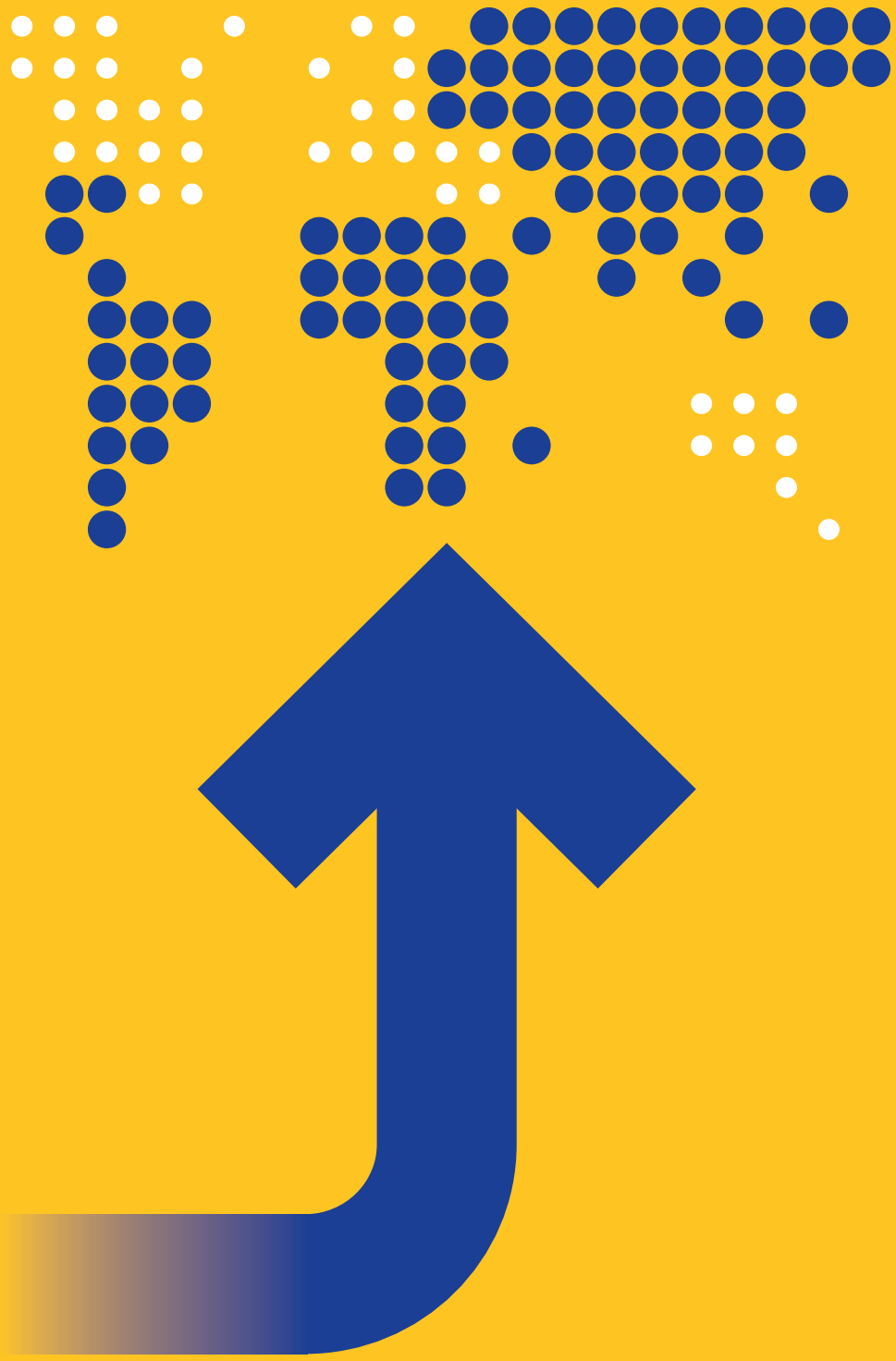

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JAPAN INTERNATIONAL COOPERATION AGENCY

JICA TICAD VI
Policy Papers

The impact of commodity terms of trade in Africa: Curse, blessing, or manageable reality?

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JICA

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Preface

The global economic environment at the time of TICAD VI (2016) is much less favorable than that prevailing at TICAD V (2013) when JICA presented a long-term vision—*Africa 2050: Realizing the Continent's Full Potential*—based on Africa's increasing convergence with the rest of the world. These changed circumstances have major implications for African policy makers.

This paper is one of six commissioned by JICA for TICAD VI to draw out these implications and suggest ways to move forward. The other five are:

- *Africa 2050 update*
- *Africa's inclusive growth challenge: Reducing deprivation and creating jobs*
- *Infrastructure in Africa*
- *Economic diversification of African economies*
- *Regional economic integration in Africa*

We are confident that the papers will contribute to a fruitful dialogue among the Heads of State at TICAD VI. In addition, we hope that they will foster the concerted action by African policy makers needed to assure that Africa continues to converge with the rest of the world and, in doing so, meets the aspirations of its people.

Hiroshi Kato
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This paper was prepared by Claudio Loser and Ieva Vilkelyte.

Executive summary

Africa's trade links with the rest of the world are based on commodity exports. In 2014 commodities represented about 76 percent of African exports, up from 71 percent in 1995 and down from a peak of 82 percent in 2011. The sharp increase in commodity prices that began in the early 2000s resulted in a marked improvement in terms of trade.

Terms of trade increased by more than 90 percent from 2000 to 2012 for all of Africa. Since then commodity exporters' terms of trade have declined despite a very moderate recovery in mid-2016. Terms of trade still remain higher than they were at the turn of the century, giving the false impression that conditions still favor Africa.

The evidence, however, suggests that the commodity-driven prosperity has ended or, at best, has been interrupted for a long time to come. The reversal of prices is having a major adverse impact on both disposable export income and output, through the multiplier effects of lower exports.

Economic growth in all Africa has slowed significantly. Average growth rates have declined from 5 percent a year during the period 2000-2012, to 3.4 percent during 2013-15, and further in 2016. The decline was even sharper among the countries with higher export concentration. For these countries, the average rate of growth was cut in half to 3.1 percent.

The effect of terms of trade on real income is dramatic. For Africa, the direct effect of changes in terms of trade changes on income over the period 2000-12 was a positive 1.3 percent of GDP a year; but in the subsequent 3 years it was a negative 1.5 percent.

In recent years, per capita GDP (the standard measure of output) has risen but at a sharply declining rate. Furthermore, per capita real disposable income, which had been growing at an annual rate of about 4 percent, has been stagnant in the last three years. For the highly concentrated exporters, the annual loss in potential per capita income has been at least 1 percent.

Of equal importance, per capita GDP growth in Africa has been consistently below that of the world since at least 2010. It also has been below that of the advanced countries for the last three years, as has been the case for Latin America and the Middle East.

Some of these losses have not been realized fully because of unsustainable macroeconomic and foreign borrowing policies. These policies cannot be sustained, and the actual losses will catch up even if terms of trade do not deteriorate further. The complacency engendered by the relatively high GDP growth rates is misplaced, given the very rapid rate of population growth in Africa both in absolute terms and as compared to most other regions of the world.

On the basis of the analysis presented in this paper, a further decline or even stable terms of trade can be expected to have a significant negative effect on African economies. If terms of trade in Africa were just to stabilize in the future, GDP growth rates would tend to fall to the trend growth rate of 3.6 percent as the multiplier effect would disappear.

A further decline in terms of trade of 5 percent for all of Africa would entail an initial decline in income and a significant decline in the rate of growth in per capita GDP, possibly to zero or even negative. A decline in terms of trade of the magnitude suggested here is far from unusual. Moreover, there are only limited prospects for increases in commodity prices on a general basis in either the near or long term.

In recent years, countries throughout Africa have reacted differently but in general have followed an unsustainable path. At present, the slowdown in activity is becoming more marked and is being accompanied by declines in reserves and increased market borrowing (although the sources of financing are drying up). Furthermore, there has been a clear trend of appreciation of African currencies. This policy approach needs to be modified urgently.

Many policy-makers believe they are choosing between continued growth on the basis of present policies, or painful

It is imperative for the African countries, both highly concentrated exporters or more diversified economies, to focus on macroeconomic sustainability.

adjustment, usually imposed from outside. However, adjustment is inevitable. The real choice is between orderly and internationally supported correction and disorderly and disruptive crisis if current policies continue.

It is imperative for the African countries, both highly concentrated exporters or more diversified economies, to focus on macroeconomic sustainability. It is important to promote physical investment and human capital formation. In today's adverse circumstances, and particularly given the fragile fiscal positions and mounting debts of many African countries, these policies are only possible if the economy adjusts to a sustainable path.

It is difficult to design a single macroeconomic policy framework for all African countries. Each country will need to pursue sound fiscal policies along with strong monetary policies, consistent with debt and balance of payments sustainability, in order for GDP to expand rapidly and equitably on a sustainable basis.

Fiscal policy must be put in place immediately to reduce existing public sector deficits and to arrest the observed increases in public debt and declines in foreign reserves in most of the continent. This policy change should include streamlining of expenditure, elimination of tax exemptions, better enforcement and a streamlining of the tax system. It is also essential to start designing stabilization mechanisms and wealth management funds. Even though it is difficult to start their operations now, these programs will help consolidate the fiscal situation in the long run.

Monetary policy will need to be highly disciplined to avoid an acceleration of inflation and a weakening of the balance of payments, which would only make the situation worse. In addition, African currencies have appreciated, initially on account of high export prices and subsequently from unsustainable capital inflows, so measures to strengthen competitiveness and foster exchange rate depreciation are also essential.

Time is of the essence, and a conscious break with a policy of shortsighted comfort is required. Each individual African country must recognize and address the implications of the current situation for its economy and its citizens, if a sharp and disorderly adjustment process is to be avoided.

The impact of commodity terms of trade in Africa: Curse, blessing, or manageable reality?

Claudio Loser & Ieva Vilkelyte

Introduction

Africa, like Latin America and the oil-producing areas of the Middle East, developed its trade links with the rest of the world on the basis of commodity exports. Over time some countries like Brazil, China, India, Mexico and South Africa have developed more advanced economies, more advanced technology, and more complex industrial exports. Nonetheless commodities remain at the center of their exports. In 2014, commodities represented about 76 percent of African exports, up from 71 percent in 1995 as prices and output went up sharply, but down from a peak of 82 percent in 2011.[1] These numbers for 2014 and 1995 for Latin America and the Caribbean were respectively 51 and 54 percent, and for the Middle East, 69 and 75 percent.

The increase in commodity prices, well over that of these regions' average import prices (even though these also include commodities), resulted in a marked improvement in terms of trade (price of exports relative to price of imports). Terms of trade increased by more than 90 percent from 2000 to 2012 for Africa, 37 percent for Latin America and the Caribbean, and about 75 percent in the Middle East. Since then, terms of trade for commodity exporters have declined, even after a moderate recovery in mid-2016, although relative prices remain higher than at the turn of the century. The impact of these enormous changes in relative prices has been a transfer of resources greater than any in the last thirty years. The rise of China and India, as well as the Newly Industrialized Countries of Asia (NICs) and other Asian countries, had resulted in a boom in demand for commodities, even as supplies were growing worldwide. Accordingly, African prosperity appeared to consolidate.

The major issue that the commodity-exporting countries face today is that most evidence suggests that this commodity-driven prosperity has ended, or at a minimum, has been interrupted for a long time, changing the perceived paradigm of the last decade. The key questions are how are the African economies being affected and reacting to this, and what can be done, if anything, to alleviate the process of adjustment. The answers are far from straightforward. The current reversal of prices is having a major adverse impact on income, and thus on output, through the multiplier effects of a decline in export income. Specifically, the growth of per capita income in Africa is well below that of the world and of advanced countries. It could even decline as is being observed in other regions.

Output had been rising in both the export sector and the general economy. However, as major emerging markets like China, India, Brazil and Mexico mature demographically and economically, they face significant structural or macroeconomic impediments. The increase in demand observed in the last decades cannot be sustained and exporters will need to adapt to these new circumstances. The past may repeat itself in periods of growth and abundance followed by times of crisis and reform. The last 150 or more years bear witness to this pattern. The quantitative assessment of the consequences of a slowdown and possible responses to it should be among the tools of policy makers. That is the aim of this paper.

Terms of trade and output measurement

Globalization, the opening of trade opportunities, and reduced import restrictions of recent decades have resulted in a major increase in the importance of trade transactions in total GDP. Export and import prices have therefore become increasingly important in determining nations' real incomes, making the effects of their changes an integral part of macroeconomic developments. Over longer periods of time, terms of trade may revert, as has been the experience over the last thirty years, directly affecting available real income (GDI), even if real GDP has not changed. From the beginning of the

1. UNCTADSTAT (2016)

Terms of trade for commodity-exporting regions and countries have shown a marked secular cyclicality over the long term.

century until 2011-12, in many emerging economies, income grew at a faster rate than GDP because of improved terms of trade. In these economies foreign trade had a large role, and export and import prices were important determinants of prosperity. In more recent years, the decline in commodity prices has had a direct adverse impact on the relationship between GDP and GDI, with declines in the rate of growth of GDP and absolute declines in GDI.

GDI measures the purchasing power of the total incomes generated by domestic production when real variables, including economic growth, are taken into consideration. (See Appendix 2 for further discussion.) When terms of trade change, the movements of GDP and real GDI may diverge. GDP is calculated in volume terms in order to measure the real change from one period to another. Changes in the terms of trade between a specific economy and the rest of the world mean that GDP is no longer identical to domestic final expenditure. Changes in import and export prices have an impact on real income. The effect of changes in terms of trade on GDI is generally taken into account by calculating what is known as the trading gains and losses from terms of trade changes.

There are other possible definitions but the effect of terms of trade gains and losses can generally be calculated as follows: GDP in volume or real terms plus the trading gain or loss resulting from changes in the terms of trade equals real GDI. The difference between real GDP and real GDI can be decomposed into two key terms: the change in the terms of trade weighted by the average share of trade in GDP, and the change in the price of tradables (relative to the rest of the economy) weighted by the average share of the trade balance in GDP.[2] In practical terms, most emerging economies do not explicitly calculate trading gains and losses; thus an adjustment provides an effective tool to capture these movements.

Developments in terms of trade, exports and imports

Terms of trade for commodity-exporting regions and countries have shown a marked secular cyclicality over the long term. During the last century, terms of trade increased after World War I, collapsed during the Great Depression, and then tended to increase at the time World War II. Subsequently, commodity prices tended to fluctuate with the world business cycle, although they showed a sharp declining tendency until the 1970s, when, at least for energy exporters, terms of trade rose sharply. Even this increase was later reversed, due to the sharp slowdown associated with the anti-inflationary measures of the early 1980s.

The experience of Africa since independence has been one of cyclical reversals in the terms of trade. In the first years of this century, commodity prices started an almost continuous increase, except for the great recession of 2008-09, helped by economic growth in a number of emerging economies, and particularly in the newly industrialized countries (NICs), China, India, Brazil and Russia. However, conditions have changed in the last five years, and there has been a general weakening (Figure 1), particularly for fuel and metals. This experience is shared by other developing regions, particularly Latin America and the Middle East, although the effect on advanced commodity producers like Australia, New Zealand and Canada is also remarkable. Furthermore, as described in more detail in section 9 below, the prospects for both the next few years and the medium term look gloomy for commodity exporters, although currently unforeseen circumstances could change this outlook for individual goods.

