Natural Resources Management in Africa

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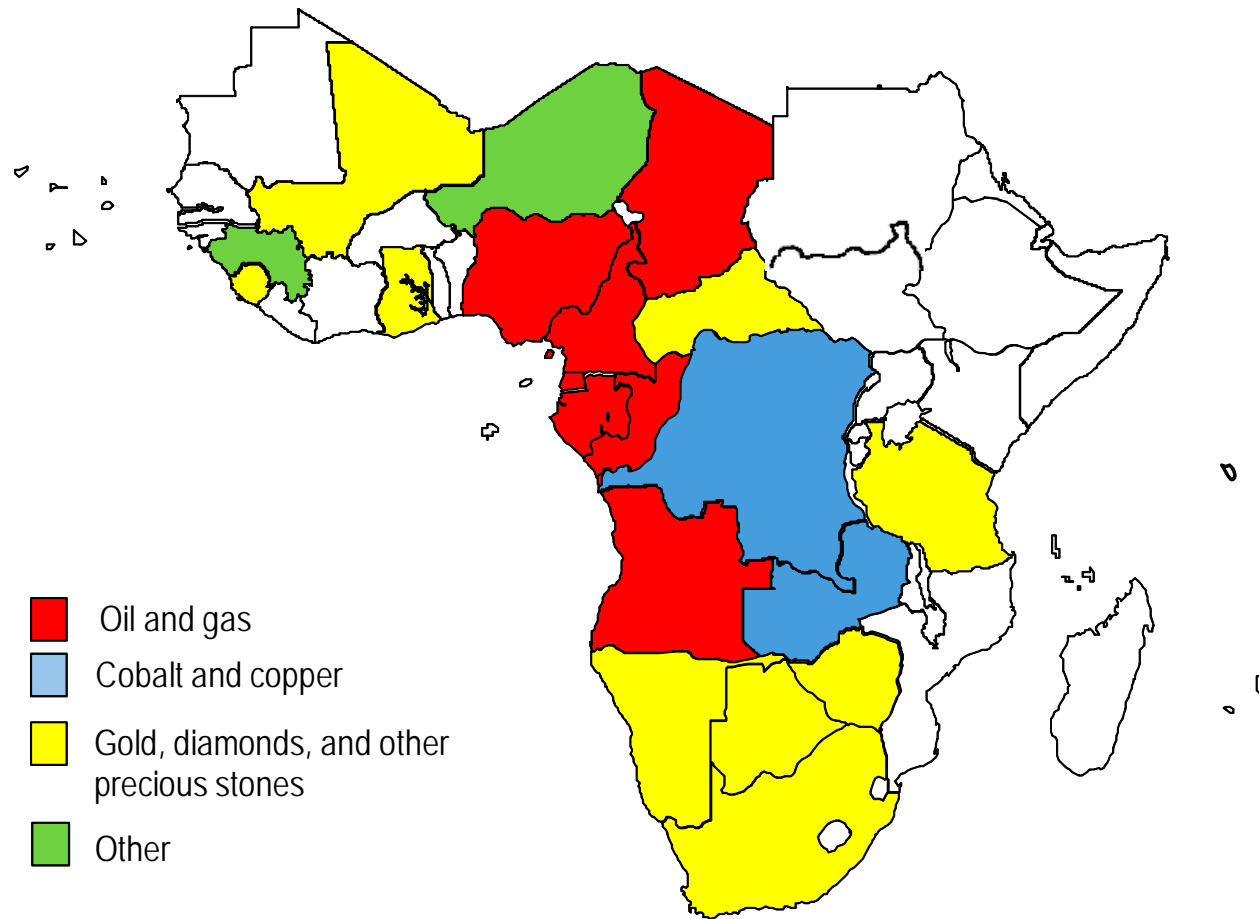
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Outline

1. Apparent disconnect between growth and poverty outcomes in Sub-Saharan Africa

2. Case studies on the inclusiveness of growth

3. Structural transformation in SSA

4. Measuring real income using Engel curves

5. Conclusions

Profile of Nonrenewable Exports in SSA

Source: IMF, African Department database.

Table 2.1. Resource-Intensive Countries: Selected Resource Indicators, 2010
(Percent of nonresource GDP, unless otherwise noted)

	Resource exports	Resource revenue	Resource revenue (percent of total revenue)	GDP per capita (U.S. dollars)	GNI per capita (U.S. dollars)	Subterranean wealth[1]	State partnership in resource extraction (percent of total)	Extractive Industries Transparency Initiative (EITI) status[2]
Oil exporters								
Angola	110.6	59.8	75.9	4,423	3,940	1,121.4	67.0	
Cameroon	10.5	4.8	26.6	1,143	1,180	167.0	45.0	Candidate
Chad	60.2	26.1	67.6	676	620	357.5	0.0	Candidate
Congo, Republic of	224.1	92.0	79.0	2,943	2,150	1,548.1	0.0	Compliant
Equatorial Guinea	171.6	66.4	88.1	19,998	14,540	141.4	Partial	
Gabon	116.3	31.6	53.9	8,643	7,740	919.7	25.0 – 35.0	
Nigeria	54.3	27.2	72.2	1,222	1,180	772.3	Partial	Compliant
Other fiscally dependent countries								
Botswana	38.2	13.4	31.3	7,403	6,790	199.3	50.0	
Congo, Democratic Republic of the	68.6	5.5	26.5	199	180	135.9	30.0	Candidate
Guinea	33.6	5.0	24.8	452	400	44.0	30.0	Candidate
Other countries								
Central African Republic	2.8	0.9	8.0	457	470	n.a.	0.0	Compliant
Ghana	12.0	0.5	3.7	1,283	1,230	49.1	0.0	Compliant
Mali	16.8	3.3	17.1	602	600	75.6	0.0	Compliant
Namibia	17.4	1.8	5.8	5,330	4,500	14.4	50.0	
Niger	11.0	1.7	11.8	358	370	26.2	15.0 – 40.0	Compliant
Sierra Leone	11.1	0.3	2.4	325	340	n.a.	0.0	Candidate
South Africa	8.6	0.6	2.0	7,275	6,090	n.a.	Small	
Tanzania	7.2	n.a.	n.a.	527	530	n.a.	0.0	Compliant
Zambia	51.7	2.7	10.9	1,253	1,070	31.4	15.0 – 20.0	Compliant
Zimbabwe	24.4	0.8	2.5	595	460	n.a.	Partial	

Sources: Mbendi.com; U.S. Geological Surveys; World Bank, World Development Indicators; IMF, African Department database; and IMF staff estimates.

Note: n.a. = not available. Based on nonrenewable natural resources.

[1]Subterranean wealth is defined as the net present value of resource wealth times the implicit tax rate (ratio of resource revenues to resource exports, 2005–10).

