Annex 1.2. Euro Area Corporate Debt Overhang and Implications for Bank Asset Quality

Objectives and Analytical Approach

The challenges posed by the debt overhang for large publicly traded firms in stressed euro area economies were analyzed in the April 2013 GFSR.[71] In this GFSR, the analysis of debt overhang is extended to the broader corporate sector, particularly to the small and medium enterprise (SME) segment. Because smaller firms in stressed euro area economies tend to have higher leverage and lower profitability than larger firms, and also face tighter financing constraints and fewer deleveraging options, the focus is on firms' debt-servicing capacity. The capacity to service debt can be gauged by looking at a firm's interest coverage ratio (ICR).[72] The size of the debt overhang in the broader corporate sector is defined as the share of total debt outstanding owed by firms with ICRs of less than 1; this concept is often referred to as debt-at-risk. An ICR of less than 1 means that a firm is unable to service its debt without making some adjustments, such as reducing operating costs, or drawing down its cash reserves, or even borrowing more. The analysis of corporate debt overhang concludes by drawing the implications for bank asset quality.

Data

The analysis is based on firm-level annual data from the Bureau van Dijk's Amadeus database. The sample includes more than 3 million nonfinancial firms, both publicly traded and private, from France, Germany, Italy, Portugal, and Spain (see Table 1.9). In these economies, Amadeus's coverage approaches 100 percent of available coverage from public and official sources.[73] Coverage of the SME segment is especially good in Italy, Portugal, and Spain. Although coverage of the SME segment is considerably smaller in Germany, Amadeus still captures two-thirds of corporate sector assets.

Table 1.9. Amadeus Database, 2011

	Number of Firms (thousands)	Total Assets	
		Billions of Euros	Percent of Total[1]
France	866	3,398	43
Germany	145	3,389	66
Italy	1,035	3,194	100
Portugal	352	361	52
Spain	818	2,199	67

Sources: Amadeus; national central banks; and IMF staff estimates.
[1]Percent of financial and nonfinancial assets of the entire corporate sector, based on central bank flows of funds data; and IMF staff estimates.

Leverage, Profitability, and Debt-at-Risk

Debt-at-risk in stressed euro area economies has increased since 2001 and tends to be larger in the SME sector (Figure 1.63, panels 1 and 2). SMEs have higher debt-at-risk because of a combination of high leverage and weak profitability:

- *Leverage*—as measured by the debt-to-EBITDA ratio—increased sharply in stressed euro area economies and is now much higher than in the core, especially in Portugal and Spain, and among SMEs (Figure 1.63, panels 3 and 4).
- These firms entered the crisis with weak *profitability* (Figure 1.63, panel 5). In contrast to the core economies, in stressed economies, SMEs tend to have much weaker profitability than large firms have (panel 6).

Higher lending rates caused by financial fragmentation in the euro area have contributed to the higher debt-at-risk among corporates and SMEs in stressed euro area economies (Figure 1.64).

Analysis of Corporate Debt Overhang

The "Chronic-Phase" and "Reversal-of-Fragmentation" Scenarios

To assess debt-at-risk on a forward-looking basis, ICRs are forecast under a "chronic-phase" scenario and a "reversal-of-fragmentation" scenario.