Different series may show different paths because of differences in composition, measurement base, and other intervening factors, particularly in earlier years, where

2. Reinsdorf (2009) within the US Department of Commerce, provides this definition.

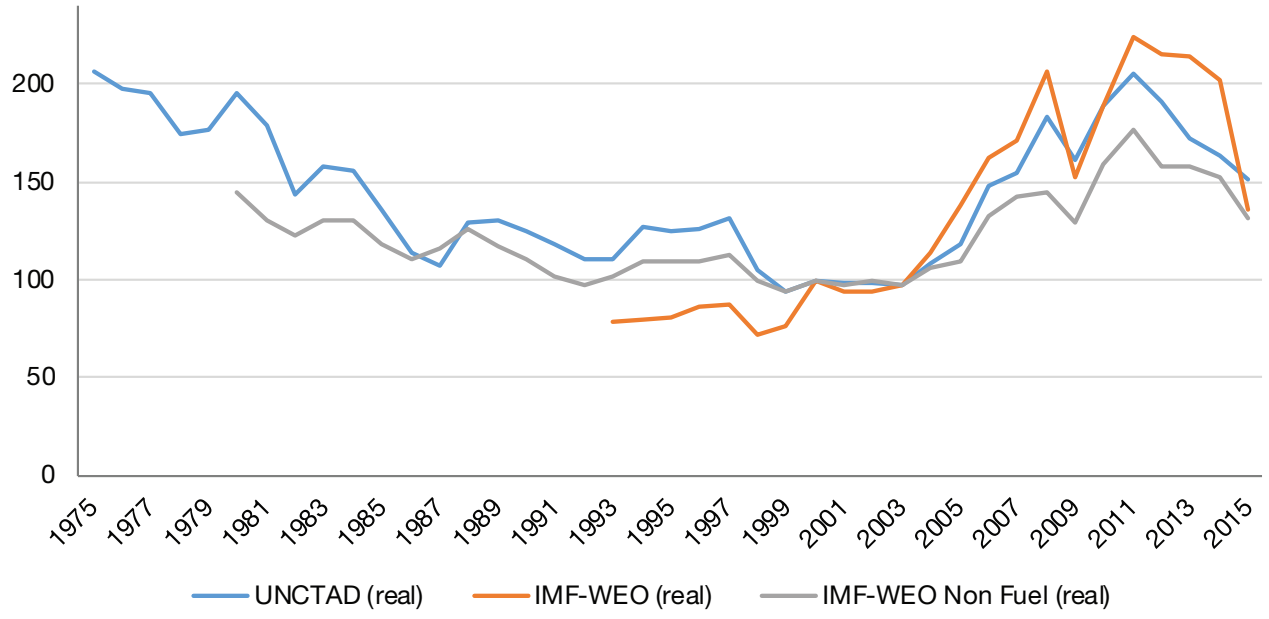
The volatility in terms of trade for the emerging economies has been much more marked than for the advanced economies.

UNCTAD statistics show a smoother path of price changes than the International Monetary Fund (IMF) figures used in this study. Nonetheless, it is clear that prices moved rapidly up through 2011-12. They have fallen since to the levels observed in the early 2000s, although they remain higher than in the previous 20 years.[3]

The volatility in terms of trade for the emerging economies has been much more marked than for the advanced economies, as seen in Figure 2. The movements in terms of trade were also much more limited in Developing Asia. Furthermore, there is significant disparity within Africa, depending on the concentration of exports. Table 1 presents the average annual rate of change in terms of trade and the standard deviation for each region and for specific country groups in Africa. The Middle East shows the highest average annual change over the period in absolute terms both for goods and for goods and services, but it has the greatest volatility, as measured by the standard deviation. Africa follows, with smaller average rates of increase, but the rate of change and volatility are much higher for North Africa (which is also included in the Middle East and North Africa numbers) and for the exporters with high concentration of commodities. Countries whose exports are diversified or only moderately concentrated have tended to show changes and volatility in line with what is observed in Latin America. Developing Asia, the destination of exports from these regions, by obvious contrast shows an inverse trend in terms of trade, with some recovery in recent years, while the advanced

3. All series are deflated by the export price index for advanced economies, as published by the IMF. Alternative deflators, like the US CPI, would not produce significantly different results, except for the impact of world-wide slowdowns as observed in the early 1980s, early 2000s and 2009.

Figure 1: Commodity prices deflated by advanced economy export prices (2002=100)



Source: IMF WEO (2016), UNCTADSTAT (2016)

At a broad regional level, terms of trade for Africa and the Middle East have the closest correlation with commodity prices because of the high concentration of exports in a limited number of commodities.

economies show very limited changes and relatively low volatility (Figure 3).

The changes in commodity prices and in terms of trade have been highly correlated.[4] For all regions terms of trade have tended to move less markedly than the comprehensive real commodity index, in large part because commodities are imported as well as exported. However, at a broad regional level, terms of trade for Africa and the Middle East have the closest correlation with commodity prices because of the high concentration of exports in a limited number of commodities. This is particularly so for Africa because of the high level of exports of fuels in North Africa. In all cases, it is clear that terms of trade have had a strong secular cyclicality that suggests that the current downward trend in commodity prices and terms of trade cannot be expected to reverse soon (See Section 9 for a discussion of commodity price prospects). The impact of the observed decline should therefore be a major concern for policy makers.

Highly concentrated commodity exporters will show a larger gain during episodes of price increases than less concentrated exporters. As the degree of concentration of exports decreases, so does the amplitude of movement in the terms of trade. In Africa, high-concentration exporters (15 countries) have considerably stronger terms of trade effects than countries in either the 20 countries in intermediate group or the 19 countries with diversified exports, which have the smallest changes, as seen in Figures 2 and 3.[5]

Terms of trade has had a significant effect on imports and exports. In general, exports have increased in real terms, helped by the increase in commodity prices. This effect is

4. This is confirmed in Section 4, on the basis of regressions of terms of trade explained by commodity prices.

5. As described in Annex 1, countries in Africa are divided into Geographical and Export Concentration subgroups. The Geographical subgroup distinguishes between countries in North Africa and Sub-Sahara. The Export Concentration has three categories: high concentration exporters, intermediate concentration exporters, and diversified exporters. This categorization is based on two criteria derived from UNCTAD indexing—the degree of concentration of exports by commodity, adjusted by the proportion of commodities in total exports

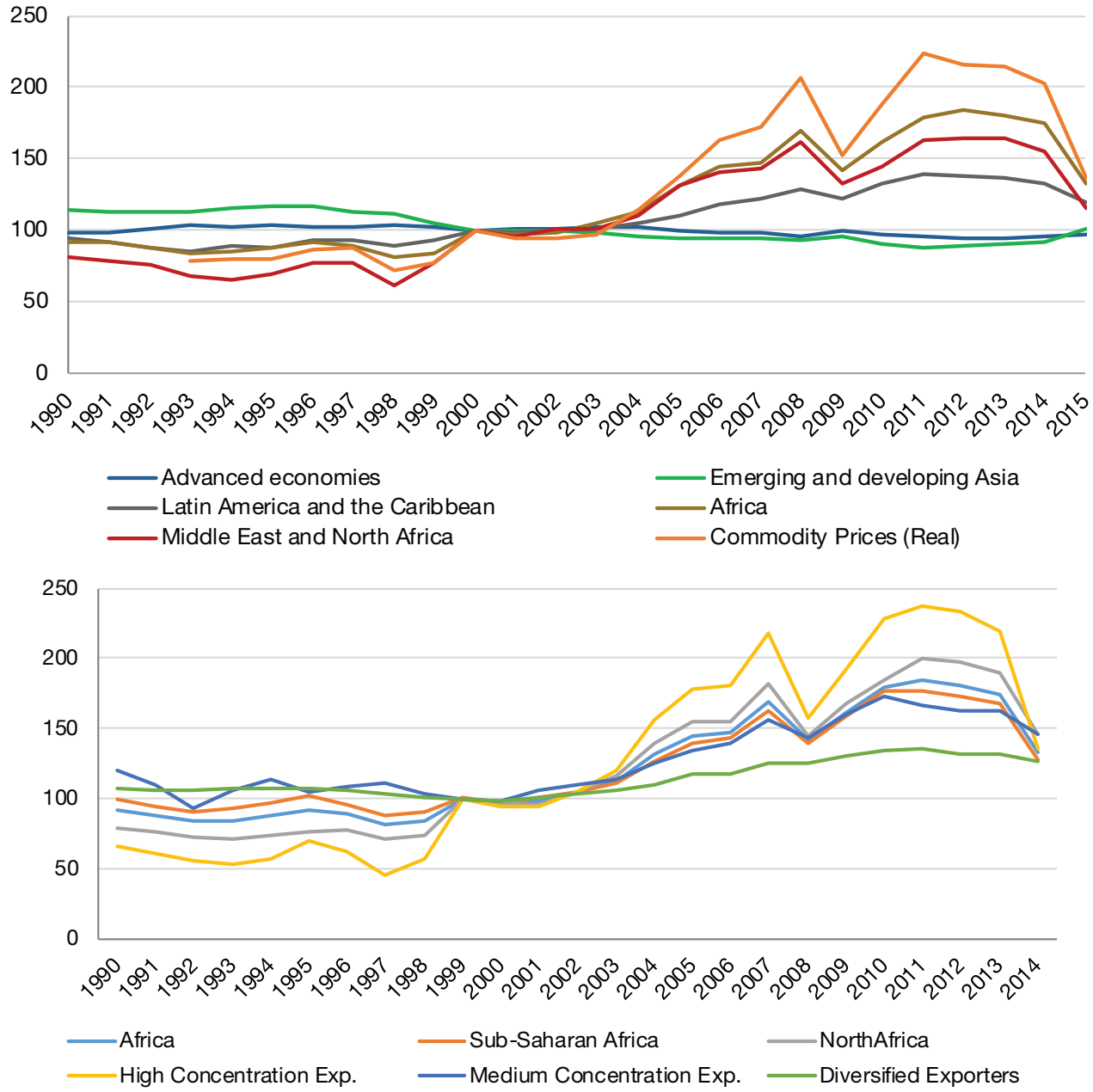
Table 1: Terms of trade annual changes (in percent, average and standard deviation, 2000-2016)

Regions and groups	Average	Standard deviation
Advanced economies	-0.27	1.77
Emerging market and developing economies	1.14	3.23
Developing Asia	0.04	3.55
Latin America and the Caribbean	1.47	5.07
Middle East and North Africa	2.25	13.69
Africa	2.16	12.14
Sub-Saharan Africa	1.55	11.24
North Africa	3.25	14.15
High Concentration Exporters	2.72	23.78
Intermediate Concentration Exporters	1.93	6.46
Diversified Exporters	1.39	2.77

Source: IMF WEO (2016). UNCTADSTAT (2016), and Centennial Group International (2016)

It is clear that terms of trade have had a strong secular cyclicality that suggests that the current downward trend in commodity prices and terms of trade cannot be expected to reverse soon.

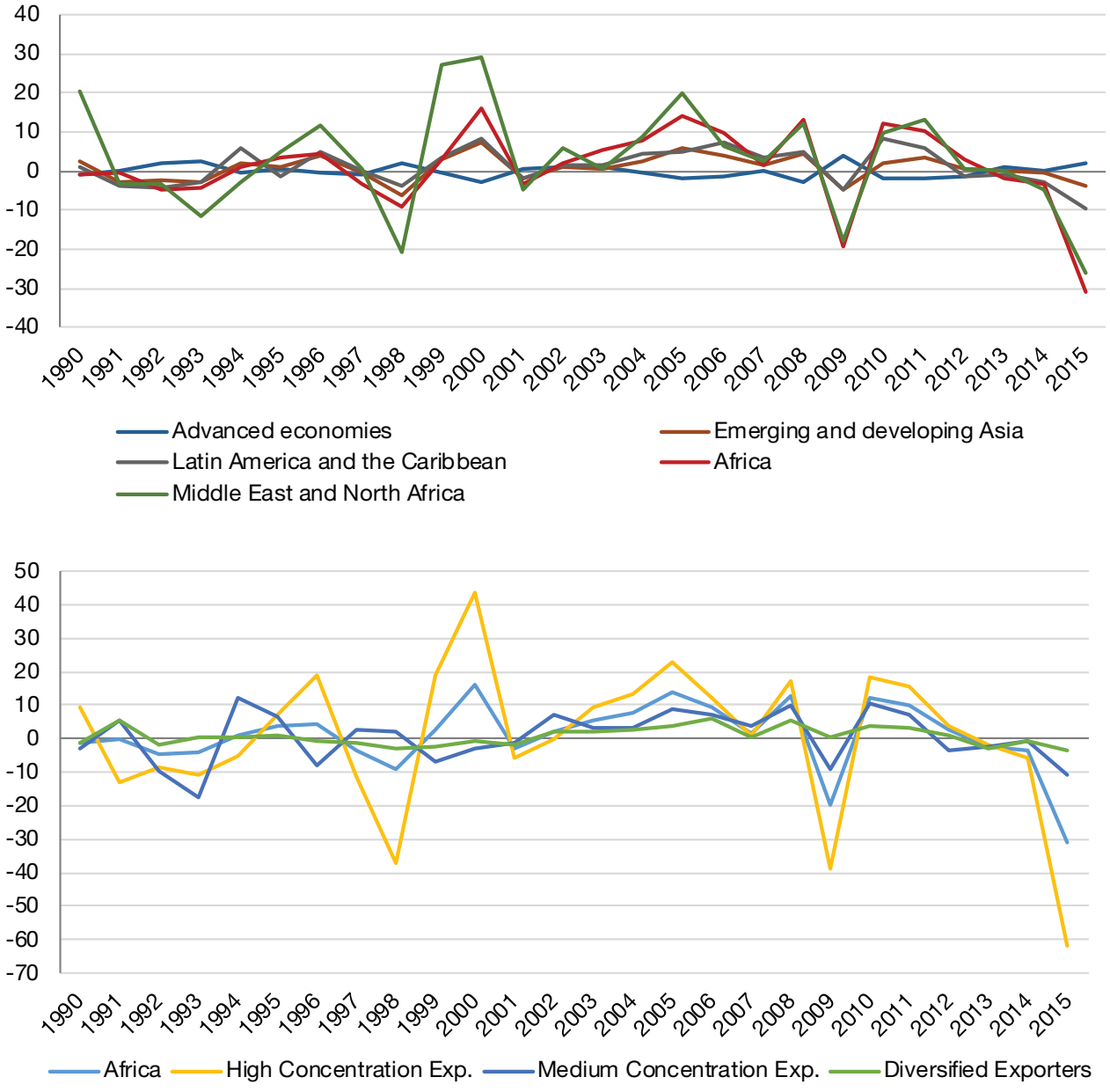
Figure 2: Terms of trade for selected regions and sub-groups (2000=100)



Source: IMF WEO (2016) and Centennial Group International (2016)

In Africa, the ratio of the volume of exports to GDP has declined persistently since 2008, for a cumulative total of about 40 percent, after a sustained increase during the 1990s.

Figure 3: Changes in terms of trade for selected regions and sub-groups (2000=100)



Source: IMF WEO (2016), UNCTADSTAT (2016), Centennial Group International (2016)

For the continent overall, there has been a slight decline in investment and a sharp fall in savings, suggesting that the region has not adjusted to the decline in terms of trade nor, more generally, to the negative impact of the decline in commodity prices on public finances and the current account.

tempered by the real appreciation of national currencies that occurs at times of increases in terms of trade or export volumes, and the depreciation at times of declines.[6] Export volumes have tended to be linked to terms of trade effects. However, the pace of export growth in recent years has often fallen below that of GDP, as noted, reflecting the dampening effect of the real appreciation of the currencies. This has been evident in Africa, although not to the same extent as in Latin America.