[2]Burkina Faso, Liberia, and Mozambique are EITI compliant but are not included in the group of resource exporters. The EITI status is as of March 2013. See Box 7.3 in Chapter 3 for a more detailed explanation of "candidate" and "compliant."
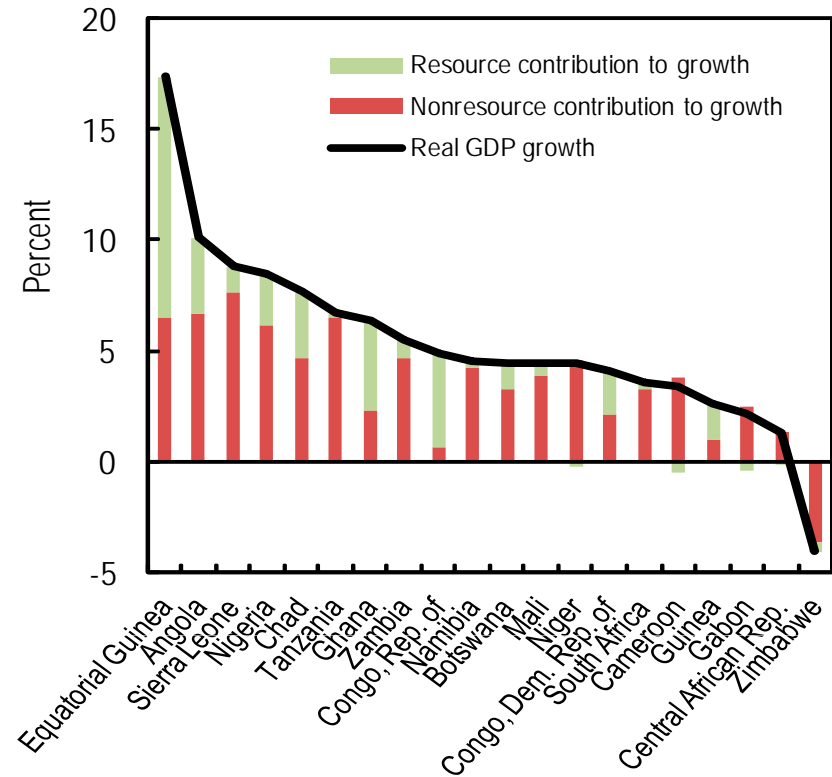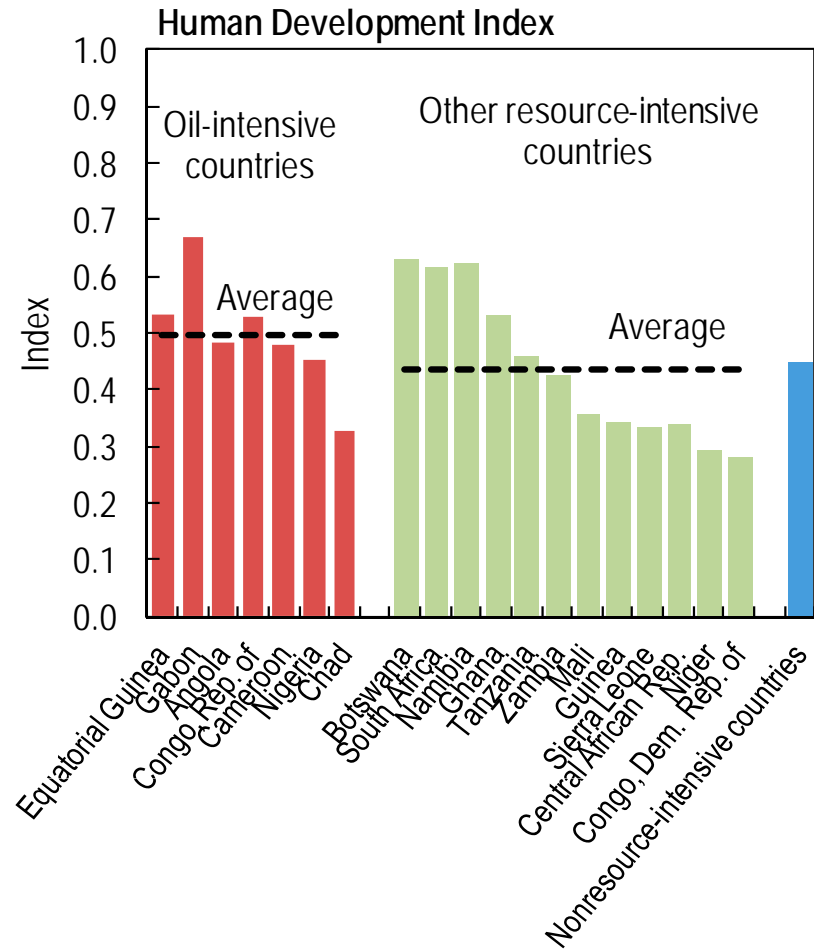
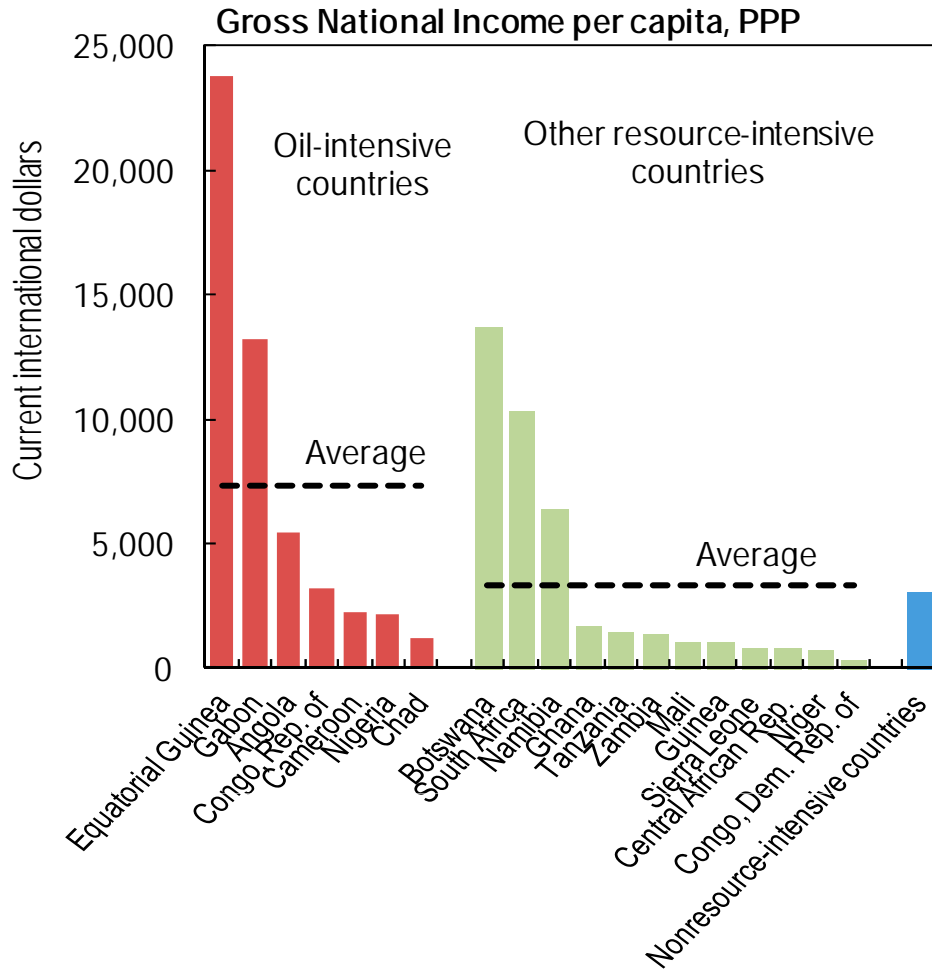# Recent Performance of Resource Intensive Countries

Real GDP per capita growth, 1990–2011
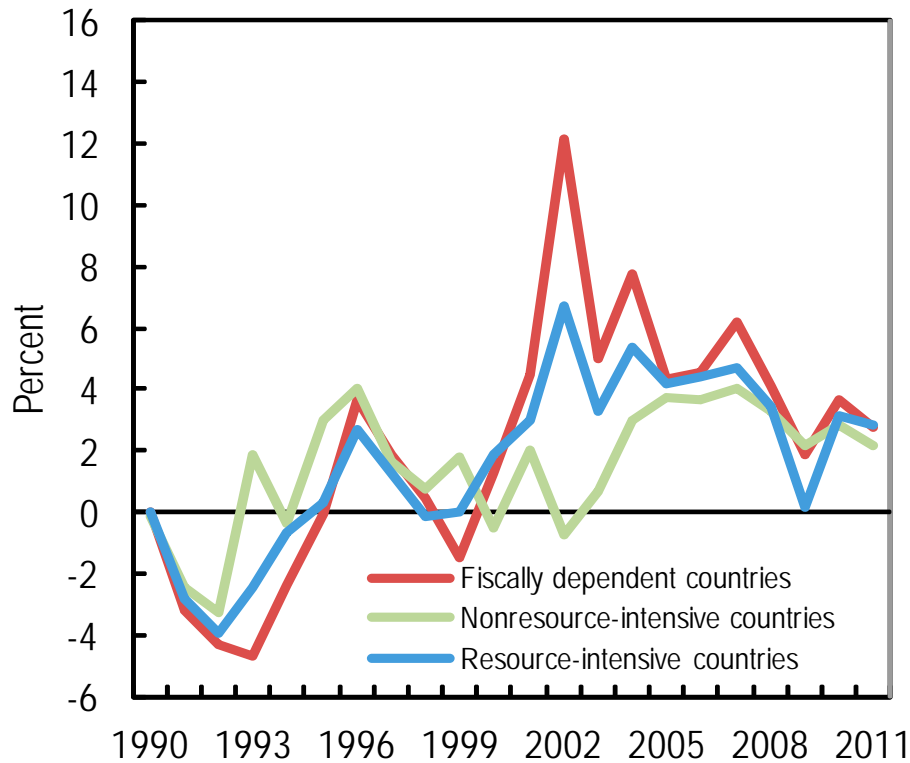
Resource and nonresource contribution to real GDP growth, 2000–11

GNI and Social Indicators

Gross National Income per capita, PPP

Human Development Index

Macroeconomic Policies

- The management of natural resource wealth is difficult because it has to face the challenges of resource exhaustibility and price volatility, with the latter often associated with procyclicality of policies

- This section looks at four specific challenges associated with managing resource wealth:

  – Consume more now or later, including the choice between investing in physical versus financial assets.

