



# IMF Working Paper

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## Global Rebalancing: Implications for Low-Income Countries

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**IMF Working Paper**

Asian-Pacific Department

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October 2011

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**Abstract**

While global rebalancing will mainly involve structural realignment among major advanced and emerging market economies, it could have significant impact on low-income countries (LICs). Simulations using a global general equilibrium model show that a more balanced global economy would tend to improve the current account balance in LICs with limited impact on domestic output. However, there could be adverse terms of trade effects on some LICs as the prices of manufactured goods rise. On the other hand, such prices increases could provide an impetus to export diversification in many LICs, raising growth in the long run. The output and terms of trade effects would be significantly amplified if structural adjustment is impeded by factor immobility and other rigidities.

JEL Classification Numbers: F4, O5

Keywords: Global Rebalancing, low-income countries

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<sup>1</sup> This paper was originally prepared as background paper for the project "New Growth Drivers for Low-Income Countries: The Role of BRICs". The author wishes to thank Dominique Desruelle, Montford Mlachila, Nkunde Mwase, Catherine Pattillo, Nagwa Riad, Issouf Samake, Misa Takebe, and other colleagues for their valuable comments on the paper. Sibabrata Das and Ke Wang provided excellent research assistance, and Neri Gomes helped with editorial work.

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## I. INTRODUCTION

Global imbalances have persisted over the past decade.<sup>2</sup> These imbalances are reflected in a large current account deficit in the United States and the United Kingdom, counterbalanced by large current account surpluses in advanced and emerging markets in Asia (namely, Japan, China, and major ASEAN economies), Russia, and oil exporting countries in the Middle East. The Euro Area as a whole is broadly in balance, but there are considerable variations among its member countries, with Germany running a large surplus which is offset by a combined deficit in the rest of the area. Low-income countries as a whole have a significant deficit, even though some commodity exporters, especially oil exporters, have experienced a surplus.

While the causes of global imbalances remain a subject of continuous debate, there is broad consensus that these imbalances are not sustainable and need to be reduced over time.<sup>3</sup> Moreover, there is broad agreement on needed policy actions by major economies to narrow global imbalances.<sup>4</sup> For the advanced countries with large deficits (e.g., the United States and the United Kingdom), reducing fiscal deficits and increasing private saving are considered to be top priorities. Private saving has already begun to rise in these countries in the wake of the global financial crisis. Reflecting a delicate balance between the need for fiscal consolidation and supporting economic recovery, advanced countries have committed, in the G-20 Toronto Summit Declaration, to at least half their deficits by 2013. Surplus countries, on their part, are committed to take measures to reduce their reliance on external demand and focus more on domestic sources of growth.<sup>5</sup> Global imbalances have fallen significantly following the global financial crisis, but many believe they will rebound as the global economy recovers if no action is taken to make necessary policy adjustment.

Whatever policy measures are employed to address global imbalances, they could have significant implications for low-income countries (LICs).<sup>6</sup> Global rebalancing would ultimately entail realignments of major bilateral exchange rates and significant adjustments in global interest rates, relative prices of various commodities, and trade and financial flows. Even though most of these changes would take place in and among the major rebalancing economies, the sheer magnitude of global adjustments involved and LICs' close trade (and sometimes financial) links with these economies mean that they are likely to be affected in the

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<sup>2</sup> See Blanchard and Milesi-Ferretti (2009) for a more detailed overview.

<sup>3</sup> See Terrones and Cardarelli (2005) for a summary of alternative views on the origins of current global imbalances.

<sup>4</sup> See G-20 Toronto Summit Declaration, June 26-27, 2010. An earlier attempt to address global rebalances was made under an IMF-sponsored Multilateral Consultation and similar measures were proposed (see IMF, 2007).

<sup>5</sup> Abiad *et al.* (2010) discuss how surplus countries can get out of sustained current account surpluses.

<sup>6</sup> Eichengreen and Park (2006) discuss how unwinding of global imbalances might affect emerging market economies in Asia and Latin America. The LICs referred to in this paper are based on the IMF classification (Nielson, 2011).

process, not only in terms of their current accounts and output, but also possibly their competitiveness of various industries in the medium and long term. The latter effect could occur if global rebalancing would accelerate industry upgrading in China and India, which would affect demand and hence relative prices of labor-intensive products that LICs export. Such upgrading could also lead to increases in outbound FDI from these two countries, and possibly other countries, to LICs, boosting their productive capacity in the long run.

This paper attempts to shed some light on these potential effects. The focus will be on the implications of global adjustment for LICs in the medium and longer term. It is organized as follows. The next section provides a brief overview of the current global imbalances and how LICs fit into this global picture. Section III outlines key adjustments that global rebalancing would entail and their potential implications for low-income countries. Section IV then describes the modeling strategy to simulate the impact of global rebalancing on LICs and presents key results on this impact. Section V is devoted to the discussion of potential longer-term implications for LICs of global rebalancing from a perspective of global relocation of manufacturing, and Section VI concludes.

## II. LICs IN THE GLOBAL IMBALANCES

LIC economies have been insignificant in the global landscape of current account imbalances. LICs as a group ran a current account deficit in the past two years, after running a surplus for three consecutive years on the back of strong commodity prices. However, either the deficits or surpluses have ever accounted for more than one tenth of one percent of global GDP. The group's 2010 deficit stood at US\$6.4 billion, about one-hundredth of one percent of global GDP (Table 1). Commodity exporters, including those in Sub-Saharan Africa, have been collectively running a surplus in recent years as a result of the surges in commodity prices. In contrast, net commodity-importers, particularly those in Asia, tend to run a deficit.

LICs as a group have been running a much larger trade deficit, which stood at about US\$108 billion in 2009, or about 11 percent of their GDP. Most LIC regions have recorded a trade surplus with the United States and emerging Asia, but almost all LIC regions registered a deficit with other major economies and regions, including non-Euro Europe, BRICs (Brazil, Russia, India, and China), Japan, Middle East, and the “rest of the world”, which is by far the largest source of trade deficit for LICs, accounting over 50 percent of the total LIC deficit (Table 2).<sup>7</sup> The bulk of this deficit is incurred by LICs in Africa, Middle East and Asia, although as a percentage of GDP LICs in Europe (Moldova only) and the Western Hemisphere had the largest deficits.

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<sup>7</sup> The rest of the world includes Canada and emerging market economies not separately identified in Table 2. This category also includes intra-LIC trade.

Table 1. Current Account Balance  
(In billions of US Dollars)

	2000	2005	2006	2007	2008	2009	2010
United States	-416	-748	-803	-718	-669	-378	-467
Euro Area	-38	49	50	51	-95	-48	22
o/w Germany	-33	143	188	254	246	163	200
Emerging Europe <sup>1</sup>	-32	-60	-90	-131	-143	-37	9
Japan	120	166	170	211	157	142	166
BRICs	39	249	352	442	486	287	244
Brazil	-24	14	14	2	-28	-24	-52
Russia	47	84	94	77	104	50	70
India	-5	-10	-9	-8	-25	-36	-44
China	21	161	253	372	436	297	270
Oil Exporters <sup>2</sup>	96	257	344	319	425	81	191
Asian NIEs <sup>3</sup>	62	95	134	177	131	208	190
LICs	-2.2	-7.0	28.0	8.0	0.2	-8.7	-6.4
Africa	-0.1	-2.1	29.0	16.3	7.5	1.7	3.1
Asia & Pacific	0.5	-0.7	2.1	-5.8	-10.0	-6.2	-10.3
Europe	-0.1	-0.2	-0.4	-0.7	-1.0	-0.4	-0.6
M. East & C. Asia	-0.4	-3.0	-2.1	-0.2	6.4	-2.3	3.3
W. Hemisphere	-2.1	-0.9	-0.7	-1.6	-2.7	-1.5	-1.9
Rest of the World	-8.8	34.9	23.8	-47.2	-82.6	-28.3	-147.2
World	-181	35	210	311	211	217	202

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

<sup>1</sup> WEO analytical group of Emerging Europe

<sup>2</sup> WEO analytical group of fuel exporters, excluding Russia, and fuel-exporting LICs.

<sup>3</sup> Includes Hong Kong, Korea, Malaysia, Philippines, Singapore, Taiwan, and Thailand.

