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Monitoring African Food and Agricultural Policies
Suivi des politiques agricoles et alimentaires en Afrique

ANALYSIS OF INCENTIVES AND DISINCENTIVES FOR RICE IN KENYA

DECEMBER 2012

This technical note is a product of the Monitoring African Food and Agricultural Policies project (MAFAP). It is a technical document intended primarily for internal use as background for the eventual MAFAP Country Report. This technical note may be updated as new data becomes available.

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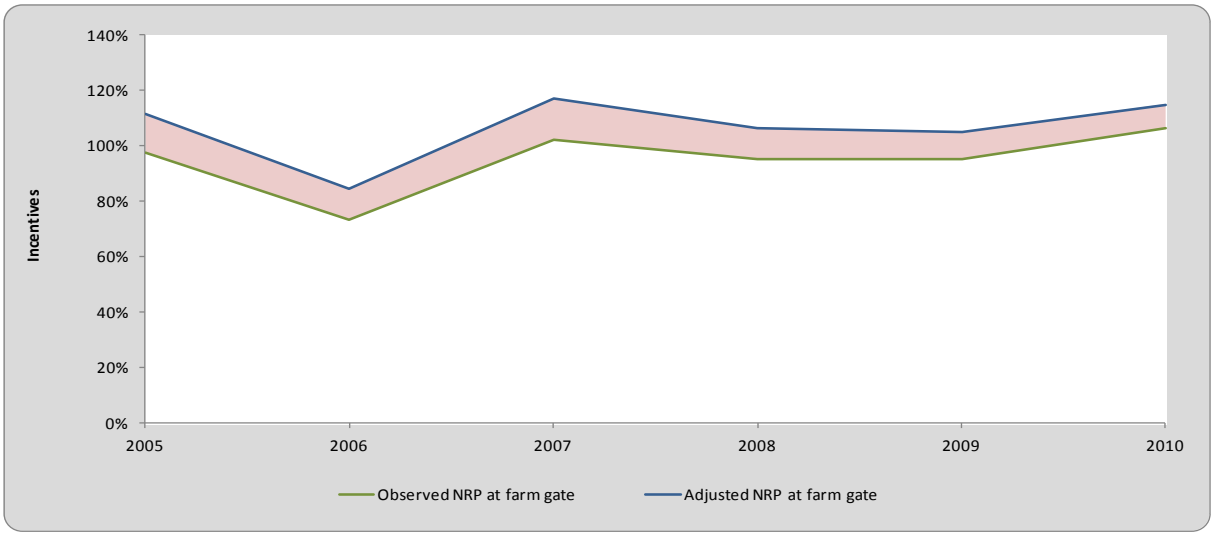
SUMMARY OF THE NOTE

Product: Rice
Period analyzed: 2005 – 2010
Trade status: Import in all years

- Rice is the third most important staple food in Kenya after maize and wheat. Historically, rice is a cash crop for rural producers.
- Rice consumption has been growing much more rapidly than production at an average rate of 11 percent per year since Kenya's independence in 1960. This rate appears to have slowed to 3 percent per year since 2005, but the country's import dependency ratio for the decade remains high at 88 percent.
- Kenya imports nearly all of its rice from the Far East, with Pakistan accounting for 74 percent of total rice imports during the period 2006-2010.
- Three main value chains can be identified within the Kenyan rice sector – the vertically integrated large farm chain, the highly concentrated chain on the National Irrigation Board (NIB) schemes and the traditional market value chain of the non-NIB irrigated production and rain-fed producers.
- Due to data inconsistencies and major differences in rice value chains, this analysis focuses solely on the value chain of NIB Schemes, specifically on the Mwea Scheme, which is located in central Kenya and is by the largest of the four rice-producing NIB schemes in the country.



The observed Nominal Rate of Protection (NRP, green line) in the graph above indicates that rice producers received market price incentives throughout the period analyzed. The adjusted NRP (blue line) captures the effect that market distortions along the NIB scheme value chain have on farmers. The area in red shows the net gains that these distortions represent for producers.

- Our results show that incentives arise from 1) Kenya's tariff structure for rice imports from countries outside the East African Community (EAC) and 2) high domestic prices due to an increase in the cost of imported inputs (e.g. fertilizers) during the world commodity price spike in 2007-2008, as well as major shocks to production, such as civil unrest following the December 2007 election and subsequent drought.

- It seems likely that many of the consumers affected by Kenya's tariff regime for rice imports are urban with moderate or high incomes because low income households typically do not consume a large amount of rice.
- It is not clear that the government's long-term goal of increased rice production will help meet Kenya's growing need for staple foods if rice is only available at relatively high prices to consumers. High prices may temper the growth in demand for rice and redirect it to maize, wheat and other staples. Consideration should be given to alternatives, such as expanding EAC integration, which may provide a lower cost means of improving food security.
- It is not clear that rice production is the best use for irrigated land in Kenya. Alternative crop production systems, such as fruit and vegetable production, may offer higher returns and should be investigated.

CONTENTS

1. PURPOSE OF THE NOTE

This technical note aims to describe the market incentives and disincentives for rice in Kenya. The note is a technical document and serves as input for the MAFAP Country Report.

For this purpose, yearly averages of farm gate and wholesale prices are compared with reference prices calculated on the basis of the price of the commodity in the international market. The price gaps between the reference prices and the prices along the value chain indicate to which extent incentives (positive gaps) or disincentives (negative gaps) are present at the farm gate and wholesale level. In relative terms, the price gaps are expressed as Nominal Rates of Protection (NRPs). These key indicators are used by MAFAP to highlight the effects of policy and Market Development Gaps (MDGs) on prices.

The note starts with a brief review of the commodity's production and consumption as well as trade and policies affecting the commodity. It also provides a detailed description of how the key components of the price analysis were obtained. Using this data, the MAFAP indicators were then calculated and interpreted in light of existing policies and market characteristics. The analysis is commodity and country specific and covers the period 2005-2010. The indicators were calculated using available data from different sources for this period.

The results of this analysis can be used by stakeholders involved in policy-making for the food and agricultural sector. They can also serve as input for evidence-based policy dialogue at the country or regional level.

This technical note is not to be interpreted as an analysis of the value chain or detailed description of production, consumption or trade patterns. All information related to these areas is presented merely to provide background on the commodity under review, help understand major trends and facilitate the interpretation of the indicators.

All information is preliminary and still subject to review and validation.

2. COMMODITY CONTEXT

PRODUCTION

There are a number of different estimates for rice production and area in Kenya. The two most often cited are those of the Ministry of Agriculture (MOA) for all milled rice production and those of the National Irrigation Board (NIB) for paddy rice production on its irrigation schemes. Both are listed in Table 1, with the NIB production estimates converted at a rate of five tonnes of milled rice from 8 tonnes of paddy (rough or unmilled rice)[1].

The MOA estimates for rice production and area should be larger than the NIB estimates because they include non-NIB irrigated production and production on lowland and highland rain-fed rice fields. Non-NIB irrigated production includes private rice irrigation enterprises and small-scale irrigation schemes established by other agencies, such as the Lake Basin Development Authority. It should also include production from Dominion Farms Ltd. (DFL), a new, large-scale, vertically integrated farm with about 7 000 ha of irrigable land in the Yala Swamp region near Lake Victoria[2]. This is a very different value chain from that on the NIB schemes.

Table 1: Milled Rice Production, Area and Yield in Kenya, 2005-2010

	Unit	2005	2006	2007	2008	2009	2010
Total							
Production	Tonne	57,942	64,840	47,256	21,881	42,202	44,468
Area	Ha	15,940	23,106	16,457	16,734	21,829	n.a.
Yield	T/ha	3.6	2.8	2.9	1.3	1.9	n.a.
NIB Schemes		**2004/5**	**2005/6**	**2006/7**	**2007/8**	**2008/9**	**2009/10**
Production	Tonne	39,173	39,366	33,196	25,041	23,249	45,313
Area	Ha	10,832	12,501	9,626	9,092	10,072	17,611
Yield	T/ha	3.6	3.1	3.4	2.8	2.3	2.6

Source: Total rice data are from MOA, ERA 2010 Table 5.7 for 2005-2010 and 2010 production from the MOA CountryStat website; NIB Schemes data are from KNBS, SA Table 67 and ES Table 8.18.

It seems likely that rain-fed value chains are also quite different from the NIB scheme value chains. Emongór et al. report that the price for rain-fed lowland rice was only 56 percent of the price for NIB scheme rice in 2009. This could be because they produce a different rice variety – Kenyans prefer the aromatic basmati rice grown on the schemes.

Chemonics Inc. and Gitau et al. claim that about 95 percent of rice production comes from the NIB irrigation schemes. This has likely been typical in the past, but the data in Table 1 indicates that on average only 74 percent of production came from the NIB schemes between 2005 and 2010. However, there are obvious uncertainties due to the apparent inconsistency of these two data

[1] See Annex III for a description of other production estimates.

[2] This is equivalent to about 67% of the average amount of irrigated land on the NIB schemes between 2005 and 2010. However, it seems likely that only about 1,000 ha were developed for irrigation by 2010. See Annex III for additional details.

sources in 2008 and 2010. Extremely low production reported by the MOA for calendar year 2008 could be masked in the NIB production data reported by crop year, while the MOA's 2010 estimate for total production may be revised upwards[3].

Due to data inconsistencies and major differences in rice value chains, depending on the producer group, this report focuses solely on production from the NIB rice schemes.

There are four NIB schemes currently producing rice. Mwea in central Kenya is by far the largest, accounting for 78 percent of the irrigated area, 88 percent of production and 98 percent of the gross value of output between 2005 and 2010, according to NIB data. The other three rice producing schemes – Ahero, Bunyala and West Kano – are located in western Kenya[4].

Ruigi (1986) provides a description of the history of the rice schemes in Kenya and their management. The Mwea Scheme began in the mid-1950s as a means to provide livelihoods for landless and unemployed Africans by former Mau Mau detainees.

The schemes adopted a paternalistic command and control management system with extensive powers vested in the Scheme Administration. Plot-holders did not and still do not own their land but are tenants with a renewable annual lease. The lease is heritable, but plot-holders could lose their rights if they did not manage their plots as required by the scheme administrators. Plot holders were required to follow administration directions on rice cultivation, had to market their paddy though the NIB milling plant, and could only raise other crops or livestock subject to administration approval. Mwea plot-holders also had to make an annual rent or service payment, which went to cover NIB administration expenses and losses incurred on the other NIB schemes.

Long-term trends on rice production, area and yield on the NIB schemes are illustrated in Figure 1 for the period 1985-2010. All three show little change, neither a trend up or down; between 1985 and 1998 despite a large Japanese project supported improved rice production on the Mwea scheme through most of this period.

However, both yield and production appear to trend up between 1999 and 2010, albeit with two large down cycles: one in 1999/2000 and the other between 2007 and 2009.