  – Ensuring external sustainability, partly through deriving a benchmark for the appropriate non-resource current account

  – Coping with price volatility

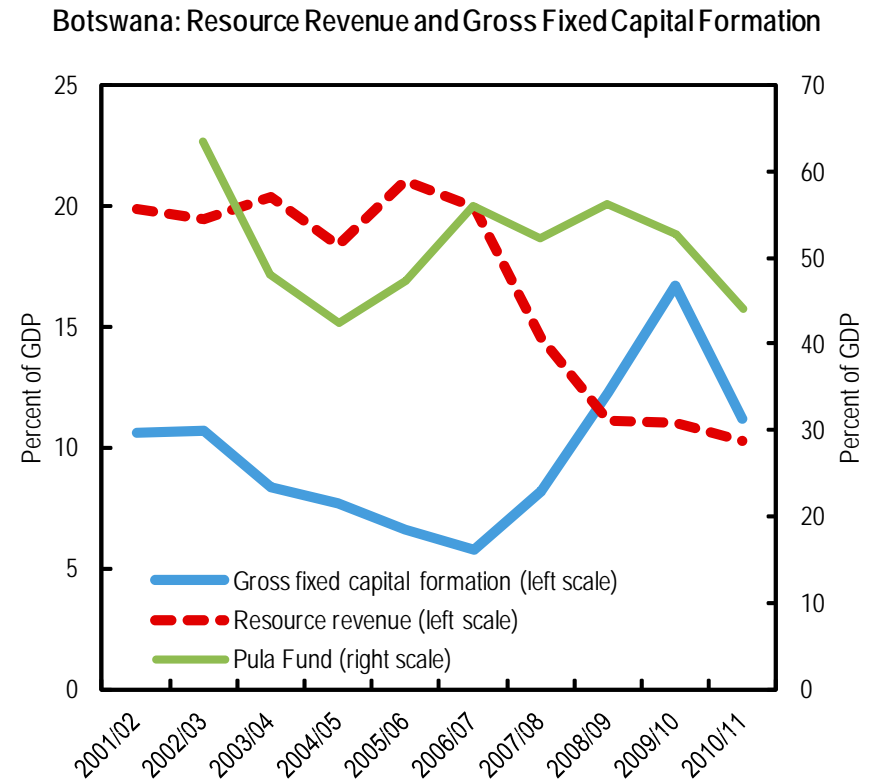 – Achieving the appropriate mix between fiscal and monetary policy

Consume more now or later

- For a country on a typical development path, income increases over time and the population becomes better off. Public consumption could be boosted in the present to facilitate welfare convergence.

- The classical consumption approach suggests a fixed level of consumption over time equal to the implicit return on the natural resource asset. However, this approach has no role for investment.

- Many resource-rich LICs are capital scarce, and therefore a case can be made that some of the resource windfall should be used to increase the capital stock, especially since many of the countries face credit constraints.

- Another argument for investing more is that the bulk of natural resource reserves in SSA are yet to be discovered so that the likely estimate of natural resource wealth is far higher than current estimates suggest.

Botswana's example

- In Botswana's case, investment expenditures are funded through non-renewable resource revenues so that the surge in capital investment during the global financial crisis was financed through a gradual drawdown of the government's investment fund (Pula fund)

Botswana: Resource Revenue and Gross Fixed Capital Formation

Legend:
- Gross fixed capital formation (left scale)
- Resource revenue (left scale)
- Pula Fund (right scale)

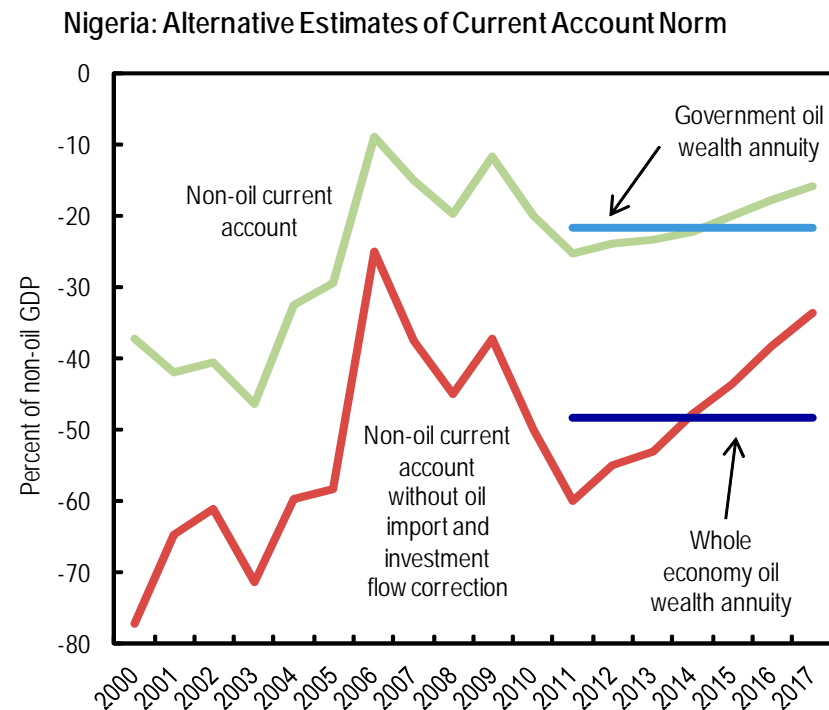Sources: Botswana authorities; and IMF staff estimates.

Ensuring external sustainability

- In addition to fiscal sustainability a country needs to ensure that it is sound in terms of its external accounts.

- This assessment is made with reference to the sustainability of the nonresource current account that approximates the current account that would prevail in the absence of the natural resource. This estimate is then compared to the annual resource flow (annuity) from the net present value of resource wealth.

- If the medium term nonresource current account and the annual annuity match, the economy is assumed to be in external equilibrium

Nigeria's example

- Nigeria's non-oil current account deficit is projected to decline to about 16 percent of non-oil GDP in the medium term.

- Since this projection falls below the sustainable annual drawdown of wealth accruing to the government, the profile appears stable, not requiring any major adjustment

Nigeria: Alternative Estimates of Current Account Norm

Source: National authorities; and IMF staff estimates.

Coping with price volatility

- Two strategies have been used to protect countries against resource price volatility:

➢ Hedging the resource price (Mexico in 2008)

➢ Setting up stabilization funds (many SSA countries)

- The appropriate size of a stabilization fund depends on the persistence and standard deviation of the resource price, the costs of changing expenditure during phases of the business cycle, and lending and borrowing fees

