ECONOMIC ANALYSIS OF EFFECTS OF GOVERNMENT INTERVENTION ON PRODUCTION, MARKETING AND CONSUMPTION OF RICE IN TANZANIA

BY

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ABSTRACT

In this study, policies affecting production, marketing and consumption of rice in Tanzania are reviewed. Distortionary and welfare effects of government intervention are empirically estimated.

Partial equilibrium analysis involving Policy Analysis Matrix (PAM) and partial equilibrium model is used. The PAM (through Nominal Protection Coefficient (NPC), Effective Protection Coefficient (EPC) and Domestic Resource Cost (DRC)) is used to estimate distortionary effects of government intervention in small and large scale rice production systems, while partial equilibrium model is used to estimate welfare effects of government intervention. Correction for overvaluation of currency is also carried out. Primary data from the survey village of Madaganya in Morogoro district and secondary data from Dakawa Rice Farm, Ministry of Agriculture and Livestock Development and its institutions, Bank of Tanzania and Bureau of Statistics form the basis of analyses.

The results indicate that the official marketing system is inefficient and incurs large financial losses which are not borne by the parastatals but directly by the producers (through reduced prices) and partly by the general public through subsidies to the marketing institutions and consumer prices. Net NPCs and EPCs for both production systems are less than one. From the net NPC

and EPC values, small holder producers experience a net tax of 20% while that of large scale producers is between 63-80% implying that taxation is a major disincentive for greater rice output. Net DRC for both production system is less than one (ie. 0.15 each) indicating that rice production is efficient and socially profitable and in the absence of distortion, production would generate more than enough value added to renumerate factors of production at their opportunity cost. The economy incurs large welfare losses due to misallocation of resources. Producers incur large welfare losses (Tsh $6,578 \times 10^3$) while consumers incur large welfare gain (Tsh $17,283.27 \times 10^3$). Government suffers losses of revenue (Tsh $12,377.15 \times 10^3$) and foreign exchange (Tsh 8769.76×10^3) as a result of distortion. The implication is that quantity of rice produced domestically declines while amount consumed locally increases. These results are based on partial equilibrium analysis which captures only partial effects. Distortions of the size discussed here would have a repercussion in other sectors of the economy as well. The general equilibrium analysis would have larger estimates than those given here.

Some policies to improve marketing efficiency, to raise farm level prices and increase output are recommended.

DECLARATION

I, OMBAELI OBADIAH NG'UNDA LEMWELI, do hereby declare to the Senate of Sokoine University of Agriculture that this thesis has not been submitted for a degree award to any other University and that it is my own original work.

Signature:.....

DATE: 15-07-1992

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DEDICATION

Dedicated to the POOR PEASANTS OF THIS COUNTRY (TANZANIA).

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1.0 INTRODUCTION

1.1 Basic Data

Tanzania covers an area of about 945,000 km^2 and is divided into 25 administrative regions. It is situated in the East coast of Africa and lies between 1^0 and 11^0 south of the equator. It borders Kenya and Uganda in the north; Zaire, Rwanda and Burundi in the west; and Zambia, Malawi and Mozambique in the south. The Mainland has a coastline of some 804 km along the Indian ocean. The ocean embraces the Islands of Zanzibar. The islands occupy an area of 2,332 km^2 and are separated from the mainland by a channel of 40 km width at its narrowest point (Fig. 1.1).

The country's population is estimated at 23.17 million (22.53 and 0.64 million for mainland and Zanzibar respectively). The respective population growth rates are 2.8 and 3.0 percent per year (Population Census 1988). About 85% of the population lives in the rural areas with predominantly large households with average size of 5.3 and 4.7 for Mainland and Zanzibar respectively. The size of labour force is currently estimated at around 9 million, or 44 percent of the total population out of which 700,000, are registered employees (National Investment Promotion Policy 1990).

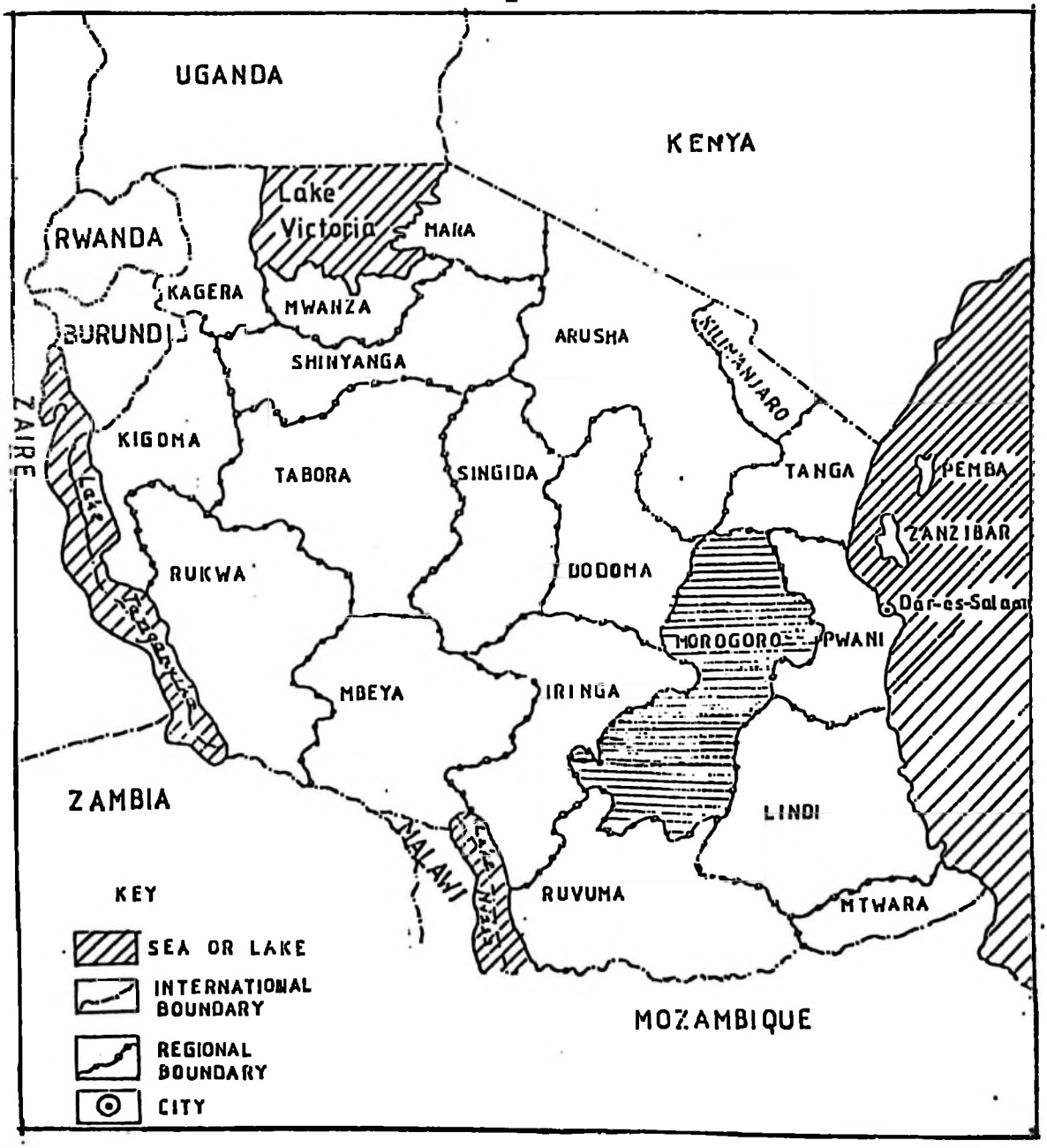


Fig. 1.1 Map:Tanzania and its Regions.

1.2 The Agricultural Sector in General

The economy of Tanzania is characterized by two distinct economic features, consisting of a large traditional rural sector and a small but key, commercialized urban sector. The former is involved in the production of food and cash crops, while the latter is concerned mainly with manufacturing, trade and service activities.

Agriculture is central to the economy of Tanzania and will continue to be so for the foreseeable future. Agriculture not only provides a livelihood for about 85% of the population but also contributes about 50% of the Domestic Gross Product (GDP) and approximately about 80% of the total export earnings (URT 1987). It provides raw material for the expanding industrial sector and in turn, agricultural producers are an important market for the industrial goods. Small holder farmers account for the bulk of agricultural output. Large scale commercial agriculture (mainly parastatal farms) is important in the case of sisal, wheat and tea.

1.3 The Food Sector

According to National Agricultural Policy (1983), food crops in Tanzania are classified under four major categories: preferred staples (maize, rice and wheat), drought staples (sorghum, bulrush millet, finger millet and

cassava), pulses (beans, pigeon peas and dolich beans) and oil seeds (sunflower, groundnut, sesame and copra). Maize, rice and wheat form the most important cereal crops and are the dietary mainstay of the majority of people in the country (MDB 1988).