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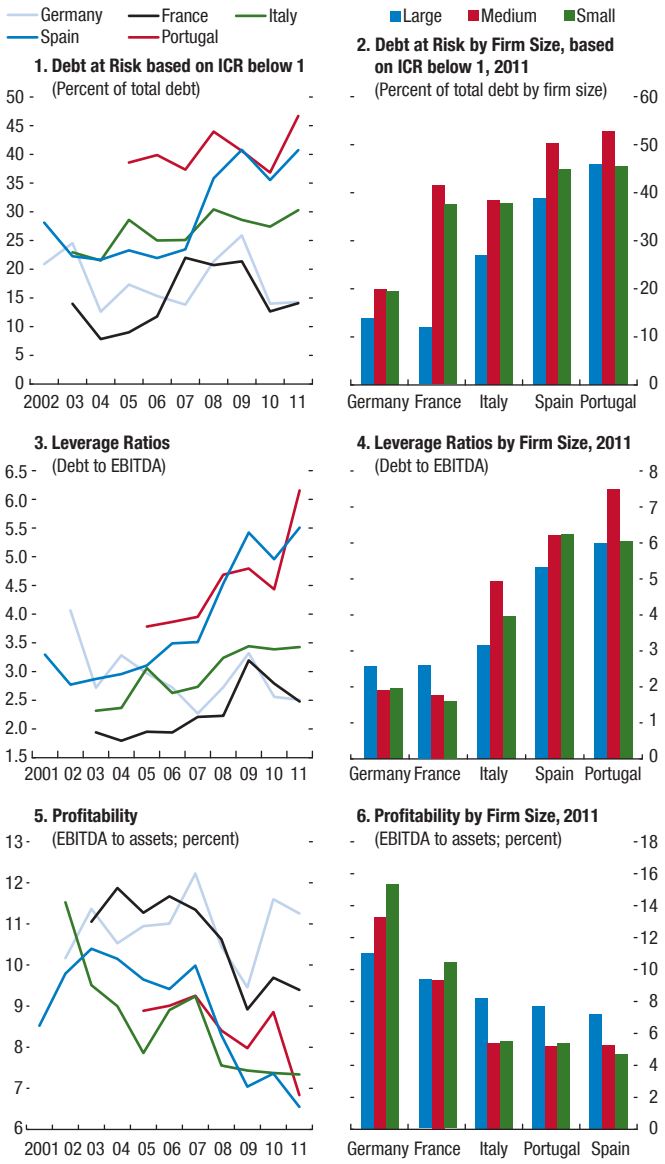
[71]The analysis in the April 2013 GFSR focused on debt repayment capacity. The debt overhang was defined as debt owed by firms that are unable to generate sufficient cash flows to repay debt (i.e., to reduce debt to sustainable levels in the medium term). The main conclusion was that the deleveraging required to bring the stock of debt down to sustainable levels could be a significant drag on growth.

[72]The interest coverage ratio (ICR) is defined as earnings before interest and taxes (EBIT) divided by interest expense. Interest revenues or financial revenues are included in the calculation of earnings (and thus partly offset interest expense). Given that the focus of the analysis is on firms' medium-term prospects, the concept of EBIT—rather than EBITDA—is used because it allows the analysis to assess whether a firm is economically viable. In some cases, rating agencies and analysts may use EBITDA when the focus is on a firm's short-term cash position.

[73]Variations in coverage across countries reflect mostly the stringency of filing requirements at local registries and associated penalties for failure to comply.

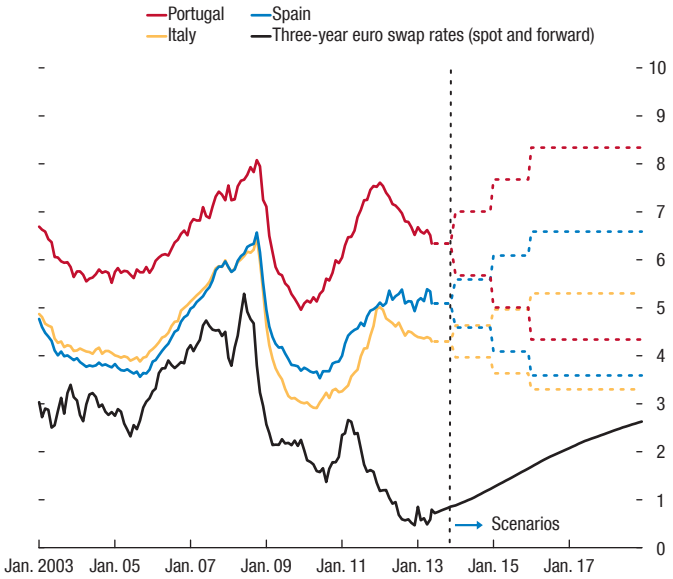
Figure 1.63. Leverage, Profitability, and Debt at Risk



Sources: Amadeus database; and IMF staff estimates.
Note: EBITDA = earnings before interest, taxes, depreciation, and amortization.
ICR = interest coverage ratio.

