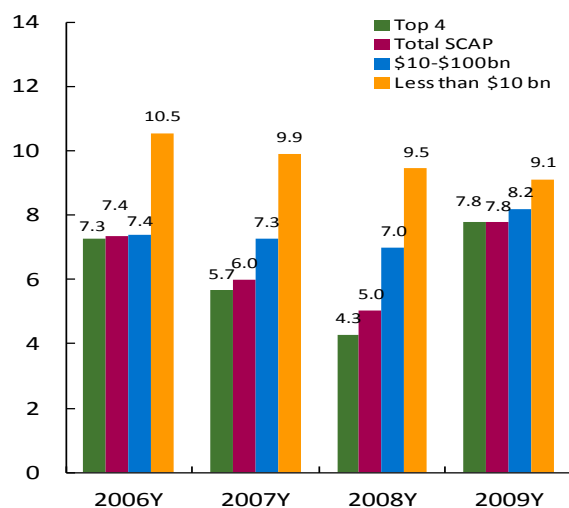
Source: IMF staff estimates. CE-3 = Czech Republic, Hungary, and Poland. CIS = Russia and Ukraine; SEE = Bulgaria, Croatia, and Romania.

<sup>101</sup> The simulations are conditioned on actual exchange rates and WEO exchange rate forecasts as a series of consecutive shocks to the model exchange rate, orthogonal to the GDP shocks in the baseline simulations.

## Annex 1.6. United States: How Different Are "Too-Important-To-Fail" U.S. Bank Holding Companies (BHCs)?

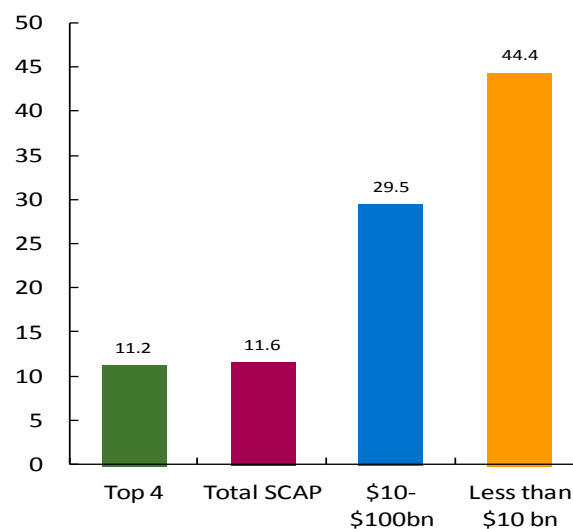
The largest BHCs came into the crisis with the lowest capital buffers...

**Tier 1 common equity to risk-weighted assets**  
(In percent)



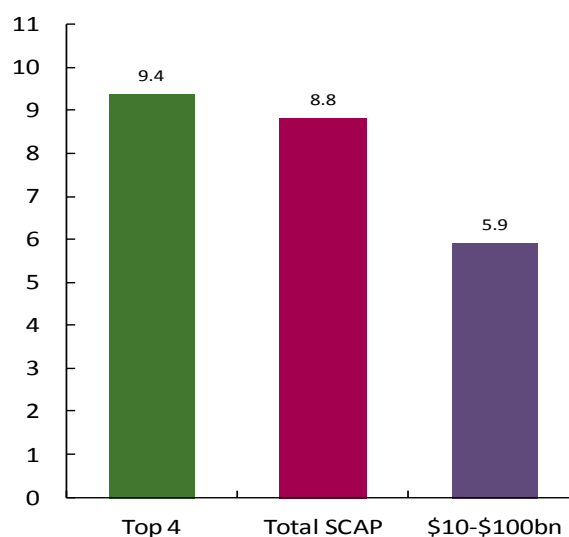
... and the lowest reliance on customer deposits as a funding source

**Customer deposits to total liabilities**  
(In percent)



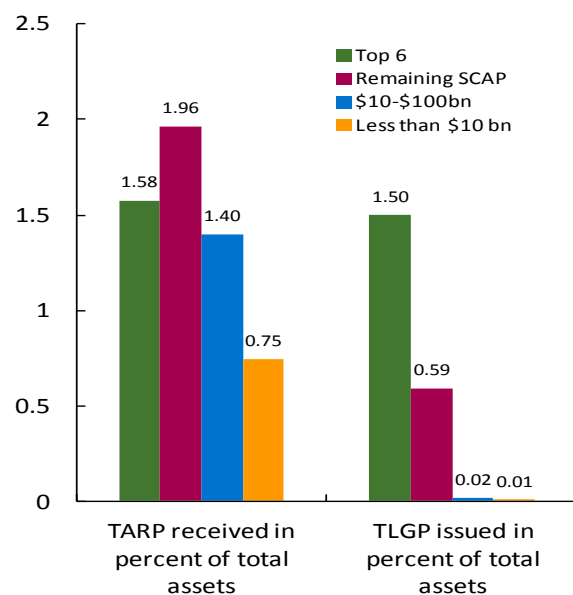
...but experienced the largest cumulative losses during the crisis

**2007Q4-2009Q3 cumulative net charge-offs to total loans** (In percent)



... and required the most government support.

**TARP and TLGP support**  
(In percent of total assets)



This annex was prepared by Andrea Maechler.

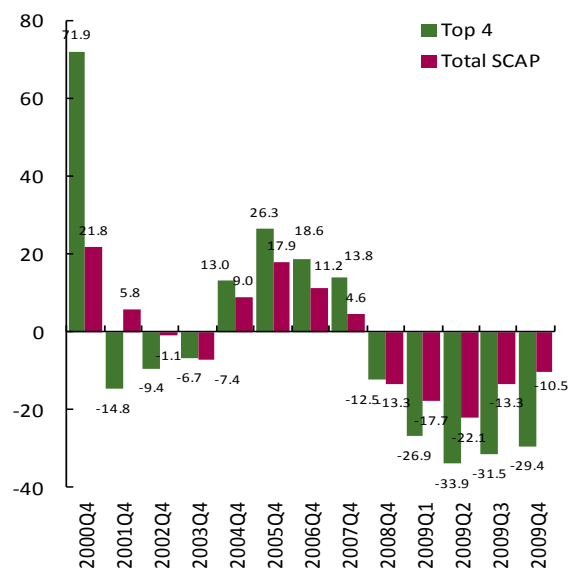
Sources: SNL Financials; and IMF staff estimates. This annex was prepared by Andrea Maechler and Geoffrey Noah.

Notes: SCAP - Supervisory Capital Assessment Program. TARP - Troubled Asset Relief Program. TLGP - Temporary Liquidity Guarantee Program

The largest firms faced also lower funding costs... ... that acted like a "subsidy" ...

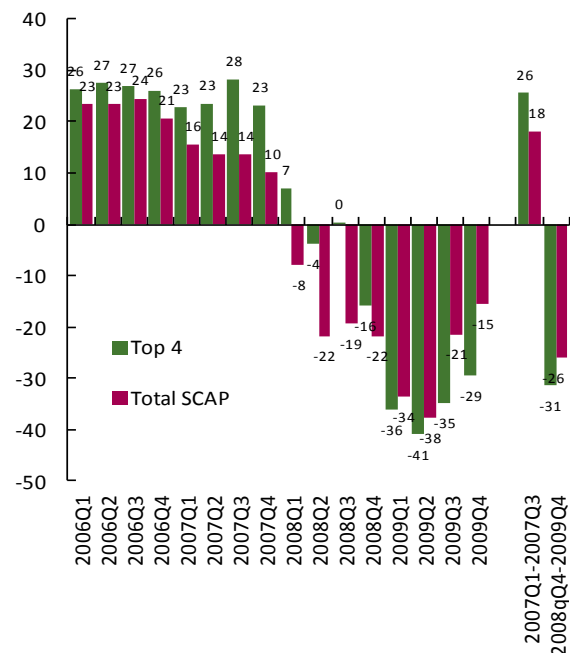
### Cost of funds

(In percentage change from industry-wide average)



### Tax (Subsidy)

(In billions)



... and helped boost profits...