Table 2. LIC's Trade Balances with Major Trading Partners, 2009  
(In billions of US dollars and percent of GDP)

	USA	Euro Area	Other Europe	Japan	Emerging Asia <sup>1/</sup>	China	Other BRICs	Mid East	ROW	World
In billions of U.S. dollars										
LICs	25.4	1.4	-12.2	-4.9	3.2	-39.8	-12.8	-12.0	-56.0	-107.7
Africa	16.8	-4.8	-2.5	-3.3	0.6	-15.3	2.5	-7.3	-33.2	-46.6
Asia	12.0	7.2	0.2	-1.8	2.5	-17.7	-6.6	-1.3	-16.3	-21.8
Europe	0.0	-0.5	-1.0	0.0	0.0	-0.2	-0.1	0.0	-0.1	-2.0
M. East & C. Asia	-1.2	-0.6	-8.8	0.5	0.2	-5.7	-5.9	-3.5	0.1	-24.8
Western Hemisphere	-2.2	0.0	-0.1	-0.2	0.0	-0.9	-2.7	0.0	-6.5	-12.5
Commodity Exporters <sup>2/</sup>	-1.2	-1.3	2.0	0.5	0.4	-5.9	-6.0	-3.5	5.4	-9.6
Non-Commodity Exporters <sup>2/</sup>	-0.7	2.6	-14.2	0.2	2.8	-0.6	-2.2	-0.2	-85.9	-98.1
In percent of GDP										
LICs	2.6	0.1	-1.2	-0.5	0.3	-4.0	-1.3	-1.2	-5.7	-10.9
Africa	3.6	-1.0	-0.5	-0.7	0.1	-3.3	0.5	-1.6	-7.1	-10.0
Asia	4.5	2.7	0.1	-0.7	0.9	-6.6	-2.4	-0.5	-6.1	-8.1
Europe	-0.6	-9.3	-18.2	-0.6	0.0	-4.5	-2.3	0.0	-1.3	-36.8
M. East & C. Asia	-0.6	-0.3	-4.3	0.3	0.1	-2.8	-2.9	-1.7	0.0	-12.2
Western Hemisphere	-4.5	0.0	-0.2	-0.5	0.1	-1.8	-5.4	0.1	-13.3	-25.6
Commodity Exporters <sup>2/</sup>	-1.2	-1.3	2.0	0.5	0.4	-6.0	-6.1	-3.6	5.5	-9.7
Non-Commodity Exporters <sup>2/</sup>	-0.1	0.3	-1.6	0.0	0.3	-0.1	-0.2	0.0	-9.6	-11.0

Source: IMF, *Direction of Trade Statistics*.

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

<sup>2/</sup> Based on WEO classifications.

Underlying these current account and trade balances are a set of bilateral trade flows that reflect the increasing importance of emerging markets as trading partners for LICs. Europe (the Euro Area and the rest of Developed Europe) remains by far the largest export market for LICs in all regions, except those in Western Hemisphere, for which the US market is dominant (Table 3). However, Asia is now comparable to the United States as a market for LICs. In fact, for LICs in Asia and Middle East and Central Asia, the Asian markets have exceeded the US market by a large margin. This is also true for commodity exporters. On the import side, Asia has even exceeded Europe as the largest source of imports for LICs, even though Europe remains critically important, especially for African LICs (Table 4). Not surprisingly, the Asian markets are particularly important for the LICs in the region and those in Middle East and Central Asia. The United States is by far the largest source of imports for LICs in the Western Hemisphere.

Table 3. LIC Exports to Major Trading Partners, 2009  
(In Percent of Total)

	USA	Euro Area	Other Europe	Japan	Emerging Asia <sup>1/</sup>	China	Other BRICs	Mid East	ROW
LICs	18	20	5	4	10	8	8	2	24
Africa	23	25	2	1	3	5	12	1	27
Asia	17	15	4	8	19	8	3	1	25
Europe	1	22	42	0	0	0	22	1	11
M. East & C. Asia	6	19	16	4	10	18	10	6	10
Western Hemisphere	27	12	1	3	1	2	16	1	38
Commodity Exporters <sup>2/</sup>	2	14	21	3	4	13	6	2	34
Non-Commodity Exporters <sup>2/</sup>	20	21	3	4	11	7	9	2	23

Source: IMF, *Direction of Trade Statistics*.

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

<sup>2/</sup> Based on WEO classifications.

Table 4. LIC Imports from Major Trading Partners, 2009  
(In Percent of Total)

	USA	Euro Area	Other Europe	Japan	Emerging Asia <sup>1/</sup>	China	Other BRICs	Mid East	ROW
LICs	6	14	5	4	6	17	9	5	34
Africa	5	21	3	3	2	13	6	6	41
Asia	3	6	2	8	14	22	8	2	35
Europe	1	24	39	1	0	8	13	0	14
M. East & C. Asia	5	13	15	2	6	20	16	9	14
Western Hemisphere	22	5	1	2	0	5	19	0	46
Commodity Exporters <sup>2/</sup>	3	13	6	2	2	12	10	2	49
Non-Commodity Exporters <sup>2/</sup>	6	14	5	4	7	17	9	5	33

Source: IMF, *Direction of Trade Statistics*.

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

<sup>2/</sup> Based on WEO classifications.

### III. WHAT WOULD GLOBAL REBALANCING ENTAIL?

Theoretically, how would a low-income country be affected by global rebalancing? One can think of global rebalancing as a set of shocks to LICs' external trade and terms of trade. Figure 1 depicts how such shocks might affect a LIC economy based on the insight of De Melo and Robinson (1989). Abstracting from various bilateral channels of impact, let's assume that global rebalancing leads to an increase in export demand and a deterioration in terms of trade for a particular LIC (these are represented, in quadrant IV, by the shift of production along the transformation curve toward the tradables, E, and the clockwise rotation of the balance of payments line in quadrant I). Think of an African LIC that imports a large portion of its manufactured goods from China and exports a range of products to Europe and the United States. A likely consequence of global rebalancing is a rise in the prices of manufactures and an increase in the demand for this African country's products as China relies less on exports and more on domestic demand for growth. These shocks lead to an



manufacturers relocate globally to seek higher returns. These potential long-term impacts are discussed in Section IV. In this and the following sections, we confine our analysis to the medium-term impact of global rebalancing on LICs, focusing on real exchange rates, product prices, and trade as the main channels of transmission of the shocks.

There is little doubt that a global balancing would entail significant realignments in the real exchange rates of major currencies, which would have important implications for LICs. In fact, adjustment in nominal exchange rates may be one of the key policy actions to facilitate the real exchange rate adjustment. In general, surplus countries are likely to experience a real appreciation of their currencies and deficit countries a real depreciation. While LICs' bilateral exchange rate movements would reflect these adjustments, how their real effective exchange rates are affected would also depend on the market distribution of their trade flows. In the case of African LICs, for instance, their continued heavy reliance on the European market for trade means that how the Euro would adjust in response to global rebalancing would be critical in determining their overall competitiveness.<sup>9</sup> Similarly, for an Asian LIC whose main trading partners are China, Japan, and the United States, how its real effective exchange rate would move would depend on the strength of the US dollar, the Yen, and the Renminbi.

Of particular interest is how real exchange rate realignments would affect the demand for LICs' manufactured exports. Most LICs would face offsetting forces affecting their manufactured exports, and bilateral trade patterns are important in determining the outcome. In principle, demand for LICs' labor-intensive manufactures in deficit countries, particularly the United States, could rise, as Chinese exports (and those from other surplus countries) fall—even though the tradable sector in the United States, including some labor-intensive manufacturing, is likely to expand, which would generally reduce US demand for LIC exports. As China's tradable sector contracts, its own import demand for labor-intensive manufactures from LICs may rise, though China remains a relatively small import market for such products. However, if a country supplies upstream inputs to Chinese export industries, demand for its exports may actually decline. As noted earlier, there is uncertainty over how demand for labor-intensive products would change in the Euro Area, and more broadly in Europe.

How global rebalancing may affect world commodity prices is important for many LICs, but it is not clear a priori which way the prices would move. If, as discussed above, China's tradable sector is to contract and non-tradable sector to expand as a result of global rebalancing, its demand for commodities as intermediate inputs is likely to fall as the tradable

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<sup>9</sup> See Engler (2009) examines how the euro area may adjust to global rebalancing in a three-country model. Obviously, debt burdens in LICs would also be affected by exchange rate movements. The analysis of this is beyond the scope this chapter.

sector tends to be more commodity-intensive in production.<sup>10</sup> There may be additional effects of a short-term slowdown of growth in China as a result of a real exchange rate appreciation (see below). Offsetting China's falling demand for commodities is a likely increase in demand for them in the United States as the country's tradable and non-tradable sectors move in the opposite directions from China's. However, given that the US economy is less commodity-intensive than the Chinese economy (measured as the amount of commodity consumption per unit of output), global demand for commodities may fall. On the other hand, US exports consist of more heavy manufactures than Chinese exports. Thus, even though US manufacturing as a whole may be less intensive in commodities, its exports at the margin could be more intensive in commodities than Chinese exports. In sum, the impact of global rebalancing on commodity prices ultimately depends on the marginal intensity of commodity use in *all* the economies that adjust their production and exports in response to global rebalancing, as well as on global supply of commodities, which will depend in turn on how resources are re-allocated in response to relative price changes.

Beyond trade, a global rebalancing would affect global prices of factors of production, which would have direct implications for welfare. In the capital market, this would be reflected in the movements of global interest rates. If surplus countries were to see a decline in their saving that could not be fully offset by increases in saving in deficit countries, global real interest rates may increase, which would, other things being equal, reduce global investment. For LICs, this would imply higher financing costs. However, if saving in surplus countries were to remain unchanged and deficit countries manage to increase their saving, global rebalancing may result in an increase in global saving and in outbound capital flows to LICs over time (rather than reserve accumulation in surplus countries, which then recycle their saving back to deficit countries), including in the form of FDI. It would be in the interest of individual LICs to attract such investment to increase its domestic productive capacity.