The food balance sheet of 1987 for Mainland Tanzania shows that cereal consumption is about 2896.7 thousand tons per annum. On per capita basis this is about 132.15 kg or equivalent to 1277 calories per annum. It is estimated that maize contributes 78.8% of total calorie intake while rice and wheat contribute 16.6% and 3.2% respectively (Food Strategy Unit 1989).

Table 1.1 shows the estimated production of these major staples in the past 20 years. The 1988/89 production season was the fourth consecutive season with estimated maize production above 2 million tons and a record harvest of paddy estimated at 718,000 tons. Wheat production fell from 72,000 tons in 1986/87 to an estimated 67,000 tons in 1987/88, but increased to 97,000 tons in 1988/89.

Despite the importance of the sector, its rate of growth is very low. In the last decade, the annual growth rate of food production was estimated at 3.0 percent (World Bank 1985) which was below the annual 3.3 percent population growth rate. During that period the country experienced intermittent food shortages which had to be met by food imports (Amani, et al. 1987).

Table 1.1. Tanzania: Production of preferred staples, 1970/71 to 1988/89 ('000 tons)

Year	Maize	Paddy	Wheat	Total	% From Total. Maize	Paddy	Wheat
1969/70	488.0	132.0	41.0	661.0	73.8	20.0	6.2
1970/71	710.0	171.0	57.0	947.0	75.9	18.1	6.0
1971/72	621.0	187.0	60.0	868.0	71.5	21.5	6.9
1972/73	667.0	301.0	88.0	1276.0	69.5	23.6	6.9
1973/74	761.0	223.0	85.0	1069.0	71.2	20.9	8.0
1974/75	1367.0	265.0	82.0	1714.0	79.8	15.5	4.8
1975/76	1449.0	346.0	69.0	1864.0	77.7	18.6	3.7
1976/77	1664.0	314.0	64.0	2042.0	81.5	15.4	3.1
1977/78	1465.0	387.0	55.0	1907.0	76.8	20.3	2.9
1978/79	1720.0	262.0	70.0	2052.0	83.8	12.8	3.4
1979/80	1726.0	291.0	87.0	2104.0	82.0	13.8	4.1
1980/81	1839.0	200.0	90.0	2129.0	86.4	9.4	4.2
1981/82	1654.0	326.0	95.0	2069.0	79.9	15.5	4.6
1982/83	1651.0	350.0	58.0	2059.0	80.2	17.0	2.8
1983/84	1939.0	356.0	74.0	2369.0	81.8	15.0	3.1
1984/85	2093.0	427.0	83.0	2603.0	80.4	16.4	3.2
1985/86	2211.0	547.0	72.0	2830.0	78.1	19.3	2.5
1986/87	2359.0	644.0	72.0	3075.0	76.7	20.9	2.3
1987/88*	2339.0	615.0	67.0	3025.0	77.1	20.7	2.2
1988/89*	3126.0	718.0	97.0	3941.0	77.3	18.2	2.5
	Average (%)				78.2	17.6	4.2

Source: MDB, (1988)
(*) From Food Security Bulletin (June, 1989).
Percentage computed from above.

Earlier observations (Msambichaka and Semboja 1982) indicated that though the country has during certain years experienced surplus production of maize, it has remained permanently, the net importer of rice and wheat.

While the precarious weather has contributed to the unsatisfactory food situation in the country, pricing and marketing polices adopted have been identified as some of the main causes for the declining food and cash crops

production performance (Keeler, et al 1982; Shayo, Mlay and Temu 1988). Other contributing factors include low investment, deteriorating transport and marketing infrastructure (Biseko 1990). Although Tanzanian farmers respond enterprisingly and rationally to incentives, the agricultural terms of trade have been unfavourable to them (Temu 1977; Bryceson 1982 and Ashimogo I988). Peasant farming is characterized by low area under cultivation, low level of technological inputs, use of manual labour and hand tools and lack of adequate farming capital. These deficiencies caused the marketed food surplus to decrease tremendously in the last decade.

1.4 The Rice Industry

1.4.1 Rice production in Tanzania

Rice is produced in Tanzania primarily by small scale farmers and the National Agricultural and Food Corporation (NAFCO), a large state parastatal. NAFCO produces rice on large scale irrigated farms (mainly Ruvu, Dakawa, Mbarali and Madibira) whilst most small farmers produce upland rice, or if irrigated, they rely primarily on small traditional irrigation schemes or rainfed flooded plains.

Rice is grown widely throughout Tanzania. Table 1.2 shows the area under rice and rice production regionally for the period 1985/86 to 1988/89. Generally, regions with large areas under production are also regions with higher

Table 1.2. Tanzania: Area under rice and rice production regionally, 1985/86 to 1988/89

Region	'000 Hectare 85/86	86/87	87/88	(1) 88/89	'000 Tons 85/86	86/87	87/88	(2) 88/89
Arusha	2.00	3.00	3.67	1.3	3.0	5.3	8.7	4.8
Coast/Dar	23.0	26.00	19.25	23.7	28.0	39.0	32.8	6.2
Dodoma	0.0	0.36	7.93	0.4	0.0	1.6	0.5	0.5
Iringa	1.0	3.10	0.67	0.8	2.0	4.0	1.0	1.3
Kagera	1.0	1.98	3.04	3.4	1.0	5.8	4.6	5.1
Kigoma	2.0	0.82	2.21	6.9	1.0	1.2	0.7	2.2
K'manjaro	4.0	4.27	4.48	3.8	5.0	16.0	11.5	15.2
Lindi	16.0	19.70	5.96	10.5	20.0	24.1	3.5	11.5
Mara	3.0	1.60	4.13	1.5	3.0	0.8	1.7	2.4
Mbeya	23.0	33.60	37.36	32.5	37.0	59.1	45.3	65.3
Morogoro	76.0	49.10	57.58	64.0	149.0	121.6	79.8	101.0
Mtwara	19.0	27.30	25.29	27.5	26.0	21.1	29.2	44.5
Mwanza	37.0	45.30	49.13	61.5	86.0	107.5	181.1	141.3
Rukwa	9.0	4.01	7.10	15.2	13.0	9.1	12.6	34.0
Ruvuma	19.0	23.30	21.94	24.6	33.0	42.2	35.9	33.4
Shinyanga	43.0	55.50	48.37	79.5	81.0	130.7	103.4	185.7
Singida	4.0	2.40	0.57	1.4	4.0	1.7	0.9	0.9
Tabora	25.0	28.00	34.79	37.2	38.0	39.8	56.4	49.9
Tanga	9.0	9.06	3.22	6.7	17.0	13.6	5.1	13.2
Total	316.0	339.00	336.72	402.4	547.0	644.0	614.7	718.4

Sources: 1. Food Strategy Unit (1989: table 3 and 5).
2. (1) and (2) are from Food Security Bulletin (June, 1989).

levels of production. Major rice growing regions include, Morogoro, Shinyanga, Mwanza, Mbeya and Tabora. The area developed for irrigated rice production on the NAFCO farms is estimated at 5,976 ha. In 1987/88 season, NAFCO produced 15,446 tons on 4,558 ha with an average yield of 3.4 tons per ha. Potential production on the farms has been put at 36,750 tons per annum from 6,125 ha (Food Strategy Unit 1989).

1.4.2 Rice marketing and availability

Prior to the re-introduction of cooperatives, official marketing of food crops was through a two-tier single marketing channel. Village cooperatives acted as agents of the National Milling Corporation (NMC) in purchasing surplus food crops from farmers. With the re-introduction of cooperatives in 1984, a three-tier single marketing channel was introduced. Primary cooperative societies purchase surplus food from farmers and this is sold to cooperative unions. NMC remains the sole buyer of surplus produce from all cooperative unions and from commercial farms (mainly NAFCO farms). Essentially, its functions include, buying and selling of food domestically as well as import and export of food grains. Regional Trading Companies (RTCs) and cooperative unions operate exclusively in the domestic market. However, the flow of rice through the official market was relatively restricted due to hierachical nature which allowed for delay in grain delivery to storage or for deficit areas.

As from 1989/90 marketing season, the food marketing system has been relaxed further following the structural adjustment to the food distribution system. Under this, NMC can by-pass the cooperative unions and obtain their requirements from primary societies and even directly from farmers where possible. In addition private traders can

legally purchase directly from cooperative societies and farmers. Cooperative unions can sell directly to consumers in addition to NMC and other institutions (MDB 1989).

The NMC and RTCs carter mainly to a small portion of the urban population while the remaining portion and most of the rural areas are served by the parallel market. Due to limited supplies, the official the official markets are unable to meet the demand for the urban population. The parallel market therefore, plays an important role in servicing both the urban and rural consumers (Keeler, et al. 1982).

