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Euro Area Policies: Spillover Report for the 2011 Article IV Consultation and Selected Issues

This spillover report and selected issues on the Euro Area were prepared by a staff team of the International Monetary Fund as background documentation for the periodic consultation with the member countries. They are based on the information available at the time they were completed on June 30, 2011. The views expressed in these documents are those of the staff team and do not necessarily reflect the views of the governments of the Euro Area or the Executive Board of the IMF.

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INTERNATIONAL MONETARY FUND

EURO AREA POLICIES

June 30, 2011

SPILLOVER REPORT FOR THE 2011 ARTICLE IV CONSULTATION WITH MEMBER COUNTRIES

Issues. Spillover reports explore the external effects of policies in systemic economies, focusing on concerns raised by key partners. In the case of the Euro Area (EA), partners appreciated policy efforts to address the sovereign debt crisis, but were concerned over potential spillovers in case debt difficulties in the EA were to deepen, as highlighted by the bouts of heightened co-movement over the past year between stresses in EA program countries and global financial markets.

Findings. The main messages are as follows:

- An intensification of the EA debt crisis, especially if stress were to spread to the core EA, could have major global consequences. This is supported by financial market signals, analysis of a model of global bank interconnectedness, and results from a broader macro-modeling approach. Thus, decisive further policy actions to contain the crisis are critical not only for the EA itself, but also from a global perspective.
- Projected fiscal consolidation efforts in the EA should have modest global demand effects that could be more than offset by credibility gains. Monetary tightening in the area that proceeds at a slightly faster pace than markets presently anticipate would have limited spillovers, but reversal of extraordinary measures would need to be timed with improvements in banking sector health and dissipation of market tensions in EA program countries to help prevent potentially large effects on other economies.
- Envisaged reforms to strengthen banking system resilience, labor and product market reforms to enhance growth potential, and further trade liberalization under the Doha round would have positive, though modest, spillovers.

Authorities' reactions. The EA authorities agreed that any spread of the crisis would have global repercussions, but were confident that policy measures enacted to date and those that were in prospect should help contain the crisis. They also broadly agreed with staff's findings on macroeconomic and structural spillovers, although they were more sanguine on the direct contractionary effects of fiscal tightening, and emphasized that, given the area's high degree of openness to international trade and finance, it was a net recipient of spillovers from the rest of the world during normal times.

Approved By
Reza Moghadam and Antonio Borges

The SPR team was led by Donal McGettigan and comprised Sally Chen, Mali Chivakul, Silvia Sgherri, Francis Vitek, under the guidance of Aasim Husain, with Helge Berger coordinating inputs from EUR. Thierry Tressel (EUR); Ola Melander, Malika Pant, Sergejs Saksonovs, Thanos Vamvakidis (SPR); Xavier Debrun, Philippe Karam (FAD); Siret Dinc, Andy Jobst, Mohamed Norat (MCM); and Derek Anderson, Ben Hunt, Vladimir Klyuev, Stephen Snudden, Stephen Tokarick (RES) also contributed.

SPILLOVER REPORTS

Spillover reports examine the external effects of domestic policies in five systemic economies, i.e., the S5, comprising China, Euro Area, Japan, United Kingdom, and the United States. The mere existence of external effects does not imply that policy modifications or collective action is needed—that depends on many considerations, including the presence of economic externalities. The aim rather is to stimulate discussion, providing a global perspective for policy advice in Article IV discussions and input for the Fund's broader multilateral surveillance.

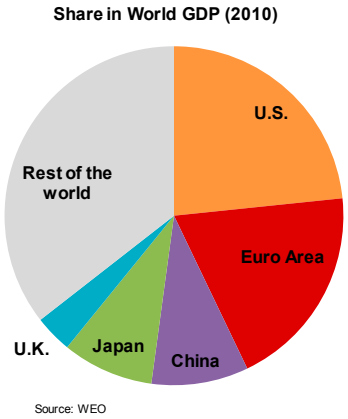
In each case, key partners are asked about outward spillovers from the economy in question, on the basis of which staff choose issues for analysis. To facilitate candor, spillover reports do not cite who raises a specific issue. For this report, the consulted were officials and analysts from the other S5 and from selected emerging markets—Brazil, Hong Kong SAR, India, Indonesia, Korea, Mexico, Poland, Russia, Singapore, and Thailand.

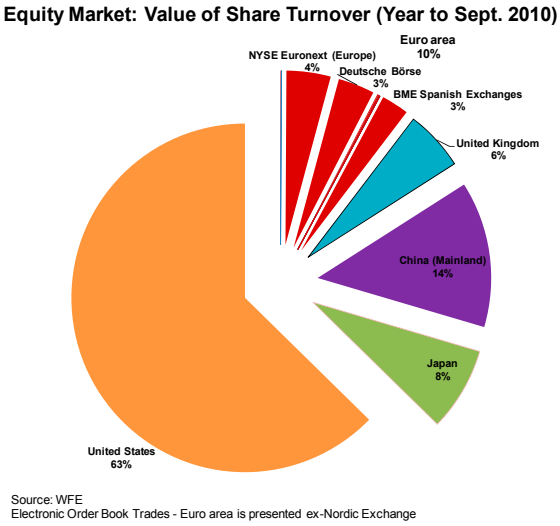
This report does not try to capture the full extent and historical significance of the EA's influence on the world economy. Rather, it focuses on a few forward-looking issues raised by partners, brings to bear relevant analysis, and describes the reactions of the Euro Area authorities. Technical papers underlying the analysis can be found in Euro Area Spillovers: Selected Issues. A separate forthcoming report will summarize the themes emerging from discussions with the S5.

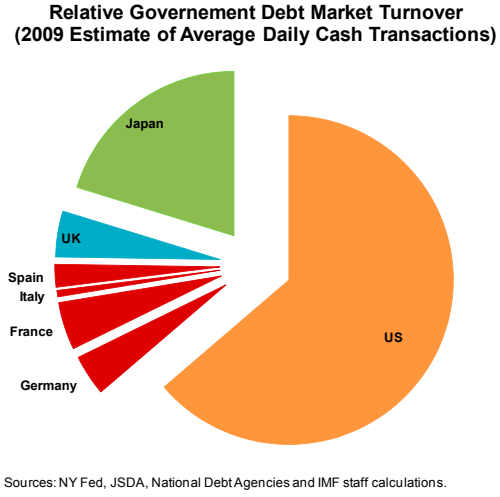
CONTENTS

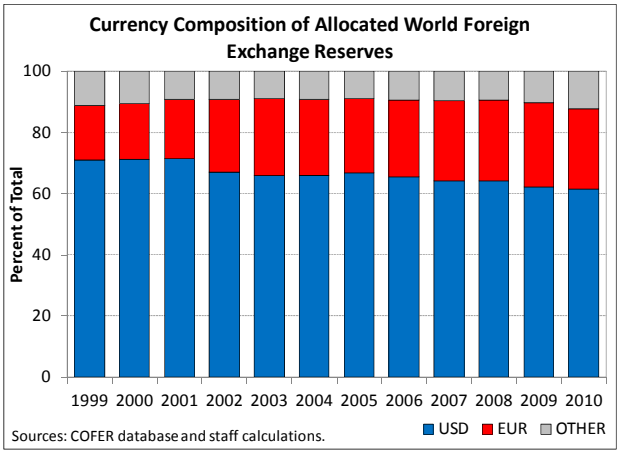
I. BACKGROUND

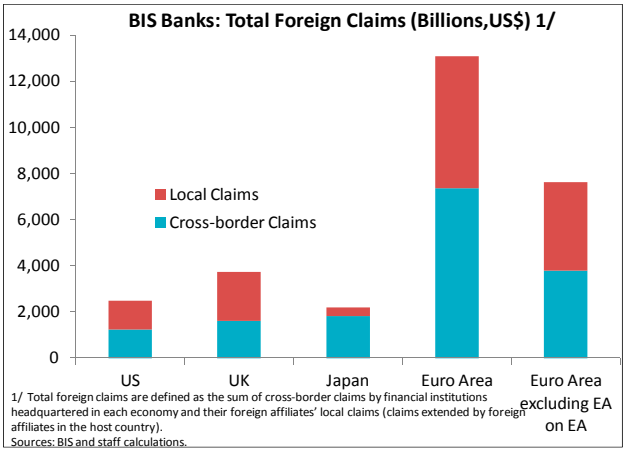
1. **The Euro Area (EA) plays a major role in the global economy and therefore has potentially large spillover effects on the rest of the world**. The EA produces about a fifth of global output, second only to the US. With its exports and imports together adding to almost 30 percent of GDP, the area accounts for a larger share of world trade than any other economy. Its financial sector is also one of the world's largest, with banking exposures to other countries exceeding those of all other economies, although its debt and equity markets—as measured by turnover—are dwarfed by those in the US. The euro is also the second most important reserve currency after the U.S. dollar, and its share of reserves has been growing steadily since its inception.







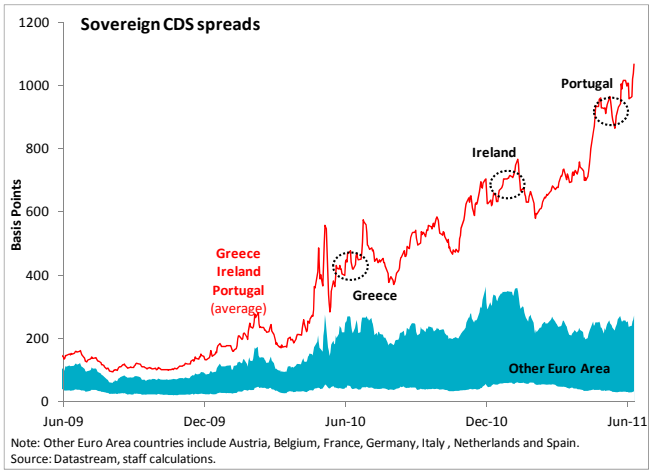


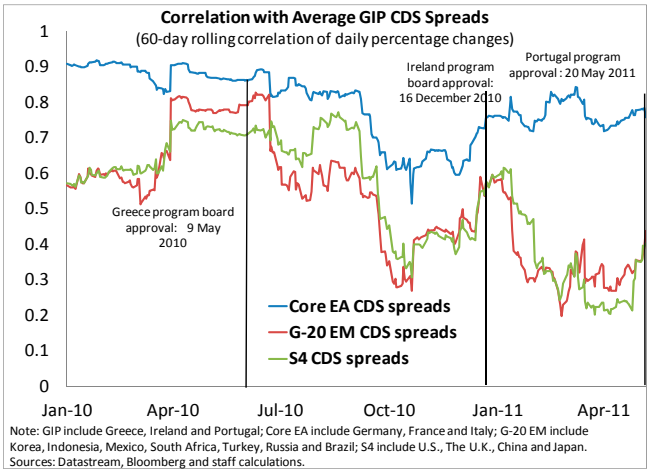


2. **Market perceptions of events in the EA program countries (Greece, Ireland, and Portugal) illustrate the possibility of large spillovers from the area in times of stress.**

- While these countries are small in economic terms, the financial exposure of core EA country banks to them is large. Jointly they represent just 6 percent of EA GDP and a very small share in the foreign exposure of core EA banks overall (2.6 percentage points). However, at 32 percent of total shareholders'equity for those core EA banks that hold such assets in the case of program countries, the exposure is quite sizable in absolute terms, opening the door to significant spillovers also outside the euro area.

- This potential for major spillovers can be seen in market reaction to developments in the EA over the past year (see charts). CDS spreads and bond yields for the EA program countries have risen to historically high levels, and their correlation with financial market spreads for other EA economies remains very high. In the run up to the approval of the





Greece program, correlations of EA program country CDS spreads and bond yields with global asset prices rose sharply, highlighting the contagion potential. Marked pickups in correlations were also evident around the time the Ireland and Portugal programs were being finalized. While the increased correlations between EA and non-EA asset prices could partly reflect reactions to common risk factors (see Section III.B), they underscore the risk that an intensification of stress in the EA could have sizable effects on global markets.

3. **Against the backdrop of the EA's large global role and ongoing challenges in the EA program countries, the rest of this paper undertakes an in-depth analysis of EA spillovers**. To motivate the analysis and to identify key areas where spillovers could be important, the next section sets out views from authorities outside the EA on their perceptions of the main spillovers from the area. Section III maps economic spillovers to assess their size and how they are transmitted across regions (e.g., through trade and financial linkages, and indirectly through broader confidence effects). Section IV assesses potential spillovers to the rest of the world from policies in progress or envisioned in the area, with special focus on the estimated global impact of (i) an intensification of financial market stress in the EA; (ii) prospective EA monetary and fiscal policies; and (iii) EA structural reform in the areas of financial regulation, labor and product markets, and trade. Conclusions are presented in the last section.

II. VIEWS FROM OUTSIDE ON EURO AREA SPILLOVERS

4. **Most partner authorities focused on financial spillovers from the EA, with spillovers seen as escalating sharply if the sovereign debt difficulties in the EA were to intensify.** Authorities generally saw the spillover potential from further stress in Greece, Ireland, and Portugal as relatively contained, but were concerned that if stress were to spread to Spain and, especially, the core EA, spillovers could be substantial. Potential spillovers through financial confidence effects and direct banking channels were seen as especially critical, but some authorities also considered that effects through trade and FDI channels could be significant, particularly for countries that are geographically close, and with strong trade ties, to the EA (see below). Counterparts noted that while EA authorities had made progress in the wake of the Greece program in addressing problems in the periphery (at both the individual country and central levels), further measures to delink sovereign and banking sector problems, including through stress tests and follow-up to recapitalize banks as needed, as well as more centralized fiscal policy would help limit adverse spillovers to the rest of the world.

5. **Other spillovers discussed included the impact of EA macroeconomic policies, trade and FDI links, and regulatory changes on partner countries.**

- Macroeconomic policies. Problems with EA debt sustainability were seen as increasing global tail risks, as discussed above. On a more positive note, counterparts saw the prospect of adverse spillovers from EA fiscal consolidation plans—through the demand compression effect—as relatively minor, and some observed that the net impact could even be positive if credibility gains and associated confidence effects are significant. Spillovers from ECB policies were, similarly, seen as contained to the extent that any phasing out of the ECB's unconventional support policies did not undermine the periphery. Spillovers from ECB rates hikes ahead of other advanced economy central banks would also likely be contained to the extent that robust EA growth at the core was in place.

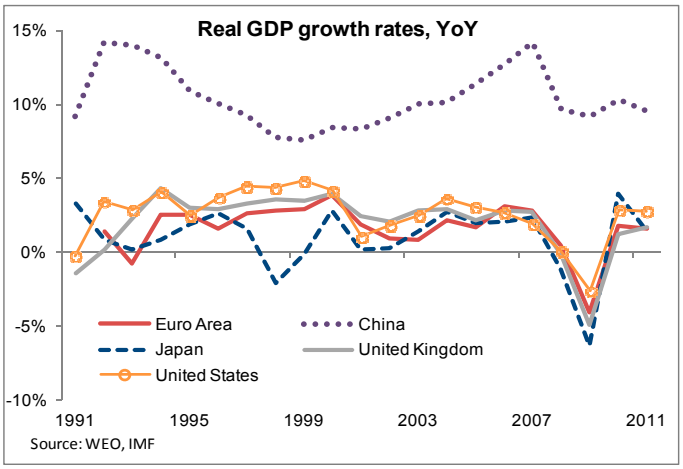
- Trade and FDI. Reflecting the EA's role as the world's single largest trading entity, trade and FDI links were seen as strong, particularly for neighboring countries. For close neighbors, their role in the EA supply chain accentuates these trade linkages, making them far stronger than financial spillovers. Counterparts were confident that implementation of the EA's Doha commitments would have a favorable impact.

- Regulation. Some counterparts argued that proposed EU financial regulatory reforms could have major spillovers on neighbors, especially should their discretionary regulatory powers be affected as a result of new EU regulations.

III. Mapping Euro Area Spillovers

A. Growth Spillovers

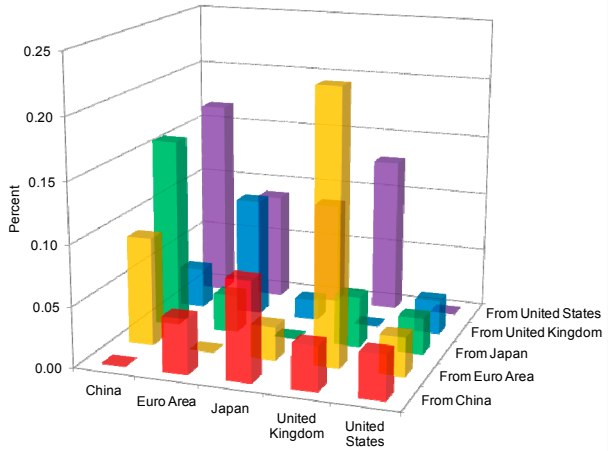
6. **Economic growth in the S-5 has, apart from China, been highly correlated** (text chart). Growth in the U.S., U.K., and EA economies was particularly highly synchronized over the past decade. The financial crisis subjected the S-5 countries to a synchronous, sharp contraction in 2008, and all have since embarked on the recovery process. The co-



movement of growth in China with the EA and the rest of the S-5 has been weaker as China's economic performance outpaced that of the rest of the S-5 countries, including during the recent crisis.

7. **A closer look at these growth links suggests that Euro Area output shocks have had generally moderate spillovers.** Estimated spillovers from the EA to the other S-4, which abstract from financial contagion and may therefore understate true spillovers, are nevertheless of meaningful size, though smaller than those emanating from the U.S. (text chart and Chapter 1 of Selected Issues Paper). Echoing this, Euro Area authorities diagnosed the EA as a net importer of global spillovers. This was attributed mostly to the EA's relative trade openness, compared with the U.S., which exposes it to incoming trade shocks. The continuing dominance of U.S. debt and equity markets, backed by the still strong global role of the U.S. dollar, was also seen as playing an important role. As an illustration, the authorities noted that their analysis of the transmission of positive investment shocks indicated that such shocks in the EA had smaller spillover effects on the rest of the world than the other way around.

Inward and Outward Output Spillovers

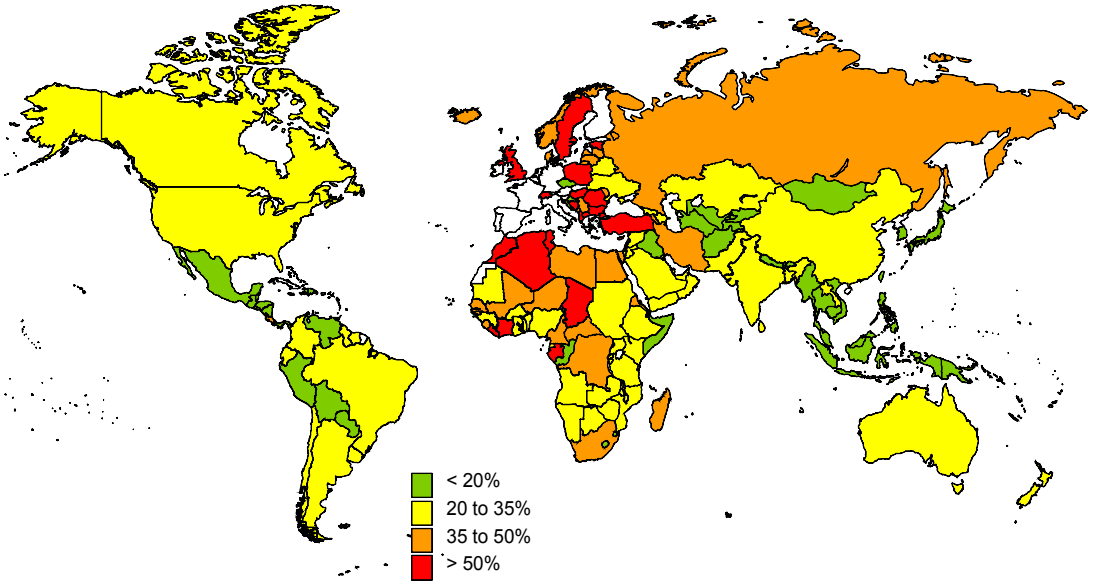


Note: Depicts the average peak impulse responses of output in each S-5 economy to shocks in each of the other S-4 economies which raise output there by one percent.
Source: Staff calculations

8. **Moving beyond the S-5, countries geographically closer to the EA—generally those with stronger trade links—are affected more by the area's economic fluctuations**. Results from a G-20 macroeconometric model of business cycle transmission through international trade and financial channels indicate that spillovers tend to be greater for economies closer to the EA (Chapter 1 of Selected Issues Paper). Among G-20 countries, the highest impact can be found in Russia, reflecting its strong trade linkages with the EA, followed by the U.K., reflecting its strong trade and financial linkages (text chart).