The fall in production in 2007-2009 likely has several causes. The spike in world commodity prices in 2007-2008 may have affected costs and availability of fertilizers needed to maintain rice yields. In

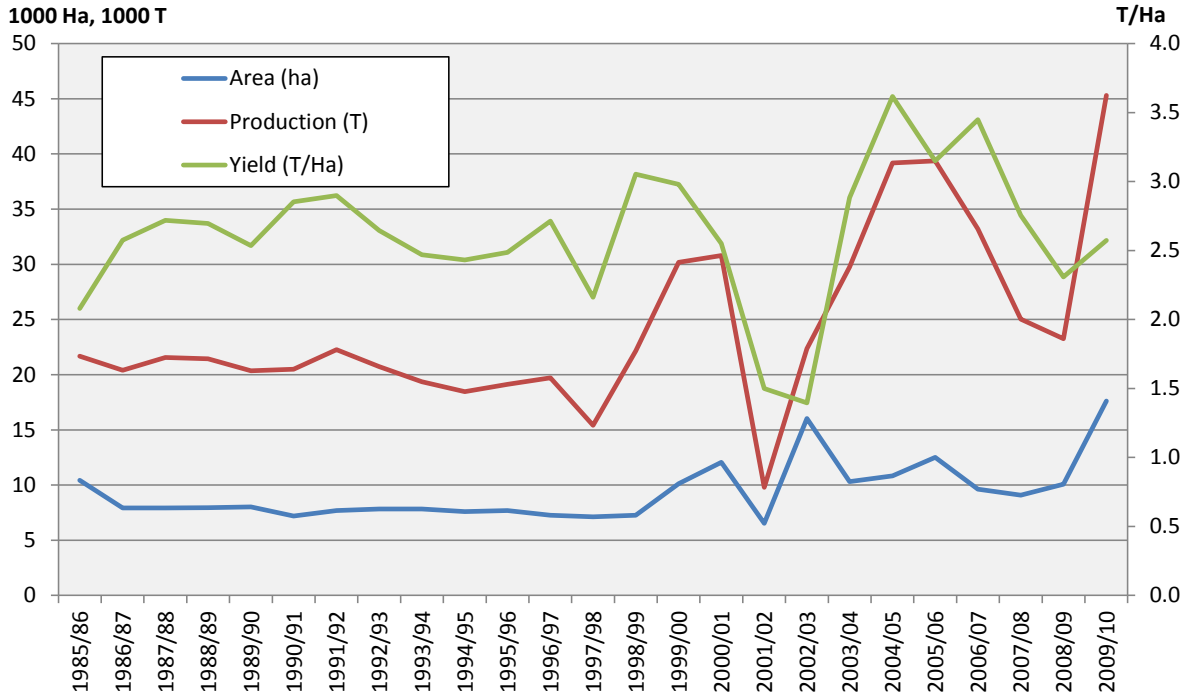
[3] *FAO Rice Market Monitor* Vol. XIV (3), July 2011 indicates that total production may be revised up to 50,000 tonnes in 2010. However, the MOA's total production estimate for 2008 is much higher than the estimate reported in the "National Rice Development Strategy (2008-2018)."

[4] The Perkerra Scheme in the Rift Valley is managed by the NIB, but produces maize and cotton. The Bura Scheme was built between 1978 and 1988 as an IBRD project. It stretches along the Tana River northeast of Mount Kenya and mainly produces maize and cotton. Its management has shifted over the years between the MOA MW&I and the NIB, but is currently under the NIB.

2008 and 2009, production was likely affected by the civil disturbances that followed the December 2007 election and the subsequent droughts[5].

The fall in production and yields in 1999-2000 may have in part been related to a particularly widespread drought in that year, but it is more directly related to a rebellion on the part of plot-holders on Mwea Irrigation Scheme in 1998. This led to a collapse of production on the other schemes as well as because the NIB had been cross-subsidizing their operations with revenues from the Mwea scheme up to this point. It also provoked a crisis at the NIB itself because it too was dependant on excess revenue from the Mwea scheme.

Figure 1: Milled Rice Production, Area and Yield on Government Irrigation Schemes, 1985-2010



Source: KNBS/NIB cited in Thairu and KNBS/NIB in SA Table 67, and ES Table 8.18. Production and yield converted to milled rice equivalent by multiplying by 5/8.

The Mwea Rice Farmer's Cooperative Society (MRFCS) managed the scheme until 2003. The NIB was restructured in 2002 to adapt to government policy on liberalization, while problems with MRFCS management over 1999-2003 resulted in deterioration of infrastructure and issues about the allocation of available irrigation water. An agreement in 2003 between the NIB and water users associations resulted in a new joint management system. Producers maintained their greater ability to make production and marketing decisions, but they still do not own their plots and still pay a rent,

[5] In the case of maize, the civil disturbances resulted in the destruction of 0.3 million tonnes (African Centre for Open Governance) and a 20 percent reduction in the area planted during long rains in 2008 (WB 2009b). Rice production too may have been similarly affected.

which in 2009 was about Ksh 62,000/ha (USD 800/ha)[6]. Between 2003 and 2005, rehabilitation on the other schemes with FAO support enabled them to resume production.

The upward trend in yield and production since 1999 is likely related to liberalizing the production controls that prevailed before 1999 and reduced market access costs for producers as well as better milled rice prices further up the value chain[7].

CONSUMPTION/UTILIZATION

Rice is the third most important food staple in Kenya after maize and wheat. The CPI expenditure weights for rice indicate its relative importance for different groups of consumers. For low income consumers in Nairobi, rice accounts for 3.9 percent of food expenditure compared to 11.5 percent and 10.7 percent for maize and wheat, respectively. Expenditure on rice is 4.8 percent of food expenditure in other urban areas compared to 13.5 percent for maize and 9.7 percent for wheat.

However, it seems likely that rice accounts for an even lower expenditure share for rural consumers. Ruigi reports that Mwea rice farmers in the 1980s sold the most of the rice and relied on maize and beans they grew off the scheme for their own consumption[8]. In effect, rice was a cash crop consumed by people in urban areas.

Several authors have noted the preference for aromatic basmati rice produced on the Mwea scheme. This might be influenced by Kenyans of South Asia origins that form a significant minority in urban areas. A preference for basmati rice may have developed among other Kenyans over the years as a large part of the rice available in Kenya is basmati. But basmati rice is relatively high value rice. It seems likely that if rice was being consumed as a staple by low income Kenyans, it would be a less expensive variety and grade.

Table 2 shows milled rice production, trade and apparent consumption for the period 2005-2010. Rice consumption has been growing much more rapidly than production throughout the nearly 50 years since independence. Consumption has grown at an average rate of 11 percent per year since 1960. As a result, imports have increased rapidly and the dependency ratio has climbed higher in most decades since 1960: it averaged 23 percent in the 1960s, 15 percent in the 1970s, 53 percent in the 1980s and 88 percent for the 1990s. The growth in consumption appears to have slowed to 3 percent per year since 2005, but the dependency ratio for the decade remains at 88 percent.

[6] This is based upon the Mwea Development Guide 2009 quoted in Gitau et al. The NIB web site indicates that about 2008, they were getting only about 4,900 Ksh/ha for their services from farmers. The difference could be absorbed by the water users associations.

[7] For example, before 1999 the NIB manager specified nearly all production practises, provided land preparation, seed, fertilizer and pesticides and farmers were required to deliver their crop for milling to the NIB mills. Farmers had to bear the costs of such things as delays in land preparation and seeding and inefficiencies in milling and marketing. See Kabutha and Mutero [2000] and Ruigu [1988].

[8] Emónger indicates more recently that more rice may be consumed by rice farmers in western Kenya.

Table 2: Milled Rice Production, Trade and Apparent Consumption in Kenya, 2005-2010

	2005	2006	2007	2008	2009	2010
Production	57,942	64,840	47,256	21,881	42,202	45,313
Imports	228,206	232,305	261,712	299,070	308,158	284,368
Exports	n.a.	801	597	1,481	2,310	1,640
Apparent consumption	279,800	296,344	308,371	319,470	348,050	328,041
Import dependency ratio	80%	78%	85%	93%	87%	86%

Source: Imports: MOA ERA 2010 for production 2005-10 and consumption in 2005; SA Table 46 for 2005 exports (likely HS 100620,100630, 100640), GTA for imports and exports 2006 - 10 (HS 1006).

MARKETING AND TRADE

Three main rice market chains can be identified within the Kenyan rice sector. These are the vertically integrated large farm chain of DFL, the traditional market value chain of the non-NIB irrigated production and rain-fed producers and the highly concentrated market value chain on the NIB irrigation schemes, particularly Mwea. These differ in the types of rice they produce and how their rice is marketed.

The NIB and the Mwea Rice Farmer's Cooperative Society jointly own Mwea Rice Mills Ltd. (MRML), which has four mills on the Mwea irrigation settlement. Milled rice from MRML is sold to supermarkets and the National Cereals and Produce Board under their Nafaka brand. There is a similar arrangement in western Kenya where Western Kenya Rice Mills (WKRM) Ltd. is jointly owned by NIB and the farmers of the Ahero, Bunyala and West Kano schemes through their respective co-operative societies.

Farmers on the NIB irrigation schemes are now free to market their own rice and there are a large number of traders and small scale rice millers that form a local wholesale market. According to Gitau et al, the introduction of diesel powered mills has increased the number of options in the milling industry. This rice may be sold as generic rice or find its way into a branded product line. Chemonics Inc. indicate that a large share of Mwea rice was milled by a large scale private sector miller, Capwell Rice Millers in Thika. Capwell markets rice under its Pearl Rice brand.

DFL farms mills and markets its rice under its own its own *Prime Harvest* brand. Other irrigated rice and rain fed rice is likely mostly marketed through traders and smaller mills as generic rice[9].

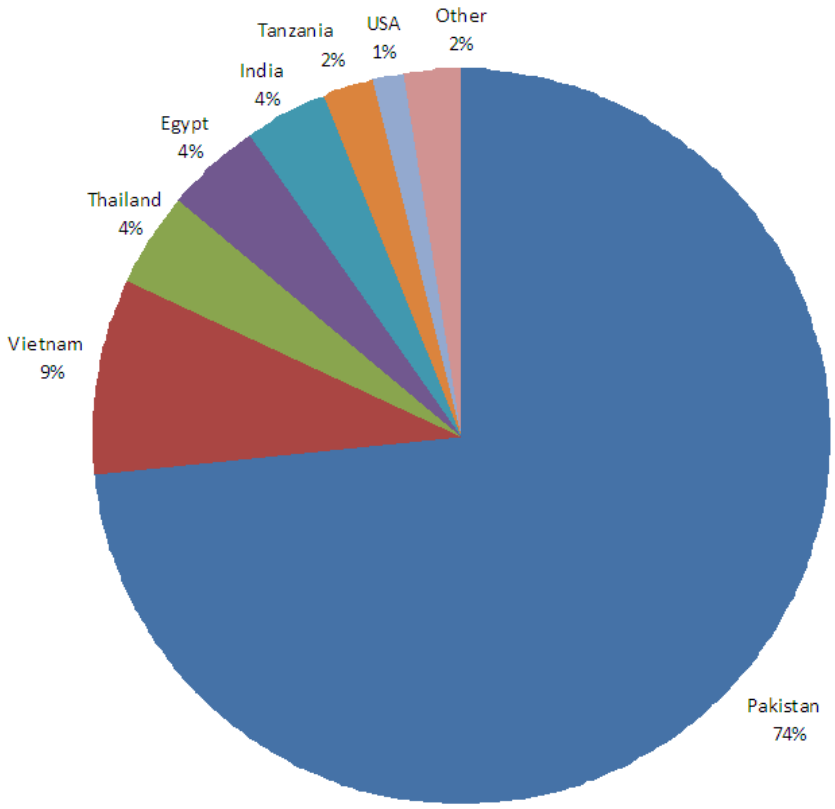
Kenya's rice imports between 2006 and 2010 have been dominated by rice from Pakistan, which accounts for 74 percent of rice imports over this period as shown in Figure 2[10]. Vietnam is the next largest source of rice imports in this period with a 7 percent share while Thailand, India and Egypt each have a 4 percent share.