In Africa, the ratio of the volume of exports to GDP has declined persistently since 2008, for a cumulative total of about 40 percent, after a sustained increase during the 1990s. The earlier change was most likely associated with a process of trade liberalization that was the common feature of emerging and developing countries during the 1990s.

The ratio of the volume exports to GDP has tended to move at a considerably different pace than that of the volume of imports. But when export volumes are adjusted to take into account the impact of terms of trade, specifically by adding the impact of terms of trade to the volume index to reflect the purchasing power of exports, the picture changes drastically. In fact, import volumes are more closely associated with the purchasing power than the volume of exports.

Figure 4 presents different aggregate variables for Africa with the simplifying assumption that all terms of trade effects reflect changes in the prices of exports. Import prices are estimated to change at the same pace as the domestic GDP deflator adjusted by real exchange rates and thus would not account for changes in relative prices.[7] Figure 5 looks at a different perspective, namely the ratio of the value of exports and imports to GDP. Exports are deflated by terms of trade, or more simply, are presented in real terms. In both cases it is clear that exports in volume terms behave very differently than imports. However, when exports are corrected for their purchasing power (i.e. adjusted for terms of trade), imports tend to follow export behavior more closely. In other words, as the export receipts of the countries in Africa have increased because of higher prices, there has been a concurrent change in the level of imports through 2011.

The increase in imports has been associated with the sharp rise in the purchasing power of exports. However, starting in 2012 there is a significant gap, with both GDP and imports growing while exports decline. This has been reflected in a widening of the external current account deficit, which has been increasingly financed by debt flows and losses in reserves and with a concurrent decline in the pace of FDI to the region. In some cases, this may reflect a continued high level of investment. But for the continent overall, there has been a slight decline in investment and a sharp fall in savings, suggesting that the region has not adjusted to the decline in terms of trade nor, more generally, to the negative impact of the decline in commodity prices on public finances and the current account.

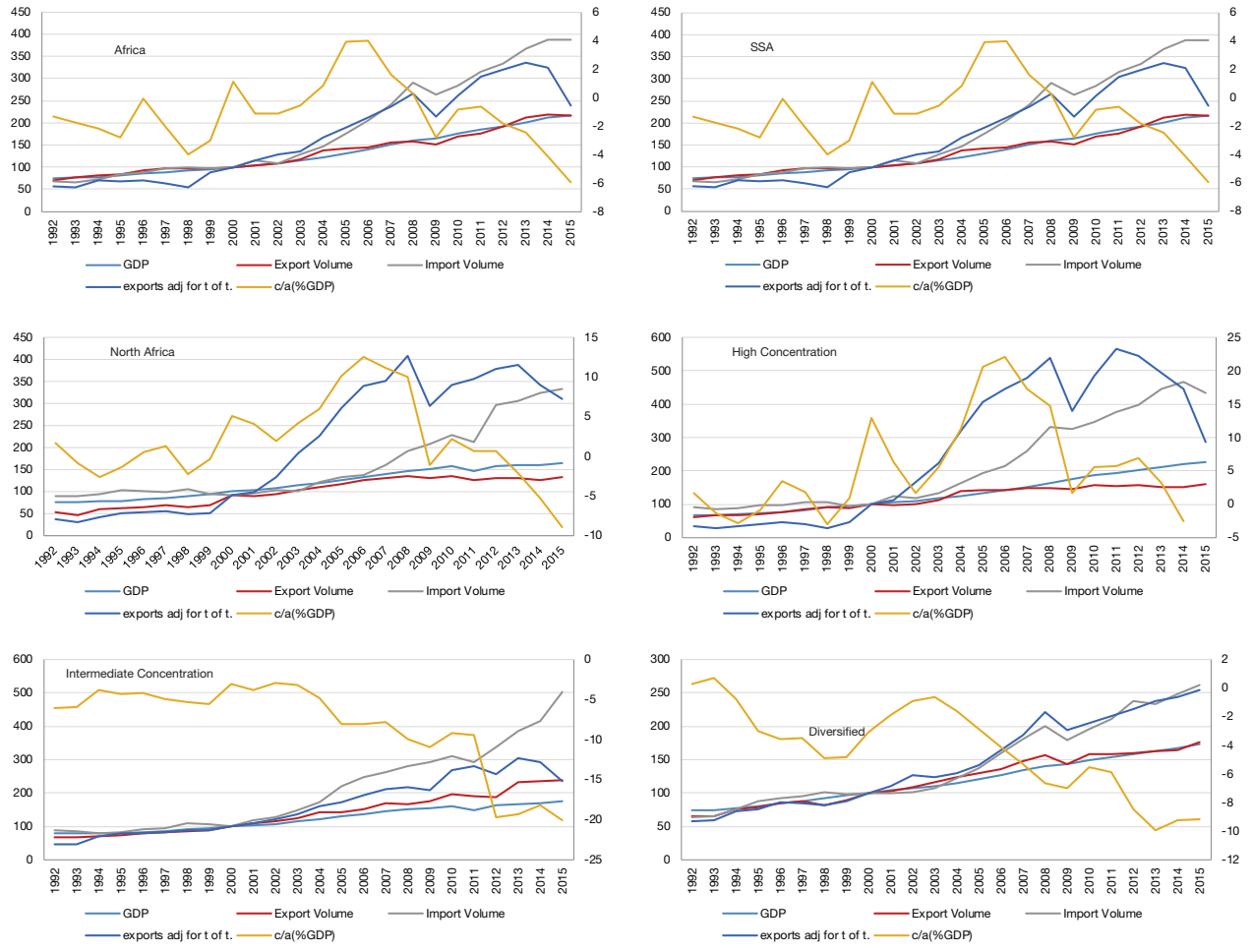
The decline in the ratio of exports to GDP in Africa in recent years does not signify stagnation of exportable output and of exports. On the contrary, export volumes have increased significantly, but that growth was outpaced by other sectors of the economy, reflecting in part the large increase in purchasing power derived from increased export prices. Investment and consumption, private and public

6. Real exchange rate movements are explained by many factors other than terms of trade, including changes in the amount and directions of capital flows, as well as domestic macroeconomic policies., The real exchange rate is also influenced by the degree of protection granted to domestic import substituting industries. Thus, it is not always easy to identify the pure effect of commodities.

7. In theory, the adjustment could be made on the basis of export prices and import prices separately and not on terms of trade. The results may not deviate much if that approach is taken. The estimates presented here follow the simpler approach. Furthermore, no adjustment is made to account for movements in real exchange rates as all variables would change in the same proportion. Real exchange rate estimates are obtained from Bruegel, which provides estimates since 1992, for most of the countries and certainly for the most important countries, in terms of their share of GDP. (http://bruegel.org/publications/datasets/real-effective-exchange-rates-for-178-countries-a-new-database/)

The growth in export volumes in the 1990s and early 2000s was also significant, at a time when terms of trade were generally stable, mostly attributable to a general opening of emerging economies to trade.

Figure 4: Exports, import, and the effect of terms of trade

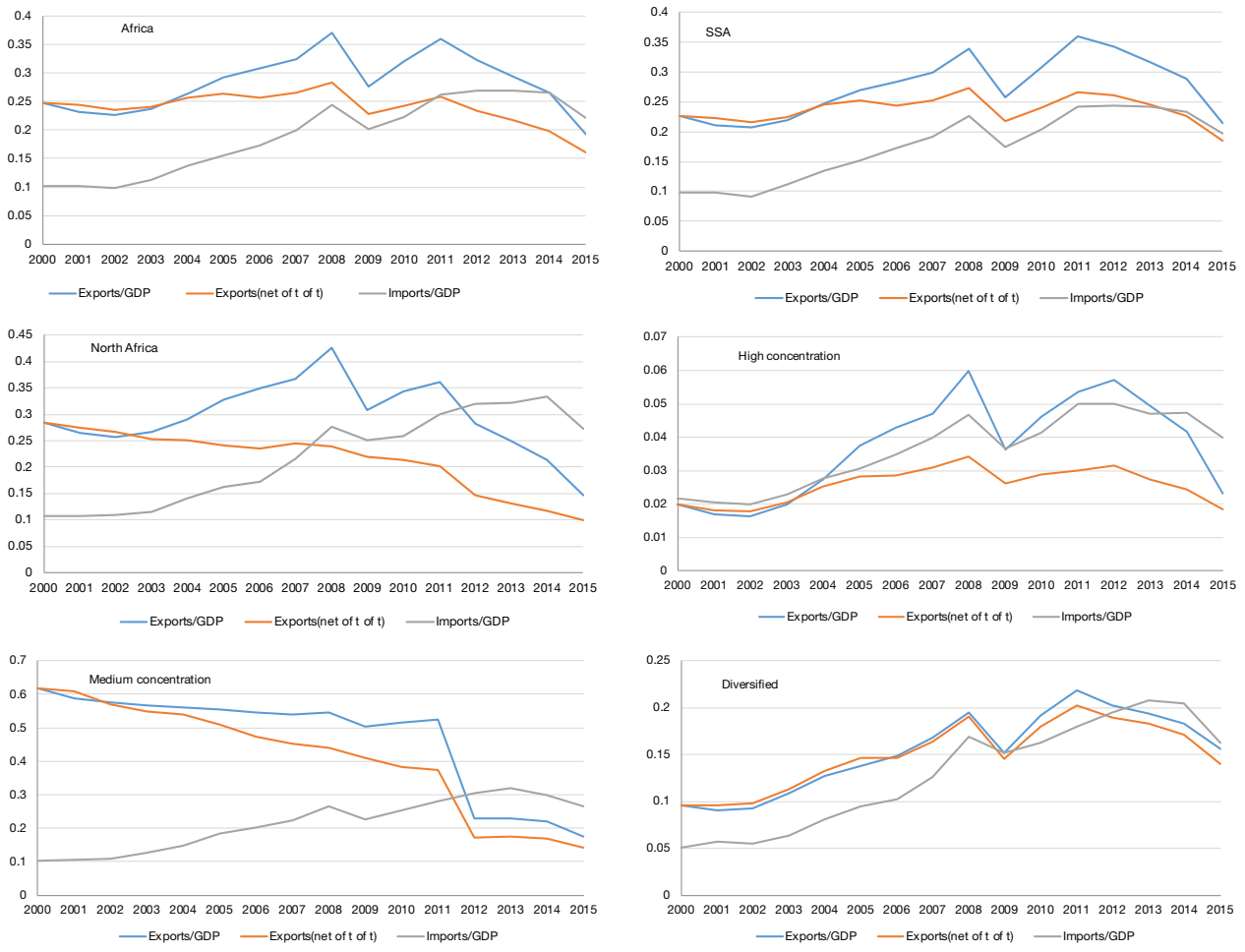


Source: IMF WEO (2016), UNCTADSTAT (2016), Centennial Group International (2016)

alike, rose rapidly to accommodate the growing prosperity, observed in recent years as terms of trade skyrocketed. Real exports have moved with terms of trade (adjusted by real effective exchange rates) used as a proxy for domestic prices for exports. The growth in export volumes in the 1990s and early 2000s was also significant, at a time when terms of trade were generally stable, mostly attributable to a general opening of emerging economies to trade. Subsequently, the increase in output followed prices more clearly. Figure 6 shows the performance of exports (in volume terms) and terms of trade (adjusted for real effective exchange rates). There is a clear correlation, although it is not perfect because of a complex investment process, including lags and long gestation periods.

The key point is that terms of trade effects are not captured in the estimation of real GDP.

Figure 5: Ratios of exports, exports (net of terms of trade effect), and import values (in percent of GDP)



Source: IMF WEO (2016), UNCTADSTAT (2016), Centennial Group International (2016)

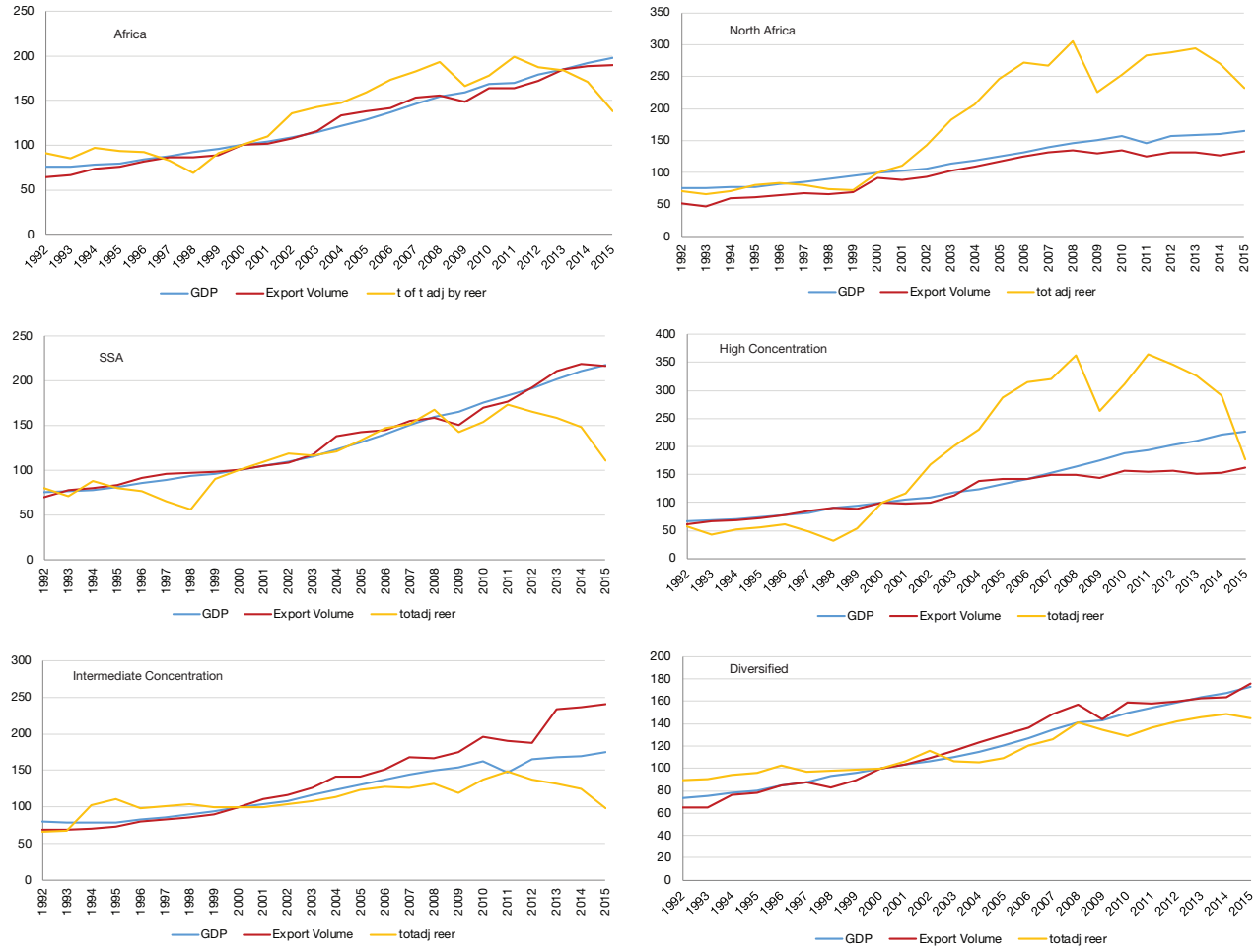
Quantification of the effects of international price shocks

The impact of terms of trade on disposable income differs significantly from that on GDP. The key point is that terms of trade effects are not captured in the estimation of real GDP. Specifically, GDP in real terms underestimates the income or purchasing power available to the country because of an increase in export price, and vice versa.