Trade Links with the Euro Area

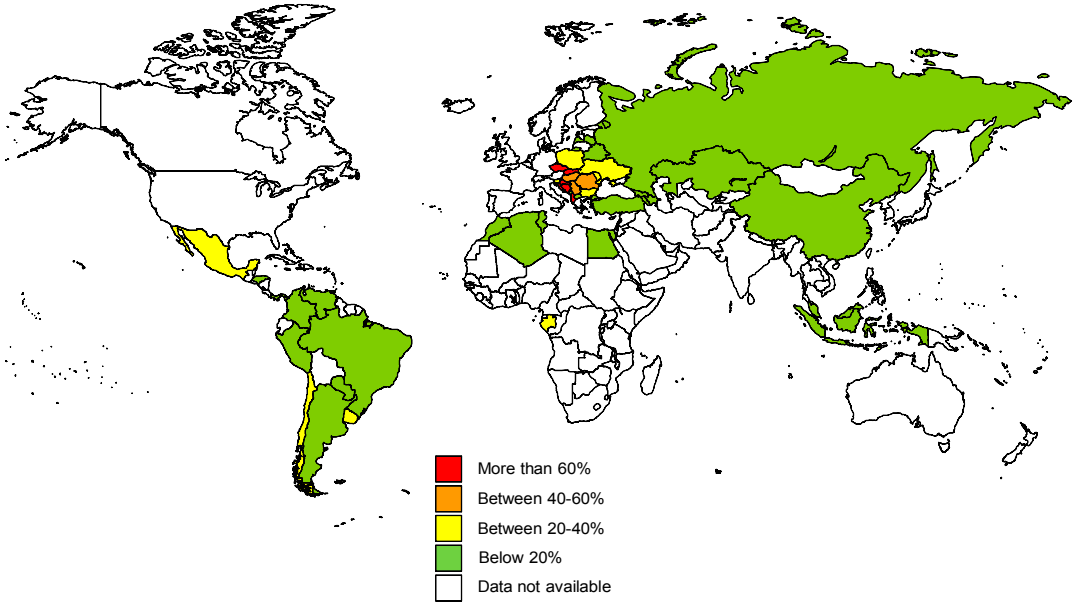
(Share of Exports to the EA in total exports)



Source: Staff calculations.

Banking Links with the Euro Area

(Share of Euro Area bank-owned assets in total banking system assets)

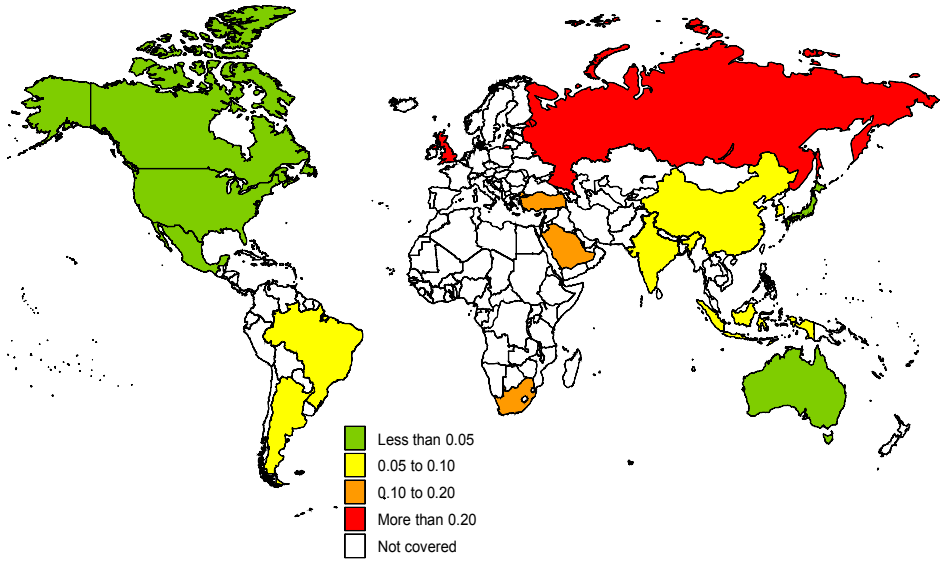


Note: Data only covers selected emerging markets.

Source: Bankscope and staff calculations.

Average Peak Impulse Responses of Output to Shocks in the Euro Area

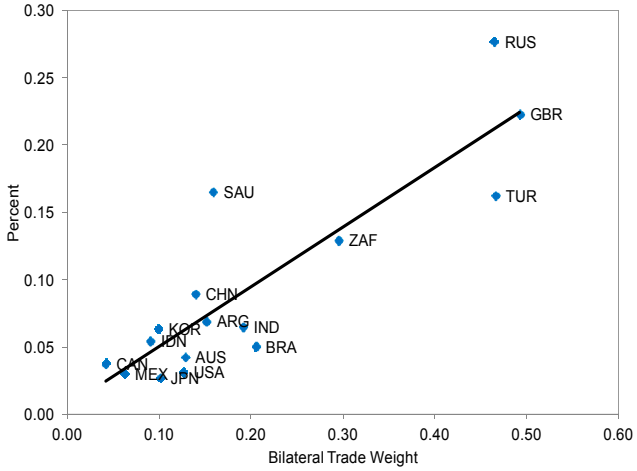
(Relative to Euro Area)



Source: Staff calculations.
Note: Depicts percent change in output in a given country associated with one percent increase in output in the Euro Area, in response to a mixture of real and financial shocks in the Euro Area.

9. **A implication of this analysis is that EA growth shocks are likely to have the largest spillover effects on non-EA European and North African economies.** Though direct empirical results from the macroeconometric analysis are not available for these countries, their generally strong financial and trading links with the EA suggest that the impact of EA growth shocks on their economies could be substantial. Indeed, the strong relation between the estimated impact of EA output shocks on G-20 economies and their share of trade with the EA (text chart) points to the importance of trade channels in transmitting growth shocks. With the EA accounting for an even larger share of trade in many non-EA European and North African countries, the impact of EA shocks on these economies could be especially significant.

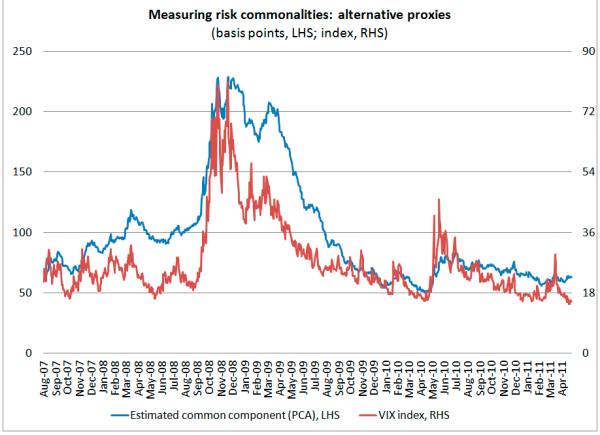
Average Peak Impulse Response versus Trade Weight



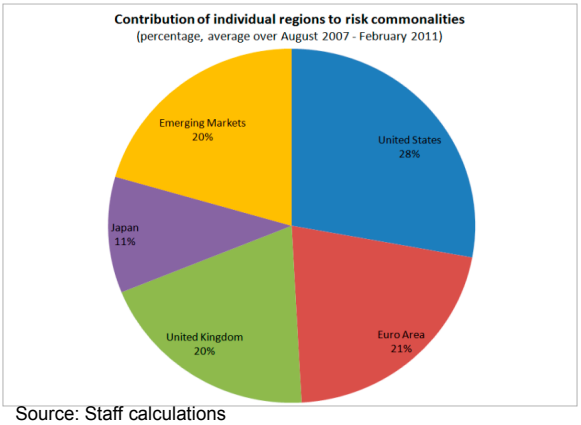
Source: Staff calculations.

B. Financial Sector Spillovers

10. **Analysis of global risk factor movements across different asset classes suggests strong spillovers from the EA** (Chapter 2 of Selected Issues Paper). The analysis, which is based on a principal components approach, assesses the extent of spillovers from individual EA asset markets across borders and across various financial markets (mainly bonds and equities), after abstracting from "risk commonalities" (that is, after adjusting for comovement due to common shocks). The key findings are:



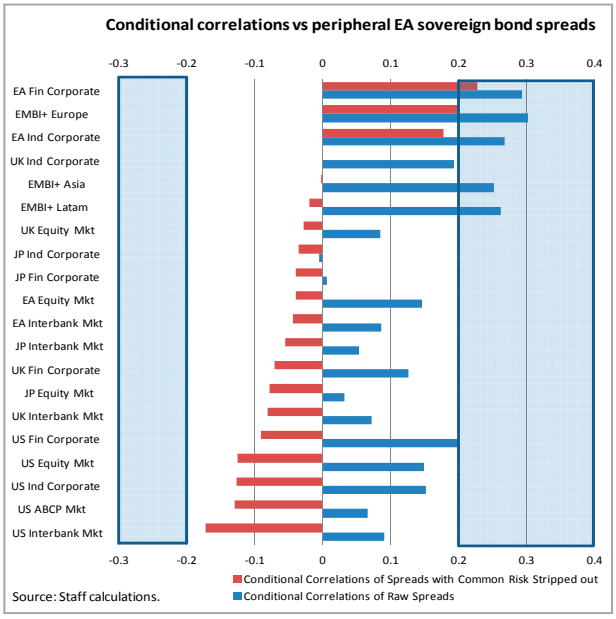
- The global common risk component increased sharply in Spring 2010 as pressures in peripheral European countries intensified, although the rise was not as severe as during the Lehman episode in late 2008.



Source: Staff calculations

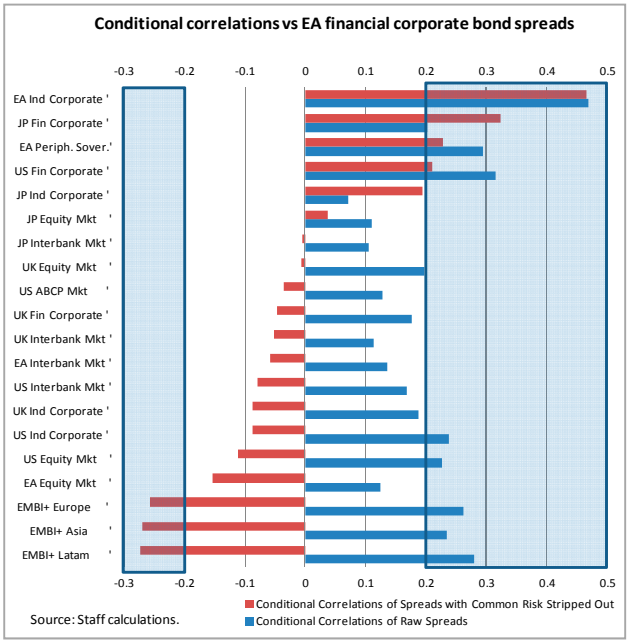
- About one-fifth of the common component of risk across global financial markets—in a selection of interbank interest rates, bonds, and equities—can be shown as being driven by volatility in EA financial markets, only modestly less than the one-quarter recorded for the U.S.

- Direct spillovers from the sovereign bond markets in Greece, Ireland, Portugal, as well as Spain—the peripheral EA countries that global market participants focused on most during the initial crisis period—to the rest of the world appear to be modest. While "raw" cross-market correlations (blue bars in the text chart) suggest that "observed" volatility co-movements



Source: Staff calculations.

across assets and across borders tend to be widespread, cross-correlations of spreads with the common risk component stripped out (red bars) reveals that, among the financial markets in the sample, volatility spillovers from these EA sovereign bond markets are likely to be felt strongly only in the bond market of EA financial corporations.



- In contrast, spillovers from core EA financial institutions appears much larger. Even after adjusting for common risk, cross-correlations of EA financial sector spreads with spreads of EA non-financial corporations as well as with financial corporations outside the EA, such as Japanese and U.S. banks, are sizable and significant. The latter may reflect direct links among financial institutions as well as transmission of spillovers via bank funding markets.

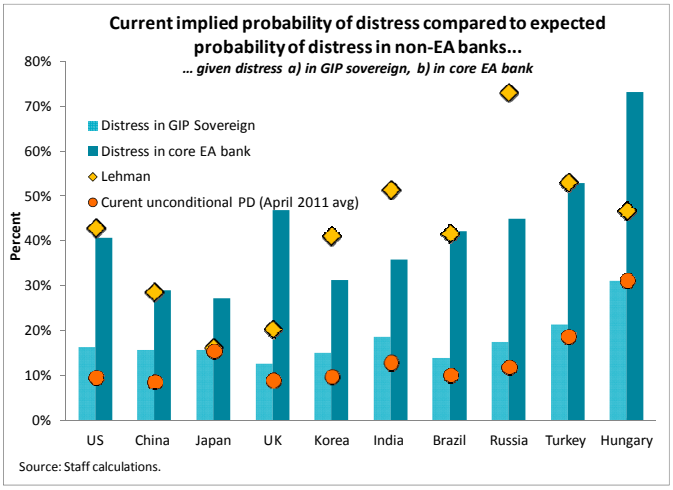
11. **The authorities agreed with staff's views that financial spillovers from core EA banks to the rest of the world could be substantial**. Both the authorities and staff also agreed that shadow banking in the EA was less relevant than in the U.S., given the EA's reliance on traditional relationship banking and the relatively large share of the banking sector in overall financing in the EA.

IV. Policy Issues

A. Spillovers from Intensification of EA Financial Market Stress

12. **Direct spillovers from further stress in the EA program countries would likely remain manageable, but the potential to affect the rest of the world is much larger if stress spreads to the core EA.** Several methods of analyzing financial and other spillovers from the periphery and the core support this conclusion, including analysis based on correlations of financial market prices, bank deleveraging analysis, and macroeconomic models.

13. **Financial markets signal that spillovers of further stress in the EA would be large if the core is affected** (Chapter 3 of Selected Issues Paper). The analysis uses correlations of market CDS spreads to estimate the implied conditional probability of distress in a variety of non-EA banks and sovereigns if distress—defined as a (hypothetical) credit event that triggers CDS contracts—were to occur in a EA program country sovereign or bank, or in a large core EA bank. The modeling framework and data availability constrained the number of sovereigns and banks that could be analyzed, so a geographically diverse group of countries—and representative banks from those countries—was chosen. The results indicate that if there is distress in a *major bank from a core EA economy*, the probability of distress in many of the non-EA banks would rise to high levels (40 percent or more), and would generally be highest in banks based in countries that are geographically close to the EA and whose banking systems are most closely linked to that of the EA. Among the S-4, the spillover to the U.K. would be greatest, reflecting its very strong banking links with the EA. For most non-EA banks, the estimated conditional probability of distress given distress in a core EA bank is as high or higher than the peak implied unconditional probability of distress in the period after the Lehman bankruptcy. By contrast, the estimated probabilities of distress in non-EA banks conditional on distress emerging in an EA program country sovereign, while still sizable, are much lower than those conditional on distress in a major core EA bank.

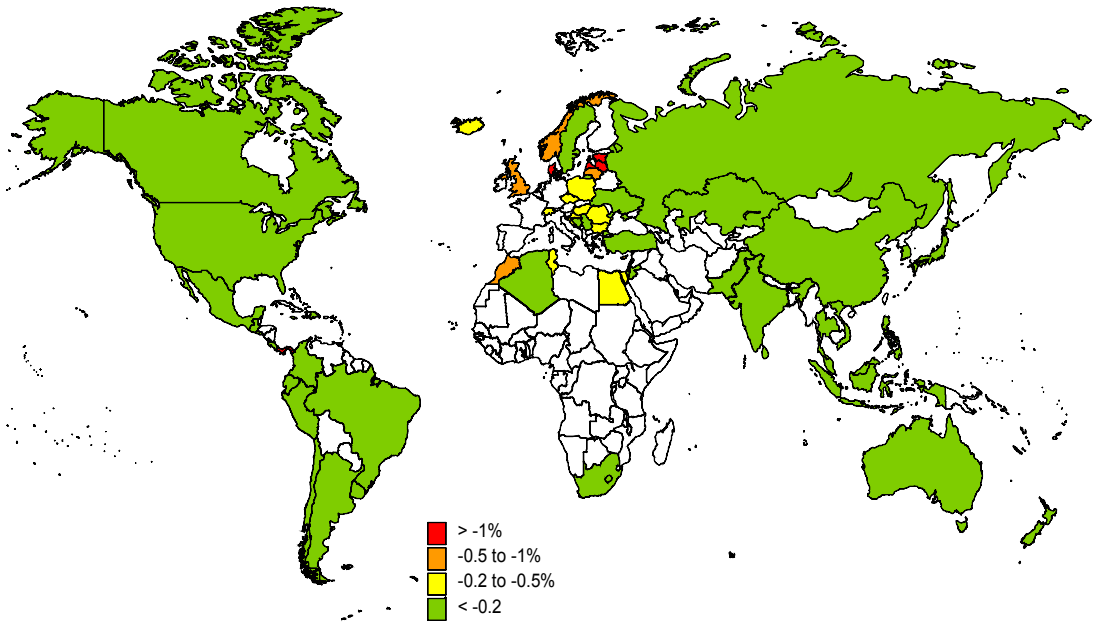


14. **Analysis of global bank interconnectedness also suggests that further EA stress would have negative spillovers that are sharply exacerbated if core Europe is affected** (text charts and Chapter 4 of Selected Issues Paper). The model, which uses BIS bank foreign claims data, is based on the assumption that banks deleverage when faced with large mark-to-market losses on their trading books. The shocks that are analyzed comprise: (i) a further decline (from current levels) in EA program country sovereign and bank bond prices of 30 percent (Scenario 1); and (ii) a further 30 percent decline (from current levels) in bond prices of EA program country sovereigns and of all EA banks (Scenario 2). Results suggest that the first shock, which is confined to the program countries, would cause some deleveraging, though mostly in the EA itself. Under the more severe scenario, the impact would be much larger, especially in the rest of Europe and parts of North Africa. These results are based on direct exposures; indirect exposures, including

through guarantees via CDS contracts, may exacerbate deleveraging in a shock scenario. Recent data from the BIS indicate that the total exposure of U.S. banks to EA program countries, for example, may be several times as large as just the direct exposure. Moreover, actual spillovers could easily be more severe than estimated by this exercise if other factors also intensify deleveraging, such as a compression in non-bank wholesale funding of banks and financial accelerator effects through impacts on non-bank private sector balance sheets, which are not captured by the model but would be expected to be at play under such a scenario.

Impact of stress in EA program countries: Reduction in foreign liabilities,

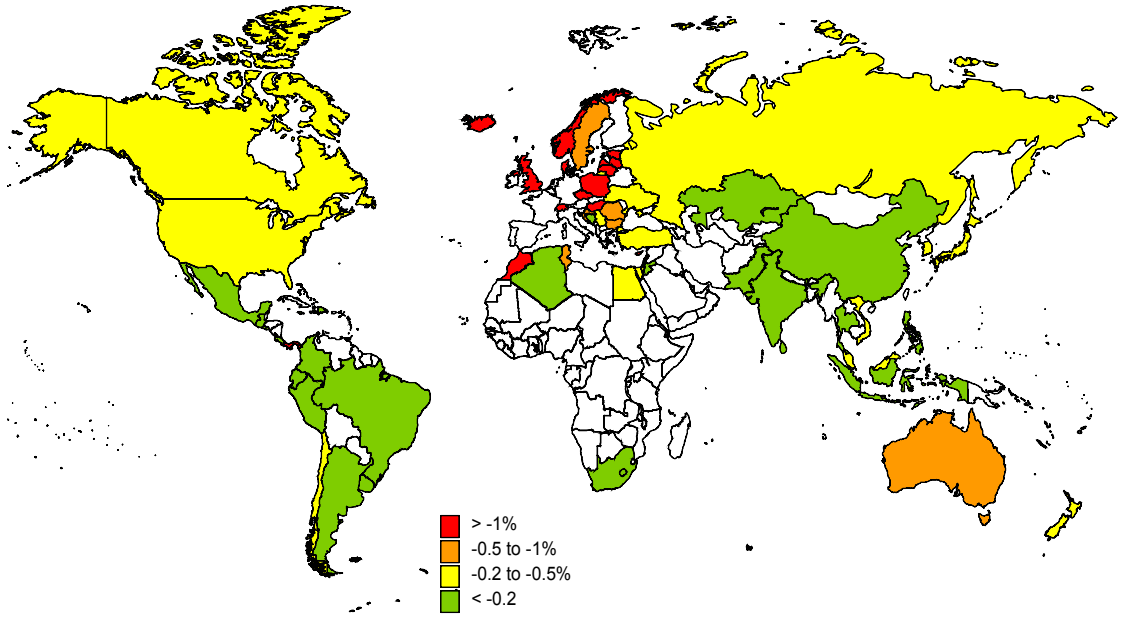
(In percent of GDP) - Scenario 1



Source: Staff calculations.

Impact of stress in entire EA: Reduction in foreign liabilities,

(In percent of GDP) - Scenario 2



Source: Staff calculations.

15. **The importance of spillovers from shocks to the core EA are further underscored by results from a broader macroeconomic modeling approach** (Chapter 5 of Selected Issues Paper). Two sets of illustrative simulations were run under the Fund's Global Projections Model (GPM; as presented in the January 2011 WEO update). These comprised, first, a "tremor" scenario of a milder shock which may be interpreted as a shock that is largely confined to the EA program countries, and, second, an "earthquake" scenario of a larger shock that spreads to the entire EA. Under the first scenario, spillovers are moderate (see text table). By contrast, the second scenario, which assumes a large shock and a policy response that falls short, leads to large financial losses in the periphery which, in turn, result in banking problems throughout the EA. Consequently, EA growth falls by 2½ percentage points relative to the baseline, while global growth falls by about 1 percent over 2011–12.