In the labor market, it is likely that in deficit countries real wages in the tradable sector would increase and those in non-tradable sector decline, in line with the sectoral movement of overall resources. However, it is unclear how real wages would move in surplus countries depending on how structural adjustment is accomplished. In China, for instance, if the tradable sector contracts as a result of reduced external demand—for example as the United States reduces its import demand—then real wages in this sector would decline. If, on the other hand, a reduction in the tradable sector is a result of supply constraints (see Section V) and/or government policy to move out of labor-intensive manufacturing, e.g., through increases in minimum wages, real wages in the sector could rise relative to those in the non-tradable sector. However adjustment takes place in surplus countries, it is not clear how real wages in LICs will adjust. If global rebalancing leads to an overall increase in LIC exports, real wages in the tradable sector are likely to rise, with a potential increase in employment if

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<sup>10</sup> This is not clear cut. At its current stage of development, an expansion of China's construction, which is presumably quite commodity-intensive, could increase the country's overall demand for commodities.

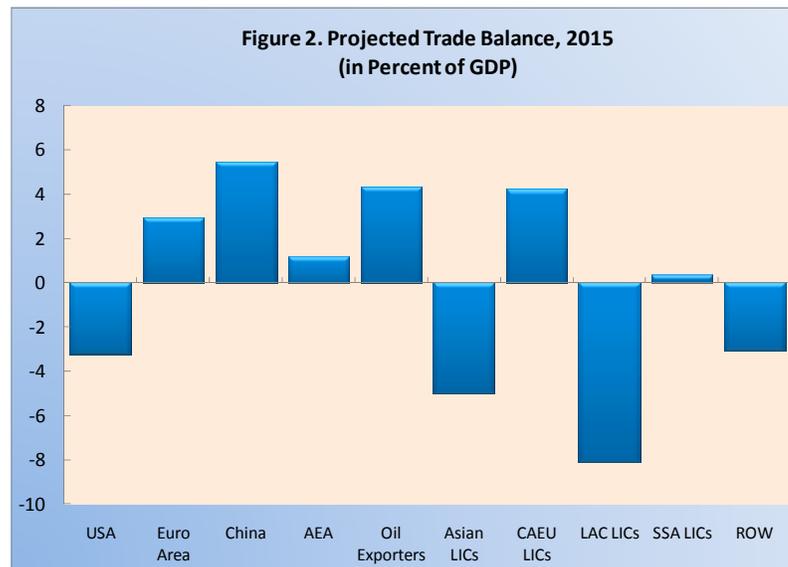
wage increases are moderated. In commodity exporters, wage developments in the tradable sector are likely to be dominated by global commodity prices.

#### IV. MEDIUM-TERM IMPACT

The analysis in the previous section shows that LICs are affected by multiple forces at the macroeconomic and sectoral level resulting from global rebalancing. To evaluate the impact of these forces on individual LICs or LIC groups one would need to take into account the interactions of these forces in a global general equilibrium setting. In this section, we employ the Global Trade Analysis Project (GTAP) model to examine the impact of global rebalancing on LICs. GTAP is a multi-region, multi-sector global general equilibrium model (Hertel, 1997). It belongs to the class of neoclassical trade models, such as those by Deardorff and Stern (1985), Shaven and Whalley (1992), with a focus on the medium-term impact of policy changes. It assumes constant returns to scale and perfect competition in product and factor markets. Consumers maximize utility and producers profits. The model is a comparative static framework and does not have forward-looking or intertemporal optimization behavior that characterizes modern macroeconomic models. The strength of the model is its rich sectoral details (e.g., input-output tables) and global coverage, including bilateral trade flows at the sectoral level.<sup>11</sup> More technical details of the model are provided in the Appendix.

The version of the GTAP used in this section consists of 10 countries/regions and 10 commodities.<sup>12</sup> Five major players in global rebalancing, namely, the United States, China, Other Asia (AEA), the Euro Area, Oil Exporters (including Russia) are explicitly represented, as are four low-income country groups: African LICs, Asian LICs, Latin and Caribbean (LAC) LICs, and Middle Eastern and European (CAEU) LICs. The remaining region is the rest of the world. The classification of 10

commodity categories is primarily based on the use of sector-specific resources (e.g.,



<sup>11</sup> For the modeling of global rebalancing using macroeconomic models, see Faruqee et al. (2005) and IMF (2010).

<sup>12</sup> This is the most detailed aggregation that one can run using RunGTAP without a source-code license for Gempack. The current GTAP database (version 7) allows aggregations with a maximum of 57 sectors/commodities and 113 countries/regions. The latest GTAP database is documented in Narayanan and Walmsley (2008).

agriculture with respect to land and mining with respect to natural resources) and factor-intensity in production (e.g., textiles and apparels, light and heavy manufactures, and various services). It is worth noting that the distinction between goods (more tradable) and services (less tradable) sectors is important in this analysis, as highlighted in the two-sector framework in the previous section.

In simulating various scenarios of global rebalancing, we first project the global economy from the model base year (2004) to 2015. This involves forecasting the accumulation of population and factors of production—labor, capital, land, and natural resource endowments. Our forecasts of population are based on UN population projections, and factors of production are based on Ianchovichina and Martin (2009). In projecting the global economy to 2015, we target the current account balances of all the major economies using the forecasts of the *World Economic Outlook* (April 2010), which assumes that considerable global imbalances will persist until 2015 (Figure 2). We use these forecasts as the baseline and examine how the global economy and individual economies would deviate from this baseline under various scenarios of global rebalancing.

### A. A Balanced Global Economy

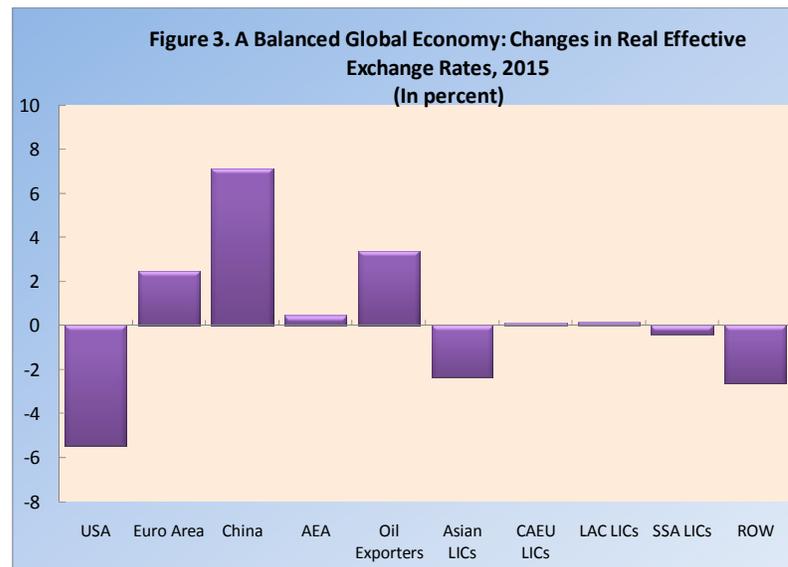
This is a hypothetical scenario in which current account imbalances in major countries/regions are completely eliminated by 2015. The objective of this exercise is to gain insights into the forces driving the impact of global rebalancing on LICs, rather than to produce accurate estimates. To simulate the impact of a balanced global economy, we impose a zero trade balance for all major economies—namely, China, the United States, the Euro Area, other Asian economies, and oil exporters—through necessary adjustment in the domestic saving and investment ratios. In all other economies, current account adjustment is endogenous. In the United States, we hold investment constant, which forces domestic saving to rise. In China the adjustment is primarily achieved by allowing a reduction in the domestic saving rate. In the remaining major economies, investment is expected to bear the brunt of adjustment, either increase or decrease, while the saving rate is held constant. We do not specify what specific policy measures would be needed to achieve these outcomes, as they will obviously vary from country to country.<sup>13</sup> Our primary interest here is to understand what a balanced global economy would imply for LICs, as major economies adjust to eliminate their current account imbalances. Under this scenario, we assume that overall employment in individual countries remains unchanged, so any changes in aggregate demand would be reflected in the movement of factor prices, including wage rates. While land and natural resources are specific to agricultural and mining industries, respectively, labor and capital can move across industries. Later on, we will explore how changing this assumption will affect the results.

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<sup>13</sup> Interested readers may want to refer to IMF (2010) and Blanchard and Milesi-Ferretti (2009).

Standard parameters for the GTAP model are used in all simulation exercises in this analysis. As with any modeling exercise, there is uncertainty over the magnitude of these parameters, which underpin simulation results. However, this analysis is aimed at obtaining qualitative insights rather than precise quantitative estimates. Changes in some parameters will alter results in a predictable direction. For example, lower elasticities of substitution between imports and home goods will result in larger changes in real exchange rates. Similarly, lower elasticities of substitution between factors of production will lead to larger changes in relative prices of products. Instead of speculating on technological flexibility with respect to input substitution, we will later on highlight the implications of structural rigidities that are more closely related to policies, notably, factor market rigidities.

