INTERNATIONAL MONETARY FUND

IMF Policy Paper

IMF MULTILATERAL POLICY ISSUES REPORT

2013 SPILLOVER REPORT

August 1, 2013

IMF staff regularly produces papers covering multilateral issues and cross-country analyses. The following documents have been released and are included in this package:

- The **Staff Report** on the 2013 Spillover Report, prepared by IMF staff and completed on July 2, 2013 for the Executive Board's consideration on July 15, 2013.

The Executive Board met in an informal session, and no decisions were taken at this meeting.

The documents listed below have been or will be separately released.

The policy of publication of staff reports and other documents allows for the deletion of market-sensitive information.

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International Monetary Fund
Washington, D.C.

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2013 SPILLOVER REPORT

July 2, 2013

INTRODUCTION AND EXECUTIVE SUMMARY

Five years after the global financial crisis, the severe tensions and risks rooted last year in some of the "Systemic five" (S5)—China, euro area, Japan, United Kingdom, United States—have abated but all five are still operating below potential, i.e., they are not contributing to global activity as much as they might: if they could somehow close their output gaps, global output would be closer to potential by 3 percentage points. Meanwhile, many parts of the rest of the world have been at or near potential. Most recently though, there have been signs of accelerated recovery in the United States and slowdown in emerging markets. This continued divergence in cyclical positions poses a global challenge, namely to find policies that help the S5 close their output gap without over-stimulating or over-tightening, through spillovers, economies that do not need it.

The key questions for this year's spillover report, therefore, are: to what extent have policies of the S5 over the past year—e.g., the Outright Monetary Transactions (OMT) program and steps toward a Banking Union, more quantitative or credit easing, Abenomics, fiscal consolidation—had positive spillovers, and how do they net out with any adverse side effects? Considering both current policies and future plans, are positive spillovers sustainable, or are there adverse spillover risks to worry about? And might different policies in the S5 be preferable from the global standpoint?

The report finds that recent S5 policies have mostly had positive near-term spillover effects on their own growth and globally (in particular, avoiding tail risks feared last year that could have cost the global economy several points of GDP). However, policy spillovers may well turn adverse again. This reflects two elements: first, the inherent risks of very accommodative monetary policies, namely the potential build up of vulnerabilities that might unravel messily when monetary stimulus is tapered off—the increased volatility seen in recent weeks highlights the risks here; and second, the significant incompleteness of other policies in place, notably fiscal and structural, which could lead to protracted low growth and sovereign debt stress.

Adoption by the S5 of more complete policies would reduce the need to rely on ultra-accommodative monetary policy along with its side-effects, and would materially lower risks of large adverse spillovers (from S5 shocks, some of which could cost the global economy several points of GDP). It would also generate positive ones (with global GDP 3 percent higher than in the baseline in the long run), with the benefits optimized if these policies were adopted by all the S5 together.

The main policy priorities (further elaborated in each S5 Article IV report) are: structural reforms to boost growth potential in Europe and Japan; credible medium-term fiscal consolidation in Japan and the United States; more pro-growth use of the budget in the near term in the United Kingdom and the United States; continued monetary stimulus in all but China, accompanied in the euro area by policies to reduce financial fragmentation (e.g., banking union and further unconventional monetary support); and in China, a set of reforms to contain growing risks in the financial, fiscal, and corporate sectors while transitioning the economy to a more consumer-based, inclusive, and environmentally-friendly growth path. Adequate cooperation—among S5 and between S5 and the rest—in the design and implementation of macro-prudential policies is also critical to ensure their effectiveness and optimize spillovers.

The report is based on analysis by country teams and two families of macroeconomic models (Annex I): one (G35-S) is able to assess temporary transmission of shocks through real and financial spillovers, but unable to capture spillovers from permanent changes in key macroeconomic variables; the other is able to perform the latter task but without financial spillovers from co-movements in risk premia and asset prices (GIMF and FSGM), and as a result generally producing lower spillover estimates. The results from these models come with the usual caveats about model-based analysis, strengthened by the still experimental nature of much of the modeling of international financial market spillovers. Unless otherwise stated, scenario results should be understood as compared to the April 2013 *World Economic Outlook* (WEO) baseline. The analysis underpinning the findings in this report is presented in the companion paper "2013 Spillover Report—Analytical Underpinnings and Other Background" (hereafter CP). Annex II highlights spillovers to low-income countries.

This report was informed by interviews with country authorities from the S5 and selected spillover recipient countries conducted over February-early June 2013, i.e., predating the recent market turmoil.

Approved by
Isabelle Mateos y Lago

Prepared by an interdepartmental task force comprising as principals Jorg Decressin (RES, WEO team leader), Phil Gerson (FAD, Fiscal Monitor team leader), Vikram Haksar (SPR), Gian Maria Milesi-Ferretti (US mission chief), Mahmood Pradhan (Euro-area mission chief), Markus Rodlauer (China mission chief), Jerald Schiff (Japan mission chief), Robert Sheehy (MCM, GFSR team leader), and Krishna Srinivasan (UK mission chief) and coordinated by Isabelle Mateos y Lago (APD) with Costas Christou (EUR) and Bikas Joshi (SPR), assisted by Kate Jonah (OFDMD). The report is based on modeling inputs from Benjamin Hunt, Rene Lalonde, Susanna Mursula (RES) and Francis Vitek (SPR) as well as analyses and inputs from Laura Papi (AFR), Steven Barnett, Dennis Botman, Stephan Danninger, Joong Shik Kang, Raphael Lam, and Papa N'Diaye (all APD), S. Ali Abbas, Petya Koeva Brooks, Alasdair Scott, and Thierry Tressel (all EUR), Anna Ilyina, William Kerry, and Mohamed Norat (all MCM), Abdul Abiad (RES), Tamim Bayoumi, Mali Chivakul, Sean Craig, Franziska Ohnsorge, Silvia Sgherri, Chad Steinberg, and Andrew Tiffin (all SPR), Roberto Cardarelli and Martin Sommer (all WHD), and the Brazil, Canada, India, Korea, New Zealand, Russia, and South Africa teams. Graphic design was provided by Manju Ismael (SPR), Janyne Quarm (EUR), and Dulani Seneviratne (APD), and formatting by Melinda Chau (APD).

Spillover reports examine the external effects of domestic policies in five systemic economies (S5), comprising China, the euro area, Japan, the United Kingdom, and the United States. The report aims to provide an added perspective to the policy line developed in the Article IV discussions with these entities and an input into the Fund's broader multilateral surveillance.

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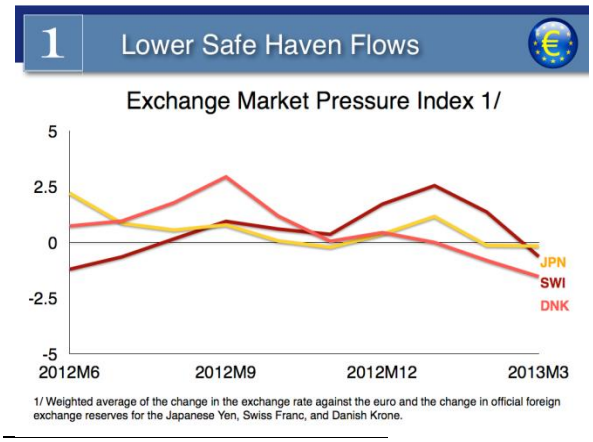
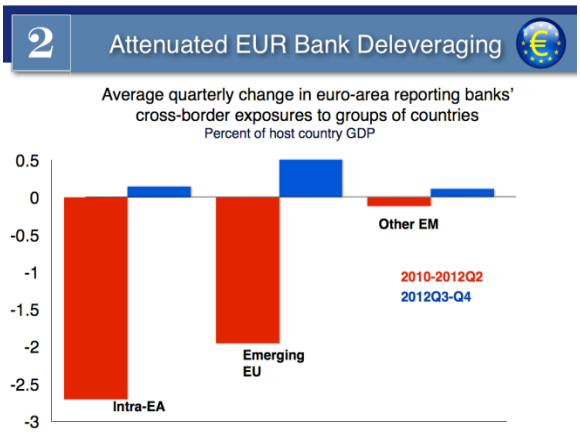
THE PAST YEAR'S POLICIES HAVE HAD SIGNIFICANT NEAR-TERM POSITIVE SPILLOVERS

A. Spillovers from Avoidance of Tail Risks and Reduction of Uncertainty

1. ***Counterfactual***. Had the euro area and the United States not acted last year to address sources of serious tail risks, there would likely have been significant negative spillovers to the rest of the world. Their policy response took these risks off the table for now, thereby lowering uncertainty and financial stress, both of which act as a drag on growth.

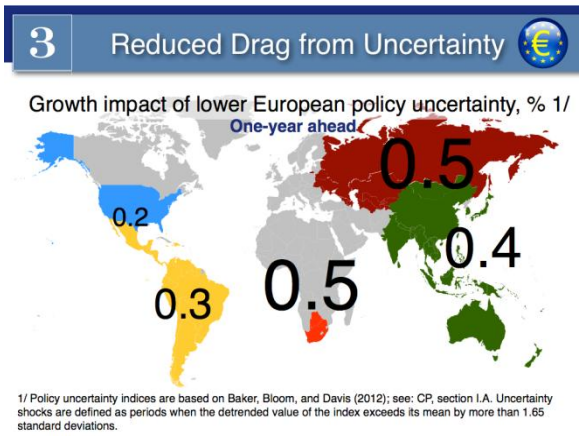
2. ***Euro area stabilization***. The 2012 Spillover Report and internal IMF risk analysis estimated that an intensification of stress in the euro area would lower global GDP by 1.5 to 5.2 percent, depending on the level of stress and assuming full use of monetary and fiscal policies in response.[1] This scenario was avoided, owing to a train of measures adopted in the second half of 2012, including notably the establishment of the OMT program, progress on the banking union for the euro area, agreement on debt restructuring for Greece, and completion of the European Stability Mechanism firewall. These measures dissipated redenomination risks, and stabilized the euro area and generated significant stability spillovers to other regions, primarily in the form of lower market stress within and outside Europe, reduced deleveraging of European banks within and outside the euro area, reversal of some of the appreciation pressure on global safe haven currencies, and lower policy uncertainty (CP, sections I.1 and VI.15). Focusing on the beneficial impact of these measures on long-term government bond yields and equity prices in the euro area and across the world, global GDP at end 2013 is estimated to be about 1.5-3 percent higher than without these measures. (The lower estimate is derived by the FSGM, consistent with reversing the negative shocks assumed