Effect of Euro Area Turbulence on GDP Growth

(Deviation from pre-crisis baseline, in percentage points)

	"Tremor" Scenario		"Earthquake" Scenario	
	Difference from Pre-crisis Baseline		Difference from Pre-crisis Baseline	
	2011	2012	2011	2012
Country/Region	Annual	Annual	Annual	Annual
U.S.	-0.2	-0.2	-0.7	-0.7
Euro Area	-0.4	-0.2	-1.4	-1.3
Japan	0.0	-0.1	-0.1	-0.4
Emerging Asia	-0.1	-0.1	-0.3	-0.4
Latin America	-0.1	-0.1	-0.2	-0.3
Remaining GPM countries	-0.2	-0.2	-0.6	-0.8
World 1/	-0.2	-0.1	-0.4	-0.5

Source: WEO Update (January 2011).

1/ GPM world represents 87.5 percent of world GDP by PPP (2007-2010 average).

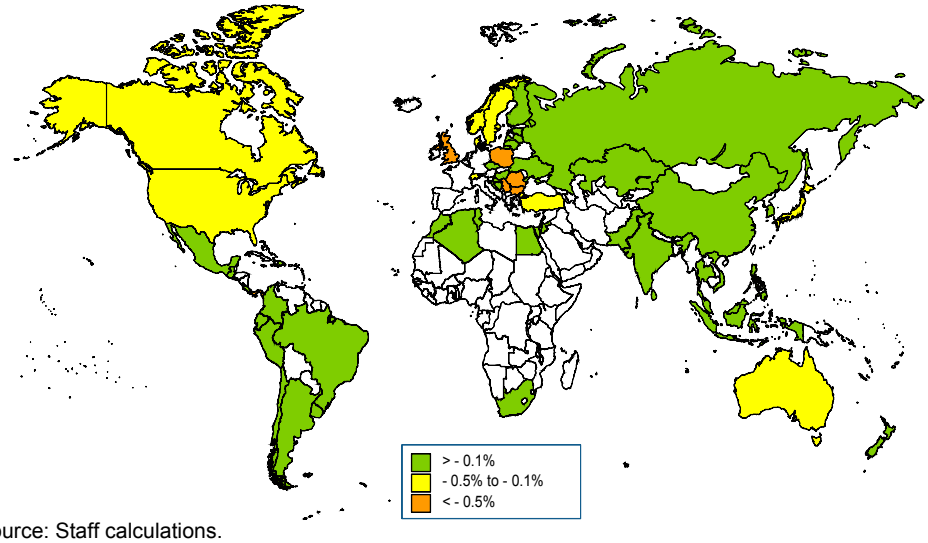
16. **The authorities shared staff's views on these dual spillover findings**. They stressed that problems confined to the periphery would have modest spillover effects. The smaller size, and greater market knowledge, of exposures to EA program country assets than, say, subprime assets at the outset of the 2008 crisis, implied less scope for panic than during the Lehman episode. Also, market exposure to program country assets has been reduced over the past year, which would also limit potential spillover effects. They acknowledged, however, that core area involvement would have severe repercussions. They agreed, therefore, that containing peripheral risk was critical and cited strong national policy action, effective EA crisis management, and completing governance reforms as key ingredients of such a strategy.

B. Spillovers from Monetary and Fiscal Policies

17. **ECB exceptional liquidity provision has helped contain deleveraging by EA banks and corresponding spillover effects.** Counterfactual scenarios used to assess the impact of higher funding costs likely associated with the withdrawal of exceptional liquidity provision indicate that the impact on some neighboring European countries, such as the U.K. could be significant (text chart and Chapter 6 of Selected Issues Paper). ECB counterparts agreed that exceptional liquidity provision had helped contain negative spillovers and stressed that it would not be withdrawn under stressed conditions. They recognized, however, that ongoing exceptional liquidity provision can also have drawbacks, notably that it could dilute incentives of weak banks to pursue timely restructuring.

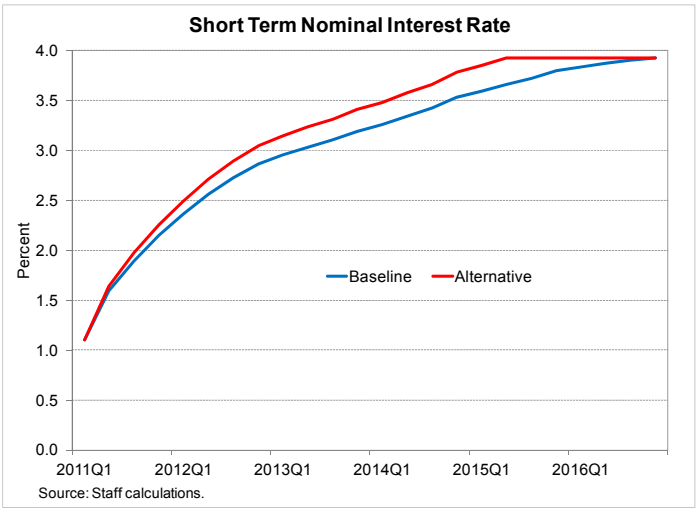
Impact of the withdrawal of ECB exceptional liquidity provision: Reduction in Foreign Liabilities

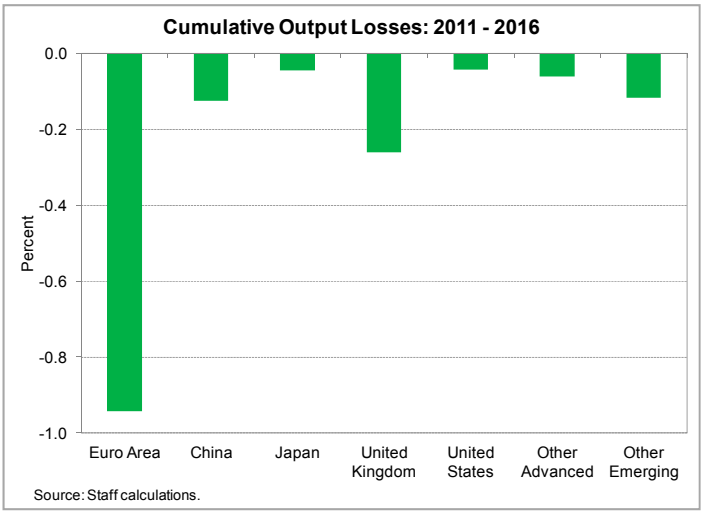
(In percent of GDP)



Source: Staff calculations.

18. **A slightly faster pace of monetary tightening in the EA than markets presently expect would have generally limited spillovers** (Chapter 6 of Selected Issues Paper). The baseline scenario assumes that monetary tightening in the EA proceeds at the pace expected by the Euribor futures market, while an alternative scenario assumes somewhat more frontloaded rate hikes (see chart). Macroeconomic model estimates suggest that accelerated monetary tightening in the EA will generate moderate output losses, on the order of a cumulative additional output loss of less than 1 percent over 2011-16, built on the implicit assumption that ongoing adjustments in the EA program countries allow them to absorb the somewhat higher interest rates without an intensification of economic stress. This in turn is estimated to have modest spillovers to the rest of the world, primarily reflecting reduced EA export demand,

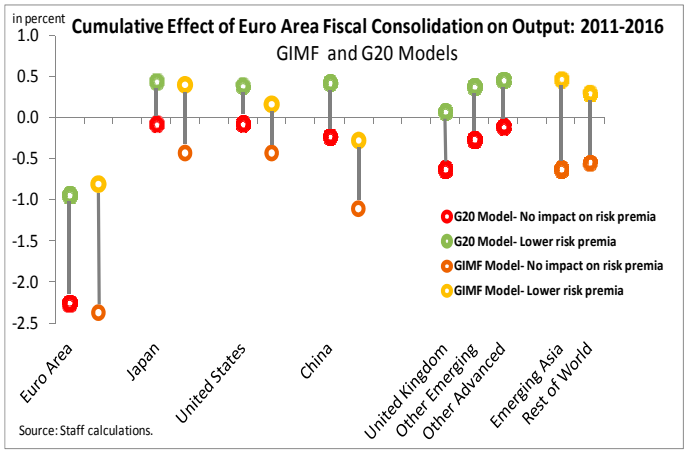




mitigated by currency depreciation in the rest of the world. The authorities also saw limited

spillovers from faster monetary tightening and stressed that the ECB's mandate was to secure price stability in the euro area overall.

19. **Projected EA fiscal consolidation should have modest global demand spillovers, and these could be more than offset by credibility gains**. The modeling exercise covers projected fiscal consolidation by EA members through 2015. To highlight the impact of fiscal policy and its spillovers, the simulations abstract from monetary policy accommodation in the EA as well as the rest of the world, thereby overstating somewhat the true contractionary effect on output that would actually take place. Even so, the negative demand effects to other countries are estimated to be relatively small since the magnitude of the consolidation for the area as a whole is moderate (Chapter 7 of Selected Issues Paper). Moreover, if the consolidation is accompanied by a decline in EA countries' risk premia—only partly reversing the 150 bps increase since late 2009—net cumulative spillovers to other countries over the medium term could even turn positive (see text charts). The authorities agreed with staff that spillovers from planned fiscal consolidation would be modest, but argued that the impact within the EA itself would likely be even more modest than estimated by staff, as the fiscal multiplier would likely be contained given the perceived permanence of the fiscal consolidation plans and since monetary policy would take into account fiscal consolidation to the extent it influenced price pressures. They observed that since consolidation efforts are mainly expenditure based, they are more likely to reassure financial markets about the long-term sustainability of the fiscal position and therefore yield a lasting and growth-friendly correction of fiscal imbalances.

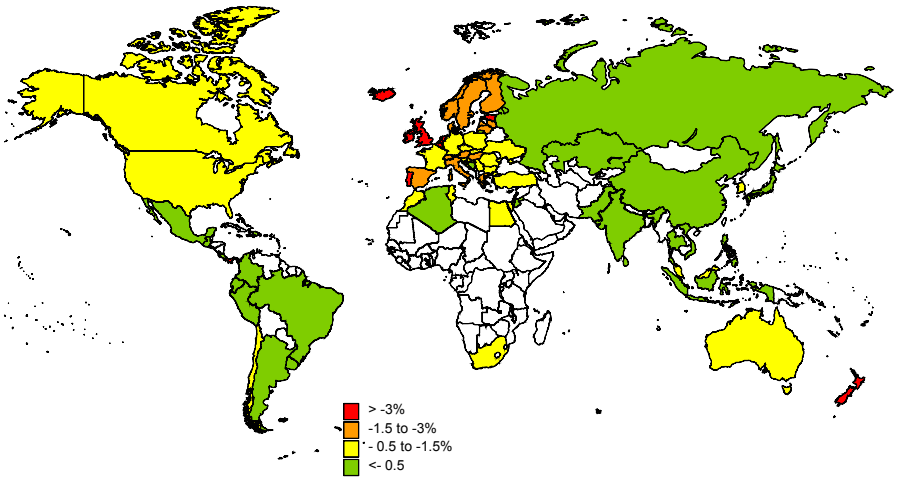


C. Structural Policy Spillovers

20. **Turning to structural reforms, any deleveraging associated with higher bank capital requirements is expected to have only modest spillovers** (Chapter 8 of Selected Issues Paper). Under Basel III, banks are expected to be subject to higher minimum core capital requirement by 2018, and many banks are likely to implement the new requirements well in advance of the deadline. Stronger capital requirements are expected to carry major financial stability benefits and address current excessive leverage, but may also have short-term contractionary effects as banks adjust, in particular if the adjustment takes the form of a rapid reduction in credit supply. Different analytical approaches suggest that direct output losses outside the EA—assuming that deleveraging will form the means through which EA banks meet

higher capital requirements—should be modest (and well within the range of estimates reported by the BIS Macroeconomic Assessment Group), even if the adjustment is undertaken well in advance of the agreed deadline. In countries where EA banks' subsidiaries account for a sizable share of banking activity, the impact would tempered by subsidiaries' reliance on domestic funding (rather than funding from parents). The ECB agreed that higher capital requirements would generate modest spillovers. On a related issue, the authorities agreed in principle that EU bank regulations could have spillover effects. They understood concerns in some neighboring countries over the preservation of supervisory independence in non-EA members of the EU, but considered that enhanced supervisory effort and supervisory and regulatory coordination (including through supervisory colleges and the newly installed EU-level financial authorities) would help address these concerns. They also took note of staff support for implementing Basel III swiftly and without exceptions, setting capital requirements at an ambitiously high level—including significant top-ups for SIFIs—and allowing sufficient flexibility for introducing macro-prudential tools (described in the 2011 Article IV Staff Report and the European Financial Stability Framework Exercise Report, EFFE). In addition, the authorities called on major regulatory authorities in the rest of the world to also implement robust requirements to limit regulatory arbitrage and spillovers.

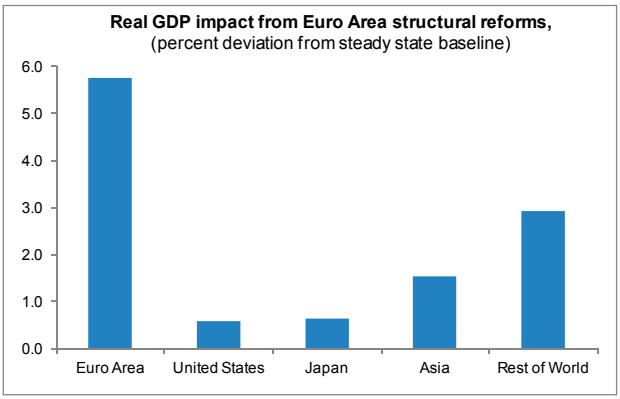
Impact of Basel III: Reduction in Foreign Liabilities, in Percent of GDP



Source: Staff calculations.

21. **Labor and product market reforms that enhance EA growth potential would have positive, albeit modest, spillovers to the rest of the world** (Chapter 9 of Selected Issues Paper). The analysis of the impact of reforms was based on work undertaken for the G-20 mutual assessment process, with simulations performed using the Fund's Global Integrated Monetary and Fiscal Model (GIMF). Structural reforms covered both labor and product market

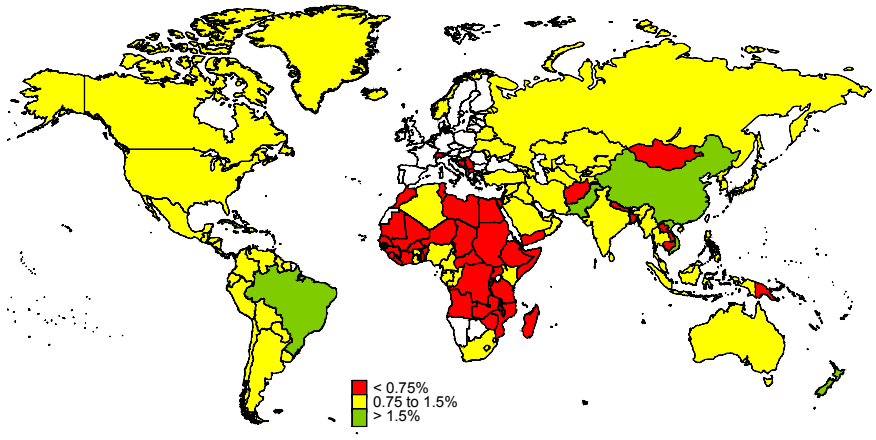
measures, along the lines of the reforms set out under the EU 2020 agenda. These include more active labor market policies, reforms to make pension systems sustainable (including a higher retirement age), which would have positive labor supply consequences and generate stronger internal growth due to budget savings and crowding-in effects. Product market reforms were assumed to result in multifactor productivity growth gains in both tradable and nontradable sectors. This in turn would lead to positive but small growth spillovers elsewhere, with spillovers to Asia and the rest of the world stronger than in the relatively closed U.S. and Japanese economies (text chart). The authorities agreed that while structural reforms were critical and could significantly improve the EA's growth prospects, the spillover effects to partner countries would likely be generally moderate.



Source: Staff calculations

22. **Further trade liberalization would also have positive spillovers** (Chapter 10 of Selceted Issues Paper). Based on current offers in the ongoing Doha round of negotiations—under which it is assumed there is a roughly 50 percent reduction in trade-weighted average tariff rates applied by EA countries on imports—exports from most countries to the EA would increase. In aggregate, preliminary results suggest that the unilateral reduction in EA tariffs would raise total global exports to the area by more than 1 percent.

Impact of a Reduction in Protection in the European Union
(Percent change in export volume to the Euro Area)



Source: Staff calculations.

V. CONCLUSIONS

23. **The prospect of large spillovers—particularly if recent stress in EA program countries were to spread to the core—underscores the urgent need for actions to contain, and eventually overcome, the ongoing crisis.** Measures taken over the past year—including national action in the countries facing market pressures, establishing the EFSF, and the continuation of the ECB's unconventional policies—may have helped contain spillovers from the EA program countries to the rest of the EA and to countries outside the EA for now, but EA financial markets remain under stress, underscoring the urgent need for additional strong measures. Decisive further actions to achieve fiscal sustainability, strengthen economic governance, introduce greater fiscal risk sharing, and address remaining banking sector weaknesses—as outlined in the 2011 Article IV Staff Report and the accompanying EFFE report—will, therefore, be instrumental in ending the crisis and mitigating adverse spillovers to the rest of the world.

24. **The planned fiscal consolidation in the EA could benefit the rest of the world, assuming it helps restore credibility.** The direct effect of the consolidation on global demand and growth in trading partner countries will likely be modest. To the extent the EA's fiscal adjustment credibly addresses sustainability concerns, it should help reduce spreads in the periphery and, through confidence effects, in the area more broadly and elsewhere. This latter effect, depending on its magnitude, could more than offset the direct demand impact.

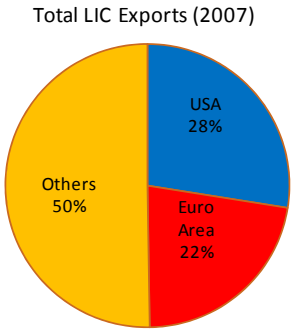
25. **Spillovers from gradual monetary policy normalization appear manageable under appropriate conditions.** Exit from current interest rates at a slightly faster pace than markets are presently discounting is estimated to have modest spillover effects, especially if the ongoing adjustment in EA program countries allows them to absorb the somewhat higher interest rates without an intensification of economic stress. Given the importance of the ECB's extraordinary crisis measures in limiting bank deleveraging, unwinding of extraordinary measures will need to be timed with progress in improving banking sector health and reducing volatility in sovereign bond markets in order to limit spillovers.

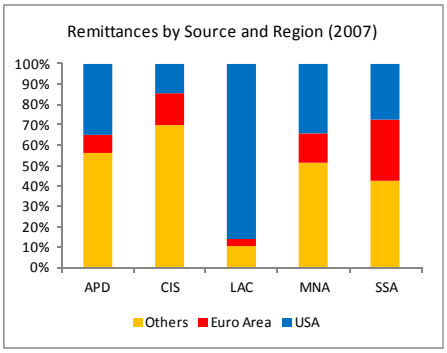
26. **Execution of the structural reform agenda will carry positive spillovers.** External effects from any temporary deleveraging that banks are forced to undergo in response to tougher capital requirements (as part of the steps to enhance stability) would be modest, and should be offset by positive externalities from a healthier banking system. Reforms to labor and product markets (as laid out in the EU 2020 agenda) and in trade (per the EU's offers under the Doha round) are good not only for the EA itself, but also for its trading partners.

Box 1. Euro Area Spillovers to LICs

Low-income countries (LICs) are affected by developments in the Euro Area (EA) through several channels. Direct channels include trade, remittances, FDI and aid flows. At the same time, the EA also has indirect spillover effects on LICs, especially through global commodity prices.

- **The EA receives about 20 percent of LIC exports**. About 30 percent of exports from LICs in Sub-Saharan Africa and 20 percent of exports from Asia and CIS countries go to the EA. Commodity exports, in particular, play an important role in LIC bilateral trade links with Europe where fuel and crude material make up roughly 60 percent of LIC exports to Europe in 2008.

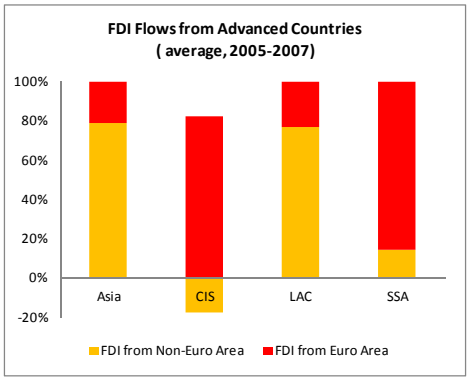


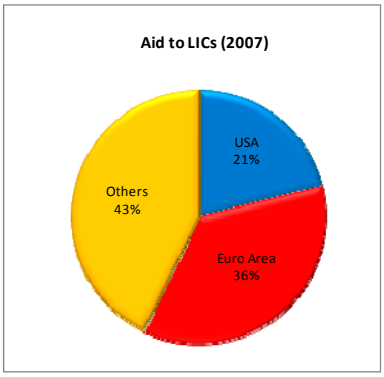


Sources: DOTS, World Bank and staff calculations

- **Remittances and FDI from the EA are particularly important for LICs in Sub-Sahara Africa.** Over 30 percent of SSA's remittance inflows originate from EA. In other regions, the U.S.'s remittance role is generally larger. In addition, EA FDI dominates flows to CIS and SSA countries.

- **The EA is the largest donor across LICs, particularly for LAC and SSA** where EA aid makes up more than 40 percent of total aid to these regions.





