2 Africa's Rice Economy Before and After the 2008 Rice Crisis

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Introduction

Rice is the most rapidly growing food commodity in sub-Saharan Africa (SSA), mainly driven by urbanization. The opportunity costs of women's labour and the ease and rapidity of cooking rice are key factors in urban settings. Urbanization is often accompanied by increased consumption of food away from the home, which has spurred rice demand due to the convenience of rice storage, preparation and cooking. With the proportion of Africans living in urban areas expected to increase from the current 38% to 48% by 2030 (AfricaRice, 2011b), rice consumption in Africa is expected to continue to grow for the foreseeable future. Household surveys reveal that urban consumers on lower incomes tend to spend a greater share of their total budget on rice than higher-income households (AfricaRice, 2011b). These developments mean that rice is no longer a luxury food, but has become the main source of calories for low-income households, particularly in West Africa. Rice is also rapidly gaining in importance in other parts of the continent. Rice is the leading provider of food calories in West Africa and in Madagascar, and it is now the second largest source of food energy in SSA as a whole (Fig. 2.1). The increasing role of rice in the food basket of SSA consumers has made rice a political crop, in the sense that its price and accessibility influence social stability. Africa depends to a large extent on imports, however, and in 2008, African imports accounted for 32% of the rice traded globally, most of it from Asia.

Increasing wealth in Asia has resulted in greater demand for meat, thereby drawing maize increasingly into the animal feed market. This has resulted in steadily rising world cereal prices (since 2003) and the simultaneous emergence of Africa as a major player in the world rice market. Some influences on world cereal prices may be transient – for example, weather-related crop failures, spikes in oil prices, and demand for ethanol from maize – but the long-term outlook for rice production in Africa is bolstered by the signs that Asia's consumption will outstrip its capacity to produce. In 2012, Asia accounted for 86% of rice consumption and 78% of rice exports worldwide, and it is facing increasing local demand with already high pressure on land and water resources.

Rice is often considered one of the most protected commodities in the world and only about 7% of global rice production is traded on the international market. In this distorted market, the major producing countries may close their borders to trade during periods of perceived supply shortage, as happened in 2007 and 2008.

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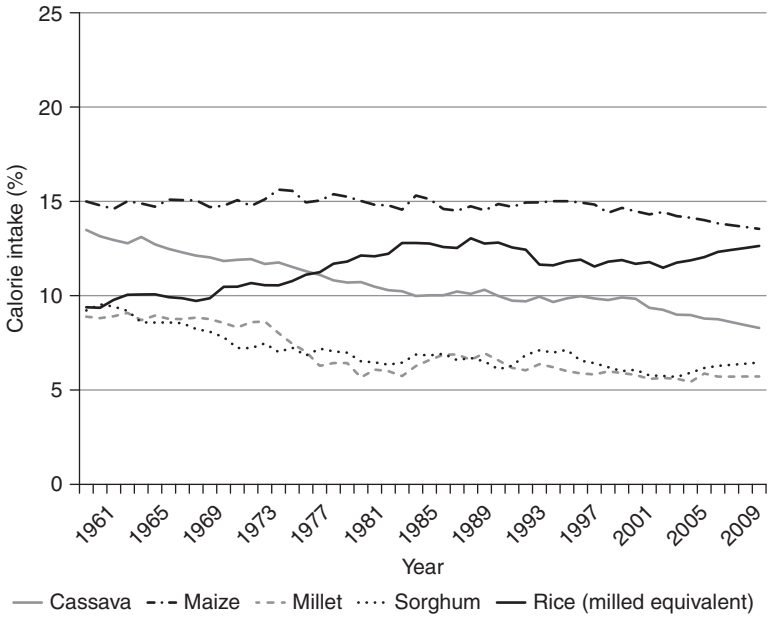

Fig. 2.1. Contribution of staple food crops in diets in sub-Saharan Africa. (Data from FAOSTAT, 2011.)

In 2008, Vietnam, India and Egypt banned rice exports for several months, pushing up rice prices, as predicted by the Africa Rice Center (AfricaRice) in 2007 (AfricaRice, 2011a). Sub-Saharan Africa's reliance on rice imports became painfully visible in 2008 during the food riots in several major capitals. In Africa, these riots were mostly related to high rice prices. Prices are predicted to remain high due to declining production capacity in major rice-producing countries in Asia and growing demand.

