Comparing the Real Size of African Economies

Highlights of the Main Findings of the 2011 Round of the International Comparison Program in Africa

African Development Bank Group

Comparing the Real Size of African Economies

Highlights of the Main Findings of the 2011 Round of the International Comparison Program in Africa

April 2014

Table of Contents

List of Figures and Tables

Preface

The Statistics Department of the African Development Bank (AfDB) is pleased to present Highlights of the 2011 round of the International Comparison Program (ICP).

The 2011 round is the third large-scale international price and volume comparison for Africa executed under the leadership of the AfDB. The first round of the ICP was carried out in 2005, and this was followed by an interim comparison of Household Consumption Expenditure in 2009. In all these rounds, the AfDB worked closely with its Regional Member Countries and with the subregional organizations AFRISTAT, COMESA, ECOWAS, and SADC, which provided invaluable assistance in coordinating the activities within their member countries.

The ICP is a global program and the 2011 round covers about 190 countries in all regions of the world. The program aims to provide a reliable basis for comparing GDP expenditures across countries using Purchasing Power Parities (PPPs). It allows comparisons of the real value of production for each country, free from price and exchange rate distortions, by using a standardized benchmark. The 2011 round of the ICP carried out by the AfDB covers 50 African countries. The African region constitutes the largest component of the Global Comparison, as well as being one of the most diverse. In its scope, it not only covers small island states like the Seychelles and Cabo Verde, but also geographically large countries such as Nigeria, South Africa, and Egypt, whose populations are spread over huge urban conglomerations as well as remote rural areas. This diversity makes it particularly challenging to carry out the comparison according to the strict rules and procedures laid down by the ICP Global Office. The rationale behind the rules and procedures are however very important, since they are designed to guarantee that all countries follow the same rules of classification and measurement. Thanks to the dedication and hard work of statisticians in the Regional Member Countries, the AfDB is confident that the results of this latest round are reasonably robust and reliable.

The extensive database that the AfDB has now built up of price and volume measures for Africa represents a valuable resource for national governments, interna-tional, subregional and regional organizations, as well as academic researchers both in Africa and abroad. A full report with the detailed statistics from the 2011 round will be published shortly. In the meantime, these Highlights answer a number of key questions relating to the Africa region: Which are the largest and smallest economies? Which are the poorer and richer ones compared to the regional average? How do price levels vary across the region? And which countries appear to enjoy the highest welfare levels?

The success of the 2011 round of ICP was due in no small part to a concerted team effort involving a broad cross-section of key stakeholders. On behalf of the AfDB, I wish to thank all those involved for making the program a huge success. In particular, I wish to thank the national statistical offices for their commendable work, despite major challenges and constraints they face in running major statistical operations of this size. I would also like to thank the subregional organizations for their technical input, under the guidance of the staff in the statistical capacity building division of the Statistics Department of the AfDB.

The AfDB is widely recognized as a knowledge bank for the region, both through its statistical publications and its online databases, in particular the Africa Information Highway (AIH) initiative which was officially launched in South Africa in February 2014.[1] The 2011 round of ICP program has done much to bolster the Bank's role as a driver of statistical excellence across the continent. I am therefore pleased to recommend this publication to all the current and future users of statistical data relating to Africa's economic performance.

Mthuli Ncube
Chief Economist and Vice President

---

1   The Africa Information Highway (AIH) is a revolutionary data management and dissemination platform that will have a major impact on how regional data is collected, stored and ultimately used by anyone who wishes to access it.

Acknowledgments

Abbreviations and Acronyms

AfDB	African Development Bank Group
AIC	Actual Individual Consumption
CEMAC	Communauté économique et monétaire de l'Afrique centrale
COMESA	Common Market for Eastern and Southern Africa
CPI	Consumer Price Index
ECCAS	Economic Community of Central African States
ECOWAS	Economic Community of West African States
GDP	Gross Domestic Product
GFCF	Gross Fixed Capital Formation
ICP	International Comparison Program
IMF	International Monetary Fund
LCU	Local Currency Unit
mn	Million
MORES	Model Report on Expenditure Estimates
NPISH	Non-Profit Institutions Serving Households
OECD	Organisation for Economic Cooperation and Development
PLI	Price Level Index
PPP	Purchasing Power Parity
SADC	South African Development Community
UNESCO	United Nations Educational, Scientific and Cultural Organization
XR	Exchange Rate
ZAR	South African Rand

Highlights: Key Findings

- There have been significant changes in the ranking of countries by the size of their economies. Egypt's real GDP was slightly smaller than that of South Africa in 2005. However, by 2011 Egypt's real growth rate had surpassed that of South Africa, positioning Egypt as the largest economy in Africa.

- Four small countries have the highest per capita GDP – Equatorial Guinea, Seychelles, Mauritius, and Gabon. Their per capita GDP is several times larger than that of Liberia, Comoros, Burundi, and the Democratic Republic of the Congo, which are all at the bottom of the rankings.

- There are large differences in price levels between countries. Mostly high price levels are associated with high per capita GDP but there are several exceptions. Liberia and Comoros Islands, which have the lowest and second lowest per capita GDP respectively, both have high price levels, whereas Egypt, with the 8th highest per capita GDP, has the lowest price level in Africa. The GDP Price Level Index (PLI) for Egypt is only just over 60% of the African average.

- Investment is the key to economic development. In 2011, per capita investment was high in many countries – notably Equatorial Guinea, Seychelles, Botswana, and Mauritius – but exceptionally low in Liberia, Comoros, Burundi, and the Central African Republic. Per capita investment is positively correlated with per capita GDP. This demonstrates the basic dilemma (vicious circle) of economic development. Countries with low per capita GDP cannot generate the savings required to invest for future growth: they are poor because they cannot invest and they cannot invest because they are poor.

- Per capita Actual Individual Consumption (AIC) is a good measure of household welfare because it includes all goods and services consumed by households, regardless of whether households make the purchases themselves or receive them free from Non-Profit Institutions Serving Households (NPISH) or government. Several countries with high per capita GDP have much lower per capita AIC. This is because a large part of their GDP may be channeled into investment, collective government services, or be used to acquire foreign financial or physical assets. Mauritius and Seychelles have higher nominal per capita AIC than nominal per capita GDP. This is explained by the net receipts of transfers – such as remittances from migrant workers or foreign aid grants. These transfers enable households to buy more consumer goods and services than if they were reliant solely on incomes derived from domestic production.

HIGHLIGHTS OF THE 2011 ICP AFRICA ROUND

Comparing the Real Size of African Economies

1. INTRODUCTION

The International Comparison Program (ICP) is a global statistical program set up on the recommendation of the United Nations Statistical Commission. Its origins date back to 1970, initiated as a joint venture of the United Nations and the International Comparisons Unit of the University of Pennsylvania. Their mission was to find a way to compare, on a regular and timely basis, the Gross Domestic Product (GDP) of countries in real (price-adjusted) terms. From these modest beginnings, the global ICP has expanded to cover about 190 countries in this latest benchmark comparison for 2011.

From its inception, the number of African countries participating in ICP has been growing. In the first two experimental phases (1970 and 1973), Kenya was the only African country included, while in the third phase (1975), the number of African countries had increased to three. Subsequently the number grew to 15, 22 and 22 countries covered respectively in the 1980, 1985, and 1993 rounds.

The ICP 2005 Program covered 48 African countries and was the first to be coordinated by an African institution, namely the African Development Bank (AfDB). Following the successful completion of the 2005 round, the AfDB, in consultation with its Regional Member Countries, decided to make ICP-Africa a routine statistical operation to be undertaken annually, albeit on a reduced scale. Forty-nine countries took part in the first reduced-scale comparison of 2009, which covered only Household Consumption Expenditure, moreover prices were collected only in capital cities.[2]

This report presents the results of the 2011 ICP round, in which 50 African countries[3] participated and which was again coordinated by the AfDB. This was a full-scale benchmark comparison covering all the expenditure components of the GDP. The results for Africa will be combined with those for other regions in the Global Comparison, which is expected to cover over 190 countries.[4]

2. WHAT ARE PURCHASING POWER PARITIES (PPPs)?

The objective of the ICP is to compare the GDPs of different countries to determine their relative size, productivity, and the material well-being of their populations. Each country estimates its GDP and component expenditures at national price levels and in national currencies. For comparison purposes though, they need to be expressed in a common currency and valued at a common price level. The ICP uses Purchasing Power Parities (PPPs) to effect this double conversion.

PPPs are spatial price indices. In the simplest example of a comparison between two countries, a PPP is an exchange rate at which the currency of one country is converted into that of the second country in order to purchase the same volume of goods and services in both countries. This makes it possible to compare the GDPs and component expenditures of countries in real terms by removing the price level differences between them. There is a close parallel here with GDP comparisons over time for a single country, where it is necessary to remove the price changes from one year to the next in order to assess the change in underlying volumes.