Sources: OECD and staff calculations

Empirical evidence suggest that developments in EA could have significant spillovers on LICs. Estimates from growth regressions suggest that trading partner growth has a significant impact on LIC growth. An empirical study using bilateral FDI data between EA and LICs suggests that EA growth is one driver of FDI flows to LICs, although the effect is much weaker than the size of the recipient economy. In addition, there is evidence that aid flows are procyclical with respect to the donors' business cycle and could be influenced by donors' fiscal situation, particularly when donors face a large negative shock.[1]

1/ See Dabla-Norris and others (2010), FDI Flows to Low-Income Countries: Global Drivers and Growth implications, IMF WP 10/132; and Dabla-Norris and others (2010), Business Cycle Fluctuations, Large Shocks and Development Aid: New Evidence, IMF WP 10/240.

INTERNATIONAL MONETARY FUND

EURO AREA POLICIES

2011 Spillover Report—Selected Issues

Approved by Reza Moghadam and Antonio Borges

June 30, 2011

Contents Page

I. EURO AREA OUTPUT SPILLOVERS[1]

This note analyzes output spillovers from the Euro Area (EA) using a global vector autoregression (GVAR) and a macroeconometric model of the G-20. These two approaches are used to assess the impact of shocks in the EA on other systemically important economies.

In the first instance, a GVAR model is used to shed light on spillover effects across countries. The approach uses a dynamic multi-country framework for the analysis of the international transmission of shocks and is based on the GVAR toolbox, launched in December 2010, and sponsored by the ECB.[2] It comprises 26 economies, with the EA as one of the economies covered. The model is constructed by combining separate models for each of the 26 economies linking core variables within each economy with corresponding trade-weighted foreign variables. EA variables are GDP-weighted aggregates of eight countries (Austria, Belgium, Finland, France, Germany, Italy, Netherlands and Spain). The model has both real and financial variables: real GDP, inflation, the real equity price, the real exchange rate, short and long-term interest rates, and the oil price. All the data are observed at the quarterly frequency, from 1979Q2 to 2009Q4.

GVAR estimates show that output spillovers from the EA to other S-4 economies are meaningful (Figure 1). Output spillovers are measured as ratios of the peak impulse responses of output to the peak impulse response of output in the EA. The spillover coefficients can be thought of as elasticity measures. The EA has the strongest spillovers to the neighboring UK, and the least to the US. These spillovers to the rest of the S-4 range from about 10 percent for spillovers to the US to about a quarter for spillovers to UK. In turn, output spillovers from the US to the EA are stronger than spillovers from the EA to the US. The US impact is most pronounced on the UK.[3]

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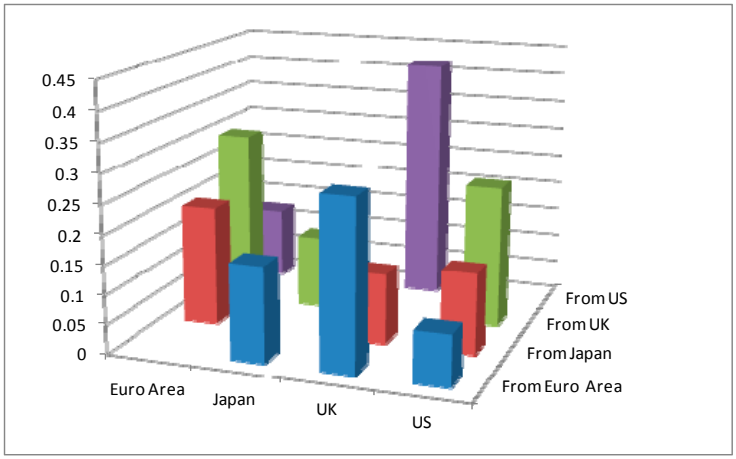
[1] Prepared by Sergejs Saksanov and Francis Vitek.

[2] Smith, L.V. and A. Galesi (2010), GVAR Toolbox 1.0, http://www-cfap.jbs.cam.ac.uk/research/gvartoolbox/index.html.

[3] Japan's spillovers to other countries might appear stronger than expected. This is likely due to the fact that the estimates are based on long time series, which cover periods in the 1980s and 1990s when Japan's role was larger.

Figure 1. GVAR Results: Peak Impulse Responses of Output
(Relative to each S-4 economy)



Source: Staff calculations.

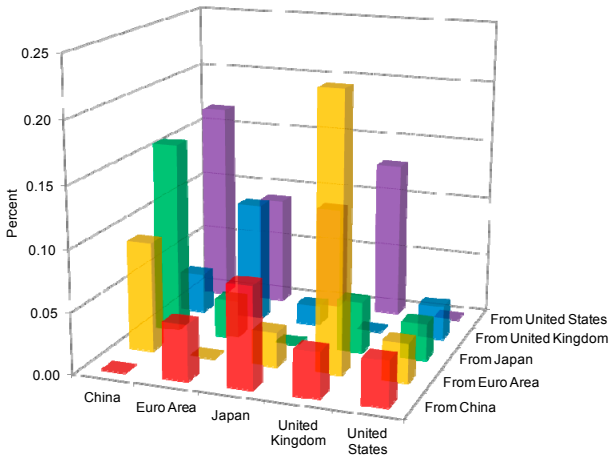
To gauge the size of output spillovers from another angle, simulations are also undertaken using a macroeconometric model.[4] Estimates are derived from a macroeconometric model which features extensive linkages between the real and financial sectors within and across the G-20 economies. The EA is represented in the model by France, Germany, Italy and Spain. The variables under consideration are the GDP deflator, a consumption price index, real GDP, real domestic demand, a short term nominal interest rate, a long term nominal interest rate, an equity price index, the nominal bilateral exchange rate, and the prices of energy and non-energy commodities.

The macroeconometric model simulations are largely consistent with the GVAR results of positive, but modest, spillovers, with spillover strength depending on proximity. Five scenarios are generated with supply, demand, monetary policy, term premium, and equity risk premium shocks in the EA. These shocks are calibrated to raise output in the EA by one percentage point in all five scenarios. A negative equity risk premium shock, for example, would increase wealth and demand in the EA, resulting in stronger demand for exports from other regions via the trade channel. Through financial linkages, it would also raise output elsewhere with the size depending on the dependence on the financial sector and the strength of linkages with EA financial markets. The peak impulse responses from these five scenarios are then averaged.

The results are similar to those obtained from the GVAR model (Figure 2). Spillovers from the EA are strongest to the UK, while the US and the UK have the strongest impact on the EA.

[4] Based on Vitek (2010).

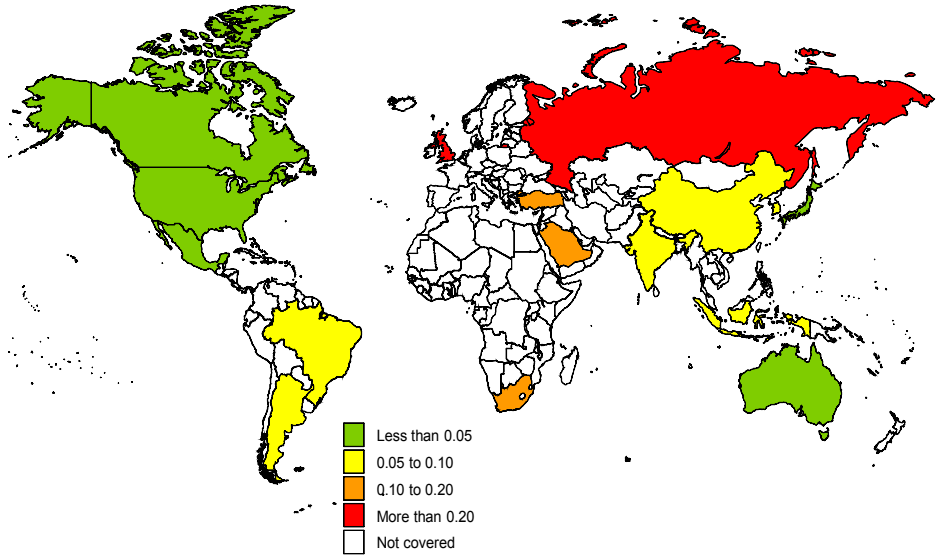
Figure 2. G-20 Model Results: Average Peak Impulse Responses of Output
(Relative to each S-5 economy)



Source: Staff calculations.
Note: Depicts the average peak impulse responses of output to supply, demand, monetary policy, term premium, and equity risk premium shocks in China ■, the Euro Area ■, Japan ■, the United Kingdom ■, and the United States ■ which raise output there by one percent.

The peak impulse responses of output to shocks in the EA are increasing with geographical proximity to the EA, reflecting the strength of trade and financial linkages. The highest spillovers are to Russia and the UK, but the magnitude is moderate with average peak impulse response ratios of about a quarter (Figure 3). In the case of Russia, this results reflects its strong trade and commodity price linkages with the EA, while for the UK it reflects its strong trade and financial linkages. The trade channel is also important for Turkey and Saudi Arabia, with the latter having significant exposure via the commodity price channel.

Figure 3. Average Peak Impulse Responses of Output to Shocks in the EA
(Relative to the EA)



Source: Staff calculations.
Note: Depicts the average peak response of output in each S-5 economy to shocks in each of the other S-4 economics which raise output there by one percent.

II. Contribution of the Euro Area to Common Risk in Global Financial Markets[5]

This note analyzes the relative contributions of different regions and assets to common risk across global financial markets. In doing so, it makes use of a simple principal component analysis on the risk premiums of a variety of assets.

A simple principal component analysis is used to estimate the extent to which unobservable shifts in common risk factors contribute to observed changes in asset-specific expected returns. As international investors react to shocks by rebalancing their portfolios in asset markets that would otherwise be unrelated, any change in the willingness of global investors to bear risk—or any common shock—is deemed to raise the co-movement across asset returns. By assuming that risk premiums embedded in selected asset yields differentials are determined jointly in the market and influenced by both asset-specific factors and a common factor, the latter component can be identified and—thereby—stripped out. In other words, if there is an increase in the (risk-neutral) probability of default for all asset considered—which most likely happened during the global financial crisis—this would likely be picked up in the principal component, along with shifts in investors' attitude toward risk.

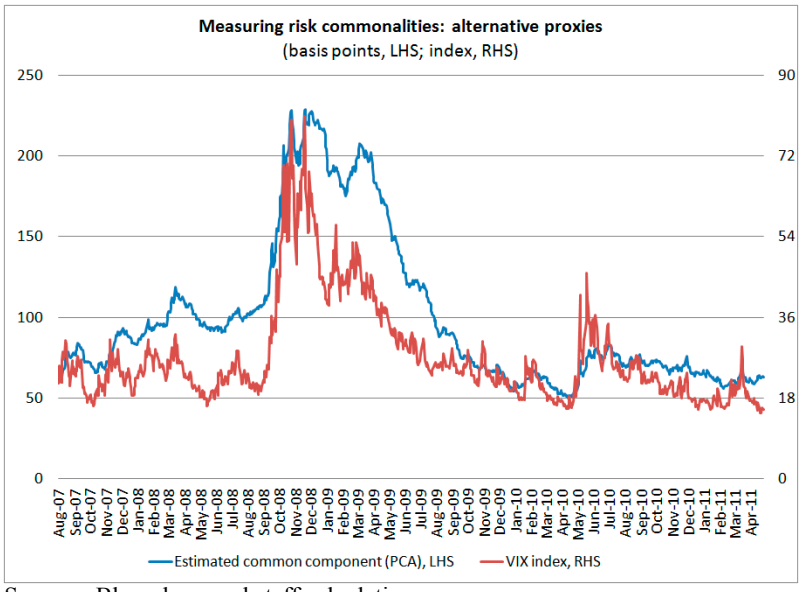
The methodology is used to assess the contribution of Euro Area (EA) asset markets to the estimated common risk component by adding up the contribution to the common risk component of all asset markets in the region. In addition, the analysis allows to gauge the extent of volatility spillovers from individual EA asset markets across borders and across markets, once we abstract from "risk commonalities".

The analysis relies on the set of risk premiums embedded in the following yield differentials:

- U.S. asset-backed commercial paper (versus the 3-month U.S. Treasury bond yield);
- Three-month U.S. dollar, euro, sterling, and yen London interbank offered rates (versus their corresponding overnight index swap rates);
- U.S., euro-area, UK, and Japanese high-yield financial and industrial corporate bonds (versus their respective benchmark 10-year government bond yields);
- U.S., euro-area, UK, and Japanese equities (whose implied risk is computed as the earning price ratio versus their respective benchmark 10-year government bond yields);
- 10-year sovereign bonds (over Bunds) for peripheral euro-area countries (including Greece, Ireland, Spain, and Portugal);
- Asia, Europe, and Latam emerging markets bonds (whose implied risk is given by their global EMBI+ spread versus the 10-year U.S. Treasury bond yield).

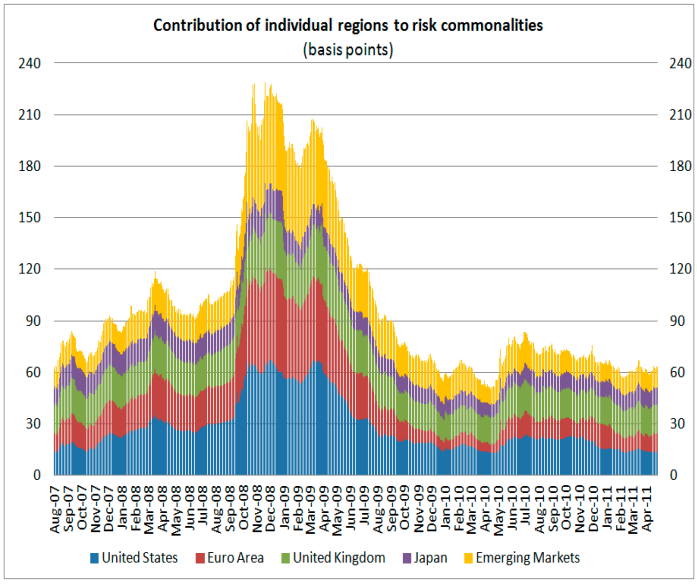
[5] Prepared by Silvia Sgherri.

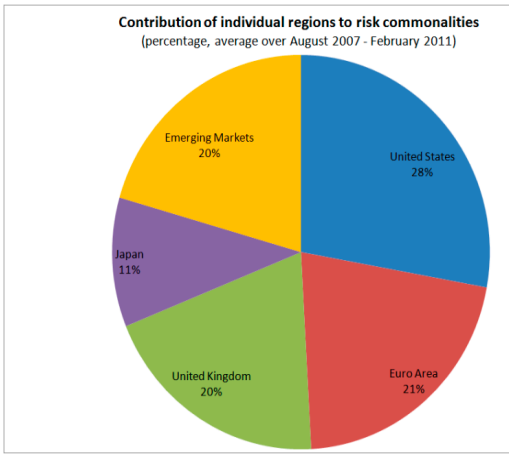
As shown in the chart below, the estimated unobserved factor indicates that the common risk component increased sharply during Spring 2010 as sovereign pressures in peripheral European countries intensified, but the rise in risk commonalities was not as severe as it was during the time of the Lehman bankruptcy. [6]



Sources: Bloomberg and staff calculations.

The analysis suggests that European financial markets play an important role in transmitting financial shocks to the rest of the world. In particular, the EA is estimated to contribute to over one-fifth of the changes in risk commonalities—a contribution which is second only to that of the US.



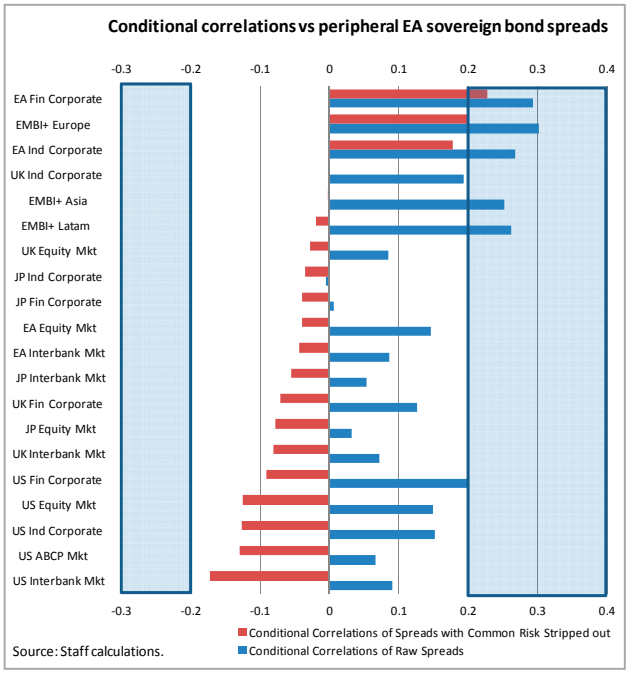


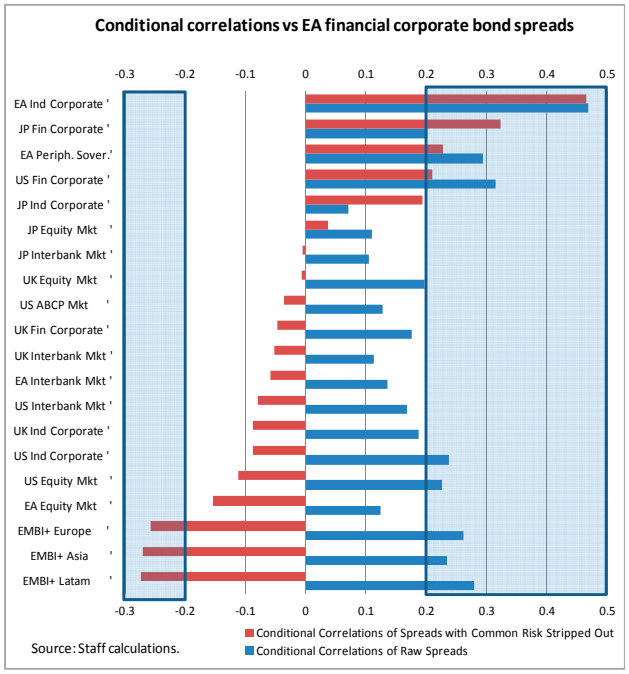
Source: Staff calculations

Sources: Bloomberg and staff calculations.

[6] The importance of risk commonalities varies over time, being greater at time of generalized stress in financial markets. On average, over the sample August 2007-February 2011, risk commonalities are found to explain about one-third of the total volatility for the portfolio considered.

Volatility spillovers from the EA periphery sovereign bond market to the rest of the world appear to be limited. Specifically, while looking at "raw" cross-market correlations (blue bars in the left chart below) indicates that "observed" volatility co-movements across assets and across borders tend to be widespread, examining cross-correlations of spreads where the common risk component has been stripped out (red bars in the left chart below) reveals that significant volatility spillovers from the EA sovereign bond market are likely to be felt only in the bond market of EA financial corporations, signaling a surge in EA banks' perceived riskiness. To a lesser extent, increases in EA sovereign risk are also expected to adversely affect the perceived riskiness of EA non-financial corporations and emerging European countries.





However, if stress spreads from the periphery to core EA financial institutions, the potential for spillovers is much larger. In particular, once the common risk component is stripped out, specific volatility spillovers from the EA financial sector have the potential to increase significantly the perceived riskiness of EA non-financial corporations, Japanese and U.S. banks (red bars in the right chart above), even though "raw" conditional correlations between spreads of EA and Japanese financial institutions are seen to remain below the 0.2 threshold. Incidentally, the analysis also seems to suggest that shocks to EA financial corporate bond spreads tend to be negatively correlated with those to EMBI+ bond spreads, once global risk commonalities have been set aside.[7]

[7] This could either be due to investors' hedging strategies in the asset markets considered or to (opposite) fluctuations in the respective benchmark 10-year government bond yields.

III. Market Assessment of Spillovers from the Euro Area Based on Conditional Distress Probabilities[8]

This note analyzes Euro Area (EA) sovereign and financial distress spillovers using market information, including credit default swaps, equity prices and sovereign yields. The results are presented in heat-maps showing the sensitivity of non-EA countries to developments in the EA as well as the importance of groups of EA countries in generating spillovers to the rest of the world. The sample consists of the following countries: Austria, Belgium, France, Germany, Greece, Ireland, Netherlands, and Portugal (EA), and Brazil, China, Hungary, India, Indonesia, Japan, Korea, Russia, Turkey, United Kingdom and United States (non-EA). When studying banks, one major bank from each country is used.[9]

Spillovers are measured by averages of estimated Conditional Probabilities of Distress (CoPoD) in non-EA sovereigns and banks given distress in EA sovereigns and banks. Distress is defined as a (hypothetical) credit event that triggers CDS contracts.[10] For example, if the CoPoD in Bank A given distress in Sovereign B is 0.5, CDS market implied probability suggests that there is a 50-percent probability that a (hypothetical) credit event in Sovereign B would be followed by a CDS event in Bank A. CoPoDs represent the market's assessment of potential spillovers through a variety of channels such as direct exposure to governments and banks, deleveraging and market confidence.

The CoPoDs are estimated using linear and non-linear dependence between individual probabilities of distress.[11] Probabilities of distress (PoDs) are first derived from market quotes

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[8] Prepared by Sally Chen, Mali Chivakul, Siret Dinc, Ola Melander, Mohamed Norat, and Malika Pant.