Estimates of the cumulative change in terms of trade on GDI calculated for Africa and its sub-groups (using the formulas presented in Annex 2) are presented in Table 2 with comparisons to a trend rate of growth (based on estimations

In recent years, per capita income has either declined or has increased negligibly, clearly showing the effect of lower prices.

Figure 6: GDP, export volumes, and terms of trade adjusted by real exchange rates (2000=100)



Source: IMF WEO (2016), UNCTADSTAT (2016), Centennial Group International (2016)

explained in the next section). These trend values reflect the long term growth potential without the impact of terms of trade. In the case of Africa, the direct effect of terms of trade changes on GDI (real income) has been 1.3 percent of GDP a year over the period 2000-12. But in the subsequent 3 years it was a negative 1.5 percent. In the case of the highly concentrated exporters, the corresponding values were 3.9 percent and -3.0 percent; in the case of the intermediate concentration exporters, 0.9 percent and -2.2 percent, and in the case of diversified exporters, with smaller changes in terms of trade, the values are 0.5 percent and -0.4 percent respectively. In recent years, per capita income has either declined or has increased negligibly, clearly showing the effect of lower prices.

For recent years, when the full effect of terms of trade is taken into consideration, including changes in GDP, the losses are higher.

For recent years, when the full effect of terms of trade is taken into consideration, including changes in GDP (with respect to trend explained by terms of trade, as detailed in a later section), the losses are higher. The full cumulative decline in income relative to trend in the period 2013-2015 was 5.3 percent of GDP for Africa, with a loss 15 percent for the highly concentrated exporters, and 3.5 percent loss for the diversified exporters. There was virtually no change for the intermediate concentrated exporters, which can be explained by increasing borrowing. The cumulative effect of these gains and losses is very significant. However, actual losses have been smaller than estimated losses, very likely on account of unsustainable macro and borrowing policies, which have to date obscured the real situation of the region. These conditions are likely to change, and the actual losses will catch up, even if terms of trade do not deteriorate further.

Table 2: Selected groups—Average annual rate of growth, 2000-2015

		Africa		Highly Concentrated Exporters		Intermediate Concentrated Exporters		Diversified Exporters	
	Period	2001-12	2013-15	2001-12	2013-15	2001-12	2013-15	2001-12	2013-15
1	**Change in Terms of Trade**	0.056	-0.097	0.086	-0.152	0.045	-0.043	0.026	-0.024
2	**GDI**	0.063	0.018	0.101	0.001	0.06	0.037	0.045	0.025
3	**Trend Growth Rate**	0.036	0.036	0.052	0.052	0.035	0.035	0.037	0.037
4	**GDI-trend (Total Terms of trade effect)**	0.027	-0.018	0.049	-0.051	0.025	0.002	0.008	-0.012
5	**GDP**	0.05	0.033	0.062	0.031	0.051	0.058	0.039	0.029
6	**GDP-trend**	0.014	-0.003	0.01	-0.021	0.016	0.023	0.002	-0.008
7	**Direct Terms of Trade Effect (GDI-GDP)**	0.013	-0.015	0.039	-0.03	0.009	-0.022	0.005	-0.004
8	**Terms of Trade effect on GDP (estimated)**	0.013	-0.023	0.007	-0.012	0.01	-0.009	0.003	-0.003
9	**Total Terms of Trade Effect (estimated)**	0.026	-0.039	0.046	-0.042	0.019	-0.031	0.009	-0.007
10	**Unexplained Terms of Trade**	0	0.021	0.003	-0.009	0.006	0.033	-0.001	-0.005
11	**GDI PC**	0.037	-0.006	7.45	-0.71	0.025	0.033	0.023	0.003

Source: IMF WEO (2016). UNCTADSTAT (2016), and Centennial Group International (2016)

The analysis also indicates a strong correlation between terms of trade and export volumes, suggesting that exportable output is price elastic.

The impact of commodity prices on GDP and export volumes

The previous section has covered the effect of prices on GDI, and also suggested total changes including those in GDP. In order to have a more accurate estimate of the latter, it is essential to analyze the impact of the external price shocks on real output, be it in exportables, other traded or non-traded goods in the economy. This is commonly described as the multiplier effect of exports. Here, the assessment is better done using a simple econometric model. It should be borne in mind that the coefficients show correlation and likely, but not necessarily, causality, and thus should be viewed with some caution.

The results for Africa and specified regions and sub-groups are presented in Table 3. A group of regressions shows the impact of different variables on GDP growth for Africa and for specified sub-groups. The regressions include as independent variables the terms of trade, and as additional variables either world GDP or a trend variable. Because world GDP growth and terms of trade behavior are highly correlated, the use of world GDP presents some technical problems that distort the results. As an alternative, a trend variable is used estimating an underlying annual constant rate of growth. This trend should be seen as a simplifying proxy for the underlying growth in labor and capital and in total factor productivity (TFP). It would have been preferable to use these factors specifically. The explanatory power of these variables on African and African sub-groups' GDP is extremely high, with an R2 on the order of 0.98 to 1.00, and coefficients for the different variables significant at the 95 percent level of confidence.

A second type of equation shows for Africa[8] the correlation between import volumes and exports adjusted for terms of trade. The result, also illustrated in section 3, suggest that a considerable portion of the increased purchasing power from improved terms of trade is spent abroad. In that sense, if and when a correction in prices occurs, the impact on domestic activity will be somewhat reduced, even though the impact on expenditure will move pari passu with the loss in terms of trade.

The analysis also indicates a strong correlation between terms of trade and export volumes, suggesting that exportable output is price elastic. More research would be needed in this regard, in order to distinguish the short term and longer term investment-related elasticities.

In summary, the econometric results show a high degree of significance for terms of trade and the trend variable in explaining GDP behavior. They confirm the experience in the main commodity-exporting group about the multiplier effect of changes in prices and also indicate significant elasticities of output to changes in prices. These results hold for all the groups under analysis.

These results are technically strong. Nonetheless, Table 2 above shows significant deviations between the actual outcome for economic growth and the estimated result based on these regressions. Specifically, while there is a strong correlation between the actual results and the estimates for the period 2001-12, there are discrepancies for the last three years as shown on lines 4, 9 and 10 of Table 2. The equations overestimate the loss in GDP by 2 percent a year for Africa, and 3.3 percent for the intermediate concentrated exporters; and they underestimate the high concentration and diversified exporters by 0.9 and 0.5 percent respectively. To a large extent, these deviations are linked to the sharp increase in the external current account deficit and concurrent losses of reserves and heavy borrowing by the region in the last few years (see Figure 8) where all sub-groups show a clear and sharp deterioration in the external accounts. Clearly, these trends and the accompanying appreciation of the currency

8. Equivalent regressions have been run for the two sub-regional and the three export-concentration groups, with equivalent results.

It is clear that fluctuations in prices have an immediate impact on available income, and thus on expenditure and on output.

Table 3: Summary of regressions for terms of trade: key coefficients and statistics (1990-2015)

	Terms of Trade	World GDP	Trend	Export values (deflated by US prices)	Specific variable	R-squared
Africa						
GDP	0.13	1.08				1
GDP	0.24		3.6[1]			1
Real Imports				.58	0.66[2]	0.99
Volume of exports	1.84	0.05				0.93
Terms of trade					0.51[3]	0.99
Terms of trade		1.02				0.92
Commodity prices		1.27				0.9
Sub Saharan Africa						
GDP	0.05	1.25				1
GDP	0.3		4.0[1]			0.99
North Africa						0.99
GDP	0.13	0.84				0.99
GDP	0.21		3.3[1]			0.99
High Concentration Exporters						
GDP	-0.22	2.13				0.99
GDP	0.08		5.2[1]			0.99
Intermediate Concentrated Exporters						
GDP	0.34	0.8				0.99
GDP	0.22		3.5[1]			0.99
Diversified Exporters						
GDP	0.15	0.94				0.99
GDP	0.13		3.7[1]			0.99

1. Annual rate of change in GDP; 2. Africa GDP; 3. Commodity prices (real)
Source: IMF WEO (various), Centennial Group International (2016), and estimates

for all groups, except for the diversified exporters (Figure 7), suggest a situation that is unsustainable for the region.

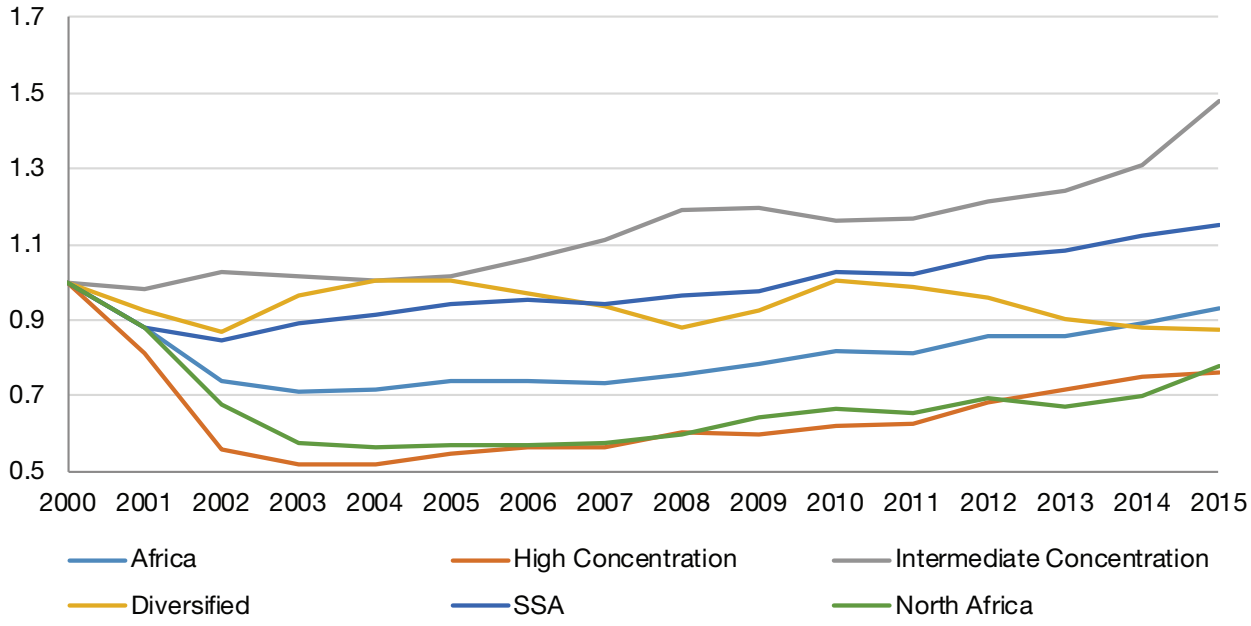
This situation requires urgent corrective actions regarding both the exchange rate and the fiscal positions, which are extremely sensitive to terms of trade.

Macroeconomic implications of the terms of trade effect

It is clear that fluctuations in prices have an immediate impact on available income, and thus on expenditure and on output. Figure 9 provides an illustration of these magnitudes. It shows for Africa the rates of growth of GDP, GDI (that is, GDP corrected by the effect of terms of trade), and GDP trend, as described previously. Equivalent results are obtained for subcategories. It shows, again, the significant gap between

If no changes in commodity prices had occurred between 2000 and 2015, according to the above estimates, GDP and GDI would have been lower than actually observed by 15 and 23 percent, respectively, even after the recent declines in commodity prices.

Figure 7: Real effect exchange rates (2000=100; increase entails appreciation)



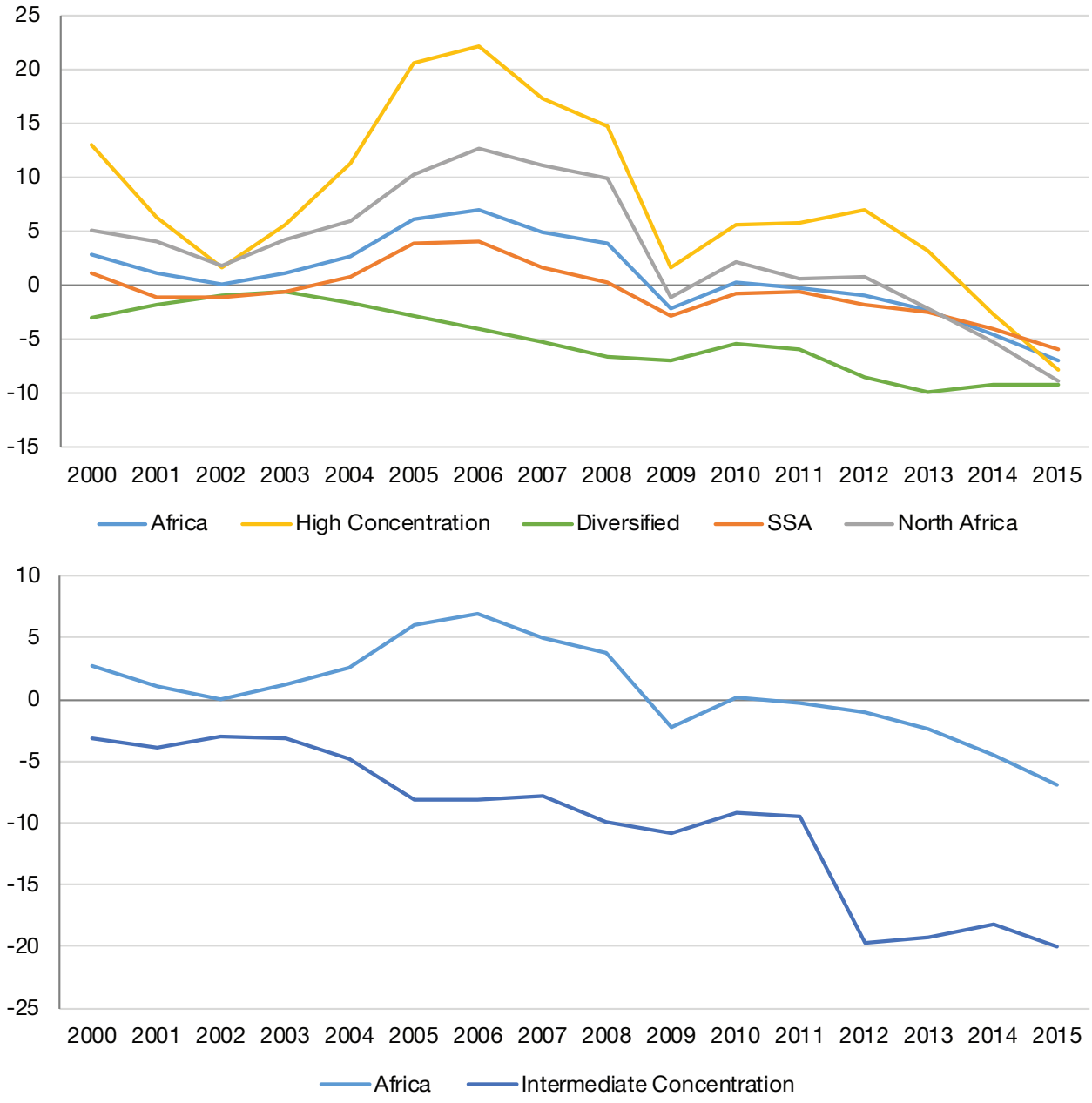
Source: Bruegel (2016); IMF WEO (2016); Centennial estimates

output and income over time as a function of changes in terms of trade as well as the effect of lower prices. If no changes in commodity prices had occurred between 2000 and 2015, according to the above estimates, GDP and GDI would have been lower than actually observed by 15 and 23 percent, respectively, even after the recent declines in commodity prices. In the case of the high concentration exporter countries, GDP would have been lower by 19 percent, and GDI would have been lower by 41 percent. In the case of the intermediate concentration exporter countries, the values would have been lower by 11 and 16 percent, respectively; and in the case of the diversified exporters, 5 and 9 percent respectively, a significant shortfall from observed values as of 2011. Equivalent declines would have been observed on a per capita basis.