Per capita consumption growth by percentile of the distribution: the high consumption growth cases
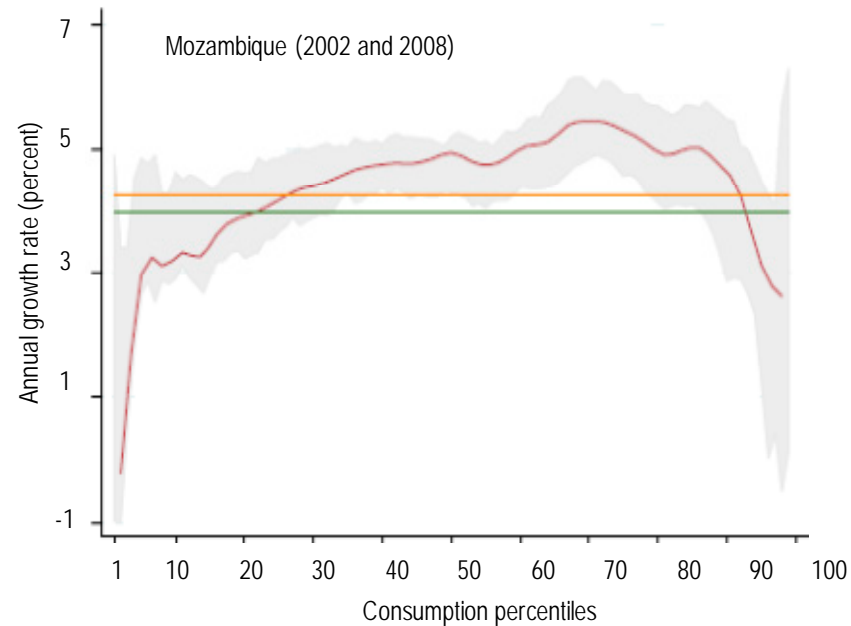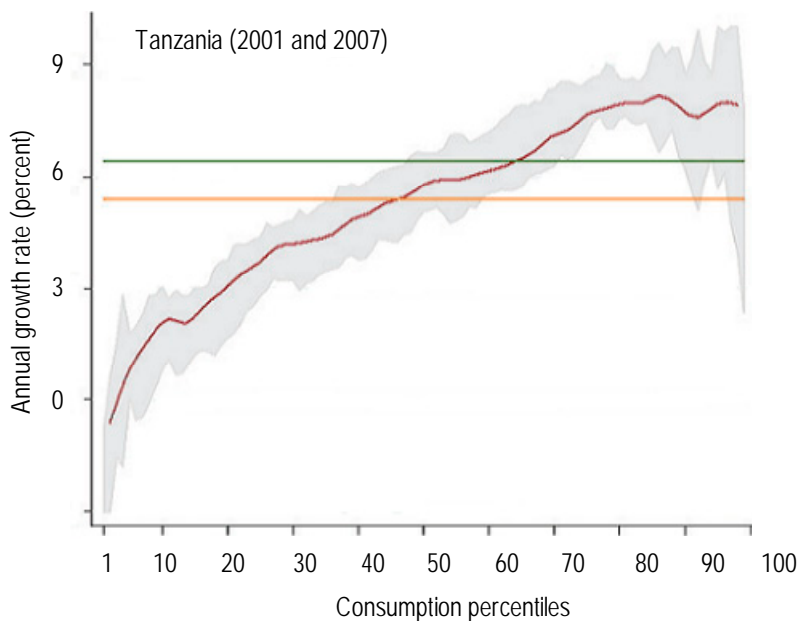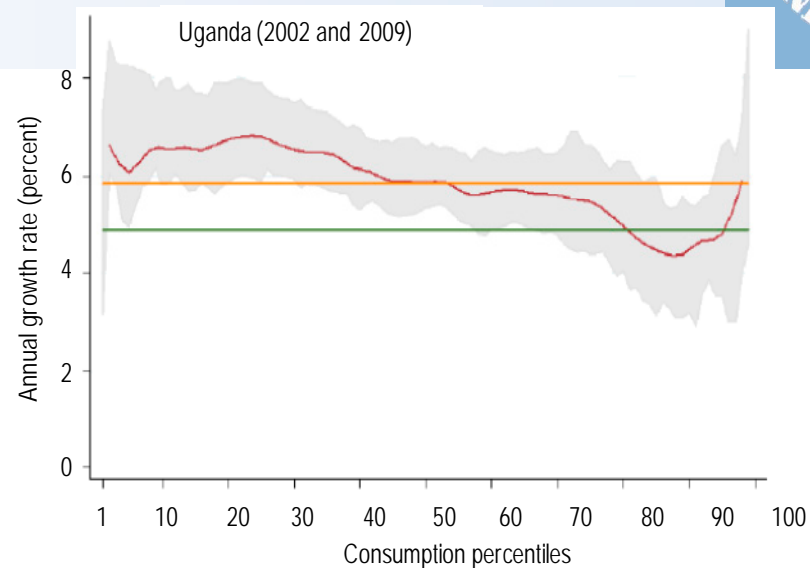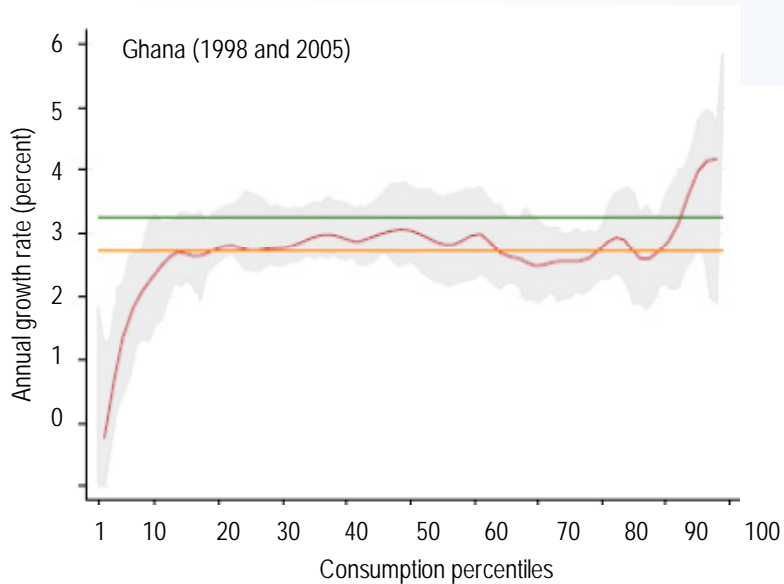
Per Capita GDP Growth and Consumption Growth of the Poorest Quartile

Legend:
- GDP Growth per Capita
- Per Capita Consumption Growth of the Poorest quartile
- Per Capita Consumption Growth of the Poorest quartile (using regional price deflators)

(Y-axis: Percent, ranging from -4 to 6)

Countries: Cameroon, Zambia, Ghana, Rwanda, Tanzania, Uganda, Mozambique
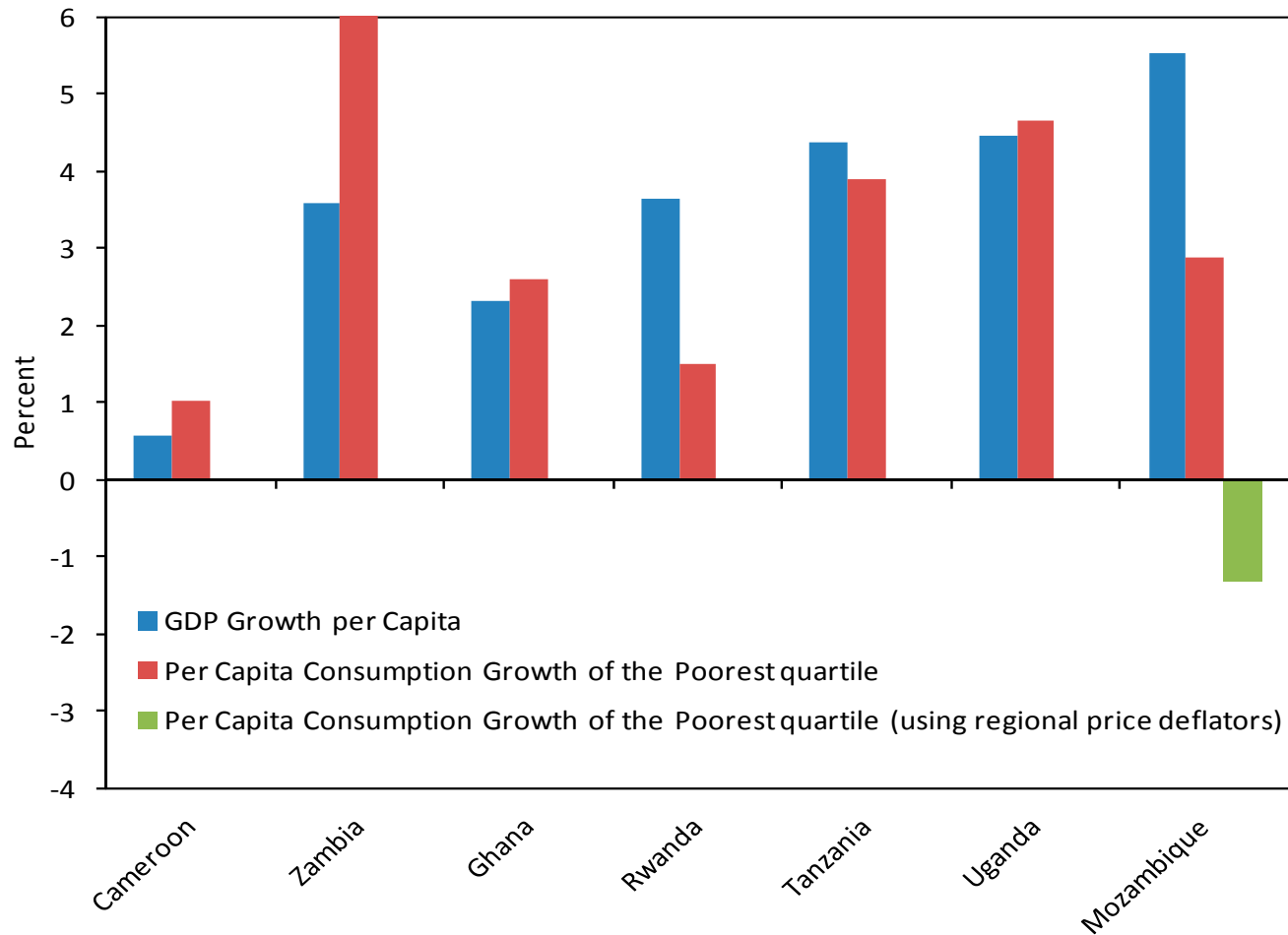
Links between per capita growth, consumption growth and changes in poverty

Table 1. Macroeconomic, Poverty, and Consumption Aggregates in Sample Countries
(Annual percentage change, except where stated)

	Period	Growth per Capita	Poverty Headcount Latest estimate	Gini Coefficient Initial estimate	Latest estimate	NIPA data	Per Capita Consumption Survey data All households	Poorest quartile	Ratio of poorest quartile to average
Cameroon	2001–07	0.57	9.6	-3.9	0.4	0.39	1.0	0.82	1.0	1.24
Zambia	2006-2010	3.57	60.5	-0.6	0.56	0.55	3.5	2.54	6.1	2.40
Ghana	1998–2005	2.33	30.0	-1.3	0.41	0.43	3.6	3.66	2.6	0.71
Rwanda	2000-05	3.65	56.9	-0.9	0.47	0.51	2.3	2.00	1.5	0.75
Tanzania	2000–07	4.38	67.9	-3.0	0.35	0.38	3.7	6.73	3.9	0.58
Uganda	2002–09	4.45	28.7	-4.1	0.46	0.44	3.6	3.40	4.7	1.37
Mozambique[1]	2003–09	5.54	60.0	-2.5	0.47	0.46	7.2	3.50	2.9	0.82
								0.69	-1.3	
Memo items:										
Bangladesh[2]	1992–2000	3.00	57.8	-1.1	0.28	0.33	0.8	1.80	1.0	0.56
Cambodia[3]	1994–2004	5.70	40.2	-0.8	0.35	0.42	5.8	2.80	0.80	0.29
Vietnam[3]	1993–2002	5.90	40.1	-2.6	0.34	0.38	4.2	5.50	4.0	0.73

[1] For per capita consumption growth rates, upper line is deflated by aggregate CPI, lower line is deflated by regional CPIs

[2] Estimate based on Bangladesh growth incidence curve.