[9] While the note investigates spillovers from the EA as a whole, the effects of developments in the core and periphery EA are studied separately. Core EA, for the purposes of this analysis, comprises of Austria, Belgium, France, Germany, and the Netherlands, and EA program countries are Greece, Ireland, and Portugal. Both sovereigns and banks are studied for all G-20 countries except India, Indonesia, Mexico and South Africa (due to insufficient data for the sovereign for India and banks for others), and for Hungary (taken because of the availability of bank CDS data as representative of new EU member states in terms of their links—and hence as potential spillover recipients—with the Euro Area). Only one major bank from each country is used due to technical limits of the model. The EA banks are as follows: Austria – Erste, Belgium – Dexia, France – BNP Paribas, Germany – Deutsche, Greece – Alpha Bank, Ireland – Allied Irish, Netherlands – ING, Portugal – BCP, Other countries' banks are as follows: Brazil – Itau Unibanco, China – Bank of China, Hungary – OTP Bank, India – State Bank of India, Japan – Nomura, Korea – Shinhan, Russia – Sberbank, Turkey – Akbank, UK – Barclays , US – Citigroup.

[10] A credit event could be a failure to pay on schedule, default, or, more broadly, a restructuring where bondholders are forced to bear losses.

[11] The CoPoDs are estimated as in Segoviano (2006), "Consistent Information Multivariate Density Optimizing Methodology," Financial Markets Group, London School of Economics, Discussion Paper 557; Segoviano (2006), "The Conditional Probability of Default Methodology," Financial Markets Group, London School of Economics, Discussion Paper 557; and Segoviano and Goodhart (2009), "Banking Stability Measures," IMF Working Paper, WP/09/04.

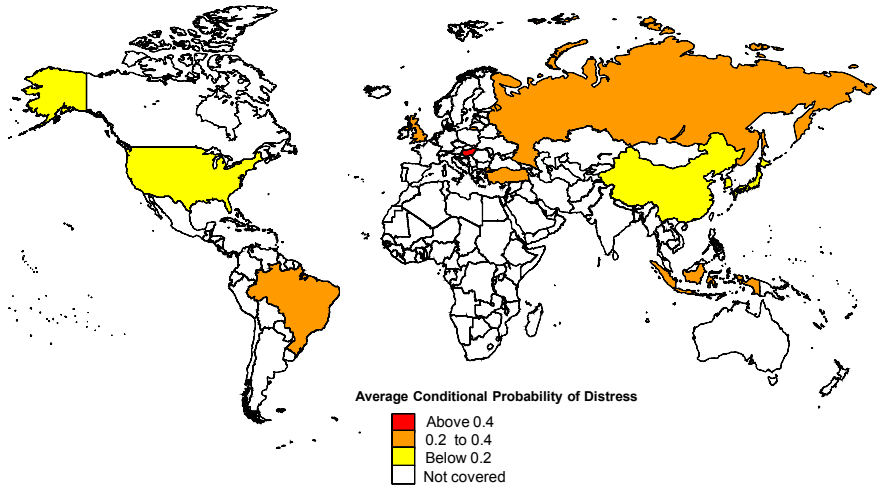
of five-year sovereign and bank CDS spreads in U.S. dollar.[12] Pairwise CoPoDs are calculated for a group of sovereigns and banks. A matrix of distress dependence between sovereigns/banks can be derived. Although conditional probabilities do not imply causation, the set of pairwise conditional probabilities can provide important insights into interlinkages and the likelihood of contagion between the sovereigns/banks in the system. The results shown below are taken from averages of CoPoDs from January 2010 to April 2011, covering a period of market turmoil for European sovereigns and banks.

The analysis shows that EA spillovers can be substantial. The impact is largest in neighboring Europe and smallest in Asia. Sovereign distress in the EA program countries could have knock-on effects on banks, including in the core EA, which would likely in turn have global systemic effects.

Sovereign-to-Sovereign Spillovers

Staff analysis suggests that sovereign credit events in peripheral EA program countries have larger spillovers to neighboring sovereigns than to elsewhere. The estimated spillovers from peripheral EA program country sovereigns tend to be largest in Eastern Europe, reflecting close links, through market confidence, but meaningful spillovers also occur to some other advanced and emerging markets such as Brazil (chart below).

Conditional Probability of Distress of each Non-Euro Area sovereign given Euro Area Program Country Sovereigns Fall in Distress



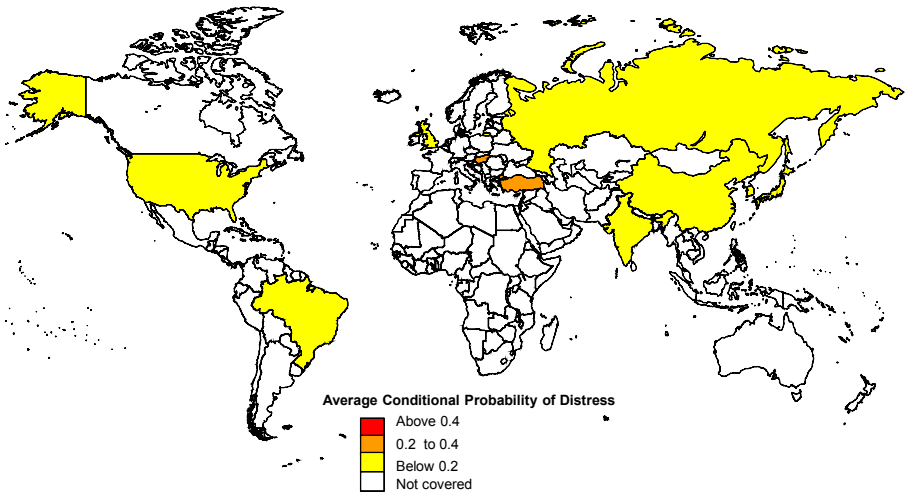
Source: Staff calculations.

[12] Transformation of CDS spreads to PoDs is done through a Matlab program which assumes a constant recovery rate of 40 percent. The transformation function is based on work on credit default swap such as O'Kane, D. and S. Turnbull. "Valuation of Credit Default Swaps."Lehman Brothers, Fixed Income Quantitative Credit Research. April, 2003.

Sovereign-to-Banks Spillovers

Sovereign credit events in the EA program countries would likely mainly affect banks in those countries. There is a larger impact on countries with close links to the EA such as Hungary and Turkey, while China and Japan are affected less, reflecting their lower exposure.

Conditional Probability of Distress of Global Banks Given Euro Area Program Country Sovereigns Fall in Distress

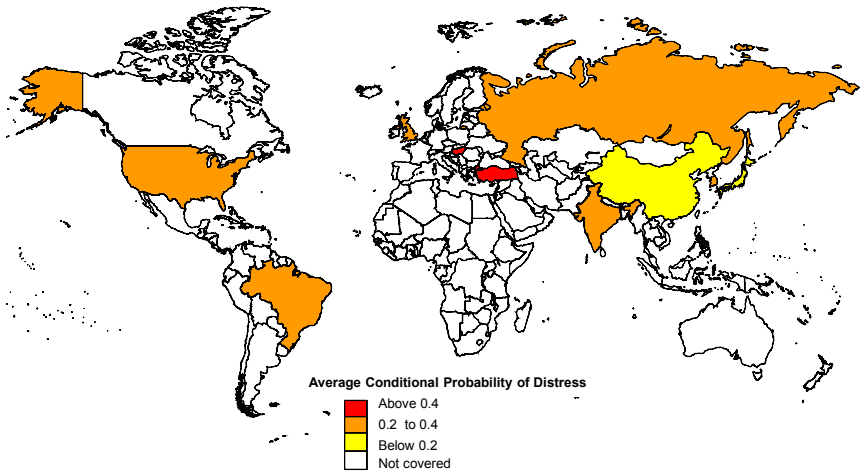


Source: Staff calculations.

Bank-to-Bank Spillovers

Estimated spillovers from EA program country banks are large for other banks in the region but smaller for banks elsewhere. The strongest distress spillovers are within Europe itself, including in Hungary, Turkey, Russia and the UK. Brazil is also indirectly affected, reflecting the large presence of Spanish banks. As expected, spillovers to the Asian and US banking systems are relatively less significant, in part due to their lower direct exposures to the program country banks but also because their earnings and profitability are supported by strong local economic conditions (Asia) or driven by investment banking returns which remained robust over 2010 helped by increased asset prices and renewed risk appetite (US). Conditional probability of default for the U.S. hovers near the low end of the 0.2–0.4 range, while Brazil is at the upper end.

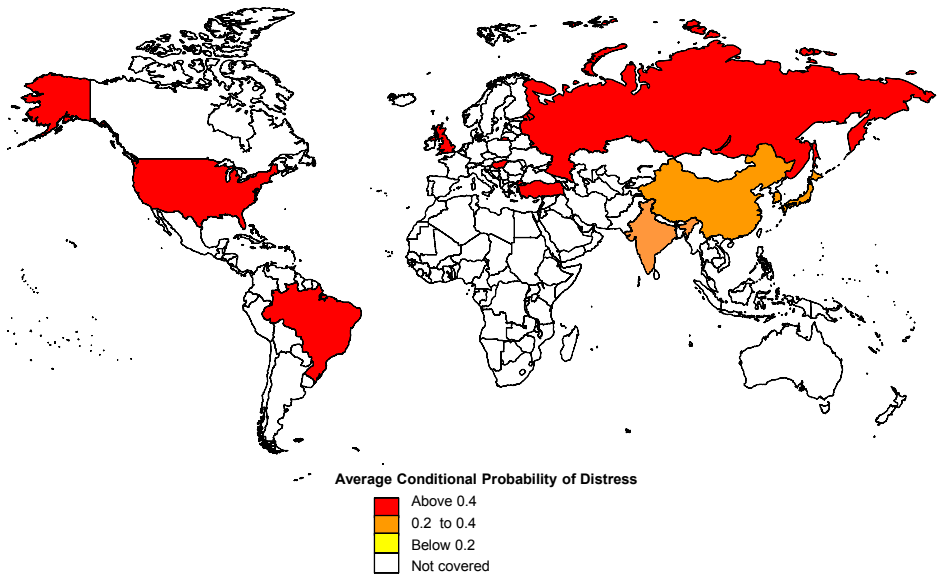
Conditional Probability of Distress of Global Banks Given Euro Area Program Country Banks Fall in Distress



Source: Staff calculations.

Core EA bank distress would, however, be a systemic event impacting banks globally. Spillovers from core EA banks are very large for Hungary, Turkey, the UK, Brazil and Russia. Distress in EA core banks would represent a systemic event that could impact banking systems far beyond the European region, including the US and Asia (The conditional probability of default for the U.S. increases to the upper end of the 0.2–0.4 range under such conditions).

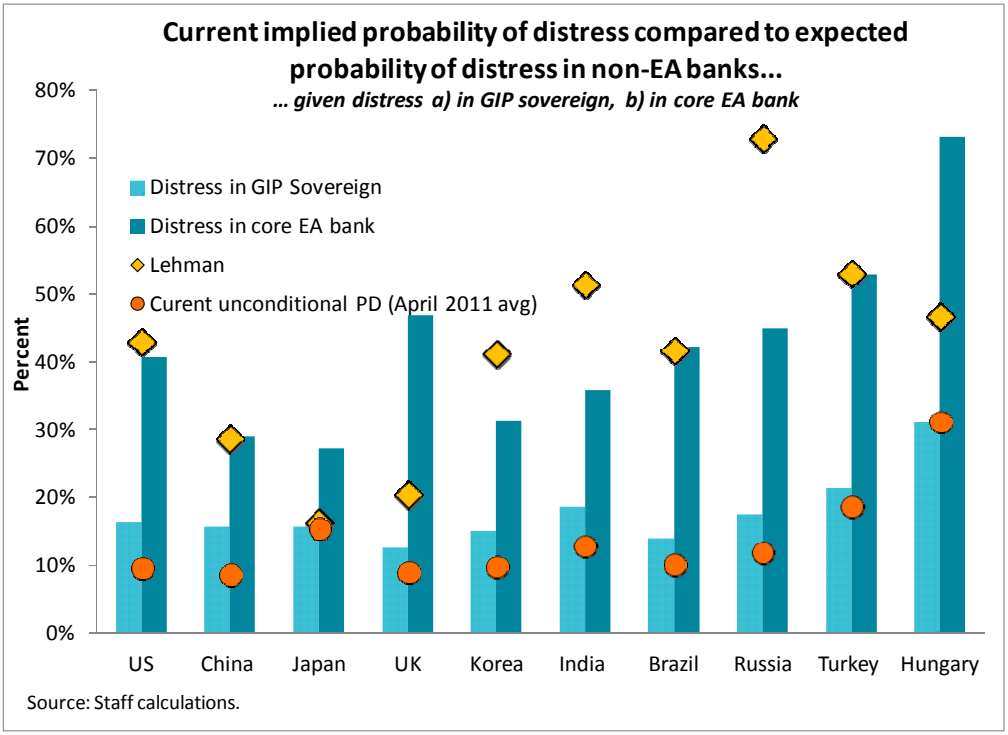
Conditional Probability of Distress of Global Banks Given Core Euro Area Banks Fall in Distress



Source: Staff calculations.

Japanese and Chinese banks remain the least affected by spillovers from the EA. The relatively weaker impact on Japanese and Chinese banks is a result of their lower direct exposure and limited holdings of bonds issued by European sovereigns and banks. Moreover, they tend to have strong liquidity positions based on a substantial local deposit base, and are therefore relatively insulated from funding withdrawal pressures due to systemic concerns. Perhaps the most significant impact of EA banks distress on Asian banks stems from their impact on global risk aversion, trade and growth prospects.

Summing up, the global impact of distress in program country sovereigns and banks is potentially sizable, but much smaller than the estimated global spillovers that would arise if stress were to also spread to core EA banks. This critical result can also be seen by mapping unconditional distress probabilities across global banks. While implied unconditional PoDs (derived from current market CDS in April 2011), are lower than the implied conditional probability in the event of distress in the program countries (light blue bars in text chart below), the implied probability in the event core EA banks are affected is much higher for all countries (dark blue bars in text chart), and would generally be highest in countries that are geographically close to the EA and whose banking systems are most closely linked to that of the EA. For most non-EA banks in the sample, the estimated conditional probability of distress given distress in a major core EA bank is as high or higher than the peak implied unconditional probability of distress in the period after the Lehman bankruptcy.



IV. CROSS-BORDER DELEVERAGING SPILLOVERS OF THE EA SOVEREIGN DEBT CRISIS[13]

This note presents simulations of cross-border spillovers of the Euro Area (EA) sovereign debt crisis. The simulations are performed based on BIS foreign claims data and the model of bank deleveraging developed in Tressel (2010).[14] The behavioral assumption is that banks maintain a target minimum capital-to-asset ratio by contracting their balance sheet when experiencing sudden losses.

Two scenarios are considered (Table 1). The events triggering these scenarios are assumed to take place over a short time span during which banks cannot raise equity as they correspond to episodes of market stress. In these scenarios, claims held in the trading books of international banks bear losses of 30 percent as a result of a sudden and sharp increase in bond yields, with 20 percent of the claims assumed to be in the trading books of banks. The increase in yields affects claims on governments and banks, with the EA program countries (Greece, Ireland, and Portugal; GIP) affected in the first scenario and other EA banks also affected in the second.

Table 1. Scenario assumptions

Scenario	Shock			Impact on balance sheet	Domestic holdings of sovereign debt	Deleveraging by subsidiaries
	Countries	Sector	Loss			
1	GIP	sovereign & banks	30 percent	Trading books (20 percent)	Same loss	20 percent
2	GIP sovereign and banks + other EA banks	sovereign & banks	30 percent	Trading books (20 percent)	Same loss	20 percent

Source: Staff calculations.

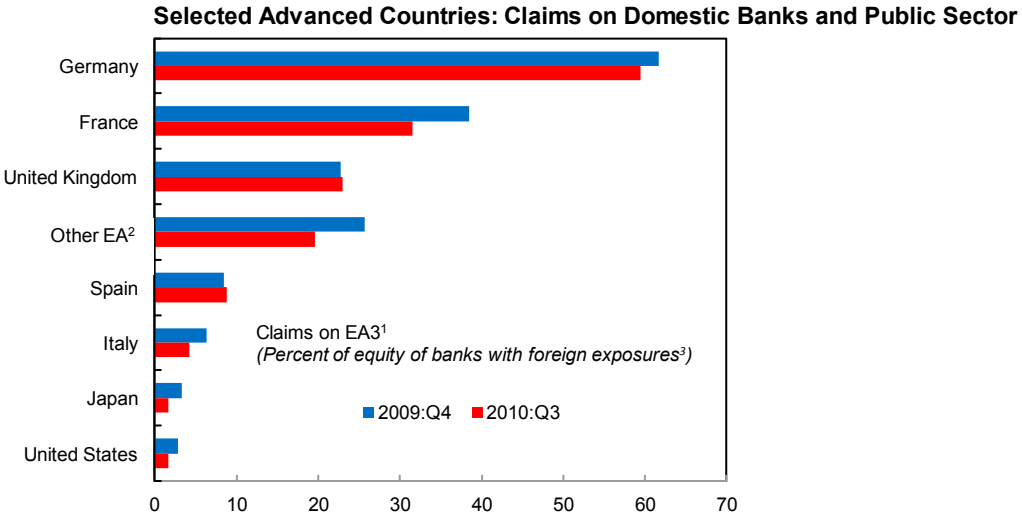
Exposures to EA program countries suggest that the spillovers will be mainly channeled by German and French banks. Because of their size and high leverage, French and German banks are the main sources of spillovers within the EA and between the EA and other regions. According to the most recently available sectoral bilateral exposures of the BIS consolidated banking statistics, German and French banks have large exposures in percent of their equity to the sovereigns and banks of Greece, Ireland, and Portugal (Figure 1).[15]

[13] Prepared by Thierry Tressel.

[14] Tressel, T, 2010, "Financial Contagion through Bank Deleveraging: Stylized Facts and Simulations Applied to the Financial Crisis", IMF Working Paper 10/236.

[15] The simulations are based on Q3 of 2010 data (ultimate risk basis), including for sectoral bilateral exposures. However, when the sectoral data were not available (for example for French banks), the simulations were based on Q2 of 2010 data disclosed in the December 2010 BIS Quarterly Review. For German banks, Q3 of 2010 data on immediate risk basis were used; this method may overestimate German exposure to Ireland.

Figure 1. Exposures of international banks to GIP sovereign and banks
(In percent of bank equity)



Sources: Bank of England; BIS Consolidated Banking Statistics; Bankscope; IMF, *International Financial Statistics;* and IMF staff calculations.
Note: The exposures were adjusted using data from the Bank of Ireland to account for the fact that a significant portion of the claims are claims on foreign banks domiciliated in Ireland.
[1] EA3: Greece, Ireland, and Portugal.
[2] Other EA includes Austria, Belgium, Ireland, Portugal, and the Netherlands.
[3] The exposures are calculated in percent of the equity of banks that have foreign exposures. Banks that do not have exposures to Greece, Ireland, and Portugal are not included in the computation.

Losses of major international banks become large when market stress spreads to more countries. Losses of banks appear manageable as long as the crisis is contained to Greece, Ireland and Portugal. However, losses of trading books become large and exceed 10 percent of equity of French and German banks under scenario 2, when market sentiment about the core EA also turns negative.

As a result, deleveraging in absolute terms would be the largest within the EA itself (Table 2). The deleveraging would negatively affect intra-EA financial integration (Figure 2). In absolute terms, the US and the UK would be the most affected after the EA, followed by Central and Eastern European countries. Most of deleveraging would be caused by EA banks.

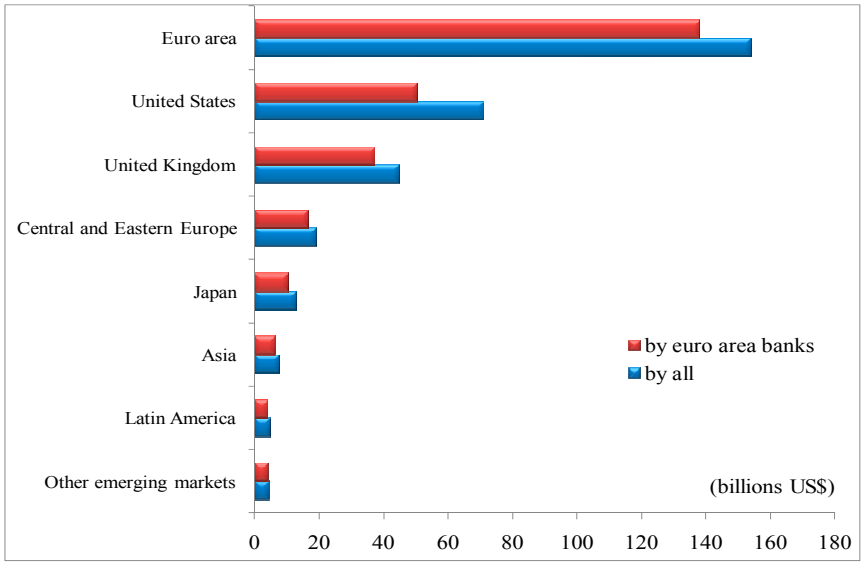
Table 2. Reduction in Liabilities to Foreign Banks
(In bil. US$)

scenario:	1	2
Advanced countries	**120**	**324**
of which:		
Euro area [1/]	54	154
Japan	6	13
United Kingdom	14	45
United States	28	71
Emerging Markets	**13**	**36**
of which:		
Central and Eastern Europe	6	19
Asia	3	7
Latin America	2	5
Other emerging markets	2	4

[1/] Excluding Luxembourg

Source: Staff calculations

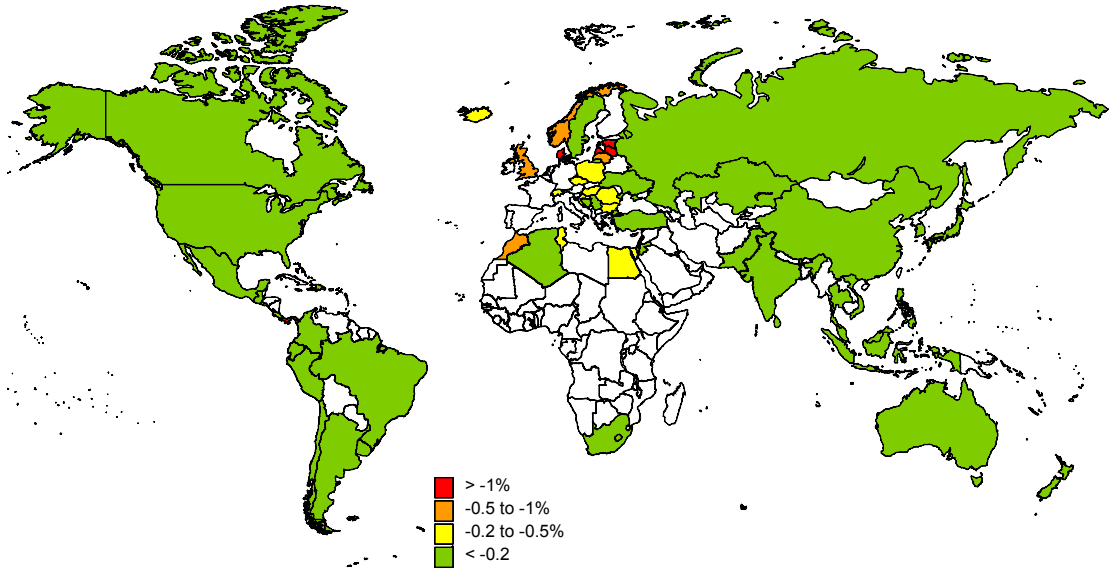
Figure 2. Reduction in foreign liabilities to foreign banks (in bil. US$)
(Scenario 2)



Source: Staff calculations.