[9] Low income consumers in rural areas might be more likely to consume generic rice sold rather than the one of the branded packages. But the prevalence of branded rice products is likely connected to the growth of the supermarket industry. This may be an important development for Kenya rice value chains especially if they are reaching low income consumers at least in urban areas. Reardon has written extensively on this subject.

[10] Data on imports by source are from the Global Trade Atlas (GTA). The earliest data in the GTA is for 2006.

The dominance of Pakistan in all years between 2006 and 2010 may be the result of the tariff regime. Under the East African Community common external tariff agreement, Kenya was to increase its external tariff to a 75 percent ad valorem duty or USD 200/tonne, whichever is greater. However, Kenya has obtained an exemption for rice imports from Pakistan throughout the period. It seems that a tariff of 35 percent has been charged on imports from Pakistan. Imports from other countries still attract the agreed EAC tariff so must compete at a 40 percent tariff differential.

Figure 2: Rice Imports by Source, 2006-2010



Source: GTA

A USDA ERS GAIN publication argues that the increase in tariffs has resulted in higher consumer prices and slower growth in rice consumption since 2003. Certainly it may have been a factor, but the favourable treatment accorded to rice from Pakistan would seem to weaken this treatment somewhat, while the surge in rice prices in global markets in 2007-2008 and relatively high prices since that are likely equally important.

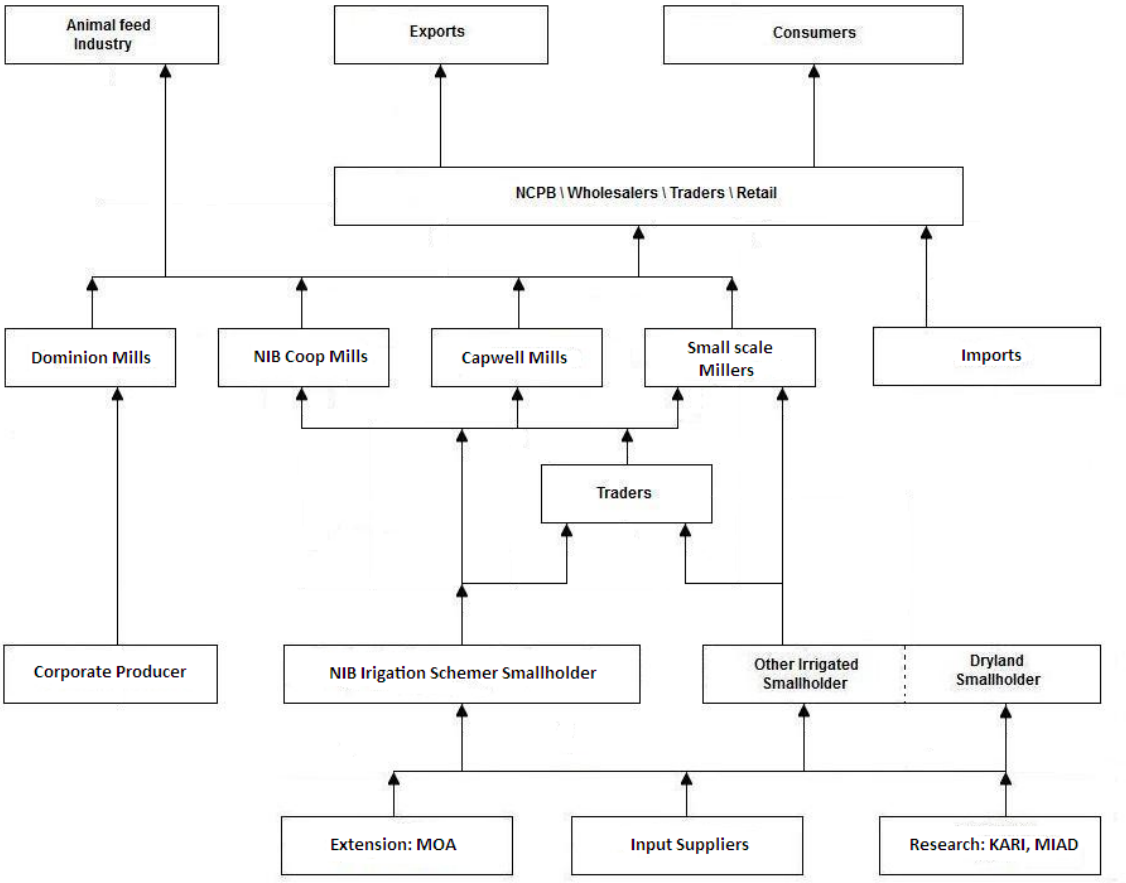
DESCRIPTION OF THE VALUE CHAIN AND PROCESSING

The three main rice market chains within the Kenyan rice sector are shown in Figure 3. The vertically integrated DFL/Dominion Mills chain is shown on the left, while the Non-NIB irrigated and rain-fed chain is shown on the right. However, 74 percent of production between 2005 and 2010 originated in the NIB irrigation scheme chain in the middle.

The NIB chain shares features of both the other two chains. Like the DFL /Dominion Farm chain, it produces high quality rice a large portion of which is processed in its own mills and sold as branded rice, in this case through the NCPB. The location of the Mwea scheme gives the NIB chain an advantage in terms of market access. Mwea is only about 100 km northeast of the principle market, Nairobi. DFL in contrast is over 350 km west of Nairobi and over 800 km from Mombasa.

Like the Non-NIB irrigated and rain-fed chain, rice from the NIB schemes may also be sold through traders and/or small scale millers and sold as generic rice. A significant portion of rice from both NIB chain and the Non-NIB irrigated and rain-fed chain may be consumed on farm but Ruigi indicates that most rice farmers in the 1980s sold most rice they produced and relied on maize and beans produced on non irrigated land for subsistence.

Figure 3: Simplified Rice Value Chain for Kenya



POLICY DECISIONS AND MEASURES

Kenya has followed the same policy goals for rice that it followed for the other two major staple crops (maize and wheat). Kenya's long-term goal is self-sufficiency for all three staples. Based upon policy decisions, price stability is another important objective, although it has been perhaps less clearly enunciated and more of a short-term issue.

Trade policy has been a major means of achieving both objectives. Both maize and wheat benefit from tariffs similar to those already described above for rice. There is a significant difference in that both rice and wheat are routinely imported, so the high tariff rates are effective in keeping prices

high for Kenyan value chains. Maize, however, is only imported from the international market in exceptional circumstances, so prices are usually well below import parity calculated based upon exports from the US gulf or South Africa. The tariff for maize imports from global exporters, therefore, is seldom a factor in determining prices in Kenya.

The tariff rates may be adjusted on a temporary basis from time to time and export bans may be imposed to support the stabilization policy objectives and moderate either unusually low prices for producers or unusually high prices for consumers.

The self-sufficiency goal for rice has been pursued as well through various projects to maintain and expand irrigated production. However, the various schemes are supposed to operate on a cost recovery basis. The fact that the Mwea scheme was profitable and was cross-subsidizing the lack of profitability on the smaller schemes as well as the administration of the NIB was one of the factors that led to the plot-holders rebellion in 1998.

Kenya has long maintained that it has up to 540,000 ha of land that could be irrigated, although less than 10 percent of this area is currently irrigated[11]. Various proposals have been put forward over the years for irrigating different areas, but were challenged because of their high cost and low benefit cost ratios.

For instance, the IBRD Bura Irrigation Settlement Project was estimated to cost USD 98 million and provide a livelihood for over 5,000 settler families on 6,750 ha of irrigated land. According to the project completion report, project cost escalated above the budget resulted in cut-backs in the number of families settled to about 2,100 at a cost USD 55,000 and a negative internal rate of return. By 1990, the Buru Settlement Scheme was confronted by a range of problems necessitating an on-going subsidy of about USD 1,000 per family per year. Because of the problems at Bura and similar on-going lack of profitability with the smaller NIB schemes in western Kenya, there has been a reluctance to engage in large-scale irrigation projects in Kenya.

The 2007-2008 spike in global commodity markets may have changed that perception. In 2008, the MOA released its long-term strategy to become self-sufficient in rice by 2030 ("National Rice Development Strategy 2008-2018"). The emphasis by the MOA on rice makes sense because, as it notes, rice consumption has been growing at 12 percent per year, while wheat and maize consumption have only been growing at 4 percent and 1 percent, respectively.

The strategy is quite clear on the importance of extension research and a strong seed dissemination system to achieve its objective. It also indicates the need for rehabilitation and expansion of existing irrigation schemes. The NIB's Long-Term Irrigation Plan produced about the same time proposes expanding the area irrigated on existing schemes producing rice from about 8,000 ha to 20,000 ha and an additional 24,000 ha irrigated on new schemes.

This type of strategy requires donor support and some of it is turning up. The World Bank began a new Natural Resource Management Project in 2007 with an important irrigation component. JICA has agreed to new project to expand irrigation on the Mwea Irrigation Scheme. The Coalition for African Rice Development (CARD) is a group of bilateral and multilateral donors and

[11] According to MOA the area irrigated could be increased further to 1.3 mha with innovative management technologies.

African/international institutions established May 2008 with the aim of doubling the African rice production in ten years. These are just two of the 17 projects in Kenya that CARD lists with a rice component.

The strategy also requires GOK support and it appeared in the 2009/10 budget in the form of the Economic Stimulus Program. It included a project to promote rice production through rehabilitation and expansion in the area irrigated. The total cost of this package in fiscal 2009/2010 was 2.3 bKsh. Most of this is on rehabilitation and expansion of infrastructure but it includes 71.2 mKsh in farmer input subsidies. The budget allocation for 2010/11 was an additional 1.8 bKsh.

Finally, in the 2011 budget speech, the Minister of Finance announced "an irrigation expansion program intended to gradually cover the 1.7 million acres of potential irrigable land in order to transform our country into a food secured and net exporter of food." The budget included 8.6 bKsh for the National Irrigation Board for various irrigation projects countrywide, 1.2 bKsh the Ministry of Regional Development to initiate a large irrigation project in Nyanza, and 0.4 bKsh for the Ministry of Water and Irrigation for small scale irrigation projects.

3. DATA REQUIREMENTS, DESCRIPTION AND CALCULATION OF INDICATORS

To calculate the indicators needed to estimate market price incentives or disincentives for rice farmers in Kenya (NRP) as well as the Market Development Gaps (MDGs), several types of data are needed. They were collected and are presented and explained hereafter.

TRADE STATUS OF THE PRODUCTS

As mentioned above, Kenya has long been a net rice importer and there were substantial volumes of rice imported throughout 2005-2010. The estimation of the nominal rate of protection, therefore starts with observed CIF prices as the benchmark. The benchmark price is the average Mombasa CIF price for all rice imports from data in the Global Trade Atlas and the Kenya National Bureau of Statistics.

BENCHMARK PRICES

Observed

The benchmark price is the average Mombasa CIF price for rice imports from all countries. These are taken from the Global Trade Atlas (GTA) for 2006-2010[12]. The Quantity and value are given in USD per metric tonne in the GTA for HS1006. They have converted to Kenya shillings per metric tonne at the annual average exchange rate for the year in the IMF database.