Table 1.3 shows the disposition of marketed surplus for rice, between 1971-1987. The data show that the share of marketed surplus rice sold to the official markets has been consistently lower than that sold in the open market. MDB estimates that over the three years preceding 1987/88, rice marketed through the official channel was below 4% of the estimated production. In the 1987/88 season, cooperative unions purchased only 11.7% (72 000 tones) of the estimated production. The observed decline was probably due to the soaring cost and inability to compete in the commercial environment, while an increasing share of marketed production has been handled by the private sector. The private trading however, is been hampered by lack of supportive service and market infrastructure (ie. formal credit, storage and processing facilities,

Table 1.3. Percentage disposition of marketed surplus for rice, 1971/72 to 1985/86

Year	Share of marketed surplus sold to	
	Official markets	SEFOHA[a]
1971-2	52.2	48.7
1972-3	44.3	55.7
1973-4	33.0	67.0
1974-5	11.2	88.8
1975-6	7.5	92.8
1976-7	9.3	90.7
1977-8	18.1	81.9
1978-9	25.9	74.1
1979-80	20.8	79.2
1980-1	13.5	86.5
1981-2	9.4	90.6
1982-3	11.9	88.1
1983-4	12.4	87.6
1984-5	5.7	94.3
1985-6	7.0	93.0

Note: a) SEFOHA: Second economy food markets.
Source: Maliyamkono and Bagachwa (1990: Table 3.4.)

developed market places etc.) as well as the usual transport difficulties.

Experience has shown that most private traders prefer to procure grains in accessible places that are closed to the major consumption centres at prices far better than the official prices. Many remote areas (like those of Shinyanga) have poor feeder roads that are inacessible with exception of the official channel private traders rarely purchase grains in such areas. Farmers in such disadvantaged areas experience prices that are well below the official prices and sometimes no ready market for their

produce especially during the harvesting season. This is a disincentive to increase production as many farmers fail to purchase inputs on cash due to lack of incentive to budget for the purchase of inputs. Given the above situation, the question whether the government should continue to set prices for rice or leave it for the market forces is still debetable.

In view of low domestic supply of rice on the official market, the bulky of supply has to be imported. However, the contribution from imports has been declining over time due to increased domestic supply as a result of increased production. For example, imports dropped considerably from 85,500 tons (the highest ever reported) to 52,300 tons and 25,900 tons in 1986/87, 1987/88 and 1988/89 marketing seasons respectively (Table 1.4). However, estimates by MDB (1989) suggest that 1989/90 crop harvest will be sufficient to meet the national demand and therefore no imports will be required.

Table 1.4. Available supply of rice, 1974/75 to 1988/89 ('000 tons)

Year	Official Domestic Purchases	Imports	Total	Imports as % of Domestic purchases
1974/75	15	14.3	29.3	48.8
1975/76	12	21.0	33.0	63.6
1976/77	15	5.0	20.0	25.0
1977/78	35	49.0	84.0	58.3
1978/79	34	41.0	75.0	54.7
1979/80	30	55.0	85.0	64.7
1980/81	13	65.2	78.2	83.4
1981/82	15	70.2	85.2	82.4
1982/83	21	29.4	50.4	58.3
1983/84	22	57.1	79.1	72.2
1984/85	12	36.6	48.1	75.1
1985/86	16	32.9	48.9	67.3
1986/87	11	83.5	94.5	88.4
1987/88	43	52.5	95.5	54.8
1988/89	45	25.9	70.9	36.5
		Average percentage		62.2

Source: MDB (1988 :table 5 and 8).
Percentage computed from the above.

1.4.3 Rice pricing mechanism

The official consumer prices in Tanzania are based on the import parity (Keeler, et al. 1982; Mitchell et al. 1983). The technical aspects of price setting process is undertaken by the MDB. The MDB recommendation are then forwarded to the Economic Committee of the Cabinet for consideration and approval. Prices are usually announced in July prior to the growing season. Both the official producer and consumer prices once announced by the government remain constant for the whole growing season.

The prices used to be the same over the country, but

recently prices of few crops (eg.maize, paddy, sorghum and millet) have been allowed to vary in different regions based on the cost of production. Parallel market prices on the other hand, vary from place to place and over time depending on the supply and demand conditions. Table 1.5 shows the evolution of producer and consumer prices in both markets. The data show that producer prices in the official channel have been increasing in nominal but not in real terms (though a slight increase was observed in some years). Such a trend may have not influenced positively the rice production. Generally, prices in the open market are consistently higher than the controlled official prices. The difference, however, emanates from the fact that, the government is trying to control prices on the official market but with little control on supply and demand forces which determine prices on the parallel market. MDB, (1988) is of the opinion that, higher open market consumer prices are not totally a result of excess demand but also due to high transport charges and are associated with the risk involved in trading illegally.

Table 1.5 Producer and consumer price for rice, 1971/72 to 1988/89 (Tsh/kg)

	Producer price			Consumer price		
Year	official current price	SEFOHA[a] current price	Official constant 1984-85 price	Official current price	SEFOHA[a] current price	Official constant price
1971-2	0.52	-	5.88	-	-	-
1972-3	0.56	-	5.81	1.65	1.64	10.07
1973-4	0.57	-	5.14	2.00	1.64	10.25
1974-5	0.65	-	4.76	4.00	1.82	16.20
1975-6	1.00	-	6.34	4.00	4.26	15.16
1976-7	1.00	-	5.80	3.50	4.74	11.89
1977-8	1.20	-	6.22	5.30	3.76	10.59
1978-9	1.20	-	5.56	3.50	3.98	9.38
1979-80	1.50	-	5.82	5.35	4.04	11.01
1980-1	1.75	-	5.16	5.35	12.00	8.76
1981-2	2.30	-	5.48	5.35	16.54	6.80
1982-3	3.00	4.00	5.39	7.20	16.54	7.20
1983-4	4.00	9.50	5.66	13.40	34.32	13.40
1984-5	6.00	12.00	6.00	14.50	30.31	8.04
1985-6	8.00	16.00	5.93	14.50	40.00	8.10
1986-7	9.60	25.50	5.69	19.00	39.00	30.00
1987-8	14.40	27.40	7.61	32.00	45.00	35.00
1988-9	12.30	29.25	9.14			

Note: a) SEFOHA: Second economy food markets.
Source: Maliyamkono and Bagachwa (1990), table 3.6 and appendix III table c1.

1.5 Problem Statement

Rice is the second most important cereal crop in Tanzania just after maize. It contributes 8% and 24% of calorie intake in the rural and urban areas respectively (MDB 1988). A vast amount of land suitable for rice production exists in Tanzania, though however, the exact area is not well known. The fertile river basins such as Rufiji and Kilombero and the available water resources

offer opportunities to expand production on both small and large scale farms.

Presently, production stands at 718,000 metric tons from 402,400 ha of land. In 1987/88 season production was 615,000 metric tons out of which 599,554 tons (97.5%) were from small scale farms and the rest 15,446 tons (2.5%) were from large scale farms. In the same production year it is estimated that 336,720 ha were under rice. Out of these, about 98.65% were under small scale while the rest were under large scale farms (Table 1.2).

Despite the large domestic potential for rice production, rice imports make a significant contribution to total available rice through the official channel. Over the period 1974/75 to 1984/85 imports contributed an average of 62.4% of available rice through the official channel while in the period 1985/86 to 1988/89 the contribution was 61.7%. The overall average was 62.2% (Table 1.4).

The inability of Tanzania to satisfy the domestic demand for rice has been attributed to several factors. These include: Unfavourable weather, pricing and marketing polices adopted, low investment and deteriorating transport and marketing infrastructure. With the exception of weather, all the other factors mentioned have an element of policy.

It is therefore the contention of the author that both macroeconomic and sector specific policies that have been

pursued by the country have had a significant effect on rice production performance and food consumption patterns. In particular:

1. Macro-economic policies such as exchange rate have contributed to rapid growth in demand for rice through implicit subsidy.
2. sector specific policies as they relate to marketing and pricing have acted as dis-incentives to production.

Because of conflicting policy objectives, end results are often contrary to those expected by policy makers and implementors. It is therefore important to study the impact of past policies on production, marketing and consumption because:

1. Lessons drawn from such a study will provide a basis for formulating more effective policies.
2. The models to be built can be used to predict the likely consequences of policy proposals before they are implemented.

1.6 Objectives of the Study

The main thrust of the study is to analyze the economic effects and impact of government interventions on production, marketing and consumption of rice in Tanzania. Specifically, the objectives of the study are:

1. To review policies that affect production, marketing and consumption of rice in the country.
2. To estimate price distortions resulting from government interventions.
3. To study the welfare effects resulting from government interventions.
4. To draw policy recommendations to guide future development of the rice industry.

1.7 Description of the Study Area

1.7.1 Location

Two sites in Morogoro district are been used for this study: Madaganya for small holder rice production and Wami Dakawa for large scale rice production. Madaganya is situated in Mzumbe ward in Mlali division. The area is essentially a basin/plain (under rainfed rice production) ranging from Mlali Irrigation Scheme, cutting across the main road to Mzumbe and Mgeta to areas around the Mindu dam. The majority of farmers in this area come from the surrounding villages. These include Kipera, Changarawe, Konga-Vikenge and Sangasanga. Dakawa Rice Farm which is a subsidiary of NAFCO is located along the Wami alluvial plains of Wami Dakawa in Dakawa ward in Mvomero division. It has a potential for growing large quantities of rice (2000 ha) on irrigated system which is dependent on water pumped from the Wami river (Fig.1.2).