The above estimates allow quantification of the impact of a "terms of trade event" on the economy. The results provide broad orders of magnitude for African sub-groups but not specific countries; still, they quantify the possible impact of external shocks rather well. Table 4 presents a summary of the key findings. It shows the percentage change in disposable income for the two main components: (1) the pure effect of terms of trade on income (which will be in addition to measured GDP, as developed in section 4); and (2) the effect of the increased export receipts on real GDP (that is, the multiplier effect on real output, as described in section 5). The sum of the two effects will be the full effect of the price change on disposable income and would have to be added to (or subtracted from, as the case may be) the trend growth. The table also includes the effect of terms of trade on the volume of exports.

In the case of the high concentration exporter countries, GDP would have been lower by 19 percent, and GDI would have been lower by 41 percent.

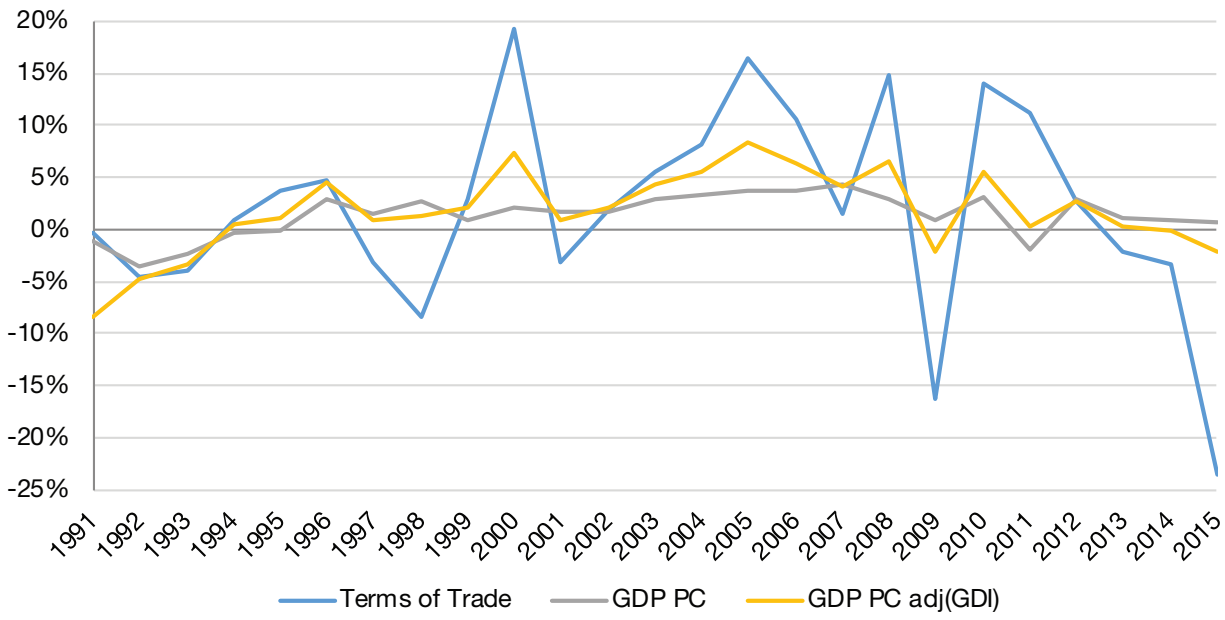
Figure 8: **External current account (percent of GDP)**



Source: IMF WEO (2016)

These results suggest that a decline in world or regional activity or, as an alternative, an increase in world supply of commodities, would have a significant effect on the domestic economy.

Figure 9: Africa, GDP, GDI, and trend GDP per capita (annual growth rate)



Source: IMF WEO (2016), UNCTADSTAT (2016), Centennial Group International (2016)

Table 4: Percentage change in selected variables associated with 1 percent change in terms of trade (elasticity)

Region/sub-group	Total Impact on GDI	Multiplier effect on GDP	Pure terms of trade effect on GDI*	Volume of exports
Africa	0.46	0.24	0.22	1.83
Sub-Saharan	0.49	0.3	0.19	1.77
North Africa	0.38	0.21	0.17	1.93
High Concentration	0.48	0.08	0.4	1.24
Intermediate Concentration	0.48	0.22	0.26	1.41
Diversified	0.32	0.13	0.19	1.98

Source: Centennial Group estimates

In the specific case of Africa, if terms of trade in the future were to stabilize at the current level, GDP growth rates would tend to fall to the trend growth rate of 3.6 percent, as the multiplier effect would disappear and the purchasing power of exports would stabilize.

These results suggest that a decline in world or regional activity or, as an alternative, an increase in world supply of commodities, would have a significant effect on the domestic economy. In the specific case of Africa, if terms of trade in the future were to stabilize at the current level, GDP growth rates would tend to fall to the trend growth rate of 3.6 percent, as the multiplier effect would disappear and the purchasing power of exports would stabilize. A further decline in terms of trade of 5 percent for Africa would entail an initial decline in GDI, resulting in a decline in output growth relative to the trend rate of growth and a decline in the rate of change in per capita GDP to effectively zero. A further decline of this nature, while steep, is not unusual and should be considered plausible as prices are about one third or more higher than in 2000 and are certainly within the realm of the long-term cycle of commodity prices. The effect tends to be similar for all regions and sub-groups except for the diversified exporters, where the effect of a 1 percent change in terms of trade is in the order of 0.3 percent for GDP. Any argument that countries should not be concerned because GDP is growing beyond the terms of trade effect disregards the effect of export prices on domestic output.

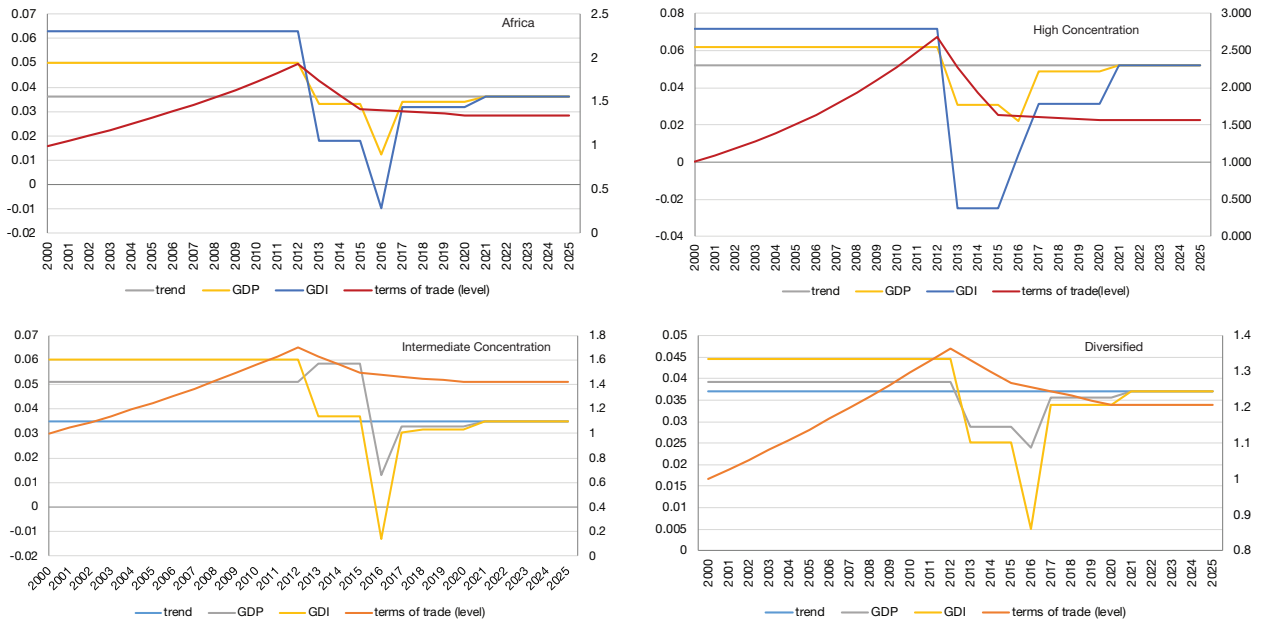
The impact of the terms of trade on the growth rates for GDP and GDI is illustrated in Figure 10, which shows their average growth rates for the period 2000-15 and a scenario for the period 2016-25. For the period through 2015, the graph presents the average rates of growth for 2000-12 and for 2013-15 against the actual level of terms of trade. The scenario assumes a sharp correction in 2016 associated with a reduction in borrowing and, from 2021 onwards, declining terms of trade by 1 percent a year for five years. It is clear from the graph that GDP and GDI growth rates would fall substantially even as terms of trade remain at current levels. Unless reforms take place, GDP growth rates would fall to the trend levels. Growth rates would fall further during periods of terms of trade decline because of the multiplier effect of export prices. For GDP to continue on the historical growth path, terms of trade would have to continue to increase indefinitely. Under the more realistic assumption of plateauing terms of trade, after a moderate decline to levels above those of 2000, GDP would be 10 percent lower in ten years than what would have been expected if the (unrealistically high) historical rate of growth of the period 2000-12 had prevailed after 2012. Available income, as measured by GDI, would be lower by 15 percent.

At this point, a word of warning is needed. The numbers presented here are estimates; they seem to fall within reasonable ranges on the basis of econometric tests. However, the actual values will fall within a range around the projected values. Thus, the estimates should be viewed with caution. Nonetheless, even if the projected GDI/GDP losses were to be one third or one half lower, they would remain considerable and would need to be taken into serious consideration in order to formulate a reasonable macro policy for the medium term.

The current levels of commodity price are likely to continue in the medium and long term, as discussed in the next section, while the high level of borrowing observed in recent years cannot be sustained. An assessment ignoring such likely developments would constitute a serious mistake by emerging and developed countries alike, and needs to be corrected through appropriate economic policy. The consequences of a complacent dependence of governments on revenues from particular commodities (be they fuels, minerals, or agricultural goods) has had extremely negative effects throughout the history of commodity exporters.

The complacency engendered by relatively high GDP growth rates is misplaced, given the very rapid rate of population growth in Africa in absolute terms, and as compared to most other regions of the world.

Figure 10: Historical and prospective terms of trade levels and rates of growth of GDP and GDI



Source: Centennial Group International (2016)

Policy requirements in the new world of low commodity prices[9]

Economic growth in Africa has slowed significantly in recent years with average GDP growth declining from 5 percent a year during the period 2000-2012 to 3.4 percent during 2013-15, and further in the first half of 2016. The decline was sharper among the more highly concentrated export countries. Furthermore, the measured decline underestimates the true magnitude of the slowdown as GDI (or domestic income), which had been growing at a rate of 6.3 percent, decelerated to a rate of 1.8 percent in the last three years, entailing an actual decline in per capita disposable income.

Of equal importance, per capita GDP growth has been consistently below that for the world at least since 2010. Moreover, it has been below that of the advanced countries for the last three years, as has been the case for Latin America and the Middle East.[10] The complacency engendered by relatively high GDP growth rates is misplaced, given the very

9. Many of these issues have been discussed in Ahlers, T., Kato, H., Kohli, H., Madavo, C., and Sood, A. (eds.). (2014). *Africa 2050: Realizing the Continent's Full Potential*, Oxford University Press. In particular, this section follows the principles presented in Chapter 9, "Maintaining Macroeconomic Stability and Increasing Resiliency" by Basu and Fajgenbaum, and Chapter 12, "Harnessing Natural Resources for Diversification" by Bond and Fajgenbaum. Also see, Fajgenbaum, J. (2012) "Macroeconomic Management—Implementing Responsible Fiscal and Monetary Policies," In *A New Vision for Mexico 2042: Achieving Prosperity for All.*.

10. The Middle East is here defined as Middle East and North Africa, as generally presented by the World Bank and the IMF. To that extent there is some overlap in that series and that of Africa.

It is generally recognized that for economic activity to expand equitably and on a sustainable basis, macroeconomic policies need to ensure stability and predictability.

rapid rate of population growth in Africa in absolute terms, and as compared to most other regions of the world.

The terms of trade effect has had a particularly strong impact for highly concentrated exporters, and more so in the case of oil producers, like Algeria, Angola, Gabon, Equatorial Guinea, Libya and Nigeria. The broader group of highly concentrated exporters declined even further. Other countries have been hit by the Ebola epidemic (Guinea, Liberia and Sierra Leone) and several southern and eastern African countries, including Ethiopia, Malawi, and Zimbabwe, are suffering from a severe drought.

Some countries, mainly those with more diversified exports, may be doing better, as their terms of trade have tended to weaken by less or even to have benefited in net terms because of low oil prices. Some institutions, like the IMF, consider that the slowdown is temporary and focus on increased investment as a good indication of these prospects (IMF 2016). However, the analysis presented here suggests that any recovery will be slow in coming. Investment as a proportion of GDP has been declining, even as the external current account deficit has risen to levels not seen since at least the early 1980s. This rise has taken place at a time when the fiscal positions have tended to weaken.

Under these conditions, based on the current circumstances and prospects, the general policy approach has to be modified. At present, the slowdown in activity and the virtual stagnation of per capita income are becoming more marked, and are accompanied by declines in reserves, increased market borrowing (at least through 2015) and lending by international institutions that, on the basis of past experience in Africa and elsewhere, cannot be sustained. Furthermore, there has been a clear trend towards appreciation of the African currencies, even as external conditions have weakened.

The adjustment becomes more urgent as the financial markets become increasingly concerned about the prospects of emerging economies. The scenarios for growth in the next years presented here suggest a short term decline in the near future, reflecting both the further terms of trade decline expected in 2016, together with the lagged effect of the previous declines on economic activity. Thus, it is essential to correct the fiscal, monetary and exchange rate policies in addition to the necessary structural reforms mentioned elsewhere in this study.

For many policy makers the apparent policy options are continued growth of per capita GDP or painful adjustment. However, the true choice is orderly and internationally supported correction or disorderly and disruptive crisis, if current policies continue as they are for most of the countries in the region. It is difficult to design a single macroeconomic policy framework for all African countries given the diversity of circumstances. Nevertheless, it is generally recognized that for economic activity to expand equitably and on a sustainable basis, macroeconomic policies need to ensure stability and predictability. Broadly, this means sound fiscal and monetary policies, consistent with debt and balance of payments sustainability. Ideally, these policies would be supported by a flexible exchange rate regime, which would allow for an independent monetary policy and would provide countries with a critical policy instrument to help absorb external shocks. Furthermore, long-term trends suggest that many of these policies would need to be corrected even if terms of trade were not to change (see Box 1).