### Quarterly net BHC income to total assets

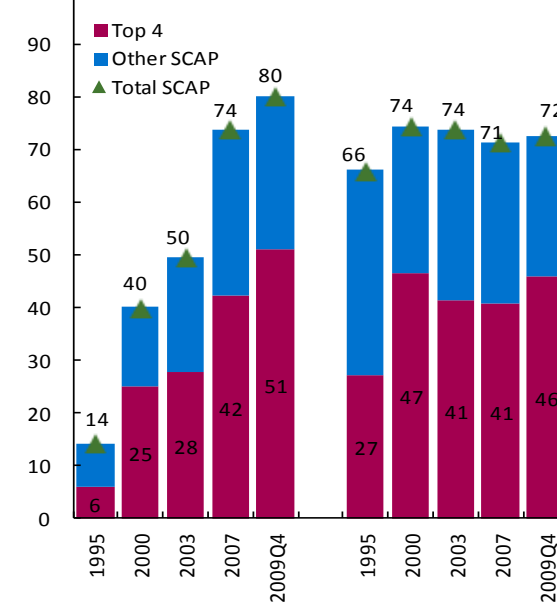
(In percent)



... while gaining in asset market share.

### Share of total bank assets

(in percent of GDP) (in percent of total assets)



Sources: SNL Financials; and IMF staff estimates.

Notes: SCAP - Supervisory Capital Assessment Program.



## Annex 1.7. Credit Demand and Capacity Estimates in the United States, Euro Area, and United Kingdom<sup>102</sup>

This annex describes our methodology for estimating the demand for credit from the nonfinancial sector and the capacity of lenders to supply credit, as discussed in Section D of this chapter. Ultimately, this exercise is intended to project the *ex ante* financing gap — that is, the difference between *ex ante* demand for credit from the nonfinancial sector and the *ex ante* capacity to meet that demand from lenders other than central banks. The method is similar to that used in the October 2009 GFSR, outlined in Annex 1.4 of that report, though a few changes have been made for this report, namely: (1) new equations for private sector credit demand in the euro area and United Kingdom; (2) added estimates of municipalities' demand for credit; and (3) updated projections for nonbank credit capacity. This annex describes these changes in more detail.

### Credit Demand

For our credit demand projections, end borrowers (issuers) were broken down into three categories: (1) government; (2) nonfinancial companies; and (3) households (mortgages and consumer credit are forecast separately). As in the October 2009 GFSR projections for central government credit demand (sovereign debt) were based on deficit forecasts included in the WEO. Municipal borrowing needs were assumed to grow at the same pace of the central government in the United States and the euro area, while municipal credit demand was assumed to be zero in the United Kingdom. The projections for private sector credit demand were modeled using regressions similar to those in the October 2009 GFSR. The projections are shown in Table 1.15 and the regressions are presented in Table 1.16.

**Table 1.15. Growth in Credit Demand from the Nonfinancial Private Sector**  
(In percent)

	2002- 2007 average	2008	2009	2010	2011
<b>Total credit</b>					
<b>United States</b>	9.3	2.3	-1.5	1.7	5.3
<b>Euro area</b>	7.3	6.6	0.5	0.9	3.4
<b>United Kingdom</b>	10.2	6.1	-1.9	0.3	4.5
Household credit					
United States	10.2	-0.1	-1.6	2.2	4.5
Euro area	7.9	3.4	1.4	1.8	2.0
United Kingdom	10.3	2.9	0.0	2.3	4.2
Mortgages					
United States	11.8	-0.5	-1.2	3.1	5.5
Euro area	8.4	3.5	1.8	2.0	2.1
United Kingdom	11.4	3.4	1.2	3.3	5.1
Consumer loans					
United States	5.0	1.6	-3.4	-1.4	0.3
Euro area	1.8	2.0	-3.8	-0.5	0.1
United Kingdom	5.2	0.1	-7.2	-4.6	-2.5
Corporate credit					
United States	8.3	5.1	-1.3	1.2	6.1
Euro area	6.9	8.8	0.0	0.2	4.3
United Kingdom	10.1	9.0	-3.5	-1.4	4.7

Source: ECB; national authorities; and IMF staff estimates.

<sup>102</sup> This annex was prepared by Sergei Antoshin, Hui Jin, and William Kerry.

**Table 1.16. Regression Output on Demand for Nonfinancial Private and Public Sector Credit**

<b>Euro Area</b>								
Sovereign sector	Consistent with the WEO deficit forecasts							
Municipal sector	Consistent with the WEO deficit forecasts							
Nonfinancial private sector								
Mortgage credit =	0.70*D2 + 0.42*D3 + 0.47*D4 + 0.25*L1.MC + 0.70*L1.HP							
<i>p-value</i>	0.00	0.00	0.00	0.04	0.00		<i>R-squared: 0.97</i>	
Consumer credit =	-3.10 + 6.58*D2 + 5.00*D4 + 0.46*L1.CC + 0.24*L3.CC - 0.27*L4.CC + 0.42*L1.PCE							
<i>p-value</i>	0.00	0.00	0.00	0.00	0.07	0.07	0.04	<i>R-squared: 0.91</i>
Corporate credit =	0.86*D2 + 0.96*D4 + 0.36*L1.NC + 0.19*L3.NC + 0.35*L3.I							
<i>p-value</i>	0.00	0.00	0.01	0.08	0.00			<i>R-squared: 0.92</i>
<b>United Kingdom</b>								
Sovereign sector	Consistent with the WEO deficit forecasts							
Nonfinancial private sector								
Mortgage credit =	0.33 + 0.28*L1.MC + 0.26*L2.MC + 0.19*L3.MC + 0.13*HP							
<i>p-value</i>	0.02	0.01	0.01	0.06	0.00			<i>R-squared: 0.79</i>
Consumer credit =	-1.42 + 1.93*D2 + 1.52*D3 + 0.81*D4 + 0.37*L1.CC + 0.37*L3.CC + 0.47*L1.PCE							
<i>p-value</i>	0.00	0.00	0.11	0.00	0.00	0.00	0.03	<i>R-squared: 0.58</i>
Corporate credit =	0.27*L3.NC + 0.37*L4.NC + 0.26*I + 0.26*L3.I							
<i>p-value</i>	0.00	0.00	0.03	0.03				<i>R-squared: 0.59</i>
<b>United States</b>								
Sovereign sector	Consistent with the WEO deficit forecasts							
Municipal sector	Consistent with the WEO deficit forecasts							
Nonfinancial private sector								
Mortgage credit =	0.44 + 0.14*PCE + 0.12*HP + 0.44*L1 + 0.19*L2							
<i>p-value</i>	0.03	0.17	0.00	0.00	0.06			<i>R-squared: 0.73</i>
Consumer credit =	-0.31 + 0.43*PCE + 0.61*L1 + 0.16*L2							
<i>p-value</i>	0.03	0.00	0.00	0.02				<i>R-squared: 0.67</i>
Corporate credit =	-2.91 + 0.09*I + 0.04*CU + 0.26*L1 + 0.42*L2							
<i>p-value</i>	0.08	0.00	0.05	0.00	0.00			<i>R-squared: 0.48</i>

Sources: National authorities; and IMF staff estimates.

Note: D2, D3, and D4 are dummy variables for the second, third, and fourth quarters, respectively; L = lagged dependent variable; MC = mortgage credit; HP = home price index; CC = consumer credit; PCE = private consumption expenditures; NC = nonfinancial corporate credit; I = investment; CU = capacity utilization rate.

## Credit Capacity

As in the October 2009 GFSR, we estimated *ex ante* credit capacity in two parts: that provided by the banking sector and that provided by nonbank lenders. Bank capacity was assumed to grow in line with projections for total bank assets, discussed in Section C.

The capacity of the nonbank lenders – including nonbank financial institutions, nonfinancial sector and foreign institutions – to provide credit was projected in aggregate for each country or region, rather than separately as had been done previously. Estimates for quarter-on-quarter growth in assets under management were based on nominal GDP growth, current account balance as a percentage of GDP, and lags of the dependent variables. Nominal GDP growth was used as a proxy for income and thus funds available to build domestic credit capacity, while current account balances represented capacity available from the rest of the world as foreigners invest their trade surpluses. For the United States, an additional ratio of private savings to GDP was found to be significant, perhaps reflecting the deeper capital market that is used to channel private sector savings to financial investments. The projections were based on WEO forecasts and are intended to capture the trend in nonbank credit growth.