The value for 2005 is calculated from the KNBS *Statistical Abstract 2010* data on quantity and value of rice imports. These apparently do not include HS100610 (rice in husk), but only a small amount of unmilled rice is imported in other years.

Adjusted

No adjustments to the benchmark prices were made.

DOMESTIC PRICES[13]

Annex III describes in detail some of the different and seemingly inconsistent prices reported for unmilled and milled rice in Kenya. In some instances they were quite a bit higher that import parity prices and even higher than the retail price of a one kilogram package of rice.

The most reliable price for unmilled rice seems to be 2,500 Ksh/80 kg for 2010 reported in the Ministry of Agricultural Report on their Economic Stimulus Project. This is equivalent to

[12] The GTA has data on Kenyan rice imports by country of origin four types of rice: rough (HS100610), brown (HS100620), broken (HS100640) and "Rice, Semi-Milled or Wholly Milled, Whether or Not Polished or Glazed" (HS100630). Less than 3% of imported rice is in the first two categories; 41% imported rice is broken and 57% is HS10030. However both of these are defined so broadly that there is only a 4% difference in price between the two types over the six years.

[13] In some cases these are calculated and put on a common basis for comparison. For example, In the case of the NIB prices, these were calculated from their estimates of the value of production and quantity of paddy produced and then adjusted for the equivalent amount of milled rice that would be produced from the paddy,

31 250 Ksh/tonne for unmilled rice and a cost of Ksh 50 000 for the 1.6 tonnes needed to make 1.0 tonne of milled rice. The most reliable wholesale price is 69,517 Ksh/tonne for milled rice which is an average of the price for the last eight months of 2010 given by RATIN. The NIB prices are extremely high. The MOA prices are extremely high in 2005-2007 and are lower in 2007-2010, when everything points to higher prices in those years, including the actual retail prices.

Consequently, prices used to calculate for 2010 are based upon the 2010 prices described above an index based upon retail prices and import parity prices, as shown in Table 3. The average Nairobi parity price index is calculated from the average CIF import price in Ksh/tonne plus the market access costs described below in Table 4. The retail price is from the KNBS Statistical Abstract 2010 Table 2006. Both are converted 2010 base indices. A simple average of these is used to back cast the 2010 prices for the other years.

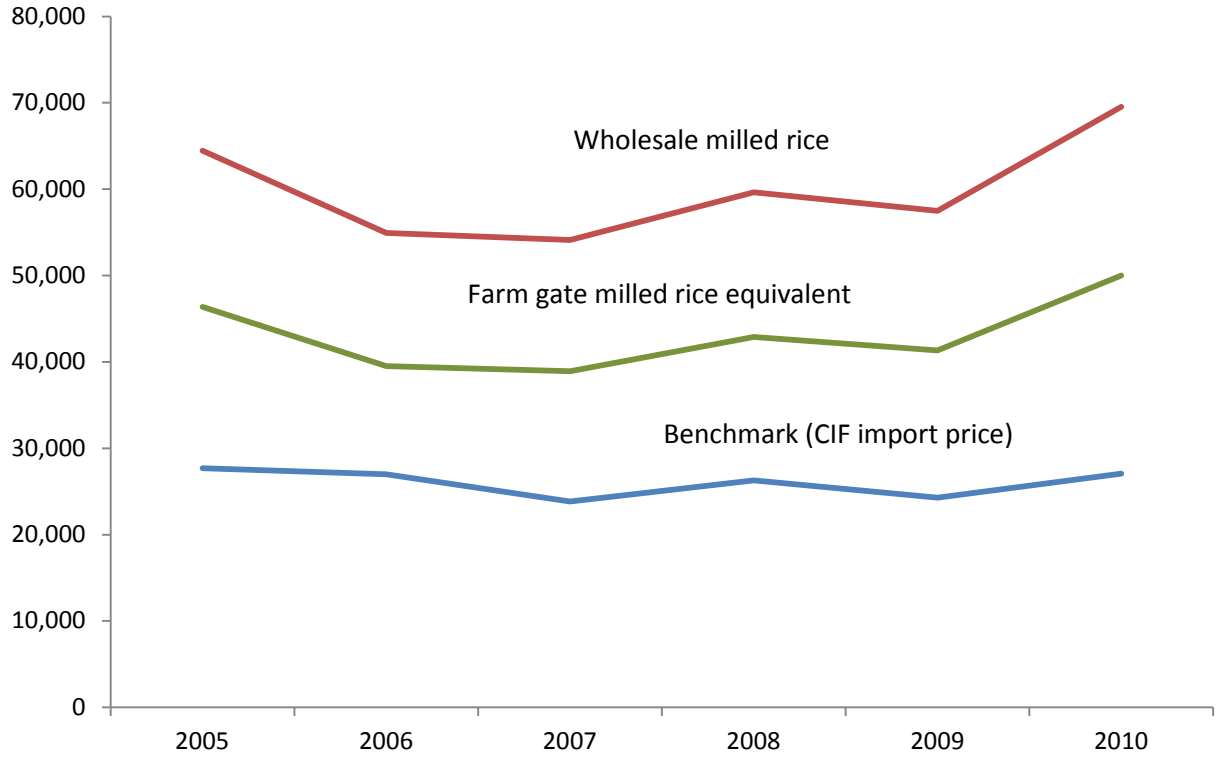
Figure 4 shows the resulting three main price series: the benchmark CIF price of imported rice expressed in Ksh/tonne, the wholesale price in Nairobi in Ksh/tonne and the farm gate cost of the 1.6 tonnes of unmilled rice needed to make a tonne of milled rice. These are all expressed in 2010 Kenya shillings using a CPI deflator. Cumulative inflation over the six years was 37 percent as measured by the CPI so prices in nominal terms increased substantially but all three series are relatively flat in real terms indicating little in price differentials.

Table 3: Observed Farm Gate Prices for Unmilled Rice and

Observed Wholesale Prices for Milled Rice, 2005-2010

	2005	2006	2007	2008	2009	2010
Nairobi parity price index	62	61	62	70	73	100
Retail Price Index	54	53	55	80	86	100
Average index	58	57	58	75	79	100
Farm gate unmilled rice (paddy) price (Ksh/tonne)	18,169	17,718	18,201	23,296	24,823	31,250
Wholesale milled rice price (Ksh/tonne)	40,417	39,414	40,488	51,824	55,220	69,517

Figure 4: Kenya Rice Prices in 2010 (Ksh/tonne)



EXCHANGE RATES

Observed

Average nominal exchange rates between the Kenya Shilling and the US Dollar were used in this analysis. The average rate for each year under review was calculated from monthly data obtained from the International Monetary Fund (IMF) database on exchange rates.

Adjusted

No adjustments to the exchange rates were made.

ACCESS COSTS

Observed

The market access cost between the border and the point of competition (the Nairobi wholesale market) is the sum of the port charges needed to clear customs and the transportation costs from Mombasa to Nairobi.

Estimates of port charges for bulk rice bulk handling in Mombasa port are based on a recent communication from Grain Bulk Handlers Ltd (GBHL) together with comparisons of other published estimates for both maize and wheat. Port charges used in the estimate of market access costs are USD 24/tonne plus 5.375 percent of the Mombasa CIF price.

With a price of imported rice of about USD 290/tonne (this is in fact the average price of imported rice over 2005-2010) port charges would be USD 41/tonne.

Transportation costs from Mombasa to Nairobi have been estimated for wheat and maize have been reported by a large number of different authors in recent years. They consistently report an estimate of about USD 34/tonne (see Annex IV, Table 14). Rice has nearly the same density as maize so a load of rice and maize should have very similar transportation costs per tonne.

The market access cost from the farm gate to the Nairobi wholesale market is made up of transport cost from the farm gate to the mill, milling cost and transport cost from the mill to Nairobi. Gitau et al estimate transport cost from the farm gate to the mill at 60 Ksh/80 kg bag and milling cost at 160 Ksh/80 kg bag.

Transport to Nairobi for rice is likely similar to the cost of transporting maize and wheat over similar distances. Costs used here are based upon costs estimated for maize in a recent World Bank study described in more detail in the Technical Note on maize in Kenya in this series.

Adjusted

A number of adjustments could be made to port charges, such as selectively reducing fees and Kenya Port Authority charges but it is difficult to know how much it would be possible to further reduce GBHL charges. Consequently, it was total port charges are reduced by USD 9.50/tonne which is in line with claims made by GBHL (ca 2008).

Adjustments to transportation costs are the same as those made for the maize technical note in this series. Two adjustments to market access costs in all transportation segments are based upon World Bank (2009b). This is done by eliminating the portion of costs due to bribes and government fees and the effect of overloading. World Bank (2009b) found that maize transportation is only profitable if trucks are overloaded. Eliminating government fees and bribes reduces 11- 12 percent for large and medium farm transportation market segments. Eliminating overloading increases market access costs by 15 percent for large and medium farms. These tend to offset each other or nearly so.

The net effect of the estimated market access costs and the adjusted market access costs are given in Table 4. It can be seen that the net effect of the adjustments is to reduce market access cost from the border to Nairobi but increase them slightly from the farm gate to Nairobi.

Table 4: Observed and Adjusted Access Costs for Rice in Kenya (Ksh/tonne)

	2005	2006	2007	2008	2009	2010
MILLED RICE						
Port costs	2,812	2,844	2,642	2,974	3,199	3,459
Transport	2,569	2,451	2,289	2,352	2,630	2,694
Border to Nairobi[1]	5,381	5,296	4,931	5,326	5,829	6,153
UNMILLED RICE						
Farm transport	750	750	750	750	750	750
Milling	2,000	2,000	2,000	2,000	2,000	2,000
Transport to Nairobi[1]	2,268	2,449	2,487	2,942	2,759	2,875
Farm Gate to Nairobi[1]	5,018	5,199	5,237	5,692	5,509	5,625
ADJUSTED COSTS						
Border to Nairobi	4,476	4,389	4,021	4,418	4,926	5,250
Farm Gate to Nairobi	5,058	5,242	5,281	5,744	5,558	5,676

[1] The transportation cost here is for the 0.625T of milled rice that would result from milling on tonne of paddy.

EXTERNALITIES

The reduced cost to the trucking industry is assumed to create an externality in terms of road maintenance and safety for other road-users. This, however, does not affect the results for access costs, as it does not affect observed costs and is eliminated in the adjusted costs estimate.

BUDGET AND OTHER TRANSFERS[14]

The Economic Stimulus Project reduced cost of inputs to rice farmers by 71.2 Ksh or 1571 Ksh/tonne in 2010. No subsidies appear to have been provided in other years.

QUALITY AND QUANTITY ADJUSTMENTS

It is assumed that 5 kilograms of milled rice can be made from 8 kilograms of unmilled rice (paddy). This ratio is ubiquitous in this context in Kenya though the actual conversion rate may vary considerably.

There is assumed to be no quality difference between imported rice and domestically produced rice.

[14] These are not used in the current study but are expected to be used in future to calculate Nominal Rates of Assistance.

DATA OVERVIEW

Following the discussion above, a summary of the main data sources and methodological decisions taken for this analysis of price incentives and disincentives is provided below.