3. WHY NOT USE EXCHANGE RATES?

Before PPPs became widely available, economists and policymakers who wanted to compare the GDPs of different countries converted them to a common currency using market exchange rates. However, this resulted in misleading comparisons because although the GDPs were now all in the same currency, they took no account of different price levels. (See Box 1.) Some other solution was needed to restore parity.

Now that PPPs are available for almost all countries in the world and are estimated econometrically by the World Bank for the few missing countries, there is no good reason to compare GDP and its expenditure components using exchange rates. This is now widely recognized by economists, financial journalists and other analysts, as well as by international organizations. The World Bank, the International Monetary Fund (IMF), the Organization for Economic Cooperation and Development (OECD), the European Commission (EC) , the United Nations (UN)

---

2   See "A Comparison of Real Household Consumption Expenditures and Price Levels in Africa", African Development Bank, 2012, Tunis.

3   Of the AfDB's 54 Regional Member Countries, only Eritrea, Libya, Somalia, and South Sudan did not participate in this latest round. South Sudan only became a separate state when the ICP 2011 round was already seven months underway.

4   A number of Caribbean and Pacific islands are participating in the comparisons for the first time. At the time of writing it is not certain how many will be included in the final results.

and its affiliates now routinely use PPPs in comparative analyses of their member countries.

4. HOW ARE PPPs CALCULATED?

A PPP is a spatial price index and it is calculated in exactly the same way as a temporal price index such as the Consumer Price Index (CPI). A CPI is compiled by dividing the prices of goods and services in the current year by their prices in an earlier base year. These price relatives are then averaged using expenditure weights that reflect the relative importance of the various goods and services in the market basket. PPPs are calculated in the same way. Let us take as an example the product group "Rice." Price relatives are first calculated for, say, 500 grams of pre-packed Basmati rice by dividing its price in one country by its price in a different country, with both prices expressed in each country's national currency. These price relatives are elementary PPPs and they are averaged with the elementary PPPs for other kinds of rice to obtain the average PPP for the product group "Rice." (These

first-level product groups are termed *basic headings* in the ICP Expenditure Classification.) Subsequently, the PPP for "Rice" is averaged with the PPPs for "Pasta products," "Beef," "Chilled and fresh fruit," and other basic headings to obtain the PPP for the major heading "Food." The process continues to obtain the PPP for Household Consumption Expenditure and, eventually, for GDP.

The PPPs for the lowest levels of the classification, such as the basic heading "Rice," are calculated as the simple unweighted averages of the price relatives of different kinds of rice. However, for higher levels of aggregation, expenditure weights that reflect the importance of each product group in total expenditure are used.

Temporal price indices are conventionally shown as 100.0 in the base period. Being spatial price indices, *PPPs have no base year*. Instead they have a base country and the PPP for the *base country* is shown as 1.0. In this report, South Africa is the base country. If another country had

Box 1. Exchange Rates and PPPs

1. The ratio of the GDPs of two countries when both GDPs are valued at national price levels and expressed in national currencies has three component ratios:

GDP ratio = price level ratio x currency ratio x volume ratio (1)

2. When converting the GDP ratio in (1) to a common currency using the exchange rate as the currency converter, the resulting GDPXR ratio remains with two component ratios:

GDPXR ratio = price level ratio x volume ratio (2)

The GDP ratio in (2) is expressed in a common currency, but it reflects both the price level differences and the volume differences between the two countries.

3. A PPP is defined as a spatial price deflator and currency converter. It comprises two component ratios:

PPP = price level ratio x currency ratio (3)

4. When a PPP is used, the GDP ratio in (1) is divided through by (3) and the resulting GDP ratio/PPP ratio has only one component ratio:

GDP ratio/PPP ratio = volume ratio (4)

The GDP ratio in (4) is expressed in a common currency, is valued at a common price level, and reflects only volume differences between the two countries.

been selected as base, the PPPs would be different but the ratio of the PPPs between any pair of countries would be exactly the same. South Africa is not being treated differently from the other countries. South Africa's prices and expenditure data enter into the calculation of PPPs in exactly the same way as those of all other countries. The base country can be switched to any chosen country by simply dividing all the other countries' PPPs by the PPP of chosen country. We can also switch to Africa as the base.

5. CALCULATING AVERAGE NATIONAL PRICES

The 2011 ICP for Africa included countries ranging from small island states such as Seychelles and Cabo Verde to large and diverse countries such as Egypt, Nigeria, and South Africa with large populations living in extensive urban conurbations as well as in remote rural areas. All countries had to produce national average prices for goods and services that were comparable with those of other countries in the region. The accuracy of the PPPs depends upon the extent to which the selected goods and services were representative of their entire country and on the country's ability to provide national prices averaged over the different subregions, over the course of the year and over different types of outlets. Participating countries were required to explain how they had calculated average national prices. Their replies showed that most countries had managed to obtain reasonably even coverage of prices throughout the country, throughout the year, and covering different types of outlets.

6. ESTIMATION OF EXPENDITURES ON THE BASIC HEADINGS

Estimation of expenditures on the 155 basic headings that were required for the weights was a challenge for many countries. This was because many do not regularly estimate GDP by the expenditure approach or do so at only at a very aggregated level.

To assist countries to estimate expenditures on the basic headings, the Global Office developed an Excel spreadsheet, Model Report on Expenditure Estimates (MORES). The spreadsheet lists each of the 155 basic headings and provides a standard format for countries to estimate 2011 expenditures on each of them. MORES starts from the assumption that in most countries, expenditure data would only be available at an aggregated level. An estimate might be available for household expenditure on "Food," but not on the basic headings such as "Rice," "Beef," and "Pasta products." Similarly, a country might have estimates of total expenditure on "Machinery and equipment" but not on the basic headings such as "Electrical and optical equipment" or on "Motor vehicles, trailers and semi-trailers." MORES suggests various ways in which the aggregated data can be split into the detailed basic headings.

The AfDB, together with the Global Office, organized a series of workshops to help national accountants complete the MORES. In each workshop there were national

accountants present who were equipped with only basic information on the various expenditure categories. A collaborative approach was clearly needed, so those with poor data sources were encouraged to borrow ideas and techniques from those with better information. In some cases, countries were able to "borrow" expenditure breakdowns from neighboring or similar countries.

An analysis of the MORES forms shows that several innovative and ingenious techniques were used to obtain the basic heading expenditure estimates. While these could not compensate fully for the lack of basic data, the MORES workshops helped to ensure that where only limited information was available, that this was used in the most efficient way possible.

7. PRICE LEVEL INDICES

PPPs are the ratios of prices in different national currencies. As a result, a PPP does not look like a temporal price index such as the Consumer Price Index, which is calculated as a ratio of prices in the same currency. However, PPPs can easily be normalized by dividing them by the exchange rate and multiplying by 100. This provides Price Level Indices (PLIs) which show the price level differences that have to be eliminated to make proper volume comparisons. For the African ICP, South Africa was chosen as the base country and so the exchange rates used to calculate PLIs are the rates against the South African Rand (ZAR) – that is the number of national currency units needed to buy one South African Rand.

Countries with PLIs greater than 100 have price levels that are higher than in South Africa, while countries with PLIs less than 100 have lower price levels. In this report, PLIs are shown with Africa as the base. In this case, a PLI above or below 100 means that the price level in that country is higher or lower than the average price level for Africa as a whole.

Like PPPs, PLIs can be calculated for products, product groups, aggregates, and GDP. At the level of GDP, PLIs provide a measure of the differences in the general price levels of countries. It is important to properly understand what the PLIs mean. For example, Zambia's PLI for GDP is 107.5 and Mozambique's is 121.5. This means that if, in 2011, Zambians had changed their Kwacha to Mozambique's Metical at the market exchange rate, had then traveled to Mozambique and bought a representative selection of all the goods and services in GDP (capital goods

and government services as well as consumer items), they would have found that they cost ((121.5 – 107.5) / 107.5) x 100.0 = 13.0% more than if they had stayed home and bought the same set of goods and services in Zambia.[5]

8. HOW ARE PPPs USED?

PPPs and the price and volume indices they generate are used for a panoply of activities, including research and analysis, statistical compilation, and administrative purposes at both national and international levels. Some of the principal users are international bodies such as the United Nations and its affiliates, the International Monetary Fund, the World Bank, the European Commission, and the OECD. However, in recent years there has been a growing demand for PPP-based measures from a variety of national users, in particular government agencies, universities, and research institutes.