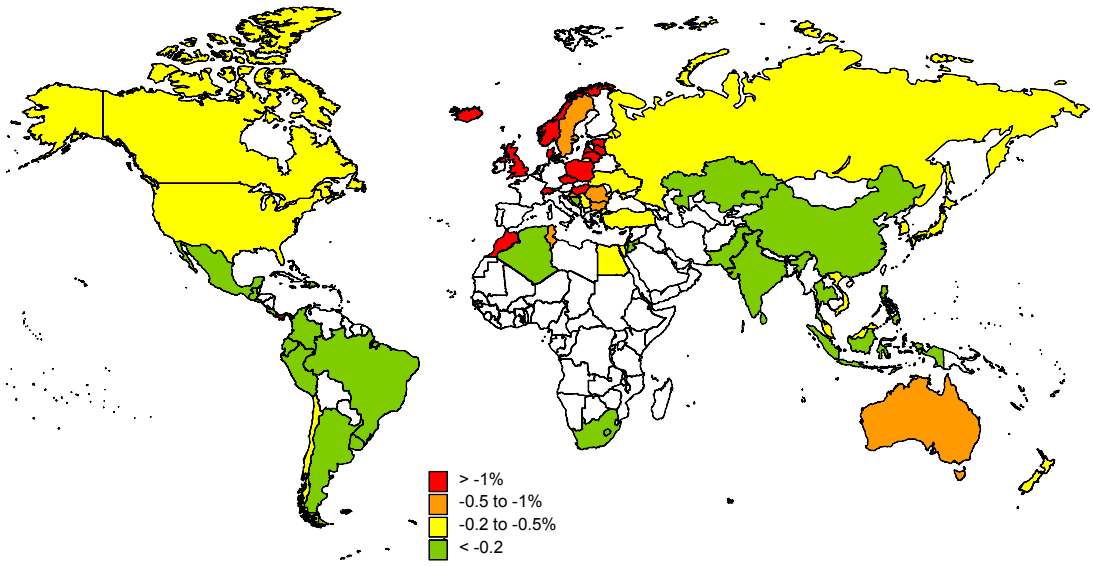
Advanced economies and emerging markets in Europe are particularly vulnerable to deleveraging. In scenario 2, countries that are the most susceptible to experience capital outflows by international banks outside of the EA are mostly in Europe: Poland, Czech Republic, Hungary, Nordic and Baltic countries. Other emerging markets are resilient to such shock. Figures 3 and 4 illustrate the estimated deleveraging under scenarios 1 and 2, respectively.

Figure 3. Estimated Deleveraging by International Banks, Scenario 1
(In percent of GDP)



Source: Staff calculations.

Figure 4. Estimated Deleveraging by International Banks, Scenario 2
(In percent of GDP)



Source: Staff calculations.

Taking account of indirect exposures to the EA program countries could significantly affect the mapping of potential spillovers. Recent data from the BIS provides some information on total direct and indirect gross exposure, including through guarantees via CDS contracts (text table). According to these data, the total exposure U.S. banks, for example, may be several times as large as just the direct exposure, while the indirect exposures of U.K. banks may be as large as their direct exposures. In contrast, indirect exposures of French and German banks, while significant, are generally several times smaller than their direct exposures.

	Debt issued by:		
	Greece	Ireland	Portugal
France			
Direct gross exposures [1/]	17.1	12.1	14.3
Indirect gross exposures	8.31	26.4	5.24
Germany			
Direct gross exposures [1/]	24.9	31.7	23.5
Indirect gross exposures	5.9	40.4	13.8
US			
Direct gross exposures [1/]	3	13.8	3.6
Indirect gross exposures	34.1	54	41.2
UK			
Direct gross exposures [1/]	6.0	22.8	6.8
Indirect gross exposures	5.0	59.2	4.7
Japan			
Direct gross exposures [1/]	0.9	3.1	1.4
Indirect gross exposures	0.1	1.3	0.6

Source: Consolidated Banking Statistics, Table 9E, Q4 of 2010 (as reported in the BIS Quarterly Review of June 2011)
[1/] Exposures to banks and sovereign only

V. EURO AREA SPILLOVERS: GLOBAL PROJECTION MODEL ANALYSIS

This note analyzes spillovers from the Euro Area using the Fund's Global Projection Model (GPM) [16]. The GPM model is a six-region non-linear rational expectations model comprising the US, the Euro Area (EA), Japan, Emerging Asia, Latin America and a group of remaining countries. It features two types of demand shocks: an idiosyncratic demand shock that originates in a particular block and propagates to other regions via the output gap over time, and instantaneous global shocks—e.g., the sovereign market distress in Europe—that are applied instantaneously to all blocks in the model. Additionally, GPM incorporates real-financial linkages—for example, bank lending tightness variables—and spillover channels such as demand shocks, exchange rates, inflation and interest rate in its estimates.

In the EA spillover analysis, GPM constructs two scenarios:

- A baseline or **"tremor" scenario**, analyzes spillovers to the rest of the world from the ongoing sovereign debt problems in EA program countries. Under this scenario, shocks to EA financial conditions (i.e., bank lending conditions) and domestic demand are equal to about half of those experienced in the Lehman crisis.

- A second, downside, **"earthquake" scenario** measures possible spillovers should sovereign risk premiums, growth declines and contagion be even larger. Under this scenario, the magnitude of the shocks are doubled from the tremor scenario. In other words, bank lending is affected in a manner similar to Lehman episode and domestic demand also doubled.

GPM model results from the "tremor" scenario indicate that a milder shock arising from the ongoing sovereign debt crisis in EA program countries would elicit a GDP reduction in the region, with only modest spillover elsewhere. The projected downturn in growth stems primarily from program country governments' fiscal responses, which would be expected to play a significant role in restraining near-term growth in those countries. However, the impact on the rest of the EA and elsewhere would be limited as the real economy of the core EA would be little affected by financial headwinds that buffet the program countries.

In the "earthquake" scenario, GPM measures the tail downside spillover risk should a worst case scenario occur, in which strains spread to the core EA. In this scenario, insufficiently rapid and strong policy action would lead to significant financial market losses, resulting in a substantial decline in capital ratios in all EA countries. Under these conditions, the overall impact on world growth would be substantially higher. Compared to the pre-crisis baseline, EA and U.S. growth in 2011 would be lower by 1.4 and 0.7 percentage points, respectively. Spillover to other regions would also be higher compared to the tremor scenario

[16] Prepared by the GPM team, Research Department. The two scenarios and their results were published in WEO Update January 2011. http://www.imf.org/external/pubs/ft/weo/2011/update/01/index.htm

though the magnitude of impact would be smaller relative to the EA and the US (see table below [17]).

Effect of Euro Area Turbulence on GDP Growth

(Deviation from pre-crisis baseline, in percentage points)

	"Tremor" Scenario		"Earthquake" Scenario	
	Difference from Pre-crisis Baseline		Difference from Pre-crisis Baseline	
	2011	2012	2011	2012
Country/Region	Annual	Annual	Annual	Annual
U.S.	-0.2	-0.2	-0.7	-0.7
Euro Area	-0.4	-0.2	-1.4	-1.3
Japan	0.0	-0.1	-0.1	-0.4
Emerging Asia	-0.1	-0.1	-0.3	-0.4
Latin America	-0.1	-0.1	-0.2	-0.3
Remaining GPM countries	-0.2	-0.2	-0.6	-0.8
World 1/	-0.2	-0.1	-0.4	-0.5

Source: WEO Update (January 2011).

1/ GPM world represents 87.5 percent of world GDP by PPP (2007-2010 average).

[17] In GPM:

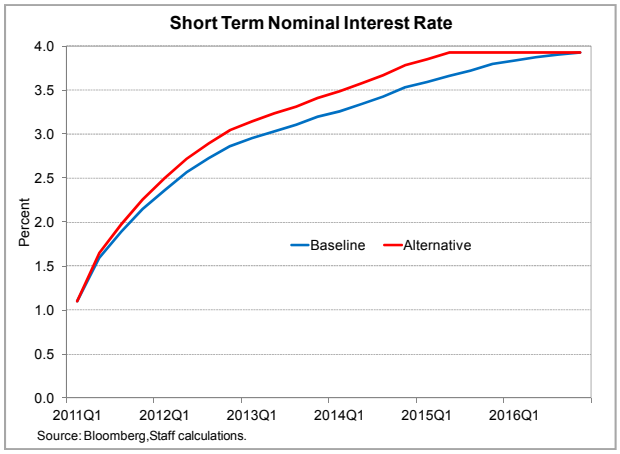
- Emerging Asia includes China, Hong Kong, India, Indonesia, South Korea, Malaysia, Philippines, Singapore, Taiwan and Thailand;
- Latin America includes Brazil, Chile, Mexico, Columbia, Peru;
- The remaining GPM countries include Argentina, Australia, Bulgaria, Canada, Denmark, Estonia, Israel, New Zealand, Norway, Russia, South Africa, Sweden, Switzerland, Turkey, UK and Venezuela.

VI. Spillovers from the Euro Area's Monetary Policy and Liquidity Operations[18]

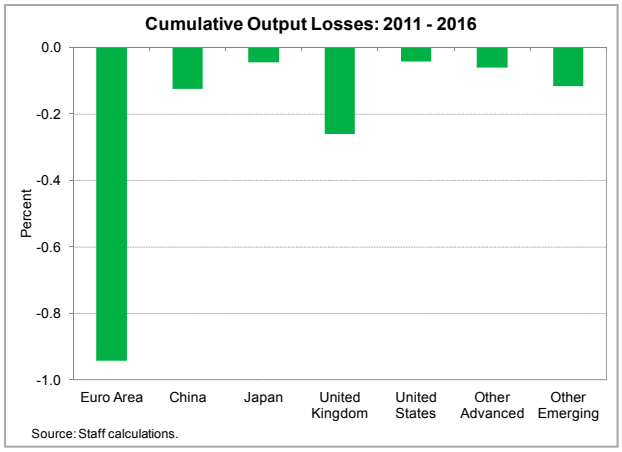
This note analyzes the global implications of the ECB's policies. It considers spillovers from the Euro Area (EA) under two scenarios: (i) faster-than-anticipated monetary policy tightening; and (ii) a withdrawal of the ECB's exceptional liquidity provision to banks. Staff analyses show that the first scenario would generate modest spillovers. By contrast, the repercussions from an early withdrawal of exceptional liquidity could be significant, especially for the UK and some CEE countries.

Monetary policy tightening

Under the scenario below, it is assumed that the short-term nominal interest rate returns to its neutral level six quarters sooner than anticipated by markets. The baseline scenario assumes that monetary tightening in the EA proceeds at the pace expected by the euribor futures market. Under the alternative scenario, the ECB tightens monetary policy faster than under the baseline to control inflation. Both scenarios abstract from monetary policy stabilization in the rest of the world. These scenarios are simulated with a refined version of the structural macroeconometric model of the G-20 documented in Vitek (2010).[19]



Accelerated monetary tightening is estimated to generate a modest output loss in the EA. Taking the difference between the alternative and baseline scenarios, a cumulative output loss of 0.9 percent is estimated over the period 2011−2016. This output loss is generated by the interest rate and exchange rate channels of monetary policy, amplified by an international financial accelerator mechanism.



[18] Prepared by Francis Vitek and Thierry Tressel.

[19] Vitek, F. (2010), Monetary policy analysis and forecasting in the Group of Twenty: A panel unobserved components approach, *IMF Working Paper*, 152.

Accelerated monetary tightening in the EA is estimated to generate moderate spillovers to the rest of the world. Taking the difference between the alternative and baseline scenarios, estimated cumulative output losses for other advanced economies range from 0.0 to 0.3 percent over the period 2011−2016, while for emerging economies they range from 0.0 to 0.2 percent. These spillovers primarily reflect reduced export demand from the EA, mitigated by real effective currency depreciations in the rest of the world.

ECB's liquidity provision

Simulations are first undertaken to estimate cross-border spillovers of the ECB full allotment liquidity provision to the periphery EA's banks. The simulations provide a counterfactual of the positive spillover effect of full allotment liquidity provision at a fixed rate. The analysis is performed based on the model of bank deleveraging based on the behavioral assumption that banks maintain a target minimum leverage ratio by contracting their balance sheet (they "deleverage") or recapitalizing when experiencing losses or an increase in the required minimum capital to asset ratio. [20]

The ECB started providing unlimited liquidity at a fixed rate in October 2008. The ECB Governing Council decided to change the procedure of the weekly main refinancing operations to a tender procedure with full allotment at a fixed rate to remedy the malfunctioning of the money market.[21] This helped lower the refinancing cost of the marginal borrower with high refinancing needs. Given renewed market tensions, in December 2010, the ECB decided to prolong the 3-month Long Term Refinancing Operation (LTRO) as fixed rate full allotment tenders at least until July 2011. As a result, the ECB's exposures to the periphery EA's banks are significant.[22] Other non-periphery EA banks also remain significantly exposed to the banks of the periphery.

	ECB liquidity funding (Q4 of 2010)	Foreign Interbank Liabilities (Q3 of 2010)
Greece	130.7	10.1
Ireland	124.8	193.2
Portugal	54.0	49.2
Spain [1/]	72.7	248.9

Note: in billions of US$

1/ ECB financing as of end January 2011

Sources: BIS, ECB, DLX, and Central Bank of Ireland

[20] Tressel, T, 2010, "Financial Contagion through Bank Deleveraging: Stylized Facts and Simulations Applied to the Financial Crisis", IMF Working Paper 10/236.

[21] Measures adopted by the ECB included fixed rate tenders with full allotment in all liquidity-providing operations; additional refinancing operations with one-month and three-month maturities, as well as the provision of funding at longer maturities of six months and one year, and a broadening of the collateral program.

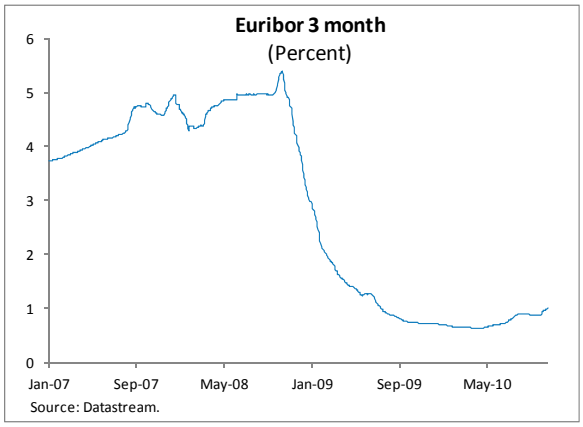
[22] Refinancing by the ECB is backed by the provision of collateral, including sovereign debt securities and bank bonds. The ECB is also directly exposed to sovereigns of the periphery through the Securities Market Programme.

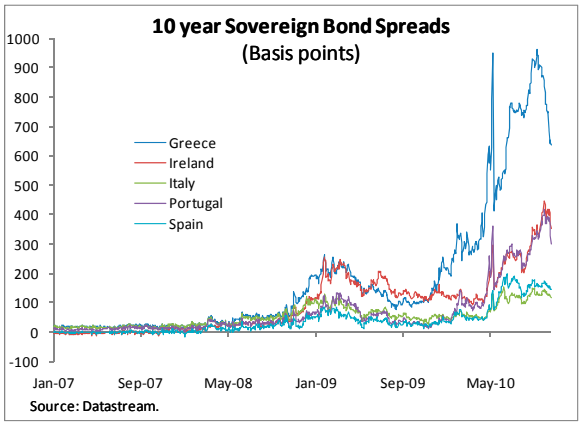
The scenario assumes that the full allotment liquidity provision by the ECB has prevented excessive movements in the funding costs of the banks of the periphery. The liquidity provision at full allotment is assumed to have lowered funding costs of the banks of the periphery and of subsidiaries by 500 basis points, and overall funding needs are approximated by the sum of (i) the liquidity provision by the ECB to these banks; and (ii) total interbank liabilities.[23] In other words, the simulation illustrates the counterfactuals, i.e. periphery banks' funding costs, both from ECB refinancing facility and from the interbank market, would increase by 500 bps in the absence of the ECB liquidity provision. The scenario assumes that subsidiaries of banks of the periphery deleverage in the same proportion as their parent in response to a withdrawal of the ECB exceptional liquidity provision. To assess robustness, we also consider an alternative scenario in which the funding shocks differs across countries. Funding costs are assumed to increase by 700 bps in Greece and Ireland, 400 bps in Portugal, and 250 bps in Spain. Finally, to gauge how the simulated deleveraging is affected by the size of the funding shock, we consider two additional scenarios, in which funding costs rise by respectively 250 bps and 750 bps.

The funding shock is derived from the increase in credit risk premia during recent market stress since 2008. The assumed 500 bps is within the range of the decrease in euribor in late 2008 at the time the exceptional liquidity provision was initiated and with the range of the increase in long-term rates in 2010, both of which reflect increased credit risks (Figure 1).The first chart shows the decline in euribor as a result of policy reactions at the onset of the financial crisis in 2008. The second chart shows movements in government bond yields of the periphery. The main scenario thus assumes that funding costs of ECB refinancing or the interbank market would increase by this amount should the ECB return to competitive auctions for its refinancing facilities. Given uncertainties in quantifying a counterfactual, we considered three additional scenarios to ascertain robustness of the main conclusions.

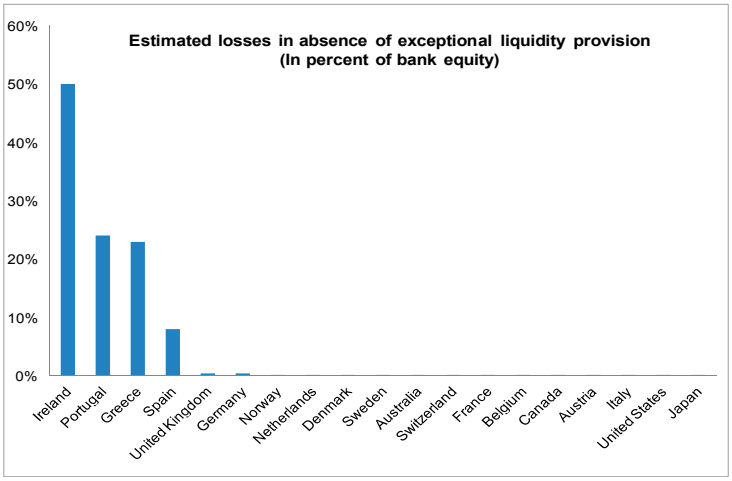
[23] Hence, the analysis differentiate banking systems according to their dependence on ECB refinancing and interbank financing. Interbank liabilities of the banking systems of the four countries are approximated by the total consolidated claims on domestic banks by banks of other nationalities (source: BIS Consolidated Banking Statistics, Q3 of 2010, and BIS Quarterly Review Dec 2010).

Figure 1. Movements in short-term and long-term financing costs





The simulation shows that exceptional liquidity provision has helped contain funding costs significantly. Should exceptional liquidity provision be ended, the funding shock would be substantial for Greek, Portuguese and Irish banks, resulting in losses exceeding 20 percent of bank capital. The shock would be more manageable for Spanish banks.



Source: Staff calculations

Positive spillovers from ECB refinancing operations occur mainly through the operations of Greek, Portuguese and Irish banks. In the main scenario, a sudden rise in funding costs would result in a large deleveraging by Irish banks (36.5 percent of foreign claims), Portuguese banks (about 15 percent of foreign claims) and Greek banks (about 5 percent of their claims). In the alternative scenario, the impact would be broadly similar. However, if the sudden increase in funding costs reaches 750 bps, the deleveraging would be much larger, as Irish, Portuguese, Greek and Spanish banks would reduce their foreign assets by respectively 68 percent, 28 percent, 18 percent and 1 percent.