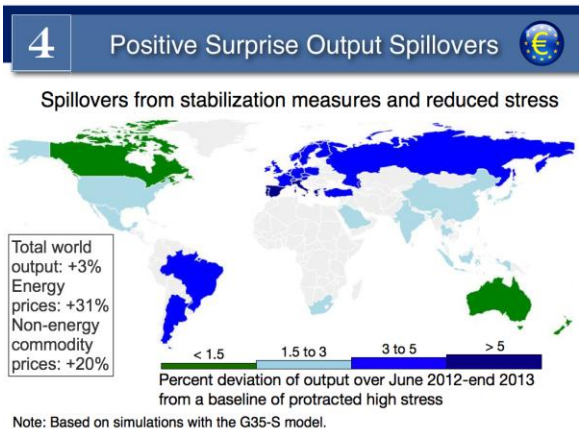




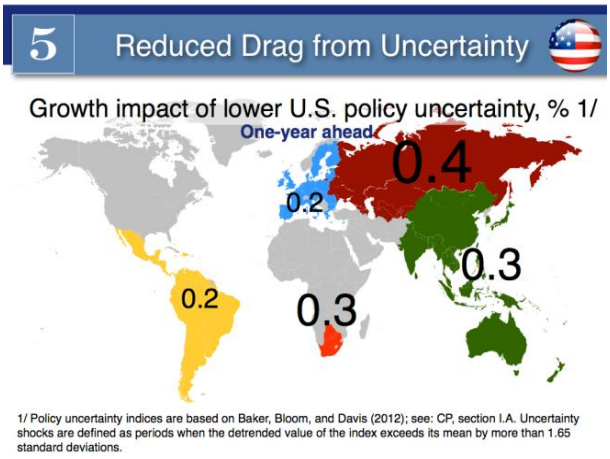
[1] The lower bound estimates come from simulations using the FSGM notably as presented in the April 2012 WEO "weak policies" scenario, where banks tighten lending standards and constrain credit growth to rebuild buffers and where sovereign yields temporarily rise by 100 basis points, with fiscal consolidation 1 percent higher in 2012 and 2013. The upper bound comes from using a G35 simulation assuming a 450 basis point increase in long-term government bond yields in the euro area periphery with high financial market contagion to the rest of the world.

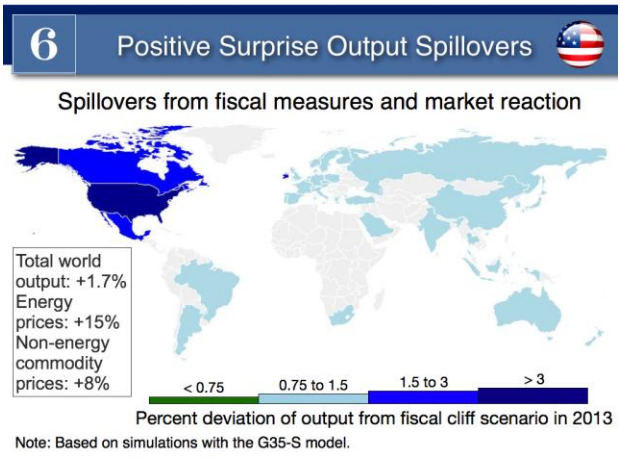
in the April 2012 WEO, while the upper ones are based on the G35-S, and assume that without the measures, the level of stress observed in mid-2012 would have persisted for several months. The size of the estimated gain depends importantly on the assumption of how long the stress would have persisted; clearly the fact that growth in the euro area is expected to fall significantly short of this order of magnitude reflects the existence of other factors at play and the difficulty inherent to any scenario-based analysis to account for all relevant factors; see Chart 4 and CP, section I.2).





3. ***U.S. fiscal cliff relief***. In the United States, the most relevant stabilization action was the passage of the American Taxpayer Relief Act in early 2013, which largely avoided the much feared abrupt fiscal consolidation or "fiscal cliff" by partially extending the tax cuts that had been set to expire automatically, while still imposing some expenditure consolidation through "sequestration."





Last year's Spillover Report estimated the cost of the full fiscal cliff (without monetary accommodation) at 2.0-4.8 percent of United States GDP, with the upper range reflecting the assumption of pervasive financial market disruptions. The implied impact on global GDP would have

ranged from ¾ percent to 2 percent.[2] This year, factoring in that the amount of consolidation avoided was smaller than the full fiscal cliff, and assuming that the Act avoided at least a small adverse stock market reaction, U.S. output is estimated to be 1¼ -3¾ percent higher in 2013 than in a fiscal cliff scenario, with the upper range again reflecting a comparison with a cliff occurring with financial market disruptions. Counting in the spillovers (up to ¼ of the effect on the United States), staff estimates the impact on global output to be between ½ and 1.7 percent in the severe financial market disruption scenario, with some of the benefits coming from lower policy uncertainty.

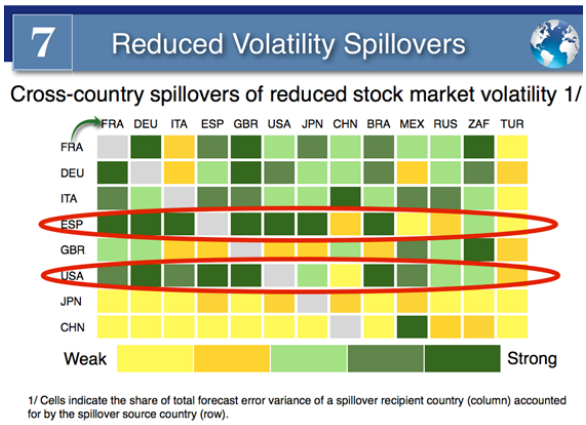
Estimated output loss in the United States Owing to the Fiscal Cliff

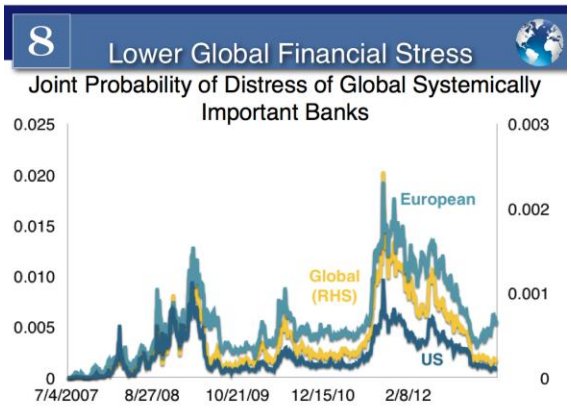
Model	GIMF	GPM	G35/G35S
		(in percent)	
2012 Spillover Report	2.7	2.0	4.8
2013 Spillover Report	1.7	1.3	3.6

Source: Staff estimates.

Overall

4. ***Lower financial stress***. All these measures contributed to a significant reduction in the level of stress in global financial markets and to a boost in equity markets in advanced countries. These gains have been significantly eroded in recent weeks, but far from cancelled. Lower volatility in equity markets brought about by policies in the United States and the euro area helped reduce stock market volatility around the world (CP, section VI.15). The joint probability of distress of global systemically important banks has gone down dramatically, particularly U.S. ones (CP, section I.3). Other market indicators (e.g., LIBOR-OIS spreads, implied volatility measures) commonly used to gauge systemic risks have also come close to pre-crisis levels, though some have picked up in recent weeks. Furthermore, a pickup in cross border lending by Asia-Pacific and North American banks has made up in large part—outside of Europe—for the deleveraging of the





[2] See 2012 Spillover Report, at http://www.imf.org/external/np/pp/eng/2012/070912.pdf (page 10)

European banks. That said the underlying financial sector vulnerabilities have not necessarily declined as much as market-based indicators of systemic risk.

5. ***Spillover recipients' views.*** These developments are consistent with the views expressed in February by the sample of spillover recipient authorities interviewed for this report on the impact of these stabilization policies on their respective economies—there was wide recognition that financial markets had begun to normalize, though when interviewed in February 2013, many noted that the impact on the real sector in their economies had yet to materialize and that further economic and financial repair was needed.

B. Spillovers from Further Quantitative Easing

6. ***Measuring challenge***.[3] Three of the S5—Japan, United Kingdom, and United States—have continued or intensified their quantitative monetary easing (QE) over the past year. While conventional wisdom is that continued QE is having significant spillover effects, mainly in the form of capital outflows, measuring them is difficult. This is primarily because the counterfactual—how high would interest rates be without QE—is not observable, although the mere talk of tapering off QE by U.S. Federal Reserve (Fed) officials pushed bond yields up worldwide and created significant volatility in equity markets. Moreover, markets only react to the unanticipated component of a QE announcement; thus one cannot rely on market reactions to assess the impact of expected policies. And while one can observe changes in key variables following policy moves, it is difficult to attribute change over any period exceeding a few days to a specific policy. Bearing these limitations in mind, two approaches are used: simulating the global macroeconomic impact of given declines in interest rates; and looking at changes in capital flows to non-QE countries and to what extent they may be driven by QE or other global factors. As work is ongoing to improve on these approaches, the analysis that follows should not be taken as the Fund's staff last word on this matter.