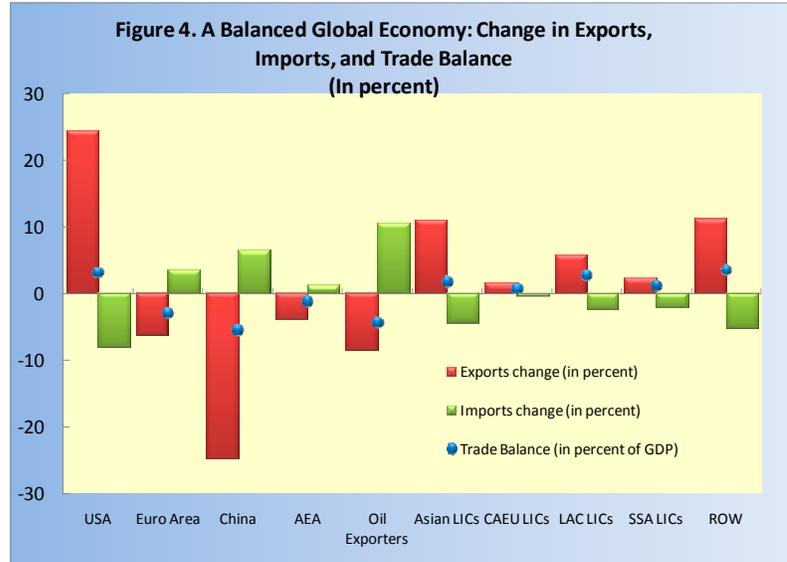
A global rebalancing as outlined above produces predictable results for real exchange rate movements in the major economies. Since GTAP is a real economy model, it does not have a nominal exchange rate variable.<sup>14</sup> However, real exchange rate changes can be gauged by some indicators. In Figure 3, we use the change in the GDP deflators relative to those of trading partners as a proxy for real exchange rate



movements. On this measure, the United States would see its real effective exchange rate depreciate by about 5½ percent, whereas surplus countries experience significant real exchange rate appreciations, with China’s appreciating by some 7 percent. By virtue of zero current account change for the world as a whole, the “rest of the world” is forced to reduce its current account deficit and its real effective exchange rate also depreciates considerably. For LICs, those in Asia experience a moderate depreciation while LICs in other regions see no significant changes in their real effective exchange rates. The key driving force for the real depreciation in Asian LICs is the increase in the world price of manufactures (see below), which leads to a decline in terms of trade for these countries and to lower consumption and investment, putting downward pressure on the prices of domestically produced goods.

<sup>14</sup> Thus all price changes are relative to the numeraire—the global average price of factors of production in this case.

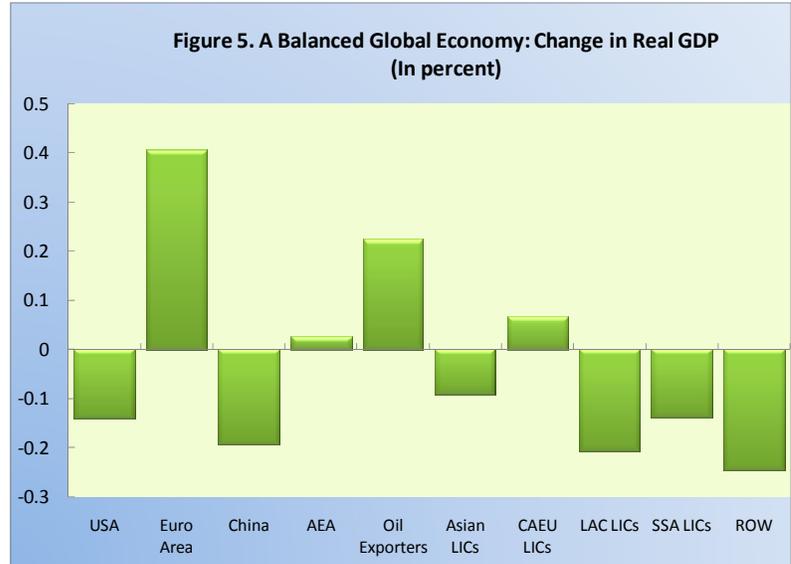
Global rebalancing would in general improve trade account balances in all LIC *regions* (not necessarily in all individual countries). The improvement in percent of GDP is the smallest in Central Asia and Europe and the largest in Latin America and the Caribbean (Figure 4). Underlying these improvements are increases in exports and decreases in imports. Exports to most major markets expand



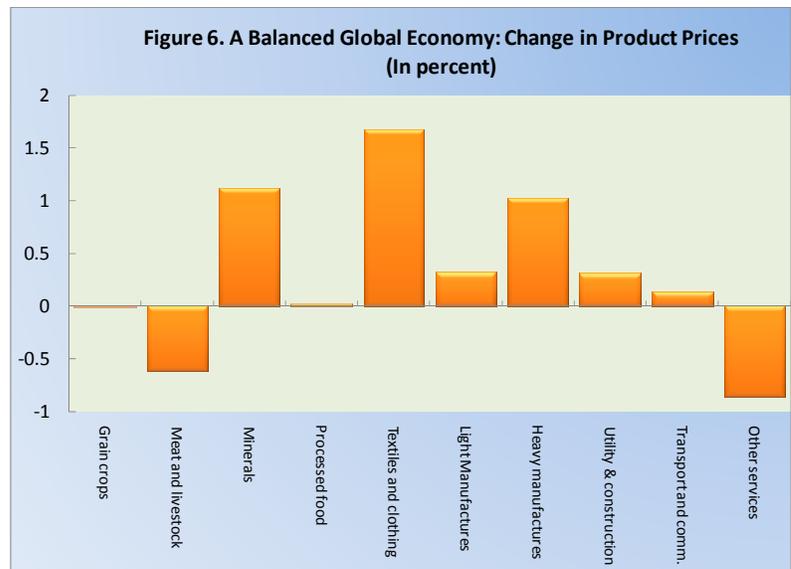
considerably except those to the United States, where a contraction in overall imports reduces demand from LICs, except for Asian LICs. China's export contraction, particularly in the United States, which is a key market for Asian LICs, gives Asian LICs more room to expand manufactured exports, despite an overall contraction of U.S. imports. Asian LICs also benefit more from their closer trade ties with China. Because of geographical proximity, trade intensity between China and the Asian LICs is considerably higher than between China and other LICs (see IMF 2011). So as China's imports expand, Asian LICs benefit the most, particularly in minerals, agricultural products and some services.

There is a downside to the improvements in the trade account in LICs. Without an increase in domestic saving, domestic investment would have to contract as the trade account improves. This highlights the importance of aid and other financial flows in maintaining investment in LICs in the process of global rebalancing. The good news is that global rebalancing does tend to raise the rate of return on capital as global capital scarcity tends to rise. This, together with a better prospect for labor-intensive exports, should help attract private capital inflows, including from BRICs (IMF 2011). As shown in IMF (2011), FDI in LICs by BRIC firms has increased rapidly and appears to be diversifying over time. The challenge is to sustain this trend and make best use of the investment.

Global rebalancing has limited impact on output, including in LICs (Figure 5). This result is largely driven by the assumption that employment remains unchanged and wages will adjust to clear the labor market. This is a somewhat extreme assumption about economic flexibility in the face of large external shocks. One can easily imagine that such shocks would lead to changes in employment if wages are not sufficiently flexible (see below).



The relative prices of manufactures increase as a result of global rebalancing. At the product level, prices for textiles and clothing increase most (Figure 6). This primarily results from a large contraction of exports from China, which is a dominant player in the world textile and clothing market. Prices for other manufactures strengthen for a similar reason, though China's impact on these commodities is smaller.



Somewhat surprisingly, prices for minerals also increase relative to most other products. This is driven by two related forces. Globally, there is an increase in the output of tradable industries, particularly that of manufacturing industries,<sup>15</sup> despite a large contraction of these industries in China. As manufacturing industries are generally more intensive in use of minerals than services industries, global demand for minerals increase. Moreover, within manufacturing, as exports from the United States and the “rest of the world” expand, there is a

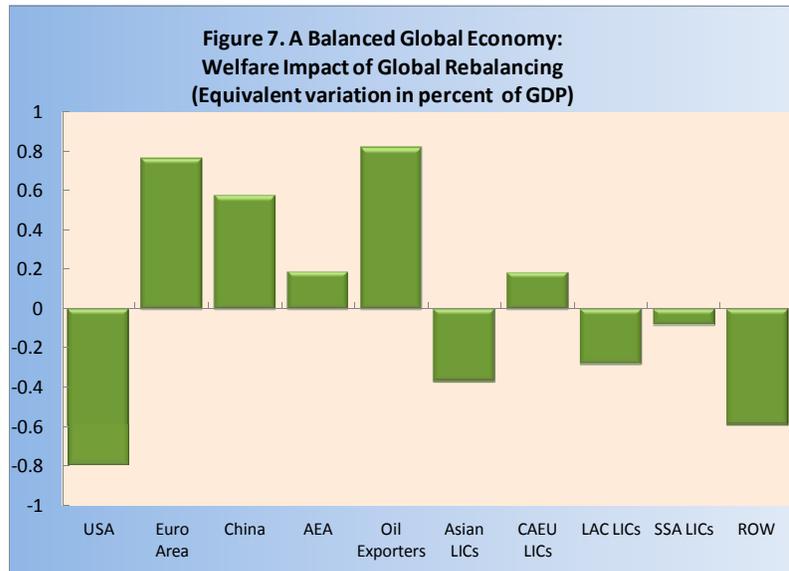
<sup>15</sup> The GTAP database does include trade in services. At the level of product/service aggregation used in this model, all goods and services are tradable at the margin. Thus, tradable and non-tradable are differentiated only by the degree of openness to trade.

shift from light to heavy manufacturing, which is more intensive in use of minerals. On the supply side, net exports of minerals from both China and oil-exporters contract,<sup>16</sup> as their overall exports fall with real exchange rate appreciation.