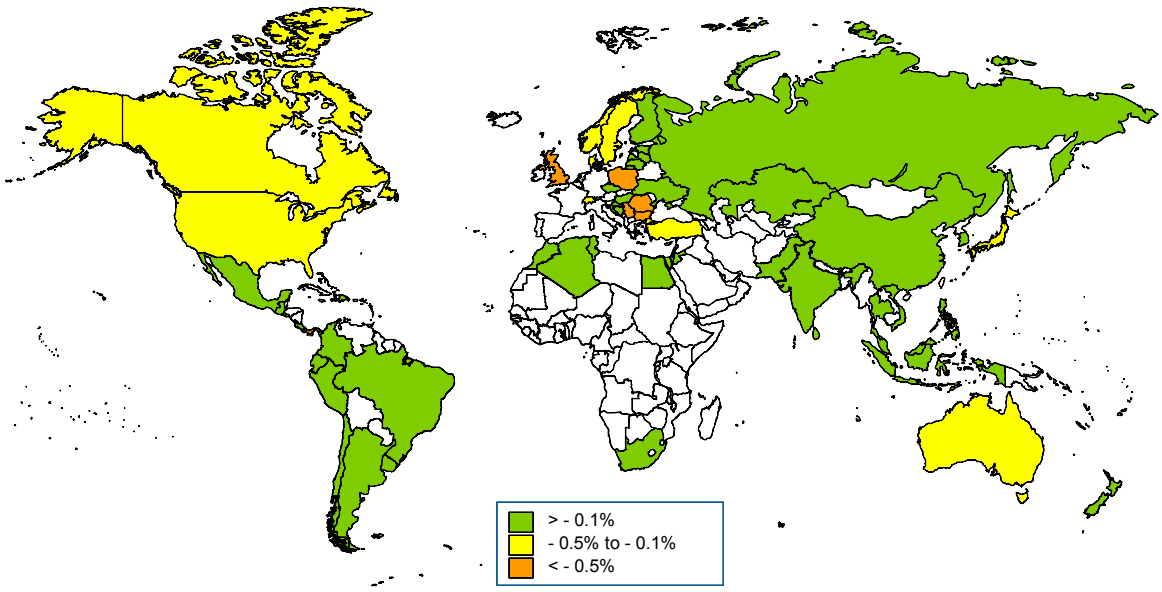
Reduction in Foreign Claims (Bil US$)

Reduction in Foreign Claims (Bil US$)	Main scenario	Alternative scenario	Scenario (250 bps)	Scenario (750 bps)
Advanced countries	**216**	**351**	**36**	**416**
of which:				
Euro area [1/]	79	121	13	151
Japan	6	9	1	10
United Kingdom	83	140	14	160
United States	34	56	6	65
EA program countries	10	12	2	20
Emerging Markets	**9**	**17**	**1**	**29**
of which:				
Central and Eastern Europe	7	15	0	21
Asia	0	0	0	0
Latin America	2	1	0	7
Other emerging markets	0	1	0	1

[1/] Excluding Luxembourg

Most spillovers would occur within the EA and between the EA and other advanced economies (Figure 2). Spillovers within the EA would account for a large share of the contraction in foreign activities of international banks, in particular in the second scenario in which ECB liquidity provisioning plays a broader stabilizing role in the interbank market. Because of its role as a financial center and interconnectedness with other European countries, the UK would be significantly affected by the withdrawal of ECB exceptional liquidity provision. Spillovers to emerging markets would be small on average, except for a small number of CEE countries. While these spillovers are large, it should be recognized that ongoing exceptional liquidity provision can also have drawbacks, notably delayed restructuring of weak banks.

Figure 2. Estimated deleveraging in the main scenario
(In percent of GDP)[24]



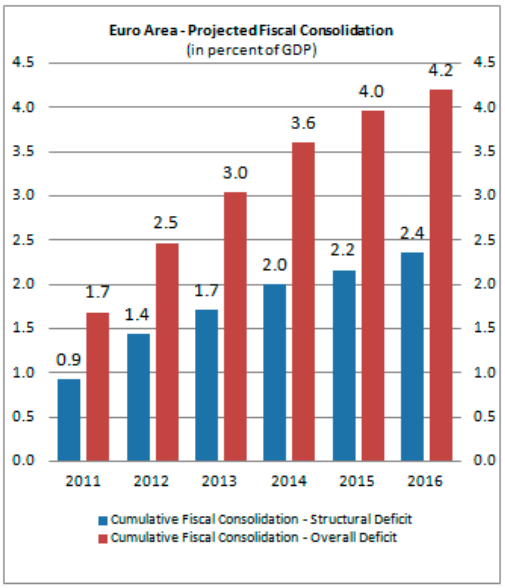
Source: Staff calculations.

[24] More negative numbers mean larger deleveraging.

VII. Euro Area Fiscal Consolidation: Model Simulation Results[25]

This note analyzes spillovers from planned fiscal consolidation in the Euro Area. The analysis is based on scenarios simulated with the latest 6-region version (including U.S., Euro Area, Japan, China, Emerging Asia, and Rest of the World) of the IMF's dynamic general equilibrium model— Global Integrated Monetary and Fiscal Model (GIMF)—and a refined version of the structural macroeconometric model of the Group of Twenty(G-20 model).[26] These alternative models provide complementary analyses of spillovers from fiscal consolidation in the Euro Area. The GIMF model features a more detailed fiscal transmission mechanism, while the G-20 model features a higher level of disaggregation across economies.

The first scenario reflects the overall Euro Area fiscal adjustment projected by the April 2011 World Economic Outlook. Staff projects the consolidation to be quite strong in 2011, on the order of 1.7 percent of GDP (of which 0.9 percent is the cyclically-adjusted component), followed by more moderate adjustments averaging 0.5 percent of GDP in subsequent years until 2016. In structural terms, the implied cumulative fiscal consolidation would amount to 2.4 percent of GDP by end-2016 (see text chart). Under the baseline scenario, the change in the structural balance is assumed to be permanent in the year it is implemented, but future changes in the structural balance are not anticipated and do not affect behavior until they actually occur. Further, the consolidation is prevented from having an impact on interest rates over the first five years in all regions.



Source: IMF *World Economic Outlook*, April 2011.

[25] Prepared by Silvia Sgherri, Francis Vitek, Derek Anderson, and Stephen Snudden.

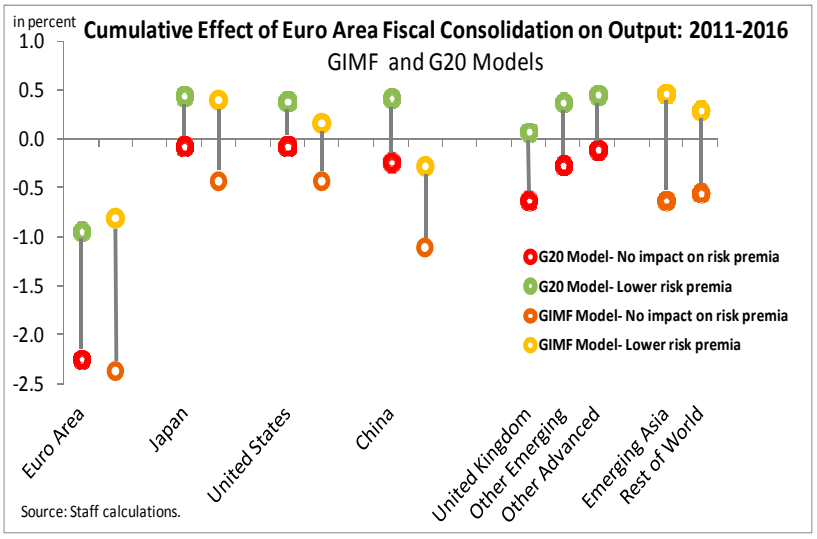
[26] A comprehensive overview of the theoretical structure of GIMF is provided in Michael Kumhof, Douglas Laxton, Dirk Muir, and Susanna Mursula (2010), "The Global Integrated Monetary and Fiscal Model (GIMF) – Theoretical Structure," *International Monetary Fund Working Paper*, 10/34. The structural macroeconometric model of the Group of Twenty is documented in Vitek, F. (2010), "Monetary policy analysis and forecasting in the Group of Twenty: A panel unobserved components approach," *International Monetary Fund Working Paper*, 10/152.

Under the alternative scenario, the impact of the same consolidation plan is allowed to flow through to interest rates as easing concerns about debt sustainability in the Euro Area lower sovereign risk premia. Under this scenario, the planned fiscal adjustment is seen as sufficiently strong to bring about a gradual and permanent reduction in sovereign risk premia, as financial conditions and market confidence improve. Specifically, sovereign risk premia in the Euro Area are assumed to fall gradually by a cumulative 50 basis points by 2016.

The decline of investors' concerns regarding sovereign risk issues in the Euro Area is assumed to spread to the rest of the world, mirrored by a cumulative reduction of other regions' sovereign risk premia on the order of 20 basis point by 2016—roughly one third of what is assumed for the Euro Area. Both scenarios abstract from monetary policy accommodation in the Euro Area and in the rest of the world over the period 2011-16, in order to highlight the impact of fiscal policy and its spillovers. Of course, this assumption overstates the "true" contractionary effect on output that would actually take place, since monetary policy stabilization would moderate the impact.

According to model simulations, planned fiscal consolidation in the Euro Area will generate meaningful output losses in this region. In particular, under the baseline scenario where the consolidation does not bring down sovereign spreads, cumulative output losses over 2011-16 are found to range from 2.2 to 2.4 percent (see text chart below). The scenario that incorporates lower sovereign risk premia—both in the Euro Area and elsewhere—results in smaller cumulative output losses for the Euro Area over the same period, ranging from 0.9 to 0.8 percent. In other words, according to our model simulations, the generalized fall in risk premia partly offsets the Euro Area output losses arising from its planned fiscal adjustment (at least until end-2015).

Model simulations envisage moderate spillovers to the rest of the world, which are negative in the absence of risk premia reductions and largely positive in the event that risk premia do fall. Assuming no risk premia reductions, model simulations reckon a cumulative output drop over 2011-16 in the rest of the world on the order of 0.5 percent—with regional output losses ranging from 0.1 to 1.1 percent. By contrast, growth spillovers from Euro Area fiscal consolidation plans would generally turn positive if the fiscal adjustment is successful in lowering global risk aversion and interest rates respond (e.g., bringing down risk premia worldwide). Under this scenario, estimated cumulative output gains are on the order of 0.2 percent, with region-specific output changes



ranging from -0.3 to 0.5 percent. Differences in the magnitude of spillover effects across countries and country groups reflect trade linkages—those with greater trade openness and a higher share of trade with the Euro Area would tend to be affected more. The somewhat larger spillover effects under the GIMF model simulations (relative to those simulated using the G-20 model) are largely due to the strength of trade links, which are magnified by distinguishing between trade in final versus intermediate goods.

VIII. SPILLOVERS FROM HIGHER BANK CAPITAL REQUIREMENTS IN THE EURO AREA[27]

This note analyzes spillovers from regulatory increases in capital adequacy requirements in the Euro Area (EA). The novelty of this analysis is that it integrates and focuses on cross-border spillovers, and therefore serves as a complement to the MAG studies.[28] The first section analyzes spillovers within the framework of a global model of bank balance sheets. The second section analyzes macroeconomic spillovers with the framework of a global macroeconometric model. In both sections, the focus is on direct potential spillovers only, abstracting from the potentially large positive impact of new higher capital requirements on underlying bank stability.

Bank Deleveraging Spillovers

This section presents simulations of bank deleveraging resulting from a tightening of capital adequacy regulations that lead to a large reduction in bank leverage. The simulations are performed in the model of bank deleveraging based on the simple behavioral assumption that banks maintain a target minimum leverage ratio by contracting their balance sheet (they "deleverage"), or by raising equity.[29] The calibration relies on BIS consolidated banking statistics for the exposures of international banks to various countries.[30] This reduction in leverage is assumed to stem from higher bank capital requirements and market pressures to reduce risk taking and leverage. To keep the exercise tractable, the risk composition of bank portfolios is assumed to remain constant, hence deleveraging is proportionally distributed across all asset classes. It is also assumed, for the purposes of the model, that the reduction in leverage does not lower funding costs.

We consider three scenarios under various amplification mechanisms and transmission to local affiliates. The main assumption, common to all scenarios, is that international banks experience a uniform 2 percentage point increase in their minimum capital to asset ratios (to reach a capital to asset ratio of 6 percent), resulting in a symmetric shock to all asset classes. Another common assumption is that banks are able to realize 80 percent of the required increase in the capital (given total assets) by increasing equity, and 20 percent by deleveraging. The baseline scenario assumes that there is full pass-through of the deleveraging to local affiliates of international banks. The second scenario adds moderate liquidity funding shocks to the baseline scenario under the assumption of 20 percent haircuts

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[27] Prepared by Thierry Tressel and Francis Vitek.

[28] Basel Committee on Banking Supervision, "Results of the Comprehensive Quantitative Impact Study", December 2010.

[29] See Tressel, T. (2010), Financial contagion through bank deleveraging: Stylized facts and simulations applied to the financial crisis, *IMF Working Paper*, WP/10/236.

[30] The simulations are based on 2010Q2 data.

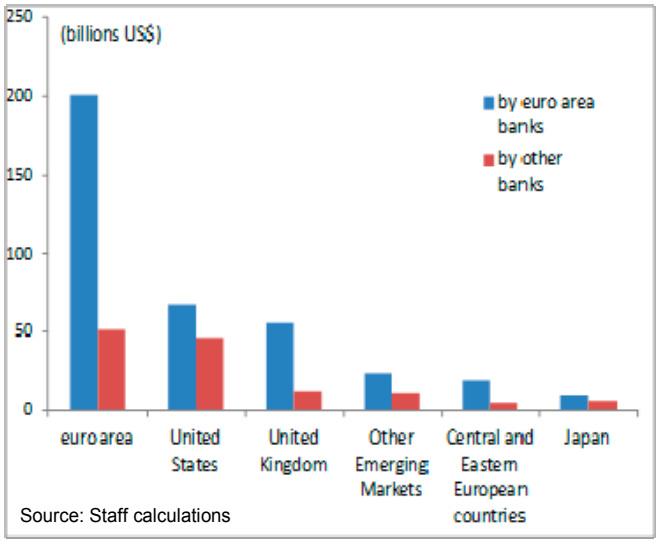
associated with fire sales. The third scenario modifies the baseline scenario by assuming only a 30 percent pass-through of the deleveraging to local affiliates, as opposed to 100 percent under the baseline.[31]

In the baseline scenario, the deleveraging is broad-based, and affects mostly large European financial institutions. The reduction in total assets is significant for French, German, Swiss and Swedish banks, where reductions equivalent to 6−8 percent of assets take place. This reflects the very high initial leverage of these banks. By contrast, Austrian, Canadian, U.S., Italian and Japanese banks do not deleverage significantly following the increase in required capital.

From a host country perspective, spillover effects are large mostly in advanced economies. The deleveraging exceeds 5 percent of GDP for a group of advanced economies (Belgium, Cyprus, Iceland, Ireland, and New Zealand), a few emerging markets (the three Baltic countries, Hong Kong SAR), and several small countries (see Table 1).

Spillovers under this scenario take place mostly within the EA. Most of the deleveraging would be driven by EA banks and would, therefore, affect other EA countries (Figure 1). In absolute terms, the US and the UK would experience the second largest deleveraging, but the spillover would remain small in percent of their GDP. While small in absolute terms, the spillovers would be the largest for Central and Eastern European countries in percent of their GDP (Table). Spillovers to the rest of the world would remain small.

Figure 1. Deleveraging by Region and Home Country of Banks



Liquidity funding shocks (scenario 2) only marginally increase spillovers to other countries. With 20 percent haircuts on fire sales of assets, the amplification of deleveraging caused by the reduction in interbank funding remains small, but higher haircuts would have much larger effects, as the amplification effect is highly non-linear (see Table).

Partial transmission to local affiliates of international banks significantly reduces cross-country spillovers (scenario 3). If the shock is only partially transmitted to local affiliates, the reduction in foreign claims of international banks exceeds or is about 5 percent of GDP in a few countries.

[31] The pass-through to subsidiaries may be partial because they are significantly financed by local deposits.

Table. 1. Reduction in Foreign Liabilities to GDP

Reduction in Foreign Liabilities to GDP
by euro area banks

Country	scenario 1	scenario 2	scenario 3
Algeria	0.31%	0.31%	0.17%
Argentina	0.29%	0.29%	0.17%
Australia	1.09%	1.11%	0.65%
Austria	2.57%	2.62%	1.70%
Belgium	6.36%	6.44%	4.54%
Bosnia and Herzegov	0.21%	0.22%	0.10%
Brazil	0.57%	0.58%	0.29%
Bulgaria	1.71%	1.73%	0.86%
Canada	0.56%	0.57%	0.39%
Chile	1.78%	1.81%	1.03%
China	0.08%	0.08%	0.06%
Colombia	0.23%	0.23%	0.10%
Costa Rica	0.16%	0.16%	0.16%
Croatia	1.42%	1.45%	0.79%
Cyprus	5.55%	5.63%	4.81%
Czech Republic	2.61%	2.68%	1.31%
Denmark	1.71%	1.73%	1.50%
Dominican Republic	0.22%	0.23%	0.21%
Ecuador	0.04%	0.04%	0.04%
Egypt	0.77%	0.78%	0.47%
El Salvador	0.04%	0.04%	0.04%
Estonia	0.37%	0.37%	0.30%
Finland	0.82%	0.83%	0.76%
France	0.83%	0.84%	0.74%
Germany	1.03%	1.05%	0.75%
Greece	2.33%	2.37%	1.74%
Guatemala	0.03%	0.03%	0.03%
Hong Kong SAR	1.75%	1.77%	0.99%
Hungary	2.97%	3.04%	1.71%
Iceland	5.58%	5.68%	5.09%
India	0.27%	0.28%	0.22%
Indonesia	0.18%	0.18%	0.15%
Ireland	8.30%	8.48%	7.46%
Israel	0.27%	0.27%	0.20%
Italy	2.41%	2.44%	1.56%
Jamaica	0.12%	0.12%	0.12%
Japan	0.33%	0.33%	0.18%
Jordan	0.15%	0.16%	0.15%
Kazakhstan	0.26%	0.26%	0.25%
Korea	0.55%	0.56%	0.41%
Latvia	0.85%	0.87%	0.51%
Lebanon	0.24%	0.25%	0.24%
Lithuania	0.57%	0.58%	0.34%
Luxembourg	47.41%	48.19%	37.37%
Malaysia	0.35%	0.36%	0.27%
Malta	4.03%	4.10%	3.84%
Mexico	0.69%	0.70%	0.35%
Morocco	1.89%	1.92%	1.24%
Netherlands	2.98%	3.03%	2.82%
New Zealand	0.86%	0.87%	0.45%
Norway	1.03%	1.05%	0.91%
Pakistan	0.04%	0.04%	0.04%
Panama	4.39%	4.46%	3.78%
Peru	0.44%	0.45%	0.23%
Philippines	0.31%	0.32%	0.29%
Poland	2.18%	2.22%	1.05%
Portugal	4.16%	4.23%	3.23%
Romania	1.39%	1.40%	0.64%
Russia	0.42%	0.43%	0.31%
Serbia	0.86%	0.87%	0.57%
Singapore	2.56%	2.60%	1.57%
Slovakia	1.53%	1.57%	0.73%
Slovenia	1.47%	1.50%	0.94%
South Africa	0.31%	0.31%	0.26%
Spain	2.26%	2.30%	1.78%
Sri Lanka	0.11%	0.11%	0.11%
Sweden	1.09%	1.11%	1.03%
Switzerland	2.01%	2.05%	1.81%
Thailand	0.26%	0.26%	0.21%
Tunisia	0.90%	0.91%	0.56%
Turkey	0.78%	0.79%	0.56%
Ukraine	0.93%	0.95%	0.55%
United Kingdom	3.91%	3.98%	2.51%
United States	0.76%	0.77%	0.47%
Uruguay	0.45%	0.46%	0.25%
Vietnam	0.35%	0.36%	0.28%