Policies need to be formulated to incorporate the effect of possible changes in terms of trade, particularly for resource rich countries. A commodity stabilization fund equivalent to the Copper Stabilization Fund of Chile together with structural fiscal targets, namely a budget based on long term trends and not only on current developments, would be optimal for these purposes. This initiative requires a predictable path for exports and a readiness by authorities to offset the deviations from this trend through fiscal policy, or a promotion of private

Fiscal policies will need to adjust as the economies continue to grow, if an indebtedness problem is to be avoided.

Box 1: **Assessment of long-term fiscal and current account sustainability**

The prospects for emerging economies are well represented by the Centennial/Emerging Markets Forum model[1], but this type of model tends to assume that the macroeconomic conditions will adapt to the underlying growth conditions. In practice, this may not be a straightforward result, and corrections may be required in macroeconomic policies. Corrections may also be required in the case terms of trade, as discussed here. For this purpose, it is possible to review the sustainability of the external outcome and of fiscal policies, broadly based on the debt sustainability methodology developed by the World Bank and the IMF.[2] The methodology addresses the consistency of policies and the ability of the economy to cope over the medium- to long-term for the attainment of higher growth. Specifically, it is possible to assess, in aggregate and stylized terms, the impact of the path of economic growth on (1) the external current account and, as a consequence, the level of indebtedness of the economy; and (2) the fiscal outcome and the corresponding increase in public sector debt.

This methodology suggests that without changes in the pattern of the fiscal and external variables, the economic growth path, represented by the trend variable, is characterized by a continued increase in per capita income based on investment and TFP. However, it does not necessarily entail a sustainable position over time., as both the external current account and the fiscal position may deteriorate, as is the case in most regions and sub-groups (Figure B1).

The projections reflect the high dependence of exports and revenues on foreign income and changes in terms of trade for Africa. Econometric analysis suggests high elasticities of exports to world GDP and to terms of trade, and in the case of imports, high dependence to domestic GDP.[3] Under the assumption that terms of trade remain stable during the period under consideration, the external current account shows a progressive weakening in the current account surplus ratio to GDP over time for Africa. Furthermore, a decline in terms of trade has a significant impact on the current accounts of all regions and sub-groups.

Regressions for government revenue and expenditure show a high correlation with domestic GDP and terms of trade. The model suggests that the fiscal outcome deteriorates for Africa overall and for most sub-regions over time as the economies grow, without changes in terms of trade. This result suggests that fiscal policies will need to adjust as the economies continue to grow, if an indebtedness problem is to be avoided. The results are worse when it is assumed that the terms of trade deteriorate. Below are charts showing for Africa the effect of changes in terms of trade of 20 percent in both directions over the next ten years on the basis of a central growth scenario, which does not fully reflect recent term of trade changes. Thus, it should be assumed that the prospective path of adjustment of both the external and the current account should be closer to the line showing a decline of 20 percent in terms of trade. The crossover point for the current account should be construed as a self-solving solution when commodity prices decline, as imports are highly sensitive to terms of trade declines, thus resulting in a more direct adjustment of the current account. This trajectory is of course influenced by possible borrowing, which will delay the adjustment to imports and therefore to the current account. In general, all sub-groups (while not shown here) record similar behavior as for the continent.

In order to deal with these problems, the macroeconomic strategy will require specific policies to correct the fiscal and balance of payments positions as needed. For example, it will be important to increase the non-export related revenues in order to reduce dependence on commodities. Expenditure would have to be slowed down, while allowing for increased

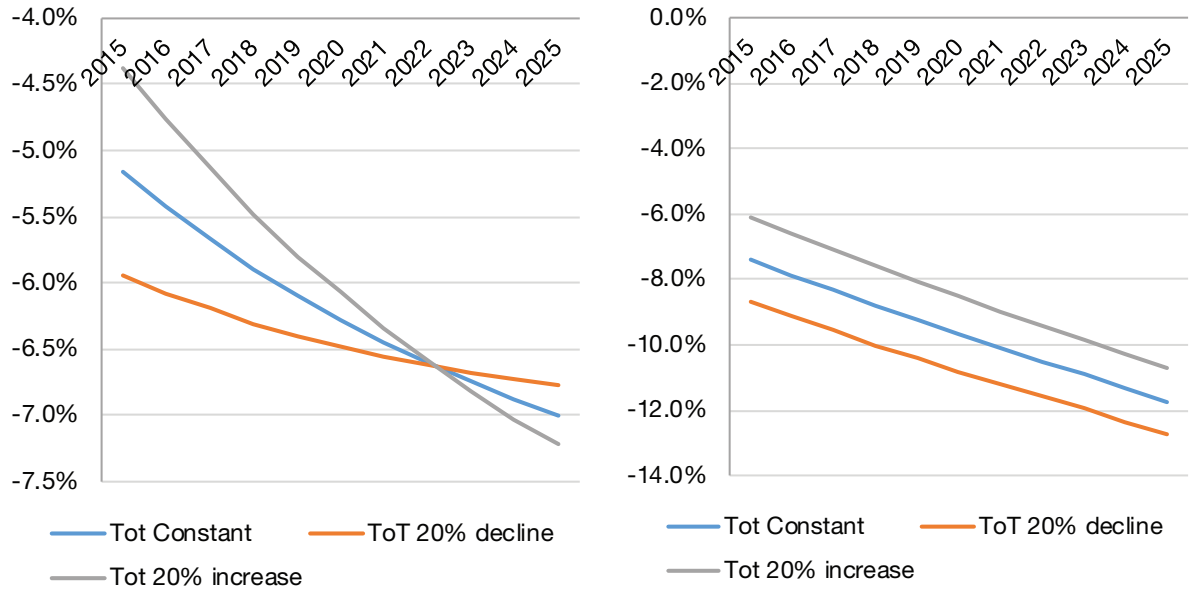
1. *The World in 2050: Striving for a more just, prosperous, and harmonious global community*, Kohli, H., ed., 2016, Oxford Press. This section follows chapter 12 of that book.
2. See www.imf.org/external/pubs/ft/dsa/mac.htm for a discussion of the methodology currently being utilized by the IMF and World Bank.
3. The econometric results are not presented here to preserve conciseness but can be provided by the authors on request. Exports of goods and services (in real terms) are regressed against terms of trade and world GDP, while imports are regressed against domestic income and terms of trade. The current account is projected as the difference between exports and imports. Revenue and expenditure projections are regressed against domestic GDP and terms of trade.

The adoption of structural fiscal targets, as in Chile, would consolidate spending patterns by allowing better expenditure planning.

Box 1: Assessment of long-term fiscal and current account sustainability (cont.)

infrastructure spending and social expenditure. It may be argued that increasing external deficits in Africa may be offset by "naturally increasing" surpluses in other areas. That would entail large increases in inter-regional indebtedness or FDI, two assumptions that cannot be accepted in simple terms. In practice, these scenarios suggest that any solution to the problems of many emerging economies would need to be multi-pronged. Structural policies will help, but there is an overwhelming need to pursue adequate macroeconomic policies, particularly in response to changes in terms of trade, including through more depreciated currencies than is the case at present.

Figure B1: Africa: External current account and fiscal balance (percent of GDP



Source: Centennial Group International (2016)

stabilization schemes when production and trade are in the private sector.

The adoption of structural fiscal targets, as in Chile, would consolidate spending patterns by allowing better expenditure planning. A structural fiscal rule would smooth public spending patterns over time and reduce the pro-cyclicality of public expenditures observed at present as governments adjust expenditure to correct for declines in revenue associated with export price reversals. A structural fiscal rule reduces the impact of cyclical revenue fluctuations on expenditures as it allows for larger deficits and higher expenditures when the output gap is negative, and vice versa. It helps, in particular,

Resource-rich countries need to make the trade-off between extracting the resource now and leaving it in the ground for future generations.

to shield social spending and to protect the more vulnerable in times of crisis. Unfortunately, and contrary to the general experience in Africa today, this approach can only be started credibly during times of prosperity, i.e. high and/or increasing terms of trade. Thus, at this point, it is of the essence to make the necessary corrections to avoid an inordinate amount of public indebtedness at times of crisis. Some use of foreign financing is called for. The details of these policy recommendations go beyond the scope of this chapter, but abundant material is available (Fajgenbaum 2012).

Efficient use of resource rents has an intergenerational dimension. Resource-rich countries need to make the tradeoff between extracting the resource now and leaving it in the ground for future generations. Moreover, for a variety of reasons (including uncertain price developments), they may consider it advisable to extract now, especially when demand is expected to fall in the future, setting aside some of the proceeds in the form of financial assets for future use. The exhaustible nature of natural resources calls for intertemporal decisions about how much resource earnings to consume and invest and how much to save. A balance has to be found between the welfare of future generations and the immediate needs to reduce poverty and invest in physical and human capital, which may well have a high social rate of return. This tradeoff is especially acute for African countries where such expenditure is crucially needed. Spending resources beyond the economy's absorptive capacity will lead to the distortions typically associated with Dutch disease. Thus, for a lasting impact on development, part of the resource earnings needs to be saved, which has important implications for short- and long-term macroeconomic policies.

The prospects for commodities in the medium term[11]

This paper focuses mainly on the impact of commodity price fluctuations on Africa, both in the recent past and in the future. Previous sections have dealt with the behavior of prices, terms of trade, as well as income and GDP, particularly since the beginning the 21st century. While future developments are always subject to considerable uncertainty, it is crucial to provide an assessment of the future, to set the context in which African policy makers can establish adequate strategies. There are a number of respectable sources for this purpose. The recent writings of the IMF (WEO, April 2016 and earlier issues) and the World Bank (Commodity Markets Outlook, April 2016, and previous issues) capture the general trends. This discussion is principally based on their recent findings.

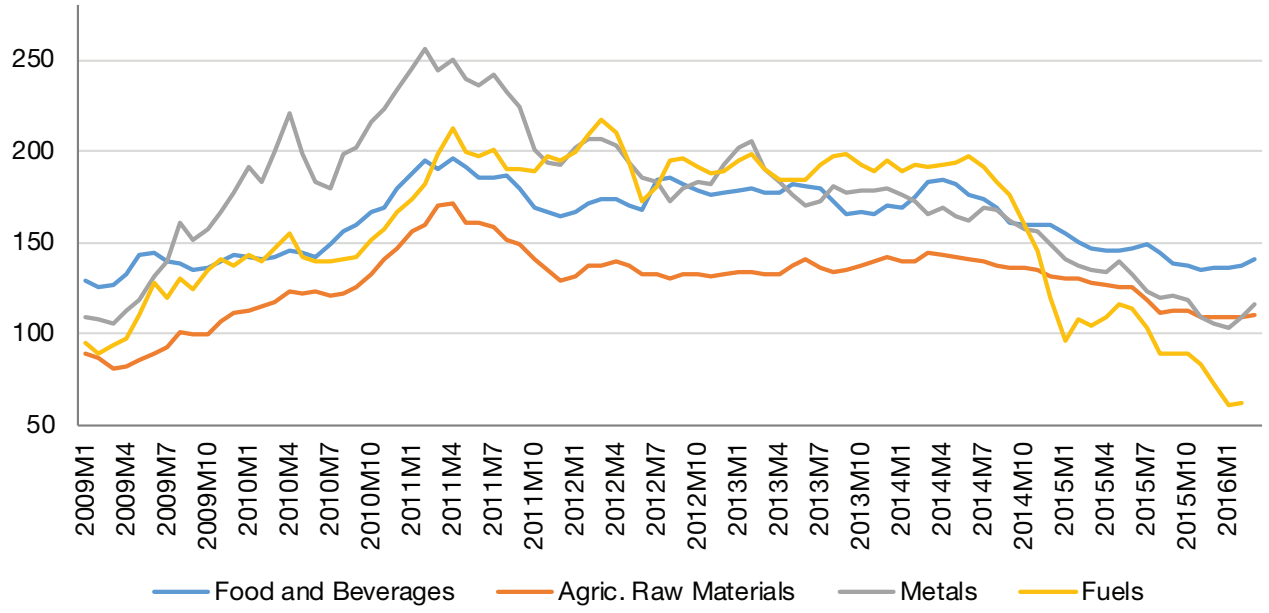
Share of world GDP

Commodity prices have continued to decline since the release of the October 2015 World Economic Outlook (WEO, April 2016), following a downward trend observed since early 2011 when they reached their peak. Diminishing growth prospects for emerging market economies, especially China, combined with abundant supply are putting downward pressure on the prices of most commodities, although the relative importance of each force differs across commodities. Oil prices have declined the most, on account of strong supply magnified by risk-behavior in financial markets. Metal prices have fallen owing mainly to slower demand growth from China. Food prices and agricultural raw materials have also declined as the result of record high harvests, although prices of selected food items have rebounded from unfavorable weather triggered by the waning El Niño.

11. An expanded discussion is presented in Annex 3

Even with the significant recovery, the collapse in oil prices suggest that market expectations are for low long term prices as is the case for natural gas and coal.

Figure 11: Commodity price indices (2005=100)



Source: IMF Primary Commodity Prices (2016)

The IMF's Primary Commodities Price Index declined by 56 percent from April 2011 to March 2016. Oil prices have decreased further, by 64 percent since April 2011, although there has been a recovery in recent months. Non-fuel commodity prices have weakened as well, with metal and agricultural prices declining by 54 percent and 30 percent in the last five years, respectively.

The weakness in oil prices is most recently explained by strong supply from members of the Organization of the Petroleum Exporting Countries (OPEC) and risk avoidance behavior in financial markets, with investors moving away from what they perceive to be riskier assets, including commodities and stocks. Even with the significant recovery, the collapse in oil prices suggest that market expectations are for low long term prices as is the case for natural gas and coal.

Metal prices have declined by half in the last five years and are at about the same level as in 2009. Prices have been gradually declining because of a slowdown in investment in China, which uses roughly half of global metals. Metal prices are projected to decline by 14 percent in 2016 and 1 percent in 2017. Futures prices point to continued low prices, with rising uncertainty related to possibly weaker demand (especially from China) and stronger supply.

Prices of agricultural commodities have declined by 4 percent overall relative to August 2015, and 28 percent in the last five years, with declines in most food items except sugar and a few oilseeds. El Niño has taken a toll on Asia and East Africa. International prices do not fully reflect the adverse weather shock, however, because of high prior inventory levels.

The impact of terms of trade can be staggering - a decline of total disposable income and per capita income growth of half a percentage point for each one percentage point decline in terms of trade.

Table 5, prepared by the World Bank, shows that in general commodity prices in real terms are unlikely to recover from the levels observed in 2015-16. Fuel prices may increase but would remain well below previous levels; this may be an overoptimistic assessment, as discussed below.

Longer term trends

The post-2000 commodity price increases, in part a reflection of demand growing faster than supply and of concerns about the security of supply, set in motion a boom in commodities exploration, investment and production, especially in mining and hydrocarbons. Less is known about the scale of investment that flowed into agriculture, but private sector investment in farmland in Africa increased significantly. With oil and metals price declines of 50-70 percent between 2011 and early 2016, many resource development projects have been delayed or put on hold. The result has been adverse consequences for commodity-exporting emerging market and developing economies facing shocks in the global economy.

After the United Nations' 2015 Climate Change Conference in Paris most countries around the globe have now firmly committed to reducing greenhouse gas emissions. At the heart of that implementation is the so-called energy transition, which consists of moving away from using fossil fuels (petroleum products, natural gas and coal) and toward clean energies to power the global economy. The technological forces unleashed by the anticipated public and private response to climate change may lead to a relatively swift transition, notwithstanding the potential delay implied by the current "low-for-long" fuel price environment. If such a scenario were to materialize, a number of emerging fuel exporters may see their mineral reserves and their concurrent investment assets become stranded or obsolete. The consequences of stranded assets would be dramatic for coal and oil exporting countries that rely heavily on fossil fuel exports, as they would face heavy losses.