With the upward spikes in food prices in Africa, many African governments (assisted by the international donor community) embarked upon ambitious programmes to boost their rice-production capacity, mostly as a response to the 2008 rice crisis. In this chapter, we review trends in rice demand and production across the continent, placing particular emphasis on what happened before and after the rice crisis, and discuss the challenges faced in attempts to boost Africa's rice sector. All data were retrieved from the United States Department of Agriculture (USDA, 2013), unless indicated otherwise. The USDA database was the source of choice, because it contains more recent data than FAOSTAT.

Rice Production

Rice paddy production in SSA increased from 5.6 million tonnes (Mt) in 1980 to 18.2 Mt in 2010, and in Africa as a whole from 8.2 Mt to 24.8 Mt over the same period. The relative contributions of yield increase and harvested area in production for the periods 1980–1990, 1990–2000 and 2000–2010 for both Africa and sub-Saharan Africa are shown in Table 2.1. The relative contribution of enhanced yield increased over time, and the contribution of yield increase and harvested area expansion to production increase in SSA reached approximate parity between 2000 and 2010. The picture is more erratic for Africa as a whole, reflecting important yield gains in Egypt during 1990–2000 followed by stagnating yields and harvested area in 2000–2010.

Figures 2.2 and 2.3 present the trend in average paddy rice yield and harvested area from the 1960s to 2012. A clear shift in gear is visible in average paddy rice yield from 2007–2008 onwards, which is analysed in more detail below.

Total paddy rice production in SSA increased during 2000–2012 by 7.5 Mt from 11.5 Mt to 19.0 Mt. Contributions of yield increase and harvested area expansion before

Table 2.1. Relative contributions of yield increase and harvested area expansion to rice production increase in sub-Saharan Africa (SSA) and Africa for the periods 1980–1990, 1990–2000 and 2000–2010. (Data derived from USDA, 2013.)

	1980–1990			1990–2000			2000–2010		
Region	Production increase (Mt)	Yield contr.[a] (%)	Area contr. (%)	Production increase (Mt)	Yield contr. (%)	Area contr. (%)	Production increase (Mt)	Yield contr. (%)	Area contr. (%)
SSA	4.2	26	74	1.7	33	67	6.7	47	53
Africa	3.8	6	94	5.4	63	37	7.4	37	63

[a]contr., contribution.

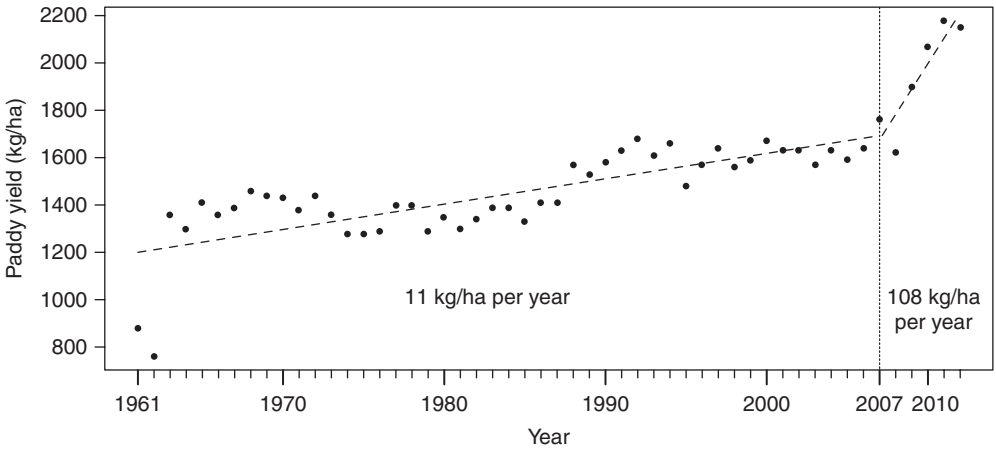

Fig. 2.2. Average rice paddy yield in sub-Saharan Africa showing segmented regression for the pre- and post-crisis periods. (Data from USDA, 2013.)