Figure 1.64. Bank Lending Rates to Small and Medium Enterprises

(Percent)



Sources: Haver Analytics; and IMF staff estimates.

Earnings before interest and taxes (EBIT) are projected using GDP growth forecasts. Time-series regressions specific to country, sector, and firm size are estimated, as are country-specific panel regressions, where corporate profitability (EBIT over assets), is regressed on GDP growth. GDP growth projections under the October 2013 *World Economic Outlook* baseline and alternative scenarios are used in the reversal-of-fragmentation and chronic-phase scenarios, respectively.

Interest rates on corporate debt are also projected under the chronic-phase and reversal-of-fragmentation scenarios. The symmetric shocks are calibrated based on the econometric exercise presented in Annex 1.1.[74] This is broadly consistent with a return of SME lending spreads over swaps to precrisis levels under the reversal-of-fragmentation scenario (see Figure 1.64). The shock for large companies is assumed to be half that for SMEs, also in line with a return to precrisis lending spreads.

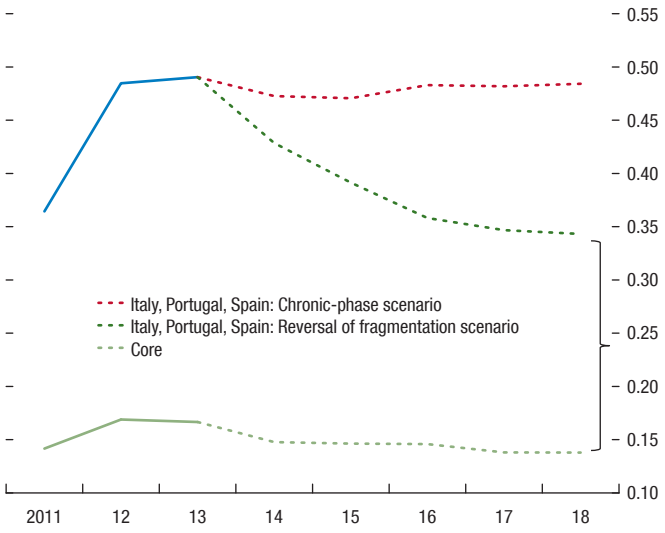
[74]The exercise described in Annex 1.1 finds that removing fragmentation would result in a reduction of lending rates to small and medium enterprises (SMEs) of about 100 basis points in Italy and 160 basis points in Spain. We assume that the effect on lending rates to SMEs in Portugal would be about 200 basis points. The reduction in lending rates under the reversal-of-fragmentation scenario is assumed to be phased in during 2014–16 as gradual progress is made toward banking and fiscal union. A symmetric shock is assumed under the chronic-phase scenario.

"Persistent" Debt Overhang

The debt overhang declines significantly as growth recovers and financing costs decline under the reversal-of-fragmentation scenario.[75] Sensitivity analysis shows that the debt overhang declines by about 5 percentage points, on average, if fragmentation is reduced by 100 basis points or growth improves by 3 percentage points.

The reversal-of-fragmentation scenario provides a basis for assessing the size of the *"persistent" corporate debt overhang*. This persistent debt overhang is defined as the share of debt in stressed euro area economies that is owed by firms with an ICR of less than 1 under the reversal-of-fragmentation scenario, in excess of the equivalent share in the core. Firms in stressed economies and in the core are expected to face similar financial conditions under the reversal-of-fragmentation scenario, but even under these benign financing conditions, and the assumed recovery in profitability in line with the projected economic recovery, a sizable persistent debt overhang of almost one-fifth of total corporate debt remains in stressed economies (indicated by the bracket in Figure 1.65).