Simulated Growth Impact: Varied but Generally Significant

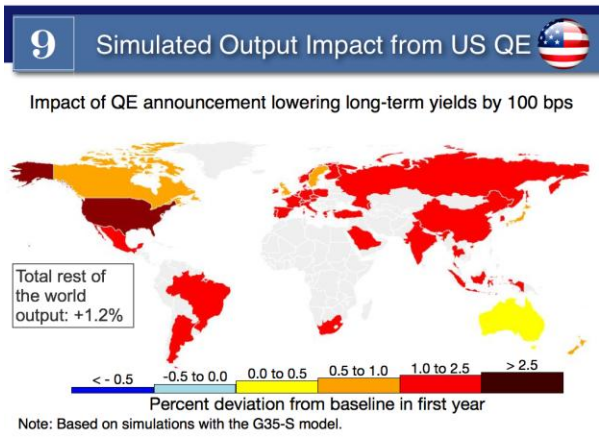
7. ***Channels***. The G35-S model suggests that using QE to lower long-term interest rates in response to a growth shock raises growth globally, by loosening financial conditions and boosting asset prices and demand both in QE economies and, to a lesser extent, around the world (CP, section II.5). Both QE economies and emerging economies with open capital accounts see a reduction in their current accounts, financed by net capital outflows from other advanced economies and to a lesser extent trading partners with closed capital accounts and/or fixed exchange rates (e.g., Middle-Eastern oil exporters). GIMF simulations suggest that growth outcomes in spillover recipients do not differ much in level whether they resist appreciation pressures or not (CP, section II.6). However, the

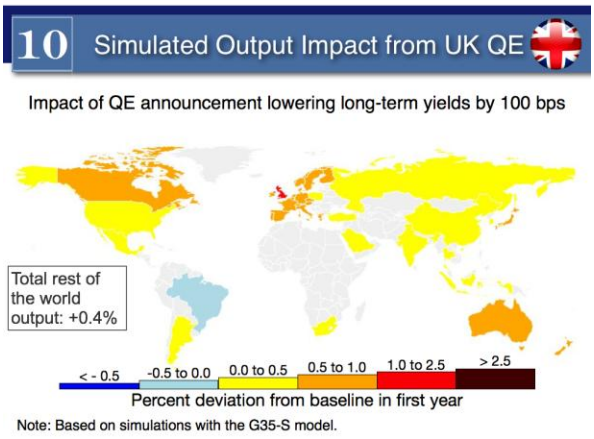
[3] Earlier analysis of the impact from unconventional monetary policies, with emphasis on the domestic impact, was presented in Unconventional Monetary Policies—Recent Experience and Prospects; April 18, 2013.

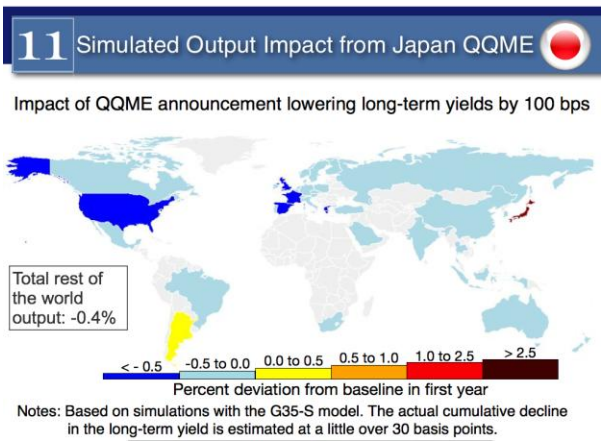
composition of growth is different: more export-driven when appreciation is resisted; and more domestic demand-driven when appreciation is allowed.

8. ***Magnitudes***. The magnitude of the spillovers varies considerably however, both across models and across countries. For every 100 basis point reduction in long-term interest rates, the G35-S model, calibrated on immediate market reactions to QE announcements, estimates output gains in the rest of the world (i.e., abstracting from the impact on the QE country itself) in the first year following the intervention ranging from 1.2 percent for U.S. QE to 0.4 percent for U.K. QE and a small loss of 0.4 percent for Japan's Quantitative and Qualitative Monetary Easing (QQME).[4] Estimates of the actual cumulative fall in long-term yields achieved by QE range between 90 and 200 basis points in the United States, 40 and 160 basis points in the United Kingdom, and a little over 30 basis points in Japan.

Using GIMF to simulate the impact on the rest of the world of a 100 basis point reduction in the one-year market interest rate (a smaller effect than the one simulated by the G35-S), spillovers from Japan and U.K. QE are positive but not significantly different from zero (albeit domestic impacts are significant, at around 1.4 percent of GDP each).







[4] The intuition behind the slightly negative spillovers from QQME in this model is that its announcement triggered a relatively sharp yen depreciation and a drop in equity prices everywhere but in Japan, likely reflecting concerns about loss of competitiveness (further discussed in paragraphs 12 and 13). The growth impact is short lived, fading after a year. Given the more limited number of observations, however, the QQME impact estimates are less robust than the others. Moreover, full implementation of the Abenomics package would generate positive net spillovers (see below).

Impact on Capital Flows: Significant but not Predominant

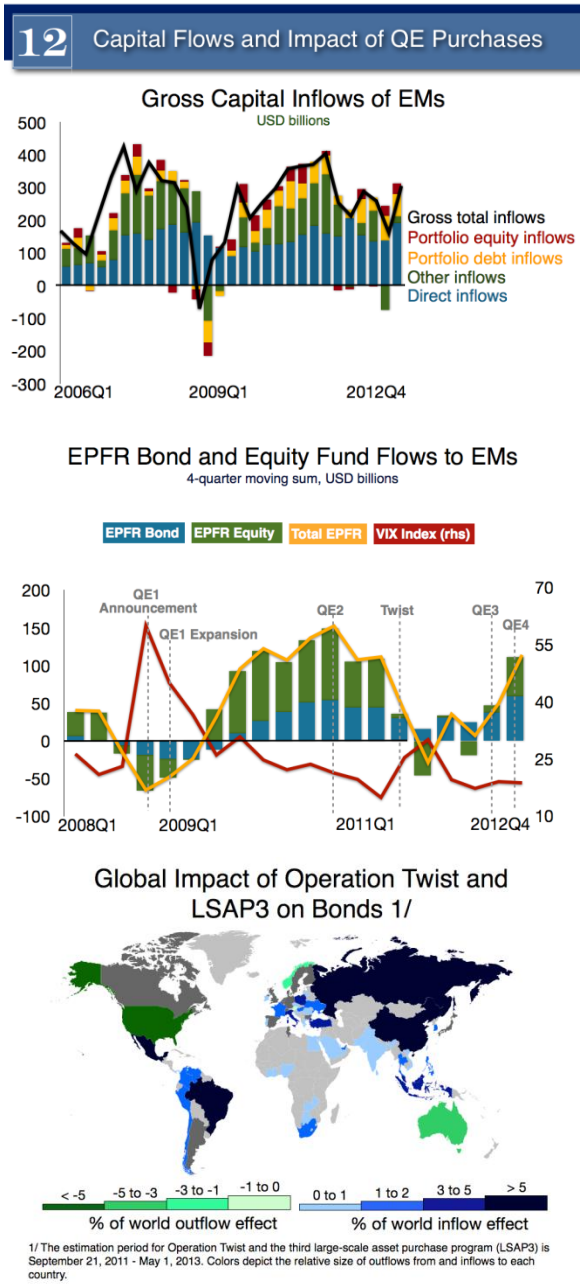
9. ***Perceptions***. Until late May 2013 there was a widespread perception among EM policymakers that easy monetary conditions in advanced economies have been fueling high capital inflows and loose financial conditions, often causing undue exchange rate appreciation pressures and other macroeconomic management complications. (Not always of course; in particular European EMs, facing much reduced bank flows, have tended to be much more welcoming of easy monetary conditions in the advanced S5). As discussed in the next paragraph, these perceptions are borne out by available evidence to a significant extent, but with contrasting experiences across countries and over time.

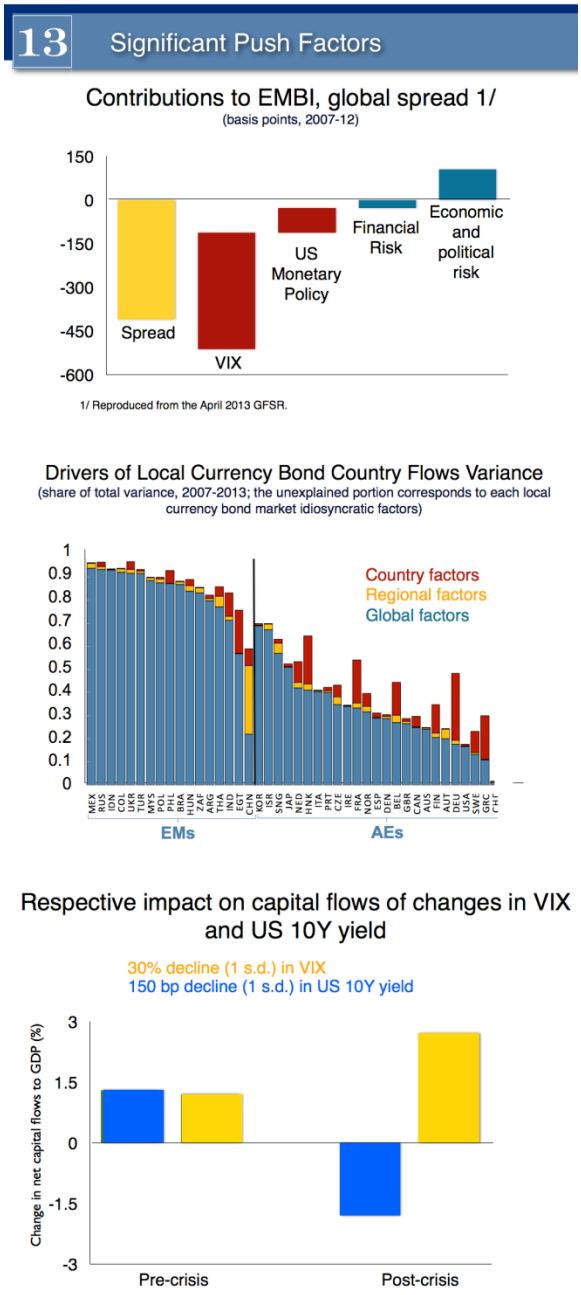
10. ***Facts***. Following the first official reference to upcoming tapering off of U.S. QE on May 22, global financial market volatility increased markedly, with emerging economy assets hit the hardest. In the face of significant capital outflows, liquidity in local bond markets evaporated and yields increased sharply, and currencies depreciated. It is too early to tell whether these developments should be seen as a start of a sustained correction in asset price levels, or an over-reaction to official statements that will be reversed and hence, be short-lived. Staff's analysis (illustrated in Charts 12-13 and elaborated in CP, section III)—which predates these developments and focuses therefore on earlier concerns shows that:

- *Volume*. Total net private capital inflows to EMs are below their 2006 (i.e., pre-boom) level, with some regional variations (lower in Europe, higher in Latin America and Asia); but portfolio flows are up sharply and volatility in bond flows has increased. (See also *2013 External Sector Report).*

- *Push*. Global factors are found to explain the bulk of changes in bond flows, and purchases of Treasury bonds by the Fed have been associated with capital outflows from the United States into selected EMs (although less so than to non-QE advanced countries). As well, reductions in long-term U.S. bond yields and in the VIX (a global index of risk aversion)—both known impacts of QE—are found in a regression analysis to be significant "push factors" for capital flows (albeit in the post-crisis period, excluding the recent sell-off, higher U.S. yields have been associated with higher capital flows to EMs, perhaps because seen as a sign of stronger growth prospects). However, the share of total inflows that is attributable to QE or to the push factors is not preponderant and the correlation between capital flows surges and U.S. QE rounds is loose. In the case of QQME, there is no evidence of net capital outflows yet.