Reduction in Foreign Liabilities to GDP
by non euro area banks

Country	scenario 1	scenario 2	scenario 3
Algeria	0.00%	0.00%	0.00%
Argentina	0.06%	0.06%	0.04%
Australia	0.55%	0.57%	0.35%
Austria	0.29%	0.30%	0.29%
Belgium	0.46%	0.47%	0.43%
Bosnia and Herzegovin	0.00%	0.00%	0.00%
Brazil	0.21%	0.22%	0.14%
Bulgaria	0.05%	0.05%	0.04%
Canada	0.28%	0.29%	0.20%
Chile	0.14%	0.15%	0.11%
China	0.07%	0.07%	0.04%
Colombia	0.03%	0.03%	0.02%
Costa Rica	0.04%	0.04%	0.03%
Croatia	0.05%	0.05%	0.05%
Cyprus	1.90%	1.94%	1.49%
Czech Republic	0.05%	0.06%	0.03%
Denmark	3.17%	3.21%	1.35%
Dominican Republic	0.04%	0.04%	0.04%
Ecuador	0.04%	0.04%	0.03%
Egypt	0.16%	0.17%	0.08%
El Salvador	0.02%	0.02%	0.02%
Estonia	7.65%	7.75%	4.92%
Finland	3.53%	3.60%	1.43%
France	0.46%	0.48%	0.37%
Germany	0.52%	0.53%	0.39%
Greece	0.14%	0.15%	0.09%
Guatemala	0.07%	0.07%	0.07%
Hong Kong SAR	3.43%	3.61%	1.38%
Hungary	0.05%	0.05%	0.05%
Iceland	0.43%	0.44%	0.41%
India	0.19%	0.20%	0.12%
Indonesia	0.15%	0.16%	0.11%
Ireland	2.67%	2.78%	1.79%
Israel	0.11%	0.12%	0.10%
Italy	0.13%	0.14%	0.11%
Jamaica	0.12%	0.13%	0.12%
Japan	0.17%	0.18%	0.11%
Jordan	0.06%	0.06%	0.06%
Kazakhstan	0.14%	0.14%	0.11%
Korea	0.44%	0.46%	0.24%
Latvia	4.26%	4.32%	1.84%
Lebanon	0.24%	0.24%	0.24%
Lithuania	3.17%	3.21%	2.36%
Luxembourg	14.77%	14.98%	12.96%
Malaysia	0.48%	0.50%	0.23%
Malta	0.49%	0.49%	0.43%
Mexico	0.14%	0.15%	0.08%
Morocco	0.02%	0.02%	0.02%
Netherlands	0.88%	0.91%	0.81%
New Zealand	4.15%	4.21%	3.65%
Norway	2.67%	2.72%	1.18%
Pakistan	0.24%	0.25%	0.11%
Panama	3.53%	3.55%	3.48%
Peru	0.05%	0.05%	0.04%
Philippines	0.17%	0.18%	0.13%
Poland	0.20%	0.20%	0.10%
Portugal	0.34%	0.36%	0.25%
Romania	0.04%	0.05%	0.04%
Russia	0.11%	0.11%	0.08%
Serbia	0.02%	0.02%	0.01%
Singapore	1.94%	2.01%	0.92%
Slovakia	0.05%	0.05%	0.03%
Slovenia	0.04%	0.04%	0.04%
South Africa	0.79%	0.84%	0.31%
Spain	0.26%	0.28%	0.19%
Sri Lanka	0.05%	0.05%	0.03%
Sweden	0.92%	0.96%	0.61%
Switzerland	0.29%	0.31%	0.26%
Thailand	0.25%	0.26%	0.12%
Tunisia	0.03%	0.03%	0.03%
Turkey	0.13%	0.13%	0.09%
Ukraine	0.32%	0.32%	0.20%
United Kingdom	0.96%	0.97%	0.54%
United States	0.62%	0.64%	0.33%
Uruguay	0.09%	0.09%	0.08%
Vietnam	0.07%	0.07%	0.05%

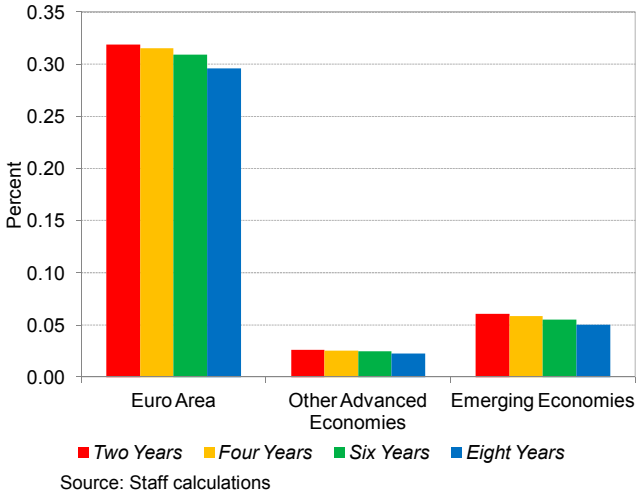
Source: BIS, staff calculations.

Macroeconomic Spillovers

This section analyzes spillovers from a regulatory increase in capital adequacy requirements in the EA. The focus is on the transitional costs of higher capital requirements, as opposed to the permanent net benefits accruing from less frequent and severe banking crises. This analysis is based on scenarios simulated with an extended and refined version of the macroeconometric model of the world economy, disaggregated into its fifteen largest national economies, documented in Vitek (2009).[32] These scenarios abstract from monetary policy stabilization and assume that the macroeconomic effects of this regulatory measure are transmitted exclusively via a permanent increase in the spread between commercial bank lending and deposit rates.

We estimate that a one percentage point increase in capital adequacy requirements in the EA would generate modest spillovers. A capital requirement shock is analogous to a permanent monetary policy shock, and is transmitted in the model via the interest and exchange rate channels of monetary policy. In the EA, we estimate a peak output loss of 0.30 to 0.32 percent, depending on the speed of implementation (Figure 2). These estimates are based on a 0.12 percent increase in the interest rate spread following MAG (2010), and are approximately linearly increasing in the capital adequacy requirement increase.[33] In other advanced economies, estimated peak output losses range from 0.01 to 0.09 percent, while in emerging economies they range from 0.02 to 0.14 percent, reflecting their greater trade openness and less flexible exchange rate regimes. These output losses primarily reflect reduced export demand from the EA, mitigated by real effective currency depreciations in the rest of the world.

Figure 2. Peak Output Losses



Source: Staff calculations

[32] Vitek, F. (2009), Monetary policy analysis and forecasting in the world economy: A panel unobserved components approach, *International Monetary Fund Working Paper*, 09/238.

[33] Macroeconomic Assessment Group (2010), Assessing the macroeconomic impact of the transition to stronger capital and liquidity requirements, *Financial Stability Board and Basel Committee on Banking Supervision Final Report*.

IX. SPILLOVERS FROM STRUCTURAL REFORMS[34]

This note analyzes spillovers from structural reforms in the Euro Area (EA). It is based on the exercise undertaken for the G-20 mutual assessment process. Simulations are performed using the IMF's dynamic general equilibrium model, the Global Integrated Monetary and Fiscal Model (GIMF).[35] Structural reforms covered comprise labor and product market reforms. The combined reforms are estimated to raise the steady state level of EA real GDP by almost 6 percent. Spillovers to the rest of the world depend heavily on the strength of trading relationships. Those to the United States and Japan, although nontrivial, are modest. Spillovers to emerging Asia and the "rest of world" block, however, are more substantial.[36]

Labor Market Reforms

The labor market reform scenarios are based on recent work by the Organization for Economic Co-operation and Development (OECD)[37]. Four components of the OECD labor market reforms were included: an increase in active labor market policies (ALMP), a reduction of the average replacement rate (ARR), an increase in the standard retirement age by two years, and a move to actuarial neutrality for worker ages 60-65. In particular:

- The ALMP reform increases ALMP spending per unemployed worker relative to GDP per capita to the average level prevailing in a group of high ALMP spending OECD countries (Denmark, Austria, Netherlands, Norway, Sweden, and Switzerland).

- The ARR reform implies a cut in average replacement rates to the average prevailing in a group of low ARR spending OECD countries (Australia, Canada, Japan, New-Zealand, United Kingdom, and United States).

- The move to actuarial neutrality implies that the implicit tax rate on continued employment is reduced to zero. The pension system is said to be "actuarially neutral" if the cost in terms of foregone pensions and contributions paid is exactly offset by an

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[34] Prepared by Mali Chivakul and Stephen Snudden.

[35] See Kumhof and others (2010), "The Global Integrated Monetary and Fiscal Model (GIMF)–Theoretical Structure," *IMF Working Paper*, 10/34.

[36] The model contains 5 blocks: the US, the EA, Japan, emerging Asia and the rest of the world. Emerging Asia block comprises China, Hong Kong S.A.R., India, Indonesia, the Republic of Korea, Malaysia, Philippines, Singapore, and Thailand. The rest of the world block comprises the remaining 167 countries in the world.

[37] The reform scenarios and country-by-country parameters are taken from Bouis and Duval (2011), "Raising Potential Growth After the Crisis: A Quantitative Assessment of the Potential Gains from Various Structural Reforms in the OECD Area and Beyond," OECD Economics Department, Working Papers No. 835. The impact analyses, however, are simulated through GIMF.

increase in future pension benefits. If this cost is not offset, there is an implicit tax on continued work.

- The ALMP labor market reforms are implemented in 2011; whereas, the other reforms are implemented gradually starting in 2012. All reforms are perceived to be fully credible by 2012.

The fiscal impact of the labor reforms are based upon IMF staff estimates. The fiscal savings in pension outlays and ARR reforms constitute a reduction in government transfers. The ALMP reforms require an increase in government consumption expenditure to implement the programs. The increase in labor tax revenues that results from the higher employment induced by the reforms occurs endogenously in the GIMF simulation analysis. The overall impact on the fiscal balance of the ARR, ALMP, and pension reform are roughly neutral in the first few years. However, fiscal gains are realized gradually from a reduction in transfer outlays and higher labor income tax revenue.

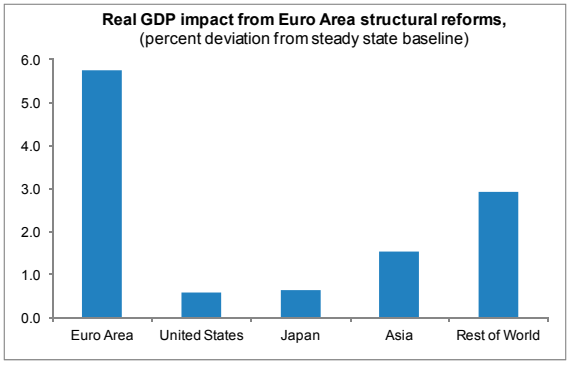
The ALMP reform has the largest direct impact on real GDP in the first few years due to the increase in government consumption expenditure and the relatively quick response of household labor supply. The gains from the pension reforms are realized over several years as the effects on labor supply are more gradual. The implementation of the ARR reforms was delayed to mitigate the negative income effect in the first few years from the reduction in transfer outlays and the slow reaction of labor supply to this reform measure.

Product Market Reforms

Product market reforms result in multifactor productivity growth gains in both the tradable and nontradable sectors that are calibrated to match OECD estimates[38]. The reforms include countries moving to the best regulatory practices in upstream sectors observed in the average of the three most competitive countries in the OECD. The reforms are implemented in 2012, and the productivity growth gains are realized over a 10-year period. The OECD reforms are scaled depending on how much of the reforms have already been already implemented.

Spillovers of the Reforms onto the Rest of the World

The implementation of the labor and product market reforms, detailed above, increase productivity and employment permanently in the EA. This results in higher average household incomes and an increase in the demand for goods. Some of the higher demand spills over



Source: Staff calculations

[38] Bourlès and others (2010), "The Impact on Growth of Easing Regulations in Upstream Sectors", CESifo Dice Report, Journal of International Comparisons, Vol. 8, No. 3.

into imports and increases exports in all other regions. In the medium term, the spillovers are small as the rise in EA and world interest rates offset the boost from the trade channel. In the long run, however, the spillovers become more significant as the supply response in the EA kicks in and crowding-out effects fade. The effects, while modest in the US and Japan, are more substantial in emerging Asia and quite significant in the "rest of the world" block. This is likely due to the fact that neighboring countries (e.g. non-EA EU countries, Turkey and Russia) which have strong trade ties to the EA account for about 40 percent of the rest of the world block (in 2007 GDP in US dollar).

The estimated spillover coefficients to the U.S. and Japan are broadly in line with earlier work assessing the impact of increasing euro area product and labor market competition to U.S. levels.[39] That analysis concluded that such increase would raise long-run output in the EA by about 12 percent, while the impact on the rest of the world, calibrated using features of the U.S. economy, would amount to just under 1 percent. International spillovers arise in the model from the appreciation of the rest of the world's terms of trade resulting from the EA's increased output and exports, as well as higher EA propensity to import due to a shift in spending from consumption toward investment (which has a higher foreign component). Reduced goods markups—reflecting improved product market competition—account for around two thirds of the gains. The spillover coefficient, which may be measured as the estimated gain in the rest of the world relative to that in the EA, was found to be larger for cuts in goods markups than for wage markups because of the former's relatively stronger output—and hence terms of trade—impact.

[39] See Bayoumi and others (2004), "Benefits and Spillovers of Greater Competition in Europe: A Macroeconomic Assessment," *NBER Working Paper* 10416.

X. SPILLOVERS FROM A REDUCTION IN TARIFF PROTECTION IN THE EURO AREA[40]

This note assesses the impact of tariff reductions in the Euro Area on trading partners' exports. The tariff cuts considered for this exercise are based on current offers in the ongoing Doha round, but other countries' tariffs are held fixed for this analysis in order to focus on the spillover effects of EA tariff policy. The results indicate that a 50 percent reduction in EA tariffs would raise global exports to the EA by more than 1 percent.

A partial-equilibrium model of international trade is used to assess the likely impact of a reduction in tariff protection in Euro Area (EA) countries on trading partners. The model consists of a large number of exporting countries. Each exporter decides how much to sell to the rest of the world based on the net-of-tariff price received by exporting to a particular importing region. In each importing region, the demand for imports from a given exporting country depends on the price of imports (inclusive of the tariff) from a particular exporter, as well as the tariff-inclusive price of imports from other, competing exporters. In equilibrium, the quantity of exports from a given country must equal the quantity of imports demanded by an importing region.

The model is used to simulate the impact of tariff reductions being considered under the Doha Round. Specifically, the model assesses the impact of a 50 percent reduction in trade-weighted average tariff rates applied by EA countries on exports and real GDP in 155 exporting countries.[41] Tariff rates applied by importers in the rest of the world are assumed to remain unchanged.[42]

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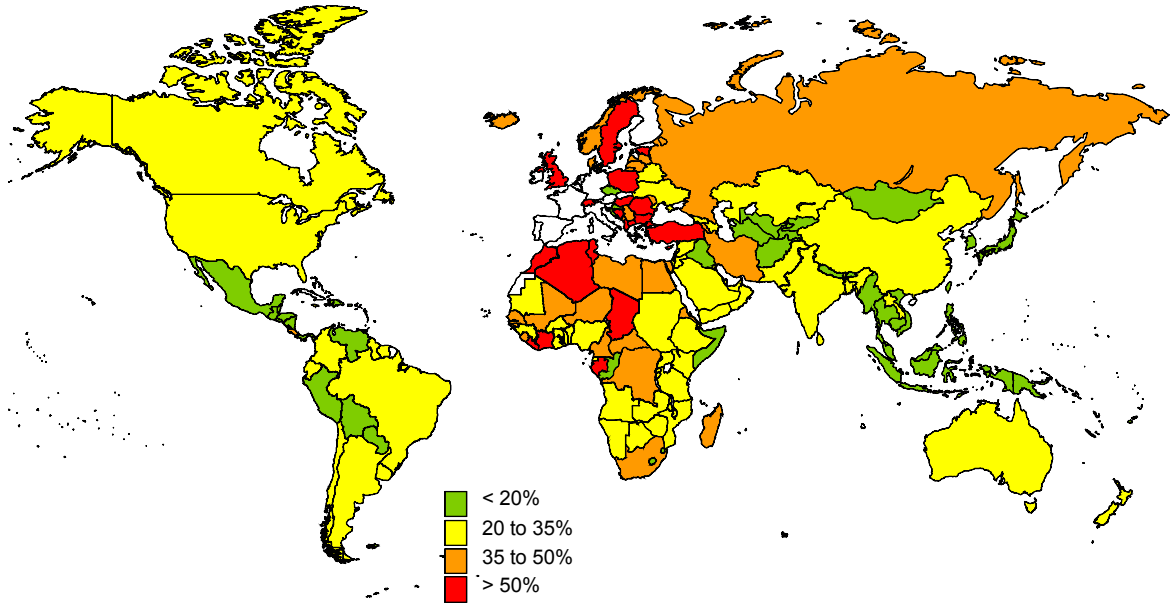
[40] Prepared by Stephen Tokarick.

[41] This is the average reduction in EU tariffs used by Laborde, D., W. Martin, and D. van der Mensbrugghe, (2010), "Implications of the 2008 Doha Draft Agricultural and Non-agricultural Market Access Modalities for Developing Countries," Washington: World Bank, to assess the likely impact of the December 2008 draft modalities being considered in the Doha Round.

[42] The 11 EU member countries that do not use the euro were excluded from this analysis due to likely conflicting effects on exports and GDP. On the negative side, these 11 EU countries would suffer from relative preference erosion under the proposed EU-wide tariff reductions. However they could benefit indirectly from their own reduced tariff rates.

Figure 1. Vulnerability of Partner Exports to the Euro Area
(Exports to the Euro Area as Share of Total Exports)



Source: Staff calculations.

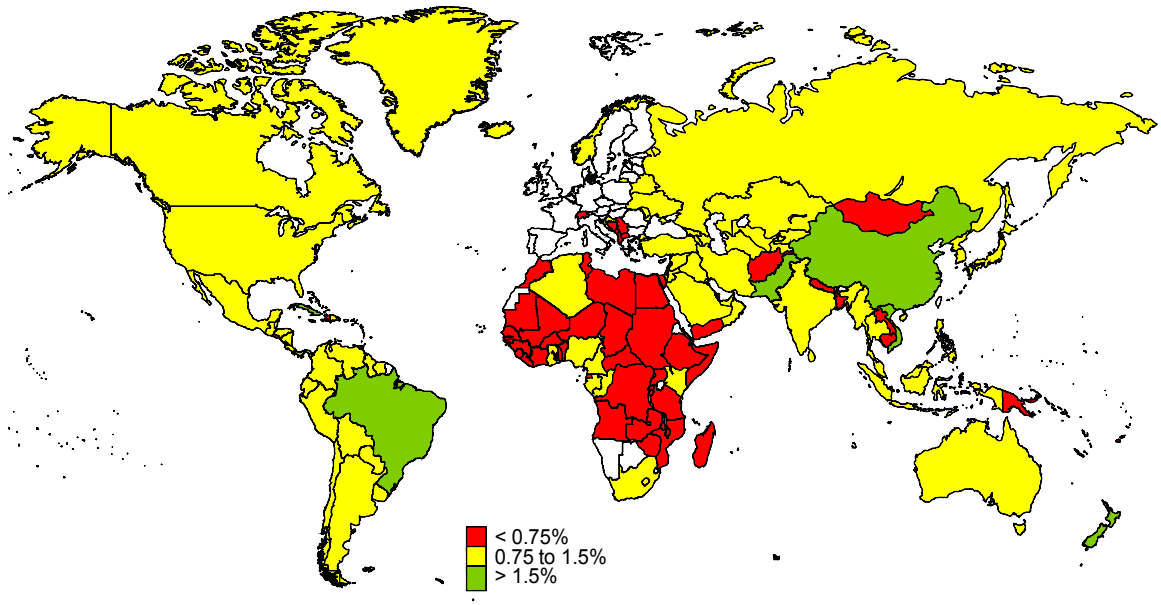
Preliminary estimates suggest that a 50 percent reduction in average tariff rates by EA countries would result in an increase in aggregate exports to the area by more than 1 percent, (Figure 2). Overall, export volume to the EA would increase the most for countries that currently face the highest tariff rates in the EA, such as China, Pakistan, Brazil, Vietnam, New Zealand, and Australia. The majority of countries would experience an increase in export volume to the EA. For these countries, export volume declines to the rest of the world, as tariff rates there remain unchanged, but aggregate export volume increases. Countries with relatively large export shares to the EA would experience the largest growth increase.

However, some countries would end up exporting less to the EA following such a unilateral tariff reduction because of preference erosion. The latter is due to the "Everything But Arms" (EBA) initiative of the European Union (EU), which allows exports from 49 developing economies to enter the EU duty free and quota free.[43] As a consequence,

[43] Countries eligible under the EBA are: Afghanistan, Angola, Bangladesh, Benin, Bhutan, Burkina Faso, Burundi, Cambodia, Cape Verde, Central African Republic, Chad, Comoros, Democratic Republic of the Congo, Djibouti, East Timor, Equatorial Guinea, Eritrea, Ethiopia, Gambia, Guinea, Guinea-Bissau, Haiti, Kiribati, Laos, Lesotho, Liberia, Madagascar, Malawi, Maldives, Mali, Mauritania, Mozambique, Nepal, Niger, Rwanda, Samoa, São Tomé and Principe, Senegal, Sierra Leone, Solomon Islands, Somalia, Sudan, Tanzania, Tuvalu, Togo, Uganda, Vanuatu, Yemen, and Zambia. Only 43 of these countries are included in the model, due to data limitations.

if the EA countries were to reduce their most-favored nation (MFN) tariff rates, the margin of preference enjoyed by the EBA countries in the EU market would become smaller or "eroded." In addition, export volume from 16 countries that are not eligible for preferences under the EBA would decline, as these countries have a preferential trade agreement with EU countries or face tariff rates that are below MFN rates.[44] These negative impacts should not, however, be exaggerated as in practice nearly all EU trading partners get some sort of preference in the EU market, reducing the "effective" preference margins for many LICs. Also, due to the bureaucratic hurdles of complying with EU rules of origin, exporters are discouraged from claiming preferences on a substantial proportion of products. Finally, many LICs will benefit from the sharper cuts under Doha for items such as agricultural products and textiles.

Figure 2. Impact of a Reduction in Protection in the European Union
(Percent change in export volume to the Euro Area)



Source: Staff calculations.

[44] Even though exports from a given country to the EA might decline, real GDP in that country could rise, depending on whether exports to other markets rise and the relative importance of exports to different destinations, as can be seen by comparing Figures 2 and 3.