[3] For Cambodia and Vietnam, the poorest quintile replaces the poorest quartile.

Consumption can be explained by 4-5 variables that are broadly stable across time and similar across countries

Table 2. Log Household Consumption Determinants [1]

	Ghana 2005	Cameroon 2007	Uganda 2009	Mozambique 2008/09	Tanzania 2007	Zambia 2010
Household size (log)	0.37 ***	0.29 ***	0.24 ***	0.26 ***	0.31 ***	0.28 ***
Age (log)	0.13 ***	0.18 ***	0.20 ***	0.16 ***	0.02	0.13 ***
Male head of household	0.03 ***	0.01	0.08 ***	0.04 ***	0.06 **	0.05 ***
Employment dummy	0.16 ***	0.04 **	0.02	0.07 ***	0.21 ***	0.12 ***
Agriculture sector dummy	-0.23 ***	-0.15 ***	-0.09 ***	-0.12 ***	-0.26 ***	-0.02
Manufacturing sector dummy[2]	-0.08 ***	-0.03 **	-0.10 *	-0.11 ***		0.12 ***
Government sector dummy	-0.12 ***	0.19 ***	0.16 ***	0.02	0.15 ***	0.06 ***
Primary schooling	0.07 **	0.08 ***	-0.14 ***	0.12 ***	0.13 ***	-0.2 ***
Lower secondary schooling	0.16 ***	0.16 ***	-0.04	0.22 ***	0.44 ***	-0.08 ***
Upper secondary schooling	0.38 ***	0.29 ***	0.01	0.56 ***	0.71 ***	0.16 ***
College/nursing/teacher training	0.69 ***	0.59 ***	0.87 ***	1.00 ***	1.23 ***	0.69 ***
Urban dummy	0.24 ***	0.21 ***	0.20 ***	0.12 ***	0.23 ***	0.24 ***
Diagnostic statistics						
Number of observations	7280	10416	6117	9836	9332	17864
R-squared	0.68	0.69	0.63	0.66	0.66	0.68

Sources: IMF staff estimates based on data from various household surveys (see Appendix I).

Note: ***,**,* indicate statistical significance at the 99 percent, 95 percent, and 90 percent levels, respectively.

[1]Characteristics refer to head of household except for household size and urban dummy.

[2]For Zambia, the manufacturing dummy refers to nonagriculture, nongovernment salaried employment.

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Employment growth has been strong with rural agricultural employment growth providing much of the explanation of per capita consumption growth among the poorest households

Table 3. Employment Indicators

(Annual percentage change, except where stated)

	Period	Total Employment	Employment Output Elasticity	Urban Employment	Agricultural Employment	Rural Agricultural Employment	Formal Sector Employment[1]
Cameroon	2001–07	2.7	0.8	5.6	5.9	4.2	9.5
Ghana	1999–2005	3.4	0.7	6.1	3.5	1.4	13.3
Mozambique	2003–09	4.4	0.6	7.4	3.4	-0.4	16.7
Rwanda[2]	2000-11	3.4	0.4	5.6	1.2	-0.9	22.6
Tanzania	2000–09	3.3	0.5	8.8	2.3	2.1	9.5
Uganda	2002–09	7.5	1.0	9.8	6.0	6.4	13.9
Zambia	2004-2010	2.6		1.0	5.4	5.6	9.1
Memo items:							
Cambodia	2004–07	4.2	0.4	4.5	3.9	4.7	25.0
Vietnam[3]	2000–07	2.9	0.4	6.1	-0.3	n.a.	27.5
Sub-Saharan Africa (sample median)		3.3	0.6	5.9	3.5	1.8	13.6

Sources: Household surveys; Vietnam Ministry of Planning and Investment and UNDP (2010); World Bank (2008).
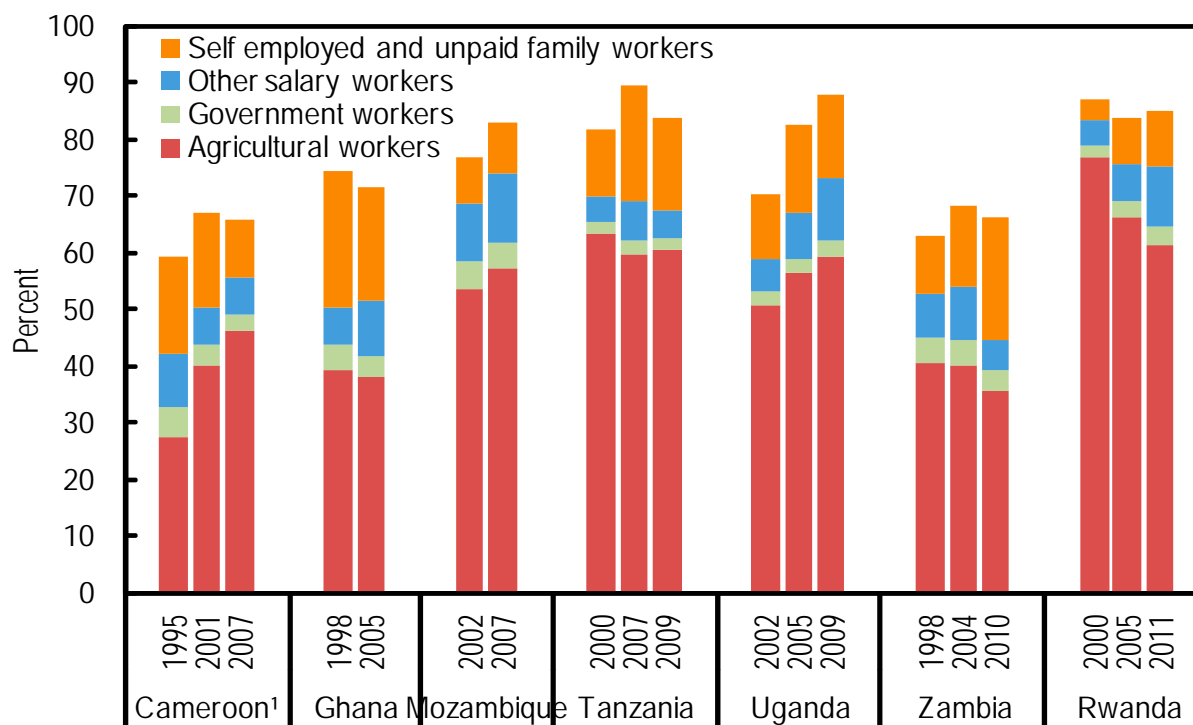
[1] Latest estimate in percent of working-age population.

[2] The urban and rural estimates cover 2000-05

[3] Agricultural employment is for 2000–08.

Employment population ratios have risen over time with agriculture playing a less dominant role in some countries

## Total Employment: Working Age Population Ratio

- Self employed and unpaid family workers
- Other salary workers
- Government workers
- Agricultural workers

Cameroon[1] | Ghana | Mozambique | Tanzania | Uganda | Zambia | Rwanda

Source: Household surveys.
[1] Cameroon's employment-population ratio in 2007 refers to those who work at least 25 hours per week.