## Financing Gap

93. Projected quarter-on-quarter growth rates of *ex ante* credit demand and credit capacity were applied to the latest level of debt outstanding available from national flow of funds statistics. The *ex ante* financing gap is estimated as the difference between the increase in *ex ante* demand and capacity in each year. Compared with our October 2009 GFSR forecast for financing gaps in 2010, the euro area gap narrowed slightly to €190 billion (from €240 billion), mainly because we now predict weaker private demand growth, especially for corporates; the gap in the United States widened to \$330 billion (from \$90 billion), largely due to the incorporation of municipal demand in our estimates; the gap of £180 billion in the United Kingdom was slightly higher than the previous forecast (£150 billion) as public sector demand is expected to be greater than before.

## Annex 1.8. The Effects of Large-Scale Asset Purchase Programs

This annex discusses the impact of the introduction and subsequent expiration of large-scale asset purchase programs on the cost of credit in the United States, United Kingdom, and the euro area.<sup>103</sup>

Beginning in late-2008, major central banks introduced large-scale asset purchase programs (LSAPs) in an effort to reduce the cost and increase the availability of credit, facilitate secondary market activity, reduce liquidity premia, and improve conditions in financial markets more generally. The Federal Reserve announced its intention in November 2008 to purchase \$100 billion in agency debt, \$500 billion in agency-backed mortgage-backed securities (MBS). In March 2009, the program was expanded to \$1.25 trillion in agency-backed MBS, \$200 billion in agency debt, and \$300 billion in Treasury securities. The full amount of treasuries was purchased by end-October 2009, while \$175 billion of agency debt and the full \$1.25 trillion of agency-backed MBS were purchased by end-March 2010. The Bank of England's asset purchase scheme was announced and implemented beginning March 2009, and was focused on gilt purchases and to a lesser extent private sector assets; the program was eventually expanded to a maximum target of £200 billion. The ECB's credit-easing program, which was initiated in mid-2009, earmarked €60 billion in covered bond purchases by end-June 2010.

The LSAPs generally had their intended impact on credit costs (first table). Ten-year U.S. treasury yields declined nearly 50 basis points following the initial announcement of the Federal Reserve's asset purchase program in November 2008. The Fed's asset purchase program had a more pronounced impact on the agency and MBS market, reducing agency debt spreads to treasuries nearly 65 basis points on the week. In the United Kingdom, the introduction of the BoE's asset purchase scheme triggered a 35 to 60 basis points decline in gilt yields over a one week time period. In the euro area, the ECB's covered bond purchase program helped to stabilize the covered bond market, leading to higher and more longer-dated issuance and tighter covered bond spreads across nearly all jurisdictions and maturities.

Beyond the initial response, it is difficult to isolate the effect of the LSAPs from the broader improvement in global risk premia and liquidity conditions, as broader credit spreads also tightened following the announcement and implementation of the programs. Regression analysis, for the most part, though, generally confirms the findings from event studies.<sup>104</sup>

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<sup>103</sup> This annex was prepared by Rebecca McCaughrin.

<sup>104</sup> The Federal Reserve Bank of New York estimated the impact on treasury yields was 70 basis points and about 120 basis points on MBS yields (see Brian Sack, Julie Remache, Matthew Raskin, Federal Reserve *Economic Policy Review*, forthcoming). Another study (Stroebel and Taylor, December 2009) found a somewhat less pronounced impact of credit-easing measures on MBS spreads, instead attributing much of the tightening to a coincidental decline in prepayment and default risks. Our own analysis showed that (i) the Federal Reserve's purchases were the dominant driver of mortgage rates over a truncated time period and that (ii) the projected impact was largely consistent with the actual repricing that occurred.

In addition to a compression in spreads, the LSAPs also improved liquidity conditions. The introduction of LSAPs helped to boost market liquidity, narrowing bid-ask spreads, boosting turnover volumes, reducing the new issuance premium on corporate bonds, and narrowing the spread between gilt or treasury yields and OIS rates – a proxy for liquidity premia.<sup>105</sup> The LSAPs also increased the dominance of the central banks in each market, especially in the mortgage market in the case of the Federal Reserve and in the sovereign debt market in the case of the Bank of England.

	<u>Pre- announcement</u>	<u>Announcement</u>	<u>Announcement + 7 days</u>	<u>Start of purchases</u>	<u>End of purchases</u>	<u>Current</u>
10-year treasury (%)	3.00	2.53	2.76	2.78	3.31	3.70
change since pre-announcement (bps)		-47	-24	-22	31	70
30-year fixed MBS current coupon (%)	5.41	4.97	4.12	4.05		4.34
change since pre-announcement (bps)		-45	-129	-136		-107
10-year agency debt (%)	4.93	4.36	3.48	3.67		3.48
change since pre-announcement (bps)		-57	-145	-126		-145
10-year gilt (%)	3.64	3.36	3.03	3.09		4.06
change since pre-announcement (bps)		-29	-61	-55		42
Euro area covered bond (%)	3.93	3.98	3.68	3.65		2.97
change since pre-announcement (bps)		5	-25	-28		-96

Source: Bloomberg

Whereas the initiation of the LSAP programs triggered a significant narrowing in spreads, the expiration of the various programs has so far had only a limited effect on credit costs. Since the Fed completed its Treasury debt purchases at the end of October 2009, yields have risen about 30-35 basis points at the long-end of the curve. A similar trend has been seen in the United Kingdom – even though the asset purchase scheme has yet to expire – where longer-dated gilt yields have come under pressure on the back of rising net new issuance and a shift toward longer-dated supply, as well as increased fiscal concerns. By contrast, two-year treasury

<sup>105</sup> The improvement was delayed in the euro area covered bond market, as investors were reportedly reluctant to sell, price transparency was weak, and banks still had insufficient balance sheet capacity to support market-making activities. There has been greater improvement in market liquidity since late-2009. See ECB *Financial Stability Report*, December 2009.

	<u>Total outstanding</u> <u>(in bns of LC)</u>	<u>Amount of central</u> <u>bank purchases to</u> <u>date (in bns of LC)</u>	<u>Targeted central</u> <u>bank purchases (in</u> <u>bns of LC)</u>	<u>Central bank</u> <u>purchases (as a %</u> <u>of outstanding)</u>
<b>US</b>				
Treasuries	7,358	300	300	4.1%
Agency MBS	5,577	1180	1250	22.4%
Agency debt	2,824	167	175	6.2%
<b>UK</b>		193	200	24.7%
Gilts	803	191		
Corporate bonds		2		
Commercial paper		0		
<b>Euro area covered bonds</b>	1600	36	60	3.8%

Sources: SIFMA, BoE, Federal Reserve, ECB

Note: Outstanding covered bond issuance is as of end-2008. Asset purchases are as of February 15, 2010. Including U.S. Treasury purchases of agency MBS, total U.S. authorities' purchases are \$1.470 trn or 26% of the outstanding stock of agency MBS. Outstanding stock of agency MBS includes Ginnie Mae MBS.

and gilt yields are at about the same level as when the respective asset purchase programs were first announced. Agency debt spreads have either [narrowed] since the program concluded or [traded in a tight range], while MBS spreads have widened [25-75] basis points, much less than the [150] basis points narrowing that took place since the inception of the LSAP program, and are still well below the historical average of 100 basis points. Although the ECB's covered bond program has yet to expire, the mere slowdown in asset purchases has also had a limited impact on rates, with covered bond yields still more than 100 basis points lower than prior to the program's announcement.

**The muted effect is in part due to the fact that the end of the programs were well-telecast to the market in advance, while the pace of purchases also diminished over time, smoothing the effect of exiting from the market. While there is likely to be some upward pressure on both agency and MBS rates as market conditions normalize, a number of factors should contain upward pressure at least in the near-term, including (i) limited net new mortgage supply; (ii) a potential reallocation by underweight institutional investors; (iii) the lack of alternative available credit-related assets; and (iv) a continued expansion in banks' securities books. Clearly, an unwind of central bank holdings could trigger a more pronounced rise in credit costs, though such actions appear unlikely in the immediate future, unless other liquidity-draining measures fail.**

## **Annex 1.9. Methodologies Underlying Assessment of Bubble Risks**

This annex outlines the methodologies underlying the assessment of asset valuation summarized in Table 1.8 and Box 1.4. It also discusses additional findings in greater detail emerging from the econometric work that seeks to explain the determinants of local government yields.