Relative price changes in the world market produce mixed terms of trade movements for LICs. LICs in SSA and Central Asia and Europe see a slight improvement in their terms of trade because their greater reliance on the exports of minerals. LICs in Asia and Latin America and the Caribbean suffer a decline in terms of trade, as increases in the prices of manufactured imports cannot be completely offset by the increase in the prices of mineral exports. Compared with LICs, advanced and emerging markets see much larger terms of trade movements. Not surprisingly, the terms of trade improves the most for China and deteriorates the most for the United States. The former results from the contraction of exports and the latter from the expansion of exports; both countries are large economies and have some market power.

Given the small impact on output, the terms of trade effects dominate the welfare outcome, as measured by equivalent variation (EV). For some countries, the terms of trade effect reinforces the impact on GDP while in others it offsets the impact. Overall, the welfare impact is rather limited. Among

LICs, those in Asia suffer the most, by some 0.4 percent of GDP, followed by LICs in Latin America and the Caribbean (Figure 7). LICs in Central Asia and Europe gain from global rebalancing, as a result of a slight GDP increase and terms of trade improvement. For LICs as a whole, combined welfare loss is on the order of US\$12 billion, equivalent to about one-tenth of global



ODA. The bulk of this loss is born by Asian LICs. The largest welfare impact of global rebalancing is seen in advanced and emerging market economies. The United States suffers a loss equivalent to 0.8 percent of GDP while all surplus countries gains, ranging from 0.2 percent of GDP in advanced and emerging Asia to 0.8 percent in the Euro Area and oil exporters.

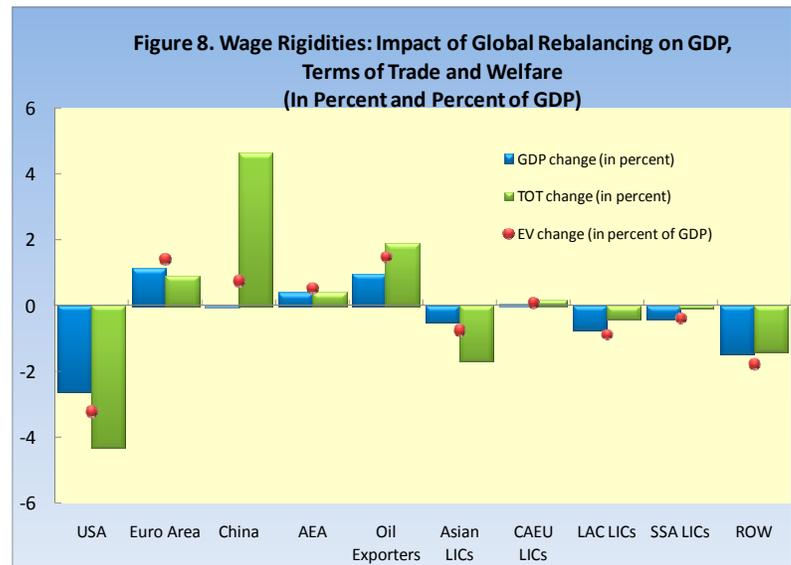
<sup>16</sup> China is one of the largest producers of minerals as well as one of the largest traders in the world.

A caveat is in order. It should be noted that the results presented so far represent static medium-term impact of global rebalancing; the long-term impact could be different. For instance, while LICs in SSA may suffer a medium-term welfare loss largely because of deteriorating terms of trade, longer-term impact could be positive if—as explained earlier—increased exports of manufactures could generate higher growth in the future as such exports tend to generate positive externalities through learning by doing and diversification.<sup>17</sup> Thus, global rebalancing may present LICs with a trade-off between a medium-term welfare loss and a longer-term gain. To reap the longer-term benefits, however, LICs will need to improve domestic supply response to take advantage of increased export opportunities. This will entail improvement in infrastructure and policy reforms (IMF 2011).

### B. The Importance of Structural Flexibility

In this subsection, we examine two scenarios to shed light on the implications of structural rigidities for the outcome of global rebalancing. The first scenario involves full indexation of wages to the consumer price index, and the second relates to immobility of labor and capital between industries. There are of course many types of structural rigidities in any economy. The purpose of this exercise is not to examine all possibilities, but rather to highlight how the outcome of global rebalancing may change if structural adjustment is impeded by rigidities of key economic variables. Both scenarios examined here could reflect short-run constraints on economic adjustment, but they could also result from government policies or institutional arrangements. In the case of real wage rigidities, the burden of adjustment is on the level of employment, and in the case of labor and capital immobility between industries, product prices will have to play a larger role in clearing markets as supply response at the sectoral level will be constrained by resources available.

Simulation results suggest that wage rigidities significantly amplify the effects of global rebalancing on all countries. Specifically, deficit countries suffer larger output and welfare losses, while surplus countries enjoy larger gains (Figure 8). This is because for deficit countries, to eliminate current account deficits, real wages have to decline to make exports sufficiently competitive to eliminate current account deficits. Downward real wage rigidities

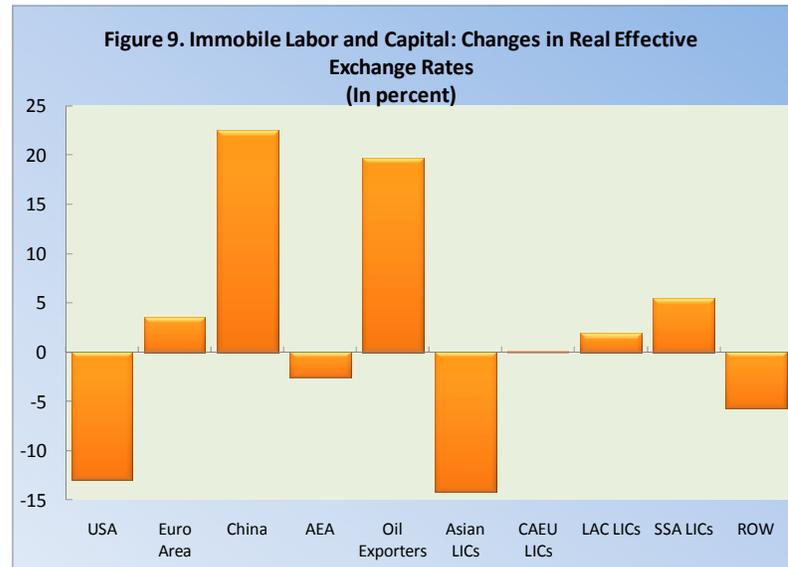


<sup>17</sup> See Yang (1997) for an empirical attempt to quantify such externalities in a general equilibrium setting.

therefore reduce employment and hence output. The pressure is opposite in surplus countries, where upward wage rigidities would prevent real wages from rising and would therefore generate additional employment. Such real wage rigidities may not be relevant for particular countries.<sup>18</sup> However, where unemployment exists in surplus countries, wage restraints would expand employment opportunities. The situation in most LICs is similar to that of deficit countries as their real exchange rates too tend to depreciate during a global rebalancing. Thus, it is not surprising that real wage rigidities also lead to a larger loss in LICs (those in Africa, Asia, and Latin America and the Caribbean) or a smaller gain (those in Central Asia and Europe).

The above results highlight the importance of economic flexibility in general in the process of global rebalancing. This importance can be further illustrated in the second experiment in which labor and capital are immobile across sectors in addition to fixed real wages. In this case, as resources cannot readily move across industries in response to external shocks, price adjustments, including real exchange rate movements,

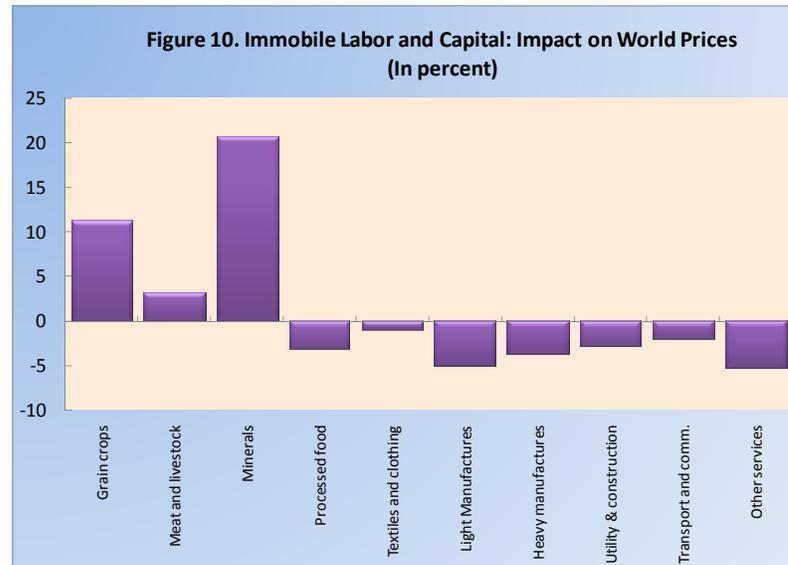
have to be much larger (Figure 9).<sup>19</sup> For instance, the real effective exchange rate of the US dollar would depreciate by as much as 13 percent, while the Chinese RMB would appreciate by 22½ percent in real terms. Among the LICs, those in Asia would see a sharp depreciation and those in Africa, a significant appreciation.



