

Strategy, Policy, and Review Department

# **Managing Global Growth Risks and Commodity Price Shocks**

Vulnerabilities and Policy Challenges  
for Low-Income Countries



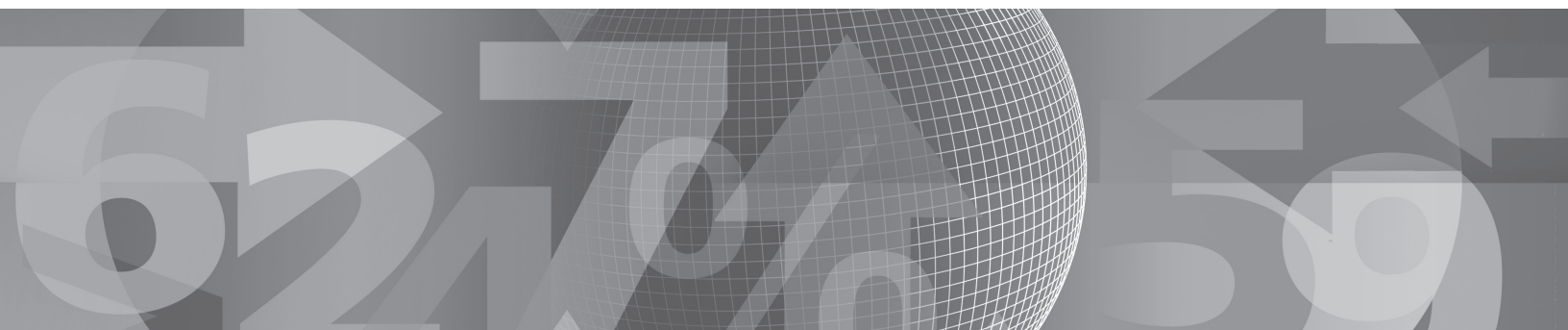
A Staff Team Led by Stefania Fabrizio

I N T E R N A T I O N A L M O N E T A R Y F U N D

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## Acronyms and Abbreviations

ASI	Asia and the Pacific
CFB	change in fiscal balance
DSGE	dynamic stochastic general equilibrium
EMPI	Exchange Market Pressure Index
FAD	Fiscal Affairs Department
FDI	foreign direct investment
FS	fiscal space
GIMF	Global Integrated Monetary and Fiscal
GPM	Global Projections Model
LICs	low-income countries
PB	primary balance
PRGT	Poverty Reduction and Growth Trust
RG	revenue growth
SSA	Sub-Saharan Africa
VAT	value-added tax
WEO	<i>World Economic Outlook</i>



## Preface

As part of its work to help low-income countries<sup>1</sup> manage volatility, the IMF has recently developed an analytical framework to assess vulnerabilities and emerging risks that arise from changes in the external environment (see IMF, 2011a). This report draws on the results of the first Vulnerability Exercise for LICs conducted by IMF staff using this new framework. The report focuses on the risks of a downturn in global growth and of further global commodity price shocks, and discusses related policy challenges.

The report is organized as follows: Chapter 1 reviews recent macroeconomic developments, including the spike in global commodity prices earlier this year. Chapter 2 assesses current risks and vulnerabilities, including how a sharp downturn in global growth and further commodity price shocks would affect low-income countries. Chapter 3 discusses policy challenges in the face of these risks and vulnerabilities.

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<sup>1</sup>The set of low-income countries referred to in this paper consists of the group of 70 countries listed in Appendix 1. This group includes all countries eligible for concessional financing from the IMF under the Poverty Reduction and Growth Trust (except for Somalia, which has been excluded due to lack of data). Therefore, the set of countries defined in this paper as “low-income countries” may differ from classifications used in other organizations or institutions.



## Key Points

- Most low-income countries (LICs) recovered swiftly from the global crisis and have grown strongly since early 2010, with real GDP growth in 2011 projected at around 5 percent for the median LIC. The surge in global commodity prices earlier this year led to a moderate uptick in inflation in most countries.
- However, progress in rebuilding macroeconomic buffers after the crisis has been slow in many LICs, partly reflecting recent measures adopted to mitigate the social impact of the recent price spikes. As a result, LICs are now less well prepared to deal with external shocks than they were prior to the crisis.
- There are now severe downside risks to the global outlook, and LICs are highly vulnerable to the risk of a sharp global downturn. Should this materialize, the scope for fiscal stimulus would be more limited than in 2009 for most LICs, given weaker fiscal buffers and constrained aid envelopes. However, countries with sufficient fiscal room should maintain spending levels to avoid aggravating the negative economic and social effects of the shock. In addition, in countries with moderate inflation, monetary and exchange rate policy could be used more actively to mitigate the impact of the shock. If the downturn were to persist over the medium term, further realignment of macroeconomic policies might be necessary.
- LICs also remain vulnerable to continued commodity price volatility, given in particular the severe impact of high food prices on poverty. A pragmatic response could include targeted measures to protect the poor, fiscal space permitting, and a monetary policy response that may largely accommodate the first-round impact on inflation, although LICs



with limited reserves may need to tighten policies in support of external and price stability.

- If downside risks materialize, a large number of LICs would need additional concessional financing from the international community to help mitigate these shocks without aggravating debt vulnerabilities.
- To build resilience against shocks over the medium term, LICs should aim to boost their revenue base and ensure the efficiency of public investment, while pursuing structural reforms to deepen the financial sector, strengthen the social safety net, and diversify the economy.

## Macroeconomic Situation

Most low-income countries (LICs) recovered quickly from the global crisis and have grown rapidly since early 2010. The spike in global commodity prices earlier this year led to a moderate uptick in inflation in most countries.<sup>1</sup>

A strong economic recovery has been underway in most LICs. Growth held up well at the peak of the global crisis in 2009 compared to that in advanced and emerging market countries, partly reflecting LICs' limited exposure to the global financial sector troubles in advanced economies (Figure 1.1). Moreover, many LICs were able to use their strong pre-crisis macroeconomic buffers to pursue—for the first time—countercyclical fiscal responses, safeguarding and often increasing spending as revenues dropped (see Fabrizio, 2010). And in contrast to past global slowdowns, the recovery in LICs was swift and synchronized with the rest of the world, reflecting strong export demand from trading partners (Figure 1.2). While advanced economies still account for a large share of LICs' trading partners, fast-growing emerging markets have played an increasing role in supporting growth in LICs (see IMF, 2011b). The “pull” factor from trading partner growth has continued to support growth well into 2011, in particular for LICs in Asia and the Pacific and those in the Middle East and Europe, with real GDP growth projected at around 5 percent for the median LIC.

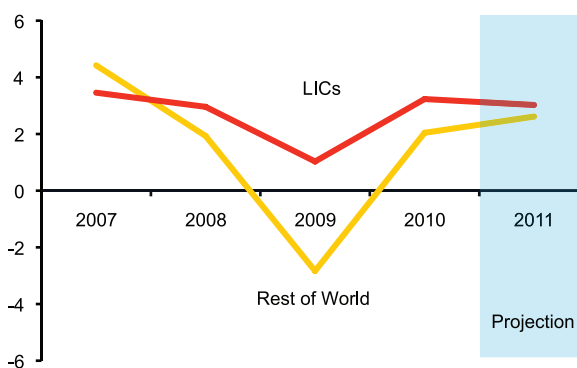
Earlier this year, LICs were affected by a renewed spike in global commodity prices. Commodity prices started increasing in mid-2010, driven in part by demand from fast-growing emerging market countries. Oil prices surged in early 2011 mainly in response to oil supply risks, including those related to the social unrest in the Middle East and North Africa region. Food prices started rising in the second half of 2010 and surged in early 2011 as disappointing harvests in major grains as a result of adverse weather conditions were exacerbated by trade restrictions in some food-exporting countries. The

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<sup>1</sup> Appendix 2 reports selected economic indicators for individual countries and country groups.

**Figure 1.1. Real Per Capita Growth, 2007–11**  
(Median, in percent)

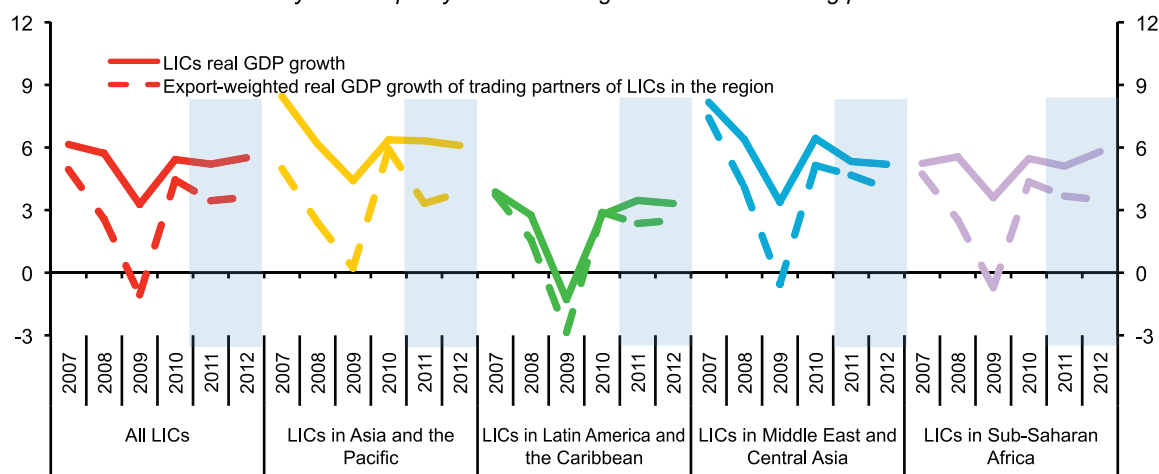
*Economic growth held up relatively well in most LICs during the crisis, followed by a swift recovery.*



Sources: IMF, *World Economic Outlook*; and IMF staff estimates.

**Figure 1.2. Real GDP Growth in LICs and Their Trading Partners, 2007–12**  
(Median, in percent)

*The economic recovery of LICs partly reflects strong demand from trading partners.*

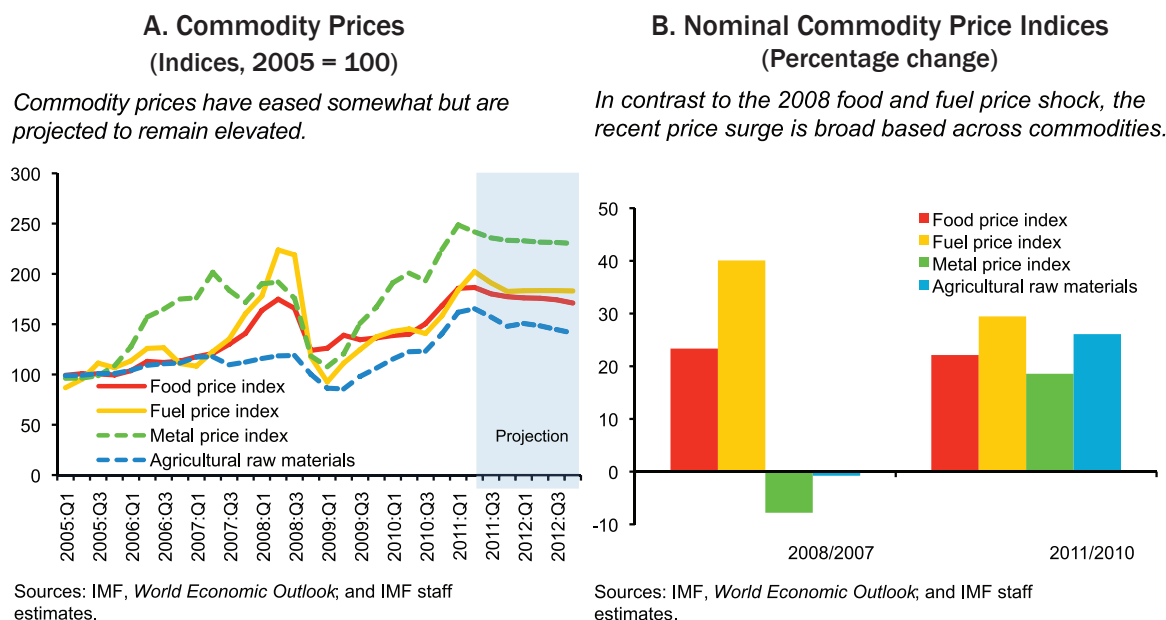


Sources: IMF, *World Economic Outlook*; and IMF staff estimates.

annual average increases in global food and fuel prices in 2011 are projected to have been similar in size to those in 2008.<sup>2</sup> However, this time around, the rally in commodity prices also included metals and agricultural raw materials, in contrast to 2008. While global commodity prices have softened since

<sup>2</sup> Global food and fuel prices are expected to have increased by 21 percent and 29 percent, respectively, in 2011; the increase in global food and fuel prices in 2008 was 23 percent and 40 percent, respectively.

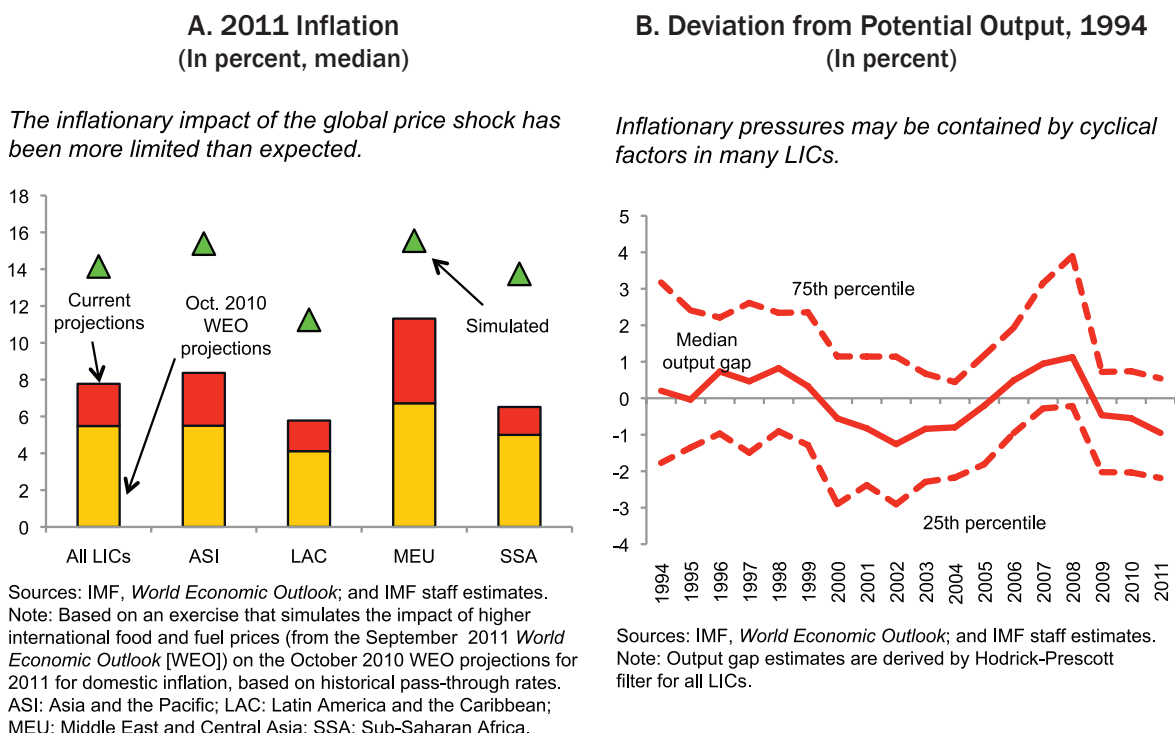
Figure 1.3. Evolution of Commodity Prices



peaking in early May 2011 on account of slowing global demand, they are expected to stay elevated in the near term (Appendix 3 and Figure 1.3).

The inflationary impact of the recent price shock has been relatively limited in most LICs, reflecting, in some cases, good harvests and measures to limit pass-through of international prices. Inflation is expected to have risen moderately in 2011 but, at a median of almost 8 percent, to have remained well below the rate observed during the 2008 episode. It is also projected to be lower than would have been expected based on historical pass-through from global food and fuel prices to domestic prices: a simulation exercise suggests that inflation could well have reached 14 percent if past experience had been repeated, though with substantial regional variation (Figure 1.4A). The limited inflation pass-through is partly explained by price subsidies adopted in some LICs (see below); contained global rice prices, which have an important impact on inflation in Asia; and good local harvests in several countries. Moreover, inflation pressures may be contained by cyclical factors in many countries where output is still below potential in the wake of the global crisis (in contrast to the 2008 episode), as shown in Figure 1.4B.

Strong external demand and, for many LICs, higher export prices have mitigated the impact of the commodity price surge on trade balances. While oil exporters have benefited from the surge in export prices, net oil-importing LICs are projected to see a widening in their current account deficits by about 1.5 percent of GDP, well below the 2008 experience. The more muted response this time partly reflects offsetting effects from high export demand

**Figure 1.4. Evolution of Inflation and Output Gap**

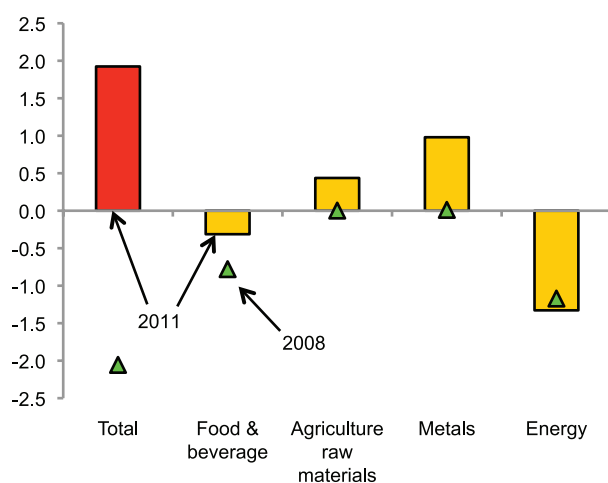
from LICs' trading partners and higher export prices for other commodities, especially for metals and agricultural raw materials (Figure 1.5). This is most apparent for oil-importing countries that are classified as primary commodity exporters, which are estimated to have experienced an overall positive effect from the recent global commodity price surge.

More than half of LICs have adopted countervailing fiscal measures to mitigate the impact of higher global food and fuel prices, with fiscal costs exceeding the 2007–08 experience in several cases.<sup>3</sup> The bulk of the fiscal cost arises from fuel subsidies and tax reductions, and several LICs have not yet unwound the tax measures taken in 2007–08 (Table 1.1). The median (annual) fiscal cost is projected to exceed 1 percent of GDP for those countries adopting new measures. Twenty-two countries have introduced or expanded price subsidies. Most fuel or food subsidies are universal, and few are explicitly targeted toward the poor. Fourteen countries have implemented other mitigating safety net expenditure measures with a median cost of

<sup>3</sup>These results are based on a survey of IMF desks covering the group of Poverty Reduction and Growth Trust-eligible countries.

**Figure 1.5. Change in Trade Balance, 2008 and 2011**  
(Median, in percent of GDP)

*High prices of metals and agricultural products have benefited non-fuel commodity exporters in 2011.*



Sources: IMF, *World Economic Outlook*; and IMF staff estimates.  
Note: The trade balance impact is simulated for 2008 and 2011 by applying the 2008/2007 price change and the *World Economic Outlook* global price revisions for 2011 (as of Sep. 2011 compared to the Oct. 2010 *World Economic Outlook*), respectively, on country-specific trade composition (average for 2005–08). Since the calculations are based on the median of changes, the sum of the components may differ from the total.

**Table 1.1. Fiscal Measures in Response to Commodity Price Increases, 2007/08 and 2010/11**

In response to the recent global commodity price increases, more than half of LICs are adopting countervailing fiscal measures.

	2007/08 episode		2010/11 episode	
	Number of countries	Median fiscal cost (In percent of GDP)	Number of countries	Median fiscal cost (In percent of GDP)
Fuel				
Tax decreases	10	0.3	18	0.4
Subsidy increases	13	0.2	15	1.2
Food				
Tax decreases	17	0.4	10	0.1
Subsidy increases	9	0.2	10	0.4
Other responses	18	0.3	16	0.5
Total	39	0.6	37	1.2

Source: IMF staff estimates based on data provided by country teams and authorities.

Note: The fiscal cost for the current run-up includes only 23 countries which provided quantitative information.

0.5 percent of GDP.<sup>4</sup> Tax cuts were deployed by about half of the LICs adopting measures, with fiscal costs ranging from 0.1 to 1.6 percent of GDP (median cost of 0.4 percent of GDP).<sup>5</sup>

The commodity price shock has had a substantial impact on poverty. The poorest segments in society are especially vulnerable to increases in food prices given the large share of food in their overall consumption basket. The World Bank estimates that the recent food price increases may have pushed about 44 million more people into poverty in low- and middle-income countries in 2011 (Ivanic, Martin, and Zaman, 2011). By comparison, the 2008 price shocks had pushed an estimated 105 million into poverty.

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<sup>4</sup> These included food stamps (Mongolia), transportation subsidies (Central African Republic), school feeding programs (Burundi), fertilizer subsidies (Bolivia), subsidies to partially cover the increase in heating prices (Georgia and Moldova), an increase in social funds (Yemen), and higher transfers to public energy companies to subsidize the energy price paid by consumers (Senegal).

<sup>5</sup> Fiscal cost is defined as the cumulative budgetary cost of fiscal measures implemented during 2010 and the estimated fiscal impact for 2011.

## Vulnerability Analysis

*Despite the strong recovery, LICs' macroeconomic policy buffers remain fragile, and the global outlook is deteriorating. LICs are more exposed to a sharp downturn in global growth than they were before the 2009 crisis as their fiscal buffers have not yet been rebuilt. LICs also remain exposed to further commodity price volatility given, in particular, the severe impact of high food prices on poverty.*

### A. How Vulnerable Are LICs Currently?

So far, the strong underlying growth dynamics during the recovery have reduced LICs' near-term risk of a recession caused by a shock. With strong demand for LICs' exports, real GDP and fiscal revenues are recovering rapidly from the 2009 trough of the global crisis. An illustrative "growth decline vulnerability index" suggests that the near-term risk of a shock-induced recession increased in the run-up to the global crisis and peaked at the end of 2009, with 37 percent of LICs showing a high degree of vulnerability (Figure 2.1 and Box 2.1). In the context of the recovery, this share of countries is expected to decline to around 16 percent in 2011–12. This recent improvement is broad-based—with the notable exception of small economies and LICs in Latin America and the Caribbean.