Researchers and policymakers, at both international and national levels, use PPPs as inputs into economic research and policy analysis that involve comparisons between countries. They are employed either to generate *volume measures* with which to compare the size of countries and their levels of material well-being and poverty levels, consumption, investment, government expenditure and overall productivity, or to generate *price measures* with which to compare price levels, price structures, price convergence and competitiveness. PPP-converted GDPs are used to standardize other economic variables such as carbon emissions per unit of GDP, energy use per unit of GDP, GDP per employee or GDP per hour worked. Among other applications, multinational corporations use PPPs and PLIs to evaluate the cost of investment in different countries.

One major use of PPPs is poverty assessment, using the World Bank's USD 1.25 per day per person poverty threshold. National poverty assessments differ because the purchasing power of currencies differs from one country to another. Therefore, to establish an international poverty line, purchasing power needs to be equalized over countries. This is done by converting the international poverty line of USD 1.25 to national price levels with PPPs. Data from household surveys are then used to determine the number of people living with per capita consumption below this poverty line.

---

5   The PLI is not strictly speaking a price index - the PPP is the price index. The PLI shows us the difference between the PPP and the exchange rate and in the earliest rounds of the ICP it was called the "Exchange Rate Deviation Index," which is perhaps a more accurate description than Price Level Index.

The eradication of hunger and poverty is the first of the United Nation's Millennium Development Goals. Other goals refer to health, particularly that of mothers and children, and primary education. The World Health Organization uses PPPs when comparing per capita expenditure on health across countries. Similarly, the United Nations Educational, Scientific and Cultural Organization (UNESCO) uses PPPs when assessing the per capita expenditure on education of different countries. A related use is the estimation of the UN's Human Development Index, in which PPP-converted gross national income per capita is one of the three variables included in the index.

Africa has benefited from the establishment of a number of highly active subregional organizations – SADC, ECOWAS, COMESA, CEMAC, and ECCAS among others. Many of these are primarily trading blocs aiming to increase trade and boost economic development among their members and to encourage investment from overseas. Real GDP (that is GDP PPP) can be used to assess the relative size of the member states, the total market potential of each group for outside investors, and the contributions each member country should make to the administrative costs.

9. WHEN NOT TO USE PPPs
PPPs are to designed compare GDP and its expenditure components at a single point in time. Three important points to bear in mind are:

- Because of their focus on GDP, they are not relevant for making international comparisons of other kinds of statistics. For example, when comparing migrant workers' remittances or foreign direct investment in different countries, the standard practice is to convert them to a single currency using exchange rates and that is the correct procedure.

- Because they refer to a single point in time, PPPs are not relevant when comparing the changes in GDP over time. Each country's own estimates of real ("constant price") GDP in national currencies provide the only correct measures of the growth of GDP.

- PPPs have sometimes been interpreted as equilibrium exchange rates to which market exchange rates are

6   Cassel, Gustav (1918). "Abnormal Deviations in International Exchanges" 28, No. 112. *The Economic Journal*. pp. 413–415, December 1918.

expected to converge. This was a theoretical proposition first suggested by Gustav Cassel[6] in the early years of the last century. Experience since then has cast considerable doubt on this convergence theory and the PPPs shown here tell us nothing about what the market exchange rate "should be."

10. RELIABILITY OF PPPS AND REAL EXPENDITURES
PPPs are point estimates and like all such estimates are subject to errors. The error margins surrounding PPPs depend on the reliability of the expenditure weights and the price data reported by participating countries as well as the extent to which the goods and services priced reflect the consumption patterns and price levels of each participating country. As with national accounts generally, it is difficult to calculate precise error margins for PPPs or for the real expenditures derived from them.

Comparing countries by the size of their real GDP or their real GDP per capita assumes that all the countries employ the same definition of GDP and that their measurement is equally exhaustive. During the conduct of ICP 2011, countries were trained on the procedures and need to ensure that the measurement was exhaustive. To ensure that this was done, all countries provided information on the exhaustiveness and quality of national accounts, and confirmed that they were in conformity with SNA 1993 requirements. However, it is possible that GDPs of countries with large informal sectors could be underestimated. It should be noted that there may be errors in the population data, in addition to those in the price and expenditure data; although small differences between real GDPs and real GDPs per capita should not be considered significant. It is generally accepted that differences of less than 5% lie within the margin of error of the PPP-based estimates.

11. KEY RESULTS OF THE ICP 2011 ROUND

11.1. Comparing the 2005 and 2011 ICP results
The ICP aims to compare prices and real expenditures for specific years and it is hazardous to compare ICP results from successive ICP rounds. A particular problem for Africa is that only 48 countries participated in ICP 2005, compared to 50 in 2011. Seychelles was one of the new additions and because it is so small, its inclusion had little impact overall. However, Algeria as the other

Figure A: Real GDP Country Shares (Africa = 100%) with 48 Participating Countries (excluding Algeria & Seychelles)

2005

Morocco 5.8% Nigeria 13.3%

Sudan 4.3% Egypt 20.2%

Other Countries 35.0% South Africa 21.5%

2011

Morocco 6.0% Nigeria 14.1%

Sudan 4.2% South Africa 16.9%

Other Countries 35.9% Egypt 22.9%
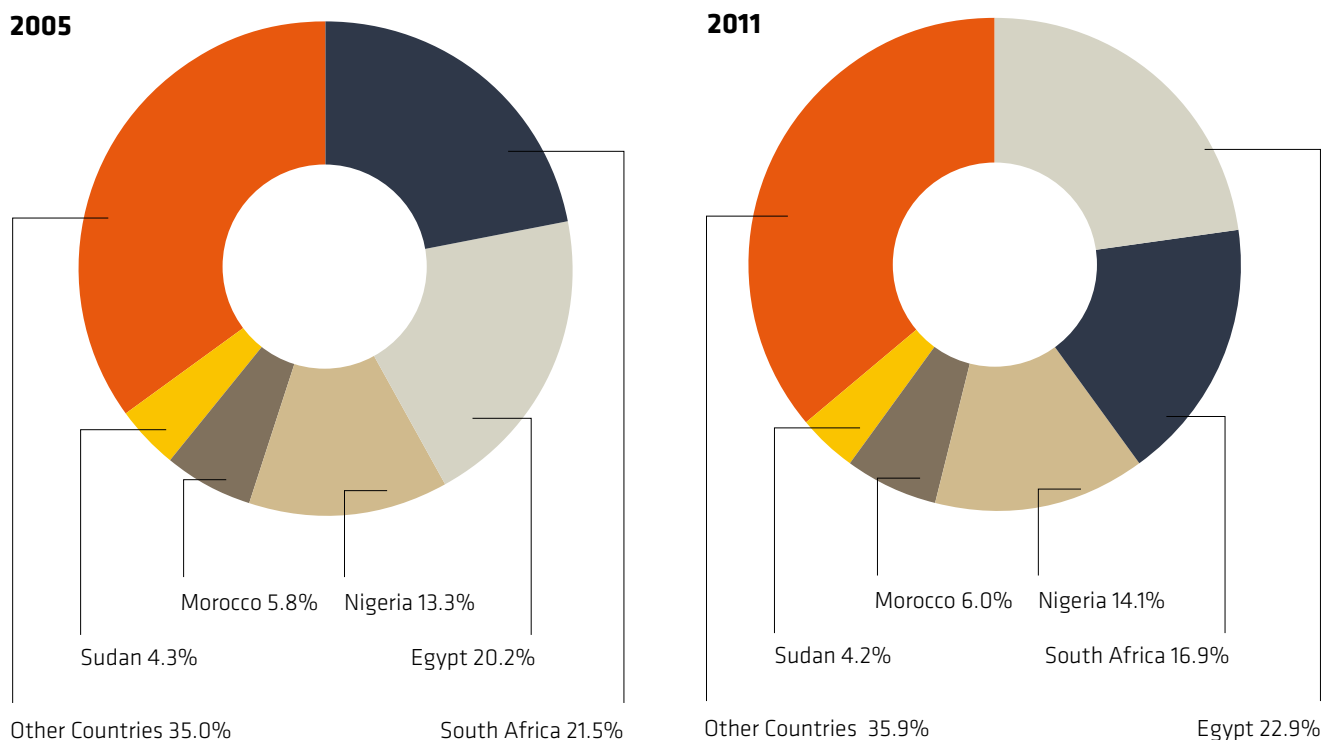
Figure B: 2011 Real GDP Country Shares (Africa = 100%) with 50 Participating Countries (including Algeria & Seychelles)