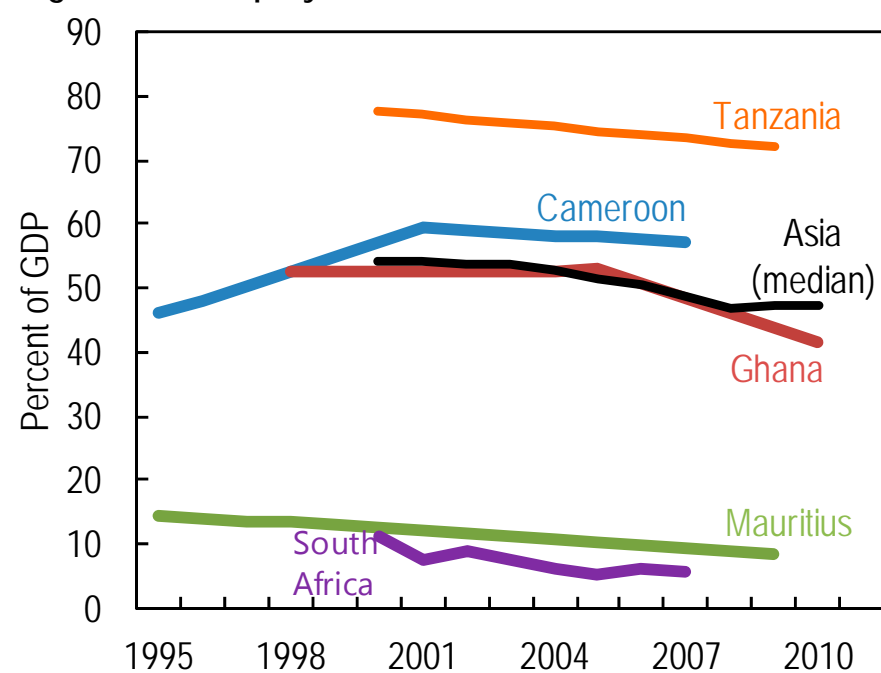# Benchmarking SSA's transformation: decline in the share of agriculture

Ghana and Tanzania have experienced declines in agricultural output and employment shares over time, with Tanzania matching the experience of the comparator Asian economies quite closely


Agriculture Output Ratio
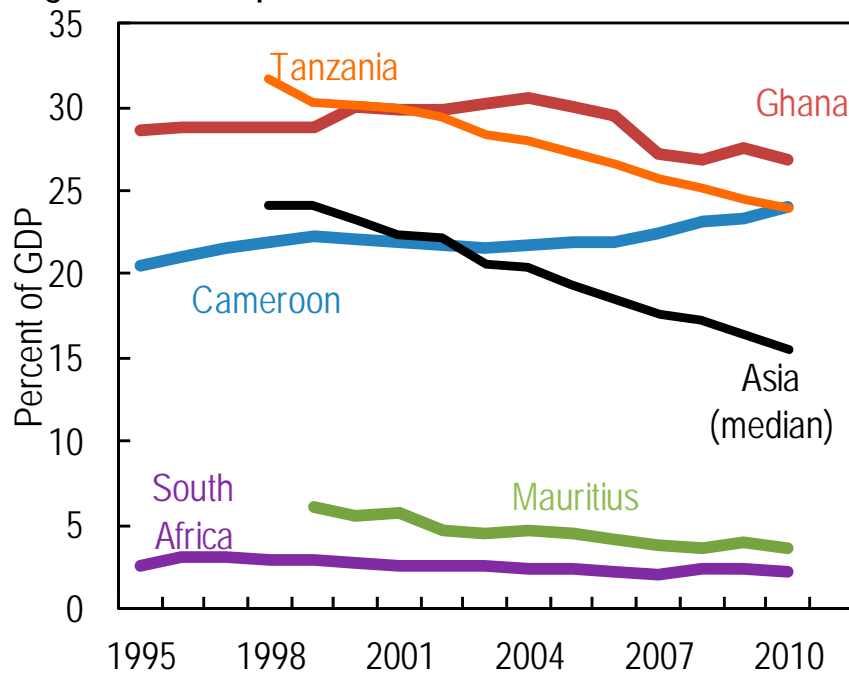
Agriculture Employment Ratio

Benchmarking SSA's transformation: shift to the secondary sector

Most middle-income countries have experienced declining manufacturing ratios for the past two decades, while only Mozambique and Tanzania among LICs have been able to raise their manufacturing output share employment shares
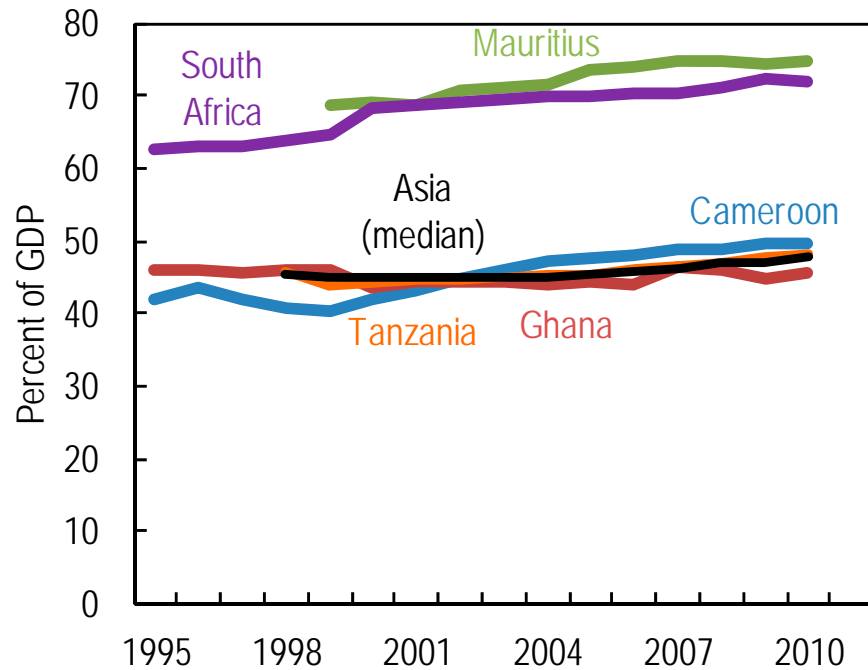

Industry Output Ratio

Industry Employment Ratio
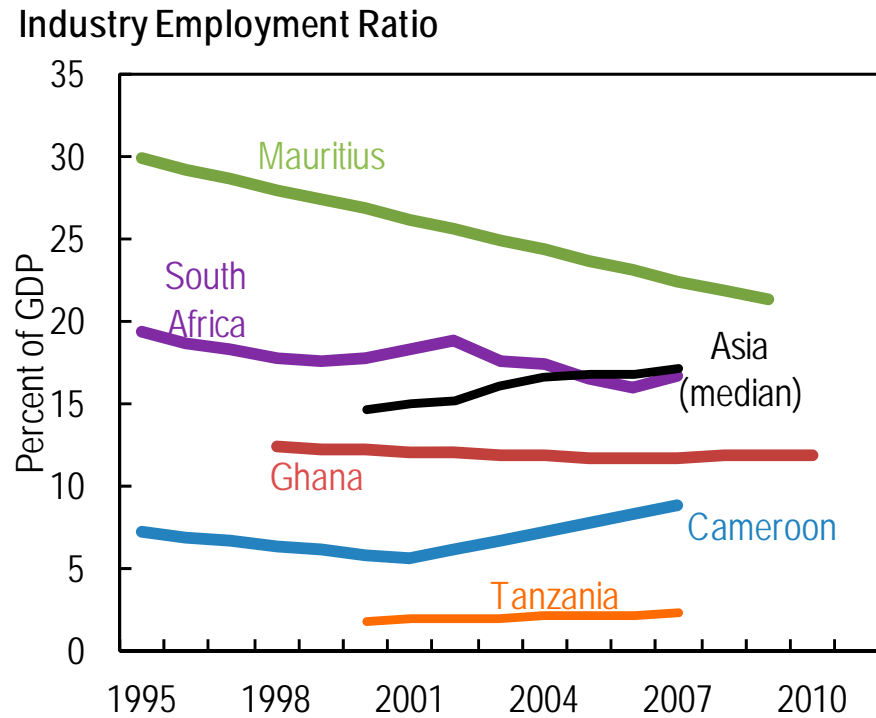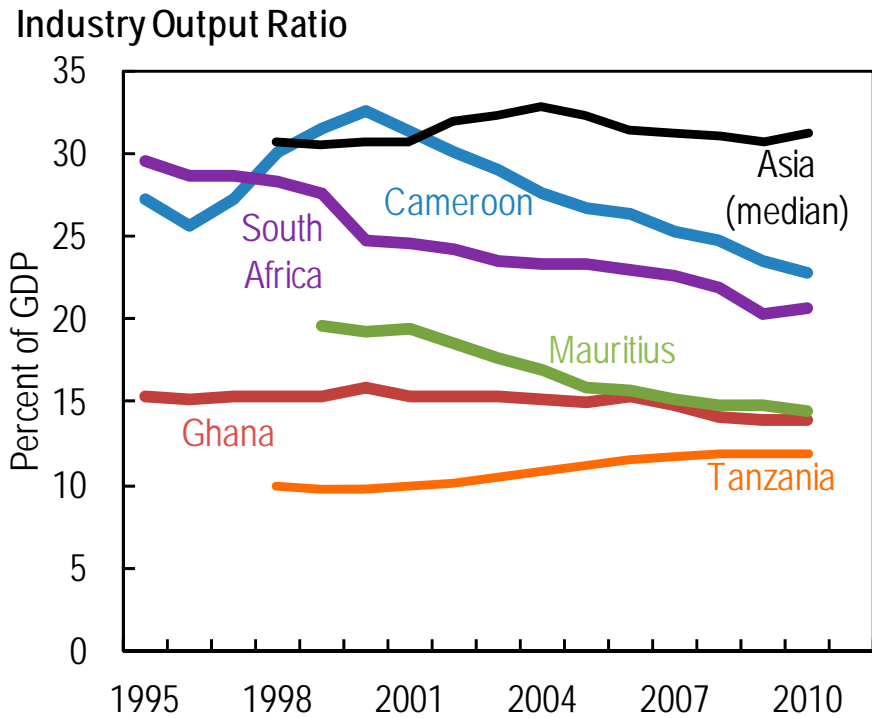
Benchmarking SSA's transformation : shift to the tertiary sector