However, in most LICs, little progress appears to have been made in rebuilding macroeconomic policy buffers after the crisis (Figure 2.2). Fiscal adjustment started in 2010 as revenues rebounded along with the economic recovery, but has since halted, with the median fiscal deficit of net oil importers remaining at around 3 percent of GDP. Public debt has remained broadly stable, and at manageable levels for most LICs (although stubbornly high for small island economies).<sup>6</sup> On the external side, current account

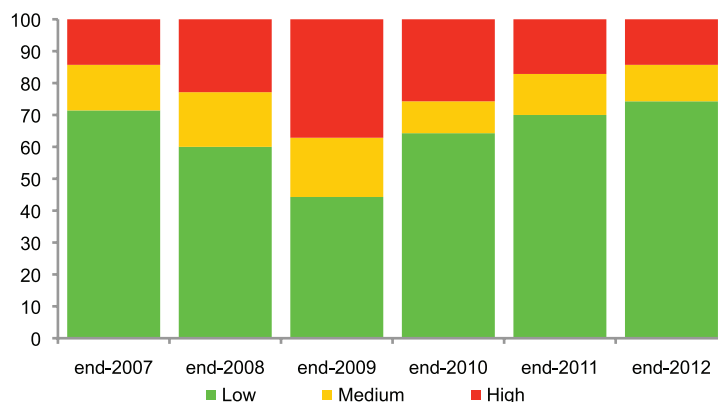
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<sup>6</sup> Average public debt of LICs has declined in recent years in part because of debt relief under the Heavily Indebted Poor Countries and Multilateral Debt Relief Initiatives.



**Figure 2.1. Growth Decline Vulnerability Index  
(Percentage of LICs)**

*Strong economic growth dynamics have reduced LICs' near-term risk of a sudden-shock-induced recession.*



Sources: IMF, *World Economic Outlook*; and IMF staff estimates.

Note: The vulnerability index is constructed using a methodology that considers historical relations among economic, fiscal, and external indicators with near-term growth declines and protracted growth slowdowns in the event of exogenous shocks.

deficits (net of foreign direct investment [FDI]) have widened since the crisis, especially for net oil importers. Reserve coverage, bolstered by the 2009 Special Drawing Rights allocation (which boosted reserve coverage of the median LIC by about 0.4 month of imports), has declined more recently, in particular in many LICs with pegged exchange rate regimes.

The slow progress in rebuilding fiscal buffers partly reflects the commodity price shock earlier this year. At the onset of the 2007–08 crisis, fiscal buffers (fiscal balances and public debt) were much stronger than in the past, reflecting a decade of buoyant economic performance, as well as debt relief under the Heavily Indebted Poor Countries Initiative. The countercyclical fiscal response of many LICs helped them navigate the twin crises that started in 2008, protecting spending and supporting growth, but also inevitably reduced fiscal space. While LICs began rebuilding fiscal buffers in 2010 during the economic recovery, this consolidation appears to have come to a halt in 2011 (Figure 2.3A). This is in part due to the measures taken in response to the renewed rise in global commodity prices. It also reflects stepped-up public investment, in particular among countries with more comfortable fiscal space (Figure 2.3B and Box 2.1), where the median fiscal deficit is estimated to have increased by 0.3 percent of GDP, driven by a 16 percent real expansion in public investment. By contrast, LICs with limited fiscal space are projected to have continued to reduce their fiscal deficits by a median 0.5 percent of GDP.

### Box 2.1. Assessing Vulnerabilities in LICs: Concepts and Approaches

*This paper uses various concepts and approaches to assess vulnerabilities in LICs from different angles. Among those are macroeconomic policy buffers, fiscal space, a vulnerability index, and scenario analysis.*

- ✓ *Macroeconomic policy buffers* are indicators of the overall external and fiscal positions of an economy. Key buffers include the overall fiscal balance, total public debt, international reserve coverage, the current account balance (adjusted by adding FDI), and inflation. Countries with high fiscal deficits and high and/or increasing public debt stocks would generally have less flexibility to use fiscal policy when hit by a shock than countries with low deficits and debt. Likewise, countries with low current account deficits and comfortable reserve coverage may be in a better position to absorb external shocks than countries with large deficits and limited reserve cushions. Finally, countries with relatively low inflation have more scope for accommodative macroeconomic policies.
- ✓ *Fiscal space* is a broad concept that considers the extent to which government expenditure can be increased (or taxes cut) without jeopardizing medium-term fiscal sustainability. While it is closely related to the overall fiscal deficit and public debt, its scope is more general and may include, for example, long-term growth and interest rate prospects and quality of fiscal institutions (Heller, 2005). For illustrative purposes, we define fiscal space in this paper as the difference between the baseline primary balance and the constant primary balance that would be needed to reach a debt/GDP ratio of 40 percent within 20 years, that is, the usual time horizon for debt sustainability analyses (see Appendix 6 for details).
- ✓ An illustrative *Growth Decline Vulnerability Index* was constructed to measure a country's underlying vulnerability to sudden growth declines that lead to negative real per capita GDP growth in the event of exogenous shocks and a protracted period of growth below the pre-shock trend, using a methodology that considers historical relations among economic, fiscal, and external indicators (see Appendix 4 for details).
- ✓ *Scenario analysis* is a tool for assessing the macroeconomic impact of tail risks. In this paper, we focus on two alternative tail risks: a sharp downturn in global growth and further global commodity price shocks. The impact of these shocks on macroeconomic buffers, fiscal space, and the vulnerability index is used to assess the ability of LICs to withstand these shocks.
- ✓ Under the scenario analysis, additional *external financing needs* are calculated as the amount needed to bring international reserve coverage (in months of the following year's imports) back to three months for those countries that had at least three months reserve coverage prior to the shock; or, for those countries with less than three months already in the baseline, as the amount of the loss in reserves resulting from the shock. Additional financing needs are zero for countries where reserve coverage exceeds three months after the shock, or if reserve coverage increased under the shock scenario.

**Figure 2.2. Key Macroeconomic Indicators, 2007–12**

*LICs have recovered swiftly from the crisis, but the rebuilding of macroeconomic buffers has been slow in many LICs.*

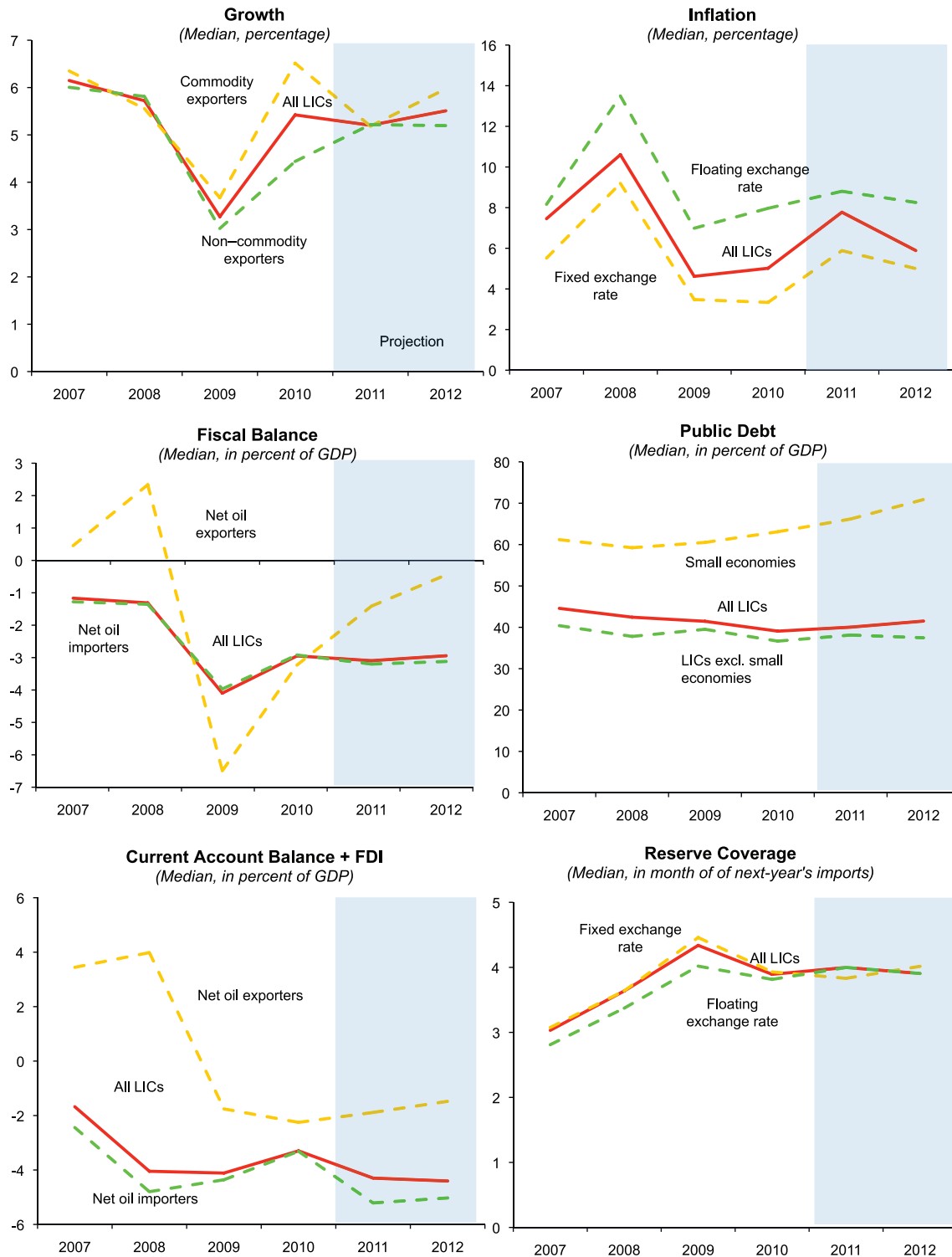
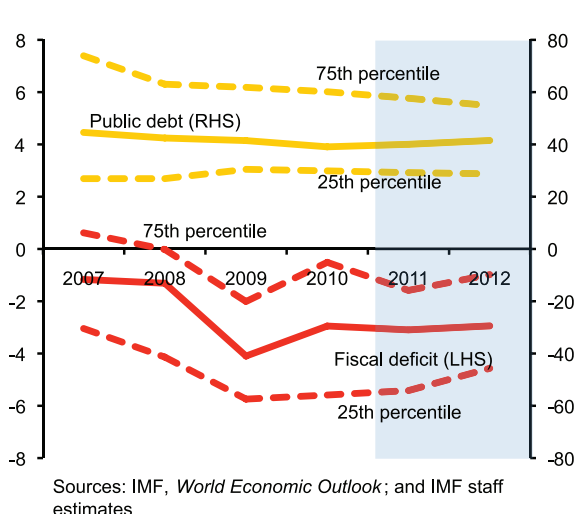


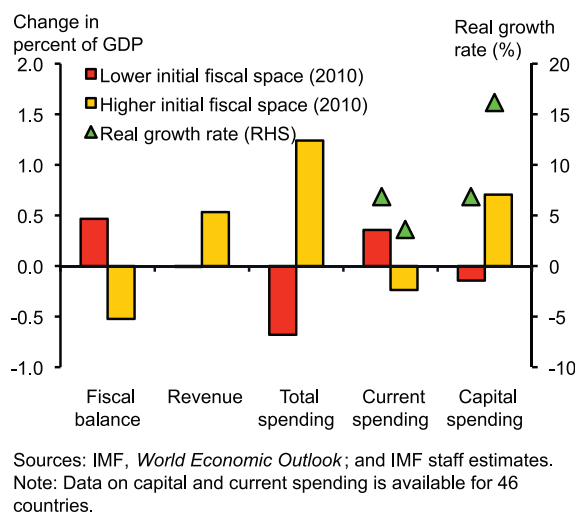
Figure 2.3. Fiscal Indicators and Fiscal Space

**A. Government Deficit and Public Debt**  
(Median, 25th and 75th percentile;  
in percent of GDP)

The rebuilding of fiscal buffers has been slow for the median LIC, as a result of the recent commodity price spike, but somewhat faster for those countries with more limited fiscal space.



**B. Government Revenue and Spending, 2011**  
(Median)



Overall, this may have led to some convergence in fiscal buffers across LICs, including on public debt.

The global outlook is deteriorating, with recent downward revisions in global growth projections and severe downside risks. Growth in advanced economies has slowed sharply since the second quarter of 2011, and renewed concerns about private and sovereign balance sheets have tilted global economic risks sharply to the downside. At the same time, commodity prices remain volatile and subject to supply shocks. To assess the impact of external risk on LICs, we conducted two alternative (mutually exclusive) tail-risk scenarios: (i) a sharp downturn in global growth and (ii) a new spike in global commodity prices.

## B. How Would a Sharp Downturn in Global Growth Affect LICs?

While the baseline forecast for the world economy envisages continued, albeit moderating, growth in 2011 and 2012, in an alternative tail-risk scenario, we analyzed the potential vulnerabilities of LICs to a sharp downturn in global growth. The scenario assumes shocks to financial conditions in some advanced economies that would lower global growth by 1.3 and 1.6 percentage points in 2011 and 2012, respectively, relative to the *World Economic Outlook* (WEO) baseline. The shock to global growth is simulated to affect

LICs through several channels: global export demand, commodity prices, remittances, and FDI (see Appendix 6 for details on the methodology). The scenario can also give a qualitative indication about the possible impact of a shallower, but more protracted, global slump.

A 1.5 percentage point decline in global growth would shave an estimated 1 percent off LIC growth in 2011–12 (Figure 2.4) and have a strong adverse impact on poverty. A little over a quarter of LICs would experience a slowdown in growth of more than 2 percentage points relative to the baseline, though overall growth is expected to remain positive in most countries.

A downturn in global growth would also erode external and fiscal buffers. Slower global growth would adversely affect the balance of payments of LICs through lower export receipts, negative terms of trade for some countries, and reduced remittances and FDI inflows, causing current account balances (including FDI) to deteriorate and reserve coverage to fall for the median LIC (Figure 2.5). Similarly, the fiscal position would be weakened for the median LIC as a result of revenue losses, with public debt increasing and fiscal deficits rising.

Fiscal balances would deteriorate to levels comparable to those observed in the 2009 experience. Fiscal deficits in 2012 would increase by 1 percentage point of GDP for the median LIC, relative to the baseline.<sup>7</sup> While the fiscal impact of the shock would be smaller than that observed during the 2009 global crisis, the post-shock fiscal deficit (of about 4 percent of GDP) would be comparable to the 2009 level, given the weaker starting point this time around (Figure 2.6).<sup>8</sup>

Additional external financing needs of \$27 billion in 2012 could emerge under this scenario. A large part of these needs would be accounted for by a small number of large economies in Sub-Saharan Africa (SSA) and Asia. However, almost half of those countries that experience a negative external impact in the scenario would face additional external financing needs (a median of about 4 percent of GDP). The additional needs would emerge in LICs across all regions, and the number of LICs with international reserves below three months of imports would increase from less than a quarter to about half of LICs.

An additional 23 million people in LICs could be pushed into poverty by 2012 under the scenario.<sup>9</sup> It is estimated that the median poverty rate will increase

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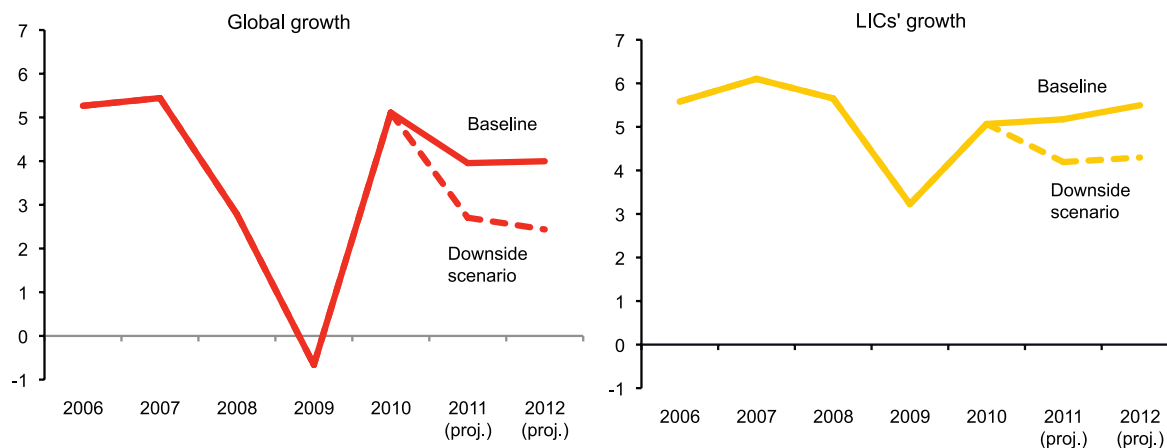
<sup>7</sup> This assumes that nominal expenditure plans in 2012 budgets would not be revised after the shock while revenues decline substantially—by around 3 percent of GDP for the median LIC.

<sup>8</sup> Prior to the global financial crisis, the fiscal deficit for the median LIC was about 1.3 percent of GDP. In 2011, the fiscal deficit is projected in the baseline to have been close to 3 percent of GDP. In 2012, only about one-quarter of countries are projected to have restored the pre-crisis fiscal balance buffer.

<sup>9</sup> Poverty is defined as consumption below \$1.25 per person per day (Ivanic, Martin, and Zaman, 2011). Appendix 7 describes the methodology.

**Figure 2.4. GDP Growth in Baseline and Downside Scenario, 2006–12**  
(Median, in percent)

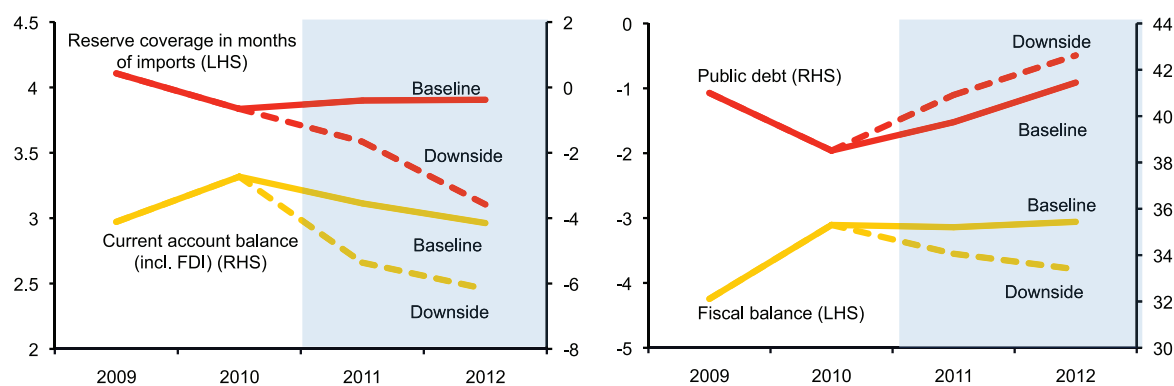
*A 1.5 percentage point decline in global growth in 2011–12 would shave an estimated 1 percent off LIC growth.*



Sources: IMF, *World Economic Outlook*; and IMF staff estimates.

**Figure 2.5. External and Fiscal Buffers in Baseline and Downside Scenario, 2009–12**  
(Median, in percent of GDP)

*A sharp downturn in global growth would severely erode external and fiscal buffers.*



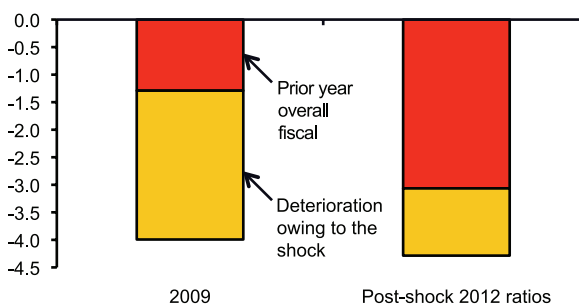
Sources: IMF, *World Economic Outlook*; and IMF staff estimates.

by 1.4 percentage points by 2012, in a framework that uses elasticities to link growth rates with changes in poverty rates.<sup>10</sup> The impact would correspond to about 23 million additional people left in poverty; most of those would be in SSA and Asia and the Pacific.

<sup>10</sup> Elasticities of poverty with respect to growth are taken from Fosu (2010).

**Figure 2.6. Fiscal Balance before and after the Shock**  
(Median, in percent of GDP)

*While the fiscal impact of the simulated growth decline in 2012 would be less severe than in 2009, fiscal deficits would reach comparable levels, given weaker starting positions.*



Sources: IMF, *World Economic Outlook*; and IMF staff estimates.

The scenario analysis can give an indication of the potential impact of a shallower but more-protracted global slump, which is not explicitly modeled here. In the event that global growth were to decline less sharply, but remain lackluster over the medium term, LICs could also be expected to experience protracted lower growth, as the demand for their exports, FDI inflows, and remittances would stay below trend, and macroeconomic buffers would weaken over time. In particular, fiscal deficits would be elevated for a prolonged period as the revenue base would be diminished because of the lower volume of international trade and weaker domestic demand. Debt dynamics would also gradually worsen, reflecting both lower growth and higher deficits. Moreover, to the extent that countries would have to realign their policies to adjust to the new lower global growth rates, there might be second-round effects on domestic growth, unless the implementation of structural reforms to boost competitiveness were to be accelerated.

### C. How Would Another Spike in Global Commodity Prices Affect LICs?

The potential vulnerabilities of LICs to spikes in commodity prices are assessed using an alternative tail-risk scenario. This scenario<sup>11</sup> assumes (based on the information embedded in commodity futures options, see Appendix 5)

<sup>11</sup> The tail-risk scenario of higher global commodity prices is constructed using fan chart-like analysis based on market expectations embedded in commodity futures options. The commodity price levels in the scenario represent extreme values that could be reached or exceeded with only 7 percent probability based on density functions built from the WEO baseline commodity price assumptions. See Appendix 5 for a description of the methodology.



that food prices would increase by 25 percent in 2011 and 31 percent in 2012 relative to the current WEO baseline scenario; fuel prices would surge by 21 percent in 2011 and 48 percent in 2012; and metals prices by 21 percent in 2011 and 36 percent in 2012 (Figure 2.7). The scenario explicitly recognizes that commodity price shocks tend to create winners and losers within and across countries, depending on the terms of trade, sectoral employment, and consumption baskets. But there are also repercussions that affect countries in a more symmetric way, in particular with respect to inflation and related social pressures.

While the impact on growth is likely to be muted in most LICs, inflation is highly sensitive to global commodity prices, as indicated by the tail-risk scenario analysis. Assuming that the pass-through from global to domestic prices follows historical patterns and that, as in the past, only mild countervailing policy monetary action is undertaken, inflation could more than double, to a median of around 16 percent (Figure 2.8). These large effects reflect the high share of food in LICs' consumer price index (CPI) baskets, while global fuel prices have a more-limited impact.