2011

Algeria 11.8% Nigeria 12.4%

Morocco 5.3% South Africa 14.9%

Other Countries 35.4% Egypt 20.2%
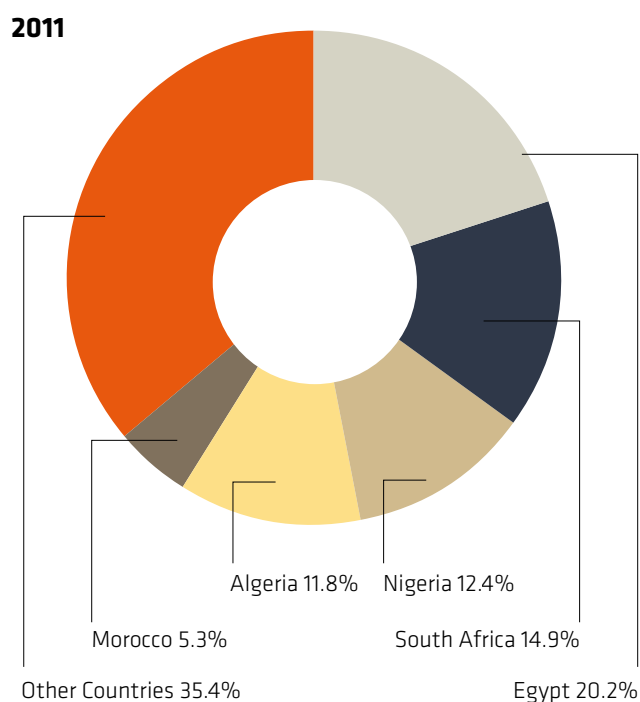
newcomer was the fourth largest economy in 2011 and had it been included in the 2005 round, both prices and real expenditures for 2005 would have been changed in ways that cannot be easily predicted. With this caveat in mind, some broad comparisons are given below.

Figure A shows the five largest economies in 2005 and 2011. Algeria was the fourth largest economy in 2011 but did not participate in ICP 2005 and so had to be excluded in both years.

The most striking feature is the changed position of Egypt, which was the second economy after South Africa in 2005 but by 2011 had become the largest in terms of real GDP. The change in rankings of Egypt and South Africa is explained by differences in the real growth of GDP over the six-year period: between 2005 and 2011, real growth of GDP in Egypt averaged 5.4% per annum compared with only 3.3% in South Africa.

Nigeria remains the third largest economy and increased its share of total African GDP from 13.3% to 14.1%. Ignoring Algeria, Morocco remains in fourth posi-

15

tion. While Sudan remains in the fifth position, its real GDP share reduced slightly from 4.3% in 2005 to 4.2% in 2011. Although it is not among the five largest economies, Angola's share increased significantly from 3.0% in 2005 to 4.0% in 2011.

In 2011, taking into account all 50 countries that participated in the program, Algeria was the fourth largest economy, while Morocco dropped to the fifth position (see Figure B).

11.2. Real and nominal GDP in 2011

Figures C and D give real and nominal GDP for all 50 participating countries. Because of the enormous differences between the small number of very large countries and the rest, it is not helpful to show all countries in the same graph. The twelve largest economies account for over 80% of Africa's total real GDP, while the thirteen smallest account for only 1%.

Nominal and real GDP are identical for South Africa because it is the base country. For all other countries the

Figure C: Size of African Economies in 2011: GDP in Real and Nominal Terms (ZAR mn). 24 Largest Economies
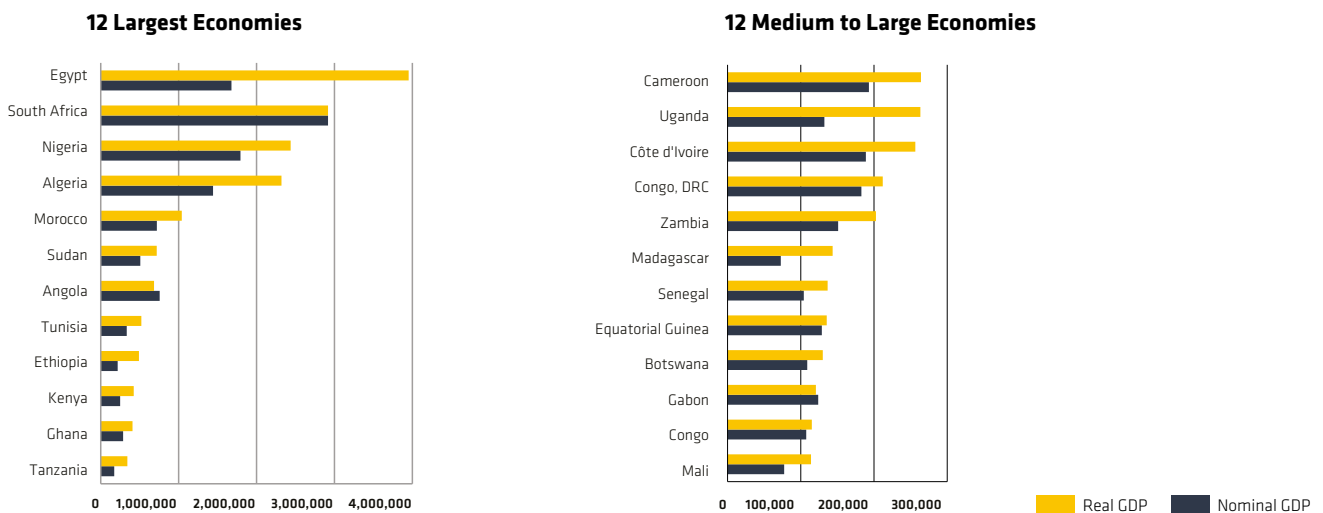
Figure D: Size of African Economies in 2011: GDP in Real and Nominal terms (ZAR mn). 26 Smallest Economies
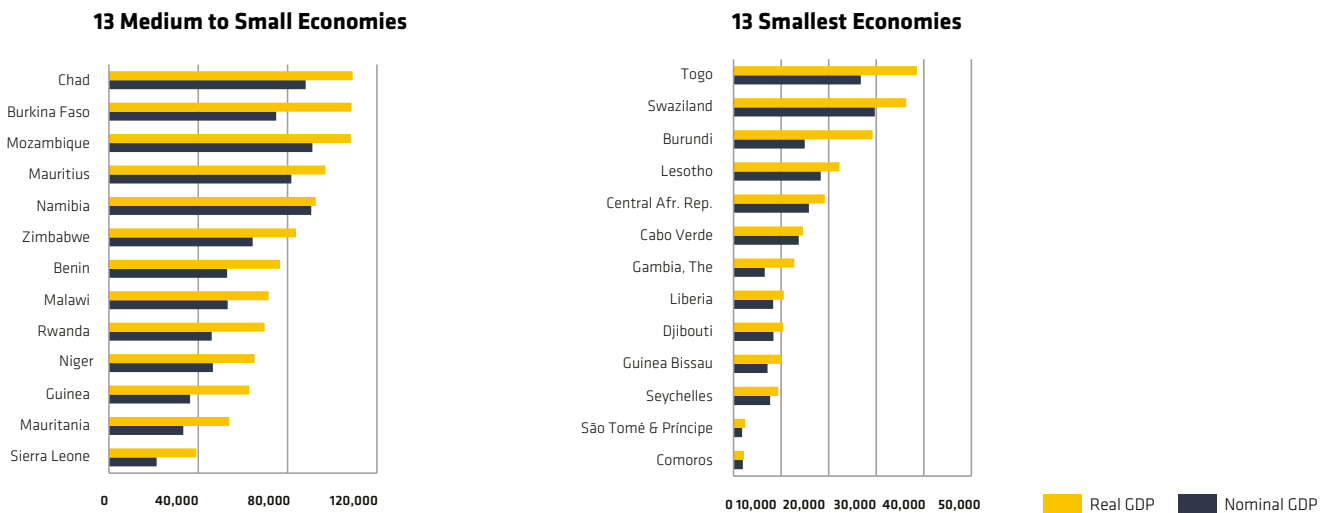
yellow (real GDP) bar is longer than the black (nominal GDP) bar with the exception of Angola and Gabon. Note however that Angola's price level is higher than that of South Africa but price levels in all other countries are lower. Price levels are particularly low in Egypt, Algeria, Uganda, Togo, and Burundi: as a result, the yellow (real GDP) bars for these countries are much longer than the black (nominal GDP) bars.

11.3. Real GDP per capita

Figure E below shows the per capita real GDP of the 50

countries. It is again not helpful to show all 50 in the same graph because of the enormous gap between the highest and lowest countries. Per capita real GDP of Equatorial Guinea – the top country – was more than 188,066 ZAR compared with 2,558 ZAR in Liberia – the lowest-ranked country.