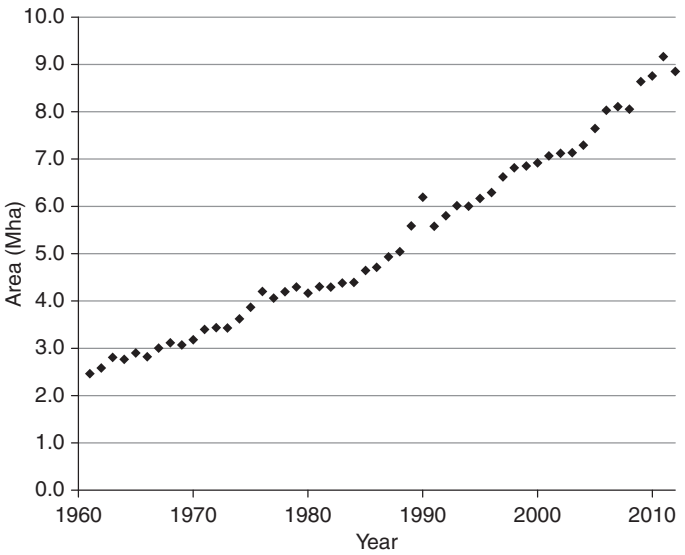

Fig. 2.3. Total harvested area under rice in sub-Saharan Africa. (Data from USDA, 2013.)

and after the rice crisis are indicated in Table 2.2. Whereas about 25% of production increase before the rice crisis can be attributed to yield increase, and 75% to harvested area expansion, after the rice crisis these percentages are more or less reversed, with yield increases contributing 71% and area expansion 29%.

Tables 2.3, 2.4 and 2.5 provide annual growth rates for production, average yield and harvested area, respectively, for each major region, SSA and Africa as a whole. Annual production growth rate (Table 2.3) over the period 2000–2012 was 5.5% per year for SSA, with a clear difference between the periods before the rice crisis (i.e. 2000–2007; 3.2% per year) and after the rice crisis (i.e. 2007–2012; 8.4% per year). Trends in the major regions were similar, except for North Africa, which was heavily influenced by the production decline in Egypt in the period 2007–2012.

Table 2.2. Relative contributions of yield increase and harvested area expansion to rice production increase in SSA and Africa for the periods 2000–2007 (before the rice crisis) and 2007–2012 (after the rice crisis). (Data from USDA, 2013.)

	2000–2007			2007–2012		
Region	Production increase (Mt)	Yield contr.[a] (%)	Area contr. (%)	Production increase (Mt)	Yield contr. (%)	Area contr. (%)
SSA	2.8	24	76	4.7	71	29
Africa	3.7	22	78	4.2	54	46

[a]contr., contribution.

Table 2.3. Rice production (equivalent milled) growth rates (% per year) for major regions in Africa for the period 2000–2012 and sub-periods 2000–2007 (before the rice crisis) and 2007–2012 (after the rice crisis). The period 2010–2012 is added because 2011 and 2012 were affected by poor weather conditions across the continent (drought, floods). (Data from USDA, 2013.)

Region	2000–2012	2000–2007	2007–2012	2010–2012
Central Africa	1.2	–1.3	4.5	2.1
East Africa[a]	5.8	5.0	6.5	–0.1
North Africa	0.9	2.5	–4.6	–3.4
Southern Africa	6.1	–1.8	29.2	12.4
West Africa	5.5	2.5	9.7	3.7
Sub-Saharan Africa	5.5	3.2	8.4	2.3
Africa	4.1	3.0	4.5	0.7

[a]For Rwanda and Uganda, no data available up to 2000; therefore the periods start from 2001 (2001–2012 and 2001–2007).

Table 2.4. Rice paddy yield growth rates (% per year) for major regions in Africa for the period 2000–2012 and sub-periods 2000–2007 (before the rice crisis) and 2007–2012 (after the rice crisis). The period 2010–2012 is added because 2011 and 2012 were affected by poor weather conditions across the continent (drought, floods). (Data from USDA, 2013.)

Region	2000–2012	2000–2007	2007–2012	2010–2012
Central Africa	0.0	–1.4	0.7	–0.6
East Africa[a]	2.8	2.0	2.6	–2.1
North Africa	0.3	1.2	–2.0	–5.6
Southern Africa	1.9	1.2	11.8	10.8
West Africa	2.5	–0.4	8.0	4.3
Sub-Saharan Africa	2.6	0.4	5.8	1.9
Africa	1.4	0.3	2.6	0.2

[a]For Rwanda and Uganda, no data available up to 2000; therefore the periods start from 2001 (2001–2012 and 2001–2007).