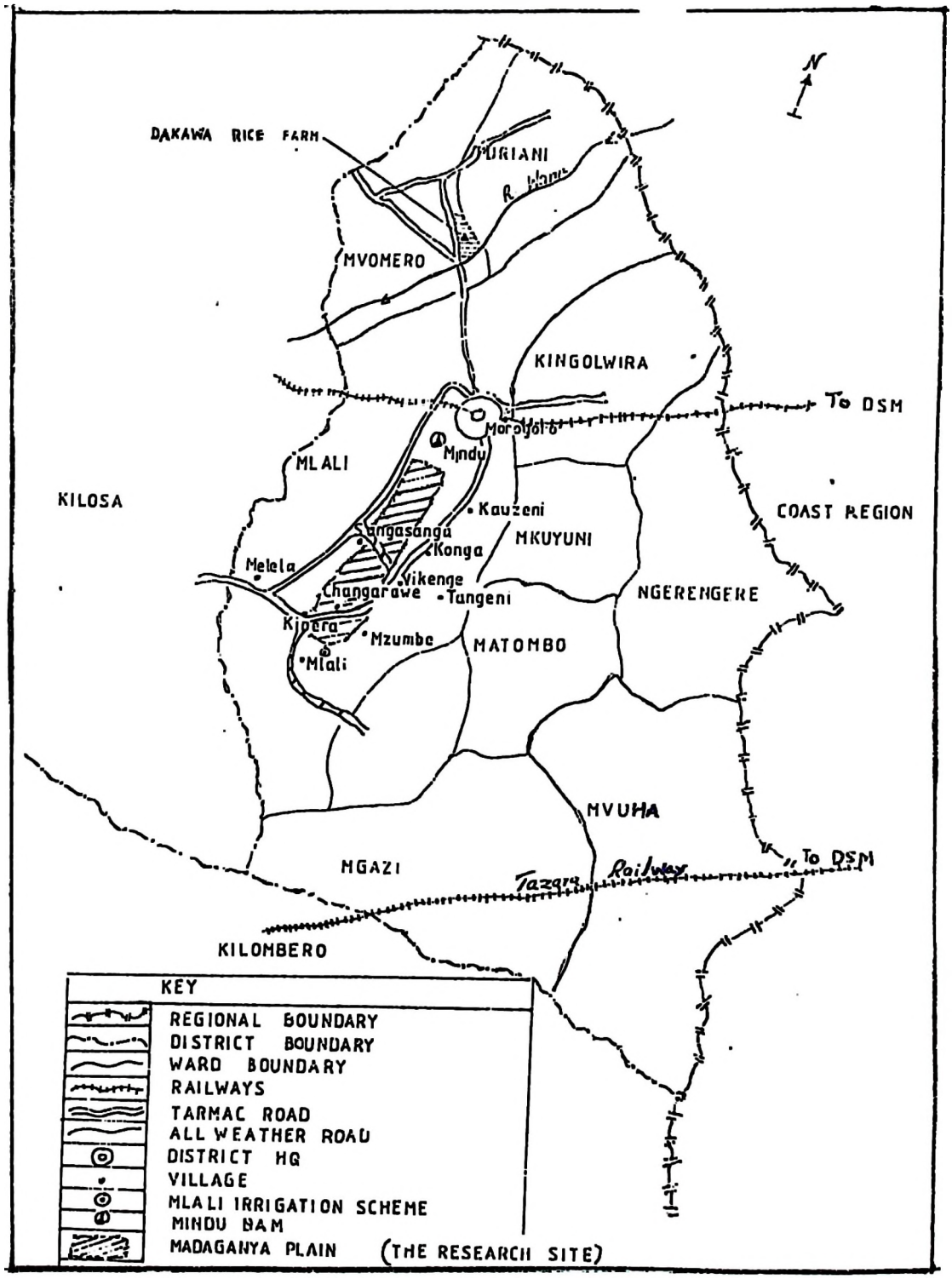


Fig. 1.2. Map: Location of the Research Sites in Morogoro District.

1.7.2 Relief

Three relief zones can be identified in Morogoro district. These are:

1. The Highlands - Uluguru, Nguu and Mgeta mountain
2. Lowlands - The study area is found in this zone. These cover Ngerengere, Mlali and Matombo.
3. The valleys - lie between the highlands and the lowlands and cover Wami, Ruvu and Ngerengere valleys.

1.7.3 Climate

The highlands have an altitude ranging from 1,400 to 2033 m above sea level. Temperatures in the highlands vary from 10.6^0C to 14^0C during the rainy seasons. Rainfall varies from 1000 to 1800 mm per annum. The rainfall is reliable and farming is done throughout the year. The lowlands lie between 400 to 900 m above sea level and valleys 180 to 400 m above sea level. Both ares have warmer climate than the highlands and have unreliable rainfall (800 to 1000 mm per annum) which fall for 6 months during all which the farming activity is done.

1.7.4 Population

The total population in Morogoro Region is estimated to be 1,222,737 living in 227,705 households. The population density is 17 inhabitants per km^2. The population growth rate is 2.6 percent per annum (Population

Census 1988).

Prior to the 1988 population census, only about 49% were abled people and about 46% were children below 15 years of age (Population Census 1978; IRDP 1980). According to the 1988 population census,the population of Morogoro district (rural) is estimated at 431,795, while that in the study area in Mzumbe ward is 14,418. This population comprises of 7,600 males and 6,818 females living in 2,811 households of an average size of 5.5 people each.

1.7.5 Major economic activities

Agriculture is the major economic activity in the study area. The majority of the peasants are engaged in subsistence agriculture. Farm size rage from 0.25 ha to 2.0 ha. The major crops grown include maize, paddy, sorghum, cassava, banana, yams, pulses, beans and vegetables. With respect to livestock production, pigs and poultry are the main species kept. Maize and beans are grown in all relief zones; cassava, banana and yams in the highlands while paddy and sorghum are grown in the lowlands and valleys. Most of the harvested output is used to meet the household food needs though in some cases a small surplus obtained is sold (mostly in the open market) to meet other family needs. Other minor crops such as sugar cane, tomatoes etc. form a good source of extra income.

1.8 Organization of the Remainder of the Thesis

The remainder of the thesis is organized into 4 chapters. Chapter 2 presents the literature review while chapter 3 deals with methodology. Results and discussion are presented in chapter 4 and chapter 5 presents the thesis summary and some policy recommendations.

CHAPTER II

2.0 LITERATURE REVIEW

2.1 Government Intervention in Relation to National Objectives

While in some parts of the world agricultural policy must deal with the problem of surpluses, in other parts of the world agricultural output is often insufficient to cover basic needs. The reasons are many and varied ranging from distribution and production techniques to interventions at various level in the global agricultural complex (Bale and Lutz 1981). Bibagambah (1986) describes the patterns of government interventions as those which relate to government initiatives in the production process, processing and marketing of agricultural products. The interventions in agricultural marketing take the form of either facilitative or restrictive policies with the aim of increasing efficiency and reducing cost or protecting state interests.

Government intervention in agricultural marketing aims at correcting market failures or externalities and thereby providing more efficient and equitable allocation of resources. The commonly used mechanism is that of administering prices of farm products and inputs. The idea behind this is to achieve one or a combination of the following objectives: to reduce price and income instability, to attain food self-sufficiency, to raise

average levels of prices and income and to curb the profit of middlemen (Tomek and Robinson 1972; Eicher and Barker 1982). In some cases however, most interventions have resulted in allocations which are less equitable and efficient than those of the market (Tweeten 1985).

2.2 Government Intervention Mechanisms in the Agricultural Sector

According to Maliyamkono and Bagachwa (1990) government intervention in the agriculture sector in Tanzania has operated at three levels : at production, marketing and consumption. Since the relevant literature that is specific to rice sub-sector policy is lacking, the literature given for each sub-section is rather general but valid in the sense that the results, impacts and implications of such interventions have in one way or another affected the rice sub-sector in terms of production, marketing and consumption.

2.2.1 Government intervention at the level of production

Intervention at production level dates back to colonial time when the colonial administrators in Tanzania used coercion and taxation to compel subsistence peasants to switch to commercial agriculture. The aim was to maximise surplus extraction (in the form of foreign exchange earned through cash crop sales), and to get necessary raw

materials for their home based industries.

After independence in 1961, a number of policy changes were instituted. The Arusha declaration which was introduced in 1967, formed the basis for initiation of the villagization programme. The programme involved moving people into organized villages (Ujamaa villages) and initiation of communal agricultural production. The objectives of the programme include exploitation of economies of scale through communal production activities and to facilitate provision of social services. In connection to this was a hidden motive: to facilitate extraction and appropriation of surplus from subsistence agriculture to state consumption.

By 1971 the number of Ujammaa villages had grown from an estimated 800 villages to 4500. The process of villagization was speeded up between 1974 and 1975 when mass movements of people was instituted chiefly through cohesive measures. By 1976, 13 million people had been moved to villages. The Ujamaa and Village Act was enacted in 1976 to provide legal framework for villages to operate as production and marketing cooperatives.