The per capita GDP for Africa was 19,267.42 ZAR in 2011 but the distribution around the average was highly skewed, with 35 countries reporting per capita real GDP of less than the average while only 15 counties had per capita real

Figure E: Real per capita Gross Domestic Product in 2011 (ZAR)

25 High-Income Countries
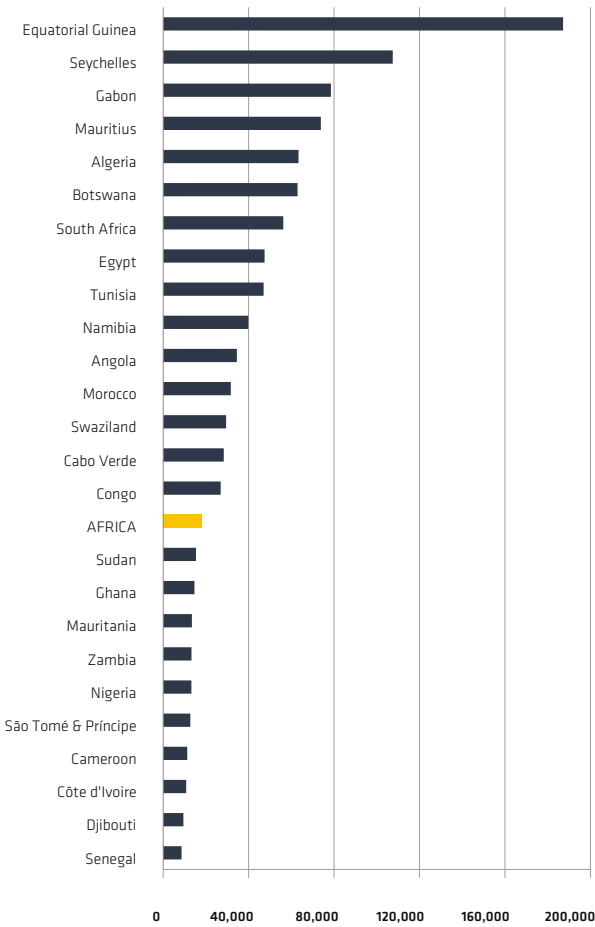
25 Low-Income Countries
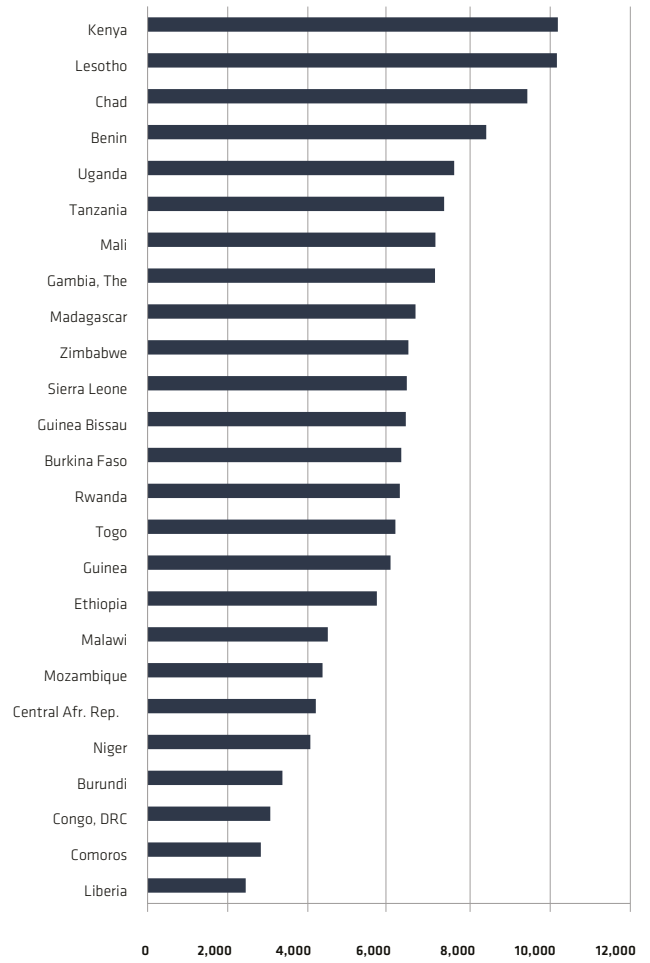
GDP above the average. The median per capita GDP was 10,703.60 ZAR and this median figure, rather than the average, better represents the overall situation in Africa.

tained by dividing the PPPs by the exchange rate and are here normalized to Africa = 100. PLIs can be calculated for all the expenditure components as well as for the GDP. Figure F shows the overall PLI for GDP.

11.4. Price levels

Figure F shows Price Level Indices (PLIs) for the 50 participating countries in 2011. The Price Level Indices are ob-

The countries have been assigned to three price-bins in Figure F: the gray bin contains 20 countries whose price

Figure F: GDP Price Level Indices 2011: Africa = 100
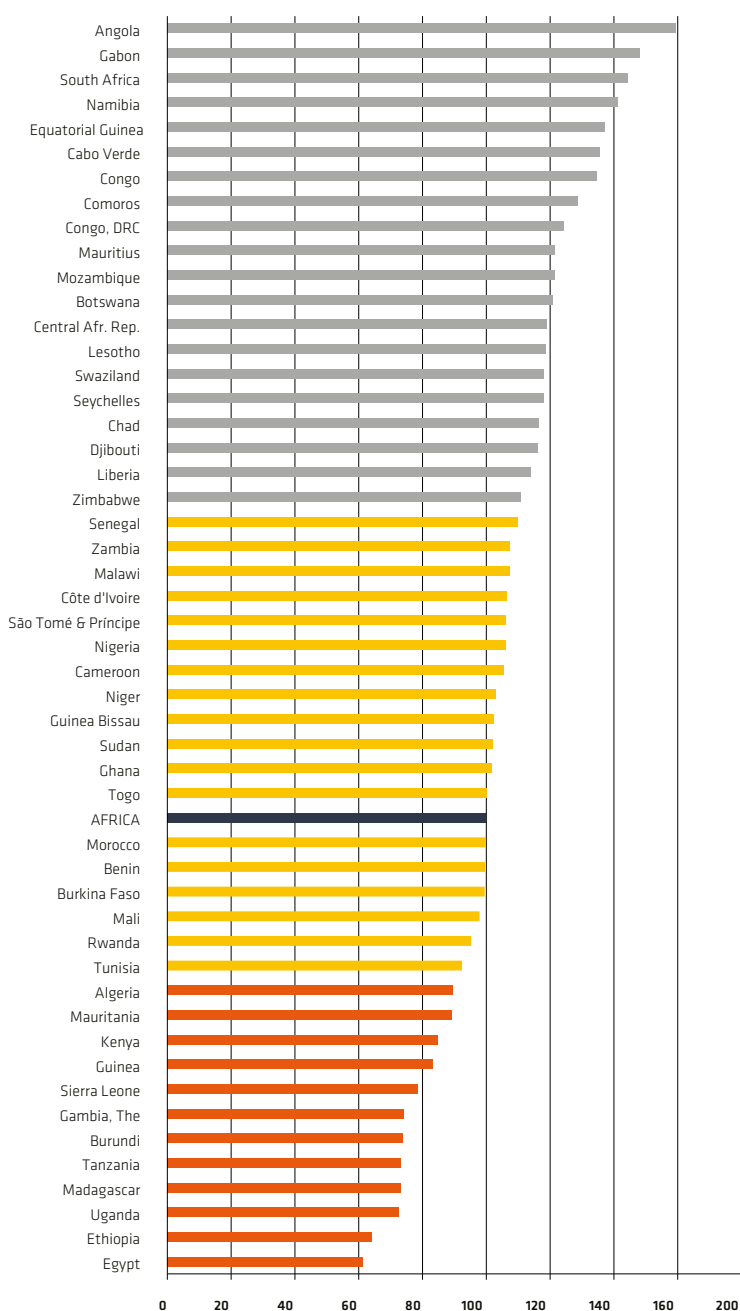
levels are 10% or more above the African average (100), and the orange bin contains 12 countries with price levels 90% or less than the African average.

There is usually a positive correlation between PLIs and per capita GDP: high PLIs are associated with high per capita GDP and low PLIs are associated with low per capita GDP. Thus South Africa, Equatorial Guinea, Gabon, Seychelles and other high per capita GDP countries are in the gray high-PLI bin, while Ethiopia, the Gambia, Uganda and some other low per capita GDP countries are in the low-PLI orange bin. There are, however, some striking exceptions: Liberia and Comoros Islands, which have the lowest and second lowest per capita GDP respectively, are both in the high PLI gray bin and Egypt, with the 8th highest per capita GDP, has the lowest PLI in Africa. The GDP PLI for Egypt is about 60% of the African average. The very low PLI explains the large differences between the nominal and real GDP for Egypt.