Table 2.5. Rice harvested area growth rates (% per year) for major regions in Africa for the period 2000–2012 and sub-periods 2000–2007 (before the rice crisis) and 2007–2012 (after the rice crisis). The period 2010–2012 is added because 2011 and 2012 were affected by poor weather conditions across the continent (drought, floods). (Data from USDA, 2013.)

Region	2000–2012	2000–2007	2007–2012	2010–2012
Central Africa	1.2	–0.1	3.9	3.0
East Africa[a]	2.9	3.0	3.8	2.0
North Africa	–0.1	0.8	–2.6	2.3
Southern Africa	3.9	–3.0	14.6	1.1
West Africa	2.4	2.5	1.6	–0.6
Sub-Saharan Africa	2.5	2.4	2.4	0.5
Africa	2.3	2.3	2.1	0.6

[a]For Rwanda and Uganda, no data available up to 2000; therefore the periods start from 2001 (2001–2012 and 2001–2007).

Annual yield growth rate[1] (Table 2.4) over the period 2000–2007 was 0.4% per year for SSA. However, annual yield growth rate jumped to 5.8% per year for the period 2007–2012, despite a relatively low yield growth rate in the period 2010–2012 (1.9% per year). The slowing rate of yield growth during these last two years can be explained by the fact that rice cropping in SSA is predominantly rainfed (see Diagne *et al.*, Chapter 3, this volume), so production and productivity are strongly influenced by the rainfall regime. Harvests in 2011–2012 were affected by poor weather conditions (drought and floods). In real terms, and despite two relatively bad years, average rice yield in SSA increased in the period 2007–2012 by 78 kg/ha per year. A segmented regression analysis[2] was performed on rice yield in SSA over the period 1961 to 2012 partitioned into two intervals, 1961–2007 and 2007–2012. The analysis shows that rice yield increased by about 11 kg/ha per year from 1960 to 2007 ($R^2 = 0.6$) and by 108 kg/ha per year from 2007 to 2012 ($R^2 = 0.8$) (see Fig. 2.2).

In comparison, rice yield worldwide, driven by the Green Revolution in Asia, increased by 52 kg/ha per year over the period 1960–2010. Cereal growth rates after the Second World War amounted to 78 kg/ha per year in the UK and 50 kg/ha per year in the USA. The rice yield growth rate in SSA – as a response to renewed commitments to boosting Africa's rice sector after the rice crisis in 2008 – is, therefore, similar to growth rates witnessed on other continents after the introduction of technological innovation and institutional change. These trends are visible in West, East and Southern Africa, but not in Central Africa (virtually no change in yield in the period 2007–2012) and North Africa (decline in average yield, driven by Egypt). Major rice-growing countries contributing to the average yield increase after the rice crisis include: Côte d'Ivoire, Ghana, Guinea, Liberia, Madagascar, Mali, Nigeria, Senegal and Sierra Leone.

Harvested area growth rates (Table 2.5) over the periods 2000–2007 and 2007–2012 in SSA were a constant 2.4% per year. In West Africa, the rate of expansion of harvested area declined somewhat after the rice crisis compared to before the rice crisis. Production increases in Central Africa in the period 2007–2012 were driven by expansion of harvested area after the rice crisis.

Rice Consumption

Total rice consumption[3] (Table 2.6) over the period 2000–2012 increased from 16 Mt to 29 Mt in Africa and from 12 Mt to 24 Mt in SSA. Annual growth rates during this period in Africa were 4.3% per year compared to 5% per year for SSA. These percentages represent huge quantities of rice. For 2012, a 5% per year increase in consumption in SSA is roughly equivalent to 1.2 Mt of milled rice per year that needs to be either produced or imported. An upward trend in consumption is particularly clear for West Africa.

Future Trends in Rice Production and Consumption in sub-Saharan Africa

Rice consumption growth rate in SSA was estimated at 5% per year from 2000 to 2012 (Table 2.6). Assuming that this growth rate and all other parameters influencing demand remain equal, rice consumption would increase from 24 Mt of milled rice in 2012 to 36 Mt of milled rice in 2020 (Fig. 2.4). The bulk of this consumption (80%) will occur in West and East Africa.

Rice production projections to 2020 were made using 2012 as a starting point. The 19 Mt of paddy rice production in 2012 was converted to a production of 12 Mt of milled rice, assuming a milling recovery of 65%. Next, projections were made assuming a production

Table 2.6. Rice consumption growth rates (% per year) for major regions in Africa for the period 2000–2012 and sub-periods 2000–2007 (before the rice crisis) and 2007–2012 (after the rice crisis). The period 2010–2012 is added because 2011 and 2012 were affected by poor weather conditions across the continent (drought, floods). (Data from USDA, 2013.)