Table 1.8 summarizes the assessment of asset valuation in Table 1.8, latest actual observations are expressed in terms of the deviation from either the period average or model value (when econometrics approaches are used). The deviations are further converted into a distribution of zero mean and unit standard deviation, or a z-score (i.e., dividing by the standard deviation of the deviations).<sup>106</sup>

### **Equity**

Backward looking valuation numbers are calculated using both the dividend-yield and price-to-book ratios. Each ratio is converted into a z-score separately, before being combined into one index by taking an unweighted average. Forward looking valuations are calculated for both a shorter horizon and a longer horizon. The former relies on the 12-month forward price-to-earnings ratio. The latter is estimated using a dividend discount model, which bases valuation assessment on analysts' long-term forecasts of, for instance, inflation, nominal long-term yields, and nominal earnings growth over a long horizon. The model uses monthly observations that go back to January 1988, from DataStream, Bloomberg, and IBES.

### **Residential real estate**

Residential house prices are scaled by rental rates and income to estimate price-to-rent and price-to-income ratios. Data are mostly quarterly, going back to the first quarter of 1970. They are obtained from the OECD and other internal sources.

### **Local sovereign yield**

The econometric model extends the approach of Baldacci and Kumar (2009) outlined in the October 2009 GFSR from annual to quarterly frequency, while using a wider set of global factors.<sup>107</sup> Local government bond yields were related to a set of domestic and global factors in a fixed-effect panel approach for two sets of countries separately. Data for a group of 12 large advanced economies span 1980Q1-2009Q3, while those for 23 emerging and other advanced economies cover 1995Q1-2009Q3. Similar, but different sets of domestic and global factors were used for the two sets of regressions.

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<sup>106</sup> The variables underlying the z scores displayed in Table 1.8 are either in percent or basis points. Therefore, the deviations from either the period average or model value are calculated as a difference, without further scaling by either the period average or model value.

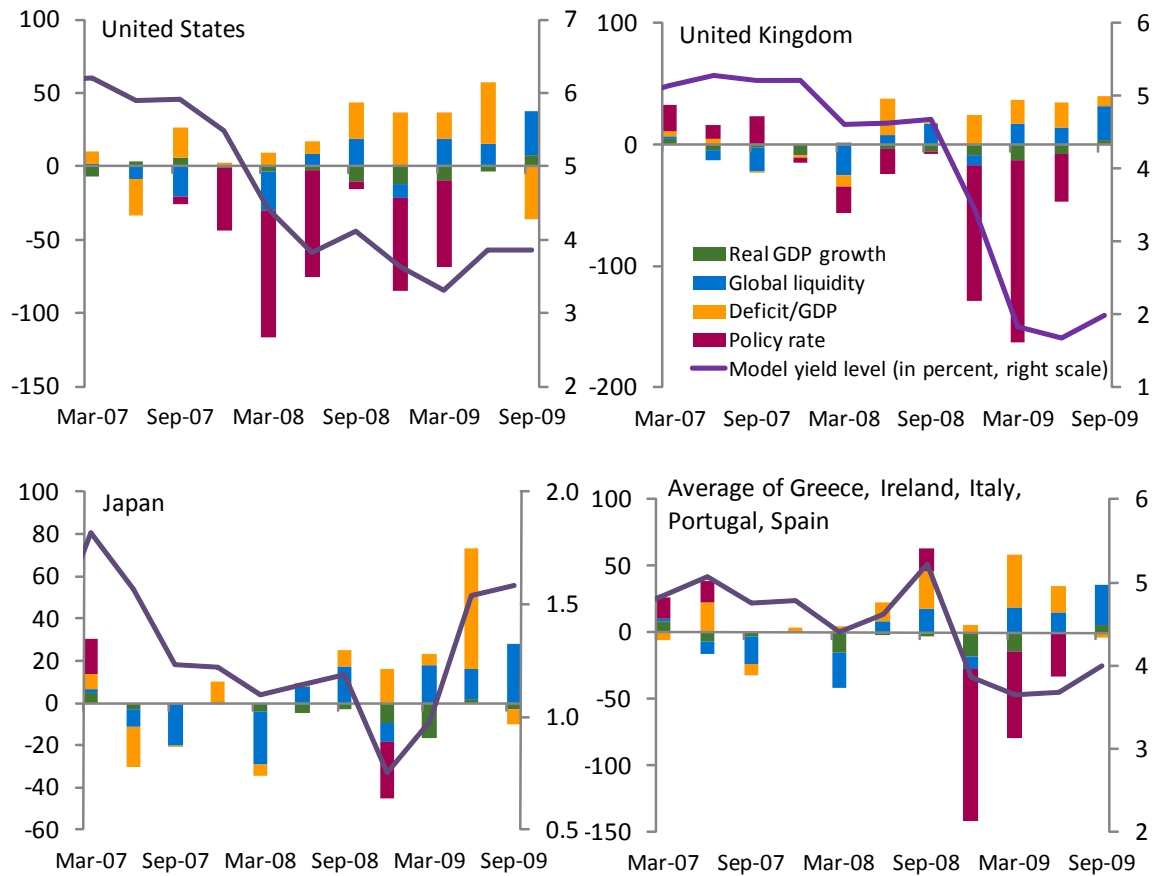
<sup>107</sup> Prepared by Ken Miyajima and Shanaka J. Peiris, with research assistance by Martha Sanchez.

## Group 1

Group 1 consists of larger advanced economies, often equipped with regional core financial markets. The baseline specification relates the local 10-year government yield to the policy rate, deficit/GDP, real GDP growth, and global liquidity (Table 17, model 3). Higher policy rates, fiscal deficits, and economic growth, as well as tighter global liquidity lead to higher local government yields. Inflation is statistically significant, but highly correlated with policy rates given the countries under consideration tend to target inflation. Therefore, the variable is not included in the baseline model to avoid multicollinearity. The coefficient on risk aversion represented by the VIX index is statistically significant and negative, suggesting local government debt was perceived as safe assets on average over the sample period. However, sovereign concerns have emerged recently for some euro area countries, making it somewhat difficult to disentangle the impact of VIX on yields. Larger gross capital flows to the local debt market increase demand and reduce yields, and the impact is significant even when included in the model along with global liquidity. However the variable lacks the latest data points.

A decomposition of the model's dynamics indicates monetary easing in response to the global financial crisis has contributed to the sharp reduction in local government yields, often counter-balancing the impact of fiscal deterioration and reduced excess in global liquidity. Yields bottomed out in 2009 after monetary policy easing halted (Figures 1.50, 1.51, and 1.52).



**Figure 1.50. Contributions to Change in Local Government Yields***(In basis points)*

Source: IMF staff estimates.

**Table 1.17. Group 1: Impact of Domestic and External Factors on Local Government Yields**

Dependent variable: 10-year government bond yields

Period: 1980Q1-2009Q3

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Policy rate (%)	0.700 *** (0.037)	0.594 *** (0.465)	0.652 *** (0.402)	0.686 *** (0.037)	0.684 *** (0.037)	0.651 *** (0.041)	0.640 *** (0.042)	0.669 *** (0.038)
Deficit (% of GDP)	-0.150 ** (0.044)	-0.161 ** (0.477)	-0.129 ** (0.332)	-0.148 ** (0.042)	-0.142 * (0.046)	-0.129 ** (0.033)	-0.118 ** (0.033)	-0.140 ** (0.043)
Real GDP growth (yoy, %)	0.061 * (0.022)	0.069 * (0.256)	0.065 ** (0.173)	0.052 * (0.019)	0.069 * (0.023)	0.063 ** (0.017)	0.069 ** (0.018)	0.060 * (0.020)
Inflation (yoy, %)		0.192 * (0.063)						
Global excess liquidity growth (yoy, %)			-0.301 *** (0.404)			-0.290 *** (0.045)	-0.284 *** (0.043)	
VIX (%)				-0.026 *** (0.004)		-0.006 (0.005)		-0.026 *** (0.005)
Foreign debt inflow (% of GDP)					-0.064 * (0.021)		-0.057 * (0.020)	-0.068 * (0.022)
Constant	2.256 *** (0.273)	2.114 *** (0.257)	2.728 *** (0.300)	2.870 *** (0.298)	2.445 *** (0.282)	2.846 *** (0.334)	2.888 *** (0.315)	3.062 *** (0.337)
R-squared								
within	0.833	0.848	0.854	0.837	0.837	0.855	0.856	0.841
between	0.931	0.920	0.953	0.936	0.918	0.953	0.939	0.922
overall	0.861	0.873	0.879	0.865	0.861	0.880	0.878	0.865