While the external impact of a commodity price spike would differ significantly across LICs depending on their trade structure, a large majority would be adversely affected, with the median trade balance deteriorating by almost 3 percent of GDP. About 80 percent of the deterioration in the trade balance would be accounted for by higher global oil prices and one-third by higher food prices. Higher global prices for metals would have little effect on the median LIC, although this masks large differences between countries (Figure 2.9). For example, while higher oil and food prices have a negative median impact on the trade balance of commodity exporters, this is more than offset by the median gain from higher prices of other commodities.

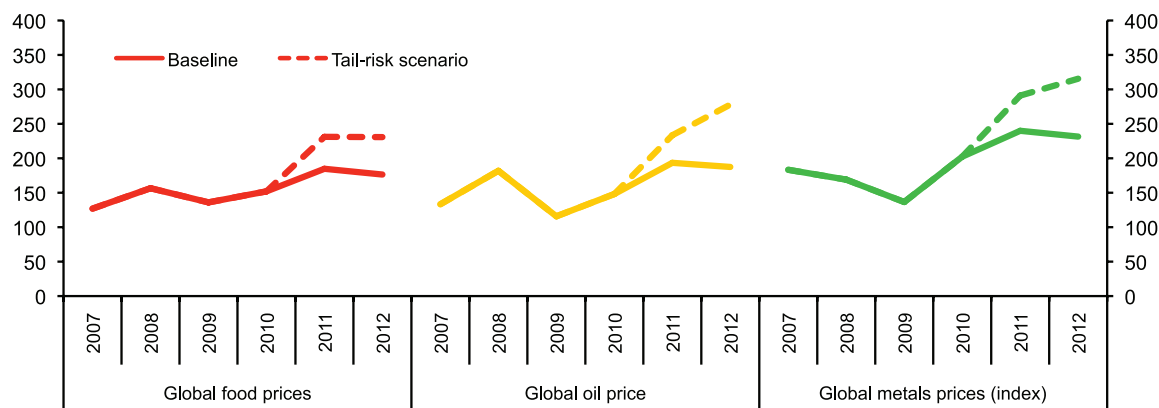
In this scenario, external financing needs could increase by around \$9 billion in 2012 for LICs experiencing a negative terms-of-trade shock. Much of the additional financing needs would be accounted for by a small number of large non-commodity exporters in Sub-Saharan Africa and Asia. About one-fifth of LICs would stand to gain from higher commodity prices. Among the four-fifths of countries that would be adversely affected by higher prices, about half would have sufficient reserves to absorb the shock. The other half would face additional external financing needs amounting to about 2.25 percent of GDP in the median case. Overall, the shock could reduce median reserve coverage by more than half a month of imports compared to the baseline, to just over three months.

The simulated increase in global commodity prices could put pressure on the fiscal positions and debt dynamics in many LICs. The scenario would



**Figure 2.7. Commodity Prices under Baseline and Tail-Risk Scenario, 2007–12**  
(Index, 2005 = 100)

*The scenario is based on the "upper tail" in market expectations, as embedded in commodity future options for 2011–12.*

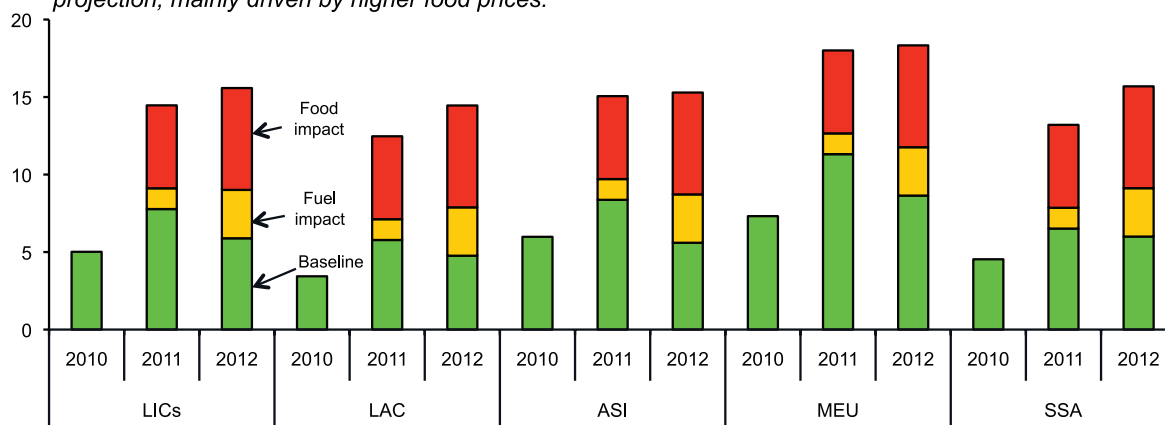


Sources: IMF, *World Economic Outlook*; and IMF staff estimates.

Note: Global food prices are assumed to increase by 25 percent in 2011, 31 percent in 2012, relative to the baseline; global oil prices by 21 percent in 2011 and 48 percent in 2012; and metals prices by 21 percent in 2011 and 36 percent in 2012.

**Figure 2.8. Impact of Tail-Risk Scenario of Higher Commodity Prices on Inflation, 2010–12**  
(Median, in percentage points)

*Under the higher global commodity price scenario, inflation in LICs could double relative to the baseline projection, mainly driven by higher food prices.*



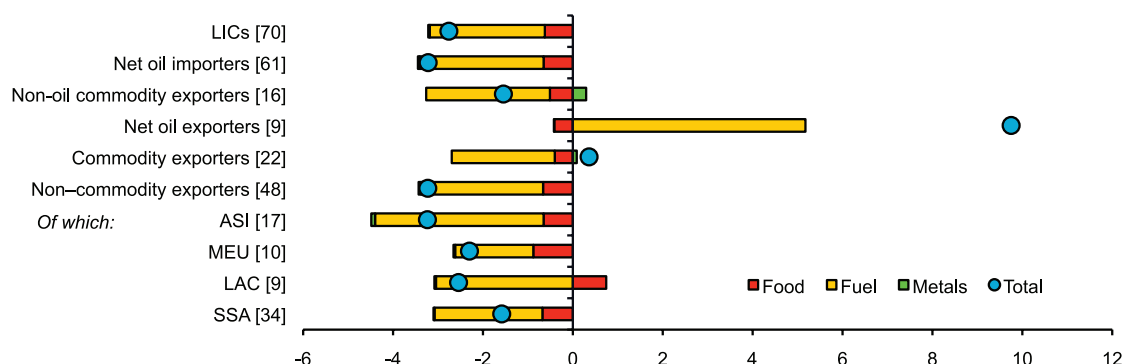
Sources: IMF, *World Economic Outlook*; and IMF staff estimates.

Note: Scenario simulated impact based on an increase in global food and fuel prices (for food by 25 and 31 percent in 2011 and 2012, respectively, and for fuel by 21 and 48 percent, all compared to baseline). ASI: Asia and the Pacific; LAC: Latin America and the Caribbean; MEU: Middle East and Central Asia; SSA: Sub-Saharan Africa.

cause the median budget balance to deteriorate by around 1 percent of GDP in 2011–12 compared to the baseline (Figure 2.10A). About half of the worsening would arise from existing policies (such as maintenance of fuel subsidies), and the other half from the possible adoption of new measures

**Figure 2.9. First-Round Impact of Tail-Risk Scenario of Higher Commodity Prices on the Trade Balance, 2012**  
(Median, in percent of 2010 GDP)

*While some countries would gain from higher global commodity prices, for the median LIC the 2012 trade balance would worsen by almost 3 percent of GDP, with most of the impact coming from oil.*



Sources: IMF, *World Economic Outlook*; and IMF staff estimates.

Note: Scenario simulated impact based on an increase in global food, metals (except gold and uranium) and fuel prices (31, 36, and 48 percent above baseline, respectively). The calculations are based on the median of differences, and the sum of the components may thus differ from the total. ASI: Asia and the Pacific; LAC: Latin America and the Caribbean; MEU: Middle East and Central Asia; SSA: Sub-Saharan Africa. Numbers of countries in each grouping are in brackets.

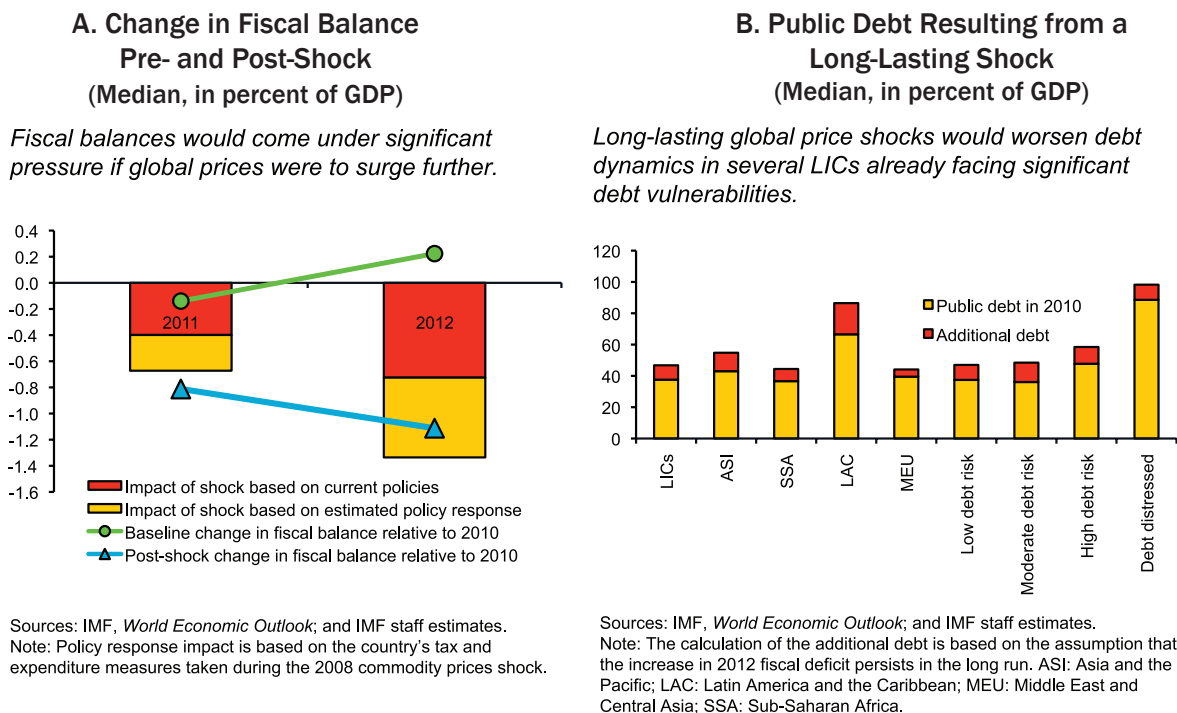
(such as new tax breaks, transfers, or subsidies).<sup>12</sup> The largest median deterioration would be in the Asia-Pacific region. If higher commodity prices were to persist beyond 2012, median public debt could increase by about 9 percent of GDP in steady state.<sup>13</sup> This would be problematic for many LICs, in particular those with a high risk of debt distress and LICs in Latin America and the Caribbean, where public debt would approach 90 percent of GDP (Figure 2.10B).

An additional 31 million people in LICs could be pushed into poverty by 2012 under the scenario, while middle-income households would also suffer.<sup>14</sup> While higher food prices would benefit net producers of food, large segments of the population, especially the urban poor and landless rural, would be hard hit, given the high share of food in their consumption basket. Higher fuel prices would cut into household income across the economy. About half of the poverty increase would be in SSA, reflecting its large population share clustered near the poverty line (Figure 2.11A). Middle-income households

<sup>12</sup> The estimates of the policy response assume that governments take revenue and expenditure measures per unit of increase in oil and food prices similar to those in the 2007–08 episode of high global oil and food prices. The measures and fiscal impact of existing policies is calculated using revenue and expenditure elasticities to changes in global oil and food prices (see Appendix 5).

<sup>13</sup> The debt increase is estimated by maintaining the 2012 increase in the deficit over the long term, and then adding the discounted sum of these deficits at the projected nominal GDP growth rate (calculated as the average of the past 10 years) to the public debt stock.

<sup>14</sup> Poverty is defined as consumption below US\$1.25 per person per day (Ivanic, Martin, and Zaman, 2011). Appendix 7 describes the methodology.

**Figure 2.10. Impact of Tail-Risk Scenario of Higher Commodity Prices on Fiscal Balances**

are also vulnerable to higher prices, especially in Africa, Europe, and the Middle East, where consumption baskets do not differ substantially across income groups. By contrast, in Asia, Latin America, and the Caribbean food and fuel prices play less of a role for middle- and upper-income households (Figure 2.11B).

#### D. Conclusions from the Vulnerability Analysis

LICs are highly vulnerable to tail risks, in particular to a sharp global downturn. A sharp slowdown in global growth would significantly raise the near-term recession risk for many LICs, with the illustrative Growth Decline Vulnerability Index returning to levels similar to those experienced at the height of the global crisis (Figure 2.12). An additional commodity price shock is not as likely to raise the recession risk, but could still undermine price stability and increase poverty.

Fiscal room for maneuver, already reduced during the crisis, could be further eroded should tail risks materialize. The ability of individual countries to absorb the fiscal costs of shocks depends on many country-specific factors, as well as the nature and persistence of the shock. However, an illustrative fiscal space measure that combines deficit and debt dynamics (see Box 2.1) can give a broad indication of the dispersion of fiscal room

Figure 2.11. Impact of Tail-Risk Scenario of Higher Commodity Prices on Poverty, by Region

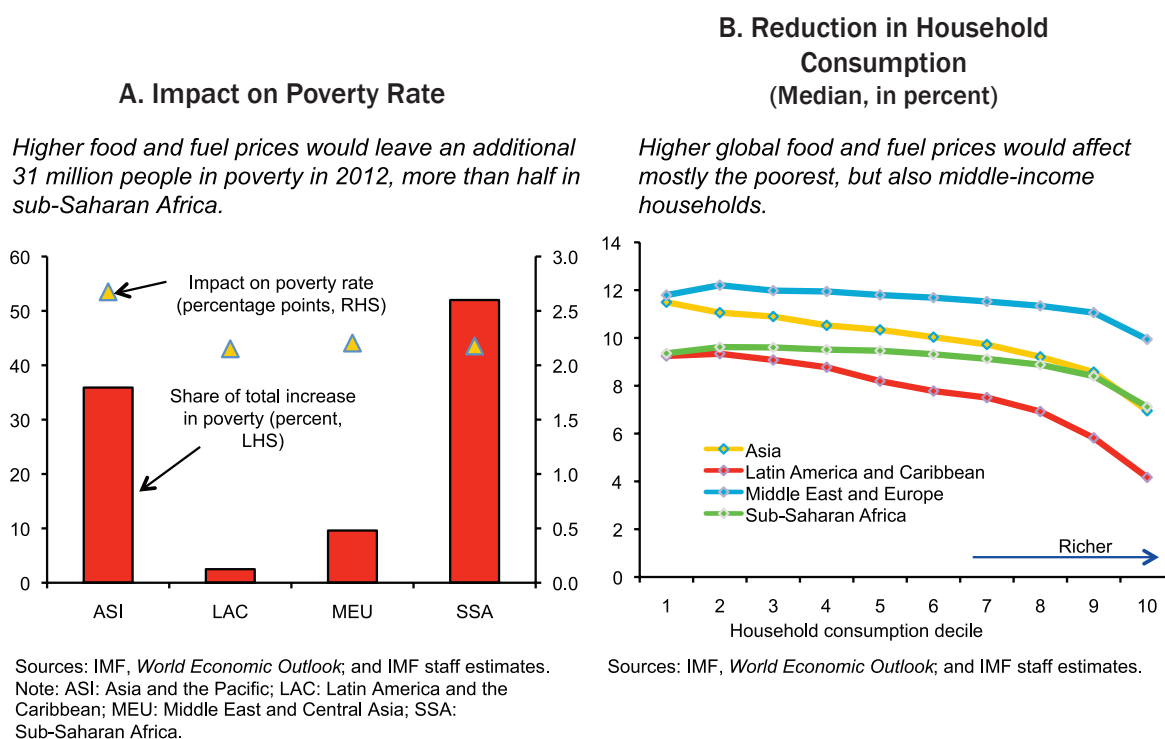
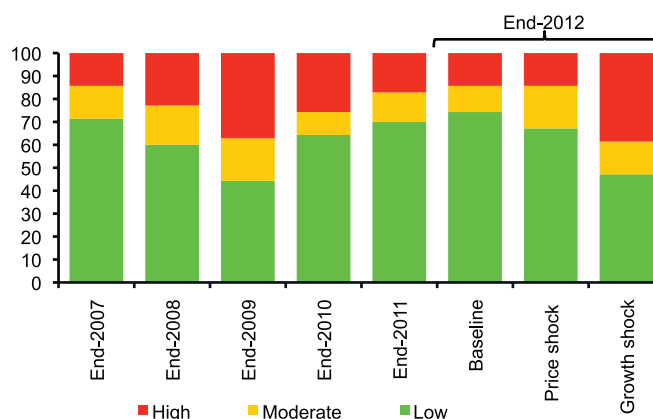


Figure 2.12. Growth Decline Vulnerability Index, Baseline and Tail-Risk Scenarios (Percentage of LICs)

LICs' near-term vulnerability to a shock-induced recession would increase under both tail-risk scenarios, in particular in the case of a global downturn.

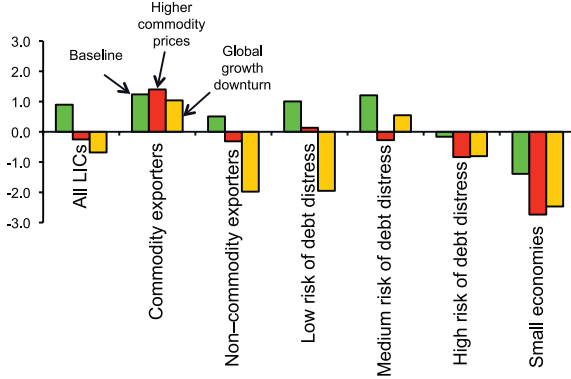


Sources: IMF, *World Economic Outlook*; and IMF staff estimates.  
Note: The vulnerability index is constructed using a methodology that considers historical relations among economic, fiscal, and external indicators with near-term growth declines and protracted growth slowdowns in the event of exogenous shocks.

**Figure 2.13. Fiscal Space and Reserve Coverage under Baseline and Tail-Risk Scenarios, 2012**

**A. Illustrative Fiscal Space Measure  
before and after the Shock in 2012  
(Median, in percent of GDP)**

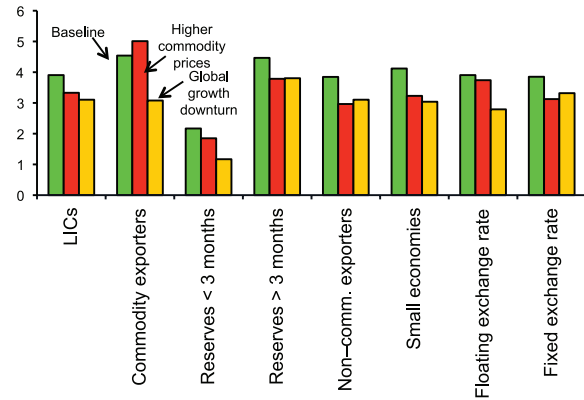
*Fiscal room for maneuver could be severely eroded in the event of a global commodity price shock or a sharp global downturn.*



Sources: IMF, *World Economic Outlook*; and IMF staff estimates.  
Note: The illustrative fiscal space measure is calculated as the difference between the baseline 2012 primary balance and the constant primary balance that is needed to achieve a target public debt-to-GDP ratio of 40 percent in 2030.

**B. Reserve Coverage in 2012  
(Median, in months of imports)**

*Under the tail-risk scenarios, reserve coverage would decline by almost one month of imports for many LICs, reducing the median coverage to around three months of imports.*



Sources: IMF, *World Economic Outlook*; and IMF staff estimates.  
Note: Simulation of the reserve coverage ratio after an increase in global food, metals (except gold and uranium), and fuel prices (by 31, 36, and 48 percent, respectively), and a slowdown in global growth (by 1.6 percentage points), relative to the 2012 *World Economic Outlook* baseline.

for maneuver. Based on this measure, a little less than half of LICs (including most commodity exporters) could fully absorb either of the tail-risk shocks without jeopardizing medium-term sustainability (Figure 2.13A). At the other end of the spectrum, more than a third of LICs (including many small island economies and about half of all non-commodity exporters) already appear to lack fiscal space in the baseline and would have little room for maneuver. The remaining countries could at least partly absorb the shock.

While many LICs would have sufficient reserves to absorb a further shock to the balance of payments, some would face additional external financing needs. The tail-risk scenarios suggest that the share of LICs with reserve coverage below three months of imports could rise from just over a quarter to about half if one of the shocks were to materialize. Non-commodity exporters would be more affected by higher global commodity prices, while the adverse growth scenario would hit commodity exporters harder (Figure 2.13B). Among non-commodity exporters, those in sub-Saharan Africa would experience a more severe erosion of their reserve

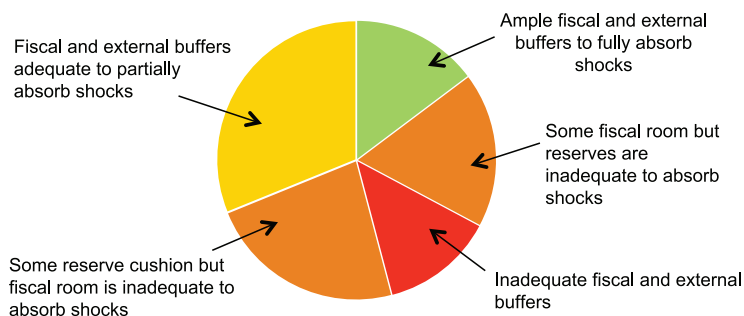
cushions, though most would still be able to absorb the impact at least in part.

Taken together, the analysis indicates that macroeconomic buffers appear still fragile in many LICs, although vulnerabilities vary significantly across countries. Based on the illustrative scenario analysis, while a large majority of LICs have some policy space on the fiscal and/or external side, only a few would have room to absorb in full either a sharp downturn in global growth or a further commodity price spike. At the other end of the spectrum, a few LICs appear to have inadequate fiscal and external buffers even under the baseline (Figure 2.14).