Region	2000–2012	2000–2007	2007–2012	2010–2012
Central Africa	3.6	4.3	6.0	6.6
East Africa[a]	4.6	4.1	5.7	3.0
North Africa	1.5	2.9	–2.5	2.5
Southern Africa	4.9	9.2	1.7	12.3
West Africa	5.4	4.2	9.7	13.6
Sub-Saharan Africa	5.0	4.4	7.9	10.3
Africa	4.3	4.0	5.9	8.7

[a]For Rwanda and Uganda, no data available up to 2000; therefore the periods start from 2001 (2001–2012 and 2001–2007).

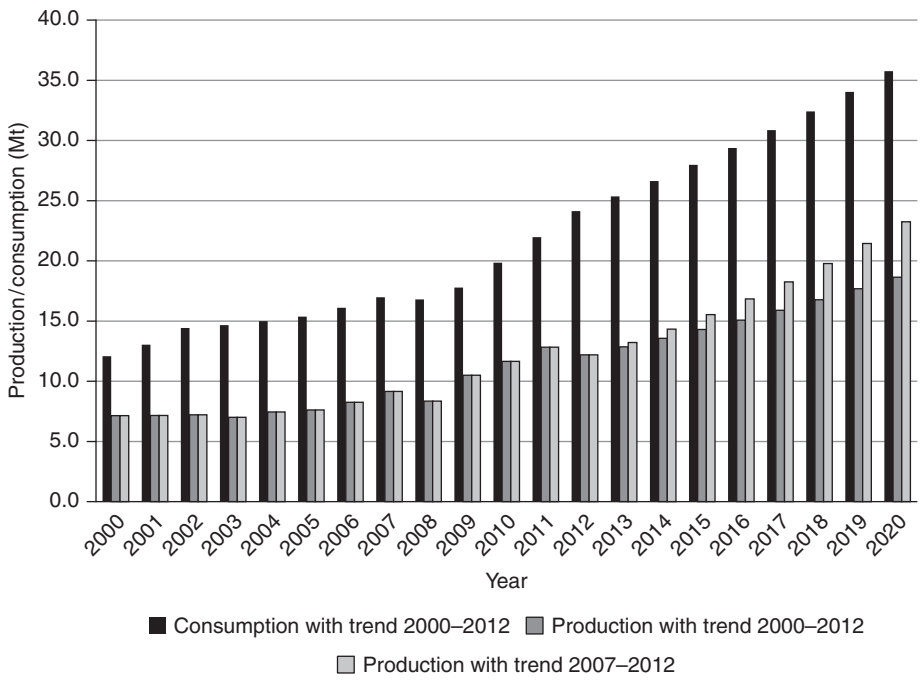

Fig. 2.4. Projection of milled rice production and consumption in sub-Saharan Africa using different assumptions (see text). (Data from USDA, 2013.)

growth rate of 5.5% per year as witnessed for the period 2000–2012 and a growth rate of 8.4% per year as witnessed for the period 2007–2012 (Table 2.3). With the 5.5% per year growth rate, SSA rice production would increase to 19 Mt of milled rice in 2020, creating a demand for imports estimated at 17 Mt of milled rice. With the growth rate seen after the rice crisis (2007–2012), milled rice production in 2020 would be at 23 Mt, closing the gap between demand and supply by 4 Mt compared to the baseline 2000–2012 scenario.

Rice Imports

Rice imports into SSA stabilized at around 7–9 Mt from 2008 to 2011, illustrating that rice production on the continent was able to keep pace with the increase in rice consumption. However, a clear surge in imports occurred in 2012 (Fig. 2.5).

Several factors explain this surge in rice imports. First, many West African countries incurred production setbacks because of severe drought spells in 2011. In addition to rice, production of other staple crops – including maize, millet and sorghum – was also undermined by drought. Consumers substituted other grains with rice, thereby creating a greater dependence on imported rice.