Table 5: Sources of Data Used in the Calculation of Indicators

		Description	
Concept		***Observed***	***Adjusted***
Benchmark price		1. *Average unit value CIF price in Mombasa for rice imports (HS1006) from all countries. Prices were obtained from Global Trade Atlas for years 2006-2010.* 2. *The price for 2005 was calculated from KNBS 2010 Statistical Abstract data on quantity and value of rice import.*	*N.A.*
Domestic price at wholesale		3. *Based on the 2010 wholesale price reported by RATIN. This price was back cast to estimate the wholesale prices for the other years using the simple average of two constructed price indices – a Nairobi Parity Price Index (the average CIF price plus access costs) and a Retail Price Index (calculated using retail price data from the KNBS 2010 Statistical Abstract Table 2006).*	*N.A.*
Domestic price at farm gate		4. *Based on the 2010 farm gate price obtained from the MOA's report on their Economic Stimulus Project. This price was back cast to estimate the farm gate prices for the other years using the simple average of two constructed price indices – a Nairobi Parity Price Index (the average CIF price plus access costs) and a Retail Price Index (calculated using retail price data from the KNBS 2010 Statistical Abstract Table 2006).*	*N.A.*
Exchange rate		5. *Average nominal exchange rates reported by the IMF.*	*N.A.*
Access costs from wholesale to the border		6. *This is the sum of port charges in Mombasa and transportation costs from Mombasa to Nairobi. Port charges are based on communication with Grain Bulk Handlers Ltd. (GBHL) and other published estimates for maize and wheat, while transportation costs are based on a widely published estimate for maize (USD 34/T). Since maize and rice have similar densities, it was assumed that both products cost the same amount to transport per tonne.*	7. *Port charges were reduced by USD 9.5/T, which is consistent with the figures reported by the GBHL. Additionally, bribes and government fees were removed, and the effects of truck overloading on transport costs were adjusted based on information provided by the World Bank (2009b).*
Access costs from wholesale to farm gate		8. *This is the sum of transportation costs from the farm gate to the mill (Ksh 60/80 kg bag) and milling costs (Ksh 160/80 kg bag) obtained from Gitau et al. (2011), as well as transportation costs from the mill to the wholesale market, which are based on maize costs obtained from the World Bank (2009b). See the technical note on maize for details.*	9. *Bribes and government fees were removed, and the effects of truck overloading on transport costs were adjusted based on information provided by the World Bank (2009b).*
QT adjustment	Bor-Wh	*N.A.*	*N.A.*
	Wh-FG	10. *It was assumed that 5 kilograms of milled rice can be made from 8 kilograms of unmilled rice (paddy). This ratio is ubiquitous in this context in Kenya, though the actual conversion rate may vary considerably.*	*N.A.*
QL adjustment	Bor-Wh	*N.A.*	*N.A.*
	Wh-FG	*N.A.*	*N.A.*
	Wh-FG	*N.A.*	*N.A.*

The data used for this analysis is summarized below.

Table 6: Data and Values Used in the Calculation of Indicators

		Year	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*
		trade status	*m*	*m*	*m*	*m*	*m*	*m*
DATA	*Unit*	*Symbol*						
Benchmark Price								
Observed	USD/TONNE	$P_{b(int\$)}$	229.82	268.70	265.12	330.27	301.82	341.77
Adjusted	USD/TONNE	P_{ba}	229.82	268.70	265.12	330.27	301.82	341.77
Exchange Rate								
Observed	KSH/USD	ER_o	75.55	72.10	67.32	69.18	77.35	79.23
Adjusted	KSH/USD	ER_a	75.55	72.10	67.32	69.18	77.35	79.23
Access costs border - wholesale								
Observed	KSH/TONNE	AC_{owh}	5,380.54	5,295.81	4,930.63	5,325.85	5,828.83	6,152.60
Adjusted	KSH/TONNE	AC_{awh}	4,476.14	4,389.32	4,021.26	4,417.60	4,925.52	5,250.42
Domestic price at wholesale	KSH/TONNE	P_{dwh}	40,416.88	39,414.09	40,488.49	51,824.17	55,220.00	69,517.19
Access costs wholesale - farm gate								
Observed	KSH/TONNE	AC_{ofg}	5,018.17	5,198.68	5,236.67	5,692.26	5,509.46	5,624.67
Adjusted	KSH/TONNE	AC_{afg}	5,058.43	5,242.14	5,280.81	5,744.49	5,558.44	5,675.69
Farm gate price	KSH/TONNE	P_{dfg}	18,168.56	17,717.78	18,200.75	23,296.48	24,823.00	31,250.00
Externalities associated with production	KSH/TONNE	E						
Budget and other product related transfers	KSH/TONNE	BOT	-	-	-	-	-	942.60
Quantity conversion factor (border - point of competition)	Fraction	QT_{wh}	1.00	1.00	1.00	1.00	1.00	1.00
Quality conversion factor (border - point of competition)	Fraction	QL_{wh}	1.00	1.00	1.00	1.00	1.00	1.00
Quantity conversion factor (point of competition – farm gate)	Fraction	QT_{fg}	0.625	0.625	0.625	0.625	0.625	0.625
Quality conversion factor (point of competition – farm gate)	Fraction	QL_{fg}	1.00	1.00	1.00	1.00	1.00	1.00

CALCULATION OF INDICATORS

The indicators and methodology used in this analysis are described in Box 1. A detailed description of the calculations and data requirements is available on the MAFAP website or by clicking here.

Box 1: MAFAP POLICY INDICATORS

MAFAP uses four measures of market price incentives or disincentives. *First*, it uses two observed Nominal Rates of Protection (NRPs), one at the wholesale and one at the farm gate level. These compare the commodity's observed domestic prices to reference prices free from trade and domestic policy interventions.

Reference prices are calculated from a benchmark price, such as an import or export price, which is expressed in the country's local currency and brought to the wholesale and farm gate levels with adjustments for quality, quantity, market access costs, shrinkage and loss.

The ***Nominal Rate of Protection - observed (NRPo)*** is the price gap between the domestic market price and the reference price, divided by the reference price at both the farm gate and wholesale levels:

$$NRPo_{fg} = (P_{fg} - RPo_{fg})/RPo_{fg}; \quad NRPo_{wh} = (P_{wh} - RPo_{wh})/RPo_{wh};$$

The $NRPo_{fg}$ captures trade and domestic policies affecting incentives and disincentives for the farmer, while the $NRPo_{wh}$ helps identify where incentives and disincentives may be distributed along the commodity's marketing chain.

Second, MAFAP uses the ***Nominal Rate of Protection - adjusted (NRPa)*** at the wholesale and farm gate level, in which the reference prices are adjusted to eliminate excessive access costs and other distortions found in the commodity's marketing chain. The equations to estimate the adjusted rates of protection, however, follow the same general pattern:

$$NRPa_{fg} = (P_{fg} - RPa_{fg})/RPa_{fg}; \quad NRPa_{wh} = (P_{wh} - RPa_{wh})/RPa_{wh};$$

MAFAP also analyzes ***Market Development Gaps (MDGs)*** caused by market power, exchange rate misalignments, externalities and excessive access costs, which, when subtracted from the observed reference prices, generate the adjusted reference prices and NRPa indicators. A comparison of the different rates of protection identifies where market development gaps can be found and reduced in the marketing chain.

In this analysis, only nominal rates of protection were calculated. The NRA includes budgetary and other transfers. In the case of rice in Kenya, calculations of transfers that can be assigned to rice production will be calculated and incorporated in a revised version of this technical note. When transfers have been included, the Nominal Rate of Assistance will also be calculated.

Table 7: MAFAP Price Gaps for Rice in Kenya, 2005-2010 (Ksh/tonne)

	2005	2006	2007	2008	2009	2010
Trade status for the year	*m*	*m*	*m*	*m*	*m*	*m*
Observed price gap at wholesale[1]	17,673	14,745	17,711	23,652	26,045	36,285
Adjusted price gap at wholesale[1]	18,577	15,652	18,620	24,560	26,948	37,187
Observed price gap at farm gate[2]	8,972	7,498	9,201	11,381	12,098	16,105
Adjusted price gap at farm gate[2]	9,577	8,108	9,814	12,001	12,711	16,719

Note:[1]Milled rice. [2]Unmilled rice.

Source: Own calculations using data as described above.

Table 8: MAFAP Nominal Rates of Protection (NRP) for Rice in Kenya, 2005-2010 (%)

	2005	2006	2007	2008	2009	2010
Trade status for the year	*m*	*m*	*m*	*m*	*m*	*m*
Observed NRP at wholesale[1]	78%	60%	78%	84%	89%	109%
Adjusted NRP at wholesale[1]	85%	66%	85%	90%	95%	115%
Observed NRP at farm gate[2]	98%	73%	102%	96%	95%	106%
Adjusted NRP at farm gate[2]	111%	84%	117%	106%	105%	115%

Note:[1]Milled rice. [2]Unmilled rice.

Source: Own calculations using data as described above.

Table 9: MAFAP Market Development Gaps for Rice in Kenya, 2005-2010 (Ksh/tonne)

	2005	2006	2007	2008	2009	2010
Trade status for the year	*m*	*m*	*m*	*m*	*m*	*m*
International markets gap (IRG)	-	-	-	-	-	-
Exchange policy gap (ERPG)	-	-	-	-	-	-
Access costs gap to point of competition (ACG_{wh})[1]	904	906	909	908	903	902
Access costs gap to farm gate (ACG_{fg})[2]	-299	-296	-297	-288	-290	-287

Note:[1]Milled rice. [2]Unmilled rice.

Source: Own calculations using data as described above.

4. INTERPRETATION OF THE INDICATORS

Figures 5 and 6 show the results for the set of MAFAP indicators generated, which include price gaps, Nominal Rates of Protection (NRPs) and Market Development Gaps (MDGs) at wholesale and farm gate. Price gaps are market price differentials between the commodity's domestic and reference price in each respective year. More conceptually, they provide an absolute measure of price incentives or disincentives that rice producers face, while NRPs express this absolute measure as ratios that are comparable across countries and commodities. MDGs measure distortions in the marketing chain, such as the gap between observed and adjusted access costs, which affect price incentives and disincentives for rice producers and wholesalers, as well as the overall marketability and trade of rice in Kenya.

Figure 5 shows the price gaps at wholesale and farm level for rice in Kenya while Figure 6 shows the nominal rates of protection NRPs, which may be easier to interpret since they present the price gaps in relative terms.

The observed price gaps at wholesale level vary from nearly 15 000 Ksh/tonne in 2008 to over 36 000 Ksh/tonne in 2010 while the nominal rates of protection vary from 60 percent to 109 percent and average 83 percent.

The rate of protection at wholesale should generally be smaller than the tariff; in the absence of all other factors because of the reference price at wholesale is the sum of the benchmark price at the border and market access costs from the border to the wholesale market. (The tariff itself is of course levied on the benchmark price). The market access costs are about 20 percent of the reference price in Nairobi for rice in Kenya in this period. Thus a 75 percent tariff should result in an NRP of at least 60 percent at wholesale and it does this in all years and a 35 percent tariff should result in an NRP of at least 28 percent.

In fact the NRP is about 60 percent in 2006 and higher than that in all other years. Possibly the relatively low NRP in 2006 is because both production and imports were a bit higher than normal in that year. Higher than expected supply would presumably depress prices below expectations, reducing returns and NRPs in 2006.