- *Impact*. Exchange rate appreciation pressures have been more sustained than historically, but in most cases not driving currencies away from where fundamentals would suggest (see 2013 *Pilot External Sector Report*). Most EMs also experienced marked compression in their spreads and local currency bond yields, driven principally by the decline in the VIX since the crisis and co-movements in global risk premia generally. As noted, these movements in EM exchange rates and interest rates went sharply into reverse at the first suggestion by the Chairman of the Federal Reserve that QE may be tapered off soon, strengthening perceptions of a correlation.





C. Spillovers from Other Policies to Close the Output Gap

Japan

11. ***Surprise stimulus***. In Japan, even before QQME, the authorities announced and implemented a short-term fiscal stimulus package of 1.4 percent of GDP, which staff estimates will raise growth in Japan by about 1 percent compared with the pre-Abenomics baseline. Owing in part to the implementation of QQME soon after and to government plans to start with medium-term

fiscal consolidation, including through consumption tax increases soon, long-term interest rates have risen only by a manageable amount and real rates have likely fallen, albeit volatility has risen significantly as markets are gauging the effectiveness of new policies.

12. ***Yen depreciation***. The yen has fallen by about 20 percent in real effective terms compared to the 2012 average. This has been driven by a combination of lower safe haven appreciation pressures with fiscal and monetary stimulus (with about 10 percent of depreciation estimated to be attributable to QQME). The stimulus (along with higher energy imports following the closure of nuclear power plants) has resulted in a widening trade deficit and expectations of higher interest rate differentials with the United States. Given the absence of notable capital outflows however, the depreciation appears to reflect primarily, so far, derivatives contracts by foreign investors. In fact, domestic investors have been repatriating capital, and foreign investors pouring into Japanese equity markets (though selling bonds), betting on stronger domestic growth prospects.

13. ***Spillovers***. While formally acknowledged by the G20 as the logical consequence of a legitimate pro-growth policy package, this depreciation has caused concern among Japan's close trading partners and competitors. There is so far scant evidence of much adverse trade spillovers except in specific industrial sectors competing frontally with Japan. In part, this reflects supply chain effects, with countries importing a lot of intermediate goods from Japan benefiting from its lower export prices, but also in sectors with limited inputs from Japan a possibly unsustainable compression in profit margins (CP, sections VII.21 and VII.22). In any case, the full impact is likely to be felt only with a lag, and if the depreciation is sustained. An FSGM simulation suggests that a sustained 10 percent fall in the yen real effective exchange rate impacts growth in the rest of the world by a very small negative amount (0.03 percent annually at its trough), with a few countries (e.g., China, Germany, Korea) losing out by 0.1 or 0.2 percent. However, as discussed below, the broader Abenomics package, would have clear positive net growth spillovers (including for those countries listed above) over the long-term if implemented in full, both because of demand effects and because over time as inflation picks up the real effective exchange rate would appreciate.

China, Euro Area, United Kingdom

14. ***Near-term boost***. In China, faced with a weaker-than-anticipated growth outlook, the authorities adjusted policy to support domestic demand, accelerating public investment spending. As a result, China has continued to be a key driver of global growth notwithstanding strong headwinds from external demand. China's robust growth (7¾ percent) and the appreciation of its currency (about 5 percent in real effective terms over the 12 months through April) have had significant positive trade spillovers to the global economy, including through strong demand for commodities and imports of capital goods. China has also continued to provide significant trade and FDI financing to the rest of the world ($61.8 billion and $62.4 billion, respectively). In the United Kingdom, the authorities showed flexibility, allowing automatic stabilizers to operate—which implied a slowdown in the pace of deficit reduction—and accommodating a slippage in meeting their debt target. In the euro area, the ECB lowered its main policy rate by 25 basis points in April. Despite this and more gradual fiscal adjustment, domestic demand has been slumping, resulting in a higher current account surplus and a negative contribution to aggregate demand in the rest of the world.

CURRENT POLICY SETTINGS POSE RISKS OF NEGATIVE SPILLOVERS AHEAD

15. ***Incomplete policies***. Current policies in the S5, while helpfully supportive of economic recovery, have gaps. In the United States and parts of Europe, fiscal policy is providing unnecessary headwinds, while the United States and Japan are lacking medium-term fiscal consolidation plans. In the euro area, Japan, and the United Kingdom, productivity-enhancing structural reforms are lagging, as is bank repair in the United Kingdom and the euro area. In China, growth remains too heavily driven by investment with diminishing returns. In the euro area, risks of tail events remain, should the adjustment process get derailed at the national level as a result of growing austerity fatigue. This section examines the risks posed by these policy settings.

Spillover Risks from S5 Policies and Policy Gaps

Key Risks From	China	Euro Area	Japan	United Kingdom	United States
Monetary Policy [1/]	✓	✓	✓	✓	✓✓
Fiscal Policy Gaps [1/]	✓	✓	✓✓	✓	✓✓
Structural Policy Gaps [1/]	✓✓	✓✓	✓✓	✓✓	
Financial Sector Policy Gaps [1/]	✓	✓✓		✓	

✓ marks indicate the relative seriousness of the spillover risk from each policy/S5 given current policy settings and plans (e.g., if intrinsic risks are large but policies in place mitigate them, a single mark, or none, may be appropriate).

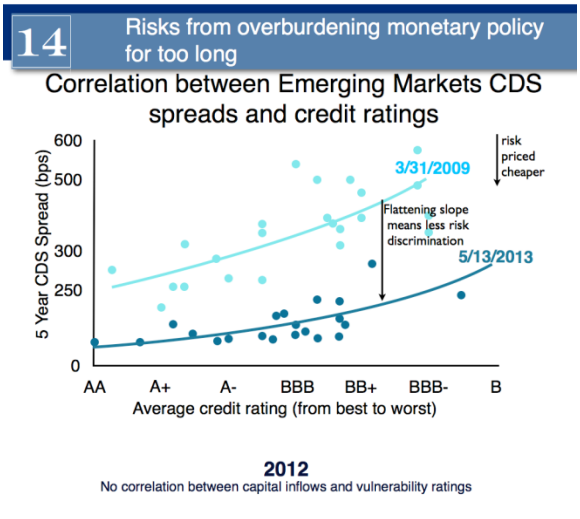
[1/]The gaps and risks associated with these areas are spelled out in the remainder of this and the next sections.

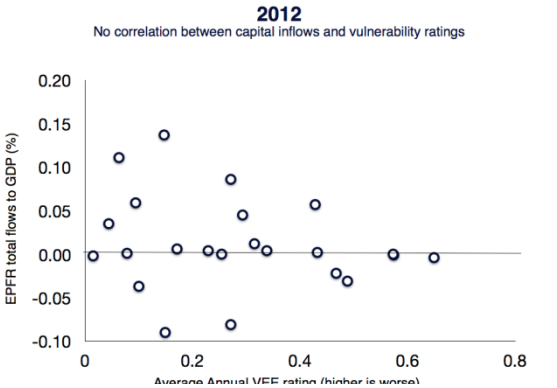
D. Adverse Spillover Risks from Monetary Policies

16. ***Dilemma***. Easy monetary conditions are in place for a good reason: preventing deflation and supporting activity. But they come with side effects: by attenuating market discipline, they can make seemingly costless the postponement of needed reforms or adjustment, and seemingly risk-free the buildup of financial leverage and exposures that in more normal times might be highly illiquid or unviable, requiring a possibly stressful unwinding. The longer this goes on, the higher the risk of an adverse shock when markets start pricing in a global interest rate normalization, which, as recent developments show, may be long before policy itself is tightened. These side effects prevail to some degree in all of the S5, and beyond their borders. However, exiting too early or abruptly could have large costs too. These latter risks—at this stage—are mostly relevant to the United States given its more advanced recovery.

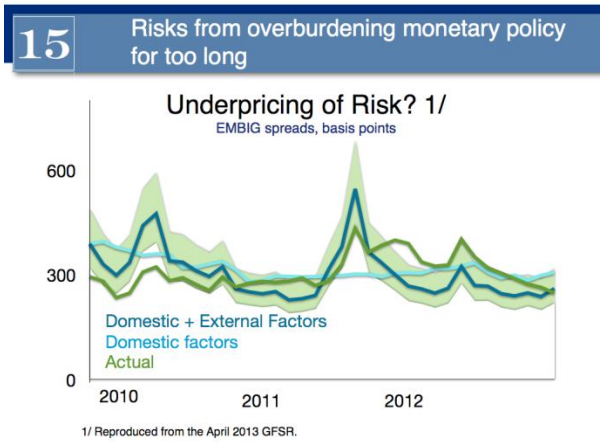
Risks from Keeping Rates Low for Too Long

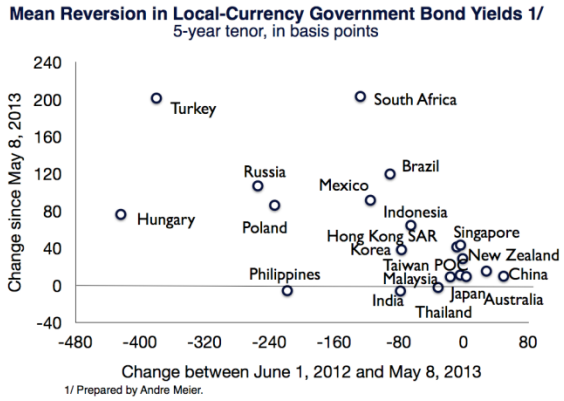
17. ***Rising vulnerabilities***. Up until late May, there was some evidence that as global investors searched for yield in the face of ultra low interest rates in the S5 ex-China, risk discrimination was ebbing, and with it so was market discipline. Several countries that were close to encountering external financing difficulties suddenly were able to tap markets again. In such an environment, if policymakers are complacent, bubbles may form and vulnerabilities develop. But was there evidence of such complacency?