According to the *FAO Rice Market Monitor* (FAO, 2012), the announcement of increased border protection in Nigeria prompted Nigerian importers to complete their procurement before the implementation of the new import duties (tariffs on husked rice were raised from 5% to 30% and for milled and semi-milled rice from 30% to 50%). Second, the flow of imports was facilitated by the recourse to lower import tariffs and/or ceiling reference prices at the retail level in several West and East African countries. In 2012, Côte d'Ivoire adopted a three-month suspension of duty and taxes, which contributed to a growth of imports from 850,000 t to 1.4 Mt, 60% more than in 2011 (USDA, 2013). The same year, Côte d'Ivoire, Mali and Senegal established ceiling reference prices at the retail level to facilitate consumers' access to rice. In East Africa, Burundi, Kenya and Rwanda faced a strong demand for imported rice with the adoption of lower import tariffs in 2012. Lastly, the above-average population growth in SSA and the resulting increase in urbanization have been identified as contributing factors to an increase in demand for food, particularly rice (e.g. Kessides, 2005; Zuberi and Thomas, 2012). The growing demand for rice provides a strong impetus to continue to improve growth and efficiency of local rice production, but also to develop policies to control large imports that can impede the development of the domestic rice sector.

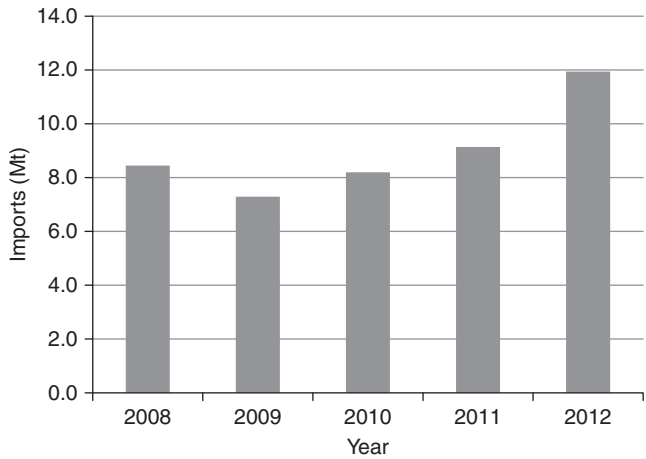

Fig. 2.5. Rice imports into sub-Saharan Africa during the period 2008–2012. (Data from USDA, 2013.)

Competitiveness of Domestic Rice Production

To assess the potential for domestic rice production following the rice crisis, AfricaRice and national (NARS) partners initiated rice competitiveness studies in collaboration with Michigan State University. Selected estimates of domestic resources cost (DRC) related to rice production are presented in Table 2.7: if the value of DRC is below 1, local rice is competitive against imports. Results indicate that local rice production systems are competitive and they make efficient use of domestic resources (see AfricaRice *et al.*, 2011, for more details). It must be noted, however, that domestically produced rice often fetches a lower price in urban markets in Africa because of perceived lower quality. The challenge often lies in postharvest practices, with the end result that African produced rice does not reach the standard of imported rice in the eyes of the African consumer (see Futakuchi *et al.*, Chapter 25, this volume).

General Discussion

Using projections of population from the United Nations and of income from the Food and Agricultural Policy Research Institute (FAPRI), Seck *et al.* (2012) predicted that global rice demand will rise from 439 Mt (milled rice) in 2010 to 496 Mt in 2020 and further increase to 555 Mt in 2035. An additional 116 Mt of rice will, therefore, be needed by 2035 to feed growing populations. In Africa, where rice is the most rapidly growing food source, about 30 Mt more rice will be needed by 2035, representing an increase of 130% from 2010. About one-third of this extra rice in Africa will be needed in Nigeria alone.

Promising developments in the African rice sector and improvements in rice productivity and competitiveness achieved after the 2008 food crisis as presented in this chapter can only be sustained over time if appropriate policies are adopted to incentivize producers and secure investments in the rice value chain. The most debated policy instrument is the Common External Tariff (CET). Small-scale producers' organizations in West Africa are currently (March 2013) pushing hard for an increase in the level of CET from 10% to 35%, in order to secure investments, provide incentives for rice production, and control for massive rice imports. Another argument is that the increase in CET level will be consistent with the Economic Community of West African States' (ECOWAS) regional agricultural policy commitment to promote food sovereignty. The proposed tariff is expected to be flexible, which means that the rate in force will fluctuate around the 35% reference level. The tariff will closely follow the trends of the international and the domestic regional markets: in times of abundant supply and very low prices on the international market that could threaten domestic investments, the CET could be raised above its reference value. Similarly, when international prices are very

Table 2.7. Estimations of domestic resources cost (DRC). (From AfricaRice *et al.*, 2011, with permission from Africa Rice Center.)