**Figure 2.14. Illustrative Distribution of the Adequacy of LICs' Fiscal and External Buffers to Absorb Simulated Tail-Risk Shocks (Percentage of LICs)**

*Macroeconomic policy buffers appear still fragile for many LICs, although vulnerabilities vary significantly across countries.*

Illustrative distribution of the adequacy of LICs' fiscal and external buffers to absorb simulated tail-risk shocks<sup>1</sup>  
(Percentage of LICs)



Sources: IMF, *World Economic Outlook*; and IMF staff estimates.

Note: Based on simulated impact on the illustrative fiscal space measure and international reserve coverage of the tail-risk scenarios of a global downturn in growth and a further spike in commodity prices. Fiscal space is considered ample if it remains positive after the tail-risk shocks, inadequate if it is negative already under baseline projections, and partially adequate if it cannot fully absorb the impact. International reserve cushions are similarly assessed, against an illustrative benchmark of three months of import coverage.



## Macroeconomic Policy Challenges

### A. Rebuilding Policy Buffers

*A central policy challenge facing LICs is to balance the rebuilding of macroeconomic buffers against pressing spending needs, whether for shock mitigation or growth-enhancing investment. To ease the trade-offs, LICs should aim over the medium term to boost their fiscal revenue base, improve the efficiency of public investment, and put in place better-targeted social protection systems. The beneficial effects of these policies on economic resilience could be complemented by longer-run reforms to increase domestic savings, deepen the financial sector, and diversify the economy.*

A key policy challenge for many LICs is to balance the rebuilding of macroeconomic buffers against pressing spending needs. Striking the right balance is important for building resilience against shocks while supporting economic development. As shown above, many LICs have emerged from the global crisis with weakened buffers, exposing them to shocks that could have severe economic and social effects and undermine long-term poverty reduction and growth objectives. At the same time, there is a pressing need to invest in public infrastructure and social systems. This underlying tension becomes even more acute when LICs experience shocks, as the authorities may need to take potentially costly measures to mitigate the adverse economic and social consequences, in particular in the context of weak automatic stabilizers and very limited social safety nets. Moreover, the expected persistence of shocks is an important consideration in finding the right balance between financing and macroeconomic adjustment. While the initial response to a shock may well rely primarily on temporary financing, this may prove too costly to maintain over the medium term if the shock persists.

Many LICs could still benefit from a further strengthening of their fiscal buffers. As shown above, a large number of LICs can only partially absorb large tail-risk shocks and may need to adjust over the medium term to preserve fiscal sustainability. This group could consider a mix of gradual

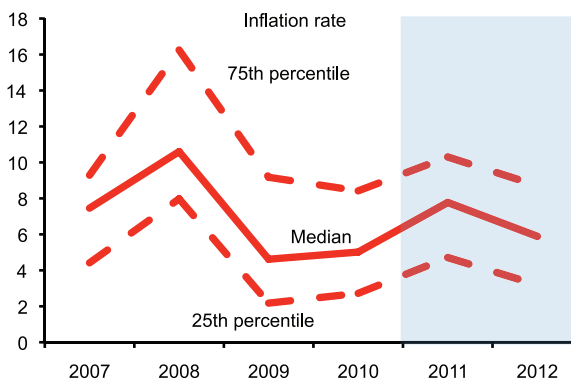


fiscal adjustment combined with realignment of priorities, for example, shifting spending in favor of investment and social programs, and building a stronger revenue base. Those LICs that have no fiscal space already under the baseline would have limited room for maneuver in the event of a tail-risk shock. For this group, rebuilding fiscal buffers and strong concessional support from development partners will be particularly important. Some LICs already have adequate fiscal buffers and may even be able to expand their fiscal deficits in the baseline, for instance, to step up critical spending, without compromising their ability to absorb large shocks.

Despite the recent commodity price spike, inflation is projected to remain in the single digits for most LICs, although a few countries face stronger price pressures and may need to tighten monetary policy (Figure 3.1). Monetary and exchange rate policies did not react much to the recent uptick in inflation caused by the global commodity price spike. Median policy rates are broadly unchanged, which has brought (ex post) real rates to around zero. The commodity price rise has also not had a major impact on exchange rates (Figure 3.2). Real effective exchange rates have remained broadly stable, though still above the pre-2008 levels. Many countries are projected to have narrowing but still sizable excess capacity through 2012. Reflecting stabilizing food and fuel prices, albeit at a high level, median inflation is projected to come down to 6 percent in 2012, from 7.8 percent in 2011. However, for a few countries, in particular in SSA, inflation has already reached double-digit levels and is not expected to ease in the short term without monetary tightening.

**Figure 3.1. Inflation Rate, 2007–12**  
(In percent)

*Inflation is projected to remain in the single digits for most LICs, though a few countries face stronger price pressures in the near term.*



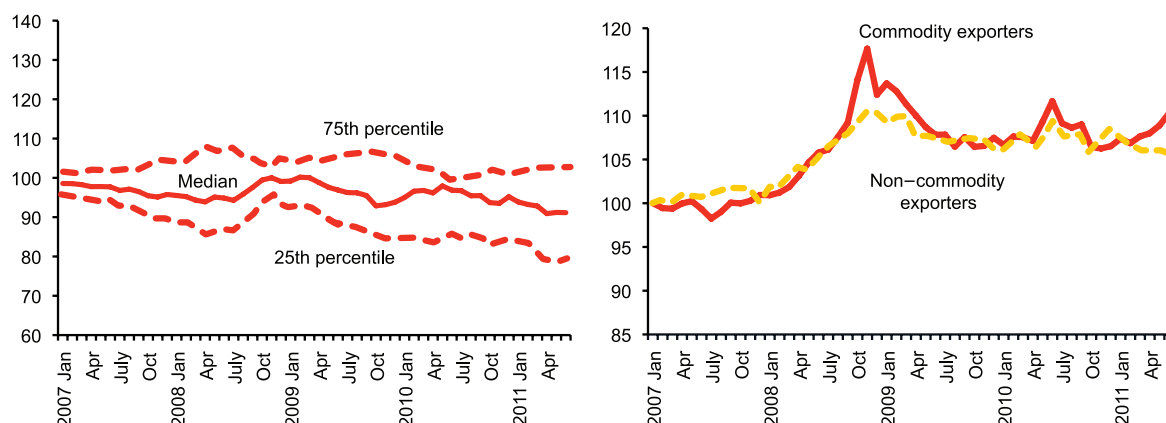
Sources: IMF, *World Economic Outlook*; and IMF staff estimates.

Figure 3.2. Nominal and Real Effective Exchange Rates, 2007–11

**A. Nominal Effective Exchange Rate**  
(Median; Index, January 2007 = 100)

**B. Real Effective Exchange Rate**  
(Median; Index, January 2007 = 100)

*Exchange rates have not moved much in the post-crisis period.*



Sources: IMF, *World Economic Outlook* and IMF staff estimates.

While many countries have sufficient external buffers to absorb shocks, others have less available room and may need to focus on preserving or rebuilding external buffers. While many LICs have built up sufficient reserves to fully absorb the impact of either a sharp global downturn or a further spike in global commodity prices without the need for adjustment (and import compression), others would benefit from further building reserve buffers through a mix of monetary and fiscal tightening, combined with greater exchange rate flexibility where appropriate. A quarter of LICs already have import coverage of less than three months under the baseline. For this group, rebuilding external buffers should be a high priority. These countries are most in need of help from the international community.

While there is no one-size-fits-all policy advice, several policy priorities apply to most LICs as they aim to strengthen macroeconomic buffers while supporting longer-term development objectives. The broad policy agenda discussed in a 2010 IMF staff paper on post-crisis macroeconomic challenges (Fabrizio, 2010) remains valid in this context:

- *Boosting the domestic revenue base*, which remains low in most LICs, by (i) strengthening customs and tax administrations, including in the areas of large taxpayers and noncompliance; (ii) moving to a simple, broad-based value-added tax (VAT); (iii) removing minor taxes and fees that are costly to administer; (iv) building simple and broad-based corporate

income taxes that also cover multinationals; and (v) balancing royalties, auctioning, and profit-related charges in taxing natural resources;<sup>15</sup>

- Continuing to increase spending in priority areas to the extent possible, including social sectors and infrastructure investment, while *improving spending efficiency and public financial management* (see Lledó and Poplawski-Ribeiro, 2011; and Dabla-Norris, Allen, and others, 2010) and ensuring that public investment projects are carefully selected, prioritized, and monitored;
- *Developing targeted social support mechanisms* that can strengthen automatic stabilizers during crises, replacing less efficient and more costly subsidy schemes (see Gupta and others, 2008; and Coady and others, 2010), which would help strengthen fiscal buffers;
- *Prudent borrowing strategies* that help maintain debt sustainability and balance the use of external nonconcessional financing against expanded use of domestic financing, supported by measures to boost domestic savings, develop financial sectors, and enhance debt management frameworks; and
- Advancing *structural reforms that increase economic diversification* to reduce exposure to exogenous shocks and achieve higher growth.

## B. Policy Challenges in the Event of a Sharp Downturn in Global Growth

*In the event of a sharp global downturn, the scope for fiscal stimulus would be more limited than in 2009 for most LICs, given weaker fiscal buffers and constrained aid envelopes. However, countries with sufficient fiscal room should maintain spending levels to avoid aggravating the negative economic and social effects of the shock. In addition, in countries with moderate inflation, monetary and exchange rate policy could be used more actively to mitigate the impact of the shock. If the downturn were to persist over the medium term, further realignment of fiscal, monetary, and exchange rate policies might be necessary.*

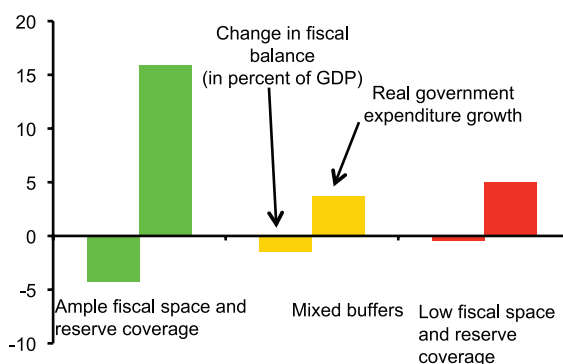
The appropriate macroeconomic policy response to a sharp global downturn would depend in part on available policy buffers. While all LICs should aim to soften the economic and social impact of such a shock, there is no one-size-fits-all policy advice, as countries would not all be affected in the same way and do not all have the same policy space to respond. During the global downturn in 2009, LICs with more comfortable buffers were able to mount a stronger countercyclical fiscal response, with large increases in real spending, than countries with weaker buffers (Figure 3.3). The countercyclical response helped

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<sup>15</sup> See IMF (2011c). Regarding taxing natural resources, Bornhorst, Gupta, and Thornton (2009) also find that increases in resource revenue in LICs are offset partially (about a fifth of the increase is wiped out) by a decline in non-resource collection because of weak incentives to collect own revenue (natural resource curse).

**Figure 3.3. Fiscal Response in 2009  
(Median)**

*During the global downturn in 2009, LICs with ample macroeconomic buffers were able to mount a stronger countercyclical fiscal response.*



Sources: IMF, *World Economic Outlook*; and IMF staff estimates.

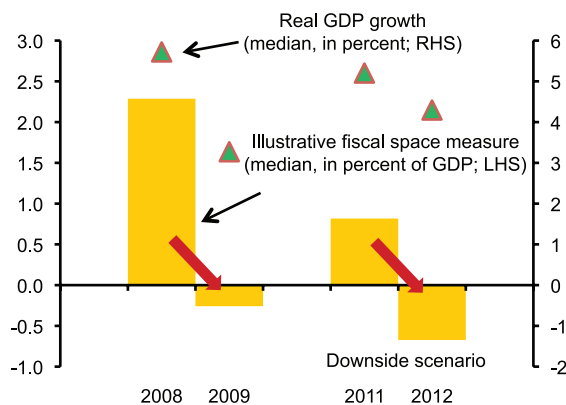
cushion the impact of the global crisis on spending, and likely also on growth (see earlier IMF staff analysis in Fabrizio, 2010). However, the risk of a new slowdown in growth comes at a time when LICs' buffers have already been weakened during the 2009 crisis. The macroeconomic policy recommendations for LICs discussed in earlier analytical work on the global crisis may continue to provide useful guideposts. This section elaborates on how those broad recommendations might be applied or adapted to current circumstances.

### Fiscal policy

In the event of a sharp global downturn, the scope for fiscal stimulus would be more limited than in 2009 for most LICs, given weaker fiscal buffers and constrained aid envelopes, but countries with sufficient fiscal room should aim to protect spending. Thanks to the fiscal buffers built over the last decade, most LICs were able to afford a countercyclical fiscal response during the 2009 crisis. In the event of another global downturn, LICs should again aim to preserve spending to the extent possible to avoid aggravating the negative economic and social effects of the shock. However, fiscal buffers are weaker now for most countries (Figure 3.4). Under the global downturn scenario analyzed above, many LICs could only partly accommodate another shock, and a few lack fiscal room for maneuver already under the baseline. Moreover, available external financial support from donor countries could be more constrained this time around as a result of tight budget envelopes, which make many LICs even more vulnerable. In the event that a global downturn were to persist beyond 2012, even LICs that could initially accommodate a shock might need to adjust fiscal policies, including through expenditure realignment and enhanced revenue efforts, to maintain fiscal sustainability.

**Figure 3.4. Real GDP Growth and Illustrative Fiscal Space Measure, 2008–09 and 2011–12**

*Fiscal room for maneuver is less than before the global crisis and could be further reduced in the event of another downturn.*



Sources: IMF, *World Economic Outlook*; and IMF staff estimates.  
Note: Box 2.1 defines the illustrative fiscal space measure.

If fiscal space allows, LICs should seek to soften the economic and social impact of a global downturn by preserving—and where feasible increasing—real fiscal spending in priority areas. Labor-intensive investment spending could help sustain growth in the short run and limit the increase in unemployment while supporting longer-term investment needs, which remain substantial in most LICs. Spending in priority areas, such as health and education, could help limit the adverse social impact of the downturn and remove bottlenecks to growth. Pushing ahead with public financial management reforms could help improve the efficiency of spending, freeing up resources for priority needs.

While many LICs lack a comprehensive social safety net to protect the most vulnerable, ad hoc programs can help alleviate the social pressures. Food voucher programs with proxy-means testing, school-based or maternal and child feeding schemes, “job-for-food” programs, and conditional cash transfer programs targeting vulnerable groups such as orphans or people with chronic physical conditions are examples of ad hoc schemes that a number of countries, such as Burkina Faso, Ghana, Kenya, and Sierra Leone (see Box 3.1), have successfully implemented.

At the same time, responding to a shock with general public wage increases should be avoided, as they are poorly targeted and may have negative implications for fiscal sustainability. Salary increases in the public sector may crowd out public investment or spending on the social safety net and are typically irreversible. Public salary increases may also spill over into the private sector, creating second-round effects and ultimately undermining competitiveness.

### Box 3.1. Policy Measures during the 2008 Food and Fuel Price Shocks—Country Experiences

Experience from the 2007–08 food and fuel price shock and the current episode has shown that some measures, though not the “first-best” option, can be well targeted and cost effective. At the same time, across-the-board measures may have serious negative implications for fiscal sustainability, competitiveness, and production incentives.

#### *Targeted measures*

- ✓ In Senegal, subsidies on small butane gas bottles, which were introduced in 2006 and benefited mostly the higher-spending households, were eliminated in 2009, and an excise exemption was introduced on lamp oil (kerosene) that benefits mostly the poorer.
- ✓ Liberian authorities in May 2011 proposed limited yet targeted measures through ring-fenced import duty exemptions for diesel consumed by the national electricity company, transit authority, and broadcasting system (estimated costs below 0.1 percent of GDP).
- ✓ In 2009 Burkina Faso introduced limited cash transfers providing food vouchers to the lowest-quintile households in the two largest urban areas, identified through proxy-means testing (beneficiaries were identified by household characteristics). A pilot scheme tested conditional and unconditional cash transfers for households affected by HIV/AIDS.
- ✓ The expansion of school feeding programs in Sierra Leone is estimated to raise the proportion of school children covered by 20 percent to 30 percent in 11 vulnerable school districts, and expansion of food-for-work programs create 10,000 food-for-work jobs.
- ✓ Ghana is rolling out a cash transfer program to households in extreme poverty, while Kenya has introduced a conditional cash transfer program targeting orphans and vulnerable children.
- ✓ Liberia adopted a fuel-pricing mechanism in April 2008 that adjusts retail ceiling prices for gasoline, diesel, and kerosene to changes in world prices, in which almost all changes in international fuel prices are passed through promptly to pump prices.

#### *Across-the-board measures*

- ✓ In 2007, the Senegalese authorities suspended customs duties on rice, wheat, and powdered milk and the VAT on powdered milk and bread. These measures, poorly targeted, cost 1 percent of GDP annually and benefited mostly the richer, as the value of tax preferences was linked to the level of spending.
- ✓ Burkina Faso suspended taxes on food products and introduced subsidies and tax exemptions on fuel, which benefited mostly richer households—the 37.5 percent of

**Box 3.1 (concluded)**

households below the poverty line received 19 percent of the food tax relief and just 13 percent of the benefits from the fuel measures.

- ✓ In Guinea, a reduction in retail prices of petroleum products in 2007 carried large costs for the budget and spurred illegal re-exports to neighboring countries, especially when world oil prices started rising.
- ✓ In March 2008, Vietnam announced a temporary curb on rice exports. The temporary ban on rice exports was lifted in June once it was clear that the new harvest was strong and domestic stockpiles abundant. By that time world prices had started to fall rapidly, and falling demand and pressure to clear stockpiles amid plentiful supply from the new harvest caused Vietnamese exporters to accept more severe price drops than their Thai counterparts. By the end of 2008, Vietnam had exported 4.7 million tons of rice and received \$2.7 billion in revenue, short of its target of \$3 billion.

For countries lacking fiscal room, key challenges will be to limit the decline in domestic revenue to the extent possible and prioritize spending. Continued efforts to strengthen tax and customs administration and policies could help broaden the revenue base and facilitate a pickup in revenues as the economy recovers. Ad hoc tax reductions or exemptions, while tempting as a stimulus measure in a downturn (Guinea and Senegal, see Box 3.1), should generally be avoided as they are difficult to reverse. Reducing non-priority spending would also help create the space to protect priority spending.

With donor countries facing severe budget constraints, LICs may find it difficult to finance larger deficits and may need to rely on domestic financing even more than in 2009. Domestic sources financed more than half of LICs' additional fiscal deficits in the 2009 global crisis, including drawing down of government deposits, borrowing from the central bank, and borrowing in domestic debt markets (Figure 3.5). Countries would need to weigh the merits and costs of nonconcessional external and domestic borrowing, and concessional support, while also considering potential crowding-out effects.

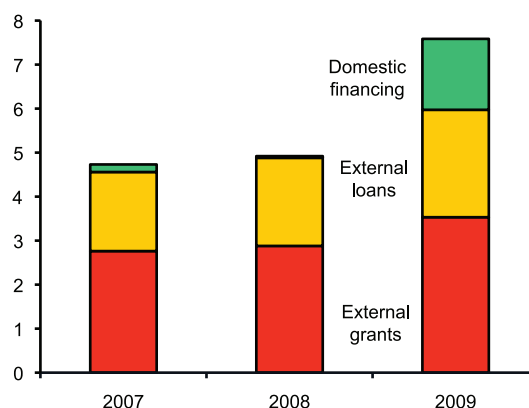
**Monetary and exchange rate policy**

In the 2009 downturn, LICs did not fully exploit the scope for monetary easing. Rather than pursuing a comprehensive countercyclical response, LICs instead relied primarily on fiscal policies, and in some cases, exchange rate flexibility. As shown in earlier analytical work by IMF staff (Fabrizio, 2010), while most LICs did lower nominal policy rates, they did so by less than the decline in inflation would have allowed, resulting in sharply higher real policy rates at the peak of the crisis (Figure 3.6).



**Figure 3.5. Source of Financing of Fiscal Deficit, 2007–09**  
(Median, in percent of GDP)

*As in 2009, LICs may need to rely on domestic financing to finance larger deficits in the event of a global downturn.*



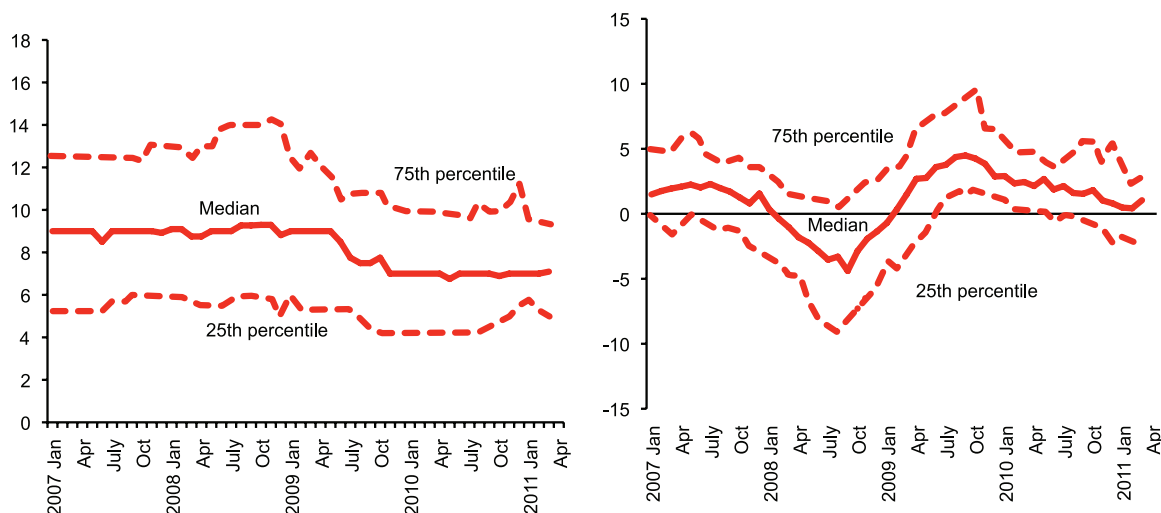
Sources: IMF, *World Economic Outlook*; and IMF staff estimates.

**Figure 3.6. Nominal and Real Policy Interest Rates, 2007–11**

**A. Nominal Policy Rate**  
(In percentage points)

**B. Real Policy Rate**  
(In percentage points)

*Monetary policy was largely passive during the 2009 global crisis, leading to a sharp increase in real policy rates.*



Sources: IMF, *World Economic Outlook*; and IMF staff estimates.