It is hard to tell for sure in aggregate. Credit growth has been rapid in many EMs. Even allowing for low initial levels, with room for healthy financial deepening, the speed of credit growth is a risk in itself. Faced with large inflows, most authorities have taken macroprudential measures to contain vulnerabilities, or are considering them. Yield





compression is not outside the confidence interval of what country fundamentals would suggest. And while new sovereign borrowers, some recently out of debt relief initiatives, e.g., in sub-Saharan Africa, are able to tap global bond markets, staff's assessment to date is that this reflects in large part much improved fundamentals (see Spring 2013 *Regional Economic Outlook: Sub-Saharan Africa*).That said, recent market movements, which have seen a significant degree of mean reversion in EM asset prices, with significant discrimination based on underlying vulnerabilities, suggest that prices and volumes reached earlier this year are not a new normal. At the time of writing, however, it is hard to tell whether a more sustained correction is in the offing.

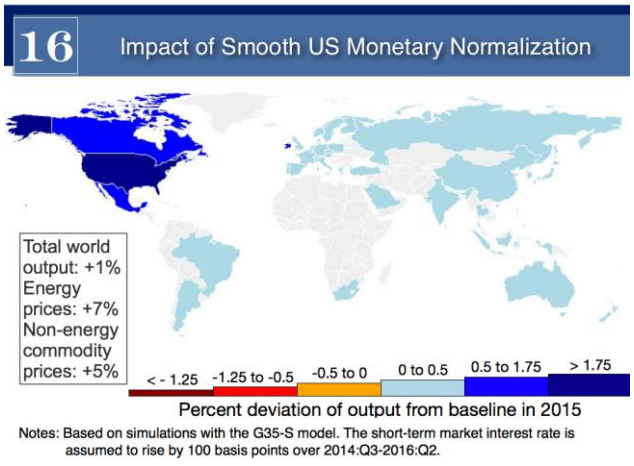
18. ***Complacency risk***. A key risk then seems to be that policymakers, both from the S5 and from the rest of the world, might fail to use effectively the other levers they have, such as macroprudential policy to deal with financial exuberance where relevant, fiscal policy to ensure the right balance between supporting growth and preserving sustainability, structural reforms to boost potential growth and, outside of the S5, macroeconomic policies to rebuild buffers and reduce vulnerability to a tide reversal. Since many of these other levers are not in the hands of the monetary policymakers, this is at heart, in the S5, a coordination problem, with cross-border dimensions in the case of macro-prudential policies (see section III-B below).

Risks from Prompt Normalization of Monetary Policy

19. ***Context***. Monetary normalization is only an issue for the United States at this stage, as prospects for closing the output gap are more distant in the other S4. Indeed, in the case of the euro area given weak growth momentum and headwinds from fiscal consolidation and a fragmented banking system, the 2013 Article IV consultation argues that the ECB should undertake more unconventional monetary policy. However, the mechanics discussed below should in principle apply to QE normalization in any of the S5 whenever it happens. As noted above, research on this front is ongoing and the diagnostic below should be seen as preliminary.

20. ***Spillover outcomes***. As the U.S. economy recovers, monetary policy should be tightened. Both of these events will tend to cause capital flows into the United States and higher interest rates across the world, slowing activity; at the same time, however, higher U.S. growth and depreciated exchange rates against the U.S. dollar, will benefit other countries, particularly those with large exports to the United States and those whose equity markets tend to move in synch with U.S. equities. The net outcome will therefore depend on the relative strength of each effect and on country circumstances. In any case, there are conceptually three possible situations:[5]

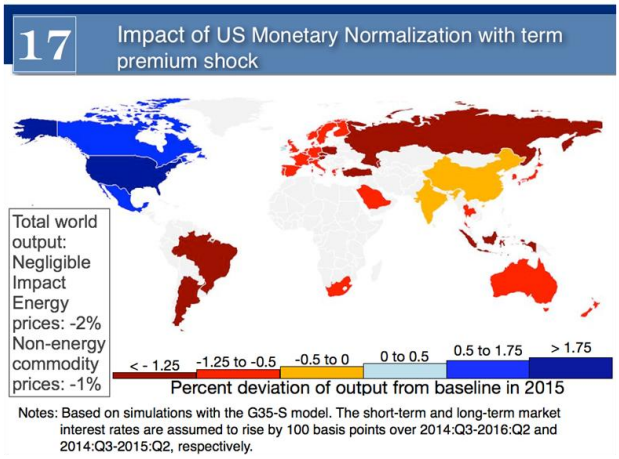
- *Smooth growth-driven exit*. If the Fed tightens monetary policy earlier and faster than in the baseline in response to higher-than-expected growth, and long-term rates remain anchored, (i.e., in staff's simulation, short-term rates rising by an additional 100 basis points and long-term rates rising in line with standard expectations theory) which should be the case if the pace of tightening is well

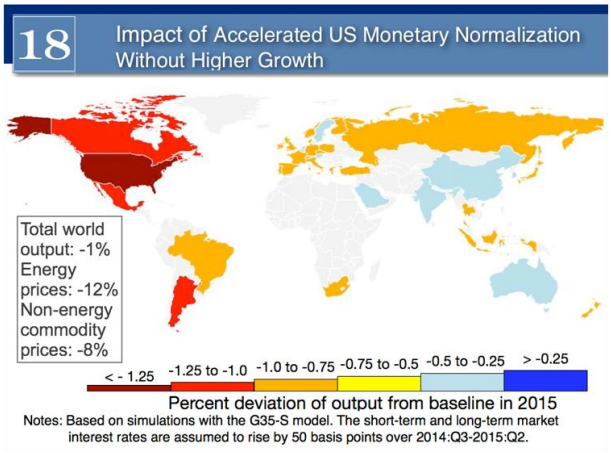


[5] See CP, section IX.25 and 26. Estimates are based either on G35-S simulations—a model that likely overestimates the adverse impact on economies with a high share of services trade, as it only imperfectly accounts for the latter; or on the FSGM, as noted.

understood by markets, global output should be higher than in the baseline, with all countries benefitting more from growth than they are hurt by tighter financial conditions. This is consistent with the results from the earlier push-pull factors regression analysis, which revealed modest elasticities of capital inflows, on average, to changes in long-term U.S. yields, as well as with the FSGM simulation presented in the April 2013 WEO.

- *Growth-driven exit with complications*. If, however, instead of remaining well anchored, long-term interest rates in the United States (and possibly the VIX) jump up as monetary policy is tightened and stay there for a significant length of time, capital outflows from the rest of the world would be more intense, focused on countries with higher risk profiles. The outcome for all but countries with very close trade links with the United States would be worse than in the baseline. For the world as a whole, however, growth could still come close to the baseline. Chart 17 illustrates the results of a G35-S simulation assuming the same short-term rate tightening as above, this time accompanied by a term premium shock such that long-term rates are also 100 points higher for a year in the United States, with interest rates rising in other countries in line with historical correlations. Global growth would then be similar to baseline, but for countries without close trade links with the United States, the tightening in financial conditions would outweigh, sometimes significantly, the boost from higher demand from North America, and their output would as a result be significantly lower than in the baseline. Estimates from FSGM simulations assume an increase in the policy rate above baseline peaking at 150 basis points in 2016, and this prompts a temporary increase in risk premium of 50 basis points in advanced economies and 100 basis points in emerging economies. That simulation suggests that global growth would be above baseline by 0.1 percentage points in 2014, but remain at baseline in the subsequent two years, as tighter global financial conditions would offset the positive impact on global growth of the faster U.S. recovery. Several countries, with close trading ties to the United States, such as Canada and Mexico, would still experience a net positive impact from the faster U.S. growth; however, other countries would see growth fall below the baseline, generally by less than 0.1 percentage points.





- *Exit without growth*. If the tightening were to occur despite a lack of growth momentum, but rather out of concern for rising financial risks, or as a result of a

stance of erring on the side of early rather than late exit, the impact of the tightening would be entirely negative both globally and at individual country level (albeit possibly less negative than allowing bubbles to form and then burst). Simulations using the G35-S model suggest that, depending on the magnitude and persistence of the interest rate shock, the costs to the United States and the global economy could reach up to several percentage points of growth. Chart 18 illustrates the case of a policy tightening where both short and long-term rates peak at 50 basis points above the baseline and stay there for a year. The case in which monetary policy has to be tightened because excess supply turns out to be lower than previously thought in the U.S. (as well as in the euro area and Japan) is explored in the April 2013 WEO with GIMF simulations. In that case, negative spillovers would arise from both lower-than-expected potential output (affecting supply) and the earlier induced monetary policy tightening—with world output declining relative to baseline by around 1.5 percentage points after three years. Conversely, if monetary policy was not tightened in a timely way and inflation expectations became unanchored, long-term interest rates would rise above the level warranted by growth prospects, with similar adverse spillovers to the above scenarios with complications.

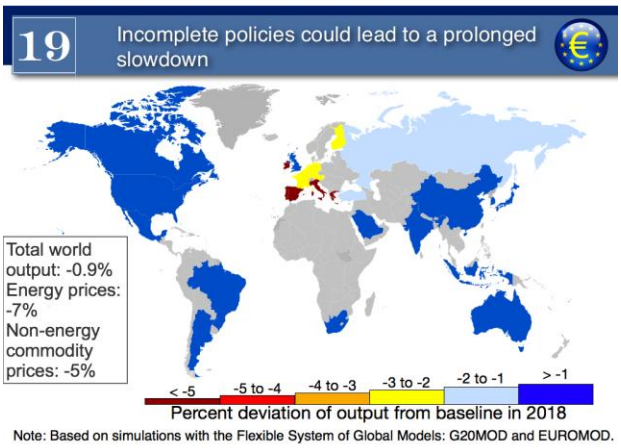
21. ***Bottom line.*** The spillovers from an earlier exit from QE because U.S. growth is picking up faster than anticipated should in principle be manageable for all except for the borrowers with the highest vulnerabilities. But, as developments in recent weeks have shown, even with a stronger recovery the process could be bumpy, with U.S. interest rates rising earlier and more sharply than desired. This would have more undesirable spillovers, as would exit without an underlying acceleration of the recovery. How undesirable? This depends on how interest rates respond in the rest of the world. So far, on average, they have adjusted somewhat more than the G35-S model's predictions, with some significant overshooting in some cases (e.g., Brazil, Greece, Indonesia, Portugal, and Turkey) and a few cases of undershooting (e.g., Japan). Thus, keeping easy monetary conditions until the recovery is well established is essential, as long as inflation expectations remain well anchored and financial stability is not threatened. The Fed will need to communicate clearly to ensure that this is well understood by markets.