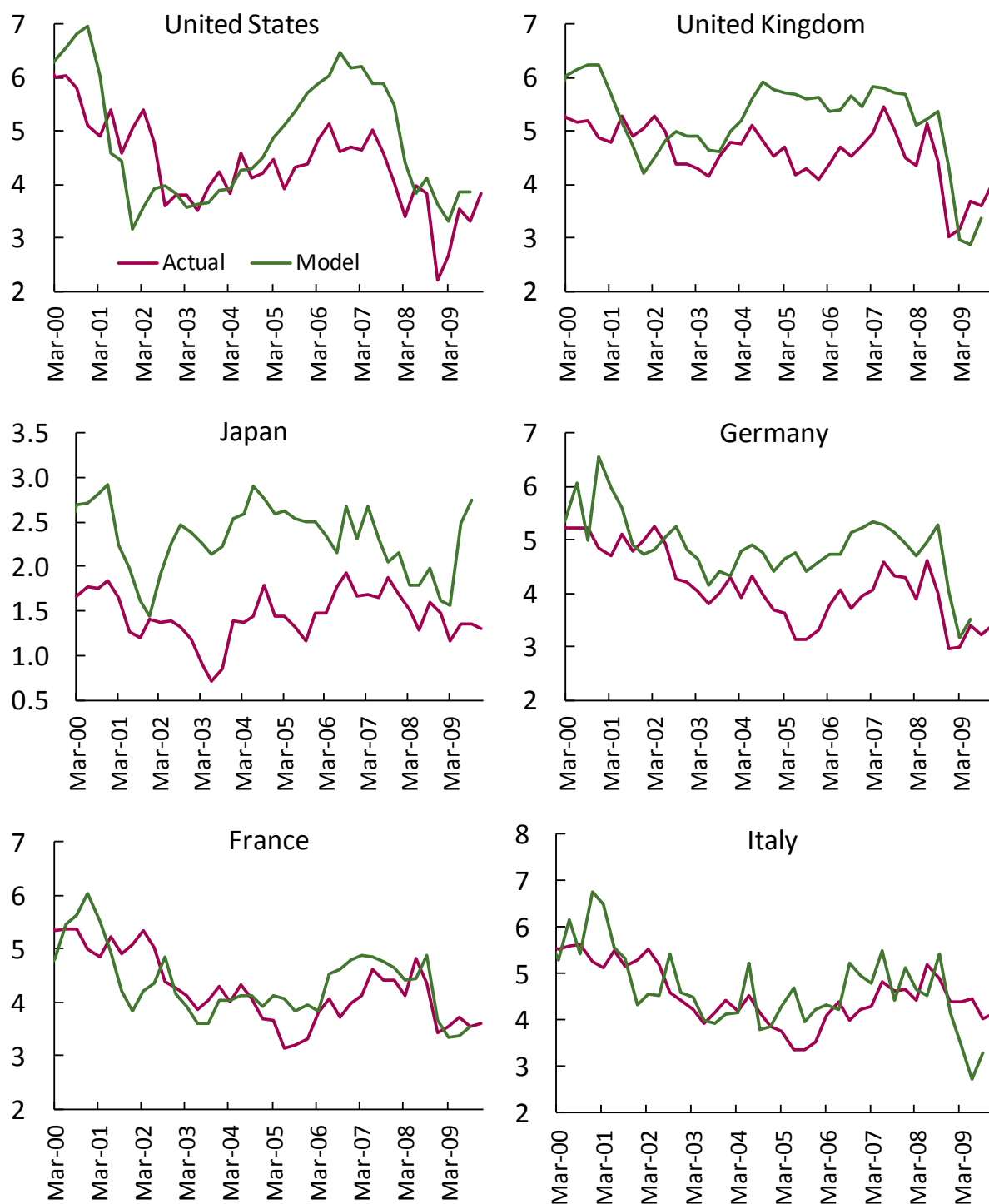
\* p&lt;0.05, \*\* p&lt;0.01, \*\*\* p&lt;0.001

Source: IMF staff estimates.

Note: Included countries: Australia, Canada, France, Germany, Greece, Ireland, Italy, Japan, Portugal, Spain, United Kingdom, and United States.

Model 3 is the baseline. Showing fixed-effect panel regression results with robust standard errors.

**Figure 1.51. Group 1. Local Government Actual and Model Yields**  
(In percent)



Source: IMF staff estimates.

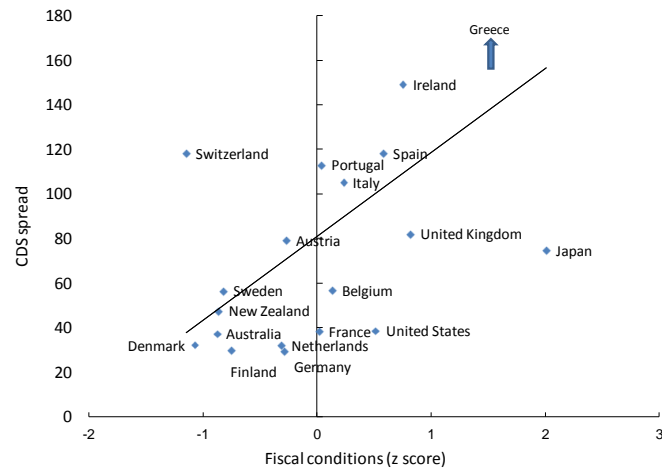
**Figure 1.52. Group 1. Local Government Actual and Model Yields**  
(In percent)



Source: IMF staff estimates.

Local government yields appear to be broadly consistent with fundamentals, given the loose monetary and fiscal conditions. Actual yields had been lower than model predictions (i.e., actual bond prices had been higher than model predictions) in most of the 12 included countries during 2004-08, but most notably in the United States, Germany, Canada, and Australia, echoing former Federal Reserve Chairman Greenspan's "conundrum" as to why global government yields remained at levels considered unusually low (Figure 1.51). In Q3 2009, actual yields and model predictions were broadly comparable excepting several instances. Japanese yields were below model predictions (i.e., actual bond prices were higher than model predictions), and factors not included in the model, such as Japan's high saving rates and institutions, may explain this result (IMF 2009). In some euro area countries, actual yields were moderately above model predictions (i.e., actual bond prices were below model predictions) in Italy, Ireland, and Portugal. This may reflect greater fiscal uncertainty that is not captured in our model, but which is highlighted by higher CDS spreads (Figure 1.53). In Greece, model predictions were above actual yields (i.e., actual bond prices were higher than model predictions) in Q3 2009, reflecting a sharp increase in the deficit-to-GDP ratio. Actual yields, however, rose sharply in Q4.

**Figure 1.53. CDS Spreads and Fiscal Conditions**  
(In basis points)



Sources: Bloomberg L.P.; IMF, World Economic Outlook (WEO) database; and IMF staff estimates.

Note: Fiscal conditions represent a simple average of 2010 debt and fiscal balance in percent of GDP in terms of z score relative to cross-country average. CDS spreads are the average of daily data during February 2010.

Long-term yields may rise substantially if monetary and liquidity conditions were to normalize. For instance, a 200 basis point increase in the policy rate and a 5 percentage point deceleration in growth of global excess liquidity could raise local government yields by nearly 300 basis points. A five-percentage point of GDP deterioration in the fiscal balance on a quarter-to-quarter basis could raise local government yields by another 65 basis points.

## Group 2

The determinants of local government yields are broadly similar to those for countries in Group 1. The baseline model includes policy rates, the debt-to-GDP ratio, and the VIX index (Table 1.18, model 8). Policy rates remain a key driver of local government yields, but the debt-to-GDP ratio, rather than fiscal deficits, has a statistically significant impact on yields. Higher global risk aversion (VIX) leads to higher local yields, likely reflecting flight to assets

denominated in reserve currencies. Real GDP growth has a statistically significant impact in some specifications, and the sign was negative.<sup>108</sup>

A decomposition of model yields suggest that deterioration in fiscal conditions (rising debt-to-GDP ratios) and risk appetite pushed yields higher following Lehman Brother's bankruptcy, while monetary easing counterbalanced these pressures in early 2009 (Figure 1.54). The policy rates continue to decline in Q3 2009 the most in Europe, Middle East and Africa (EMEA), as economic activity remained depressed in the region.