In the event of another global downturn and related softening in commodity prices, more active monetary easing may be appropriate in LICs with moderate inflation. A weakening in commodity prices owing to the global slowdown would likely bring inflation down rapidly, similar to the experience



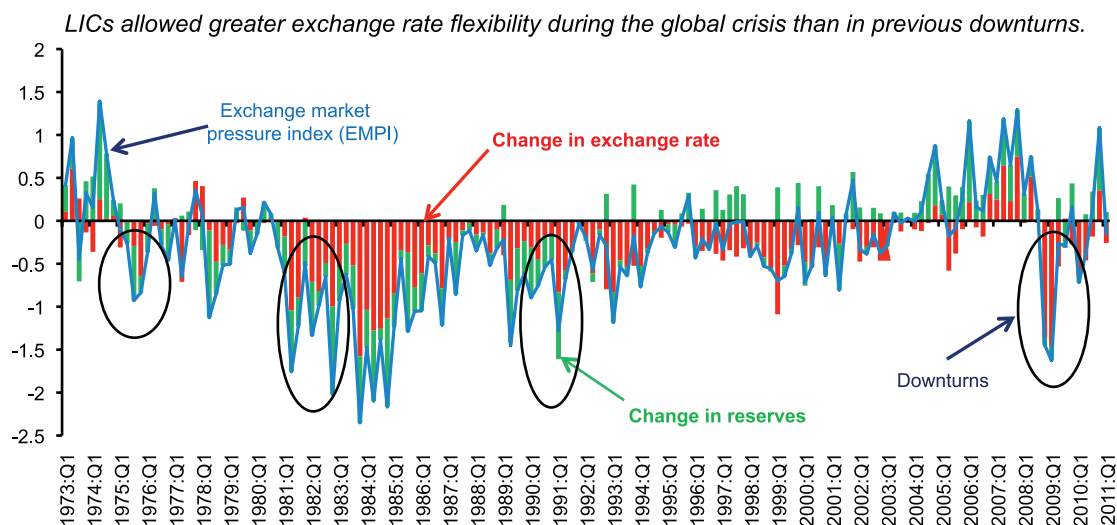
in 2009. Also, in many cases, output may fall well below potential, widening excess capacity. However, for the few countries where inflation pressures have recently spiked, a more conservative monetary policy response may still be appropriate.

Greater use of exchange rate flexibility could help in the event of another downturn, especially for countries with low reserve cushions. During the global downturn in 2009, LICs made greater use of exchange rate flexibility to cushion the external shock than in past shock periods (Figure 3.7). In the event of a double dip in global growth, many LICs would experience renewed pressures on exports, FDI, and remittances. For countries with flexible exchange rate regimes, the exchange rate could play an important role in smoothing the adjustment, especially among countries with low reserve buffers. In the event of a more-protracted global downturn, exchange rate realignment, together with reforms to boost competitiveness, would be even more important to facilitate external adjustment.

### C. Policy Challenges in the Event of Global Commodity Price Spikes

*Spikes in global commodity price rises present LICs with difficult trade-offs among inflation, external, and social objectives. A pragmatic response could include targeted measures to protect the poor and a monetary policy response that may largely accommodate the*

**Figure 3.7. Exchange Market Pressure Index, Floating Exchange Rate Regimes, 1973–2011**



Sources: IMF, *World Economic Outlook*; and IMF staff estimates.

Note: The EMPI combines movements in the exchange rate and international reserves. Negative (positive) values suggest downward (upward) pressure on the exchange rate, to which countries could respond by either letting the exchange rate depreciate (appreciate) or by selling (accumulating) reserves.

*first-round impact on inflation, although LICs with limited reserves may need to tighten policies in support of external and price stability.*

### **Fiscal policy**

As in the case of a growth shock, the scope for mitigating the social impact of higher commodity prices depends in large part on the available fiscal space, which is country specific. In framing an appropriate fiscal response, it remains critical to ensure a sustainable fiscal stance and avoid excessive debt accumulation, bearing in mind that the persistence of commodity price shocks is highly uncertain *ex ante*. As indicated in the illustrative tail-risk scenario, many LICs appear to have adequate fiscal space to absorb the effect of a large, but temporary, global commodity price shock. By contrast, those LICs that lack fiscal space even under the baseline would need to adjust over the medium term to preserve fiscal sustainability after such a shock.

Institutional and political constraints limit LICs' ability to adopt a "first-best" policy response to global price shocks. Such a policy response would consist in fully passing on price increases while relying on an effective, well-targeted social safety net—in combination, these measures would ensure fiscal affordability and avoid economic distortions, while protecting the most vulnerable. For LICs the need for well-targeted social transfers would be particularly important in light of the fact that poorer households have weaker economic buffers and limited access to consumption-smoothing mechanisms compared to other countries (for example, low savings rates and limited access to credit). However, institutional and political constraints may limit LICs' ability to opt for the first best when responding to shocks in the foreseeable future:

- LICs lack comprehensive social safety nets that could cushion the impact of shocks on the most vulnerable, and introducing broad-based welfare programs or social insurance schemes would be prohibitively expensive.
- Even if some support to the poorest is provided, it is important not to overlook the impact of the price increases on a broader share of the population, given generally low incomes and the high share of food in consumption for middle-income households.

These constraints may imply a need to resort to pragmatic policy responses—a challenge then being to make the measures as cost effective and targeted as possible. In adopting such "second-best" solutions, policymakers need to weigh the benefits against the fiscal and social costs, including opportunity costs, inefficiencies, and distortions of incentives. Even in a second-best setting, fiscal affordability is essential, and the aim, as far as possible, should be to (i) target the most vulnerable including by proxy—means testing using

information on household characteristics, (ii) limit potential economic distortions, (iii) tailor measures to the duration of shocks, and (iv) enhance the longer-term resilience of automatic stabilizers to future shocks. Second-best solutions that have proved to be effective in a number of countries (see Box 3.1) could include, in addition to the ad hoc social support schemes discussed in Section B, the following:

- *Well-targeted commodity price subsidies.* Subsidies could be targeted at commodities that are predominantly consumed by the poor (e.g., kerosene), although leakage to non-poor households will remain a problem. Agricultural input subsidies, if well targeted, could help stimulate domestic production. To avoid leakages and inefficiencies, such subsidies should be targeted at low-income farmers and be part of a more comprehensive strategy focused on increasing agricultural productivity.
- *Import tariff reductions on selected food items.* This could be a pragmatic approach to help mitigate the impact of higher global prices, while also potentially reducing existing trade distortions to domestic consumption and production. Targeting of tariff reductions to food items primarily consumed by the poor would also help limit the revenue loss.

Country experience has also shown that some measures, while politically tempting, may have negative implications for fiscal sustainability, competitiveness, and production incentives (see Box 3.1):

- *Large buffer stocks used as a price smoothing mechanism.* While building buffer stocks may well be needed for strategic reasons or for social support in emergency situations, maintaining large buffers will entail substantial administrative and operational costs. Also, when prices rise over a prolonged period, stock interventions may undermine private investment and, in the case of perishable items, may add to volatility in the market place.
- *Export restrictions.* Export restrictions can be highly distortionary as they prevent domestic farmers and exporters from capturing the gains from higher prices in global markets, undermine the long-run supply response by discouraging domestic food production, and may risk retaliatory responses from other countries. In response to the commodity price shock earlier this year, eight countries initiated export bans on food (compared with ten in 2007–08).
- *Generalized (untargeted) subsidies.* As in the case of the response to growth shocks, these subsidies often prove unsustainable for the budget, distort production incentives, and may mostly benefit the non-poor. If subsidies

create a substantial wedge between the world price and the domestic price, smuggling incentives could create the perverse effect that the budget ends up subsidizing consumption in neighboring countries.

- *Ad hoc tax reductions and exemptions.* As discussed in the previous section, they are difficult to reverse and often benefit the better-off segments of society disproportionately. Also, reducing selective VAT rates would be particularly distortive for the tax system, as such reductions could, for example, weaken compliance.
- *General public sector wage increases.* As noted, salary increases in the public sector may crowd out priority spending, undermine competitiveness, and become hard to reverse, even if the price shock is temporary.

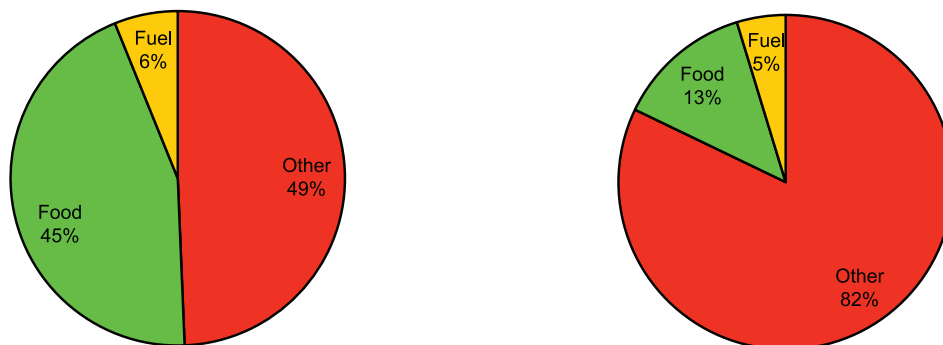
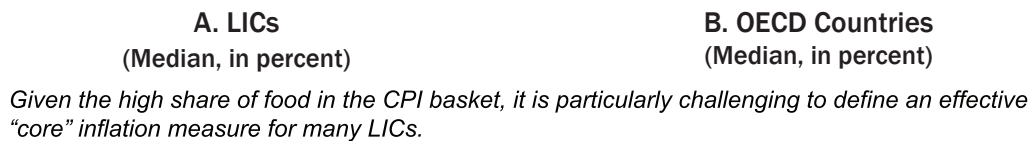
### Monetary and exchange rate policy

The standard monetary policy advice is to accommodate the direct impact of commodity price shocks while counteracting potential second-round effects. The rationale is to avoid exacerbating the impact of the price shock on output while preventing a persistent effect on inflation (and inflation expectations). This policy is often pursued by targeting some measure of “core” inflation that excludes volatile components, such as food and energy.

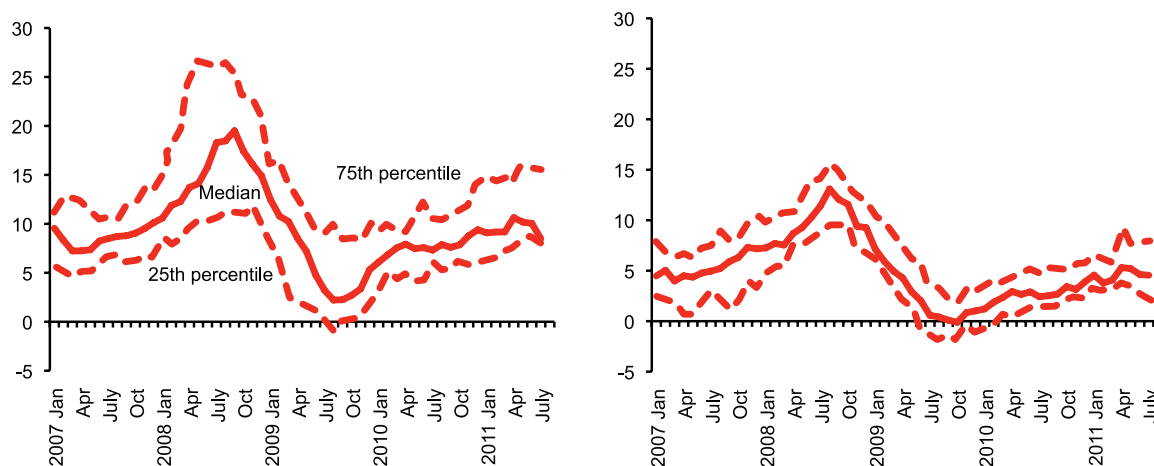
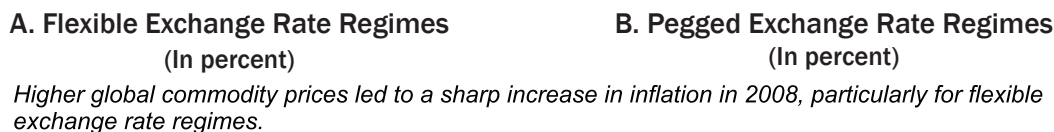
Applying this standard policy advice in the LIC context is not straightforward, in part because first-round effects may be much greater than in more advanced economies. Section C of Chapter 2 shows that a sharp upward spike in global commodity prices could more than double headline inflation, to almost 16 percent for the median LIC, and would exert significant pressure on the external positions of non-commodity exporters. This reflects, in part, two LIC-specific factors, and makes the application of the standard policy advice more complex:<sup>16</sup>

- First, given the large share of food in the CPI basket, headline inflation in LICs is highly sensitive to global food prices (Figure 3.8). This implies that accommodation of first-round effects from global price shocks comes at the cost of high volatility of headline inflation and the real exchange rate, and it could undermine central bank credibility. However, tightening monetary policy to offset these effects may also have negative consequences for economic activity.
- Second, exchange rate pass-through to inflation is significant for LICs, potentially creating a difficult trade-off between inflation and external

<sup>16</sup> Appendix 8 discusses some of the analytical considerations that may call for adaptations of the standard policy advice in developing countries.

**Figure 3.8. Composition of CPI Basket in LICs and OECD Countries**

Sources: IMF, *World Economic Outlook*; and IMF staff estimates.

**Figure 3.9. Inflation across Flexible and Pegged Exchange Regimes, 2007–2011**

Sources: IMF, *World Economic Outlook*; and IMF staff estimates.

objectives (Figure 3.9). For non-commodity exporters, global price shocks will exert pressures on reserves and the exchange rate. Adjustment will thus often require some degree of exchange rate depreciation, amplifying the inflationary impact of the shock. For these countries,

some monetary tightening may be helpful in reducing the dual pressure on inflation and the balance of payments, although again at some cost in terms of aggregate demand.

A further difficulty is that second-round effects are difficult to measure and distinguish from first-round effects, though they seem to be relatively muted for most LICs:

- It is difficult for many LICs to define and monitor an effective core inflation measure that would give a sense of second-round impacts. The high shares of food, administered prices, and imported goods in the CPI leave a relatively limited basket of domestic goods and services that may not be a very representative measure of underlying inflation. Moreover, data on wages and other factor costs that may give indications of potential second-round effects are often not available or of poor quality. Finally, even the first-round effects depend on the monetary policy response (e.g., because it affects the exchange rate that in turn determines the local currency price of food imports), making it hard to distinguish first- and second-round effects in practice. Hence, central banks will have very limited information to act on potential second-round effects.
- Inflation inertia is relatively low in LICs, and the volatility of headline inflation relatively high, compared to those in advanced and emerging market economies (Box 3.2). This may reflect the fact that many LICs have recently been able to maintain their nominal anchor, even though they have been hit frequently with domestic and external shocks (IMF, 2011d). It may also reflect the lack of formal wage indexation and collective bargaining. Hence, while the direct impact of global food prices on domestic inflation is high, these shocks do not have very persistent effects, that is, second-round effects are relatively muted.

Notwithstanding these complications, most LICs would be justified in following the conventional prescription and setting monetary policy to accommodate the direct impact of further global commodity price spikes. While an accommodative monetary policy stance could imply a sharp spike in headline inflation, the inflationary impact is unlikely to be very persistent, given low inflation inertia. Thus, risks to credibility from an accommodating policy would appear less severe than the risks to output from undue tightening in most LICs.

However, for some LICs, in particular those with weak external buffers, policy tightening may be needed, supported by exchange rate flexibility where appropriate. Higher global commodity prices would exert pressure on the balance of payments of non-commodity exporters, implying a potentially difficult trade-off between maintaining external stability and price stability (Figure 3.10). For LICs that have low reserve buffers and would also

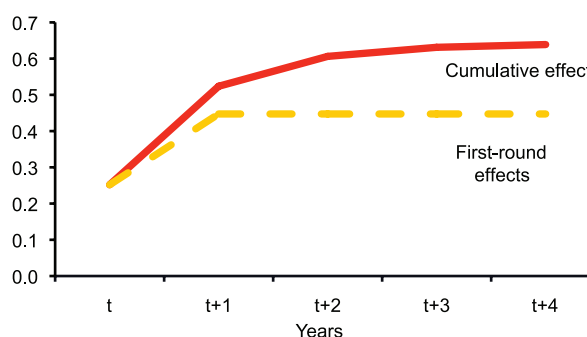
### Box 3.2. Impact of Global Commodity Prices on LIC Inflation

IMF staff's empirical analysis suggests that inflation in LICs is particularly responsive to higher global food prices, exchange rate movements, and the output gap. These results hold for all oil-importing

LICs as well as the subset of flexible exchange rate regimes. International food prices have both a contemporaneous and a lagged effect on LIC headline inflation. While it is difficult to associate these empirical results with first- and second-round effects, one reasonable approximation is to associate first-round effects with the direct effects of international food prices, holding other variables in the regression constant. With this approach, first-round effects under flexible regimes are estimated to be substantial—a 1 percentage point increase in global food prices would add 45 basis points to headline inflation over two years and a long-run pass-through of about 64 basis points.

#### Cumulative Pass-Through of a 1 Percentage Point Increase in Global Food Prices to Headline Inflation

*There is strong direct impact from global food prices to domestic inflation, while second-round effects are relatively limited.*



Sources: IMF, *World Economic Outlook*; and IMF staff estimates. Note: Full pass-through is calculated as the sum of estimated coefficients for contemporaneous and lagged change in global prices divided by  $(1 - \text{coefficient of lagged inflation})$ .

Second-round effects are difficult to measure, but there is some evidence suggesting that they are relatively muted in LICs. Regression analysis by IMF staff finds that headline inflation inertia is low, as captured by the low coefficient on lagged inflation. This reflects in part weaker transmission channels such as formal wage bargaining or indexation, but also the high frequency and impact of shocks.<sup>1</sup> While a low estimated coefficient need not imply small second-round effects—since an endogenous monetary policy response may be embedded in this outcome—an analysis of the experience of 31 SSA countries during the last food crisis is consistent with the latter hypothesis. In particular, it finds that most of the increase in inflation during this period is due to the direct effect of food and fuel prices, that is, first-round effects.

<sup>1</sup> In the same vein, the standard deviation of monthly changes in 12-month headline inflation in LICs is almost 2 percent compared with 0.6 percent for advanced-market economies and 1.25 percent for emerging-market economies, and changes in inflation are distributed quite symmetrically around zero.



**Box 3.2. (concluded)**Determinants of Inflation during the Commodity Boom-Bust Cycle<sup>1</sup>

	Oil Importers			
	LICs	Excluding monetary unions	Flexible exchange rate regimes	
	Sample 2006–09	Sample 2006–09	Sample 2006–09	Sample 2001–09
Lagged headline inflation	0.3203 (4.64)	0.3718 (4.92)	0.3034 (3.53)	0.4591 (8.9845)
NEER appreciation weighted by openness			–0.0025 (–2.29)	–0.0028 (–3.10)
NEER appreciation weighted by openness interacted with flexible exchange rate dummy	–0.0024 (–1.58)	–0.0026 (–2.05)		
Output gap	0.5600 (2.29)	0.5104 (2.29)	0.7459 (2.16)	0.2612 (1.71)
Change in international food prices (%)	0.2099 (6.85)	0.2349 (5.98)	0.2519 (4.65)	0.2653 (6.40)
Lagged change in international food prices (%)	0.1595 (3.30)	0.1417 (2.62)	0.1954 (2.54)	0.0786 (2.99)
Number of observations	180	132	82	197
Number of countries	46	34	26	28

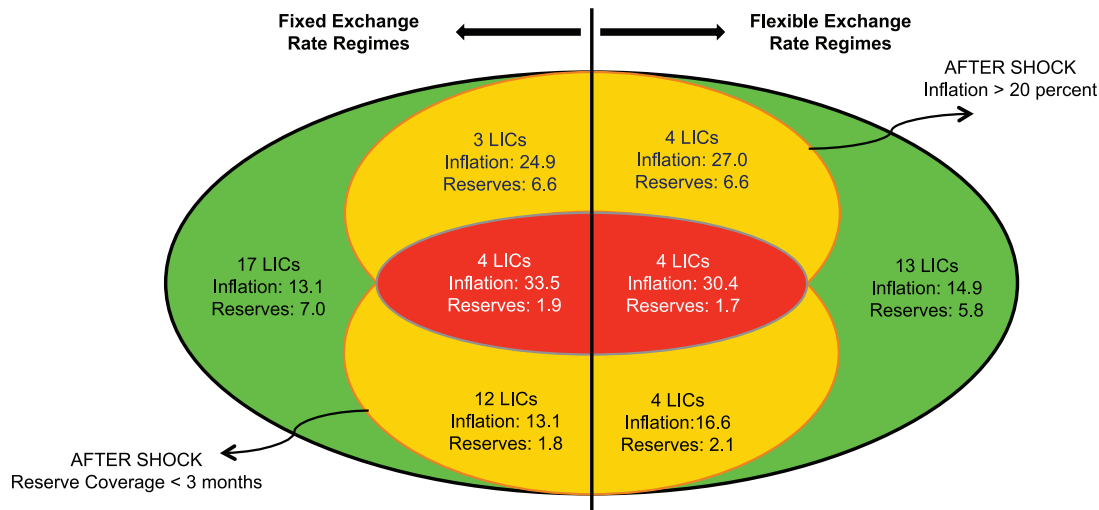
<sup>1</sup>Regression coefficients estimated by Arellano-Bover/Blundell-Bond linear dynamic panel-data system-generalized method of moments estimator. Nominal effective exchange rate (NEER) depreciation and output gap are treated as endogenous. *t*-statistics are presented in parentheses below the coefficients.

experience very high inflation as a result of the price shock—for example, one in seven LICs has reserve coverage of less than three months of imports, and inflation would rise above 20 percent under the scenario—there would be very little room for maneuver. In these cases, monetary and fiscal tightening would be particularly important to safeguard both external and inflation objectives. Some degree of policy tightening may also be appropriate for other LICs that have either high inflation or low reserves. For countries with a flexible exchange rate, the extent to which exchange rate depreciation is desirable would depend on available reserve buffers and the exchange rate pass-through into inflation. For fixed regimes, tighter monetary and possibly fiscal policies will likely be appropriate to facilitate the required external adjustment and avoid excessive losses in reserves.



**Figure 3.10. Inflation and Reserve Coverage across Flexible and Pegged Exchange Regimes**

*The ability of monetary policy to accommodate another commodity price shock differs significantly across LICs and depends on available reserve buffers, the impact on inflation, and exchange rate regimes.*



Sources: IMF, *World Economic Outlook*; and IMF staff estimates.

Note: Medians of projected 2012 inflation (in percent, year-over-year) and reserve coverage (in months of next year's imports) are reported for each group after the shock.