The prolonged fall in metal prices is consistent with a typical commodity boom-and-bust cycle. High prices have led to downward adjustments on the demand side. Those adjustments have contributed to a gradual decline in metal prices since 2011. The lower investment will eventually reduce capacity, and lower production should eventually lead to a rebound in metal prices. The more prolonged the slump in metal prices, the sharper the likely eventual reversal. However, for the medium term, price prospects remain at best weak.

Over the next several years, the agricultural sector will adjust to lower prices for most farm commodities. For crops, production response to lower prices will lead to reduced planted acreage. In the livestock sector, lower feed costs will provide economic incentives for expansion. Following those near-term adjustments, long run developments for global agriculture reflect steady world economic growth and possibly continued global demand for biofuel feedstocks. Those factors combine to support longer run increases in demand. Most agricultural prices have fallen from recent high levels and are projected to fall further during the next few years, although they will recover somewhat in the long run, as presented in Table 5. Still, the prospects for increases in real prices are fairly low, at least during the next decade.

Concluding remarks

The impact of terms of trade can be staggering - a decline of total disposable income and per capita income growth of half a percentage point for each one percentage point decline in terms of trade. The impact is divided equally between the pure decline in income because of lower prices, and the multiplier effect on real GDP because of its impact on demand. It is true that part of the impact will be defused because imports may decline as a consequence, with a smaller effect

It is imperative for the African countries, be they highly concentrated exporters or more diversified economies, to focus on their macroeconomic sustainability.

on the external current account than the reduction in export receipts. This may help in reducing the financing needs of individual countries. However, it clearly entails a reduction in disposable income and a below-par behavior of per capita income, with significant social, economic and political implications. The central issue as discussed here is related to the repeated occurrence of these events and countries' ability to withstand these shocks.

The evidence presented here is that there are long-term secular cycles. After a decade of affluence that was seen as permanent, the trend has reversed, and prospects are that the secular decline observed in recent years, as a minimum will not be reversed and might well continue. Countries throughout the region have reacted differently but in general have made an unsustainable use of borrowed resources and of their reserves, which have fallen dramatically.

It is imperative for the African countries, be they highly concentrated exporters or more diversified economies, to focus on their macroeconomic sustainability. Certainly, it is important to promote investment, both physical and in human capital. But it is also crucial to adjust the economy to a sustainable path, particularly in today's adverse external circumstances. Given the fragility of the fiscal positions and the mounting debt, aggravated by a weakening trend even in circumstances of moderate growth, actions in this field are of the essence.

Stabilization mechanisms and wealth management funds will need to be brought in to help consolidate the fiscal situation. Furthermore, monetary policy will need to be highly disciplined to avoid an acceleration of inflation and a weakening of the balance of payments that can only make the situation worse. Various measures to strengthen competitiveness and foster a depreciating exchange rate are also essential, especially as recent indications have been that the currencies of African countries have appreciated, possibly helped by large and unsustainable capital inflows. The main message of this report is that time is of the essence if a sharp and disorderly adjustment process is to be avoided.

Annex 1: Country classification by export concentration

Table A1: **Country classification by export concentration**

	Concentration Index (2010-2014 average)	Primary Commodities (to total exports, 2014)	Primary Commodities excluding fuels (percentage of exports, 2014)	Concentration + primary comm. Index	Exceptional Classification	Export classification
Angola	0.96	0.99	0.30%	1.94		Highly concentrated
Guinea-Bissau	0.94	0.99	96.60%	1.93		Highly concentrated
Chad	0.88	0.99	4.90%	1.87		Highly concentrated
Congo	0.8	0.96	11.70%	1.76		Highly concentrated
Libya	0.8	0.95	0.70%	1.75		Highly concentrated
Nigeria	0.78	0.98	4.40%	1.77		Highly concentrated
Botswana	0.75	0.11	10.50%	0.86	Gold exporter	Highly concentrated
Gabon	0.72	0.89	23.70%	1.61		Highly concentrated
Equatorial Guinea	0.72	0.96	1.40%	1.67		Highly concentrated
Somalia	0.66	0.94	94.10%	1.6		Highly concentrated
Zambia	0.65	0.8	78.90%	1.45		Highly concentrated
Algeria	0.53	0.98	0.70%	1.51	High Commodity Share	Highly concentrated
Seychelles	0.49	0.91	86.80%	1.4	High Commodity %	Highly concentrated
Mauritania	0.47	0.94	85.10%	1.41	High Commodity %	Highly concentrated
Dem. Rep. of the Congo	0.42	0.95	80.20%	1.37	High Commodity %	Highly concentrated
Sudan	0.61	0.73	9.70%	1.34		Intermediate
Mali	0.55	0.42	39.60%	0.98		Intermediate
Comoros	0.53	0.45	45.40%	0.98		Intermediate
Sao Tome and Principe	0.51	0.7	69.90%	1.2		Intermediate
Burkina Faso	0.5	0.48	40.80%	0.98		Intermediate
Guinea	0.48	0.82	43.40%	1.3		Intermediate
Malawi	0.48	0.84	83.60%	1.32		Intermediate
Burundi	0.46	0.69	68.80%	1.15		Intermediate
Cabo Verde	0.43	0.77	69.40%	1.21		Intermediate
Rwanda	0.43	0.88	78.10%	1.32		Intermediate
Liberia	0.43	0.65	64.70%	1.08		Intermediate
Ghana	0.43	0.77	42.30%	1.19		Intermediate
Eritrea	0.42	0.9	89.70%	1.32		Intermediate
Cameroon	0.39	0.92	37.60%	1.31		Intermediate

Table A1: Country classification by export concentration

Niger	0.39	0.72	34.80%	1.11		Intermediate
Sierra Leone	0.36	0.79	79.20%	1.15	High Commodity %	Intermediate
Ethiopia	0.35	0.88	78.70%	1.23	High Commodity %	Intermediate
Côte d'Ivoire	0.34	0.78	58.00%	1.13	High Commodity %	Intermediate
Mozambique	0.34	0.77	50.00%	1.11	High Commodity %	Intermediate
Central African Republic	0.35	0.73	71.80%	1.08		Low
Lesotho	0.33	0.06	6.30%	0.39		Low
Gambia	0.31	0.73	72.60%	1.04		Low
Benin	0.29	0.74	59.60%	1.03		Low
Zimbabwe	0.27	0.72	60.80%	0.99		Low
Djibouti	0.25	0.56	46.80%	0.81		Low
Swaziland	0.24	0.44	43.00%	0.69		Low
Mauritius	0.24	0.33	33.30%	0.57		Low
Senegal	0.24	0.62	42.30%	0.86		Low
Madagascar	0.23	0.66	63.60%	0.89		Low
Namibia	0.22	0.49	46.70%	0.71		Low
Kenya	0.21	0.63	55.70%	0.84		Low
Togo	0.2	0.5	34.20%	0.7		Low
United Republic of Tanzania	0.2	0.68	66.30%	0.88		Low
Uganda	0.19	0.66	65.10%	0.85		Low
Egypt	0.16	0.51	22.60%	0.67		Low
Morocco	0.16	0.34	28.90%	0.5		Low
Tunisia	0.15	0.24	12.40%	0.39		Low
South Africa	0.14	0.48	37.10%	0.61		

	Main crieterion: Concentration	**Subsidiary criterion: High commodity percent & sum of share of commodities and concentration**
Highly concentrated	.65 to higher	.90 and 1.35
Intermediate	.35 to .64	.75 and 1.10
Low	below .34	Lower

Source: UNCTADSTAT (2016) and Centennial Group International (2016)

Annex 2: Measurement of trading gains and losses

GDI measures the purchasing power of the total incomes generated by domestic production. It is a concept that exists only when real variables, including economic growth, are taken into consideration. When terms of trade change, there may be a significant divergence between the movements of GDP and real GDI. The difference between the change in GDP and disposable income, GDI, is generally described as the "trading gain" (or loss). The scope for trading gains and losses is substantial as a) imports and exports become increasingly large relative to GDP and b) the difference in the commodity composition of imports and exports grows.[1]

Domestic product, GDP, is calculated in volume terms in order to measure the real change that occurs from one period to another independent of price. Similarly, aggregates of income, GDI, are not broken down into quantity and price components. The effect of changes in the terms of trade for a specific economy and the rest of the world must be taken into account when moving from domestic product in volume terms to national income in real terms. GDP is no longer identical to domestic final expenditure as there is an impact on real income of changes in import and export prices. Incorporating the change in terms of trade into GDP is generally done by calculating the "trading gains and losses."

Trading gains or losses, T, is measured by the following expression:

$$T = \frac{X - M}{P} - \left\{\frac{X}{P_x} - \frac{M}{P_m}\right\} \quad (1)$$

Where

- X = exports at current values
- M = imports at current values
- P_x = the price index for exports
- P_m = the price index for imports
- P = a price index based on some selected numeraire.

P_x, P_m and P are all equal 1 in the base year. The term in brackets measures the trade balance calculated at the export and import prices of the reference year; the first term measures the actual current trade balance deflated by the numeraire price index. It is possible for these terms to have different signs.

As noted by the National Accounts Manual, there is an important choice to be made in the measurement of trading gains or losses: the selection of the price index P with which to deflate the current trade balance.[2] The literature on this topic is large but inconclusive, but there is general agreement that the choice of deflator, P, can sometimes make a substantial difference to the results. That the measurement of real GDI can be sensitive to the choice of P has prevented a consensus from being reached on this issue. The National Accounts Manual notes that trading gains or losses should be treated as an integral part of the System of National Accounts. The choice of appropriate deflator for the trade balance should depend on the particular circumstances of a country, and practical solutions are required, even with no consensus. No matter how defined, the formula to be used would be: GDP in volume or real terms plus the trading gain or loss resulting from changes in the terms of trade equals real GDI.

In discussing this issue, Reinsdorf (2009) at the US Department of Commerce, describes the best adjustment as follows: The difference between real GDI and real GDP can be decomposed into two key terms: the change in the

1. This discussion draws heavily on *System of National Accounts, 2008*, (European Commission, International Monetary Fund, Organization for Economic Co-operation and Development, United Nations, and World Bank), New York, 2009; and *Terms of Trade Effects: Theory and Measurement*, Marshall B. Reinsdorf, Bureau of Economic Analysis, Dept. of Commerce, US; Revised version of WP2009-01; October 2009, as well as material of the Australian Statistical office.

2. As described in the System of National Accounts, 2008: "If the prices of a country's exports rise faster (or fall more slowly) than the prices of its imports (that is, if its terms of trade improve) fewer exports are needed to pay for a given volume of imports… Thus, an improvement in the terms of trade makes it possible for an increased volume of goods and services to be purchased by residents out of the incomes generated by a given level of domestic production."

terms of trade weighted by the average share of trade in GDP, and the change in the price of tradables (relative to the rest of the economy) weighted by the average share of the trade balance in GDP.[3]

On that basis, the present discussion uses a simple formula, as follows:

$$dy^*/y^* = d(er^*(p_x^*x - p_m^*m))/dy^* \quad (2)$$

where dy/y is the difference between GDI and GDP, on the basis of changes in the terms of trade, and real exchange rates is er. In this presentation, the volume changes of x (exports) and m (imports) respectively are incorporated as part of GDP.

After manipulation, the operating formula for an annual change is

$$dy^*/y_0^* = (x_1/y_0)[(dp_x/p_x) - (dp_m/p_m)] + (ca_1/y_0)^*(drer/rer) \quad (2'')$$

where rer is the real exchange rate denominated in local currency (appreciation entails a decline, and vice versa), and ca is the current account balance The relevant formula on a multi-year basis, i.e. based on the cumulative effect of terms of trade changes over time, for a three period horizon would be

$$dy_3^*/y_0^* = (1 + (dy^*/y^*)_1)^* (1 + (dy^*/y^*)_2)^*(1 + (dy^*/y^*)_3) - 1 \quad (3)$$

or in more general terms

$$dy_t^*/y_0^* = (\Pi_{1 \text{ to } t}(1 + (dy_i^*/y_{i-1}^*)) - 1 \quad (4)$$

The result is the cumulative change of GDI relative to GDP, with regard to a base year. In this way the measurement captures the effect of the terms of trade over a period of time extending beyond a year. If a change occurs for one year only, the impact will be for that year alone. If the change extends for several years, the formula accounts for this effect over time.

3. Estimates based on US national accounts data for 1974 to 2007 show significant terms of trade effects in many years. Trading gains subtract at least 0.21 percentage points from real GDI a quarter of the time, and that they add at least 0.18 percentage points a quarter of the time. Occasionally, however, the shocks are much larger. The petroleum price shocks that occurred at the end of 1973 and in 1980 subtracted more than a full percentage point from real GDI, and the one in the first half of 2008 in combination with rising prices of other imports subtracted almost 2 percentage points from the annualized growth rate of real GDI (Reinsdorf 2009).

Annex 3: The prospects for commodities in the medium term

Prospects in the next two years[1]

Commodity prices have continued to decline since the release of the October 2015 World Economic Outlook (WEO), following a downward trend observed since early 2011, when they reached their peak. Diminishing growth prospects for emerging market economies, especially China, combined with abundant supply are putting downward pressure on the prices of most commodities, although the relative importance of each force differs across commodities. Oil prices have declined the most because of strong supply magnified by risk-behavior in financial markets. Metal prices have fallen owing mainly to slower demand growth from China. Food prices and agricultural raw materials have also declined as the result of record high harvest, although prices of selected food items have rebounded from unfavorable weather triggered by the waning El Niño (IMF 2016)

The IMF's Primary Commodities Price Index (see Figure 11) has declined 19 percent from August 2015, the reference period for the October WEO, to March 2016, for a total decline of 56 percent since April 2011. Oil prices have decreased further, by 32 percent, for a total of 64 percent since April 2011, although there has been a recovery in recent months. Nonfuel commodity prices have weakened as well, with metal and agricultural commodities prices declining by 9 percent (54 percent in the last five years) and 4 percent (30 percent in the last five years), respectively, over the seven- month period.

The weakness in oil prices is most recently explained by strong supply from members of the Organization of the Petroleum Exporting Countries (OPEC) and risk avoidance behavior in financial markets, with investors moving away from what they perceive to be riskier assets, including commodities and stocks. Even with the significant recovery in the recent past, the collapse in oil prices has proceeded in spite of geopolitical tensions in the Middle East, suggesting that market expectations are for low long term prices. Natural gas and coal prices have also declined, as the former are linked to oil prices, including through oil-indexed contract prices, but with a lag.

Excess oil supply has pushed inventory levels in the Organization for Economic Co-operation and Development (OECD) to record-high levels in spite of strong oil demand—the highest rate of growth in five years, and significantly higher than earlier forecast by the International Energy Agency (IEA). Oil supply has been quite resilient in spite of low prices, mostly on account of strong OPEC and Russian production, as well as the Islamic Republic of Iran's return to world oil markets. However, there have been signs of a slowdown in shale oil production in the United States recently, driven by the record low oil prices. This suggests that the relative resilience of shale oil production, due to the dramatic operational efficiency gains that have prevailed during the past year, is coming to an end. For the next year, world oil demand is expected to grow at a slower pace, according to the IEA, although the global economy is expected to grow slightly faster than in 2015. Non-OPEC supply is expected to shrink for the first time in eight years, although only slightly. OPEC members have been producing well above their target levels. Some OPEC countries have a strong incentive to increase production because of the dire state of their public finances. At a meeting in Doha in February 2016, oil ministers agreed to freeze output, but in the end there was no commitment to stop or slow scheduled production increases.