11.5. Investment

Investment – measured here by Gross Fixed Capital Formation (GFCF) – has long been recognized as the key to economic development. GFCF consists of investment in residential and other buildings, namely roads, bridges, railroads, electricity, etc. It is important because it enhances a country's potential for future growth. The developed countries have accumulated large stocks of machinery and equipment and infrastructure assets like ports, high-quality roads, power transmission systems, dwellings and commercial buildings, and these assets account for their higher levels of productivity and hence higher incomes. African countries are still at an early stage of building up their capital stocks.

Figure G shows Real Gross Fixed Capital Formation per capita – the number of South African Rand (ZARs) invested per person in 2011. Equatorial Guinea reported an exceptionally high per capita GFCF of ZAR 63,951.

Figure G: Gross Fixed Capital Formation per capita in 2011(ZAR)
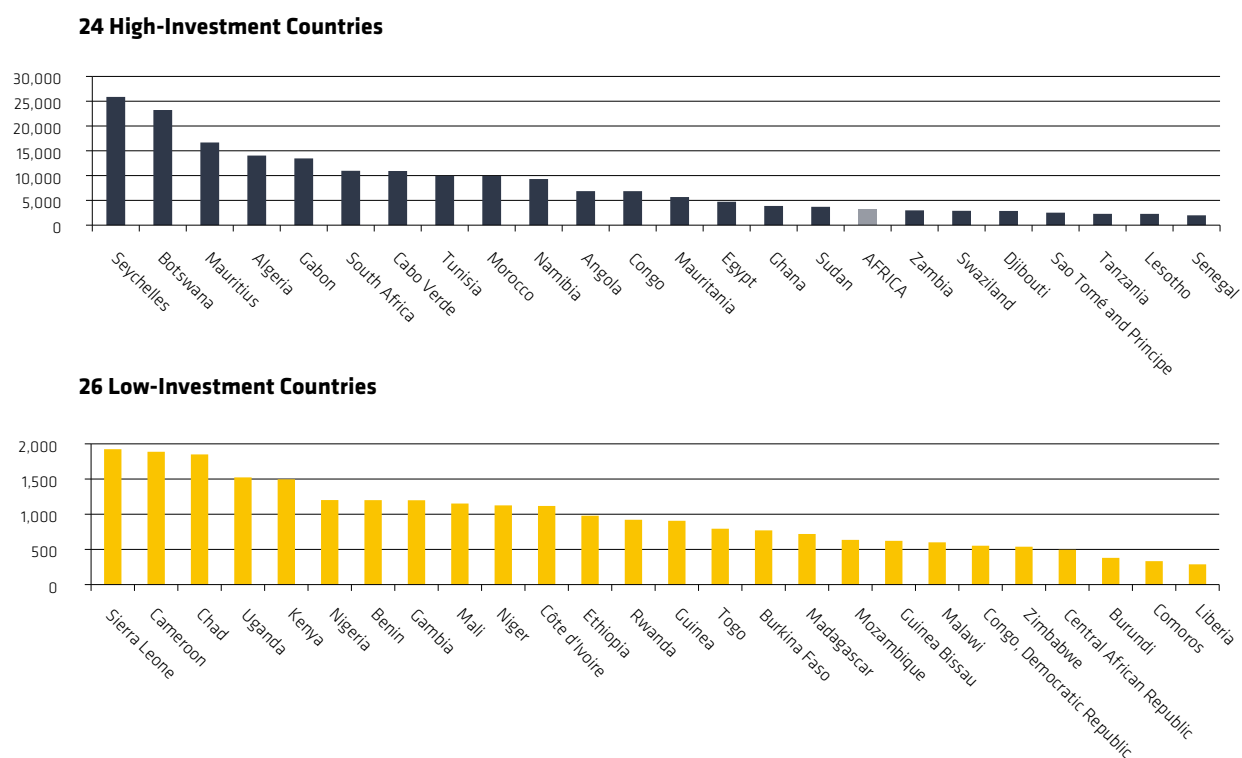
Almost all the high-investment countries in Figure G are also countries with high per capita GDP, while the low-investment countries all have lower per capita GDP. This can be seen more clearly from Figure H, which shows the correlation between per capita GFCF and per capita GDP. The R^2 value suggests that about 87% of the variation in per capita GFCF is explained by per capita GDP and there are very few outliers: Botswana and Cabo Verde are investing more than could be expected, given their levels of per capita GDP, while Egypt, Ethiopia and Sudan are investing less.

Figure H demonstrates the basic dilemma of economic development. Countries with low per capita GDP cannot generate the savings required to invest for future growth: they are poor because they cannot invest and they cannot invest because they are poor. In the 19th century the developed countries were able to break out of this vicious circle by technological developments that raised productivity first in the agricultural sector and subsequently in manufacturing. Foreign direct investment is another way in which countries can break the vicious circle.

11.6. Household welfare

A good measure of household welfare is provided by per capita Actual Individual Consumption (AIC). Actual Individual Consumption includes all goods and services consumed by households regardless of whether households make the purchases themselves or receive them free from NPISH or government.

Figure I ranks the 50 countries by per capita Actual Individual Consumption. The Seychelles and Mauritius are at the top, with per capita AIC more than four times larger than the African average: the Democratic Republic of the Congo and Liberia have the lowest per capita AIC – about one-fifth of the African average. Fourteen countries are in the gray bin with per capita AIC at least 50% above the average. Twenty-one are in the lower (orange) bin with per capita AIC less than half of the African average.

It is instructive to compare the rankings in Figure I with per capita GDP in Figure E above. Equatorial Guinea has the highest per capita GDP but falls to 11th place for per capita AIC. By contrast, the Republic of Congo was 14th in per capita GDP but only 29th in per capita AIC. Egypt, on the other hand, moves up from 8th position in per capita GDP to 3rd in per capita AIC and Swaziland is 13th in per capita GDP but 10th in per capita AIC.

It is clear that high or low per capita GDP does not automatically translate into high or low per capita AIC. Countries with high per capita GDP may use substan-

Figure H: Correlation between Gross Domestic Product per capita and Gross Fixed Capital Formation per capita
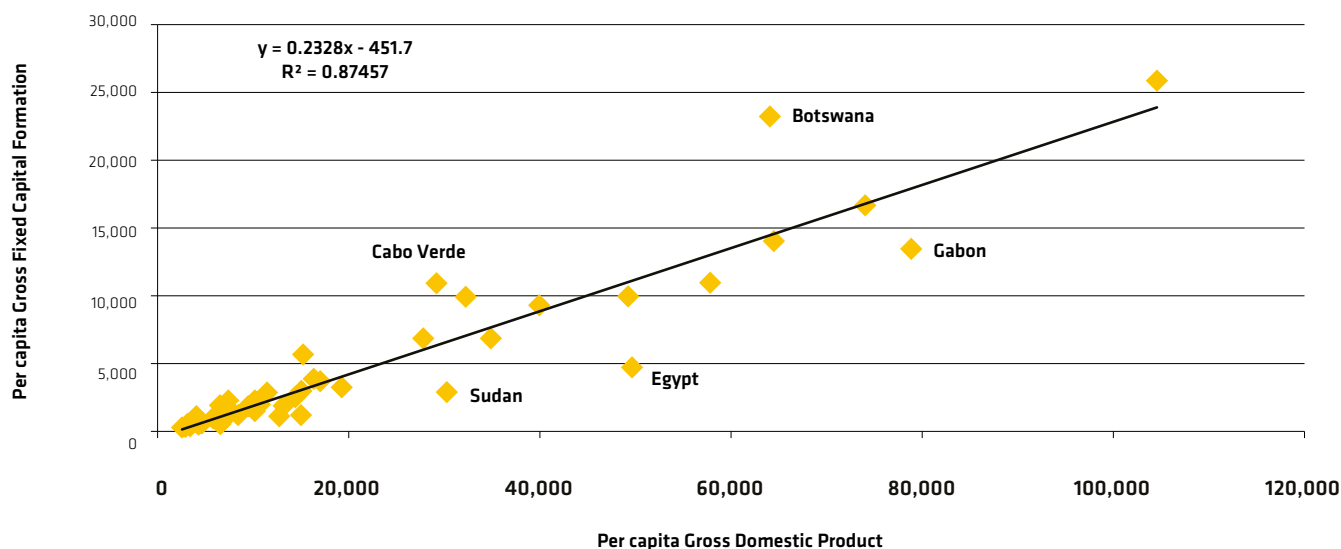
tial parts of their large GDP for investment, for collective government services including defense and law and order, or for the accumulation of financial and physical assets abroad. Countries with low per capita GDP can achieve higher per capita AIC if they receive transfers from abroad, either as official development assistance or as migrants' remittances. In Liberia and Lesotho, per capita AIC was higher than per capita GDP in 2011. Liberia was receiving substantial foreign aid and households in Lesotho were receiving large remittances from migrant workers in South Africa.