**Table 1.18. Group 2: Impact of Domestic and External Factors on Local Government Yields**

Dependent variable: medium-term government bond yields

Period: 1995Q1-2009Q3

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Policy rate (%)	0.778 *** (0.122)	0.774 *** (0.119)	0.750 *** (0.115)	0.780 *** (0.124)	0.755 *** (0.118)	0.776 *** (0.120)	0.750 *** (.116)	0.737 *** (0.156)
Debt (% of GDP)	0.103 ** (0.301)	0.108 * (0.039)	0.124 ** (0.035)	0.104 ** (0.031)	0.116 ** (0.039)	0.108 * (0.039)	0.126 ** (.036)	0.138 *** (0.036)
Real GDP growth (yoy, %)	-0.134 * (0.056)	-0.131 * (0.057)	-0.083 (0.063)	-0.141 * (0.058)	-0.079 (0.063)	-0.139 * (0.059)	-0.088 (.064)	
Global excess liquidity growth (yoy, %)		0.067 (0.141)			-0.164 (0.142)	0.062 (0.145)		
VIX (%)			0.046 (0.027)		0.054 (0.029)		0.051 (.028)	0.069 * (0.025)
Foreign debt inflow (% of GDP)				0.142 (1.552)		0.290 (1.501)	1.779 (1.454)	
Constant	-0.802 (1.364)	-1.064 (1.8347)	-2.547 (2.170)	-0.795 (1.396)	-2.226 (2.209)	-1.040 (1.883)	-2.711 (2.239)	-3.804 (1.928)
R-squared								
within	0.546	0.549	0.564	0.553	0.565	0.553	0.570	0.555
between	0.686	0.676	0.643	0.689	0.661	0.679	0.643	0.611
overall	0.653	0.647	0.632	0.656	0.644	0.650	0.634	0.612

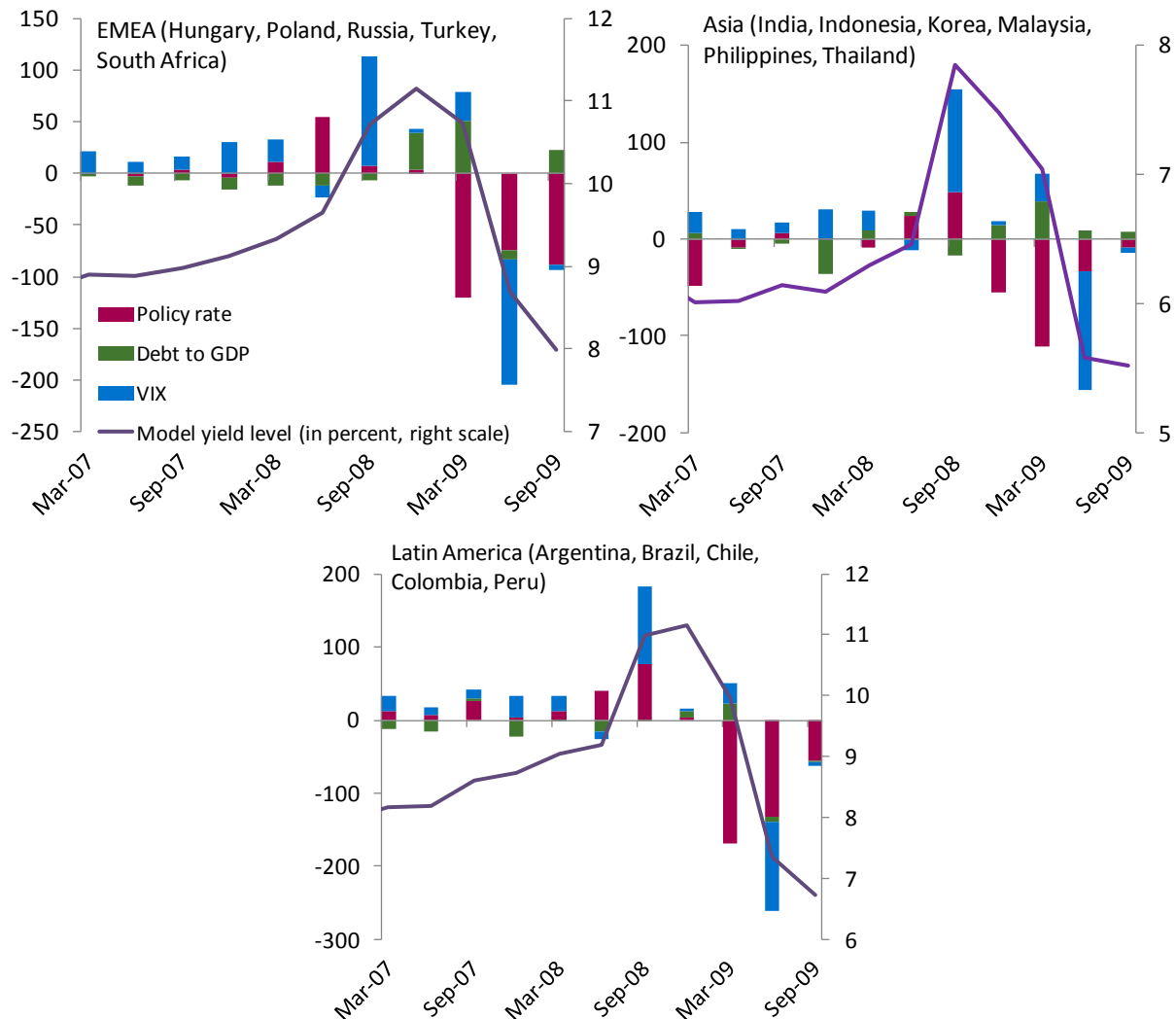
\* p<0.05, \*\* p<0.01, \*\*\* p<0.001

Source: IMF staff estimates.

Note: Included countries: Argentina, Brazil, Chile, Colombia, Croatia, Czech Republic, Estonia, Hungary, India, Indonesia, Kazakhstan, Korea, Latvia, Lithuania, Malaysia, Peru, Philippines, Poland, Russia, South Africa, Thailand, and Turkey.

Note: Model 8 is the baseline. Showing fixed-effect panel regression results with robust standard errors.

<sup>108</sup> One interpretation as to how higher GDP growth tends to lower yields (as opposed to increasing yields for countries in Group 1) may be that many economies in Group 2 may have “excess” capacity and not exhibit classic business cycles, thus higher income growth eases economy-wide liquidity constraints. Our valuation assessment is broadly robust to the including of the variable.

**Figure 1.54. Group 2. Contributions to Change in Local Government Yield***(In basis points)*

Source: IMF staff estimates.

Actual yields in 2009Q3 were somewhat lower than model predictions (i.e., bond prices were higher than model predictions) in a handful of countries, but not meaningfully so. Going forward, local yields may be vulnerable to policy rate “normalization” and renewed retrenchment in risk appetite.

### Local corporate credit

The model extends that featured in Box 1.5 of the April 2009 GFSR (IMF, 2009a), which seeks to explain U.S. investment-grade corporate bond spreads based on a combination of business cycle variables, volatility, and financial strains in various sectors. The specification used for this GFSR excludes variables representing capital inflow into the asset class.

## External sovereign credit

The model explores the determinants of emerging market sovereign external bond spreads, by relating JPMorgan's EMBIG composite index spread to variables representing economic, political, and financial risks, as well as a range of external factors. For more detail on the methodology, see Box 1.5 of the April 2006 GFSR.

Box 1.4 looks at the conditions in emerging markets that could potentially lead to the formation of asset price bubbles. The method used to create the figures follows that in Borio and Lowe (2002). The charts show quarterly real domestic credit, real cumulative portfolio inflows and real asset prices. Real asset prices are the simple average of real equity prices and real house prices, where available. Each data series is shown relative to its trend, calculated using a Hodrick-Prescott filter with a high smoothing parameter, an approach widely accepted in the academic literature. The de-trended series is then converted to a z-score using the average and standard deviation calculated over the period 1991 to 2005.

The first figure shows the average of the three time series in past episodes of financial stress, specifically: (i) data for the euro area, Japan, United Kingdom and United States in the early 1990s; (ii) information for the same countries but for the recent Global Credit Crisis; and (iii) figures for the south-east Asian countries (excluding Japan) during the 1997 crisis. The chart plots a smoothed, four-quarter moving average. The second figure shows a z-score of the median de-trended series for Brazil, China, India, and Russia. The z-score is based on the same period as above.