The upward output and employment trends in the service sector have been stronger than in SSA than in the Asian economies, suggesting that the path to transformation has been taking place at least partly through services
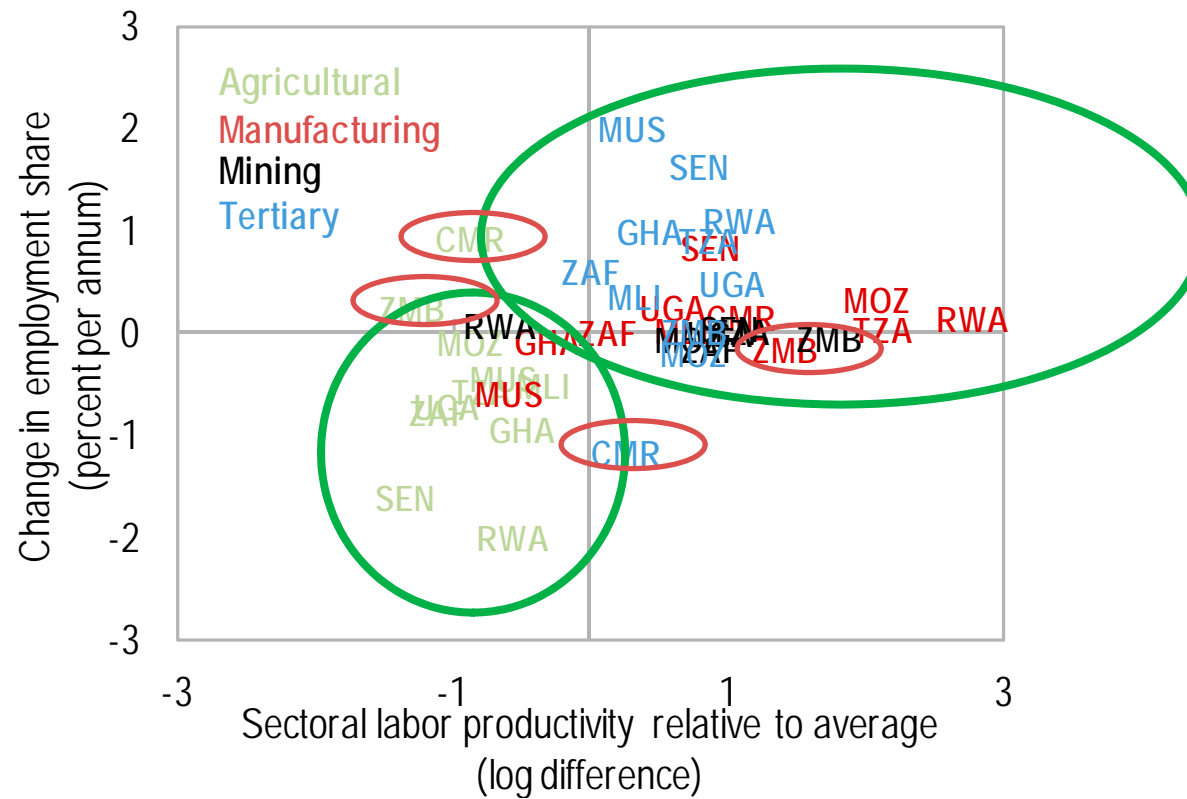

Services Output Ratio

Services Employment Ratio
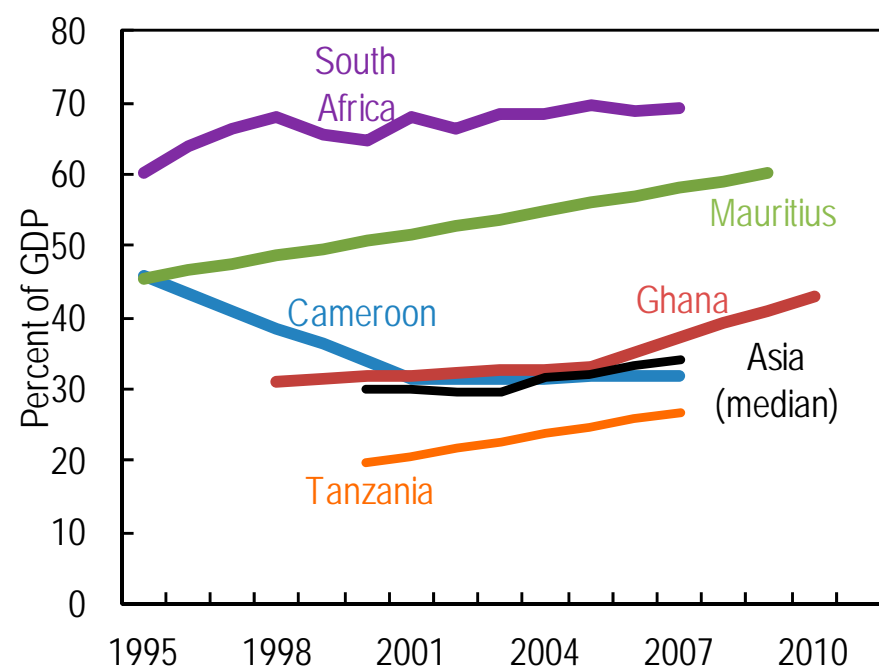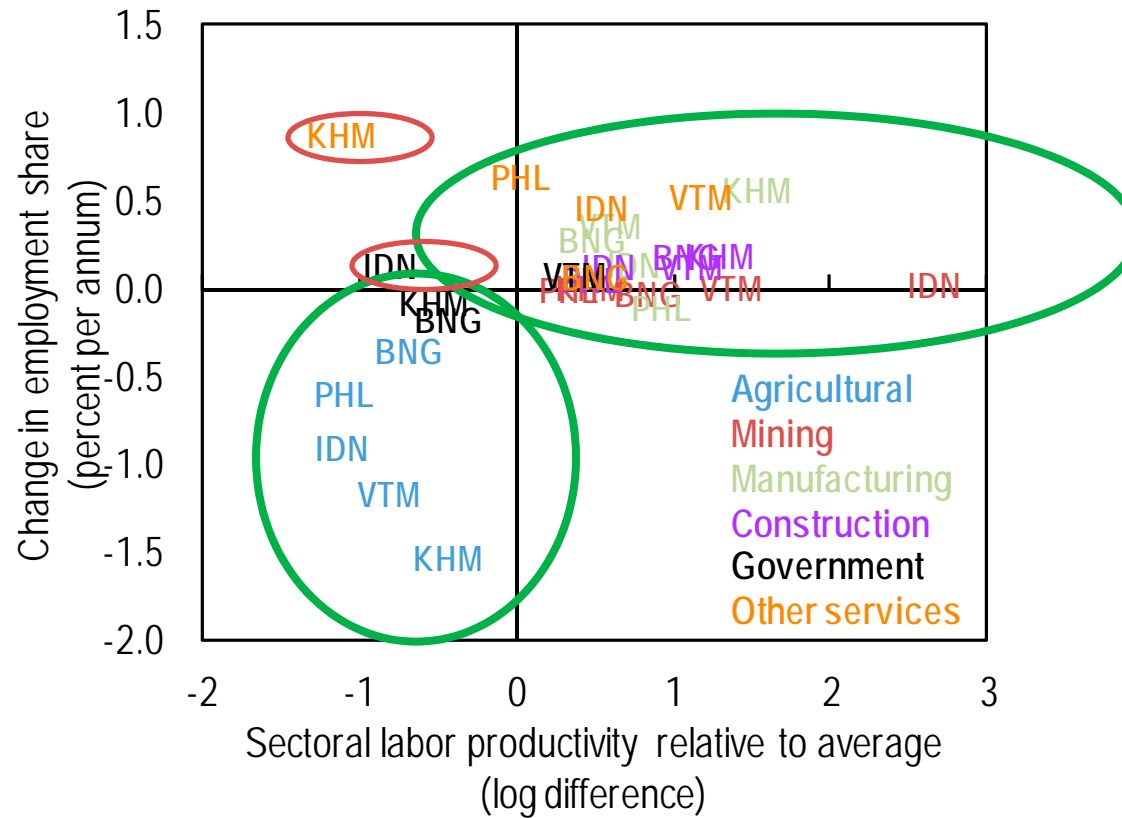
Benchmarking SSA's transformation