Although in the short run villagization programme might have caused disruptions in peasants' production schedules, possibly resulting in short-term output decline, its long term effects on aggregate output and productivity is not well known. It is persuasively argued that villagization

was a disruptive process and had adverse effects that went beyond those instances where villages were poorly cited in relation to soil and water or when main fields were distant or vulnerable to vermin. Increased travelling time, to and from fields, over cultivation of fields close to the village, and a greater distance for collecting fire wood and drinking water were cited as longer term effects (Raikes 1986, quoted by Johnson 1989).

Given that the programme involved physical relocation of households, and that household lacked incentives to engage in communal production, the move must have contributed to slow down in the food production (Amani et al 1987).

2.2.2 Government intervention in the agricultural marketing

Official intervention in the marketing, distribution and pricing of cereal grains in Tanzania can be traced back to the colonial period. During the second World War, cereal boards were established in Kenya, Tanganyika (now Tanzania) and Uganda. The objectives were to: guarantee stable prices to producers, rationalize internal trade, achieve food self-sufficiency and build surpluses for meeting post war shortages in other countries of sterling bloc (Maliyamkono and Bagachwa 1990). During the post war period the control was put under marketing boards which had monopoly power to

buy and sell specific crops at fixed prices.

By 1950 Tanganyika had its own crop control agency- The Grain and Storage Department (GSD). Apart from having a monopoly in purchasing and marketing of food crops, GSD provided storage facilities for holding surplus food stocks. GSD became redundant and formally abolished in 1955 when the country attained food self-sufficiency. Thereafter the produce control policy was abolished in favour of free market policy.

After independence and following the enactment of the 1962 Agricultural Product Act (control and marketing), the government established the National Agricultural Products Board (NAPB). A three -tier- single channel marketing system became operational in 1963. The NAPB became the apex of the system and had the monopoly powers in the commercial purchases of grains. Cooperative unions through their primary societies were appointed as agents of NAPB, and purchased food grains from peasants and sold them to NAPB. Through such marketing arrangements the government intended to eliminate wholesalers and brokers in the agricultural trade with the objectives of guaranteeing incentive price to farmers, to ensure efficient marketing and distribution system, to maintain reserves against famine and contribute to the agricultural development in general (Temu 1977; Msambichaka et al. 1982; Maliyamkono and Bagachwa 1990).

Prior to the 1967 Arusha Declaration, the milling

functions and other activities remained under private enterprises. Following the Arusha Declaration the milling function was brought under state control. The eight major milling companies were nationalized and brought under NAPB temporarily before being amalgamated to form NMC in 1973. Primarily, NMC was to be responsible for the purchasing, processing and distributing staple grains countrywide. Latter on, NMC was given responsibility for managing Strategic Grain Reserve (SGR) and became responsible for imports and exports of food grains. Following the abolition of cooperatives in 1976, the three-tier-single channel marketing system was replaced by a two-tier-single channel marketing system. The previous economic functions under cooperatives were transferred and shared among crop authorities, Regional Trading Companies (RTCs) and District Development Corporations (DDCs). The primary cooperative societies which had served as procurement points for unions were replaced by newly established villages, legally instituted to act as multipurpose cooperative societies. These changes had significant implications on food crop marketing efficiency. To operate such marketing system efficiently it meant that the infrastructural and coordination ability were required. Since both lacked at the time the system was instituted, there was a significant rise in overhead costs and marketing inefficiency.

Inefficiencies of the official marketing system between 1970s and early 1980s have been summarized by Odegaard (1985) who grouped them as those related to:

-ensuring timely collection of peasants' produce,

-prompt payment of peasants for their produce,

-ensuring timely supply of agricultural inputs, and

-effectiveness in reducing collection, handling, transportation and overhead costs.

These inefficiencies were partly attributed to organizational problems (eg. overmanning, centralized bureaucracy, inadequate take home pay, misappropriation of public resources and general low morale of workers which resulted in low productivity) and partly due to institutional set-up.

An important effect of government attempt to enforce monopolistic marketing and produce price control has been the development of parallel markets, the outcome of which has been among other things the acute food grain shortfalls and deterioration of the official marketing system.

The structure of parastatal costs between 1976 and 1984 did not provide any incentives to maximize marketed output. The cost of these inefficiencies was born not by the parastatals but directly by the farmers (through reduced producer prices) and partly by the general public by subsidizing parastatal losses and consumer prices. For

instance, from 1981-2 to 1983-4 government subsidy to NMC alone amounted to Tsh 939 million (Maliyamkono and Bagachwa, 1990). These losses were aggravated by increasing unit cost of marketing and handling a declining volume of officially marketed output. This however, resulted into tremendous squeeze on real resources as government deficit widened every year, further aggravating inflationary pressure since the subsidies were mainly absorbed by the government through budget deficit. The need to improve the performance of the marketing system led to the re-establishment of cooperatives in 1984, following the enactment of the cooperative act of 1982. However, the re-organised cooperatives continued to lack capacity (in terms of transport, storage, and qualified manpower) for effective handling of grain.

In order to improve the performance of the marketing system the government has recently instituted some changes in the administrative and functional structure of NMC. Such changes include: the closure of corporation's six regional branches (in Bukoba, Lindi, Mtwara, Musoma, Singida) and the termination of 246 pensionable workers from the headquarters and regional offices (Daily News, November, 5th. 1990). The functional changes include: the transfer of the function of maintaining Strategic Grain Reserve (SGR) from NMC to Food Security unit (under the Ministry of Agriculture and Livestock Development) leaving NMC

solely for commercial purposes (Daily News, September, 25th. 1990). Together with these changes, further relaxation of the food marketing system (as discussed in section 1.4.2) has been instituted.

2.2.3 Government intervention in agricultural pricing

Government can in one way another influence production and consumption decision through price control. Essentially state intervention in the agricultural pricing needs to address three issues: determination of absolute levels of prices to induce increased agricultural production, setting of relative prices to influence composition of agricultural output and pricing over space to reflect transport cost differentials (Msambichaka et al 1982).

Prior to the 1974 period, pricing was never used as policy instrument to influence agricultural production. Government concern was in maintaining price stability. State intervention was in fixing into store prices. The authority to set into store prices was under the Economic Committee of the Cabinet. This was considered essential in order to ensure that producer prices conformed with the country's newly announced overall wages, income and price policy (Maliyamkono and Bagachwa 1990). Producer price was determined as a residual after deduction of estimated marketing cost of cooperatives (Mlay 1988). The negligence

of agricultural pricing as an instrument of policy resulted into a sharp decline of producer prices in real terms for both food and cash crops (Orbac 1985, cited by Mlay 1988).

The previous de-emphasis on the level of producer price was severely shaken by the disastrous crop failures in 1973/74 and 1974/75 periods with consequent large food imports. This gave way to a more deliberate and structured mechanism of price determination than had hitherto been the case. There was a change in priority to food self-sufficiency. A large increase in producer price was instituted for both food and export crops but with a shift in terms of trade in favour of food crops (Ellis 1980). Consequently, food crops experienced a positive increase in producer price in real terms.

In order to protect consumer from the effects of large producer price increases, the government fixed consumer prices below ex-store cost of NMC. This had the following effects: NMC was deprived of margins it needed to develop its marketing capability and it incurred large financial loss. With the dissolution of cooperatives in 1976, and institution of a two-tier-single channel marketing system, state intervention changed from fixing pan-territorial into-store prices to fixing pan-territorial producer prices. This move affected pan-territorial pricing that was instituted in 1974. The aims were to: encourage farmers in the remote areas to produce for the market, reduce inter-

regional income differences through price incentives and increase country's agricultural output (URT 1985; Orback 1985, quoted by Mlay 1988). In principal the policy of pan-territorial pricing was consistent with Tanzania's goal of equal development of all regions (Mlay 1988; Maliyamkono and Bagachwa 1990), but it had detrimental effects on resource allocation efficiency (Mlay 1988). The following were consequences of pan-territorial pricing:

1. Increased transportation cost for procuring increased output from remote regions.
2. The development of a systematic bias against high values low weight crops in remote regions In Ruvuma region for instance, production of tobacco became relatively unattractive as a result of rapid increase in price of maize through crop regional subsidization (Msambichaka, et al 1982).

In 1982, pan-territorial pricing was replaced by regional pricing policy. This was thought to boost production of food grains by giving a premium price to areas with high production potential and awarding a lower price to marginal areas. The aim was to attain food self-sufficiency irrespective of resource cost for producing it.

Between 1976 and 1984, producer prices for major staples have been strongly influenced by government's policy of protecting the cost of living (by keeping food prices low through subsidies) of urban consumers. The

result was a decline in real producer prices despite an increase in nominal terms (Mlay 1988). Experiences have shown that final producer prices for major staples were politically determined and largely dependent on revenue available for subsidies and the cost of living among urban wage earners.

The need to maintain low consumer prices is partly used to justify maintaining low producer prices. Compensatory effects to disinsetives arising from low producer prices were expected to come from input subsidies. Both seed and fertilizers have been highly subsidized up to 1984/85. A 50% subsidy on fertilizer was introduced in 1976 and remained in effect until june 1984.