Commodity exporters should generally rely on exchange rate appreciation to mitigate inflation pressures from a global commodity price spike. This would limit potential overheating and reduce the degree of necessary monetary tightening. As the recent experience in Mongolia shows, attempts to limit nominal exchange rate flexibility can undermine inflation objectives in commodity exporters (Appendix 8).

For countries with money targeting regimes, accommodating first-round effects typically implies missing or adjusting the money targets. Adjusting money targets allows the central bank to satisfy the increase in money demand that will likely result from higher consumer prices. Otherwise, the increase in money demand will raise interest rates and result in an undesired tightening of monetary conditions. How much target adjustment is warranted depends on whether second-round effects are building up, whether there are signs of aggregate demand pressures, and whether there are additional increases in money demand unrelated to commodity prices. The difficulty in identifying these factors suggests greater flexibility in the money targeting regime, as well as paying attention to movements in short-term interest rates and other indicators of the policy stance.

In all cases, close monitoring of potential second-round effects and clear communication by the monetary authorities would be critical for an effective

response to shocks. Monetary policy should be forward-looking and respond to emerging demand-driven inflationary pressures and potential second-round effects of higher food and fuel prices. As the output gap continues to narrow, stronger demand and tighter capacity constraints could lead to wage pressures and pass-through from food and fuel prices to prices of other goods and services. For oil importers with floating exchange rates, expectations of continued exchange rate depreciation could lead to an inflationary spiral. For commodity exporters, rising income and external inflows could boost domestic credit growth and demand. Central banks should therefore signal a strong commitment to bringing inflation back to the pre-shock rates over time. Transparent communication to the public on the drivers of inflation and the temporary nature of this spike would be crucial, especially for inflation-targeting LICs, and help anchor the medium-term inflation expectations.

### **How Can Development Partners Help Mitigate Shocks?**

Looking ahead, it will be important for the international community to provide highly concessional support, particularly to the more vulnerable LICs, in the event of shocks. As the vulnerability analysis suggests, additional external financing needs could be in the range of \$9 billion–27 billion under the tail-risk scenarios, coming at a time when bilateral external support could be constrained by the current advanced economies' tight budgets. This could increase the demand for multilateral financial support. The IMF's financing instruments for LICs were made more flexible and concessional in 2009, and the financing envelope was doubled, to \$17 billion for 2009–14. The World Bank's International Development Association (IDA) support was increased by 18 percent during the 16th IDA replenishment, to \$49 billion, and the World Bank's Crisis Response Window expands the range of facilities available to support LICs in times of severe exogenous crises. The World Bank is also currently reviewing its existing facilities to address shocks more rapidly.

Coordinated international initiatives aimed at improving the functioning of global commodity markets would also benefit LICs. Greater price stability would follow from better information on inventories and from steps toward greater transparency in commodity derivatives markets. Reforms to commodity derivatives markets, such as the use of central clearing and standardized contracts, could contribute to market stability, though these would need to proceed in tandem with broader derivatives market reforms. Moreover, development aid specifically targeted to modernizing the agriculture sector and making more efficient use of land in LICs would enhance food security.



## Appendix 1: List of Low-Income Countries

The group of LICs analyzed in this work is formed by the 70 countries eligible for support from the Poverty Reduction and Growth Trust for which data were available,<sup>1</sup> which are, by region:

### Sub-Saharan Africa

Benin, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Democratic Republic of Congo, Republic of Congo, Côte d'Ivoire, Eritrea, Ethiopia, The Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mozambique, Niger, Nigeria, Rwanda, São Tomé and Príncipe, Senegal, Sierra Leone, Tanzania, Togo, Uganda, and Zambia.

### Middle East and Europe

Afghanistan, Armenia, Djibouti, Georgia, Kyrgyz Republic, Mauritania, Moldova, Sudan, Tajikistan, Uzbekistan, and Republic of Yemen.<sup>2</sup>

### Asia

Bangladesh, Bhutan, Cambodia, Kiribati, Lao People's Democratic Republic, Maldives, Mongolia, Myanmar, Nepal, Papua New Guinea, Samoa, Solomon Islands, Timor-Leste, Tonga, Vanuatu, and Vietnam.

### Latin America and Caribbean

Bolivia, Dominica, Grenada, Guyana, Haiti, Honduras, Nicaragua, St. Lucia, and St. Vincent and the Grenadines.

<sup>1</sup> This group includes all countries eligible for concessional financing from the IMF under the Poverty Reduction and Growth Trust (PRGT), except for Somalia, which has been excluded because of lack of data. The list of PRGT-eligible countries contains essentially those IMF members that (i) have annual per capita gross national income of less than twice the operational IDA cutoff (or three times the operational IDA cutoff for small economies); or (ii) have the capacity for durable and substantial access to international financial markets; and (iii) do not face serious short-term vulnerabilities. Therefore, the set of countries defined in this paper as LICs may differ from classifications used by other institutions. For technical details, see IMF (2010).

<sup>2</sup> Georgia and Armenia participate also in the emerging market vulnerability exercise and are not subject to the same degree of analysis as the other countries covered by the paper.



## Appendix 2: Selected Economic Indicators

	GDP growth in percent				Inflation in percent				International reserves in months of imports <sup>1</sup>				Fiscal balance in percent of GDP				Current account balance incl. FDI in percent of GDP				Gross public debt in percent of GDP			
	2009	2010	2011	2012	2009	2010	2011	2012	2009	2010	2011	2012	2009	2010	2011	2012	2009	2010	2011	2012	2009	2010	2011	2012
Afghanistan, I.R. of	20.9	8.2	7.1	7.2	-12.2	7.7	8.4	3.2					-1.6	0.9	0.0	-1.8	-0.2	4.8	1.5	-1.3				
Armenia	-14.1	2.1	4.6	4.3	3.5	7.3	8.8	3.3	5.7	4.7	4.5	4.2	-7.7	-4.9	-3.8	-3.1	-7.4	-7.8	-5.5	-4.6	40.2	39.2	41.5	41.4
Bangladesh	5.9	6.4	6.3	6.1	5.4	8.1	10.1	7.4	4.1	3.6	3.0	2.5	-3.5	-2.9	-3.2	-4.4	4.3	3.0	0.8	0.1				
Benin	2.7	2.6	3.8	4.3	2.2	2.1	2.8	3.0	7.7	7.0	6.4	5.9	-3.3	-0.4	-1.7	-1.6	-7.4	-5.1	-6.0	-5.2	28.3	31.1	30.8	30.5
Bhutan	6.7	8.3	8.1	8.5	8.6	7.0	6.5	5.0	13.3	12.7	12.2	12.2	2.1	2.4	-4.3	-6.4	-8.0	-3.3	-9.5	-14.8	64.1	66.0	76.0	89.1
Bolivia	3.4	4.1	5.0	4.5	3.3	2.5	9.8	4.8	14.9	14.9	15.1	16.1	0.6	2.0	1.8	1.2	7.1	6.8	5.9	6.1	40.5	36.6	32.4	31.4
Burkina Faso	3.2	7.9	4.9	5.6	2.6	-0.6	1.9	2.0	6.4	5.9	6.5	6.8	-5.3	-5.8	-4.3	-3.1	-3.1	-3.1	-1.5	-5.1	26.1	27.1	29.1	29.9
Burundi	3.5	3.9	4.2	4.8	10.7	6.4	8.7	12.5	5.0	4.9	4.8	5.1	-8.6	-3.9	-3.1	-3.1	-15.3	-12.5	-15.5	-16.2	48.2	50.0	49.0	44.2
Cambodia	-2.0	6.0	6.7	6.5	-0.7	4.0	6.4	5.6	4.3	3.9	4.0	4.5	-4.1	-2.9	-2.2	-2.4	-0.4	2.5	-1.7	0.6	28.7	29.9	29.2	28.8
Cameroon	2.0	3.2	3.8	4.5	3.0	1.3	2.6	2.5	6.2	5.5	5.3	4.8	-0.1	-1.1	-1.4	-0.4	-1.8	-0.9	-1.9	-1.5	10.6	12.1	14.5	14.7
Cape Verde	3.7	5.4	5.6	6.4	1.0	2.1	5.0	4.9	4.0	3.5	3.1	3.4	-6.3	-10.6	-10.2	-9.0	-7.7	-4.5	-7.1	-5.8	68.6	73.2	73.9	78.3
Central African Rep.	1.7	3.3	4.1	5.0	3.5	1.5	2.8	2.6	5.1	3.9	3.6	3.8	-0.1	-0.8	-2.0	0.2	-6.0	-7.0	-5.3	-5.0	36.8	41.9	37.0	32.8
Chad	-1.2	13.0	2.5	6.9	10.1	-2.1	2.0	5.0	1.1	1.3	2.1	3.1	-9.9	-5.2	2.3	2.5	5.3	-8.6	0.7	-0.5	30.5	32.6	29.8	29.7
Comoros	1.8	2.1	2.2	3.5	4.8	2.7	5.8	3.3	5.3	5.4	4.8	4.6	2.7	2.1	-1.6	-0.9	-6.4	-8.3	-12.0	-10.8	55.3	51.8	47.1	42.9
Congo, Dem. Rep. of	2.8	7.2	6.5	6.0	46.2	23.5	14.8	12.5	0.5	1.2	1.3	1.5	-5.2	1.2	-7.7	-6.2	-1.2	4.6	5.1	9.6	124.3	33.8	46.6	50.5
Congo, Republic of	7.5	8.8	5.0	7.0	4.3	5.0	5.9	5.2	7.0	6.5	12.6	18.5	4.8	16.0	19.5	20.3	12.0	23.5	26.2	27.9	57.2	23.8	22.0	22.2
Côte d'Ivoire	3.8	2.4	-5.8	8.5	1.0	1.4	3.0	2.5	4.6	5.1	4.9	4.7	-1.6	-2.3	-6.4	-3.8	9.0	6.6	2.5	1.1	67.0	66.8	70.0	54.8
Djibouti	5.0	3.5	4.8	5.1	1.7	4.0	7.1	1.9	5.8	4.6	4.3	4.2	-4.6	-0.5	0.4	0.0	0.4	-2.4	-3.5	1.8	59.8	56.1	53.7	53.6
Dominica	-0.7	0.3	0.9	1.5	0.0	3.3	4.2	1.9	3.5	3.4	3.2	3.1	-0.2	-2.6	-1.8	-1.4	-12.7	-15.2	-15.6	-14.2	53.4	55.1	55.9	55.8
Eritrea	3.9	2.2	8.2	6.3	33.0	12.7	13.3	12.3	1.7	2.0	2.1	2.9	-14.7	-16.1	-16.2	-13.5	-2.7	-1.3	2.2	4.8	145.7	144.8	134.4	127.6
Ethiopia	10.0	8.0	7.5	5.5	36.4	2.8	18.1	31.2	2.2	2.3	2.8	2.4	-0.9	-1.3	-2.1	-4.0	-2.3	-1.1	-2.9	-6.0	32.2	36.7	39.4	34.1
Gambia, The	6.7	6.1	5.5	5.5	4.6	5.0	5.9	5.5	6.5	5.2	5.5	5.6	-2.4	-4.9	-3.4	-2.7	-5.5	-7.4	-11.5	-7.8	57.0	57.8	57.7	56.9
Georgia	-3.8	6.4	5.5	5.2	1.7	7.1	9.6	5.0	4.2	3.7	4.4	4.1	-6.5	-4.8	-2.2	-2.3	-5.1	-5.4	-5.2	-3.8	37.3	39.1	36.8	38.0
Ghana	4.0	7.7	13.5	7.3	19.3	10.7	8.7	8.7	2.6	3.1	3.4	3.8	-5.8	-7.4	-4.2	-2.3	2.5	0.2	-2.2	-0.5	36.2	37.4	38.1	37.5
Grenada	-7.6	-1.4	0.0	1.0	-0.3	3.4	4.2	3.2	4.0	3.3	2.3	2.3	-5.3	-3.1	-5.3	-4.8	-11.1	-12.2	-13.6	-12.4	98.2	98.6	101.9	104.3
Guinea	-0.3	1.9	4.0	4.2	4.7	15.5	20.6	13.8	2.9	1.5	2.0	2.0	-7.2	-14.2	-12.2	1.0	-15.2	-18.0	-17.1	-6.0	77.0	88.6	85.5	82.2
Guinea-Bissau	3.0	3.5	4.8	4.7	-1.6	1.1	4.6	2.0	8.2	6.0	6.0	6.1	2.9	-0.2	-1.9	-1.6	-4.3	-4.5	-5.2	-6.7	163.8	49.0	45.1	43.5
Guyana	3.3	4.4	5.3	6.0	3.0	3.7	5.8	5.8	4.3	4.5	4.4	4.5	-3.5	-2.7	-2.4	-2.5	-1.1	0.7	-3.2	-6.7	61.2	60.2	60.4	59.3
Haiti	2.9	-5.4	6.1	7.5	3.4	4.1	7.3	8.0	2.3	5.8	5.1	4.3	-4.4	2.1	0.2	-4.6	-2.9	-0.1	-1.2	-4.7	27.7	17.1	12.6	19.0

(continued)

## Appendix 2: Selected Economic Indicators (continued)

	GDP growth in percent				Inflation in percent				International reserves in months of imports <sup>1</sup>				Fiscal balance in percent of GDP				Current account balance incl. FDI in percent of GDP				Gross public debt in percent of GDP			
	2009	2010	2011	2012	2009	2010	2011	2012	2009	2010	2011	2012	2009	2010	2011	2012	2009	2010	2011	2012	2009	2010	2011	2012
Honduras	-2.1	2.8	3.5	3.5	8.7	4.7	7.8	7.9	2.6	2.9	3.0	3.1	-4.7	-2.9	-3.1	-2.5	0.0	-1.0	-1.6	-1.4	24.1	26.3	27.6	27.8
Kenya	2.6	5.6	5.3	6.1	10.6	4.1	12.1	7.4	3.5	3.0	3.0	3.3	-5.2	-6.0	-5.4	-4.8	-4.4	-5.7	-7.1	-6.8	47.6	50.4	51.2	50.2
Kiribati	-0.7	1.8	3.0	3.5	8.8	-2.8	7.7	5.0					-12.6	-9.1	-16.3	-16.1	-29.6	-22.4	-30.9	-26.7				
Kyrgyz Republic	2.9	-1.4	7.0	6.0	6.8	7.8	19.1	9.4	4.6	3.8	4.0	3.8	-1.3	-6.1	-8.0	-7.7	4.7	2.3	-3.0	-2.7	58.0	62.6	55.2	54.6
Lao People's Dem. Rep	7.6	7.9	8.3	8.4	0.0	6.0	8.7	6.7	2.2	2.0	1.9	2.0	-6.5	-4.2	-2.3	-1.6	-6.9	-7.4	-5.8	-4.3	61.7	60.1	55.3	52.2
Lesotho	3.1	3.6	5.1	5.1	5.9	3.4	6.5	5.1	1.7	2.3	3.4	3.1	-3.9	-4.6	-14.9	0.6	0.6	-12.5	-17.2	-2.3	38.4	34.1	38.2	41.9
Liberia	4.6	5.6	6.9	9.4	7.4	7.3	8.8	1.6	2.2	2.4	2.1	2.2	-12.0	-6.5	-3.6	-3.3	-20.8	-3.3	1.5	-0.1	194.0	13.4	13.3	14.5
Madagascar	-3.7	0.6	1.0	4.7	9.0	9.2	10.3	8.5	4.0	3.2	2.9	3.0	-3.1	-0.4	-1.3	-2.3	-11.9	-4.1	-5.3	-5.7	33.7	34.0	36.4	36.0
Malawi	9.0	6.5	4.6	4.2	8.4	7.4	8.6	11.5	0.8	1.9	1.2	0.9	-5.0	1.5	-4.2	-3.8	-4.4	-0.2	-4.3	-2.3	40.1	35.1	38.6	41.2
Maldives	-7.5	7.1	6.5	4.6	4.0	4.7	12.1	8.4	2.1	2.4	2.0	1.1	-20.8	-16.0	-15.0	-13.6	-14.7	-20.7	-19.7	-18.1	52.2	59.3	62.9	70.5
Mali	4.5	5.8	5.3	5.5	2.2	1.3	2.8	2.3	6.1	4.6	4.2	4.3	-3.3	-1.5	-2.3	-1.7	-1.2	-5.6	-5.3	-4.4	24.2	29.6	30.0	27.2
Mauritania	-1.2	5.2	5.1	5.7	2.2	6.3	6.2	6.3	1.0	1.0	1.4	1.6	-5.1	-1.9	-2.8	-3.8	-10.8	-5.2	-2.5	-3.8	101.5	86.2	62.0	64.2
Moldova	-6.0	6.9	7.0	4.5	0.0	7.4	7.9	7.8	3.9	3.6	3.8	3.9	-6.3	-2.5	-1.9	-1.2	-6.3	-5.0	-6.2	-6.4	29.1	26.6	23.6	21.7
Mongolia	-1.3	6.4	11.5	11.8	6.3	10.2	10.2	14.3	3.9	4.4	6.7	8.0	-5.0	1.2	0.9	-1.9	1.9	10.3	0.6	-4.1				
Mozambique	6.3	6.8	7.2	7.5	3.3	12.7	10.8	7.2	5.2	4.6	4.4	4.6	-5.5	-3.9	-6.1	-6.8	-3.3	-2.2	-4.7	-4.2	41.5	37.8	39.0	42.7
Myanmar	5.1	5.5	5.5	5.5	8.2	8.2	6.7	3.7	4.7	4.5	5.3	7.1	-3.6	-3.9	-3.2	-2.8	1.4	1.9	2.8	4.8	44.6	42.8	45.2	47.7
Nepal	4.4	4.6	3.5	3.8	12.6	9.6	9.5	8.0	5.9	5.2	5.1	5.0	-3.0	-1.4	-2.1	-3.1	4.4	-2.2	-0.6	-0.1	39.5	35.9	33.9	33.5
Nicaragua	-1.5	4.5	4.0	3.3	3.7	5.5	8.3	8.2	3.4	3.3	3.2	3.0	-1.9	-0.5	-0.2	-0.5	-5.2	-6.7	-5.5	-8.2	80.9	80.3	77.4	76.0
Niger	-0.9	8.0	5.5	12.5	1.1	0.9	4.0	2.0	2.8	3.0	3.3	3.9	-5.5	-2.5	-2.2	-0.9	-11.1	-2.8	-10.6	-7.4	15.7	16.2	17.7	17.8
Nigeria	7.0	8.7	6.9	6.6	12.5	13.7	10.6	9.0	8.7	6.6	7.8	8.2	-10.2	-8.5	0.4	2.2	16.4	8.7	16.5	14.2	15.2	17.3	15.7	16.3
Papua New Guinea	5.5	7.0	9.0	5.5	6.9	6.0	8.4	8.7	4.4	4.3	4.8	6.0	-9.6	-0.3	1.0	0.4	-2.8	-4.7	-4.3	-3.0				
Rwanda	4.1	7.5	7.0	6.8	10.3	2.3	3.9	6.5	5.4	5.2	5.8	5.2	0.3	0.4	-1.5	-3.8	-5.1	-5.2	-3.8	-8.0	23.0	23.2	24.4	26.1
Samoa	-5.1	-0.2	2.0	2.1	14.4	-0.2	2.9	3.0	6.4				-4.1	-11.3	-8.2	-5.1	-3.1	-8.1	-12.7	-13.3				

São Tomé & Príncipe	4.0	4.5	5.0	6.0	17.0	13.3	11.4	7.4	4.8	3.6	5.6	5.2	-16.9	-11.0	-17.4	1.5	-18.8	-25.3	-18.6	-24.1	31.0	71.4	82.4	84.1
Senegal	2.2	4.2	4.0	4.5	-1.7	1.2	3.6	2.5	5.0	4.2	4.9	5.4	-5.0	-5.2	-6.2	-5.4	-4.7	-3.9	-5.4	-5.2	32.0	38.0	40.0	41.5
Sierra Leone	3.2	5.0	5.1	51.4	9.2	17.8	18.0	11.0	4.9	2.9	2.8	2.7	-3.2	-6.9	-5.1	-2.3	-4.4	-2.0	-7.6	-3.7	61.8	64.7	61.1	33.2
Solomon Islands	-1.2	6.5	5.6	6.1	7.1	1.0	6.0	5.0	3.3	5.7	6.4	7.0	1.6	5.9	1.7	1.5	-2.0	3.9	-4.0	-6.9	28.9	25.7	23.1	20.6
St. Lucia	-1.3	4.4	2.0	2.6	-0.2	3.3	2.5	2.5	2.7	2.9	2.8	2.8	-4.0	-5.9	-8.2	-5.8	0.5	-2.4	-7.6	-8.2	64.5	66.1	72.0	78.8
St. Vincent & Grens.	-2.3	-1.8	-0.4	2.0	0.4	0.6	2.5	1.4	2.7	4.0	3.4	3.3	-3.2	-5.7	-3.2	-3.7	-14.9	-16.1	-14.4	-12.5	64.9	66.8	69.5	71.2
Sudan	4.6	6.5	-0.2	-0.4	11.3	13.0	20.0	17.5	1.1	0.9	1.1	1.3	-4.8	-3.2	-2.8	-3.0	-8.5	-2.3	-3.1	-3.9	83.6	71.6	78.2	87.3
Tajikistan	3.9	6.5	6.0	6.0	6.5	6.5	13.6	10.0	1.4	1.6	1.7	1.8	-5.2	-3.0	-4.9	-4.2	-5.6	2.4	-2.0	-4.1	36.6	36.7	37.0	38.6
Tanzania	6.7	6.4	6.1	6.1	11.8	10.5	7.0	9.4	5.0	4.8	4.2	4.2	-4.8	-7.0	-8.5	-6.5	-8.2	-6.9	-6.7	-8.0	37.1	40.1	45.0	48.9
Timor Leste, Dem. Rep. of	12.9	6.0	7.3	8.6	0.1	4.9	10.5	6.0	2.9				239.3	238.6	210.2	179.3	245.4	227.1	196.9	167.6				
Togo	3.2	3.7	3.8	4.4	1.9	3.2	4.0	2.8	4.9	4.0	3.3	3.1	-2.8	-1.6	-3.9	-4.1	-6.3	-6.5	-6.8	-6.7	67.8	32.3	27.6	27.3
Tonga	-0.3	0.3	1.4	1.7	3.4	4.0	5.9	4.8					-2.6	-3.6	-3.2	-3.5	-11.1	-9.4	-11.3	-11.2				
Uganda	7.2	5.2	6.4	5.5	14.2	9.4	6.5	16.9	6.3	5.9	4.6	4.3	-2.4	-5.0	-7.6	-6.5	-3.1	-4.2	1.4	-2.2	22.2	23.6	23.0	25.3
Uzbekistan	8.1	8.5	7.1	7.0	14.1	9.4	13.1	11.8	11.1	9.7	12.9	15.8	3.1	2.7	3.3	4.6	4.7	10.8	11.2	10.3	11.0	10.0	12.6	14.0
Vanuatu	3.5	2.2	3.8	4.2	4.3	2.8	2.2	2.9	4.8	4.7	4.4	4.1	-0.7	-2.7	-1.3	-0.9	-4.0	-3.0	-3.6	-4.4				
Vietnam	5.3	6.8	5.8	6.3	6.7	9.2	18.8	12.1	2.3	1.4	1.5	2.2	-9.0	-5.7	-4.0	-3.8	0.8	2.1	1.6	2.4	51.2	52.8	50.3	48.1
Yemen, Republic of	3.9	8.0	-2.5	-0.5	3.7	11.2	19.0	18.0	7.7	5.5	3.3	1.9	-10.2	-4.0	-7.1	-6.1	-10.9	-7.1	-8.2	-7.1	49.9	40.6	42.9	44.4
Zambia	6.4	7.6	6.7	6.7	13.4	8.5	9.1	7.5	4.0	3.3	3.5	3.9	-2.6	-3.1	-3.1	-6.0	7.5	8.4	9.9	7.4	25.6	24.6	25.1	28.7
<b>Medians</b>																								
All LICs	3.3	5.4	5.2	5.5	4.6	5.0	7.8	5.9	4.3	3.9	4.0	3.9	-4.1	-2.9	-3.1	-2.9	-4.1	-3.3	-4.3	-4.4	41.5	39.1	40.0	41.5
Sub-Saharan Africa																								
Africa	3.6	5.5	5.1	5.8	6.6	4.5	6.5	6.0	4.9	3.9	3.9	4.1	-4.3	-3.9	-3.8	-2.9	-4.4	-4.2	-5.2	-5.1	37.8	35.9	38.4	36.7
Asia	4.4	6.4	6.3	6.1	6.3	6.0	8.4	5.6	4.2	4.3	4.6	4.7	-3.6	-2.9	-2.3	-2.8	-2.0	-2.2	-3.6	-4.1	47.9	47.8	47.8	47.9
Middle East and Europe																								
Europe	3.4	6.4	5.3	5.2	3.6	7.3	11.3	8.6	4.4	3.8	3.9	3.9	-5.2	-3.1	-2.8	-3.1	-6.0	-3.7	-3.3	-3.8	45.0	39.9	42.2	42.9
Latin American and Caribbean																								
Latin American and Caribbean	-1.3	2.8	3.5	3.3	3.0	3.4	5.8	4.8	3.4	3.4	3.2	3.1	-3.5	-2.7	-2.4	-2.5	-2.9	-2.4	-5.5	-8.2	61.2	60.2	60.4	59.3
Net oil exporters	4.6	7.9	3.8	6.6	4.3	6.0	8.4	6.7	4.6	5.1	4.8	4.7	-6.5	-3.2	-1.4	-0.4	-1.8	-2.3	-1.9	-1.5	53.5	36.6	36.3	37.1
Net oil importers	3.2	5.2	5.3	5.5	4.7	4.9	7.7	5.8	4.1	3.8	3.9	3.9	-4.0	-2.9	-3.2	-3.1	-4.4	-3.3	-5.2	-5.0	40.5	39.1	40.0	41.5

Sources: IMF, World Economic Outlook database; and IMF staff calculations.