E. Spillovers from Risks of Growth and Fiscal Consolidation Failures

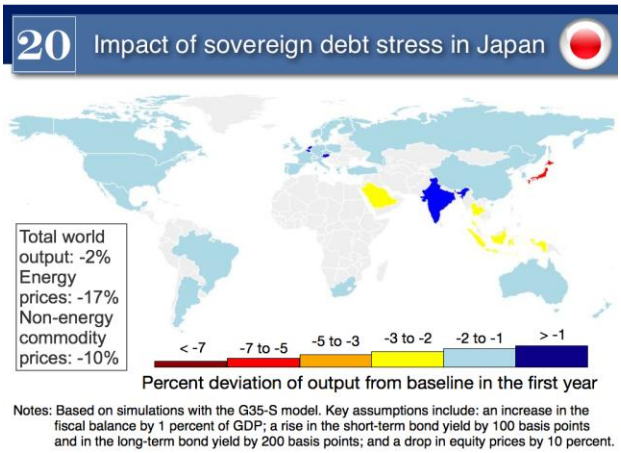
22. ***Overview***. All of the S5 need to provide adequate aggregate demand support to implement structural reforms that boost potential output in a sustainable way, and put their public debt on a sustainable path. The euro area and the United Kingdom also need to repair and strengthen banks. Failure to do so would have serious consequences for the S5 themselves and the rest of the world. The balance of risks however is different in each case, and the potential for adverse spillovers varies, as discussed below.

23. ***China***. Failure to rebalance the sources of growth from exports and investment to domestic consumption is likely to lead to a sharp and prolonged growth slowdown. In the baseline scenario this shock would only happen after the next five years given the significant policy space and resources still available, although the timing is hard to predict and it might in fact happen earlier. The spillovers from such a scenario are estimated to be around 1.5 percent of global GDP based on the Factor Vector Autoregression Analysis presented in the 2012 Spillover Report.

24. ***Euro area***. As explored in the April 2013 WEO, in the absence of further actions to address fragmentation, support demand, and tackle structural reform gaps, there would be significant downside risks to growth over the medium term (CP, section VI.16). Specifically, the adverse impact of public and private sector debt and deleveraging on the real economy may be larger than currently expected, potentially spurring debt-deflation dynamics in the periphery. In the core, real activity could also suffer due to confidence effects and trade links. Persistently high unemployment and subdued investment would erode the region's growth potential. As a result, the level of euro area GDP might be about 4 percent below the baseline by 2018, and the level of global GDP would then be lower by around 1 percent according to both FSGM and G35-S.



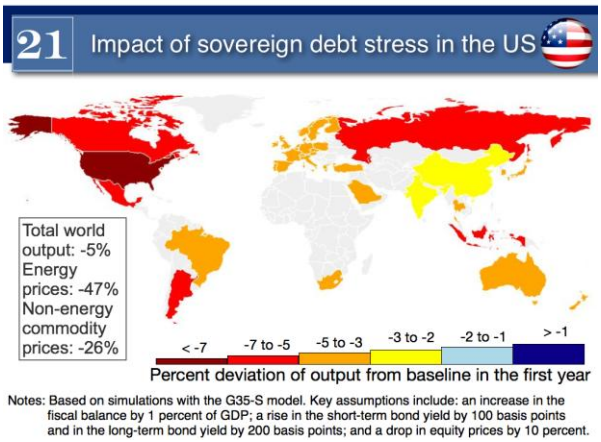
25. ***Japan***. The pickup in growth provided by short-term fiscal and monetary stimulus is expected to wind down after a year or so, not least because of the need to revert to fiscal consolidation. In the absence of a successful reform package including structural reforms, fiscal consolidation, and achievement of the new inflation target, FSGM simulations suggest that output in Japan would be lower by 4 percent after 10 years. The global output shortfall implied by such a performance would be 0.5 percent after 5 years (based on G35-S). If Japan were to be exposed to a reconsideration of sovereign risk by investors that raised long-term rates by 200 basis points, triggered the need for prompt additional fiscal consolidation, and drove down equity prices, G35-S simulations suggest that global output losses could reach 2 percent of GDP (CP, section IV.10; and 2012 Spillover Report Background Paper #16, which points to a similar conclusion using GIMF).



26. ***United Kingdom***. While the United Kingdom faces similar risks of protracted low growth and higher sovereign risk premium, the global spillovers from such developments would likely be limited given the size of the U.K. economy; (see 2011 Spillover Report and section III below).

27. ***United States***. In the near term the key issue for the United States is that it could afford to run less tight fiscal policy, and doing so would allow faster short-term growth and with it the prospect of scaling back asset purchases earlier. Over the medium term however, the key problem is the absence of a credible medium-term fiscal consolidation plan. While the emerging pickup in GDP

growth and recent aggressive fiscal consolidation has put its debt-to-GDP ratio on a downward path, this achievement will be reversed in 2019 on unchanged policies, and earlier in the event of protracted low growth, which remains a credible downside risk. As such, the United States, too, is subject to the possibility of a reconsideration of sovereign risk by markets. As discussed in previous Spillover Reports, such a scenario would have strong adverse repercussions worldwide. Were long-term yields to rise by 200 basis points, global output could be lower than the WEO baseline by 5 percent in the first year (CP, section IV.10).[6]

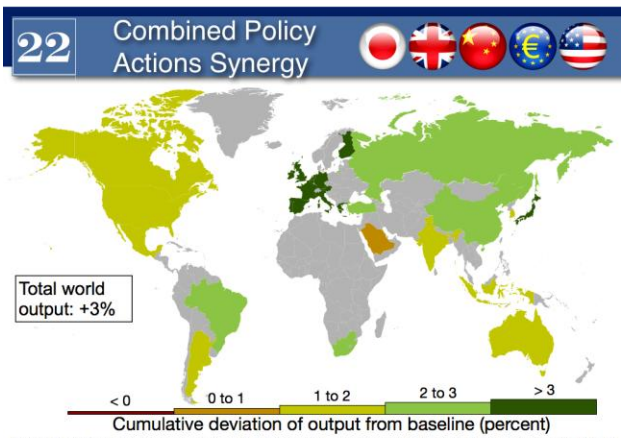


Notes: Based on simulations with the G35-S model. Key assumptions include: an increase in the fiscal balance by 1 percent of GDP; a rise in the short-term bond yield by 100 basis points and in the long-term bond yield by 200 basis points; and a drop in equity prices by 10 percent.

POLICIES TO MINIMIZE RISKS AND MAXIMIZE POSITIVE SPILLOVERS

F. Macroeconomic and Structural Policies

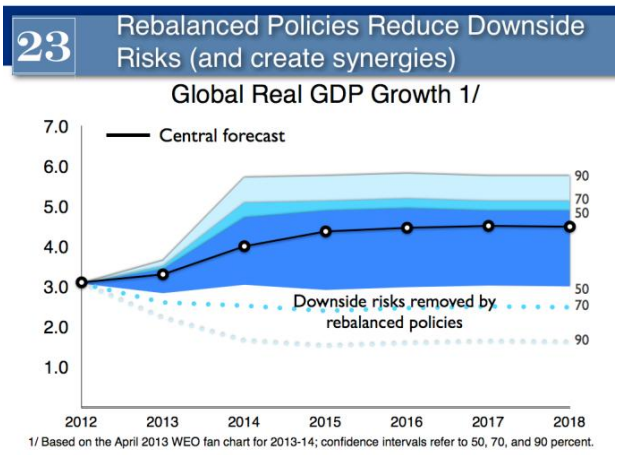
28. ***Rebalancing engines***. Given these risks, policies in place, while helpful, are not sufficient. In the context of the 2013 Article IV consultations with the S5, staff is recommending additional policy steps (see Box 1) that would have significant spillover benefits, including, importantly, bringing about a stronger and more sustainable recovery permitting normalization of monetary policies and essentially removing the lower tails of the global growth forecast fan chart. Using FSGM, staff estimates the payoffs to be about 3 percent higher global GDP than in the baseline after 10 years (CP, section IV.11). In the nearer term, confidence effects and likely positive co-movements in asset prices could help boost growth above the baseline beyond the effects captured by the model. Global imbalances would also be essentially eliminated and sovereign debt burdens much reduced.



Note: Based on simulations with the Flexible System of Global Models: G20MOD and EUROMOD.

[6] The magnitude of the global output loss depends heavily on the degree of contagion to long-term rates in the rest of the world. The correlations assumed here reflect historical correlations. Using FSGM, but with similar contagion effects outside the United States and Japan to the 200 basis point increase in both countries' short-term sovereign risk premium, the April 2013 WEO scenario estimated a peak impact on global GDP of 2.7 percent after two years.

29. ***Synergies***. These policy packages are all in the global interest and in the interest of each S5 for itself. But their global benefits would be magnified if they were implemented in parallel, for two reasons. First, for parts of the period under consideration, some of the S5 would grow more slowly than under the baseline. While necessary to ensure growth is sustainable, this would generate temporary negative growth spillovers. These, however, are offset by the other S5 growing well above baseline in the same timeframes. Second, these scenarios imply lower aggregate saving in China and the euro area, which without offset would push up the global interest rate and dampen global growth. However, here, higher saving in the other S3 during the same timeframe offsets that impact. These synergies make a strong case for coordination among the S5. Without it, the benefits/costs ratio from each set of reforms might be perceived by each S5 as insufficiently high to warrant the effort, leading to a slow/no reform path.



G. Macroprudential Regulation

30. ***Use mindfully.*** The international dimensions of macroprudential policies are explored in the recent Executive Board paper on Key Aspects of Macroprudential Policy (SM/13/145; 6/11/13). Without repeating the analysis here, it is worth highlighting a few aspects of particular relevance in dealing with the risks highlighted earlier in this report stemming from low interest rates in four of the S5. The general message is that mindfulness of the spillovers from these policies is critical in maximizing their good spillovers and minimizing the bad; and that it could be a concrete way to internalize the potentially destabilizing spillovers from very accommodative monetary policy.

31. ***Domestic stability as a global public good***. Systemic financial distress in any of the S5 would inflict considerable damage across the S5 borders. It is therefore essential that all have strong macroprudential frameworks and policies.