Oil futures contracts point to rising prices, suggesting average annual prices of $35 a barrel in 2016—a decline of 32 percent from 2015—and $41 a barrel in 2017. There remains substantial uncertainty around the baseline assumptions for oil prices. High inventory levels and a rapid response

1. There are a number of respectable sources for this purpose. The recent writings of the IMF WEO (2016 and earlier issues) and the World Bank's *Commodity Markets Outlook* (2016 and previous issues) capture the general trends. This discussion is principally based on their recent findings.

from U.S. shale producers should limit the scope for a sharp price adjustment in the near future. Oil prices of about $30 a barrel led to significant price recovery, as many relatively high-cost producers halted production in response to the prolonged low prices and declining oil prices dramatically reduced investment in extraction activities.

Natural gas prices are also declining, with the average of prices in Europe, Japan and the United States down by 22 percent since August 2015. Falling oil prices and a relatively warm winter contributed to this decline. An important coal price index (the average of Australian and South African prices) has also declined 12 percent since August 2015, in tandem with oil prices.

Metal prices have declined by half in the last five years and are at about the same level as in 2009. Prices have been gradually declining because of a slowdown and a shift away from commodity intensive investment in China, which uses roughly half of global metals. Metal prices are projected to decline by 14 percent in 2016 and 1 percent in 2017. Futures prices point to continued low prices with rising uncertainty on account of both demand (especially from China) and stronger supply. Iron ore prices have declined 17 percent since August.

Prices of agricultural commodities have declined by 4 percent overall relative to August 2015 and 28 percent in the last five years, with declines in most food items except sugar and a few oilseeds. Sugar and palm oil prices have increased because of a drought in India and Malaysia, likely caused by El Niño. El Niño has also taken a toll on East Africa. International prices do not fully reflect the adverse weather shock, however, because of high prior inventory levels. For example, Ethiopia is suffering from its worst drought in 30 years. Unusually dry weather in North Africa is also likely to reduce harvests significantly, including for cereals.

The beverage price index has stagnated as a cocoa price increase has offset a coffee price decline. Annual food prices are projected to remain low over the next two years owing to ample supply—supported by high levels of stocks—and slower demand. Food prices are projected to decline by 6 percent in 2016 from the previous year; current price levels are already 5 percent below 2015 levels. However, over the next two years, prices for major food products, such as wheat, corn and soybeans, are expected to increase slightly from current levels. Risks to food prices are associated with weather variability, particularly El Niño conditions, which are expected to strengthen throughout the Northern Hemisphere and persist beyond the first quarter of 2016.

Longer term trends

The post-2000 commodity price increases, in part a reflection of demand growing faster than supply and concerns about the security of supply, set in motion a boom in commodities exploration, investment, and production, especially in mining and hydrocarbons. Less is known about the scale of investment that flowed into agriculture, but private sector investment in farmland in Africa increased significantly. With oil and metals price declines of 50-70 percent between 2011 and early 2016, many resource development projects have been delayed or put on hold. Lead times—the time it takes from resource discovery to production—are a critical issue in many countries as these periods are associated with heightened macroeconomic vulnerabilities. This raises concerns about the ability of commodity-exporting emerging market and developing economies to withstand shocks in the global economy.

Discoveries

Several major discoveries transformed country prospects in Sub-Saharan Africa and Latin America and the Caribbean. Since 2000, 120 “giant” oil and gas fields (fields with recoverable reserves of more than 500 million barrels of oil equivalent) have been discovered world-wide, with estimated “proved plus probable” reserves of almost 250 billion barrels of oil. The fields are located in seven clusters, two of which are in Africa, mostly offshore in East and West Africa. In Tanzania alone (which accounts for almost 7 percent of these reserves) there have been 13 giant oil and gas discoveries. Other major discoveries are in Kenya, Madagascar, Mozambique and Uganda, as well as in six countries in West Africa and in the Gulf of Guinea. Another major frontier for giant oil and gas fields has emerged in the Bay of Bengal in South Asia.

Lead times from discovery to production

Bringing discoveries to actual production is a process that requires large upfront and sustained investment that varies across regions and time. Currently, there is high uncertainty about prices, as well as macroeconomic and policy environments.

- *Oil and gas*: Conventional discoveries can take 30 to 40 years to develop, but lead times for giant oil and gas discoveries can be shorter. For oil deposits, such as shale, the lead times are much shorter (2 to 3 years), a reflection of technological improvements and reduced entry barriers for small, agile firms. Monetizing discoveries in natural gas is harder than in oil because the former require investment in transport infrastructure (in addition to drilling) as well as long-term contractual arrangements with end-users (Hurdeman 2014).
- *Mining*: The time to develop resources ranges from a few years to decades, depending on the type of mineral, the size and grade of the deposit, financing conditions, country factors, availability of key inputs like electricity and commodity prices. For example, resource development takes an average of 10 years for gold but more than 15 years for base metals such as zinc, lead, copper and nickel. Given that resource development, production and revenue streams take place over decades, with substantial sunk costs along the way, longer term commodity price prospects are critical in deciding whether to develop a discovery into production. In 2016, the outlook for an era of low commodity prices has already set back many resource development projects. Ambitious improvements in business climates along with better and more predictable macroeconomic policies will be needed to offset these obstacles to resource development. Governments seeking to develop natural resources may consider delaying new initiatives until the price outlook turns more favorable.

Table A2, prepared by the World Bank, shows that in general commodity prices in real terms are unlikely to recover from the levels observed in 2015-16. Fuel prices alone might increase but would remain well below previous levels. This may be an overoptimistic assessment, as discussed below.

Savings and investment

After the United Nations' 2015 Climate Change Conference in Paris most countries around the globe have now firmly committed to reducing their greenhouse gas emissions through the Intended Nationally Determined Contributions (INDCs). At the heart of that implementation is the so-called energy transition, which consists of moving away from using fossil fuels (petroleum products, natural gas and coal) and toward clean energies to power the global economy. While the energy transition is at an early stage, with important differences across countries, it is at a critical juncture. If the energy intensity of economic activity does not fall or if countries in the developing world do not adopt state-of-the-art technology for coal-powered plants to lower the carbon intensity of their electricity generation, global warming will worsen, and all will have to pay. One important lesson from earlier energy transitions is that these transitions take time to complete. However, the technological forces unleashed by the anticipated public and private response to climate change may lead to a relatively swifter transition this time, notwithstanding the potential delay implied by the current "low-for-long" fossil fuel price environment.

If such a scenario were to materialize, a number of emerging fuel exporters might find that their mineral reserves and their concurrent investment assets become stranded or, put differently, obsolete. The consequences of stranded assets would be dramatic for coal and oil companies and exporting countries that rely heavily on fossil fuel exports, as they would face heavy losses. Oil-exporting countries have attempted to diversify their economies away from oil, but this has proved challenging. Nevertheless, opportunities exist. Many high-income countries are reducing greenhouse gas emissions already and are committed to continue doing so. Consumption of fossil fuels by advanced economies can, therefore, be expected to continue to decrease. Though large economies account for the bulk of current emissions, emerging markets will continue to drive the growth of future emissions. In contrast to the falling emissions intensity of the advanced economies, emerging market and developing economies remain heavily reliant on coal, and their consumption of fossil fuels will continue to rise. However, as they become more dominant in the world economy, pressures for them to reduce demand for fossil fuels will increase. Already, China has adopted an ambitious plan to derive a significant fraction of its future energy needs from renewables. Shifting from coal to gas in electricity generation can help significantly in this regard. Still, while these trends are generally desirable and should continue to be promoted, fuel exporters will lose with considerable consequences for their future growth and welfare prospects.

Metals

Metal prices have been declining since 2011. The prolonged fall in metal prices is consistent with a typical

Table A2: Commodity price index forecasts (2010=100)

Commodity	2013	2014	2015	2016	2017	2018	2019	2020	2025
Nominal US dollars (2010=100)									
Energy	127.4	118.3	64.9	52.4	62.9	67.2	71.4	75.9	102.6
Non-energy commodities	101.7	97	82.4	78.2	80	81.9	83.8	85.8	97.3
Agriculture	106.3	102.7	89.3	86.2	87.8	89.4	91.1	92.9	102.9
Beverages	83.3	101.8	93.5	89.2	88.8	88.4	88.1	87.8	86.8
Food	115.6	107.4	90.9	87.8	89.6	91.5	93.4	95.5	106.8
Oils and meals	115.9	109	85.2	82.3	84.7	87.3	89.9	92.6	107.7
Grains	128.2	103.9	88.8	84.1	86.5	88.9	91.5	94.1	108.8
Other food	103.9	108.4	100.3	98.3	98.8	99.3	99.9	100.5	103.8
Raw materials	95.4	91.9	83.2	80.8	82.7	84.8	86.9	89.1	101.7
Timber	102.6	104.9	96.1	93.3	95.9	98.5	101.1	103.9	118.8
Other Raw Materials	87.6	77.8	69.2	67.1	68.4	69.8	71.3	73	82.9
Fertilizers	113.7	100.5	95.4	82.8	84	85.2	86.4	87.6	94.4
Metals and minerals[1]	90.8	84.8	66.9	61.4	63.7	66.1	68.6	71.2	86
Base Metals[2]	90.3	89	73.6	67.7	70.3	73	75.9	78.8	95.6
Precious Metals	115.1	101.1	90.6	89.1	88.1	87.2	86.4	85.5	81.6
Constant 2010 US dollars (2010=100), deflated by the MUV Index									
Energy	120.1	111.7	61.4	48.7	57.5	60.5	63.2	66.1	82.3
Non-energy commodities	95.9	91.6	78	72.7	73.1	73.7	74.2	74.8	78
Agriculture	100.2	97	84.5	80.1	80.2	80.4	80.6	80.9	82.5
Beverages	78.5	96.1	88.5	82.9	81.2	79.5	78	76.5	69.6
Food	109	101.4	86	81.5	81.9	82.3	82.7	83.2	85.7
Oils and meals	109.3	103	80.6	76.4	77.4	78.5	79.6	80.7	86.4
Grains	120.9	98.1	84	78.1	79	80	81	82	87.3
Other food	98	102.3	94.9	91.4	90.3	89.4	88.4	87.5	83.2
Raw materials	90	86.8	78.8	75.1	75.6	76.3	76.9	77.7	81.6
Timber	96.7	99	90.9	86.7	87.6	88.6	89.6	90.5	95.3
Other Raw Materials	82.6	73.5	65.5	62.3	62.5	62.8	63.2	63.6	66.5
Fertilizers	107.2	94.9	90.3	77	76.8	76.6	76.5	76.4	75.7
Metals and minerals[1]	85.6	80.1	63.4	57.1	58.2	59.5	60.7	62	69
Base Metals[2]	85.2	84.1	69.7	62.9	64.3	65.7	67.2	68.7	76.7
Precious Metals	108.5	95.5	85.8	82.8	80.6	78.5	76.5	74.5	65.4
Inflation indexes, 2010=100									
MUV index[3]	106.1	105.9	105.7	107.6	109.4	111.2	112.9	114.8	124.7
percent change per annum	-1.4	-0.2	-0.2	1.9	1.7	1.6	1.6	1.6	1.7
US GDP deflator	105.4	106.9	108.5	110.7	113	115.3	117.6	120	132.6
percent change per annum	1.5	1.3	1.6	2	2	2	2	2	2

1. Base metals plus iron ore; 2. Includes aluminum, copper, lead, nickel, tin, and zinc; 3. MUV is the unit value index of manufacture reports.
Source: World Bank (2016)

commodity boom-and-bust cycle. Indeed, after a period of high metal prices during the 2000s, investment and, in turn, capacity in the sector have increased substantially. At the same time, high prices have led to downward adjustments on the demand side. Those adjustments have contributed to a gradual decline in metal prices since 2011, which has led to less investment in the sector due to the lower expected profits. The lower investment will eventually reduce capacity, and lower production should eventually lead to a rebound in metal prices. The more prolonged the slump in metal prices, the sharper the likely eventual reversal. However, for the medium term, price prospects remain at best weak.

From an economic point of view, iron ore is by far the most important base metal, with a $225 billion annual industry in terms of global sales. The top iron-ore-producing country is China, which accounts for about half of the world's production, followed by Australia and Brazil. Copper is the second-most important base metal by value—accounting for roughly a $130 billion industry annually. Chile is the largest producer, followed by China and Peru. Copper prices have been more transparent than those for iron ore because copper futures markets and London Metal Exchange settlements are used as benchmarks. The third most important base metal is aluminum (an annual $90 billion industry). Large producers of aluminum are located where electricity is cheap and abundant. The largest producer is China, followed by Russia, Canada and the United Arab Emirates. Aluminum prices are the most stable among those for metals because of the reliance on electricity in its production. The fourth most important base metal is nickel (accounting for a $40 billion market), which is used for alloys such as stainless steel. Nickel ore is mined in several countries, including the Philippines. Futures markets point to lower nickel prices, though the decline is projected to bottom out. On the demand side, the Chinese economy is projected to slow further. On the supply side, the drop in investment is unlikely to lead to a substantial price rebound in the near future. Low energy prices have in fact helped reduce mining and refining costs, including those for copper, steel and aluminum.

The secular expansion of the frontier of metal extraction to Latin America and Africa as a result of improvements in the investment climate is unlikely to revert to any great extent. Instead, those improvements should continue steadily. Thus ample supply is likely to continue pushing metal prices down. The balance between weaker demand and a steady increase in supply suggests that, given the existing cost structure, metal markets are likely to experience a continued glut, leading to a "low-for-long" price scenario.

Agriculture

Over the next several years, the agricultural sector will adjust to lower prices for most farm commodities. For crops, production response to lower prices will result in reduced acreage planted. In the livestock sector, lower feed costs will provide economic incentives for expansion, although the timing of expansion for beef will be delayed by the building of beef cow inventories and biological lags. Following those near-term adjustments, long run developments for global agriculture reflect steady world economic growth and, possibly, continued global demand for biofuel feedstocks. Those factors combine to support longer run increases in consumption, trade and prices of agricultural products. Reflecting these market adjustments and price projections, export values will grow over the medium term. Developing countries are projected to have a growing role in the global economy and food demand. As incomes rise in developing countries and more consumers enter the middle class, diets tend to diversify, with increased consumption of meat, dairy products and processed foods (including vegetable oils).

World production of agricultural products is projected to increase more rapidly than world population, enabling a small increase in average world per capita use of most agricultural products. During this period, world trade in agricultural products is projected to maintain strong growth. Most agricultural prices have fallen from recent high levels and are projected to fall further during the next few years although they will recover somewhat in the long run. Still, the prospects for increases in real prices are fairly low, at least during the next decade and possibly beyond. World agricultural production is projected to continue rising in the coming decade as yield growth through technological enhancements and area expansion continue. The growth rate for world average crop yields has been slowing for nearly two decades and is projected to slow further in the next ten years. Reduced public funding for research and development over the last 25 years may have contributed to this slowdown. Increasing demand for higher quality food grain varieties can result in lower yields for specific countries. Water constraints in some countries are also impeding the expansion of irrigation. Where irrigation water is pumped from deep wells, the cost of pumping is projected to continue to increase due to falling water tables.

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