<sup>1</sup> Next year's imports of goods and services.





### Appendix 3: How Do Global Commodity Prices Behave? A View from the Literature

Research suggests that the impact of shocks on commodity prices is long-lasting though the persistence varies. Cashin, Liang, and McDermott (1999) find that the typical half-life of shocks to commodity prices is five to eight years, though depending on the commodity, it could vary from permanent to as short as one year. According to Cashin, McDermott, and Scott (2002), the likelihood of an end to a slump/boost in prices is independent of the time spent in the slump/boost, though price increases have become more persistent than in the past.

Higher persistence of oil price increases in the 2000s could be due to increasing oil scarcity. As discussed in the fall issue of the *World Economic Outlook* (IMF, 2011d), the strong momentum in oil demand growth, in particular in emerging economies, combined with the recent downshift in oil supply trends, has likely resulted in oil scarcity. The analysis suggests that the period of higher-than-average prices could be rather long, as the effect from resource scarcity on price is strengthened by low elasticity of oil demand and supply to the price.

Movements in prices of commodities are usually synchronized, possibly driven by several factors. The recent episodes of surges in commodity prices have been widespread across the whole range of commodities, raising questions over co-movements and their determinants in the prices. Several factors have been considered as determinants of fluctuations in commodity prices. Svensson (2008) and Wolf (2008) consider global demand as a determinant of commodity prices. Frankel (2008) believes that real interest rates on bonds are a driver for commodity prices. Vansteenkiste (2009) finds that oil prices, the U.S. dollar effective exchange rate, the real interest rate, and increasingly global demand are important in explaining commodity price movements. On the other hand, Lombardi, Osbat, and Schnatz (2010) find evidence in support of only world industrial production and the U.S. dollar real effective exchange rate's significance as determinants in commodity price fluctuations.



## Appendix 4: Methodology for Vulnerability Indicator Underlying the Growth Decline Model

This appendix describes the methodology developed by the IMF staff (IMF, 2011a) to capture LICs' vulnerabilities to a growth recession when hit by exogenous shocks. The approach taken is to identify observations (country-years) in which a country is hit by a large external shock. Policies and structural variables that predict whether the country also experiences negative growth are then identified. Such countries are considered "vulnerable."

### Dependent Variable: Identifying Shock Episodes and Real Output Drops

Large negative shocks events in LICs are identified if the annual percentage change of the relevant variable falls below the 10th percentile in the left tail of the country-specific distribution.<sup>3</sup> In particular, shock episodes include one or more of the following six shocks occurring over the period 1990–2009: (i) external demand; (ii) terms of trade; (iii) FDI; (iv) aid; (v) remittances; and (vi) climatic shocks (large natural disasters).<sup>4</sup> Within the sample of identified shock episodes, a crisis is defined as a large real output drop when the following two conditions hold: (i) the post-shock two-year average ( $t$  and  $t+1$ ) level of real output per capita falls below the pre-shock three-year trend; and (ii) output per capita growth is negative at time  $t$ .

### Selection of Vulnerability Indicators

Several indicators were considered, based on empirical studies of growth declines and protracted growth slowdowns in the event of exogenous shocks. Those that were retained can be constructed for a majority of LICs and capture the flow and stock vulnerabilities in the external and public sectors as well as institutional weaknesses identified in past studies and IMF surveillance. These include lagged values of:

- Overall economy and institutions: real GDP growth; the World Bank's Country Policy and Institutional Assessment index; and the Gini coefficient;

<sup>3</sup> Defining large negative shocks over country-specific distributions better captures cross-country heterogeneity among LICs, particularly with respect to their economic structure and vulnerability to external shocks. It means that each country experiences the same frequency of shocks, so that the focus is on the reaction to the shock.

<sup>4</sup> FDI, aid, and remittances are measured as ratios to GDP.

- External sector: reserve coverage (gross international reserves in months of imports) and real growth of exports of goods and services; and
- Fiscal sector: overall fiscal balance in percent of GDP; public debt in percent of GDP; and real government revenue growth.

### **Methodology**

The approach examines a range of indicators one by one to identify variables and thresholds that separate crisis and non-crisis cases in a given data set. For each of the individual indicators, the approach involves searching for a split that minimizes the combined percentages of missed crises (Type I error) and false alarms (Type II error). Thresholds that yield the best split map indicator values into zero-one scores. These indicators are then aggregated into sectoral indices using weights that depend on the individual indicator's ability to discriminate between crisis and non-crisis cases.

The overall vulnerability index, which ranges from zero (low vulnerability) to one (high vulnerability), is a summary measure of underlying vulnerability. Indicator-based ratings ("low," "medium," or "high") are derived from the vulnerability index.

## Appendix 5: Methodology of the Tail-Risk Scenario of Higher Global Commodity Prices

The scenario of higher global commodity prices uses market expectations in commodity futures options. Risk-neutral probability density functions are derived for expected future spot prices over different time horizons. The values at the upper two standard deviation level implied by the risk-neutral density functions are used to construct commodity price levels in the adverse scenario. Given that futures options are traded only for a small set of commodities, we construct probability density functions for the following major commodities: crude oil, copper, corn, and soybeans. Estimated price deviations of crude oil from the baseline, 20.7 percent in 2011 and 48.3 percent in 2012, correspond to \$124.5 and \$148.3 a barrel in 2011 and 2012, respectively, compared to the baseline prices of \$103.2 and \$100. We then apply the estimated price deviations of copper from the baseline (21.3 percent in 2011 and 36.3 percent in 2012) to all other base metals, and the average deviations for corn and soybeans (25.1 percent in 2011 and 30.8 percent in 2012) to the other food commodities. Commodity price levels under this adverse scenario are somewhat higher than those in April 2011 WEO, reflecting increased volatility in commodity markets since late April, although not far out of the ordinary relative to historical trends.

### Impact of Higher Global Prices for Commodities on LICs' Growth

The methodology for analyzing the impact of higher global prices for commodities on LICs' growth is similar to that used to analyze the impact of the slower global growth scenario on LICs' growth (Appendix 6), except that only the impact from the terms of trade is considered (changes in terms of trade are found to impact growth only for the most open economies (top quartile of the distribution of LICs).

### Impact of Higher Global Prices for Commodities on Inflation

The country-specific impact of higher global food and oil prices on domestic inflation is derived using regression analysis. For the sample period January 1996 to March 2011, monthly year-over-year domestic headline inflation is regressed on contemporaneous and up to 12-month lags of international food and oil price inflation (in U.S. dollars), contemporaneous and one lag of changes in the nominal exchange rate, and time dummies. For each country, the optimal lag length for international food and oil price inflation is chosen via the Akaike information criterion. A symmetric lag structure for food and oil price inflation is assumed for simplicity. For the optimal lag structure, the

cumulative multipliers for international food and oil prices are calculated as the sum of the contemporaneous and lagged coefficients on international food and oil price inflation, respectively. If the estimated value of the cumulative multiplier is not different from zero with statistical significance, or negative, or data are not available, the average cumulative multiplier for the peer group of LIC commodity exporters or non-commodity exporters is used.

### **Impact of Higher Global Prices for Commodities on the External Sector**

A first-round effect on a country's trade balance stemming from a shock to global commodity prices is estimated by multiplying the change in the price (index) of individual commodities grouped in five categories (crude oil, food, metals, agricultural raw materials, and others) and the country's commodity export and import weights derived from trade data for the period 2005–08.

Two types of price changes are considered. First, price changes are taken from the IMF's October 2011 baseline projections relative to the October 2010 WEO baseline commodity exports. Second, the impact of an adverse scenario of further increases in global prices for commodities is analyzed (see the discussion earlier in the paper).

The analysis of the effect on the overall balance of payments is analogous to the approach followed in the double dip growth scenario discussed above and uses (i) financing gap, (ii) reduction in reserves, and (iii) potential for import compression.

- The external financing gap in percent of GDP is defined as the difference in the overall balance of payments between the scenario and the baseline external balances, in percent of GDP.
- The level of reserves after the shock, in months of imports, is calculated under the assumption that shortfalls in financing on account of the shock are entirely absorbed by a commensurate reduction in reserves. Countries are assumed to make use of available reserve buffers up to a reserve floor of three months of imports.
- Import compression in percent of GDP is the change in imports that would compensate for the financing shortfall in order to maintain reserves at three months of imports. Import compression is zero if, after the shock, the estimated level of reserves (from the second metric) is above three months of imports.

## **Impact of Higher Global Prices for Commodities on the Fiscal Sector**

Higher international food and oil prices (compared to the 2011–12 projections in the baseline WEO projections) are assumed to have the following additive impacts on the fiscal sector: (i) unchanged policies effects and (ii) fiscal impact of measures.

### **Unchanged policies effects**

These effects on the budget are estimated following the methodology to assess “automatic stabilizers” in the case of a growth shock.

We calculate the effects by estimating revenue and expenditure country-specific elasticities (separately for fuel price and fuel price changes) based on historical data (typically for the last decade). The elasticities are estimated using fixed-effects panel regressions, conditional on other prices and growth (and controls for time dummies).<sup>5</sup> We then apply the elasticity to the assumed increase in international prices and estimate a new set of revenue and expenditure projections for 2011 and 2012 for the 62 LICs in the sample. Results of this simulation are compared with the baseline, the difference being the size of the impact of this first component.

### **Policy response**

We also estimate the impact of policies introduced in response to the recent surge in prices. To do so we have collected information on tax and expenditure measures adopted by countries in response to price increases during the last price shock (2007–08). We use the fiscal impact of revenue and expenditure measures separately for food and fuel prices to calculate country-specific semi-elasticities, which measure the cost (in percent of GDP) of measures adopted in response to a 1 percent increase in prices. We multiply these semi-elasticities by the assumed increase in international prices and get the fiscal impact of these measures in each LIC. We use the 2007–08 data in our first round of results. For countries with no information, we use the median semi-elasticity.

### **Overall impact**

These are the sum of the unchanged policies impacts and policy responses. Results are provided for each country in the sample.

<sup>5</sup> Additional specifications of this basic model have been used to control the robustness of the elasticities, including by assessing possible nonlinear effects of sharp increases in prices and controlling for residuals’ serial correlation and heteroscedasticity.





## Appendix 6: Methodology of the Tail-Risk Scenario of Lower Global Growth<sup>6</sup>

The downside scenario, based on the Global Integrated Monetary and Fiscal (GIMF) model developed by the IMF, reflects exclusively the global macroeconomic impact of bank capital being severely eroded by sovereign debt distress in the euro area, which translates into lower growth, and therefore global demand, in different regions of the world, including the United States, the euro area, Japan, and emerging Asia (Table A6.1).

The macro growth impact is calculated in a two-step process. In the first step, a closed economy dynamic stochastic general equilibrium (DSGE) model with a banking sector is used to estimate the own-country GDP effects of the banking sector responding to restore its regulated capital adequacy ratio. In the second step, the higher costs of borrowing, for both firms and households, are then used in the GIMF model to replicate the GDP impacts for each region. Higher lending rates reduce loan volumes and raise returns, shrinking bank balance sheets and raising profitability sufficiently to restore capital adequacy ratios. The resulting sharp fall in investment reduces aggregate demand globally. The larger borrowing costs are imposed in all regions to capture the full global impact.

Further value-at-risk simulations convert the associated lower global growth into changes in global commodity prices, which in turn are translated into LIC-specific export and import prices.

### Impact of the Slower Global Growth Scenario on LICs' Growth

Weak global demand stemming from advanced and emerging market countries and the attendant effect on commodity prices are key transmission channels for LIC growth prospects.

The analysis is carried out in two stages. First, the elasticity of LICs' growth to its main trading partners (both advanced and emerging market countries) is estimated using a growth spillover regression for a panel of commodity exporters and non-commodity exporters. Second, alternative projections for the global economy and six relevant regions, along with alternative country-by-country projections for the terms of trade, are used to estimate the potential downside growth impacts for LICs. This calculation makes use of information on trading patterns taken from the IMF's Direction of Trade Statistics.

<sup>6</sup>The methodology shown here was developed in IMF (2011a).

**Table A6.1. GDP Growth Projections under the Downside Scenario**

	Baseline		Downside		Difference	
	2011	2012	2011	2012	2011	2012
World	4.0	4.0	2.6	2.4	-1.4	-1.6
United States	1.5	1.8	0.6	1.0	-0.9	-0.8
Euro area	1.6	1.1	-1.8	-2.9	-3.4	-4.0
Japan	-0.5	2.3	-1.3	1.6	-0.8	-0.7
Emerging Asia <sup>1</sup>	7.9	7.6	7.5	7.2	-0.4	-0.4
Latin America <sup>2</sup>	4.2	3.9	3.5	3.2	-0.7	-0.7
Rest of the world <sup>3</sup>	4.1	4.1	2.7	1.8	-1.4	-2.3

<sup>1</sup>Includes China, Hong Kong SAR, India, Indonesia, South Korea, Malaysia, the Philippines, Singapore, Taiwan Province of China, and Thailand.

<sup>2</sup>Includes Brazil, Chile, Mexico, Colombia, and Peru.

<sup>3</sup>Includes Argentina, Australia, Bolivia, Bulgaria, Canada, Denmark, Estonia, Israel, New Zealand, Norway, Russia, South Africa, Sweden, Switzerland, Turkey, United Kingdom, and Venezuela.

### **LICs' elasticities of growth to partner country growth and terms of trade**

Separate regressions are run for commodity exporters and non-commodity exporters, as the former are less affected by partner country growth. Partners' growth is calculated using weighted averages of trading partners' GDP growth, with the weights based on the 2008 bilateral trade flows from the Direction of Trade Statistics. For non-commodity exporters, the model finds the elasticity of growth to partners' growth to be 1.2. In addition, the elasticity of growth to changes in the terms of trade is also found significant (elasticity of 0.1) for the most open countries (i.e., countries in the top quartile in trade openness, measured in terms of the ratio of exports plus imports to GDP).

For commodity exporters, in the post-1995 period, growth prospects appeared to be aligned with growth in the dynamic emerging market countries (Brazil, Russia, India, and China). The elasticity of GDP growth to these emerging markets' growth is estimated at 0.35.

### **Application to individual LICs**

The IMF Research Department's Global Projections Model (GPM) provides a baseline and an alternative scenario for growth in six regions of the world (United States, euro area, Japan, emerging Asia, Latin America, and remaining GPM countries). Using trade data for these six regions, average partners' growth is calculated for each LIC in both the baseline and the alternative scenario.

## Impact of the Slower Global Growth Scenario on the External Sector

The external sector module for the slower global growth scenario estimates the impact on LICs' gross financing gaps, the adequacy of reserve buffers, and the potential for import compression. The GPM scenario of lower world growth is assumed to affect the balance of payments of individual LICs through four spillover channels affecting both the current account and the financial account. The main assumptions are:

- Variation in export prices and import prices (of goods and services) affect the dollar value of exports and imports with an elasticity of 1.
- A reduction in growth affects the external demand facing each LIC, and the elasticity of export volumes to external demand is equal to 3 (based on Dabla-Norris, Espinoza, and Jahan, forthcoming). The change in external demand is computed using weighted averages of trade partners' real GDP growth, where the weights are based on the 2008 Direction of Trade Statistics exports flows.
- A reduction in growth affects remittances from source countries with an elasticity of 1.5 (based on Lueth and Ruiz-Arranz, 2008). Partners' growth is computed using the weights from bilateral remittances data (2006 World Bank remittances flows and Organization for Economic Cooperation and Development data).
- A reduction in growth affects FDI from source countries with an elasticity of 21 the year of the shock and an elasticity of 35 the year after the shock (based on Dabla-Norris, Honda, and others, 2010). Partners' growth is computed using weights derived from bilateral (Organization for Economic Cooperation and Development) FDI data.

The effect on the overall balance of payments is then analyzed using three metrics: (i) financing gap, (ii) reduction in reserves, and (iii) potential for import compression.

- The first metric is the external financing gap in percent of GDP, defined as the difference in the overall balance of payments between the scenario and the baseline external balances, in percent of GDP.
- The second metric computes the level of reserves after the shock, in months of imports, under the assumption that shortfalls in financing on account of the shock are entirely absorbed by a commensurate reduction in reserves. Countries are assumed to make use of available reserve buffers up to a reserve floor of three months of imports.

- The third metric computes the change in imports divided by GDP (import compression) that would compensate for the financing shortfall in order to maintain reserves at three months of imports. Import compression is zero if, after the shock, the estimated level of reserves (from the second metric) is above three months of imports.

### **Impact of the Slower Global Growth Scenario on the Fiscal Sector**

This section presents the methodology used in the fiscal module to assess the public finance implications of an adverse shock to global growth for LICs. It describes the estimation of revenue and expenditure buoyancy ratios for the real GDP growth rate shock and the terms-of-trade shock associated with this adverse scenario. Using these results, fiscal impacts are calculated for each country under the shock scenario for 2011.

Three indicators of fiscal vulnerability are constructed using these simulation results along with an associated heat map that classifies countries into low, medium, or high vulnerability. A combined overall fiscal vulnerability ranking is also presented.

### **Growth Shock**

Revenue buoyancy ( $B_R$ ) is defined as:  $B_{R,t} = (R_t - R_{t-1}) / (g_t - g_{t-1})$ , where  $R_t$  is the revenue/GDP ratio for year  $t$  and  $g_t$  is the real GDP growth rate for year  $t$ . The revenue buoyancy for each country is calculated as follows:

- Median country-specific buoyancy ratios are estimated for revenue and, if available, also tax revenue, on the basis of 2007–10 data.
- For countries with median revenue buoyancy estimated to be outside the 0.25–1.5 range, we replace the country-specific buoyancy with the estimated country-specific median tax revenue buoyancy. If this is not available (or its value is outside the 0.25–1.5 range), we use the median revenue buoyancy estimated for the sample (excluding countries that have estimated values outside the range).

The country-specific revenue buoyancy is then multiplied by the corresponding output growth shock (output growth in the shock scenario in 2012 minus the baseline 2012 growth rate) to calculate its impact on the revenue/GDP ratio in 2012 compared to the no-shock baseline. The 2012 expenditure/GDP ratio in the shock scenario is derived by assuming that nominal expenditures remain the same as in the baseline for 2012, while GDP is consistent with the shock scenario assumptions for the same year. This assumes no expenditure adjustment by countries in the face of the shock.

### Terms-of-Trade Shock

For the terms-of-trade shock, the expenditure and revenue effects are calculated in a similar fashion: we use four price indices (fuel export price, fuel import price, nonfuel export price, nonfuel import price). For each price index we calculate the buoyancy as  $B_{X,i,t} = (X_t - X_{t-1})/p_{i,t}$ , where  $X_t$  is the revenue/GDP (or expenditure/GDP) ratio in year  $t$  and  $p_{i,t}$  is the growth rate of the price index  $i$  in year  $t$ . Given the significant decline in global commodity prices from 2008 to 2009, which is similar to the terms-of-trade shock here, the buoyancy coefficients are calculated using 2009 data. However, if a country has estimated buoyancy greater than four or less than the 25th percentile value for a given price index, we use 2008 data instead. For the countries with buoyancy rates based on 2008–09 data that are outside the range, we use 2010 data.