Due to lack of an effective system of enforcing official subsidized prices, government policy of subsidizing agricultural inputs especially fertilizer did not generally result in increased output, except in few regions (eg. Ruvuma, Rukwa and Mbeya). Even there, the beneficiaries have been the few large scale farmers (Maliyamkono and Bagachwa 1990).

Between 1984 and 1986 a number of policies have been instituted in the food sector (Amani et al 1987; Mlay 1988). These include:

- Substantial increase in producer prices,
- removal of consumer subsidies,
- imposition of import tax on rice,

- allowing individual to import goods and sell them at whatever price they could fetch, and
- devaluation of the shilling by 26 percent in dollar terms.

These policy measures were latter reinforced following the adoption of structural adjustment programme (ERP) in June 1986. Under this programme the following policy measures were taken:

- devaluation of the shilling and following of the crawling peg,
- raising producer prices by 5% in real terms annually or paying 60-70% f.o.b prices whichever is higher,
- rising interest rates with targets of attaining real interest rates,
- further liberalization of marketing of food crops and reduction of items under price control,
- imposition of ceiling on government expenditure, and
- the nominal increase in resource allocation to agriculture and attempts to restructure marketing institutions.

The policy thrust is currently towards a market oriented Economy.

The evolution of producer prices for the country's main staples of maize, wheat, paddy, sorghum and cassava is

summarized in table 2.1. The data show that the downward trend of producer prices in real terms continued even after the initiation of the ERP. While the nominal prices of all crops has been increasing at an impressive rate the increase has not been commensurate to inflation in the country. As a result, producer prices have been declining in real terms over the years considered. Thus, there remains still a long way to go before the policy objectives of rising producer prices in real terms is achieved.

In an attempt to enforce policy objective of raising producer prices the government has recently raised producer prices of the major staples of maize, rice, and

Table 2.1. Percentage changes in official producer prices of selected food crops, 1984 to 1988

	Percentage increase/ decrease	
crop	current price 1984-1988	constant price 1984-1988
maize	2.47	-7.15
paddy	30.31	-1.21
wheat	23.15	-6.63
sorghum	18.92	-9.84
cassava	23.15	-6.63

Source: Computed from Statistical Bulletins, MALD.
Note: MCPI, 1985=100

wheat for the 1990/91 season (Daily News, Sept. 1990) by 18 percent for maize and 20 percent for rice and wheat

respectively. These are supposed to be floor prices that farmers should be paid to compensate for production costs in which case producers would be free to sell their produce at whoever offered a better price. The aim is to motivate farmers to increase production of food crops (which has been declining of late) with the objective of attaining food self-sufficiency.

2.3 Approaches Used to Study Government Intervention

Studies on government interventions have focused mainly on: Distortionary effects of intervention - the objective being to assess the extent interventions have removed or introduced distortions and, welfare effects of such interventions to both consumers and producers.

2.3.1 Measurements of distortions and comparative efficiency

The methodology for analysis of the impacts of economic policies on agricultural sector and its application was developed in the late 1960s to early 1970s when concepts like economic efficiency, nominal and effective protection, domestic resource cost became popular especially amongst development economists (Ascari 1979). Since then, a number of contributions have been made on the subject and the methodology widely applied (Balassa and Schyldowsy 1968; 1972; Bruno 1972; Kruger 1972; Bhagwati and Srinivasani

1980; Scandizzo and Bruce 1980).

2.3.1.1 The Nominal Protection Coefficients (NPC)

NPC is the simplest measure that compares domestic output (input) price to border output (input) price. It has been used to analyze the real and pecuniary effects of distortions in agricultural prices where producer price support, tariffs, quotas, export taxes have been taken as typical causes of price distortions (Bale and Lutz 1981). It can also capture the implied level of taxation or subsidy on both producers and consumers.

NPC can be measured at any stage in the production - marketing - consumption chain though its use is largely limited by the availability of suitable data. Large year to year variation in NPCs exists within agricultural products. It is therefore important to compute NPCs for more than one product and for several years (at least 3 years) if reasonable results and conclusion are to be obtained (Norton 1988). The sources of instability in NPCs that cause variations over time are: variation in real domestic prices, in the world market prices, and in the degree of disequilibrium in the exchange rate.

2.3.1.2 The Effective Protection Coefficient (EPC)

EPC of a particular commodity is defined as the ratio of the value added in domestic prices to value added in

border prices.

Numerous attempts have been made to examine the systems of interventions affecting agriculture. The concept of effective protection has been used to collapse the system of interventions from hierarchy of markets to an equivalent tax and or subsidy in a single market. Early attempts dealt with tax, while in recent years analysis has been extended to include exchange rates (Valdies, 1973; Tshibaka 1986) and numerous agricultural programmes (Wipf 1971). The principle involved is that of balancing implicit taxes on production with subsidies on inputs or vice versa. Unlike the NPC, EPC takes into account the effects of both output and input prices in production. It is superior to NPC since it enables the analyst to determine the incentive impact on production. It is also a measure with specific reference to the production at farm level, processing and marketing (Tsakok 1985).

2.3.1.3 The Domestic Resource Cost (DRC)

Protection in some cases simply conceals country's inability to compete. In order to make a proper assessment of comparative advantage, it is necessary to distinguish between costs and economic rents or excess profits. This can be done by estimating cost based coefficients such as DRC.

DRC is a measure of comparative advantage or

disadvantage of producing a certain agricultural commodity in a country vis-a-vis its trading partners. It was brought into common use by Bruno (1972) specifically for the purpose of measuring comparative advantage. By comparing it with some measurements of economy's "real" or "accounting" exchange rate, it can be used as an investment criterion just as internal rate of return of project is compared with some measures of real rate of interest. DRC can vary substantially over time because it is measured against international prices which vary considerably from year to year. Reca (1980) observed large annual variations in domestic resource cost coefficients for wheat, maize and sorghum in the case of Argentina.

2.3.1.4 The protection measures and the Policy Analysis Matrix (PAM)

Agricultural policy analysts have devoted considerable effort to analyze the consequences of particular interventions, but they are recognizing the need to analyze the whole system of intervention together. Failure to do so can provide erroneous view of impacts of interventions (Kenneth 1983). Pearson and Monke (1987) proposed a general framework for the analysis of impact of economic policies on agricultural sector in terms of a "Policy Analysis Matrix" (PAM). The advantages and disadvantages of the PAM methodology can be summarized as follows:

1. Advantages

a) It is a highly useful way of "thinking" about how various government policies combine to create inefficient allocation of resources. It is prescriptive since it can be used to allocate national resources and orient future economic policies towards the most efficient economic activities.

b) It serves as an empirical procedure to organize and interpret information.

c) It is diagnostic since its aim is to asses how and to what extent the policies pursued by government affect the agricultural sector in terms of "private profitability" and conversely what would be the performance under equilibrium prices.

d) The coefficients calculated on the basis of PAM data permit the ranking of commodity systems according to degree of protection that they receive and efficiency with which they operate.

The important roles that it plays include: analysis and diagnosis of a commodity system, analysis of impact of past policies and recommendation of future economic policies (Ascari 1989).

2. Disadvantages

a) The choice of representative year can greatly influence the results and therefore deserves a lot of care (eg. a year affected by drought, floods, sharp devaluation of currency or sharp increase in wages).

b) The hidden transfers are not taken into account.

c) Production and efficiency coefficients may change over time if international prices used in the analysis change. For some commodities international price is hardly an indicator of their scarcity value given government interventions and or producer cartels.

3. Purposes of PAM analysis

The central purpose of PAM analysis is to measure the impact of government policy on the private profitability of agricultural systems and on the efficiency of resource use (Peason and Monke 1987). Social profitability and efficiency can be expected to be emphasized by economic planners whose concern is with allocation of resources among sectors and the growth of aggregate income in the economy. Both sets of issues are ultimately concerned with the incentive effects of policy and how such incentives can be altered. Through evaluation of private and socials revenues and costs, the PAM methodology is designed to illuminate these related issues of agricultural policy analysis. The method is particularly well suited for

empirical analysis of agricultural price policy and farm incomes, public investment policy and efficiency, and agricultural research policy and technological change (Peason and Monke op cit).

2.3.1.5 Shadow prices in policy analysis

Shadow pricing is a process of deriving "true" prices of goods and services and productive factors, by adjusting the market prices of cost and benefit items (Schohl 1979). Shadow prices provide a link mechanism, they are summary measures of social costs of using particular resources for different rates and the benefit of using them in particular ways (Squire, Little and Durdag 1979). In policy analysis, these are used as benchmark against which to assess the extent of distortions. To device shadow prices that can be used as benchmarks, the basic task of practitioner are: to identify important economic activities in a production system and to assess relevant economic alternatives that are foregone because resources are tied to the production of specific commodities. Once these alternatives have been identified they must be priced (Tsakok 1985).