Figure 1.65. Projected Corporate Debt Overhang in Italy, Portugal, and Spain
(Based on ICR < 1; share of total debt)



Sources: Amadeus database; and IMF staff estimates.
Note: ICR = interest coverage ratio.

Assessing Implications for Bank Asset Quality

Finally, this GFSR illustrates the implications of corporate sector stresses for bank asset quality by estimating potential bank losses on corporate exposures (assuming no improvement in corporate fundamentals over the next two years) and comparing them with bank buffers to gauge the extent to which these asset quality problems might not have yet been dealt with.

Compared to the standard bank solvency stress tests, the GFSR analysis provides a complementary (yet, less precise) perspective on the problem of corporate stress and its implications for bank asset quality. While standard bank solvency stress tests typically rely on granular information on the individual bank exposures to different types of borrowers, the GFSR analysis considers *aggregate* banking system exposures, and hence cannot yield any insights about individual banks. On the other hand, the GFSR analysis uses very detailed nonfinancial firm-level data to assess the extent of potential credit quality deterioration on corporate exposures of the entire banking system. In addition, the GFSR analysis has the advantages of using a consistent approach across firms and countries, and providing an up-to-date assessment of corporate sector stress and its implications for banks (see Box 1.5 for more details).

Assuming that corporate fundamentals remain unchanged, the potential losses during 2014–15 arising from the corporate exposures of the banking system are assessed as follows:

- ICRs as of 2013 are extrapolated using the latest data available, with estimates of EBIT based on the 2011 firm-level data from Amadeus and October 2013 *World Economic Outlook* GDP growth and the estimates of interest expense based on actual lending rates.[76]
- The firm-level ICRs are mapped into the probabilities of default (PDs) by (1) assigning implied credit ratings to companies in the sample based on average ICRs by credit rating for companies rated by Moody's, and (2) assigning PDs over the next two years to each implied rating based on historical

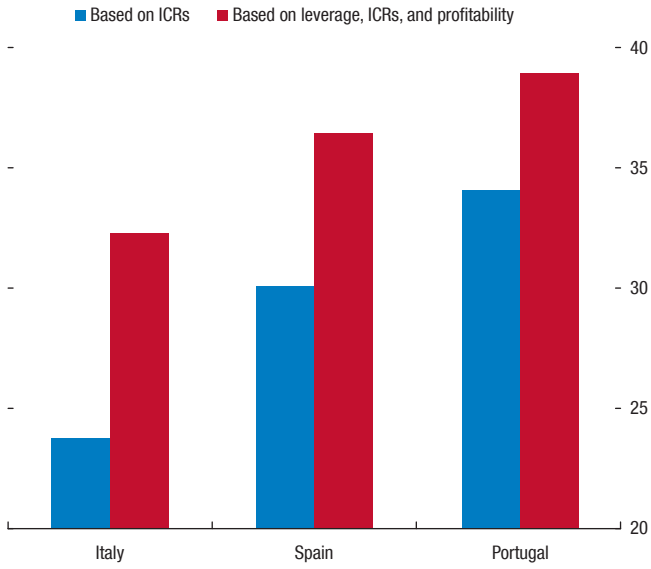
[75]The analysis assumes that balance sheets remain static in the forecast period. Aggregate data for 2012 show that corporate debt declined in Spain, and credit data suggests that the decline in debt is greater in weaker companies. However, the lack of data on the asset side and on the effect of asset sales on the income statement prevents this study from taking deleveraging into account.

[76]The EBIT projections use the same empirical relationships between profitability and GDP growth as the ones discussed in the section on "Analysis of Corporate Debt Overhang" in this Annex. In the case of Portugal, the estimated ICRs are adjusted using actual 2012 data (available to date) by sector/size that were provided by the Bank of Portugal.

default rates of companies rated by Moody's. Aggregate PDs on corporate debt owed to banks are estimated at the country level as the average of PDs of individual firms weighted by the share of each firm's debt in aggregate country debt.[77] This mapping of corporate credit scores into implied ratings and PDs is a standard approach used by rating agencies and banks. The estimation of PDs is robust to the use of alternative corporate vulnerability indicators (other than ICRs), such as profitability and leverage ratios (Figure 1.66), and to the use of historical default rates from other rating agencies (Table 1.10). Generally, PDs based on ICRs and on Moody's historical default rates tend to be lower than those based on other vulnerability indicators and rating agencies.