The difference between the NRP and the average tariff could be interpreted as the average rate of return to the importer. These results seem to indicate very high rates of return (14 percent or more) in all years for rice importers. These might not be an unreasonable rate of return considering the financial risks associated with commodity trading. However, considerable caution is warranted in this interpretation because this is a residual estimator so it includes all errors in estimates of prices and market access costs.

As shown in Figure 5, the price gaps are quite a bit lower at the farm gate. This is mainly because the commodity at the farm gate is unmilled rice (paddy). Really the price gap would need to be grossed up by a factor of about 60 percent to make it comparable to the price gap at wholesale.

The effect of a tariff on nominal rates of protection at the farm gate should be higher than they are at wholesale for an ideal import competing industry because of the effect market costs between the

farm and wholesale. This is the case in Kenya for all years except 2010, as shown in Figure 6. The average NRP at the farm gate is 95 percent compared to 83 percent at wholesale.

The adjusted market access costs make only a small difference to the results. The largest change in market access costs is for clearance costs in the port. This would result in lower market access costs between the port and point of competition and lower the reference prices. Lower reference prices result in slightly higher price gaps and nominal rates of protection throughout the system.

Figure 5: Observed and Adjusted Price Gaps at Wholesale and Farm Gate for Rice in Kenya, 2005-2010 (Ksh/tonne)

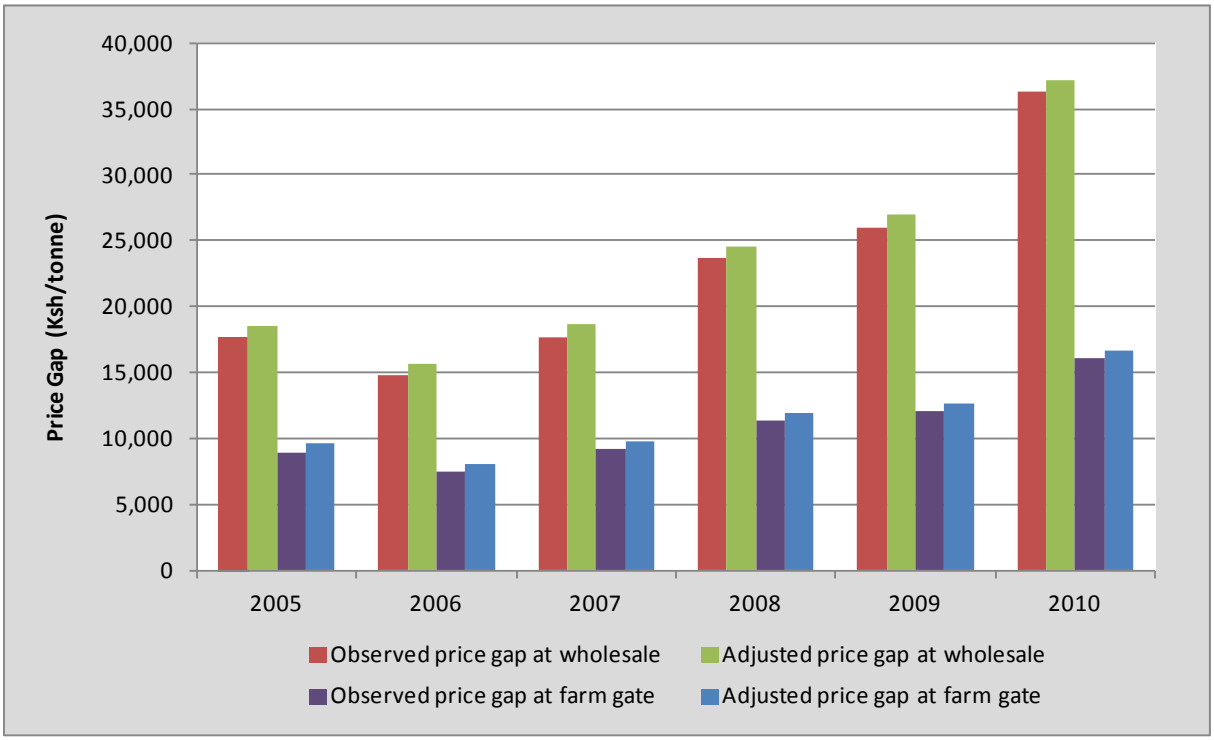
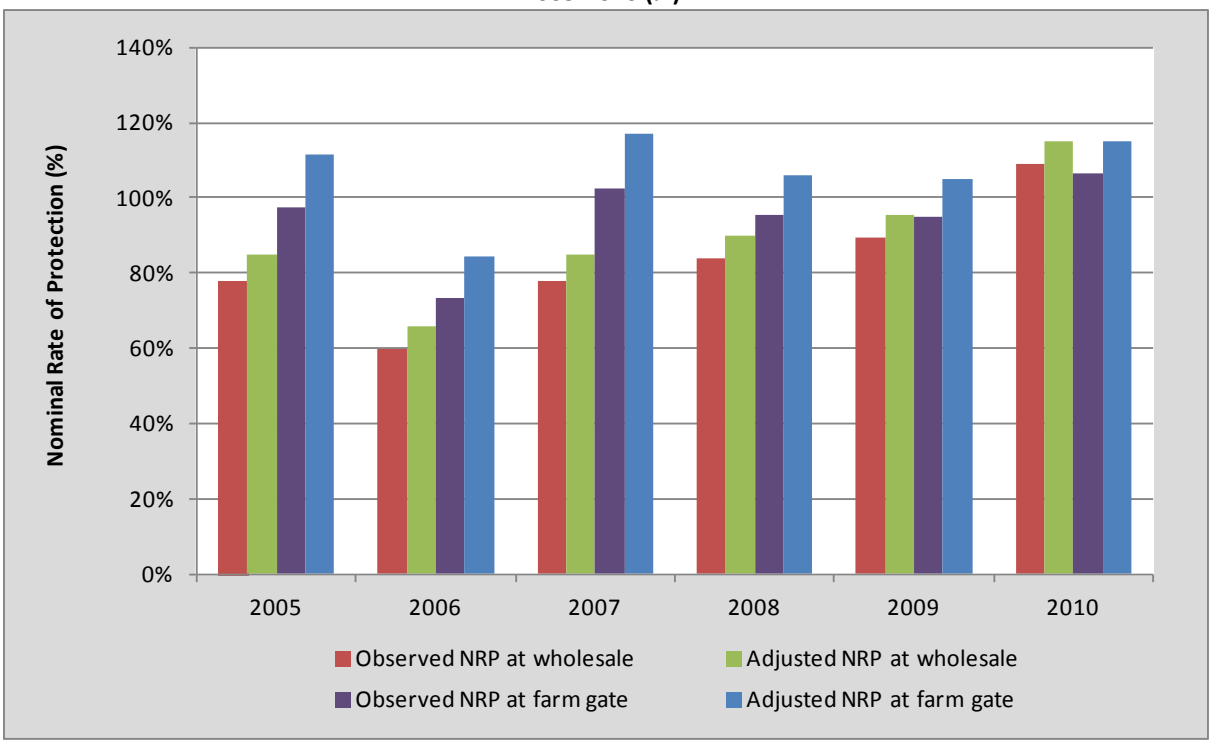


Figure 6: Observed and Adjusted Nominal Rates of Protection at Wholesale and Farm Gate for Rice in Kenya, 2005-2010 (%)



5. PRELIMINARY CONCLUSIONS AND RECOMMENDATIONS

MAIN MESSAGE

Despite the favourable treatment of rice from Pakistan, prices in the main rice value chain in Kenya appear to largely be determined throughout the period 2005-2010 by price of imported rice and the 75 percent tariff on rice for countries other than Pakistan.

The main effect of this trade policy regime is to raise prices for consumers and producers in Kenya. It seems likely that many of the consumers affected are urban with moderate or high incomes because low incomes Kenyans do not consume a lot of rice now.

Producers benefiting are relatively low income with a small land base of four acres (less than two hectares). It has only been successful in the past as an alternative to offer the unemployed and landless. As a social program, it might have been better than the alternatives available. But two hectares producing rice is not very much land and will be an increasingly unattractive alternative if development is successful elsewhere in Kenya.

More productive systems that make it possible for small-scale Kenyan farmers to expand and compete with imports without the large tariffs are needed. These could involve double cropping, or farming larger tracts, better varieties, etc.

The recent surge in commodity prices may be an additional justification for public investment in irrigation to produce rice and a large expansion has been proposed. There may be some element of scale and agglomeration economies that will make creating and operating more large-scale irrigation schemes successful. Nearly all rice production today takes place on about 10 000 ha in a contiguous area 50 km from Nairobi. There is specialization and competition among both upstream and downstream participants in the value chain

This “hope” contradicts conventional wisdom that irrigation in Kenya has only been successful financially on the Mwea scheme and smaller private sector operations. In contrast, rice production on the smaller NIB schemes is scattered in other regions without the same agglomeration economies and has typically required operational subsidies.

But additional food security is being bought at a price that is hidden price and could be very high. The smaller private sector farms are mostly used to produce horticultural products rather than rice. They have also been export oriented rather than an import that substitute. The relative success of Mwea is in large part based upon a high level of protection. It is possible that Mwea could be even more successful without a subsidy if it was producing horticultural commodities like he smaller private sector irrigated farms.

PRELIMINARY RECOMMENDATIONS

No rationale was presented in any of the material reviewed in this report for special treatment for rice from Pakistan. There is no obvious economic rationale and it would seem to provide an exceptional profit for imports from Pakistan.

It is not clear that increased rice will meet Kenya's growing need for staple foods if they are only available at relatively high prices to consumers. This might temper the growth in demand for rice and redirect it to maize, wheat and other staples. Consideration should be given to alternatives such as expanding EAC integration may provide a lower cost means of improving food security.

It is also not clear that rice production is the best use for irrigated land in Kenya. Alternative crop production systems such as fruit and vegetable production may offer a better return and should b investigated.

LIMITATIONS

The data used on production and prices in this study is very weak. The production data is not critical but better data on prices at farm gate and wholesale would provide greater confidence in results.

FURTHER INVESTIGATION AND RESEARCH

It would be useful to expand this study to the other rice value chains in Kenya.

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ANNEX I: Methodology used

A guide to the methodology used by MAFAP can be downloaded from the MAFAP website or by clicking here.