<sup>18</sup> The assumption of two-way wage rigidities is partly dictated by the constraints imposed by RunGTAP without a source-code license.

<sup>19</sup> A similar scenario is also highlighted by Dekle et al. (2008), who showed that the US dollar could depreciate by as much as 30 percent on real effective terms if global imbalances are completely eliminated.

Prices for resource-based commodities increase sharply as a result of resource immobility (Figure 10). When labor and capital are mobile across sectors, a contraction of manufacturing industries in surplus countries releases resources for the expansion of agricultural and mineral production. Similarly, agricultural and mining industries receive resources from contracting service industries in deficit countries.



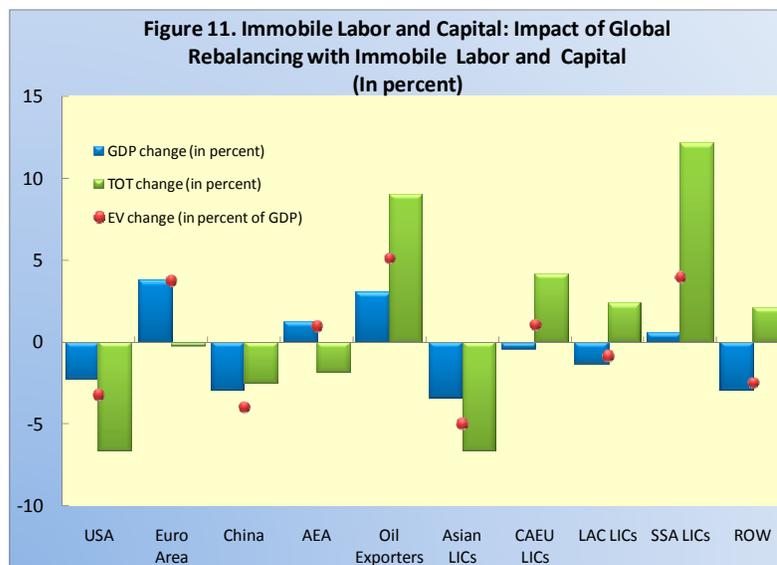
When there is no such resource mobility, agricultural and mineral production cannot meet the incipient demand in major economies,<sup>20</sup> including China, the United States, and the “rest of the world”. In the case of China, this leads to substantial increases in the imports of these products, pushing up world prices. Together with a real exchange rate appreciation, the Chinese CPI increases sharply,<sup>21</sup> and wage indexation to the CPI make Chinese workers too “expensive”, and employment of unskilled labor fall sharply as labor-intensive manufacturing industries contract. Because of higher mineral and agricultural prices China’s terms of trade worsen substantially, in contrast to an improvement when resources can move across sectors. In the United States, its capacity to expand manufactured exports is severely curtailed by labor immobility, forcing even a larger reduction in the employment of skilled workers. On the other hand, the downward pressure on the employment of unskilled workers is reduced as service industries contract less.

<sup>20</sup> Recall in the previous section that global rebalancing tends to increase demand for minerals, as reflected in the relative increase in the world prices of minerals.

<sup>21</sup> Note this is relative to the numeraire, not over time. Also, because there is no nominal exchange rate in the model, a real appreciation is solely reflected in the rise of domestic prices. In a flexible exchange rate regime, such CPI increases would be reflected in the appreciation of nominal exchange rates.

Sectoral resource immobility also produces polarizing macroeconomic effects on LICs (Figure 11). For Asian LICs, which are mostly net importers of primary commodities, higher mineral and agricultural prices significantly worsen their terms of trade. At the same time, a limited contraction of Chinese exports of labor-intensive manufactures generates less demand for these countries' exports in

third country markets. More importantly, with the CPI falling less than domestic output prices, wage indexation increases effective labor costs and significantly reduces employment, leading to a large GDP contraction. GDP also falls in Central Asia and Europe, and Latin America and the Caribbean, but it increases slightly in Africa, with major contributions from agricultural and related industries.



This scenario represents a somewhat extreme circumstance and probably underestimates the flexibility of the world economy. Nevertheless, the results presented above serve to highlight the risks that structural rigidities may pose to global rebalancing, or disruptions that a disorderly rebalancing can create. Such rigidities could produce large changes in relative prices and hence volatile global prices. The large real exchange rate adjustment required could be disruptive if not well managed, and potential increases in structural unemployment could pose a challenge. For most LICs, labor market rigidities are unlikely to be a key issue, but large terms of trade shocks could increase economic volatility, particularly given relatively underdeveloped financial markets that could impede rapid movement of capital across sectors.

### C. A G-20 Scenario

This subsection examines the implications of a G-20 Mutual Assessment Process scenario. We focus on the so-called upside scenario that reflects collective action of G-20 countries that goes beyond what is assumed in G-20 policy frameworks. The scenario represents an enhanced effort to achieve “strong, sustainable and balanced growth” (IMF 2010). Unlike the previous scenarios analyzed so far, this scenario assumes that global imbalances will persist into the future, even though they will decline over time. This perhaps represents a more “realistic” outcome for the global economy in the medium term. In the original IMF assessment of this scenario, the results are presented against a baseline refined from the submissions of G-20 countries. Because of data limitations, only five broad countries/country groups—the United States, Euro Area, Japan, Emerging Asia, and the rest of the World—were included in the model-based assessment. In the current exercise that focuses on LICs, we

use the WEO projections as the baseline, as in the previous simulations. In other words, we examine what the collective action that goes beyond G-20 policy frameworks would imply for LICs, measured against the April 2010 WEO projections.

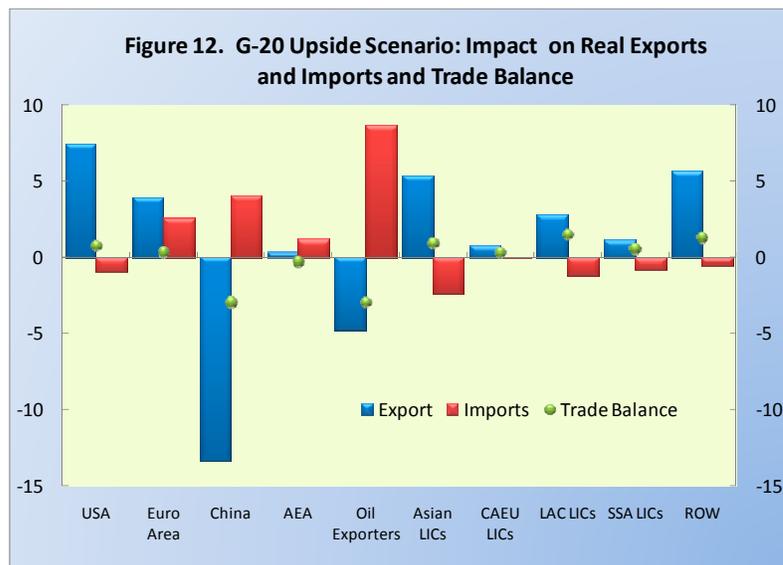
IMF assessment shows that this upside scenario brings substantial economic benefits to the world economy. Global GDP will be higher by around 2½ percent over the medium term while significant progress will be made toward global rebalancing (Table 5). In our simulations, we take these results as given and impose them as exogenous shocks. To evaluate the implications for LICs of these shocks, we do not introduce any policy changes in LICs so that any impact on them will be effects of “spillovers.” To be consistent with the IMF results of higher employment, we set real wages constant in all countries in the simulations so that as productivity increase, demand for labor rises. We also set the same target of the current account adjustment for China and oil exporters as for Asian emerging economies. The current account in the “rest of the world”, which has different country coverage from the IMF assessment, is endogenously determined to ensure that global current account changes add to zero.

Table 5. Macroeconomic Impact of the G-20 Upside Scenario

Country/region	Real GDP (Percent)	Current Account (Percent of GDP)
United States	3.0	0.8
Euro Area	4.5	0.4
Japan	2.5	1.2
Emerging Asia	1.4	-2.9
Rest of the World	2.1	-0.2

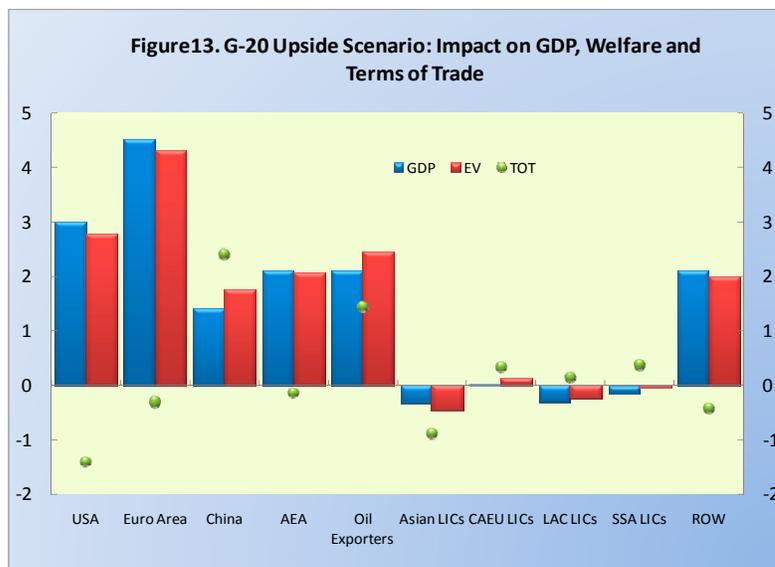
Source: IMF, “G-20 Mutual Assessment Process—Alternative Policy Scenarios”, June 2010, International Monetary Fund, Washington.