- Loss rates at the country level are obtained by multiplying estimated aggregate PDs by loss given default (LGD) ratios. A range of 10 percentage points around the standard Basel LGD ratio of 45 percent is used to estimate a range of potential loss rates (to reflect uncertainties about collateral valuations). Potential bank losses from corporate exposures at the aggregate country level are obtained by applying these aggregate loss rates to the stock of loans extended to nonfinancial corporates by monetary financial institutions in each country.[78]
- The estimated potential losses are related to existing buffers, including provisions on corporate loans, operating profits, and Tier 1 capital[79] (see Figure 1.53 in the main text of the chapter).

Figure 1.66. Probabilities of Default in the Corporate Sector
(Percent as of 2011; over the next two years)



Sources: Amadeus database; and IMF staff estimates.
Note: ICR = interest coverage ratio.

The key parameters used in the GFSR analysis, such as PDs and LGD ratios, appear to be broadly in line with those used in available stress testing exercises that consider the entire stock of loans. For example, using the same approach as described previously to estimate three-year PDs at the end of 2011 yields an estimated aggregate PD for Spain that falls within the range of the parameters used in the Oliver Wyman stress tests published in 2012 (Table 1.11); the same is true for the LGD assumptions.

[77]Fifty percent of debt of large corporates and all debt of SMEs is assumed to be owed to banks.

[78]For Spain, potential losses on bank loans are adjusted for the loans transferred to SAREB (Spain's asset management company) in December 2012 and February 2013.

[79]Buffers on domestic corporate exposures may be overestimated because provisions, operating profits, and core Tier 1 capital data are available only on a consolidated basis at the system level. Provisions on corporate loans are estimated by applying the share of corporate loans in nonperforming loans to the stock of total provisions, including general provisions.

Table 1.10. Mapping of Corporate Vulnerability Indicators to Probabilities of Default

Corporate Vulnerability Indicators[1,2]				Cumulative Default Rates[3]					
				Moody's		Standard & Poor's		Fitch	
ICR	Profitability	Leverage	Implied Rating	Year 1	Year 2	Year 1	Year 2	Year 1	Year 2
27.0	21.1	0.6	Aaa/AAA	0.0	0.0	0.0	0.0	0.0	0.0
14.7	13.5	1.5	Aa/AA	0.0	0.1	0.0	0.0	0.0	0.0
9.3	12.0	2.0	A/A	0.1	0.2	0.1	0.2	0.1	0.2
5.2	9.9	2.6	Baa/BBB	0.2	0.5	0.2	0.6	0.2	0.7
3.4	9.3	3.2	Ba/BB	1.1	3.1	0.9	3.0	1.1	2.8
1.6	7.3	4.8	B/B	4.1	9.6	4.5	10.0	2.0	4.8
0.5	3.2	7.6	Caa-C/CCC-C	16.4	27.9	26.8	36.0	24.9	31.9

Sources: Fitch; Moody's; Standard and Poor's; and IMF staff estimates.
[1]ICR is defined as EBIT/interest expense; profitability is defined as EBIT/average assets; leverage is defined as Debt/EBITDA.
[2]The probabilities of default are extrapolated beyond those corresponding to the implied rating C for firms with weaker vulnerability indicators.
[3]Based on 1970–2012 for Moody's, 1981–2011 for S&P, and 1990–2012 for Fitch.
Note: EBITDA = earnings before interest, taxes, depreciation, and amortization; ICR = interest coverage ratio.