ANNEX II: Data and calculations used in the analysis

	Name of product		**Rice**										
	International currency		**US$**			**Local currency**		**Ksh**					
					Year	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*		*Notes*
	DATA		*Unit*	*Symbol*	*trade status*	*m*	*m*	*m*	*m*	*m*	*m*		
	Benchmark Price												
1		*Observed*	US$/TON	$P_{b(int\$)}$		**229.82**	**268.70**	**265.12**	**330.27**	**301.82**	**341.77**		GTA, SA for 2005
1b		*Adjusted*	US$/TON	P_{ba}		229.82	268.70	265.12	330.27	301.82	341.77		No adjustment
	Exchange Rate												
2		*Observed*	Ksh/TON	ER_o		75.55	72.10	67.32	69.18	77.35	79.23		Average of FAO monthly Erates
2b		*Adjusted*	Ksh/TON	ER_a		75.55	72.10	67.32	69.18	77.35	79.23		No overvalued Erates
	Access costs border - point of competition												
3		*Observed*	Ksh/TON	ACo_{wh}		5,380.54	5,295.81	4,930.63	5,325.85	5,828.83	6,152.60		=[(34+24)+.05375*P]*erate
3b		*Adjusted*	Ksh/TON	ACa_{wh}		4,476.14	4,389.32	4,021.26	4,417.60	4,925.52	5,250.42		= above less $9.50
4	**Domestic price at point of competition**		Ksh/TON	P_{dwh}		**40,416.88**	**39,414.09**	**40,488.49**	**51,824.17**	**55,220.00**	**69,517.19**		Rice- KNBS sheet row 119
	Access costs point of competition - farm gate												
5		*Observed*	Ksh/TON	ACo_{fg}		5,018.17	5,198.68	5,236.67	5,692.26	5,509.46	5,624.67		See MAC sheet
5b		*Adjusted*	Ksh/TON	ACa_{fg}		5,058.43	5,242.14	5,280.81	5,744.49	5,558.44	5,675.69		See MAC sheet
6	**Farm gate price**		Ksh/TON	P_{dfg}		**18,168.56**	**17,717.78**	**18,200.75**	**23,296.48**	**24,823.00**	**31,250.00**		Paddy- KNBS sheet row 118
7	Externalities associated with production		Ksh/TON	E									
8	Budget and other product related transfers		Ksh/TON	BOT		-	-	-	-	-	942.60		
	Quantity conversion factor (border - point of competition)		Fraction	QT_{wh}		1.000	1.000	1.000	1.000	1.000	1.000		
	Quality conversion factor (border - point of competition)		Fraction	QL_{wh}		1.000	1.000	1.000	1.000	1.000	1.000		
	Quantity conversion factor (point of competition - farm gate)		Fraction	QT_{fg}		0.625	0.625	0.625	0.625	0.625	0.625		
	Quality conversion factor (point of competition - farm gate)		Fraction	QL_{fg}		1.000	1.000	1.000	1.000	1.000	1.000		
	CALCULATED PRICES		*Unit*	*Symbol*		*2005*	*2006*	*2007*	*2008*	*2009*	*2010*		*Formula*
	Benchmark price in local currency												
9		*Observed*	Ksh/TON	$P_{b(loc\$)}$		17,364	19,373	17,847	22,847	23,346	27,080		[1]*[2]
10		*Adjusted*	Ksh/TON	$P_{b(loc\$)a}$		17,364	19,373	17,847	22,847	23,346	27,080		[1b]*[2b]
	Reference Price at point of competition												
11		*Observed*	Ksh/TON	RPo_{wh}		22,744	24,669	22,778	28,173	29,175	33,232		([9]*[QTwh]*[QLwh])+[3]
12		*Adjusted*	Ksh/TON	RPa_{wh}		21,840	23,762	21,868	27,264	28,272	32,330		([10]*[QTwh]*[QLwh])+[3b]
	Reference Price at Farm Gate												
13		*Observed*	Ksh/TON	RPo_{fg}		9,197	10,219	8,999	11,916	12,725	15,145		([11]*[QTfg]*[QLfg])-[5]
14		*Adjusted*	Ksh/TON	RPa_{fg}		8,591	9,609	8,387	11,296	12,112	14,531		([12]*[QTfg]*[QLfg])-[5b]
	INDICATORS		*Unit*	*Symbol*		*2005*	*2006*	*2007*	*2008*	*2009*	*2010*		*Formula*
	Price gap at point of competition												
15		*Observed*	Ksh/TON	PGo_{wh}		17,673	14,745	17,711	23,652	26,045	36,285		[4]-[11]
16		*Adjusted*	Ksh/TON	PGa_{wh}		18,577	15,652	18,620	24,560	26,948	37,187		[4]-[12]
	Price gap at farm gate												
17		*Observed*	Ksh/TON	PGo_{fg}		8,972	7,498	9,201	11,381	12,098	16,105		[6]-[13]
18		*Adjusted*	Ksh/TON	PGa_{fg}		9,577	8,108	9,814	12,001	12,711	16,719		[6]-[14]
	Nominal rate of protection at point of competition												
19		*Observed*	%	$NRPo_{wh}$		78%	60%	78%	84%	89%	109%		[15]/[11]
20		*Adjusted*	%	$NRPa_{wh}$		85%	66%	85%	90%	95%	115%		[16]/[12]
	Nominal rate of protection at farm gate												
21		*Observed*	%	$NRPo_{fg}$		98%	73%	102%	96%	95%	106%		[17]/[13]
22		*Adjusted*	%	$NRPa_{fg}$		111%	84%	117%	106%	105%	115%		[18]/[14]
	Nominal rate of assistance												
23		*Observed*	%	NRAo		98%	73%	102%	96%	95%	113%		([17]+[8])/[13]
24		*Adjusted*	%	NRAa		111%	84%	117%	106%	105%	122%		([18]+[8])/[14]
	Decomposition of PWAfg		*Unit*	*Symbol*		*2005*	*2006*	*2007*	*2008*	*2009*	*2010*		*Formula*
25	International markets gap		Ksh/TON	IRG		0	0	0	0	0	0		([1]-[1b])*([2]+[2b]/2)*QTwh*QLwh
26	Exchange policy gap		Ksh/TON	ERPG		0	0	0	0	0	0		([2]-[2b])*(([1]+[1b])/2)*QTwh*QLwh
27	Access costs gap to point of competition		Ksh/TON	ACG_{wh}		904	906	909	908	903	902		[3]-[3b]
28	Access costs gap to farm gate		Ksh/TON	ACG_{fg}		-299	-296	-297	-288	-290	-287		[5b]-[5]+(([12]-[11])*(1-(QTfg*QLfg)))
29	Externality gap		Ksh/TON	EG		0	0	0	0	0	0		-

ANNEX III: Estimate of rice production and prices in Kenya

This annex describes some confusion about how much milled and unmilled rice is produced in Kenya and the related question of the price of each.

This report relies on the NIB estimates for unmilled rice production on its schemes (on which the analysis is based) and MOA estimates for total milled rice production (although the MOA data has some consistency issues). These are converted for comparison purposes at the rate of 5 units of milled rice per 8 units of unmilled rice. Unmilled production and is normally reported in terms of 80 kg bags in Kenya while milled rice is denominated in terms of 5 0kg bags. Thus a report of production of 112 bags would indicate both 112 bags of unmillied rice at 80 kg/bags were produced and that 112 bags of milled rice weighing 50 kg each were produced).

The NIB also produces estimates of the value of production which together with its production estimates could be used to calculate an average price of unmilled rice. However the resulting unmilled price is unreasonably high so an alternative estimate of the farm gate price of unmilled rice is used in this report.

PRODUCTION

KNBS reports rice production for sale in Statistical Abstract 2010 Table 60 and Economic Survey 2011 Table 8.11. (See Table 10 of this annex for a summary of production estimates). Production in these KNBS tables is quite a bit lower than production on the NIB rice schemes reported by crop year in the same publications. (NIB rice scheme production is assumed here to be production of unmilled rice (see Table 11 of this annex for details on the rice schemes). Presumably, production for sale is an estimate of milled rice production based upon sales to medium and large scale wholesalers and the difference between this figure and estimates of milled rice production by the Ministry of Agriculture (MOA) is rice retained for subsistence consumption and local sales.

The MOA provides estimates of rice production in its Economic Review of Agriculture 2010 attributing them to its Directorate of Crop and the NCPB. These same estimates are the ones the MOA give in the COUNTRYSTAT database on their web site. These might be expected to be higher than the level of production on the main rice schemes if they included production from non-scheme small scale irrigated production and rain-fed production. They are in fact substantially higher in 2005-07 and 2009, but lower in 2008 and 2010.

FAOSTAT seems to have opted for a mix and match approach in its estimate of unmilled rice production. It uses the 2004/05 KNBS/NIB estimate from the schemes for 2005 (i.e. unmilled rice), the MOA ERA 2010 estimates for 2006-09 (i.e. milled rice) and another exceptionally high estimate of its own for 2010). In FAO Rice Market Monitor Vol. XIV (3), July 2011 it again seems to mix milled rice and unmilled rice.

Table 10: Different estimates for Rice Production in Kenya, 2005-2010 (tonnes)

	2005	2006	2007	2008	2009	2010
MILLED RICE						
KNBS: "paddy rice" production for sale	34,700	38,300	32,300	24,300	22,600	44,000
MOA: ERA 2010	57,942	64,840	47,256	21,881	42,202	
MOA CountryStat Database	57,942	64,840	47,256	21,881	42,202	44,468
MOA: Rice strategy 2008 -30	57,942	64,840	47,256	73,141		
PADDY (ROUGH) RICE						
MOA: ERA 2010*	92,706	103,745	75,609	35,010	67,523	
MOA CountryStat Database*	92,707	103,744	75,610	35,010	67,523	71,149
MOA: Rice strategy 2008 -30*	92,707	103,744	75,610	117,026		
FAOSTAT: Paddy Production	62,677	64,840	47,256	21,881	42,202	80,042
	2004/5	**2005/6**	**2006/7**	**2007/8**	**2008/9**	**2009/10**
KNBS / NIB: Production on all schemes						
Milled rice	39,173	39,366	33,196	25,041	23,249	45,313
Paddy (rough) rice	62,677	62,986	53,113	40,065	37,198	72,500
Non-scheme milled rice*	18,769	25,474	14,060	-3,160	18,953	-845
Non-scheme milled rice share*	32%	39%	30%	-14%	45%	-2%

Source: Author's own calculations.

They MOA estimates of production are repeated for 2005-2007 in the MOA National Rice Development Strategy 2008-2030 but a drastically different estimate is given for 2008. Total production in 2008 is estimated at 73 141 tonnes instead of 21 881 tonnes reported in the Economic Review of Agriculture 2010. The total is made up of 16 628 tonnes from rain-fed production and 58 513 tonnes from irrigated production. The latter is higher than amount reported by KNBS/NIB for the main irrigation schemes both for 2007-08 and for 2008-09.

Production from the smaller schemes and private sector irrigation would need to be about 19 000 tonnes to account for the difference. Chemonics also includes an estimate of production in 2008 from Kenya's only large scale rice farm. This is not shown because it seems wildly high (see Box 1 for a description of the large scale farm).

Box 1: Dominion farms Limited (DFL)

Dominion Farms Limited is an American-owned, Kenyan-registered company that has been producing rice since 2006 on its large-scale farm in western Kenya. DFL negotiated a 45 year lease for 17 000 acres (6 900 ha) of the 17 700 hectare Yala Swamp in 2004. (This area is equivalent to nearly 60 percent of the average area on all NIB rice schemes in Kenya over the period 2004-2010). Besides rice, the farm produces tilapia, rotation crops and by-products. It is vertically integrated, with its own milling and processing plant and selling its rice and Tilapia under its own Prime Harvest brand.

According to Siegenbeek van Heukelom, the Kenya government had wanted to transform parts of the Yala Swamp into agricultural land for food production since the early 1970s and some small-scale development of part of the swamp was undertaken in the 1980s and 1990s by the Lake Basin Development Authority (LBDA). However, in 2003 the LBDA together with the Siaya and Bondo Distrct Councils agreed to DFL CEO, Calvin Burgess's proposal to establish his farm in the Yala Swamp.