Simulation results suggest that the G-20 upside scenario would help narrow the trade deficits in LICs. The largest improvements in the trade balance are seen in Latin America and Asia, on account of robust export expansion almost across all major export markets (Figure 12). The GDP expansion in G-20 markets as a result of collective action and structural reforms play an important role in narrowing



LICs' trade deficits by increasing export demand. Although exports expand in all LIC regions, the results are shaped by the export patterns. For Latin America and the Caribbean, increased exports of textiles and apparels to the United States and a rise in other manufactured exports across all major markets account for the bulk of the overall export expansion. For LICs in SSA and Central Asia and Europe, it is the mineral exports that drive the overall export increase, though exports of textiles and apparels also increase, starting from a relatively low base. In contrast, export expansion in Asia LICs is based on a broad range of manufactured products, including textiles and apparels.

The impact on LIC output of the G-20 upside scenario is generally limited. As in the experiment in which global imbalances were completely eliminated, GDP declines slightly in all LIC regions except in Central Asia and Europe (Figure 13). Welfare changes follow a similar pattern. In the case of Asian LICs, worsening terms of trade exacerbate the output contraction, but in other regions even an improvement



in terms of trade is unable to offset the effect of output declines, leading to small overall welfare losses. A separate experiment with flexible real wages in LICs shows similar welfare results. In this case, even though the negative impact on GDP is smaller, terms of trade deterioration results in a slightly larger welfare loss in most regions. A further experiment with sectoral immobility of labor and capital confirms the results in the previous subsection—relative price (including real exchange rate) changes increase substantially and this has a polarizing effect on LICs regions. As a result, LICs in SSA may benefit from a sharp increase in the prices of minerals, while output and welfare losses are amplified in LICs in other regions.

It should be noted that the same caveat on the results for the balanced global economy scenario also applies here. Specifically, the medium-term welfare impact should be balanced against the potential longer-term, dynamic benefits for LICs in terms of greater opportunities to export manufactured products and attract more FDI. Moreover, if LICs respond to global rebalancing by accelerating reforms, there would be additional benefits in the form of faster productivity gains.

## V. LONG-TERM IMPLICATIONS

The above analysis suggests that global rebalancing is likely to make labor-intensive manufactured exports from LICs more competitive. In principle, industrial upgrading in emerging market economies, particularly in China and India, should provide increasing opportunities for LICs to increase their manufactured exports. Global rebalancing can be viewed as an accelerated phase of this long-term process. Some authors suggest, however, that this process cannot begin until Asian exporters graduate from labor-intensive markets. Collier (2007) contends that the bottom billion—a group of stagnating LICs—has missed the boat in the global relocation of labor-intensive manufacturing; their last chance was before the late 1970s when China began to open up. Similarly, Goldstein et al. (2007) argues that the emergence of China and India has re-enforced Africa's comparative advantage in the production of resource-based commodities and the continent now runs the risk of falling into a trap of resource dependence.

There appears to be a dilemma. When commodity prices had been chronically weak for a long time before their surges in recent years, unfavorable terms of trade was considered a key constraint on growth in resource-dependent LICs.<sup>22</sup> Now that global commodity prices are strong and may stay so in the long run, the fear is that LICs may have to face an acute Dutch Disease problem.

This dilemma should be viewed from a dynamic, long-term perspective. The current reliance of many LICs on commodities is a phase of development that many present emerging market economies went through. Resource-rich LICs have little choice but to exploit their comparative advantage in the production of commodities. The real issue is not whether to rely on commodity exports at this stage—commodity booms over the past decades have already boosted growth (IMF 2011); rather, it is how to make best use of the revenue from resource exports. These countries should use the revenue to build up physical and human capital and productive capacity to ready themselves for the next phase of development as comparative advantage evolves. For non-resource-rich LICs, the competitive pressure they have faced over the past decades should gradually diminish as some major emerging market economies such as China move up the market. It is likely that this evolution will be accelerating with global rebalancing. In fact, there always have been opportunities for LICs and some of them have succeeded in diversifying into manufactured exports.

Textiles and clothing have often been a spearhead of such export diversification, and how well countries do in exporting these products can be a good indication of their progress. Starting with Japan, many Asian countries have been able to take advantage of the high labor-intensity of these products and begun diversify away from primary commodities. Japan's dominant

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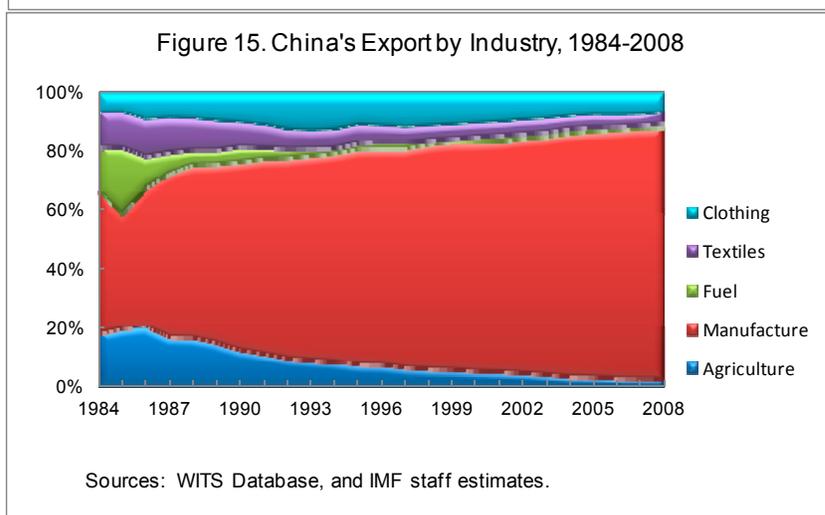
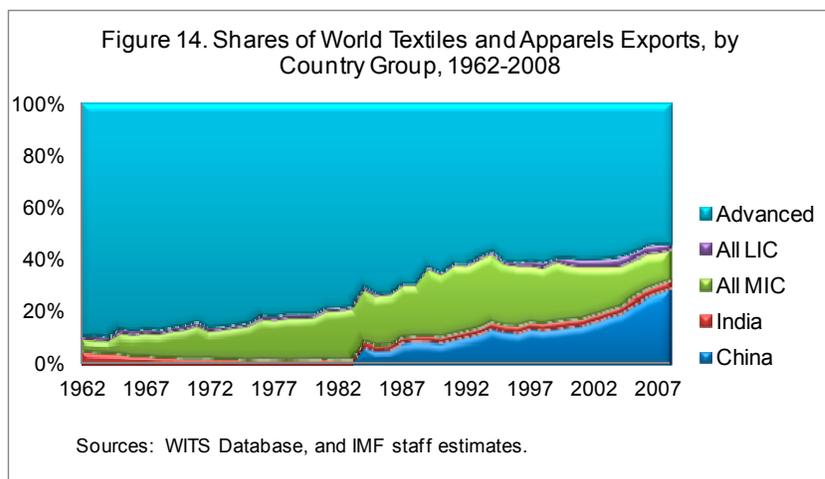
<sup>22</sup> This concern was backed up by the growth literature which find that a growth accelerations are preceded by a terms of trade improvement (See Hausmann et al., 2007)

position in the 1950s and 1960s was gradually replaced by the Asian newly industrialized economies (the Hong Kong SAR of China, the Republic of Korea, Singapore, and the Taiwan Province of China) and the more advanced ASEAN countries (Indonesia, Malaysia, and Thailand) in the 1970s and 1980s. China began to increase its competitiveness in textile and clothing exports in the late 1970s. Thirty years on, there are signs that China is diversifying out of the most labor-intensive segments of manufacturing. Meanwhile, several Asian LICs, namely, Bangladesh, Vietnam, Cambodia, and the Lao PDR, have managed to increase their exports of textiles and clothing since the late 1990s. This suggests that LICs do not have to wait until China and other emerging market economies substantially move out of markets for labor-intensive products. History shows that breaking into a new market is as much a “push” process as a “pull” process. China emerged as a competitor while NIEs and ASEAN were still well positioned in the market. Cambodia, Madagascar, and Bangladesh have emerged while China is still dominating.