Box 1: Rebalancing Policy Scenarios in the S5

In China (CP, section V.13), the scenario comprises product market reform, fiscal reforms that reduce public and precautionary private saving, and financial sector reform leading to an increase in the cost of capital. This scenario leads to a slowdown in growth initially but avoids a collapse in investment beyond the medium term, with domestic consumption eventually lifting growth well above the baseline. After 10 years, global GDP is 1.5 percent higher. The current account is 4 percentage points smaller than in the baseline and the exchange rate about 10 percent higher after 10 years. Separately, staff estimates that if China were to liberalize portfolio capital flows, both foreign assets and liabilities would rise significantly, with the net asset position rising by 4 to 18 percent of GDP. This however may well be offset by changes in the current account or any other line of the balance of payments (e.g., FDI, international reserves).

In the euro area (CP, section VI.17), the scenario has a dual focus: (i) euro area wide policies that reverse market fragmentation (e.g., fuller banking union, with appropriate backstops, further unconventional monetary policies); and (ii) country-specific policies structural reforms that raise productivity and employment, help rebalance demand in the periphery and the core. The growth dividends for the EA could be ¾ percentage points a year, with global output higher than in the baseline by 1 percent after 10 years.

In Japan (CP, section VII.18), the scenario comprises fiscal consolidation that put sovereign debt on a sustainable path, continuation of policies to raise inflation, and productivity boosting structural reforms (in line with the authorities' stated intentions under Abenomics). The scenario achieves higher growth over the long-term, with debt to GDP declining by 25-35 percent more than in the baseline (depending on whether the scenario is implemented in Japan alone or combined with the other S4). Global output would be a little higher than in the baseline after 10 years.

In the United Kingdom (CP, section VIII.23), the scenario combines monetary easing, public investment in high-multiplier projects (e.g., infrastructure or financial sector repair), and skills and immigration reforms that boost productivity and labor supply respectively. The net result is a long-run increase in the level of real output compared with the baseline path of around 5 percent; public debt to nominal GDP would be lower by as much as 7½ percentage points. Exports would increase by nearly as much as output. The exchange rate would depreciate (by around 1½ percent), implying exchange rate appreciations in other countries. But the effect of increased demand would dominate, such that the net effect on world trade is positive.

In the United States (CP, section IX.28), the scenario features a fiscal adjustment plan involving less fiscal consolidation in the near term and more consolidation in the medium term, with households' saving rate rising to partially compensate for less generous entitlements. The plan involves both additional revenues and cuts in mandatory spending (mostly in social security and health care), consistent with a general government primary balance of about 1 percent of GDP in the medium term. GDP growth is stronger in the near term (by about 0.1 pp globally for 2013-15), but faster fiscal adjustment subsequently implies that the output gap is closed later than in the baseline. The external current account would improve (by 1-1½ percentage points vis-à-vis the baseline) and the real exchange rate weaken. The long-term impact on United States and global output would be positive given the higher saving rate and lower interest rates.

32. ***Two-sided spillovers***. However, any country whose financial system comprises a large share of institutions regulated abroad–as is the case in three of the S5 and most advanced economies and EMs–faces leaks in the implementation of the macroprudential measures it adopts[7]. And it potentially faces fallout from measures adopted by the home supervisors of the institutions it hosts. If financial stability conditions are similar in all jurisdictions, therefore requiring the same macro-prudential medicine, a good outcome may be obtained without cooperation. However this is often not the case at present, with many EMs experiencing low risk aversion and at least two of the S5–the euro area and the United Kingdom–abnormally low risk appetite. There is, therefore, a case for supplementing the traditional domestic stability focus of macroprudential authorities with awareness of the potential for positive or negative spillovers of their decisions, along with a willingness to act on that basis even if not strictly required by domestic stability considerations.[8] In the latter case, implementing measures on a reciprocity basis as opposed to group-wide can help ensure that the impact is focused on those financial systems that need it.

33. ***An example***. Imposing a hypothetical group-wide 2.5 percent higher capital requirement on U.K. banks, including for macro-prudential reasons, could lead them to curtail credit to some jurisdictions by up to 50 percent of their domestic credit if global banks respond by eliminating exposures to non-core countries while fully protecting exposures to key jurisdictions (CP, section VIII.24). While the strategic choice itself is not under the home authorities' control, consultation before imposing a measure may help anticipate and mitigate the likely fallout, in collaboration with host jurisdictions. Conversely, some host authorities may welcome the sand in the wheel, e.g., if they too see too fast credit growth and could conceivably ask for such measures to be imposed by home regulators. This approach is already embedded in the Basel III agreement for counter-cyclical capital buffers (CCBs) but could in principle be pursued much more broadly.

S5 AUTHORITIES' REACTIONS

34. ***Taking stock***. S5 authorities welcomed the opportunity to discuss spillovers from their and other S5 policies, and generally agreed that negative spillovers have been much reduced since last year. However, most felt it is too soon to talk of positive spillovers given the risks posed by current policy settings unless the right steps are taken ahead. Some stressed the significant difference in size

[7]See "Does Micro-Pru Leak? Evidence form a U.K. Policy Experiment", Aiyar, Calomiris, and Wieladek, Bank of England, 2012. Risks may also migrate toward the non regulated financial sector. In the United Kingdom, all the major banks are highly and increasingly sensitive to risks of distress in shadow banks. Thus, problems in shadow banks could also have large adverse spillovers.

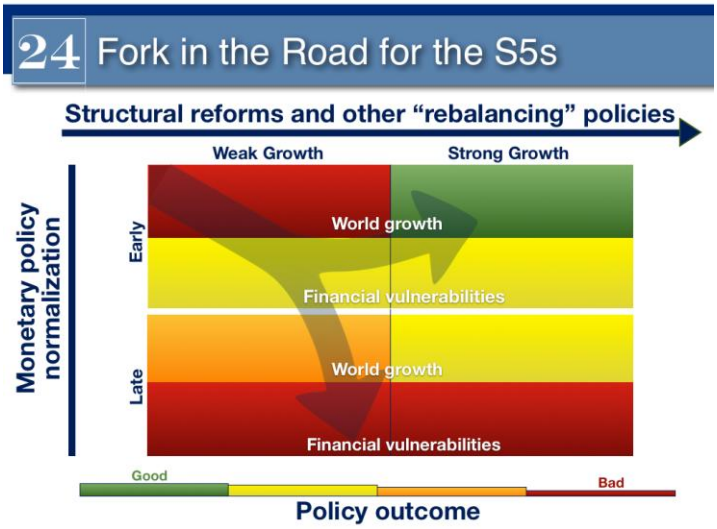
[8] There will also be cases, e.g., in a downswing, where the interest of different financial systems not only do not overlap but conflict. For example, supervisor of country A may press its banks to disengage from country B where the economy is in trouble and therefore credit risk is sharply higher. This would bolster financial stability in A but make it worse in B. Short of a collective agreement to avoid such a vicious circle, as happened in the first phase of the crisis with the " Vienna Initiative", only a supervisor assessing systemic stability at the multi-country level can remedy such a conflict. Recognition of this problem is one of the drivers of Europe's efforts toward a single supervisory mechanism.

and nature of the spillovers from each of the S5. Like in previous years, S5 authorities had many questions on methodology, and some noted their own models yielded smaller spillover estimates.

35. ***Looking forward***. They all recognized that each of the S5, themselves included, holds the key to a durably improved outlook. A few stressed the need to avoid trading short-term gains for increased spillover risks down the road. As such, they welcomed the message that some of the S5 (themselves included) may need to temporarily slow down at some stage in the next five years to ensure sustainable growth down the road. Some also stressed that a favorable global environment, including positive spillovers from the other S5, would be more conducive to progress in their own reform agenda. Some expressed interest in using the better policies scenarios developed by staff to rekindle efforts to monitor systemic countries' progress toward strong and sustainable growth, including at the G20.

CONCLUSION AND POLICY IMPLICATIONS

36. ***S5 policies***. The feared and actual negative spillovers that prevailed last year have been much reduced by the policies implemented by the S5. However, the policy mixes currently in place are unbalanced and this carries large risks of serious adverse spillovers down the road. Failing to find the right pace of monetary normalization could also have very large negative spillovers. Therefore it is critical that all five economies adopt more complete and, hence, more balanced policies. This alone will permit a return to sustainable growth, and, in time, a harmless exit from exceptionally easy monetary policy. Having emerged from intense stress conditions, the S5 are at a fork in the road: one way, in the continuity of the past, risks leading to a vicious path of protracted low growth, sovereign stress risks, continued monetary accommodation and financial bubbles; the other, which requires a bit of a turn, leads to a virtuous one of higher growth, monetary normalization, and contained financial vulnerabilities. The policy advice in the five Article IV consultations seeks to place them decisively on the latter path. Even if this advice cannot be implemented in full, policymakers should steer as far as possible toward that direction.



37. ***Collaboration***. Given the degree of interconnections of today's economies and financial markets, spillovers, both good and bad, are inescapable. Generally, what is good for each S5 is good for the rest of the world (and vice versa); but good spillovers sometimes come with adverse side effects. This is potentially the case now with easy monetary policies, and may be the case with monetary normalization. Minimizing adverse side-effects might require countries to rebalance their

overall policy mix and, principally in the realm of regulatory and macro-prudential policies, adopt policies designed not to solve a problem at home but help others deal with a problem they cause. While IMF surveillance can help flag such problems, it is incumbent on spillover recipients to seek the collaboration of S5 authorities in dealing with them, e.g. by asking for reciprocity in the implementation of a macroprudential measure aimed at limiting overseas banks lending. It is then incumbent on spillover sources to consider such requests positively, assuming they do not go against their national interest.

38. ***Policies of the rest of the world***. Significant as spillovers are, there is much that spillover recipients can do to position themselves in such a way as to minimize the risks they face. In particular, they need to fully use macroeconomic and macroprudential levers (including CFMs, both on inflows and outflows, as necessary, though not as a substitute for other needed policy adjustments) to reduce any vulnerabilities that may have emerged, build buffers, and continue to undertake reforms that will raise potential output and thereby maximize the strength of the pull factors. Only thus will they be able to face the potential stress of the upcoming monetary policy normalization in a position of strength and resilience.