Country	National	Rainfed rice	Lowland rice	Irrigated rice
Benin	0.65	0.61	0.64	0.62
Burkina Faso	0.50	0.75	0.38	0.18
Côte d'Ivoire	0.61	0.88	0.73	0.60
Ghana	0.34	1.17	0.40	0.29
Guinea	0.68	n/a	n/a	n/a
Mali	0.51[a]	n/a	n/a	n/a
Nigeria	0.69	0.70	0.58	0.78
Senegal	0.75	0.83	n/a	0.55
Togo	0.41	0.50	0.23	0.68

[a]DRC of Mali is for the rice sector at the Office du Niger.
n/a, data not available.

high or if particularly poor harvests are anticipated within the ECOWAS community, the CET could be set below 35%. The argument for more protection of domestic rice production is rooted in infant industry theory, which stipulates that smaller countries need to protect their emerging industries (Edwards, 1993) in order to develop. Although criticized, empirical evidence in the rice economy in Asia as well as in Africa strongly supports this theory. First of all, the success of major rice producers and exporters was due to a large extent to the protectionist policy implemented by their governments. The majority of rice-producing countries in Asia had a policy of maintaining a very high import tariff on rice. Rice self-sufficiency and protection of the domestic sector from entry of cheaper rice are the reasons often provided to justify such high tariffs. The second empirical evidence is that trade liberalization and the reduction of import tariff, promoted mainly by the World Bank and the International Monetary Fund during the structural adjustment period, encouraged massive rice imports into Africa and hindered the development of the local rice industry. The period before 1980 saw import restrictions, licensing, high tariff rates, and government support to the development of local rice production. Those interventions enabled countries like Côte d'Ivoire to achieve self-sufficiency in rice in 1977. From 1980 to 2000, major policy shifts took place through structural adjustment policies. Countries liberalized their domestic sector, reduced or dismantled their import restrictions and became outward-oriented to cover domestic rice consumption. As a result, self-sufficiency ratios began decreasing while imports grew. After 2000, some countries (Nigeria and Ghana) reverted back to more protection of their local sector, but lack of harmonization of tariff policy across countries[4] in West Africa did not allow a reduction in import volume, thus the large gap between production and imports persisted. These facts demonstrate that more protectionism together with coordination and harmonization of import tariffs are necessary to boost the domestic sector and control large inflows of rice.

Higher import tariffs undoubtedly play an important role in the performance of the domestic rice sector, but they should not be the only policy option and cannot alone solve the structural and marketing problems that hamper the expansion of demand and supply of locally produced rice. Additional policy measures need to be implemented throughout the rice value chain. As Demont and Neven (Chapter 24, this volume) point out, policy makers and stakeholders need to gradually upgrade the domestic rice value chain according to a three-stage sequence: (i) investment in value adding through quality enhancement, certification, branding and labelling; (ii) adoption of supply-shifting strategies, including investments in research, extension and storage infrastructure; and (iii) implementation of demand-lifting actions based on the development of marketing strategies.

More specifically, investment in value addition will raise rice quality: mechanized harvesting and threshing operations to ensure product quality; promotion of private-sector investment in efficient rice processing technologies with built-in capacity for de-stoning, polishing and sorting homogeneous high-quality rice; packaging and labelling. Adoption of supply-shifting strategies will need to be based on sustainable area extension, enhanced access to quality seed of improved high-yielding varieties, promotion of producer incentives including better access to credit, facilitation of access to input subsidies (particularly fertilizer subsidy), and increased private-sector and local-community investment in storage infrastructures. Promotion to raise demand may include advertising, generic promotion and consumer subsidy on local rice. Consumer subsidy will not only provide vulnerable consumers with access to local rice, but also stimulate the demand for rice. Effective targeting of the beneficiaries of the subsidy will be made possible with the use of modern technologies including biometry (Gelb and Decker, 2011). Regional integration and inter-country cooperation within Africa are necessary to more efficiently address some of the cross-country challenges, including tariffs on imported rice and fertilizer subsidy.