Sub-Saharan Africa: Labor productivity and change
in employment shares, circa 1995-2010

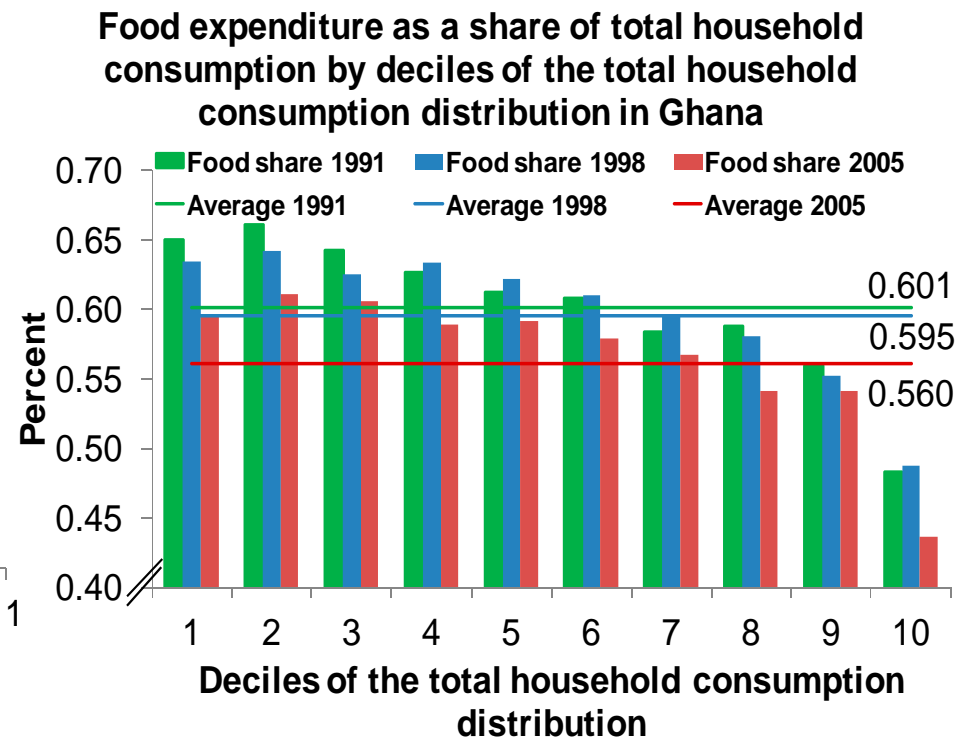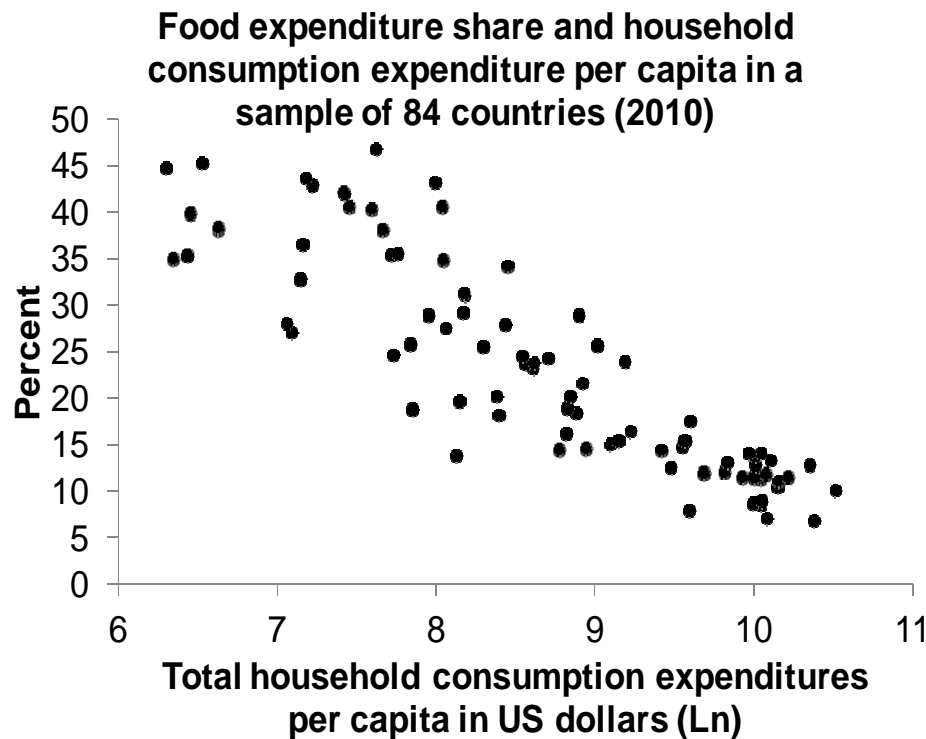# Benchmarking SSA's transformation

Asia: Labor productivity and change in employment shares, circa 1995-2010

Legend:
- Agricultural
- Mining
- Manufacturing
- Construction
- Government
- Other services

X-axis: Sectoral labor productivity relative to average (log difference)
Y-axis: Change in employment share (percent per annum)

Engel's Law: the share of total consumption devoted to food decline as real total income increases. Support for this empirical regularity exists both across and within countries

Food expenditure share and household consumption expenditure per capita in a sample of 84 countries (2010)

X-axis: Total household consumption expenditures per capita in US dollars (Ln)
Y-axis: Percent

Food expenditure as a share of total household consumption by deciles of the total household consumption distribution in Ghana

Legend: Food share 1991 | Food share 1998 | Food share 2005 | Average 1991 | Average 1998 | Average 2005

0.601
0.595
0.560

X-axis: Deciles of the total household consumption distribution
Y-axis: Percent

Engel Curves Estimates

This empirical regularity can be used to measure the biases built in the Consumer Price Index (Costa, 2001, and Hamilton, 2001): if estimated Engel curves drift over time towards the origin, so that households are allocating less consumption to food than in previous years, then this is evidence that inflation overestimates true cost-of-living increases

Estimated Engel curve for Ghana
using data for the period 1998–2005
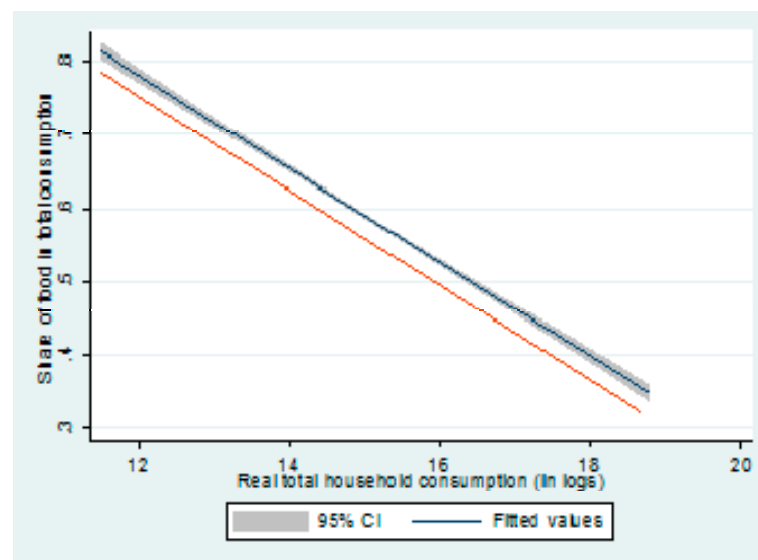
Engel Curves Estimates

Dependent variable: Food consumption as a share of total household consumption

County	Cameroon	Ghana	Uganda	Zambia
Periods	**2001-2007**	**1998-2005**	**2002-2010**	**1998-2004**
Constant	1.546 ***	1.515 ***	1.970 ***	1.283 ***
	0.021	0.026	0.021	0.015
Total real household consumption	-0.089 ***	-0.065 ***	-0.108 ***	-0.061 ***
	0.002	0.002	0.001	0.001
d (second year dummy)	-0.065 ***	-0.027 ***	0.049 ***	-0.063 ***
	0.002	0.002	0.003	0.003
Household size	0.013 ***	0.002 ***	0.011 ***	0.001 ***
	0.000	0.001	0.000	0.000
Age of household head	0.001 ***	0.001 ***	0.001 ***	0.001 ***
	0.000	0.000	0.000	0.000
Male head of household	-0.006 **	-0.006 **	0.016 ***	0.031 ***
	0.002	0.002	0.002	0.001
Employed	0.065 ***	0.032 ***	0.006 *	-0.008 ***
	0.003	0.004	0.003	0.001
Number of observations	22,140	13,950	16,727	29,246
R-squared	0.2106	0.1318	0.2510	0.1403
Adjusted R-squared	0.2104	0.1314	0.2507	0.1402

Insights from Engel Curves Estimates

- Evidence of real income being underestimated in Cameroon, Ghana and Zambia

- In Uganda, evidence of income being overestimated

- Main reason for the bias in the measurement of income likely because CPI inflation is overstated