Tsakok (1985) defines the opportunity cost of land where farmer can grow two types of crops (given cropping pattern and incentive structure) as output foregone in producing the other. The opportunity cost of a piece of land or its marginal value product can be indicated by its

rental value. If there is competitive market in renting or leasing land, analysis can consider the rental value as indicative of contribution of the alternative output. If competitive value of land does not exist, the rental value of land can be estimated as residual. The procedure is to access the value added in the alternative crop per unit of land in border prices and deduct shadow costs of other primary resources.

According to Ascari (1989) the PAM methodology requires an extensive use of shadow prices. The shadow prices for labour is defined as the productivity of the labour factor measured at international prices. It is necessary to calculate the appropriate shadow price for each category of labour; skilled, semi-skilled and unskilled. In many developing countries it is noted that opportunity cost for unskilled labour is usually below the market wage while for skilled labour it is often above.

Tsakok (1985) describes two methods for determining shadow prices of capital assets:

1. the demand and supply approach in which the analyst tries to approximate opportunity cost through the price farmers are willing to pay either for the capital or for services rendered by the capital assets.
2. the cost of supplying services - the supply approach.

The elements of PAM have to be expressed in local currency. Since exchange rates in most developing countries rarely reflects the real purchasing power of local currency, a Shadow Exchange Rate (SER) has to be applied. Estimation of SER is usually done by international agencies or ministries.

2.3.2 Measurement of welfare effects

An important task of a policy analyst is to assess quantitatively economic and social costs of government intervention. Although protection and efficiency measures reviewed above are indicative of efficiency of the production and marketing system, they don't go far enough to show the gains and losses resulting from such distortions. Bale and Lutz (1981) studied the effects of price distortion on the distribution of income between producers and consumers and government revenue, foreign exchange and the net social losses for developed countries (Japan, West Germany and Great Britain) and developing countries (Thailand, Egypt, Argentina and Pakistan). The study was based on a partial equilibrium model. Details on this approach are given in Curie, Martin and Schmitz (1971) while the review of its application is given in Bale and Shields (1978) and Lutz and Scandizzo (1980). The gains or losses depend linearly on the assumed elasticities and quadratically on the size of the price distortions.

The partial equilibrium model is restrictive as it does not take into account the complex supply and demand interaction among economic sectors and regions. The model fails to consider both short and long run effects of protection (Maria da Conceicao Sampaio de Sausa 1989).

The limitations pointed above can be overcome by using general equilibrium models. According to Maria da Conceicao Sampaio de Sausa(1989), the approach offers a framework in which one can analyze decision in agriculture. In assessing quantitatively the impact of a tariff on agricultural performance in Brazil a non linear dynamic general equilibrium model was built in which price mechanism played an important role. The model was dis-aggregated in such a way as to permit the analysis of agricultural sector within the context in which it is inserted. Special attention was given to effects of urban protection in growth and welfare variables and strong emphasis was put on role played by rural urban interactions. The simulation of the model showed that tariffs constitute a burden to the rural sector.

Despite the fact that the general equilibrium frame work is superior over partial equilibrium in many aspects, the methodology is not widely applied. It is the pragmatic considerations, namely, data, time and resources devoted to the task and the policy questions that jointly indicate specific technique to use. While in an ideal world, policy

analyst would have unlimited time and resources to evaluate polices, in practice however, policy analyst face the binding constraints of limited time and resources. Data availability are often constrained as well. Policy consideration are made in short time periods and decisions are usually taken whether or not economic analysis is complete. However limited it may be, partial equilibrium analysis can certainly enable the analyst to evaluate welfare effects of government intervention in a specific sub-sector or sector of the economy. The analysis can be used to conceptualize the factors at work and the resulting information can give perspectives on the likely evolution of the economy at large.

CHAPTER III

3.0 METHODOLOGY

3.1 Introduction

This chapter presents and discusses various analytical procedures employed in this study in order to fully address the study objectives. It begins by presenting various tools of analysis and analytical models used. This is followed by a section on data requirements in which type and sources of data, questionnaire and sampling designs are given. A section on data modifications ends the chapter.

3.2 Tools of Analysis

3.2.1 The policy analysis matrix (PAM)

This covers some of the important measures of distortion. The methodology was used to evaluate the impact of government policies on the rice as a commodity system - at production level, marketing/processing and consumption. Production was covered both under small and large scale. The methodology is summarized on an accounting matrix which consists of four columns and three rows (Table 3.1).

Table 3.1. The Policy Analysis Matrix

	Revenue	Tradeable inputs	Domestic resource	Profit
Private Analysis	A	B	C	D
Social Analysis	E	F	G	H
Transfers	I	L	M	N

The PAM allows for the calculation of the following economic indicators:

1. Private profitability: This is defined as the difference between the revenue of the economic activity (A) and the cost of the associated tradeable inputs and domestic factors eg. labour, land etc. It is calculated at actual market prices and is defined in the PAM as [D] = [A] - [B] - [C]

2. Social Profitability: This is the profit of the production system when revenue, tradeable inputs and domestic factors are measured at their opportunity cost. It is defined as [H] = [E] - [F] - [G].

3. Transfers: The difference between elements in the private analysis and in the social analysis is caused by the government policy or market imperfection. Assuming no intervention or market imperfection, the elements on the two lines will be equal. The meaning of the elements on the transfer line can be explained with a few examples:

a). If A > E (private revenues > social revenues): This

can be defined as "output transfer" (I). In this case, the consumers are taxed by the system.

b). If B < F (private cost of tradeable inputs < social cost of tradeable inputs): This is an "input transfer"(L). In this case, the producers are subsidized by the system.

c). C > G (private cost of domestic resources > social cost of domestic resources): This is a negative "input transfer" (M). In this case the producers are taxed by the system.

d). The sum of the first three element on the transfer line gives the total value of the "incentive /disincentive effect" of government policies or market imperfection on private profitability. It is defined as (N).

3.2.2 Efficiency and Protection Coefficients

3.2.2.1 Nominal Protection Coefficient (NPC)

This is the simplest measure that compares domestic output/input price to border output/input price.

$$NPC = P^d/P^b$$

where: P^d = Domestic price

P^b = Boarder price.

In the PAM context it is the ratio between revenue measured at market price (A) and revenue measured at social price (E).

3.2.2.2 Effective Protection Coefficient (EPC)

It is a measure of protection that takes into account the distortion in final goods as well as in intermediate goods. It is defined as:

$$EPC = \frac{P^d - \Sigma(a_j P^d_j)}{P^b - \Sigma(a_j P^b_j)}$$

where: P^d = domestic price of output

a_j = units of input j per unit of output.

P^d_j = domestic price of input j

P^b = border price of output in local currency.

P^b_j = border price of input j in local currency.

In the PAM context it is the ratio between (A-B) and (E-G).

3.2.2.3 Domestic Resource Cost (DRC)

It is a ratio between the domestic resources consumed in the production process to the value added in generated foreign exchange. It is algebraically written as:

$$DRC_i = \Sigma(a_{ij} V_j) \;/\; P^b_i - \Sigma(a_{ij} P^b_j)$$

Where: DRC_i=Domestic resource cost of production system i

a_{ij} = Units of domestic resource or a non traded input j used to produce a unit of output i

V_j = shadow price of domestic resource or non traded input j

P^b_i = border price of output i

P^b_j = border price of input j

In the PAM context DRC was obtained by comparing domestic resource (G) with net flow of foreign exchange measured at social prices (E-F).

3.2.3 Price Elasticities

Price elasticities of supply and demand are required for the assessment of welfare effects of government intervention.

3.2.3.1 Price elasticity of supply for small scale farms

Since time series data for small scale production system are not available, a profit function analysis based on cross section data is used. Following the approach of Yotopoulos, Lau and Lin (1976) the models to be estimated are obtained as follows:

The Cobb-Douglas production function is defined as

$$Q=f(S, L; K) = AS^{\beta 1}L^{\beta 2}K^{\beta 3} \qquad (1-1)$$

Where: Q = output

S = amount of seed

L = labour

K = land

A = a scale factor

β_1, β_2, β_3 are partial elasticities for respective inputs

Using the production function in 1-1 and output and input prices, the following profit function is obtained:

$$\pi = P_Q f(S, L; K) - P_S S - WL \qquad (1-2)$$

Where: P_Q = Output price

P_S = Price of seed

W = Wage rate

The Unit - Output - Price (UOP) profit function is defined as:

$$\pi^* = \pi/P_Q = f(S, L; K) - P'S - W'L \qquad (1-3)$$

Where $P' = P_S/P_Q$ is normalized seed price.

$W' = W/P_Q$ is normalized wage rate.