Regional cooperation will be needed to develop efficient market regulation policies, including regional rice storage and bulk purchase. Regional storage is considered as a policy instrument to stabilize price variability and ensure food security. Although countries possess national facilities for grain storage, the 2008 food crisis illustrated the importance of developing a stock of rice at regional level. Quantities of

national stock released during the crisis were often small and had only limited effect in drawing food prices down (ECOWAS, 2008). It is, apparently, therefore essential to stock rice at regional level to address price instability caused by domestic shocks as well as the international market. Prices will be stabilized through a release of stocks during periods of high domestic prices and accumulation of stock during periods of abundant production or low international prices. Market regulation will be through public or public–private purchasing and selling capacity. The use of regional public inventories to achieve price stabilization has been common in economic community blocs such as Europe, the USA and Asia (Larson *et al.*, 2004; Yao *et al.*, 2005). Using data for the Middle East and North Africa region, Larson *et al.* (2012) were able to demonstrate that when the importing region is sufficiently large, setting a grain reserve is effective to hold domestic price below a specific target and to smooth global prices. Bulk purchase could facilitate increased access and provide affordable prices to consumers, particularly the most vulnerable. This policy will also help countries to address diverse forms of distortions introduced by the main exporters and importers and reduce most of the transaction costs of importing rice. Despite the fact that SSA imports a third of the international rice supply (AfricaRice, 2011b), there is no regional instrument for regulating rice imports into the sub-Saharan regional economic blocs. Yet, by aggregating their procurement of rice from the world rice market, countries could be in a position to exercise some buyer power on the international rice import markets or at least improve their bargaining power *vis-à-vis* the multinational grain trading firms or the state trading agencies on the export side. Support for this approach comes from Fiamohe *et al.* (2012), who show that if West African nations would aggregate their purchase of rice from Thailand, they could exercise a strong importer oligopsony[5] market power and distort prices below their competitive level. But taken individually, only Nigeria could be in a position to exercise market power. The effectiveness of the bulk-purchase strategy will rely on agreement among stakeholders in the rice economy, including exporters, traders, commercial banks and importers.

Conclusions

Africa's rice economy has seen a tremendous boost since the rice crisis occurred in 2008. Over the period 2007–2012, average rice yield in SSA increased in real terms by 108 kg/ha per year, comparable to Green Revolution growth rates in Asia or what was witnessed in the USA and Europe after the Second World War. Given the tremendous growth in rice consumption across the continent, this positive trend must be continued and even enhanced, to ensure that imports can be kept at a manageable level.

Together with a continued emphasis on enhanced production, it will be essential to invest in harvest and postharvest equipment and infrastructure to improve processing and marketing of domestic rice to ensure that rice produced is of the quality standard of imported rice and can find a market. Appropriate policy instruments need to be applied at national and regional levels to encourage the development of Africa's rice sector. Such instruments must be rules-based and predictable, avoiding uncertainty which could discourage investment or undercut the emergence of a dynamic private rice sector. Continued development of Africa's rice sector will take multiple paths and great caution is needed because of the complexity, political sensitivity and context specificity of the land issue within and across countries. African countries need to ensure that investments lead to win–win situations for all involved, not least the resource-poor local farmers.

Notes

[1] 'Growth rate' as used in this chapter is the ordinary least squares growth rate used by the World Bank (http://data.worldbank.org/about/faq/specific-data-series). It represents the average annual growth rate over the entire period and has the advantage of taking into account intermediate values of the series. It does not necessarily match the actual growth rate over any given period.

[2] 'Segmented regression' is a regression analysis method in which the independent variable is partitioned into intervals and a separate line segment is fit to each interval (http://en.wikipedia.org/w/index.php?title=Segmented_regression&oldid=541637502, accessed 7 March 2013).
[3] 'Total consumption' (or domestic consumption) refers to the sum of production and imports of milled rice. This apparent rice consumption is slightly different from real consumption by the value of stock and exports which are not very substantial in most of Africa.
[4] For example, Nigeria has a very high import tariff, whereas its neighbour Benin has a low tariff of 10%. This is also the case with Ghana and Côte d'Ivoire: tariff rate in Ghana ranged between 20% and 37%, whereas Côte d'Ivoire implemented the West African Economic and Monetary Union tariff of 10%. These differences in import tariffs encouraged smuggling across borders and did not help high import tariff countries to reduce their rice imports.
[5] 'Oligopsony': 'a state of the market in which only a small number of buyers exists for a product' (Oxford Dictionaries [online], http://oxforddictionaries.com/definition/english/oligopsony?q=oligopsony, accessed 4 March 2013).

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