Is China really moving out of labor-intensive manufactured exports, such as textiles and apparels? Measured by its share in the world market, China is not (Figure 14). As a share of China’s total exports, however, textiles and apparels are clearly in the decline (Figure 15). It is the sheer pace of overall export expansion that keeps China’s world market share rising. However, recent developments suggest that the growth of labor-intensive exports is likely to slow. First, wage increases in China (particularly on the coast) have accelerated after a short period of freeze during the global financial crisis. Minimum wages have recently been raised by as much 20 percent in several coastal cities. There are signs that the supply of unskilled labor is tightening, both as a result of tremendous labor absorption over the past three decades and of an expected decline in the young labor force.<sup>23</sup> Thus, the recent wage increases are unlikely to be one-off. Moving manufacturing activities further inland will slow wage increase, but this is only a medium-term solution if China is indeed running out of unskilled labor for continuous rapid export expansion (Cai and Wang, 2008). Second, as China moves to rebalance its growth to rely more on domestic markets, resources will increasingly shift from manufacturing to services, as the simulations have shown.

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<sup>23</sup> See “Is China’s labor market at a turning-point?” *The Economist*, June 12, 2010, page 86.



The experience of Asian emerging economies (including China) suggests that FDI can play a catalytic role in accelerating labor-intensive exports. Specifically, FDI can provide the necessary managerial skills and marketing networks that would plug LICs into global value chains. In this regard, LICs can benefit from closer economic cooperation with emerging market economies, such as BRICs. Improvements in infrastructure with financing from BRICs would help attract export-oriented FDI by reducing the cost of exporting. As discussed in IMF (2011), FDI inflows from BRICs have been increasing rapidly in recent years and are diversifying. If the investment climate continues to improve in LICs, this trend is likely to continue. There is evidence that FDI from developing countries is less risk-averse than that from advanced countries (Darby et al., 2009). This makes FDI from BRICs, and developing countries in general, more likely to move to LICs. In addition, FDI from BRICs can bring more appropriate technology that is more in line with relative costs of labor and capital.

Current BRIC policies are generally conducive to FDI and other forms of financial flows to LICs. At the political level, BRICs appear to have attached strategic importance to their

economic ties with LICs, particularly with those in Africa, and have shown high-level commitment to strengthening these ties.<sup>24</sup> This commitment has been backed by increases in public resources allocated to increasing trade and investment. To the extent that these resources are used to subsidize development financing in LICs, they should help boost investment in LICs. BRICs, particularly China, have also been involved in building several industrial parks in Africa. The World Bank is in discussion with China to set up low-cost factories in new industrial zones in Africa to help the continent develop a manufacturing base. Given the past experience with similar initiatives in Africa—and indeed in other parts of the world—there are obvious risks to this approach. However, there are at least two key differences this time around: (i) macroeconomic conditions and public resource management have improved considerably in many African countries over the past decade; and (ii) the private sector seems to be playing a much prominent role than in the past—the process is more demand-driven. There is no doubt that this is another huge economic experiment: it faces considerable risks but its potential payoffs can be path-changing.

## VI. CONCLUSIONS

LICs have played no role in the emergence of global imbalances, yet global rebalancing could have a significant impact on their economies. This impact would likely be felt through changes in major bilateral exchange rates, interest rates, product prices, and associated trade and financial flows. An effective global rebalancing would entail significant structural adjustment in most of the major economies, including major emerging market economies. While adjustments in industrial country markets would have a dominant impact on LICs given their continued dependence on these markets, increasing linkages between LICs and emerging market economies (e.g., BRICs) are expected to shape the overall impact significantly, especially in the long run.

Global general equilibrium analysis suggests that LICs in general are likely to see an improvement in their current account balances as a result of global rebalancing. Losses of exports as a result of contracting demand in the United States and some other deficit countries are more than offset by increase in exports to other countries. China plays a key role in this result: both increases in its imports and contractions in its exports to the world market help accommodate LICs' export expansion, particularly of manufactured goods. However, there is a downside with this current account improvement. With little chance for domestic saving to rise in LICs, domestic investment could fall if aid and other financial inflows do not increase. Moreover, the terms of trade for most LIC regions are likely to deteriorate and this can lead to welfare losses in the short to medium term. This can have a disproportionately adverse effect on the poor as prices of imported consumer goods, such as textiles and apparels, rise.

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<sup>24</sup> Freemantle and Stevens (2009) highlight the frequent visits to Africa by BRIC leaders.

In managing global rebalancing it is critical to maintain economic flexibility. Global rebalancing requires large adjustments to the structure of major economies, particularly between tradable and non-tradable industries as reflected in changes in relative prices, including real exchange rates. Inflexibilities at country level in major economies can feed onto global outcomes and this can have major implications for LICs. For instance, factor market inflexibilities, such as wage rate rigidities and inter-sectoral immobility of labor and capital, would result in large changes in real exchange rates and relative prices by reducing the supply response of the global economy. This would lead to far larger redistribution of global welfare through changes in terms of trade and employment, and some LICs regions could suffer significant losses in the short to medium term as a result.

If these short-medium term risks are well managed, global rebalancing could provide a unique opportunity to accelerate export diversification and boosting long-term growth in LICs. The competitiveness of LICs' labor-intensive manufactured exports would improve as China rebalances its growth toward domestic demand and as its industries upgrade. This could provide more than just a one-off improvement in LICs' competitiveness. The rise of labor cost in China appears to be accelerating and this over time will erode the country's competitiveness in labor-intensive manufactured exports. If LICs can continue to improve their investment climate by improving infrastructure and strengthening the policy and regulatory framework, more FDI could flow from emerging markets, particularly China and India. These countries' current policies toward LICs are encouraging such flows. Their financing of key infrastructure projects are alleviating supply bottlenecks, and their government's promotion of investment in LICs—including using public resources—would help boost FDI (IMF 2011). Firms in emerging markets are generally well integrated into global supply chains, their participation in manufacturing and IT services could greatly reduce the entry cost for LICs.

Countries that are able to seize upon these opportunities may well be riding on potentially another wave of global relocation of labor-intensive manufacturing. Many LICs have missed such opportunities in the past and some will continue to miss in the future. Whether a LIC can get on board this time around is probably not determined by how competitive it is relative to its emerging market forerunners; it is a country's competitiveness against its LIC peers that is likely to be more decisive as more opportunities arise. Thus, accelerating domestic reforms to improve the investment climate would be critical.

### **Appendix. Modeling Global Rebalancing Using the GTAP Model**

The Global Trade Analysis Project (GTAP) model used in this analysis is a comparative-static global general equilibrium model based on neoclassical trade theory (Hertel, 1997). Firms are assumed to maximize profits. Production exhibits constant returns to scale, and both product and factor markets are perfectly competitive. Each industry produces a single commodity using intermediate inputs (in fixed proportions—the Leontief technology) and a primary factor composite, which is a constant elasticity of substitution (CES) function of land (used in agriculture only), unskilled labor, skilled labor, capital, and natural resources (confined to mining). Intermediate inputs are CES blends of home products and imports, which are sourced from all regions in a CES manner (the Armington approach).

Expenditure in each region consists of household and government consumption, and the remaining national income goes to savings. Households maximize their utility based on a non-homothetic constant difference in elasticity (CDE) function. Public consumption claims a fixed proportion of national income, as do savings, unless determined otherwise. All goods and services purchased by households and the government are CES combinations of home products and imports.

All regions contribute their savings to a global savings pool managed by a global bank, which purchases capital goods in each of the regions on behalf of world savers. The allocation of investment among regions is based on regional expected rates of return, which in turn reflect projected productivity growth and factor accumulation. While capital (i.e., savings) is mobile across regions, the capital stock is not—although it can be perfectly mobile within a region, as is labor. Land and natural resources are sector specific.

In simulating the impact of global rebalancing, we first undertake a benchmark projection for the global economy in 2015 based on forecasts of key macroeconomic variables broadly consistent with those of the IMF *World Economic Outlook* (April 2010) (GDP and current accounts), World Bank (factors of production), and United Nations (population). The GTAP database version 7, as documented by Narayanan and Walmsley (2008) was used as the starting point for projection. Counterfactual experiments are then conducted to assess the impact of global rebalancing. In these experiments, trade balances of individual countries and regions are eliminated (exogenously) to create a more balanced global economy through changes in the saving-investment balance in the capital account. All simulations employ standard GTAP values for all elasticities (see the table below for some key parameters), and use the free-download version of the model available at <https://www.gtap.agecon.purdue.edu/>.

A 10-region, 10-sector aggregation of the model was chosen. The selection of regions was based largely on the role of each country and region in global rebalancing in line with discussions in the literature. LIC regions are separately identified to enable us to evaluate the impact of global rebalancing. The sectors identified in the model are largely based on factor

intensity, with a view to highlighting the movement of resources between tradable and non-tradable sectors and structural changes at the industry level as the global economy rebalances.

Key Elasticities of Substitution

	Elasticity of substitution between factors of production	Elasticity of substitution between home goods and imports	Elasticity of substitution between sources of imports
Grain crops	0.3	2.6	5.0
Meat and livestock	0.5	3.1	7.2
Minerals	0.2	5.1	11.8
Processed food	1.1	2.1	4.3
Textiles and clothing	1.3	3.7	7.5
Light manufactures	1.3	3.3	6.6
Heavy manufactures	1.3	3.5	7.4
Utility & construction	1.4	2.1	4.6
Transport & communication	1.6	1.9	3.8
Other services	1.3	1.9	3.8

Source: GTAP database, version 7.

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