Figure I: Per capita Actual Individual Consumption, 2011
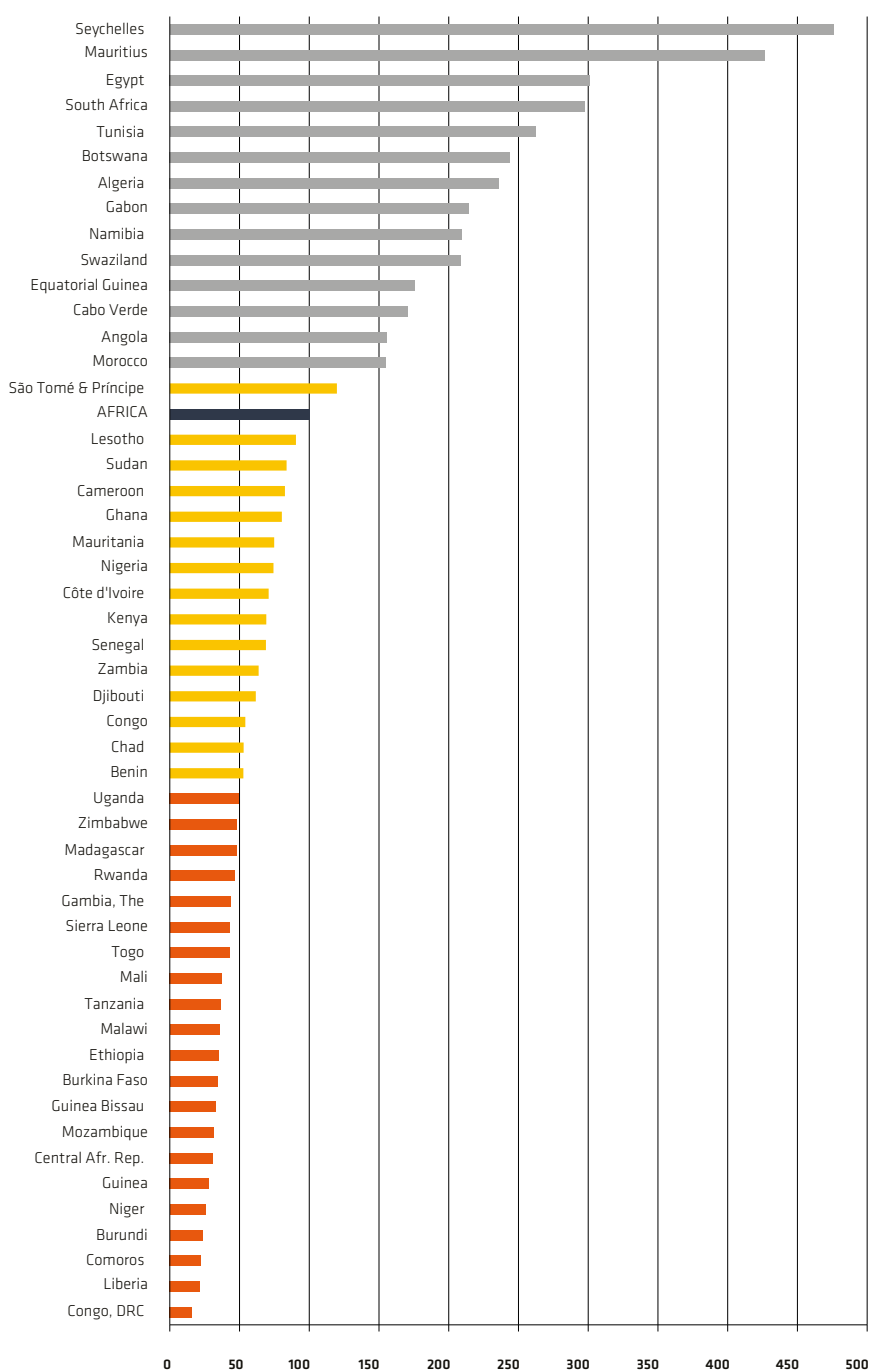
12. CONCLUSIONS

Exchange rates cannot be used to convert GDP in national currencies to a common currency because price levels vary between countries. Genuine volume differences between countries risk being masked by price differences which, in Africa, are quite substantial. In the same way that the real growth over time for a single country can only be compared after eliminating price changes, price differences must be eliminated when comparing the GDP of a group of countries at a single point in time.

With 50 participating countries, Africa is the largest region in the Global ICP comparison for 2011. But African countries are not only numerous they are also economically diverse and this creates many practical problems in calculating the annual national prices that are required to derive Purchasing Power Parities (PPPs). Annual national prices should be averaged over the quarters or months of the year, for both urban and rural areas, and across the different kinds of shops and markets typical of each country. Nevertheless, the participating countries have mostly been assiduous in following the operational guidelines drawn up by the ICP Global Office, which were designed to ensure that all participating countries follow the same classifications and measurement methods.

Calculation of expenditure weights was also a challenge for many countries that either do not regularly estimate GDP from the expenditure side or do so at only very aggregated levels. Mindful of this problem, the AfDB organized a series of workshops for national accounts compilers and the Global Office developed software to ensure that countries made the best use of all available information in estimating their expenditure weights.

Once the annual national prices and expenditure weights have been obtained, the calculation of PPPs is relatively straightforward. In fact, the procedure is identical to that used in compiling any other price index, such as the Consumer Price Index.

Despite the challenges faced in estimating expenditure weights and annual national prices, the AfDB is confident that the PPPs and the real expenditures obtained for 2011 are reasonably reliable. PPPs are statistical constructs rather than precise measures. Like all statistics, they are point estimates lying within a range of estimates – the error margin – that includes the (unknown) true value. As with national accounts generally, it is not possible to calculate precise error margins for PPPs or for the real expenditures derived from them. Bearing in mind that there may be errors in the population data, in addition to those in the price and expenditure data, small differences between real GDPs and real GDPs per capita should not be considered significant. It is generally accepted that differences of less than 5% lie within the margin of error of the PPP-based estimates.

Appendix: Summary Table of Main Results

NOTES

The Summary Table below focuses on PPPs, PLIs, and Real Expenditures at the GDP level (in the main report that will shortly be published, there will be detailed tables showing PPPs and real expenditures broken down by expenditure categories):

- Column 1 gives GDP for 2011 as reported by countries in millions of their own currency units (in other words, local currency units or LCUs).

- Column 2 gives the PPPs for GDP with South Africa as the base country (ZAR = 1.00).

- Nominal GDP divided by the PPP gives Real GDP in million South African Rand (ZAR mn). These GDP figures are "real" in the sense that the differences in price level between countries have been removed: comparisons between these real GDP figures are between the underlying volumes of goods and services. Real GDP in ZAR is given in Column 3.

- Column 4 shows the share of each country's real GDP in the total GDP of the African continent.

- Column 5 shows each country's mid-year 2011 population giving the real GDP per capita in ZAR shown in Column 6.

- Column 7 converts the per capita figures to an index with the average for Africa as 100. A figure greater/smaller than 100 means that the country's per capita GDP is above/below the average for Africa.

- Column 8 gives the market exchange rates for each country's currency against the ZAR. The ratio of the PPPs to the exchange rates gives the Price Level Indices which are shown both with ZAR equal to 1 and with the average for Africa equal to 100 (in columns 9 and 10). In the latter case, a figure greater/smaller than 100 means that the country's overall price level is higher/lower than the average for Africa.

- Columns 11 and 12 show what is here referred to as nominal GDP both in million ZAR and as shares of Africa's total *nominal* GDP. There is no analytic value to these nominal figures. They cannot be compared across countries because they are at different price levels and are given only to here to demonstrate how misleading exchange rate converted GDP can be.

- Columns 13 to 16 show the rankings of the 50 countries by nominal GDP, by real GDP, by real GDP per capita, and by price levels. The comparison between the rankings of nominal and real GDP is particularly revealing. When the rankings are done correctly, that is using real rather than nominal GDP, rankings change by at least one position for 35 countries and by 2 or more places for 23 countries.