Annex I. Modeling Frameworks

Spillover scenarios have been simulated using: (i) the Global Integrated Monetary and Fiscal Model (GIMF) and two modules of the Flexible System of Global Models (FSGM): G20MOD and EUROMOD; (ii) the GPM model; and (iii) the G35-S model.[9]

H. GIMF and FSGM

39. FSGM is a system of annual, multi-region, general equilibrium models, combining both micro-founded and reduced-form formulations of various economic sectors. It has a fully articulated demand side, and some supply side features. International linkages are modeled in aggregate for each country/region. The models have full stock-flow consistency, public deficits cumulate into the level of public debt, current account balances cumulate into the level of net foreign assets, and investment cumulates into the level of the capital stock. A key feature is the use of overlapping-generations households. This implies that the level of public debt in each country and the resulting implications for national savings determine the global real interest rate in the long run. There are endogenous rules governing the operation of both monetary and fiscal policy. All the model's parameters, except those determining the cost of adjustment in investment, have been estimated from the data using a range of empirical techniques.

40. Real GDP in the model is determined by the sum of the components of demand in the short run (consumption, investment, government absorption, and exports less imports), and the level of potential output in the long run. The households' consumption-savings decisions are explicitly micro founded as are firms' investment decisions. Government absorption is determined exogenously while imports and exports are specified with reduced-form error-correction models. Domestic price inflation in the model is specified in terms of the consumer price index, and is modeled via a reduced-form Phillips' curve. The exchange rate plays a central equilibrating role in the model. In the short run, the exchange rate is determined via uncovered interest parity, while in the long run it is the key price that adjusts to ensure external stability given households desired holdings of net foreign assets.

41. GIMF shares many features of the FSGM models, but goes beyond in terms of its economic rigor. It is a fully micro-founded, multiple-good, multi-country dynamic structural general equilibrium model with optimizing behavior by households and firms, and full intertemporal stock-flow accounting. Frictions in the form of sticky prices and wages, real adjustment costs, liquidity constrained households, along with finite planning horizons of households, mean that there is an important role for monetary and fiscal policy in economic stabilization. GIMF encompasses the entire world economy, explicitly modeling all the bilateral trade flows and their relative prices for each

[9] These models were presented at a technical seminar on spillover methodologies at the margins of the 2013 Spring Meetings, with participants from all five systemic economies and major countries affected by spillovers.

region, including exchange rates. Given the full tracking of all the bilateral trade flows of multiple goods, GIMF has many fewer countries/regions than do the modules of FSGM. The standard production version comprises 6 regions: the United States; the euro area; Japan; emerging Asia; Latin America and, as a single entity, the rest of the world. GIMF is a calibrated, with the model's parameter values chosen based on the extensive literature estimating key behavioral parameters as well as the matching of the model's simulation properties to a wide range of empirical evidence.

I. GPM

42. The GPM is a 6-region open-economy dynamic macroeconomic model developed by the IMF' Research Department designed to illustrate the effects and importance of cross-border real and financial shocks. Conceptually, it embraces the spirit of the New Keynesian synthesis, which blends the emphasis on nominal and real rigidities with the real business cycle tradition of dynamic stochastic general equilibrium modeling with rational expectations. The GPM also incorporates a financial variable in the United States, euro area and Japan geared to identify directly the linkages between the real and financial sectors within the economies and with the rest of the world. One of the virtues of this type of modeling framework is to produce model-consistent measures of key, yet unobservable variables such as the output gap or the unemployment gap.

J. G35-S

43. The G35-S Model is a structural macroeconometric model of the world economy, disaggregated into thirty five national economies, documented in Vitek (2013).[10] This estimated global dynamic stochastic general equilibrium model features a variety of nominal and real rigidities, and has been designed to facilitate policy analysis, spillover analysis, and forecasting. Within this framework, each economy is represented by interconnected real, external, monetary, fiscal, and financial sectors. Spillovers are transmitted across economies via trade, financial, and commodity price linkages. Financial linkages are both direct, through cross-border debt and equity portfolio holdings, and indirect via international comovement in asset risk premia.

44. The theoretical foundation of the G35-S Model is the canonical New Keynesian dynamic stochastic general equilibrium model of the world economy, disaggregated into a finite number of large open economies. This stylized theoretical framework has been extended in numerous directions to enhance its empirical adequacy. Households choose consumption and labor supply to maximize their utility, given habit persistence in consumption. Credit unconstrained households can transfer budgetary resources intertemporally through transactions in international money, bond and stock markets, whereas credit constrained households consume their real disposable income. The output market is disaggregated into a finite number of industries. The energy and nonenergy commodity

[10] Vitek, F. (2013), Policy analysis and forecasting in the world economy: A panel dynamic stochastic general equilibrium approach, *International Monetary Fund Working Paper*, forthcoming.

industries produce internationally homogeneous goods under decreasing returns to scale, whereas all other industries produce internationally heterogeneous goods under constant returns to scale. In each industry, final goods are composites of differentiated intermediate goods produced by monopolistically competitive firms which choose prices and labor demand to maximize their stock market value, given staggered reoptimization and partial indexation in price setting. Final export goods are composites of industry specific final output goods, while final import goods are composites of economy specific final import goods. Exchange rate pass-through is incomplete in the short run, because these economy specific final import goods are composites of differentiated intermediate import goods produced by monopolistically competitive firms which choose prices to maximize their stock market value, given staggered reoptimization and partial indexation. The government consists of a monetary authority and a fiscal authority. The monetary authority implements monetary policy through control of the nominal policy interest rate according to a monetary policy rule, which is common across currency union members. The fiscal authority implements fiscal policy through control of public consumption according to a fiscal expenditure rule, and the tax rate according to a fiscal revenue rule. It can transfer budgetary resources intertemporally through transactions in the domestic money and bond markets.

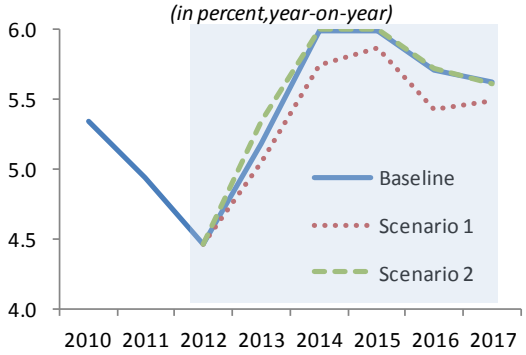
45. Estimation of the G35-S Model is based on an approximate linear panel unobserved components representation of it, in which cyclical components satisfy linearized equilibrium conditions, while trend components follow independent random walks. Parameters and unobserved components are jointly estimated by Bayesian maximum likelihood, conditional on prior information concerning the common values of structural parameters across economies, and judgment concerning the paths of trend components. This prior information includes empirical evidence on key impulse responses, such as that of output to a monetary policy shock, which is aligned with the midpoint of the range of estimates in the literature. The panel data set consists of the levels of a variety of macroeconomic and financial market variables observed over the period 1999Q1 through 2012Q4.

Annex II. Spillovers to Low-Income Countries[11]

Robust growth in the low-income countries (LICs) is likely to continue in the near term. However, notwithstanding strong growth, in most LICs macroeconomic buffers are being reconstituted slowly, limiting the scope for countercyclical policies in the case of a negative shock to the global economy. A better-than-expected global outlook would present opportunities to accelerate the pace of building buffers. The macroeconomic implications from the simulations of two scenarios reported below—a negative one and an upside rebalancing scenario—illustrate these points.

46. *Scenario 1. A protracted slowdown in the euro area:* Under this scenario, LICs could face additional external financing needs amounting to $7 billion by end 2014 and $10 billion by end 2015 in the absence of policy adjustment, with most of the additional needs concentrated in several Sub-Saharan African (SSA) countries. Reserve coverage in the median LIC could decline to 3.0 months of imports, from 3.7 months at end 2012, and the share of LICs with reserve coverage below 3 months of imports would almost double. At the same time, the pace of fiscal consolidation would generally be slower than that expected under the baseline. If policies had to adjust to offset such rising vulnerabilities or in the absence of financing, the growth impact would be much more significant than shown in Chart 1.

Chart 1: Growth in a Median LIC
(in percent,year-on-year)



47. *Scenario 2. A rebalancing of global demand:* While the impact on LICs' growth and fiscal

Chart 2: Reserve Coverage in the Median LIC
(in month of prospective imports)

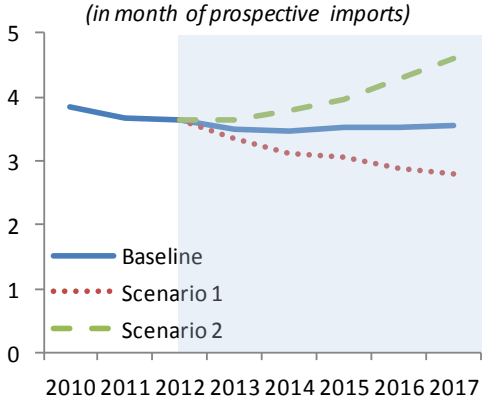
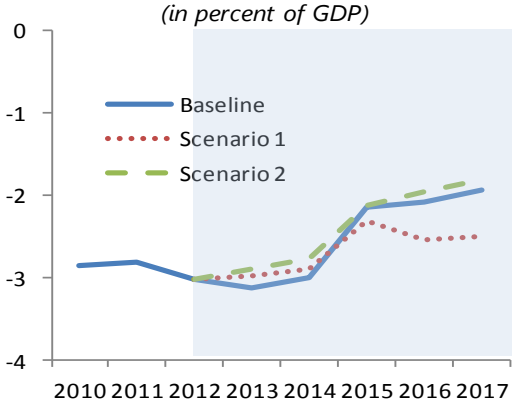


Chart 3: Fiscal Deficit in the Median LIC
(in percent of GDP)



[11] The analysis of the impact of the spillover scenarios on LICs was prepared by Marco Arena, Vera Kehayova, and Svitlana Maslova.

balances are small, the beneficial effects on the external balances would be larger. As a result, reserve coverage in the median LIC could improve to 4 months of imports by end 2015, although some countries could lose out, leading to additional external financing needs of about $2 billion concentrated in a very few oil-exporting countries.

48. Finally, the recent strengthening of trade and investment links between SSA countries and China has made the former more susceptible to spillovers from and demand fluctuations in the latter.[12] China's rapid investment-led economic growth has had positive spillovers to exports of SSA countries: a one percentage increase in China's domestic investment growth is associated with an average of a 0.3 percentage point increase in SSA's export growth rate, with an even larger impact (about 0.4 percentage point) for resource-rich countries. Moreover, low-income countries are more vulnerable to fluctuations in investment demand from China than other SSA countries.

[12] Drummond, P. and E. Liu (2013), Africa's Rising Exposure to China: How Large are Spillovers through Trade, *International Monetary Fund Working Paper,* forthcoming.