To calculate the impact on revenue/GDP (or expenditure/GDP) in 2012 under the terms-of-trade shock, the assumed price shock under the adverse scenario for each price series is multiplied by the respective buoyancy ratio and then weighted and aggregated using the following weights:  $W_i = (\mu_i/\sigma_i) / [\sum (\mu_i/\sigma_i)]$  (where  $\mu$  is the mean and  $\sigma$  is the standard deviation of the index-specific buoyancy ratio, and  $i$  indicates the  $i$ th price index).

### Combined Shock Impact

The growth shock and the terms-of-trade shock impacts on the budget components are then combined using the following weights, for all countries: 0.9 for the growth shock and 0.1 for the terms-of-trade shock.<sup>7</sup>

### Fiscal Indicators

We use three indicators to measure fiscal vulnerability:

- *Change in Fiscal Balance (CFB)*: defined as the overall fiscal balance in 2012 under the shock scenario minus the baseline projected (pre-shock) 2012 balance:

$$CFB = (R_s - E_s) - (R_b - E_b),$$

where  $R_s$  is the revenue/GDP ratio after the shock impact and  $R_b$  is the projected baseline 2012 revenue/GDP ratio (similarly for expenditure/GDP ratios  $E$ ). This indicates the additional net financing needs to maintain the baseline nominal expenditure plans.

<sup>7</sup> These parameters are consistent with results of regression on the relative weight of the growth and terms-of-trade shocks on the budget for the sample.

- *Revenue/GDP Growth Rate (or Revenue Growth) (RG)*: this is the relative change in the revenue/GDP ratio after the shock compared to the 2012 baseline (in percent):

$$RG = (R_s - R_b) / R_b.$$

This indicates how severe the impact of the shock is on a country's revenue/GDP ratio, adjusting for severity of underlying shock, and the degree of fiscal rigidity in the budget.<sup>8</sup>

- *Fiscal Space (FS)* (see Escolano, 2010): this is defined as the difference between the baseline 2012 primary balance (PB) and the constant PB that is needed to achieve a target debt/GDP ratio of 40 percent in 2031.<sup>9</sup> It is an indicator of initial vulnerability intended to capture how much flexibility authorities may have in employing countercyclical fiscal policy when the economy is hit by a negative shock.

The fiscal space calculation requires the initial (2012) primary balance ( $PB_0$ ) (overall balance plus interest expense), the initial (2011) debt/GDP ratio ( $D_0$ ), the target debt/GDP ratio ( $D_N$ ) (in 2030), and the average projected implied real interest rate ( $r$ ) and output growth rate ( $g$ ). The target debt/GDP ratio of 40 percent in 2031 is applied to all countries. Given the fiscal space ( $FS$ ) definition, we have  $FS = PB_0 - PB^*$ , where  $PB^*$  is the constant primary balance needed in each year  $t = 1, \dots, N$  to achieve the target debt/GDP ratio in year  $N$  (with  $N = 20$ ).  $PB^*$  can be calculated as

$$PB^* = [\lambda / ((1 + \lambda)^N - 1)] (D_N (1 + \lambda)^N - D_0),$$

where  $\lambda = (r - g) / (1 + g)$ . It is assumed that the difference  $r$  minus  $g$  converges to zero in 30 years (year 2041). In the first 10 years (2012–21)  $r$  minus  $g$  is kept constant at its 2012–16 average for each country in the calculation. Starting from the average value in 2012, a linear trend in the difference is assumed from 2022 until  $r$  minus  $g$  converges to zero in 2041.

A country with an initial positive primary balance will have more fiscal space. Also, a country with more negative  $\lambda$  (i.e., average lower real interest rate and/or higher output growth) or a lower initial debt/GDP ratio will have a larger fiscal space.

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<sup>8</sup> The rank correlation between this indicator and the one based on the growth rate of nominal revenue is greater than 0.9.

<sup>9</sup> The rank correlation is high between this indicator and an alternative indicator using a 65 percent of GDP target in 2030.

## Appendix 7: Methodology for Assessing the Poverty Impact of Higher Food and Fuel Prices

The impact of an increase in food prices on poverty is estimated as follows:

- Estimate the pass-through of exogenous increases in international food prices to domestic prices. This uses information from Ivanic, Martin, and Zaman (2011) on changes in international food prices and retail food prices from June to December 2010 for a sample of 28 developing countries, of which 17 are included in the Vulnerability Exercise for LICs. Country-specific pass-through rates transform changes in international prices into price changes at the retail level, assuming unchanged policies in the short term.
- Estimate the effects on poverty. The World Bank study estimates elasticities of retail food price changes on poverty incidence for the 28 developing countries,<sup>10</sup> based on household survey data. These elasticities are applied to the country-specific projected retail price changes to simulate the impact on poverty incidence.<sup>11</sup>
- For LICs for which information on retail food prices and elasticities is not available, the pass-through is assumed to be 50 percent and the elasticities to be the average of similar countries based on region, GDP per capita, and agriculture as a share of GDP.

The impact of an increase in fuel prices on poverty is estimated as follows:

- Estimate the pass-through of increases in international fuel prices to retail prices. This is based on two studies by the IMF's Fiscal Affairs Department, one that provides estimates on the pass-through rates for 20 countries (Arze del Granado, Coady, and Gillingham, 2010), and another one for Middle East, North Africa, and Central Asian countries (Coady and Antonio, 2011). The pass-through estimates for the Middle East and North Africa are based on data for 2008–10, while estimates for other regions are based on data prior to 2008.
- Estimate the direct effect of higher fuel prices by decile. Multiply the share of household consumption of fuel by the projected percentage price increase.

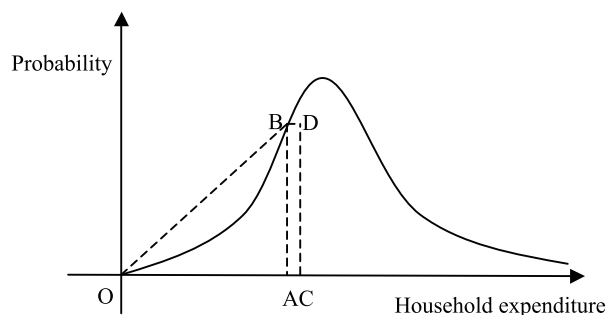
<sup>10</sup> The elasticity measures the change in poverty incidence (in percentage points) from changes in food prices (in percent) and includes the effect of food prices on incomes for households that are food producers. The poverty line is based on the \$1.25 a day definition.

<sup>11</sup> Simplifying assumptions are made with regard to the ability of consumers to substitute into less expensive food items (we simulate an increase in the price index of all food items), the coping strategies of households, and the effects of food price increases on wages.



- Estimate second-round effects of higher fuel prices on domestic nonfuel prices. Arze del Granado, Coady, and Gillingham (2010) provide estimates of input-output tables (production of other goods and services using fuel as input) for a subset of the countries in their sample. Here other goods and services include the categories: food, non-food, and nonfuel. Elements in the input-output tables measure the increases in the prices of other goods and services when the price of fuel increases by 1 percent. These input-output tables are combined with data on household consumption share of other goods and services by decile to compute the indirect impacts of fuel prices on household consumption by decile.
- Combine the direct and indirect effects to get the overall impact on household consumption by decile. The overall impact is translated into a new poverty line in nominal prices, which is equivalent to the poverty line of \$1.25 per day in real terms.
- Estimate the impact on poverty of higher fuel prices. For household expenditure distributed as in Figure A7.1,  $OA$  denotes the poverty line of \$1.25 per day; the area under curve  $OB$  denotes the poverty rate under the baseline;  $AC$  denotes the increase in the poverty line in nominal terms as a result of higher fuel prices; and  $ABDC$  approximates the poverty impact of higher fuel prices when  $AC$  is small.  $AB$  can be estimated by  $(\text{baseline poverty})/OA * \alpha$ , where the value of  $\alpha$  depends on how the baseline poverty rate is approximated. For example, if we use triangle  $OAB$  to approximate baseline poverty,  $\alpha$  would be 2. For the distribution shown in Figure A7.1,  $\alpha$  would be greater than 2.
- Pass-through rates, consumption shares, and input-output tables for LICs for which data are not available are imputed based on countries with similar characteristics.<sup>12</sup>

**Figure A7.1. Household Expenditure Distribution and Poverty Estimation**



<sup>12</sup> The method does not take into account the effects of increases in fuel prices on wages and does not model the effects of behavioral responses, such as the effect on demand and other coping strategies by households.

## Appendix 8: Monetary Policy Responses to Food and Fuel Price Shocks in Low-Income Countries

### Analytical Considerations

The standard monetary policy advice has been to allow for the direct effects of increases in world food and energy prices on headline inflation, but not for the indirect effects that may be present in the response of wages and, in turn, core prices. This advice, whose theoretical underpinnings can be found in the benchmark New Keynesian model with nominal price rigidities (Blanchard and Gali, 2007), has taken different forms. Some describe it as allowing for first-round effects, but not for second-round effects; while others refer to it as *not* allowing for pass-through into wages and core inflation. But despite the different forms, the logic behind the policy advice is the same: avoid persistent effects on inflation. The first-round or direct effects—which also include the effects associated with the use of oil as an intermediate production input—capture changes in relative prices in the economy and therefore their impact on headline inflation should be short-lived. In contrast, the second-round effects involve increases in prices that are more persistent, including those that result from pressures to preserve real wage levels.

A related monetary policy issue is to determine the most appropriate inflation measure that should serve as the target that guides policy decisions by central banks. In general, the literature advocates for excluding from this measure flexible and volatile prices, such as those associated with food and energy, that is, core inflation (Aoki, 2001; Bodeinstein, Erceg, and Guerrieri, 2008; Wynne, 2008; and Mishkin, 2008). By stabilizing core inflation, the monetary authority would stabilize output and implement, to a great extent, the standard policy advice of allowing for direct (first-round) effects while reacting to indirect (second-round) effects.

The standard policy advice, however, may need to be modified depending on the structural characteristics/distortions of the economy and their interaction with the world food and energy price shocks. Whether monetary policy should heavily react to first-round and second-round effects or, on the contrary, allow for some pass-through may also depend on the central bank's objectives: concerns about inflation pressures versus the real economic adjustment induced by tight monetary policies that try to offset these pressures.

The central bank's concern about the real adjustment, labor market frictions, and the importance of food and oil in consumption baskets may imply the need for some pass-through into wages and core inflation to reduce the painful *real* adjustment. Of course, the degree of acceptable pass-through

should be consistent with keeping medium-run inflation expectations anchored.

- In the presence of real wage rigidity, the central bank must decide whether to accommodate a higher level of inflation or, instead, keep inflation constant but allow for a larger decline in the welfare-relevant output gap (increase in unemployment). The reason is that when real wages respond sluggishly to labor market conditions, stabilization of inflation and stabilization of the welfare-relevant output gap (and therefore unemployment) present the central bank with a trade-off (Blanchard and Gali, 2007). In fact, when there is substantial workers' resistance to real wage decline, it may be necessary to have very large increases in interest rates and unemployment, to get wages not to respond (preventing pass-through). So by allowing for some pass-through and therefore some increase in core inflation, monetary policy may lead to a smaller decrease in output.
- When the share of food in the CPI is high, food price shocks may involve large decreases in real wages to which workers respond demanding higher nominal wages. If the monetary authority allows for pass-through and therefore an increase in wages, the full adjustment in real wages may be delayed. The reason, present in New Keynesian models with sticky prices à la Calvo (nominal price rigidities), but also in the data, is that as wages increase, prices increase more slowly for some time, causing a temporary decline in markups of prices over wages. Thus, for some time, markups are lower and real wages higher than they would be under flexible prices. So higher inflation comes with a smoother real wage adjustment. By permitting a more gradual adjustment of real wages, monetary policies that allow for some pass-through can also decrease the painful adjustment to food shocks.

When concerns about inflation prevail, other structural characteristics of the economy suggest that countries should perhaps react to first-round effects, as some of the literature advocates targeting headline inflation.

- Since food is a large part of the consumption basket in developing economies and it has limited substitutability with other goods, food price fluctuations often have a significant impact on overall consumer prices. If food price shocks are large relative to monetary and productivity shocks, monetary policies that react only to core inflation may entail high real exchange rate volatility (Catão and Chang, 2010). As higher real exchange rate volatility may translate into consumption volatility, monetary policy responding to headline inflation (e.g., not allowing for first-round effects) may be superior to policies responding exclusively to core inflation.

- In the presence of financial frictions that limit consumers' access to credit in financial markets, a narrow policy focus on core inflation, which excludes food and oil prices, instead of headline inflation, can lead to suboptimal outcomes (Anand and Prasad, 2010). With financial frictions, inflation and output, which is demand determined, may move in opposite directions. In contrast to the benchmark New Keynesian model, stabilizing core inflation is no longer sufficient to stabilize output. With these frictions food and energy prices influence aggregate demand, since this demand is mainly determined by the real wages of credit-constrained consumers. So monetary policy may have to stabilize these prices to ensure that aggregate demand declines when monetary policy is tightened.
- Central bank credibility has also important implications for monetary policy responses in the context of supply shocks (IMF, 2011d). When monetary policy responds to core inflation instead of headline inflation, tight monetary policies may induce smaller output losses at the expense of higher inflation. But benefiting from this trade-off depends on the credibility of the central bank (Habermeier and others, 2009). If credibility is low, food and oil price shocks can have significant effects on inflation expectations, inducing second-run effects. Lack of credibility may then call for stronger monetary policy actions, including reacting to headline inflation.

These analytical considerations are relevant for LICs, where food and oil are a large part of the consumption basket, consumers are credit constrained, policy credibility is still limited, and food inflation volatile. Under these conditions, targeting core (i.e., non-food) inflation may result in large headline inflation volatility. For the small number of LIC central banks that are primarily inflation targeters, this may argue for counteracting even first-round effects of food price shocks to enhance policy credibility and anchor inflation expectations. However, this must be weighed against those considerations discussed earlier regarding the implications for the real economy. A strong policy response might be particularly contractionary and painful in real terms at a time when economies are already being hit by a negative supply shock. Therefore, the policy response may have to be more gradual than is optimal from the point of view of inflation objectives alone.

The manner in which monetary policy is tightened must be adjusted to the policy regime in place. Inflation targeters would need to raise their policy rates. Money targeters, on the other hand, would have to be flexible, since sticking to previously set targets may be an excessively tight policy. More generally, real money balances must fall relative to planned levels so as to contain aggregate demand and reduce inflation pressures.

The exchange regime may also determine the monetary policy response to commodity price shocks. Since LICs may need a real exchange rate depreciation to ensure external balance, in flexible regimes central banks should consider that this may take place through nominal depreciation, which might be at odds with the need for disinflation. Countries with fixed exchange rate regimes are limited in their policy options. Limited capital mobility could give them some room for monetary tightening.

In any case, the fact that inflation and monetary aggregates are likely to be above target means that the central bank's communication strategy is important to help shape expectations and contribute to inflation stabilization. Such communication should explain why targets have been missed, what the policy strategy is for bringing inflation down, and what the central bank will do if inflation does not fall as intended (Habermeier and others, 2009).

### **Selected Country Experiences in 2007–08**

The 2007–08 food and fuel price shocks led to a large and broad-based increase in inflation across LICs, with monetary policy remaining largely passive. The experience differed across countries, depending on the policy mix, policy regimes, and other country-specific factors (e.g., openness, extent of dollarization, share of food items in the CPI basket, and climatic shocks). Pass-through from exchange rate depreciation was an important factor, with pegged exchange rates regimes generally experiencing lower inflation outcomes. Within this group, appreciation of the euro in particular helped alleviate inflationary pressures in the CFA zone. With output in about three quarters of LICs exceeding potential output at the time, aggregate demand pressures likely played a significant role in explaining some of the acceleration in inflation. But more than half of LICs adopted fiscal measures limiting the increase in prices of selected food items and petroleum products, partly suppressing the inflationary pressures. Monetary policy tightening appears to have had a negligible role. The collapse in global food and fuel prices during the onset of the global financial crisis in the second half of 2008 brought inflation down rapidly.

In SSA LICs, inflation surged from 6.2 percent in March 2007 to 14.8 percent in August 2008 for SSA oil importers. However, the median policy rate was raised by only 1.5 percentage points through late 2008, implying an overall decline in real rates (Figure A8.1). Zambia's policy response was the most aggressive, with a gradual rate increase of 3 percentage points, although it took two years to bring inflation to its pre-shock level. Reserve requirements were raised significantly in some countries, helping to reduce excess reserves, though the level of excess reserves remained fairly high (Figure A8.2). Exchange rate pressures were not apparent, with fairly muted exchange rate

Figure A8.1. Sub-Saharan Africa: Policy Interest Rates and Broad Money

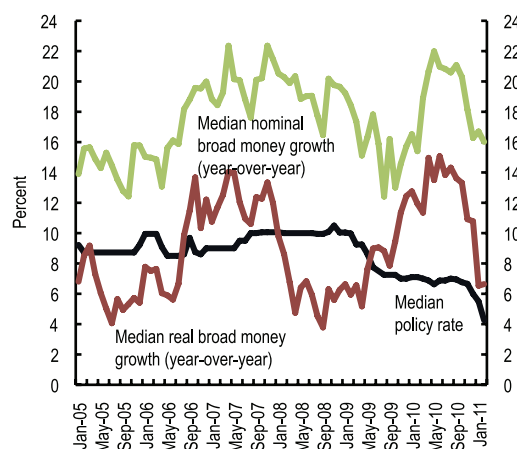
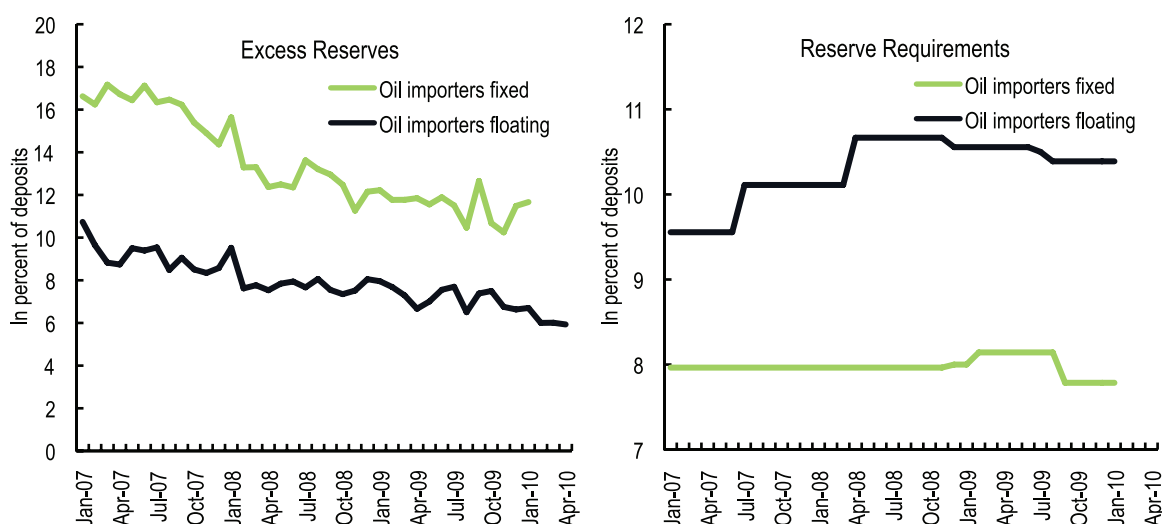
Source: IMF, *International Financial Statistics*.

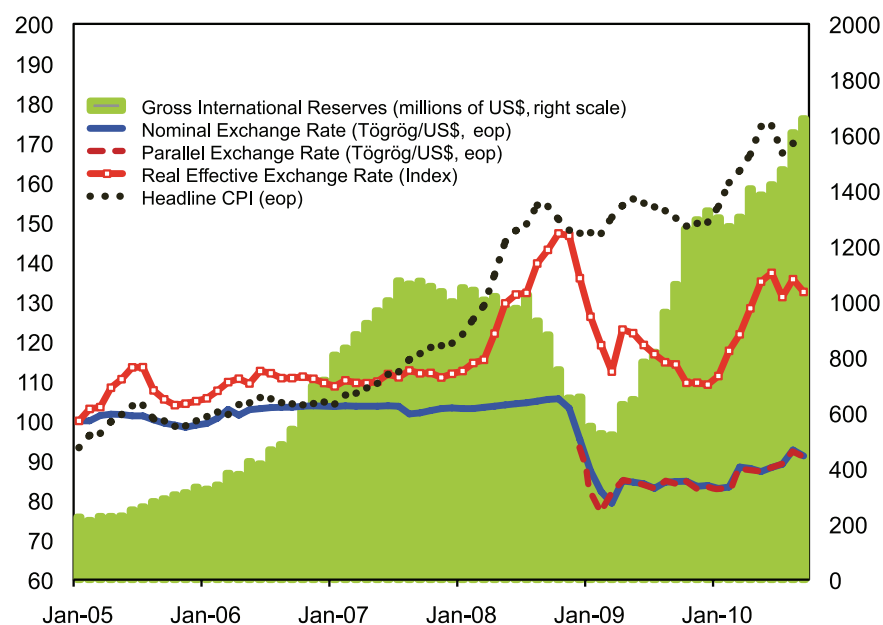
Figure A8.2. Reserves of the Banking Sector, 2007–10



response and continued buildup of international reserves for both floaters and fixers. Ethiopia's inflation reached a record high of 64 percent among LICs in July 2008, associated with strong money growth and with a large depreciation of the exchange rate. Overall, the sharp reversal in food and fuel prices in the second half of 2008 was primarily driven by the global crisis and collapse in global commodity prices, rather than monetary policy action.

Owing to sharp movements in copper prices, Mongolia was hit hard during the last commodity boom and bust cycle. The stronger copper prices brought faster growth together with a fiscal and current account surplus. When copper prices nosedived in late 2008, exports dropped sharply as did foreign exchange inflows and government revenue. The economy was on the verge of

**Figure A8.3. Mongolia: Gross International Reserves and Exchange Rates, 2005–10**  
(January 2005 = 100, increase denotes appreciation)



collapse when an IMF-supported Stand-By Arrangement was put in place in April 2009. Mongolia had to allow a significant depreciation in the exchange rate to absorb external shocks and safeguard international reserves (Figure A8.3). During 2007–08, nominal exchange rate rigidities did not prevent real exchange rate adjustments but instead led to runaway inflation. The collapse in copper prices combined with foreign exchange interventions brought a significant decline in reserves. A significant tightening of monetary policy played a key role in facilitating an orderly switch to a flexible exchange rate regime and safeguarding international reserves while keeping inflation on a stable path. The authorities increased policy rates by 425 basis points upfront to signal a regime change and limit capital outflows. Once the exchange rate stabilized and remonetization (after bank runs in end-2008) progressed, the policy rate was decreased gradually.



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