Summary of Main Results: ICP 2011

Country	Nominal GDP (LCU mn)	PPP ZAR=1	Real GDP ZAR (mn)	Real GDP Shares (Africa=100%)	Population (in million)	Real GDP per capita ZAR	Real GDP per capita Index (Africa=100)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Algeria	14,481,008	6.24	2,319,976	11.83	35.98	64,479	334.65
Angola	9,767,611	14.28	684,143	3.49	19.62	34,872	180.99
Benin	3,439,771	44.88	76,637	0.39	9.10	8,422	43.71
Botswana	102,492	0.79	130,050	0.66	2.03	64,041	332.38
Burkina Faso	4,868,468	44.82	108,634	0.55	16.97	6,402	33.23
Burundi	2,599,941	88.92	29,240	0.15	8.58	3,410	17.70
Cameroon	12,545,651	47.49	264,151	1.35	20.03	13,188	68.44
Cabo Verde	149,004	10.21	14,590	0.07	0.50	29,145	151.27
Central Afr. Rep.	1,029,724	53.64	19,197	0.10	4.49	4,279	22.21
Chad	5,725,350	52.46	109,135	0.56	11.53	9,469	49.15
Comoros	95,438	43.52	2,193	0.01	0.75	2,909	15.10
Congo	6,982,507	60.68	115,076	0.59	4.14	27,798	144.27
Congo, DRC	23,146,149	109.20	211,957	1.08	67.76	3,128	16.24
Côte d'Ivoire	12,275,478	47.87	256,441	1.31	20.15	12,725	66.04
Djibouti	205,314	19.70	10,419	0.05	0.91	11,506	59.72
Egypt	1,371,078	0.35	3,952,422	20.16	79.62	49,643	257.65
Equatorial Guinea	8,367,319	61.78	135,447	0.69	0.72	188,066	976.08
Ethiopia	506,096	1.03	490,517	2.50	84.73	5,789	30.04
Gabon	8,046,080	66.69	120,640	0.62	1.53	78,631	408.10
Gambia, The	26,596	2.08	12,763	0.07	1.78	7,186	37.30
Ghana	59,816	0.15	407,906	2.08	24.97	16,339	84.80
Guinea	33,128,317	526.72	62,895	0.32	10.22	6,153	31.93
Guinea Bissau	464,653	46.15	10,068	0.05	1.55	6,508	33.78
Kenya	3,048,867	7.20	423,484	2.16	41.61	10,178	52.82
Lesotho	18,331	0.82	22,280	0.11	2.19	10,156	52.71
Liberia	1,147	0.11	10,560	0.05	4.13	2,558	13.27
Madagascar	20,276,384	141.28	143,514	0.73	21.32	6,733	34.94
Malawi	1,140,843	15.95	71,525	0.36	15.38	4,650	24.14

Exchange rate	Price Level Indices		Nominal GDP		Rankings			
(LCU per ZAR)	ZAR=1	Africa=100	ZAR (mn)	Shares (Africa=100)	Nominal GDP	Real GDP	Real per capita GDP	Price Level Index
(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
10.04	0.62	89.65	1,441,616	10.61	4	4	5	39
12.91	1.11	159.55	756,598	5.57	5	7	11	1
64.99	0.69	99.65	52,932	0.39	32	31	29	34
0.94	0.84	120.73	108,830	0.80	20	21	6	12
64.99	0.69	99.50	74,917	0.55	28	26	38	35
173.67	0.51	73.86	14,970	0.11	42	40	47	45
64.99	0.73	105.44	193,054	1.42	12	13	22	27
10.86	0.94	135.63	13,715	0.10	43	43	14	6
64.99	0.83	119.09	15,845	0.12	41	42	45	13
64.99	0.81	116.47	88,102	0.65	25	25	28	17
48.74	0.89	128.82	1,958	0.01	49	50	49	8
64.99	0.93	134.71	107,448	0.79	21	23	15	7
126.63	0.86	124.42	182,783	1.35	14	16	48	9
64.99	0.74	106.27	188,896	1.39	13	15	23	24
24.48	0.81	116.15	8,389	0.06	44	46	24	18
0.82	0.42	61.25	1,678,049	12.35	3	1	8	50
64.99	0.95	137.15	128,757	0.95	18	20	1	5
2.33	0.44	63.96	217,455	1.60	11	9	42	49
64.99	1.03	148.07	123,814	0.91	19	22	3	2
4.06	0.51	74.10	6,555	0.05	48	44	33	44
0.21	0.70	101.61	287,286	2.11	9	11	17	31
911.82	0.58	83.34	36,332	0.27	35	35	41	42
64.99	0.71	102.46	7,150	0.05	47	47	37	29
12.23	0.59	84.92	249,274	1.83	10	10	26	41
1.00	0.82	118.70	18,331	0.13	40	41	27	14
0.14	0.79	113.82	8,331	0.06	45	45	50	19
278.90	0.51	73.09	72,702	0.53	29	18	34	47
21.45	0.74	107.27	53,178	0.39	31	32	43	23

Country	Nominal GDP (LCU mn)	PPP ZAR=1	Real GDP ZAR (mn)	Real GDP Shares (Africa=100%)	Population (in million)	Real GDP per capita ZAR	Real GDP per capita Index (Africa=100)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Mali	5,024,473	44.09	113,970	0.58	15.84	7,195	37.34
Mauritania	1,309,364	24.29	53,903	0.27	3.54	15,220	78.99
Mauritius	322,959	3.33	96,988	0.49	1.31	74,229	385.26
Morocco	802,607	0.77	1,040,298	5.31	32.27	32,234	167.30
Mozambique	364,737	3.37	108,348	0.55	23.93	4,528	23.50
Namibia	90,603	0.98	92,643	0.47	2.32	39,863	206.90
Niger	3,025,525	46.40	65,210	0.33	16.07	4,058	21.06
Nigeria	38,016,971	15.60	2,437,744	12.43	162.47	15,004	77.87
Rwanda	3,814,419	54.73	69,694	0.36	10.94	6,369	33.06
São Tomé & Príncipe	4,375,542	1,786.76	2,449	0.01	0.17	14,531	75.42
Senegal	6,766,801	49.52	136,659	0.70	12.77	10,704	55.55
Seychelles	13,119	1.39	9,411	0.05	0.09	108,319	562.19
Sierra Leone	12,754,889	325.63	39,170	0.20	6.00	6,531	33.90
South Africa	2,917,539	1.00	2,917,539	14.88	50.46	57,819	300.09
Sudan	186,556	0.26	718,809	3.67	42.25	17,015	88.31
Swaziland	29,700	0.82	36,312	0.19	1.20	30,176	156.62
Tanzania	37,532,961	109.78	341,900	1.74	46.22	7,397	38.39
Togo	1,739,222	45.10	38,566	0.20	6.15	6,266	32.52
Tunisia	64,730	0.12	521,364	2.66	10.59	49,213	255.42
Uganda	45,944,057	174.47	263,337	1.34	34.51	7,631	39.61
Zambia	101,104,814	498.87	202,666	1.03	13.47	15,040	78.06
Zimbabwe	8,865	0.11	83,767	0.43	12.75	6,568	34.09
AFRICA	**na**	**na**	**19,606,607**	**100**	**1,017.60**	**19,267**	**100**

Exchange rate	Price Level Indices		Nominal GDP		Rankings			
(LCU per ZAR)	ZAR=1	Africa=100	ZAR (mn)	Shares (Africa=100)	Nominal GDP	Real GDP	Real per capita GDP	Price Level Index
(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
64.99	0.68	97.88	77,317	0.57	27	24	32	36
39.31	0.62	89.14	33,305	0.25	36	36	18	40
3.95	0.84	121.52	81,692	0.60	26	28	4	10
1.11	0.69	99.91	720,385	5.30	6	5	12	32
4.00	0.84	121.32	91,112	0.67	23	27	44	11
1.00	0.98	141.10	90,603	0.67	24	29	10	4
64.99	0.71	103.01	46,557	0.34	33	34	46	28
21.20	0.74	106.15	1,793,637	13.20	2	3	20	25
82.88	0.66	95.27	46,021	0.34	34	33	39	37
2,427.03	0.74	106.21	1,803	0.01	50	49	21	26
64.99	0.76	109.93	104,128	0.77	22	19	25	20
1.71	0.82	117.95	7,694	0.06	46	48	2	16
597.17	0.55	78.67	21,359	0.16	39	37	36	43
1.00	1.00	144.28	2,917,539	21.47	1	2	7	3
0.37	0.71	101.96	507,983	3.74	7	6	16	30
1.00	0.82	118.00	29,700	0.22	37	39	13	15
216.51	0.51	73.15	173,353	1.28	15	12	31	46
64.99	0.69	100.12	26,763	0.20	38	38	40	33
0.19	0.64	92.39	333,870	2.46	8	8	9	38
347.43	0.50	72.45	132,239	0.97	17	14	30	48
669.41	0.75	107.52	151,036	1.11	16	17	19	22
0.14	0.77	110.87	64,373	0.47	30	30	35	21
na		100	13,589,732	100	na	na	na	na

AFRICAN DEVELOPMENT BANK GROUP

Statistical Capacity Building Division
Statistics Department
African Development Bank
Temporary Relocation Agency
BP 323, 1002 Tunis, Belvédère
Tunisia

Tel.: (216) 71 10 36 54
Fax: (216) 71 10 37 43

E–mail: Statistics@afdb.org
Website: www.afdb.org