Table 1.11. Comparison of the GFSR Analysis with Oliver Wyman's Stress Tests for Spain

	PD Baseline	PD Adverse	LGD Baseline	LGD Adverse
Oliver Wyman, as of 2011 (for 2012–14)				
Real Estate Developers	0.61	0.88	0.39	0.47
Large Corporates	0.09	0.17	0.47	0.49
Small and Medium Enterprises	0.21	0.35	0.40	0.42
Total Corporate Sector	**0.29**	**0.45**	**0.42**	**0.46**
GFSR, as of 2011 (for 2012–14)	**0.37**		**0.45**	

Sources: Bank of Spain; IMF staff estimates.
Note: LGD = loss given default; PD = probability of default.

Box 1.5. The GFSR Analysis of Corporate Credit Quality versus Bank Stress Tests

The methodological approach used in this GFSR to assess potential losses on corporate exposures of the banking systems can be compared with standard stress tests that are carried out in the context of Financial Sector Assessment Programs, by looking at the main elements of the analysis:

Exposures

- Standard bank solvency stress tests focus mainly on additional losses on performing loans and, in some cases, capture the impact on existing nonperforming loans (NPLs) through, for instance, adjusting loss given default (LGD) rates in the stress scenario. The analysis is based on granular, bank-level data on loan exposures. In some cases, the adequacy of provisions against the existing stock of NPLs is assessed as well.
- The GFSR analysis considers the entire stock of loans, sidestepping the issue of banks' classification of exposures as performing or nonperforming and any cross-country differences in NPL definitions. The analysis considers aggregate corporate loan exposures of all banks operating in a given country.

Probabilities of Default

- In a standard bank solvency stress test, PD is typically defined as the one-year probability that a performing loan becomes nonperforming (actual default rates from the central credit registry provided by central banks are commonly used; forward-looking PDs are also often tied to specific macroeconomic assumptions).
- In the GFSR analysis, the PDs are estimated at the firm level (not at the loan level) and are obtained by mapping current corporate vulnerability indicators into PDs through implied credit ratings for individual companies.

Loss Given Default Rates

- The LGD rate used in many standard stress tests are typically provided by supervisory authorities, who may use different methodologies to estimate aggregate LGDs (e.g., coverage ratios, LGDs estimated from collateral valuation models, and so forth).
- The GFSR analysis uses the *Basel LGD ratio of 45 percent* (and a range of ±10 percentage points around the 45 percent level to reflect uncertainties about collateral valuation).

References

Acharya, Viral V., and T. Öncü, 2013, "A Proposal for the Resolution of Systemically Important Assets and Liabilities: The Case of the Repo Market," *International Journal of Central Banking*, Vol. 9, No. S1, pp. 293–394.

Amisano, Gianni, and Carlo Giannini, 1997, *Topics in Structural VAR Econometrics* (New York: Springer).

Arslanalp, Serkan, 2013, "Banking Sector Risks under the Government's New Policies," in *Japan: Selected Issues,* IMF Country Report No. 13/254 (Washington: International Monetary Fund).

Banca d'Italia, 2013, *Financial Stability Report* (Rome).

Barisitz, Stephan, 2013, "Nonperforming Loans in Western Europe—A Selective Comparison of Countries and National Definitions," *Oesterreichische Nationalbank Focus on European Economic Integration* Q1/13 (Vienna).

Begalle, Brian, Antoine Martin, James McAndrews, and Susan McLaughlin, 2013, "The Risk of Fire Sales in the Tri-Party Repo Market," Federal Reserve Bank of New York Staff Report No. 616 (New York).

Bloom, Nicholas, 2009, "The Effect of Uncertainty Shocks," *Econometrica*, Vol. 77, No. 3, pp. 623–85.

Christiano, Lawrence J., and Terry J. Fitzgerald, 1999, "The Band Pass Filter," NBER Working Paper No. 7257 (Cambridge, Massachusetts: National Bureau of Economic Research).

Chung, Hess, Jean-Philippe Laforte, David Reifschneider, and John C. Williams, 2011, "Have We Underestimated the Likelihood and Severity of Zero Lower Bound Events?" Federal Reserve Bank of San Francisco Working Paper No. 2011–01.