### *What are the potential consequences if investors are too sanguine about growth or interest rates?*

Our sensitivity analysis in Table 1.19 indicates that equity valuations could come under significant pressure if growth disappoints or interest rates rise more than expected, pointing to the risk of a sudden correction.<sup>109</sup> Local government yields could be pressured upwards if policy rates and liquidity conditions rise sharply or fiscal sustainability worsens (see Annex 1.4). Such negative scenarios could also translate into a fast and significant reversal of recent portfolio flow trends.

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<sup>109</sup> To illustrate this point, we measured the sensitivity of the results from the dividend discount model to a change in two main inputs, long-term real yields and earnings growth. The size of shocks to long-term yields was selected guided by our econometric analysis that relates government yields to domestic and external determinants. As for earnings growth expectations, we relied on historical deviations of analyst expectations from outturns to determine the size of possible shocks. The results indicate that unexpected shocks of reasonably realistic sizes could make valuations appear overly stretched. Data limitations prevented a broader extension of this analysis to emerging market and other advanced economies.

**Table 1.19. Sensitivity of Equity Valuations Using Dividend Discount Model to Shocks to Discount Rate and Earnings Growth**

(z score, February 2010 data)

	Baseline	Alternative valuations when ....							
		discount rate is shocked by ... (basis points)				earnings growth is shocked by ... (percentage points)			
		+50	+100	+200	+300	-1	-3	-5	-10
Australia	-2.1	-1.5	-1.0	0.0	0.7	-1.6	-0.6	0.4	2.9
Austria	-0.1	0.2	0.4	0.7	1.0	0.1	0.4	0.8	1.6
Belgium	-0.3	0.2	0.4	0.7	0.9	0.0	0.3	0.6	1.2
Canada	0.4	1.0	1.5	2.4	3.0	0.9	1.8	2.7	4.9
France	-1.1	-0.5	0.1	0.9	1.6	-0.7	0.3	1.2	3.5
Germany	-1.3	-0.9	-0.5	0.2	0.7	-0.9	-0.2	0.6	2.5
Ireland	0.9	0.9	1.0	1.0	1.1	0.9	1.0	1.1	1.4
Italy	-0.6	-0.3	-0.1	0.3	0.6	-0.4	0.1	0.5	1.6
Japan	-2.6	-2.3	-2.1	-1.7	-1.4	-2.5	-2.2	-1.9	-1.3
Netherlands	-1.0	-0.6	-0.2	0.5	1.0	-0.7	-0.1	0.5	2.0
Spain	0.2	0.7	1.1	1.7	2.2	0.5	1.3	2.1	3.9
Sweden	0.2	0.6	1.0	1.7	2.2	0.6	1.4	2.2	4.1
Switzerland	0.9	1.3	1.7	2.3	2.7	1.1	1.7	2.3	3.6
United Kingdom	-0.9	-0.5	0.0	0.6	1.2	-0.6	0.1	0.9	2.7
United States	-0.1	0.6	1.2	2.1	2.8	0.4	1.4	2.4	4.7

Sources: Bloomberg, L.P.; Consensus Economics; Datastream; IBES; and IMF staff estimates.

Note: This table indicates the sensitivity of present equity valuations to higher discount rates and lower earnings expectations, based on a dividend discount model. The numbers in the table represent z-scores (the differences between actual equity prices and estimated equilibrium levels divided by the standard deviation of the differences) to account for country-specific data characteristics. For instance, a value of two signifies actual values are above equilibrium by two standard deviations, potentially becoming stretched. Green signifies one standard deviation or less, orange between one and two standard deviations, and red two standard deviations or greater. The table uses long-term consensus forecasts of long-term government yields for discount rates and IBES forecasts of long-term earnings growth.



### ANNEX 1.10. EURO ZONE SOVEREIGN SPREADS: GLOBAL RISK AVERSION, SPILLOVERS OR FUNDAMENTALS?<sup>110</sup>

*This annex explores what was driving the large movements in euro zone sovereign spreads over the course of the crisis. In particular, how much of these changes reflected shifts in global risk aversion or country-specific risks, both directly from worsening fundamentals and indirectly from spillovers originating in other sovereigns? The analysis shows that earlier in the crisis, the surge in global risk aversion was a significant factor influencing swap spreads, while more recently country-specific factors have started to dominate.*

To measure euro zone sovereign spreads as spreads to a common numeraire, we use the yield on a 10-year euro swap, in other words the yield at which one party is willing to pay a fixed rate in order to receive a floating rate from a given counterparty. The credit risk of exposure of these swaps should reflect that of the better quality banks across the euro zone. Therefore, the swap spread should in part reflect the risk differential between individual sovereigns and the euro zone banking system as a whole. Typically, the yield on an AAA-rated government bond would trade below the swap yield. In contrast, yields on lower-rated bonds might be above the swap yield as investors demand a higher premium on these riskier assets. The crisis and the following interventions of the sovereigns to support financial institutions have significantly altered these relationships.

In order to address the question of what is driving euro area sovereign spreads, we introduce a simple model where each of these spreads is regressed over a number of factors including:

- (i) *Global Risk Aversion*. The price of an asset reflects both market expectations of the asset's returns and the price of risk; i.e., the price that investors are willing to pay for receiving income in "distressed" states of nature. The Index of Global Risk Aversion typifies the market price of risk; thus, it allows us to extract from asset prices the effects of price of risk; henceforth, to compute the market's expectation of the probability of distress (Espinoza and Segoviano, 2010).

- (ii) *Fundamentals*, identified by each country's stock of public debt and budget deficit.

- (iii) *Spillovers*, as captured by a measure of distress dependence, which characterizes the probability of distress of a country conditional on another country becoming distressed. This indicator embeds distress dependence across sovereign CDS and their changes throughout the economic cycle, reflecting the fact that dependence increases in periods of distress. This measure of distress dependence is appropriately weighed by the probability of each of these events to occur (Segoviano and Goodhart, 2009).

The constructed data set spans from mid-2005, well ahead of the start of the crisis, through early 2010, for a total of over 1,000 daily observations, encompassing ten euro zone sovereign markets.

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<sup>110</sup>The authors of this annex are Carlos Caceres, Vincenzo Guzzo, and Miguel Segoviano.

### The Estimation Model

The model used in this analysis is described by the following General Autoregressive Conditional Heteroskedasticity (GARCH(1,1)) specification:

$$Y_t = \alpha Y_{t-1} + \beta' X_t + \varepsilon_t \quad [1]$$

$$\sigma_t^2 = \omega + \theta \varepsilon_{t-1}^2 + \gamma \sigma_{t-1}^2 \quad [2]$$

where [1] is the mean equation for the swap spreads  $Y_t$  as a function of the explanatory variables stacked in the vector  $X_t$  (which include a constant term) and an error term  $\varepsilon_t$ , with conditional variance  $\sigma_t^2$ . This conditional variance is given by equation [2] as function of the lag of the squared residual from the mean equation  $\varepsilon_{t-1}^2$  and last period's variance  $\sigma_{t-1}^2$ .

The explanatory variables include an index of Global Risk Aversion, a measure of distress dependence captured by the sum of joint probabilities of default and two country specific fundamental variables, namely the overall fiscal balance as percent of GDP and the debt-to-GDP ratio. The lagged dependent variable is included in the model to capture the high persistence inherent in the swap spread time series<sup>111</sup>.

### Estimation Results

The results from the estimation of the model described by equations [1] and [2] are presented in Table 1.<sup>112</sup> These results were obtained using daily data from 2005Q2 to 2009Q3<sup>113</sup>.

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<sup>111</sup> The presence of the lag dependent variable mitigates the autocorrelation that would otherwise be observed in the residuals from estimating equation [1] without the lag dependent variable.

<sup>112</sup> The estimation was carried out in EViews via Maximum likelihood estimation, using the Marquardt optimization algorithm.

<sup>113</sup> The daily series for the fundamental variables were obtained by using a linear interpolation on the underlying quarterly data. This is based on the assumption that these variables tend to explain the low frequency movements on the swap spreads, with almost no impact on high frequency (daily) variations in these spreads.