DFL is the only large scale rice farm in Kenya so there are no agglomeration economies at all and Burgess has little experience in agriculture. His US businesses are construction and real estate management. But he is not a typical profit motivated investor: his "mission is about bringing the people of Kenya out of … poverty by helping to build their economy by producing and distributing as much rice as possible and by demonstrating a reproducible agricultural model". Starting a new business in a new country in a new sector like agriculture is extremely difficult.

The farm initially seemed to be well-received with favourable stories in the media and was lauded by Members of Parliament. By 2008, about 300 ha producing rice (Chemonics Ltd0 and this expanded to perhaps three times that area by 2010. But in 2009, Bloomberg Business Week was highly critical of DFL in an article about how "agribusiness and global investors are scooping up farmland. Are corporate farmers the new colonialists?" Then a documentary that aired on the American PBS Network described how "efforts to alleviate poverty in Africa may be undermining the very communities they aim to benefit".

All of this makes doing business in Africa and making DFL successful all the more difficult. Most recently Burgess was chased by an angry "panga-wielding" mob possibly incited by local councilor and had to ask for police protection.

The agricultural commodity price spike in 2007-2008 gave a new impetus to foreign investment in agriculture in Africa, especially by sovereign investors seeking to secure their own food supplies. This is not DFL but its success or lack of it will make a difference to future rice production in Kenya.

Emongór et al found big differences for average yield and price in their survey of 79 producers according to production system: producers in an irrigated production system had yields of 44 bags/ha that sold at a price Ksh 4500/bag; those using a rain-fed lowland system had yields of 30 bags/ha that sold at Ksh 2 500/bag. The yield differences are easy to understand but the price differences less so. It might have to do with rice variety (Kenyans prefer aromatic long-grain basmati rice grown on the government irrigation schemes) or it might be that lowland producers are further from rice millers and the rest of the value chain and so face much higher market access cost.

NIB IRRIGATION SCHEMES

The confusion over price has to do with the "gross value of output" reported by the NIB and published by KNBS in its annual flagship publications the *Statistical Abstract* and the *Economic Survey*. The abridged *Economic Survey* version is reproduced below in Table 11. The NIB gives aggregates the aggregates in Table 11 for area, number of plot-holders, etc. while the implied per unit values have been added.

The difference between gross value of output and payments to plot-holders amounts to about Ksh 60 000/ha in all years. Gitau et al cite the 2009 Mwea development guide to the effect that plot-holders are charged Ksh 25 000/acre as rent. It is assumed therefore that the difference between gross value of output and payments to plot-holders is rent.

PRICES

KNBS reports prices paid to producers for "rice paddy" in the Statistical Abstract Table 61 in Ksh/100 kg (not "paddy rice.") (see Table 12). This particular label is indicative of vagueness in about what is being reported with regard to rice. It's a price per 100 kg but is it 100 kg of paddy (unmilled rice) or 100 kg of (milled) rice? It assumed to be the former here.

The Ministry of Agriculture reports an estimate of the price of milled rice in its Economic Review of Agriculture 2010. It reports another estimate in its COUNTRYSTAT database but this only goes up to 2005 and it is considerably lower than the estimate in ERS 2010. The ERS 2010 estimates are describe the MOA Crops Directorate and the NCPB are cited as the source so it may somehow combine information from District Officers and the NCPB. Since they are so high, it seems likely that they are wholesale prices while the extremely low COUNTRYSTAT price may be a farm level price of paddy (unmilled rice).

Another estimate of the price of paddy in 2010 can be calculated from the MOA's report, "Economic Stimulus Package Progress Report at December 2010". An advantage of this estimate is that it is clearly a farm-level price estimated based on substantial quantity of production.

Table 11: Rice Production, Area and Value on Government Irrigation schemes

	Units	2004/5	2005/6	2006/7	2007/8	2008/9	2009/10
Mwea							
Area[1]	ha	10,000	10,332	8,325	7,806	7,431	10,526
Plot-holders Number[1]			5,400	7,267	7,257	4,936	7,178
Production[1]	t	58,520	57,422	51,458	38,560	32,406	52,000
Gross Value of Output[1]	mKsh	1,786	1,775	1,544	2,121	1,782	2,860
Payments to Plot-holders[1]	mKsh	1,066	1,009	919	1,450	1,341	2,080
Yield[2]	T/ha	5.9	5.6	6.2	4.9	4.4	4.9
Gross Value of Output[2]	Ksh/t	30,519	30,911	30,005	55,005	54,990	55,000
Payments to Plot-holders[2]	Ksh/t	18,216	17,572	17,859	37,604	41,381	40,000
Retained[2]	Ksh/t	12,303	13,340	12,146	17,401	13,609	15,000
Other Schemes							
Area[1]	Ha	832	2,169	1,301	1,286	2,641	7,085
Plot-holders Number[1]		1,260	1,929	1,499	1,459	3,995	8,340
Production[1]	t	4,157	5,564	1,655	1,505	4,792	20,500
Gross Value of Output[1]	mKsh	94	262	60	39	315	1,478
Payments to Plot-holders[1]	mKsh	49	122	22	7	194	1,058
Yield[2]	t/ha	5.0	2.6	1.3	1.2	1.8	2.9
Gross Value of Output[2]	Ksh/t	22,612	47,088	36,254	25,914	65,735	72,098
Payments to Plot-holders[2]	Ksh/t	11,787	21,927	13,293	4,651	40,484	51,610
Retained[2]	Ksh/t	10,825	25,162	22,961	21,262	25,250	20,488
All Schemes							
Area[1]	Ha	10,832	12,501	9,626	9,092	10,072	17,611
Plot-holders Number[1]		6,660	7,329	8,766	8,716	8,931	15,518
Production[1]	t	62,677	62,986	53,113	40,065	37,198	72,500
Gross Value of Output[1]	mKsh	1,880	2,037	1,604	2,160	2,097	4,338
Payments to Plot-holders[1]	mKsh	1,115	1,131	941	1,457	1,535	3,138
Yield[2]	t/ha	5.8	5.0	5.5	4.4	3.7	4.1
Gross Value of Output[2]	Ksh/t	29,995	32,341	30,200	53,912	56,374	59,834
Payments to Plot-holders[2]	Ksh/t	17,790	17,956	17,717	36,366	41,266	43,283
Retained[2]	Ksh/t	12,205	14,384	12,483	17,546	15,108	16,552

Source: [1]NIB as reported in SA Table 67, ES Table 8.18; [2]Author's own calculation.

RATIN also began collecting monthly wholesale prices of rice in Nairobi and other cities in May 2010, so this too can be used for comparison purposes.

All of these are reported in Table 12 below expressed in common units both as a rice price and a price for an equivalent amount of paddy. An estimate of the Nairobi wholesale parity price is included and the retail price of a one kg package expressed in equivalent are included as a basis for comparison.

Table 12: Different Price Estimates for Milled Rice and an Equivalent Amount of Paddy (Ksh/tonne)

	2005	2006	2007	2008	2009	2010
PADDY (unmilled rice)						
NIB schemes	29,995	32,341	30,200	53,912	56,374	59,834
MOA ESP Progress Report						31,250
MOA Country Stat	16,250					
RICE (milled rice)						
NIB schemes	49,992	53,901	50,333	89,854	93,957	99,724
MOA ESP Progress Report						50,000
MOA ERA 2010	68,000	70,000	53,000	54,900		
RATIN Nairobi wholesale						69,517
Nairobi Parity	30,385	30,843	31,887	35,435	37,054	52,412
Retail price	45,180	44,310	45,970	66,820	72,420	83,990

The issue though is that using the NIB gross value of output to calculate a farm gate price gives a price for the equivalent amount of rice that is unrealistically high. It is far higher that the parity price of imported rice landed in Nairobi. It is even higher than the price of equivalent amount of rice sold in 1 kg packages in retail stores. It is not clear what the gross value of output is supposed to capture but it is not the gross value of rice output on the schemes.

One possibility is that the NIB price is for Basmati rice which sells at about twice the price of other rice. It is clear from the price premium. This premium price attaches to high quality Basmati, 1 percent broken or less with uniform colour. Most high quality Basmati is produced in Pakistan and India. Although Kenya meets most of its rice requirements with rice from Pakistan, the import price is that of ordinary long grain rice not Basmati. It is possible still that Kenya is servicing only high end-market from its domestic production. But it seems more likely that high priced Basmati is actually a small part of the crop produced as it is in India and Pakistan and most rice sells as ordinary long grain rice.

No documentation has been found at this time explaining how the NIB determines the gross value of production.

Even the MOA ERA prices are improbably high as wholesale prices. These too are far higher than Nairobi import parity prices and even the price of equivalent amount of rice sold in 1 kg packages in retail stores.

In contrast both the RATIN wholesale price and the MOA ESP price do seem consistent with each other and with the import parity and retail prices. Unfortunately, both are only available for 2010. Consequently, an artificial series is constructed by using an index of the retail and import parity prices to create a plausible set of farm-level and wholesale prices for 2005-2009.

ANNEX IV: Market access costs for wheat

Table 13: Port Costs for Wheat Imports in 1999

Item	Argentina Ksh/t	USA Ksh/t	Australia Ksh/t	Argentina USD/t	USA USD/t	Australia USD/t
C&F Mombasa	9,772	10,334	11,459	138.95	146.95	162.94
Tariff	3,896	3,896	3,896	55.40	55.40	55.40
Port Costs	2,501	2,531	2,591	35.56	35.99	36.85
Landed into store Mombasa	16,169	16,761	17,947	229.91	238.34	255.19
Road haulage to Nairobi	2,261	2,261	2,261	32.16	32.16	32.16
Landed Nairobi	18,430	19,023	20,208	262.07	270.50	287.35
Proportional to C&F	5.375%	5.375%	5.375%	5.375%	5.375%	5.375%
Fixed Port Costs	1,976	1,976	1,976	28.09	28.09	28.09
Unavoidable Fixed Port Costs	201	201	201	2.85	2.85	2.85
Avoidable Fixed Port Costs	1,775	1,775	1,775	25.24	25.24	25.24

Source: Hezron Nyangito, Moses M Ikiara, Eric E. Ronge, "Performance of Kenya's Wheat Industry and Prospects or Regional Trade in Wheat Products, KIPPRA Discussion Paper No. 17, November 2002

Table 14: Estimates of Margins in Major Portions of Grain Supply Chains

Source		USD/t	Ksh/t
Port Charges			
Agriculture import surges study	Apr 2000	39.93	2,991
Nyoro Kiiru & Jayne	May 2001	27.86	1,950
Nyoro, Kirimi & Jayne	2003	35.63	2,672
Kirimi: Trends in …	Jul 2009	37.62	2,927
Kirimi: Trends in …	Jul 2009	34.12	2,654
Transport Mombasa to Nairobi			
Nyangito, Ikiara and Ronge	1999	32.16	2,261
Chemonics Inc.	2010		
Agriculture import suges study	Apr 2000	32.50	2,434
Nyoro Kiiru & Jayne	May 2001	47.62	3,333
Nyoro, Kirimi & Jayne	2003	32.50	2,438
RATIN in Ke MOA	Feb 2009	33.00	2,625
Kirimi: Trends in …	Jul 2009	33.56	2,611
RATIN web site	Aug 2011	33.00	3,062
Transport Surplus Area to Nairobi			
Kitali: Nyoro, Kirimi & Jayne	2003	33.33	2,500
Kitali: Nyoro	2001	42.54	3,342
Eldoret: Nyoro	2001	36.03	2,831

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