Dattels, Peter, Rebecca McCaughrin, Ken Miyajima, and Jaume Puig, 2010, "Can You Map Global Financial Stability?" IMF Working Paper No. 10/145 (Washington: International Monetary Fund).

Dudley, William, 2013, "Fixing Wholesale Funding to Build a More Stable Financial System," remarks at the New York Bankers Association Annual Meeting and Economic Forum, New York, February 1.

European Banking Authority, 2012, *Final Report on the Implementation of Capital Plans Following the EBA's 2011 Recommendation on the Creation of Temporary Capital Buffers to Restore Market Confidence* (London).

European Central Bank (ECB), 2009, *Monthly Bulletin* (August).

———, 2010, *Monthly Bulletin* (May).

———, 2013a, *Corporate Finance and Economic Activity in the Euro Area: Structural Issues Report 2013*, Occasional Paper No. 151 (Frankfurt).

———, 2013b, *Financial Stability Review* (Frankfurt, May).

Financial Stability Board (FSB), 2013, "Strengthening Oversight and Regulation of Shadow Banking: A Policy Framework for Addressing Shadow Banking Risks in Securities Lending and Repos" (Basel).

Financial Stability Oversight Council (FSOC), 2013*, Annual Report* (Washington).

Goretti, Manuela, and Marcos Souto, 2013, "Macro-Financial Implications of Corporate (De)Leveraging in the Euro Area Periphery," IMF Working Paper No. 13/154 (Washington: International Monetary Fund).

Hoenig, Thomas M., 2013, "Tangible Equity Capital Ratios for Global Systemically Important Banks," Federal Deposit Insurance Corporation (Kansas City).

International Monetary Fund (IMF), 2010, *Integrating Stability Assessments under the Financial Sector Assessment Program into Article IV Surveillance: Background Material* (Washington).

———, 2013a, *Euro Area Policies: 2013 Article IV Consultation: Selected Issues,* IMF Country Report No. 13/231 (Washington).

———, 2013b, *People's Republic of China: 2013 Article IV Consultation*, IMF Country Report No. 13/211 (Washington).

———, 2013c, *United States: Article IV Consultation,* IMF Country Report No. 13/236 (Washington).

———, 2013d, *United States: Article IV Consultation: Selected Issues,* IMF Country Report No. 13/237 (Washington).

———, 2013e, *Portugal: Seventh Review Under the Extended Arrangement and Request for Modification of End-June Performance Criteria*, IMF Country Report No. 13/160 (Washington).

International Organization of Securities Commissions (OICV-IOSCO), 2012, "Principles on Suspensions of Redemptions in Collective Investment Schemes: Final Report," FR02/12 (Madrid: Technical Committee of the International Organization of Securities Commissions).

Johansen, Søren, 2009, *Likelihood-Based Inference in Cointegrated Vector Autoregressive Models* (New York: Oxford University Press).

Lam, Raphael, 2013, "Japanese Financial Institutions Expanding Abroad: Opportunities and Risks," in *Japan: Selected Issues,* IMF Country Report No. 13/254 (Washington: International Monetary Fund).

Oliver Wyman, 2012, "Bank of Spain Stress Testing Exercise," June 21 (Madrid).

Santos, Carlos, 2013, "Bank Interest Rates on New Loans to Non-Financial Corporations—A Look at a New Set of Micro Data," *Banco De Portugal Financial Stability Report May 2013* (Lisbon).

Vináls, José, Ceyla Pazarbasioglu, Jay Surti, Aditya Narain, Michaela Erbenova, and Julian Chow, 2013, "Creating a Safer Financial System: Will the Volcker, Vickers, and Liikanen Structural Measures Help?" IMF Staff Discussion Note No. 13/4 (Washington: International Monetary Fund).

Zoli, Edda, 2013, "Italian Sovereign Spreads: Their Determinants and Pass-Through to Bank Funding Costs and Lending Conditions," IMF Working Paper 13/84 (Washington: International Monetary Fund).