Table 1.20. GARCH Estimation Results

Country	GER	FRA	ITA	SPA	NET	BEL	AUT	GRE	IRE	POR
<b>Mean equation:</b>										
Constant	-0.247***	-0.162**	-0.196**	-0.160***	-0.211***	-0.068**	-0.158***	-0.402***	-0.276***	-0.107***
	-0.068	-0.073	-0.09	-0.024	-0.028	-0.028	-0.034	0.057	-0.065	-0.038
Lagged dependent	0.902***	0.939***	0.930***	0.896***	0.891***	0.864***	0.918***	0.918***	0.947***	0.915***
	-0.01	-0.009	-0.01	-0.013	-0.013	-0.015	-0.008	-0.007	-0.007	-0.008
Global Risk Aversion	-0.251***	-0.327***	0.005	-0.200***	-0.355***	-0.215***	-0.254***	-0.012	-0.203***	-0.319***
	-0.063	-0.052	-0.063	-0.05	-0.056	-0.052	-0.045	-0.06	-0.055	-0.053
Contagion	0.185**	0.470***	0.649***	0.694***	0.734***	1.188***	0.933***	1.662***	0.988***	1.453***
	-0.101	-0.07	-0.101	-0.073	-0.081	-0.116	-0.081	-0.159	-0.1	-0.11
Fiscal Balance	-0.005***	-0.004*	-0.005***	-0.003***	-0.006***	-0.006***	-0.003***	-0.001*	-0.002***	-0.002**
	-0.001	-0.002	-0.001	-0.001	-0.002	-0.001	-0.001	-0.001	-0.001	-0.001
Debt/GDP ratio	0.002*	0	0.002**	0.001***	0.001**	-0.001	0	0.004***	0.002***	-0.001*
	-0.001	-0.001	-0.001	0	0	0	0	-0.001	-0.001	0
<b>Variance equation:</b>										
Constant	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
	0	0	0	0	0	0	0	0	0	0
ARCH term	0.227***	0.256***	0.119***	0.321***	0.220***	0.220***	0.242***	0.135***	0.183***	0.232***
	-0.024	-0.031	-0.014	-0.036	-0.026	-0.028	-0.028	-0.017	-0.021	-0.029
GARCH term	0.784***	0.751***	0.882***	0.691***	0.780***	0.780***	0.765***	0.918***	0.834***	0.755***
	-0.02	-0.026	-0.012	-0.026	-0.022	-0.025	-0.024	-0.012	-0.016	-0.023
R-squared	0.952	0.956	0.988	0.983	0.967	0.978	0.984	0.996	0.997	0.987
No. of observations	995	1061	1061	1061	1061	995	1061	995	1061	1061

Source: IMF Staff Estimates; \* significant at 10 percent level. \*\* significant at 5 percent level. \*\*\* significant at 1 percent level.

**Distress Dependence Matrices**

Contagion could be further broken down across sources of distress. In other words, for a given probability of distress in a specific sovereign, we can assess which countries are the most significant sources of contagion during the four phases we previously identified. The percentage contributions to a country's probability of distress can be read along the rows of table 2. As noted in the text, the pattern of distress dependence has varied through the crisis, with those countries with most pressing fiscal concerns (Greece, Portugal and Spain) becoming the largest contributors to sovereign risk spillover in the euro zone.

**Table 1.21. Distress Dependence Matrices**

Jul 07_Sep 08	GER	FRA	ITA	SPA	NET	BEL	AUT	GRE	IRE	POR	
GER		19.4	16.5	20.2	13.0	9.7	4.6	4.2	3.9	8.5	100.0
FRA	5.7		21.0	26.0	19.3	10.8	3.0	3.2	3.5	7.6	100.0
ITA	4.2	17.3		29.6	13.9	9.4	4.6	5.6	4.9	10.6	100.0
SPA	5.0	18.4	26.9		12.8	9.7	4.4	5.3	5.5	12.1	100.0
NET	4.7	22.1	19.8	20.3		13.7	3.9	3.5	4.5	7.5	100.0
BEL	5.1	14.4	17.3	17.0	14.7		6.6	7.0	7.2	10.7	100.0
AUT	4.5	10.2	17.7	15.4	10.0	11.3		8.5	8.0	14.4	100.0
GRE	4.3	9.8	19.2	16.2	8.3	10.5	8.2		8.8	14.8	100.0
IRE	4.7	10.5	17.8	16.3	9.6	10.7	8.4	9.9		11.9	100.0
POR	4.4	12.0	19.8	21.9	9.5	10.0	7.4	8.6	6.3		100.0
	4.2	14.1	18.1	19.7	11.8	9.2	4.4	4.9	4.7	9.0	100.0

Oct 08_Mar 09	GER	FRA	ITA	SPA	NET	BEL	AUT	GRE	IRE	POR	TOT
GER		9.9	12.0	11.1	13.7	9.4	15.8	8.4	11.1	8.7	100.0
FRA	7.7		11.8	9.7	17.4	8.9	18.0	7.8	11.4	7.3	100.0
ITA	6.3	8.6		10.8	14.7	8.9	19.2	9.9	13.9	7.8	100.0
SPA	6.5	8.6	13.3		14.3	8.5	18.6	9.0	14.1	7.1	100.0
NET	6.9	10.1	13.3	11.5		10.6	17.3	8.9	12.3	9.0	100.0
BEL	6.1	8.1	11.3	9.2	14.8		19.0	9.4	14.5	7.5	100.0
AUT	5.7	7.9	14.1	12.6	11.4	10.6		11.8	14.4	11.5	100.0
GRE	5.3	7.0	12.8	10.5	11.0	9.5	18.4		16.1	9.3	100.0
IRE	5.4	7.2	13.3	11.6	11.7	10.5	18.2	12.5		9.6	100.0
POR	5.8	7.6	11.6	9.0	12.8	8.4	21.0	9.8	13.8		100.0
TOT	5.6	7.4	11.4	9.6	12.2	8.5	16.7	8.8	12.3	7.7	100.0

Apr 09_Sep 09	GER	FRA	ITA	SPA	NET	BEL	AUT	GRE	IRE	POR	TOT
GER		9.5	12.6	11.0	11.0	10.6	13.1	9.9	12.9	9.3	100.0
FRA	8.0		12.8	12.3	10.7	10.7	12.3	10.3	12.8	10.1	100.0
ITA	6.9	7.7		11.3	10.8	10.9	15.2	11.8	15.6	9.8	100.0
SPA	7.4	8.9	12.8		10.9	10.9	13.7	11.2	14.3	10.0	100.0
NET	7.1	8.7	13.6	11.6		11.3	13.6	10.6	13.9	9.6	100.0
BEL	6.8	8.3	13.0	10.8	11.2		14.5	11.0	14.9	9.4	100.0
AUT	6.5	7.3	14.0	10.7	10.4	11.2		12.7	17.3	9.9	100.0
GRE	6.4	7.4	13.1	10.0	10.2	10.9	15.9		16.6	9.5	100.0
IRE	6.5	7.2	13.8	10.4	10.5	11.5	17.3	13.2		9.6	100.0
POR	6.9	8.4	12.9	10.9	10.4	10.6	14.1	11.4	14.4		100.0
TOT	6.2	7.2	11.9	9.8	9.5	9.9	13.1	10.3	13.4	8.7	100.0

Apr 09_Sep 09	GER	FRA	ITA	SPA	NET	BEL	AUT	GRE	IRE	POR	TOT
GER		9.5	12.6	11.0	11.0	10.6	13.1	9.9	12.9	9.3	100.0
FRA	8.0		12.8	12.3	10.7	10.7	12.3	10.3	12.8	10.1	100.0
ITA	6.9	7.7		11.3	10.8	10.9	15.2	11.8	15.6	9.8	100.0
SPA	7.4	8.9	12.8		10.9	10.9	13.7	11.2	14.3	10.0	100.0
NET	7.1	8.7	13.6	11.6		11.3	13.6	10.6	13.9	9.6	100.0
BEL	6.8	8.3	13.0	10.8	11.2		14.5	11.0	14.9	9.4	100.0
AUT	6.5	7.3	14.0	10.7	10.4	11.2		12.7	17.3	9.9	100.0
GRE	6.4	7.4	13.1	10.0	10.2	10.9	15.9		16.6	9.5	100.0
IRE	6.5	7.2	13.8	10.4	10.5	11.5	17.3	13.2		9.6	100.0
POR	6.9	8.4	12.9	10.9	10.4	10.6	14.1	11.4	14.4		100.0
TOT	6.2	7.2	11.9	9.8	9.5	9.9	13.1	10.3	13.4	8.7	100.0

Source: IMF staff estimates.

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