From equation (1-3), optimal amount of seed (S^*) and labour (L^*) are obtained as functions of land and normalized prices of seed and labour. The indirect UOP profit is obtained by substituting S^* for S and L^* for L in Equation (1-3). This is shown as equation 1-4.

$$\pi^{*\prime} = f(S^*(P',W',K), L^*(P',W',K); K) - P'S^*(P',W',K) - W'L^*(P,W',K)$$

$$= G(P',W',K) \qquad (1-4)$$

By employing Sherphard's lemma, output supply function, seed and labour demand functions presented in equations 1-5 to 1-7 are obtained.

$$S^* = -\delta\pi^*(P',W',K)/\delta P' \qquad (1\text{-}5)$$

$$L^* = -\delta\pi^*(P',W',K)/\delta W' \qquad (1\text{-}6)$$

$$Q^* = \pi^{*\prime}(P',W',K) - \delta\pi^*(P',W',K')/\delta P' * P' - \delta\pi^*(P',W',K)/\delta W' . W' \qquad (1\text{-}7)$$

Following Yotopoulos, Lau and Lin (1976) the UOP and demand functions to be estimated are of the following form:

$$\ln\pi'_n = \ln A_0 + A_1 \ln P'_n + A_2 \ln W'_n + A_3 \ln K_n + U_n \qquad (1\text{-}8)$$

$$-P'S_n/\pi'_n = A_1 + U^*_n \qquad (1\text{-}9)$$

$$-W'L_n/\pi'_n = A_2 + U^{**}_n \qquad (1\text{-}10)$$

Equations 1-8 to 1-10 are estimated by Zellner's method for estimating seemingly unrelated regression equations.

By using equations 1-5 to 1-10, the following elasticity formulas are obtained:

(a) Price elasticity of demand for seed

$$\delta \ln S^*/\delta \ln P' = A_1 \qquad (1\text{-}11)$$

(b) Price elasticity of demand for labour

$$\delta \ln L^*/\delta n W' = A_2 \qquad (1\text{-}12)$$

(c) Price elasticity of supply for rice

$$\delta \ln Q^*/\delta \ln P_Q = -(A_1 + A_2) \qquad (1\text{-}13)$$

The elasticity estimates based on the above equations are used in estimating welfare effects of government intervention in the case of small holder farmers.

3.2.3.2 Price elasticity of supply for large scale farms

The supply response approach based on time series data from a large scale farm is used. In this approach, the relevant decision variable is the desired output. The output supply response model is of the following form.

$$Q_t^* = \beta_0 + \beta_1 P_t^* + \beta_2 PC_t + \beta_3 T_t + U_t \qquad (1\text{-}14)$$

$$PR_t^* = PR_{t-1} \qquad (1\text{-}15)$$

$$Q_t - Q_{t-1} = a(Q_t^* - Q_{t-1}) \qquad 0 < a < 1 \qquad (1\text{-}16)$$

Where: Q_t^* = Desired rice output in year t.

PR_t^* = Expected real price of rice in year t.

PC_t = Input prices (production costs) in year t.

T_t = Technology in year t.

U_t = Disturbance term assumed to be normal with zero mean and constant variance.

Equation 1-15 is used to model price expectations while equation 1-16 is used to explain how output adjusts from present to desired situation. Combining equations (1-14), (1-15) and (1-16) equation 1-17 is obtained. Under the assumption that the error term is non-autocorrelated and homoskedastic, equation 1-17 is estimated by least squares method to obtain consistent parameter estimates.

$$Q_t = a\beta_0 + a\beta_1 PR_{t-1} + a\beta_2 PC_t + a\beta_3 T_t + (1-a)Q_{t-1} + aU_t \qquad (1\text{-}17)$$

From equation 1-17 the following price elasticities of supply are obtained:

(a) Short run price elasticity of supply

$E_s = a\beta_1$

(b) Long run price elasticity of supply

$E_l = \beta_1$

3.1.3.3 Price elasticity of demand

The static theory of consumer behaviour is employed where the individual demand for a commodity is given by.

$$Q = f(P_Q, P, I) \qquad (2\text{-}1)$$

where Q = Quantity demanded

P_Q = Price of the commodity

P = Vector price of related commodities (Substitutes and complements)

I = Income.

A linear approximation of equation 2-1 leads to the following model which is estimated by least squares method.

$$QR_t = \beta_0 + \beta_1 PR_t + \beta_2 RM_t + \beta_3 PW_t + \beta 4 I_t + U_t \qquad (2\text{-}2)$$

Where: QR_t = Average per capita consumption of rice in year t.

PR_t = Average price of rice in year t

RM_t = Average price of maize flour in year t

PW_t = Average price of wheat flour in year t

I_t = Average individual income in year t

U_t = error term.

β_i (i=0, 1,2,3,4) are parameters to estimated.

3.2.4 The Partial Equilibrium Model

An important task of a policy analyst is to assess quantitatively the economic and social cost of government intervention. Calculations of the various efficiency and protection coefficients in the previous sections are used to determine the size and directions of consumers and producers domestic price deviation in percentage terms from corresponding border price due to government interventions in the rice sub-sector. Although this is an indicative measure of efficiency of the system, further analysis is required if the impact of government intervention is to be fully understood. This is done by computing the following:

1. Net social loss in production (NSLP)

$$= .5(Q_w - Q_d)\ (P_w - P_p)$$

2. Net social loss in consumption (NSLC)

$$=.5(C_w-C_d)(P_c-P_w)$$

3. Total Net Social loss = NSLP + NSLC

4. Welfare gain by Producers (GP)

$$= Q_d(P_p-P_w)-NLSP$$

5. Welfare gain by consumers (GC)

$$= C_d\ (P_w - P_c)\ -NSLC$$

6. Change in foreign exchange earnings (FE)

$$=-P_w(Q_w-Q_d+C_d+C_w)$$

7. Change in Government Revenue (DG)

$$= Q_d(P_w-P_p)-C_d(P_w-P_c)$$

Where:

Q_w = Production at World Price.

Q_d = Production at domestic price.

P_w = Border price

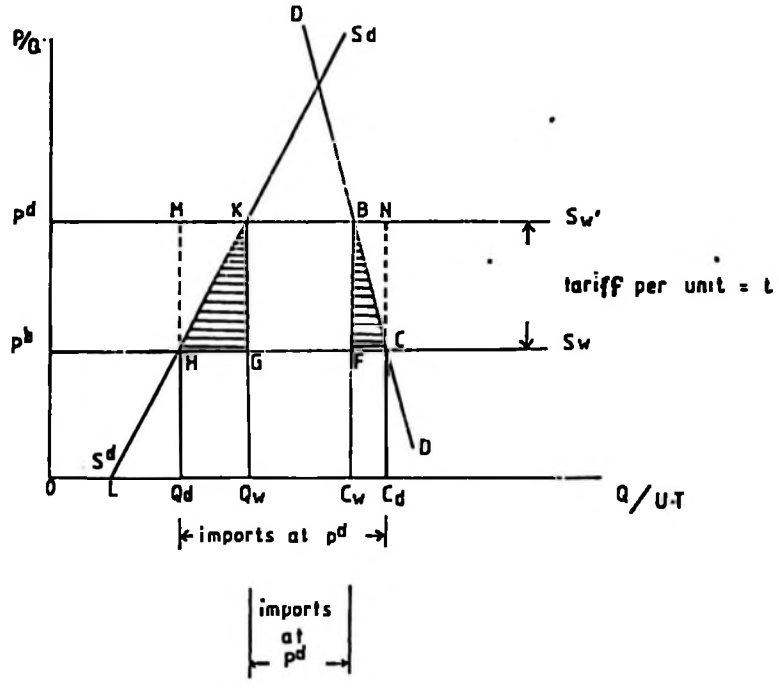
P_c = Price faced by domestic consumers.

P_p = Price faced by domestic producers.

C_w = consumption at world price

C_d = consumption at domestic price.

Figure 3.1 is used to illustrate the above components using an example of a tariff imposition on a food commodity. Suppose a tariff is imposed on a commodity such that the domestic price rises above the world price. The supply and demand conditions before the imposition of the tariff are shown in the figure by the supply curve S_d, and the demand curve D, and the supply curve of imports from the rest of the world S_w which is horizontal because the importing country is a small country. Before tariff is imposed, the domestic price is the same as world price P^b and the consumers are willing to purchase quantity C_d at this price. At this relatively low price, domestic producers are willing to supply only the quantity Q_d and $Cd-Q_d$ must be supplied from imports. If the tariff is imposed at the advalorem rate t, the domestic price rises above the world price to P_d and the supply curve of imports is raised to S_w' because of the inclusion of import



NOTE:

1. NSLP = Δ HGK
2. NSLC = Δ FBC
3. NSL = Δ HGK + Δ FBC
4. GP = area $p^b p^d KH$
5. GC = area $p^b p^d BC$
6. ΔGR = GKBF
7. ΔFE = area $Q_d HC_d$ – area $Q_w KBC_w$

Fig. 3.1. Tariff on Imports of a Food Commodity.

tax. At the higher price the consumer reduce their purchase of commodity to C_w while domestic producers respond to the higher price and increase output to Q_w. The quantity of import declines to C_wQ_w because of the reduced consumption and expanded production of the commodity. For illustration purposes, Q_w and C_w are unobservable. Using data on price ratios and elasticities these can be derived and through graphical derivations, other components of the model are as shown in the figure.

3.3 Data Requirements

3.3.1 Type and Sources of Data

The data needed for the analysis are collected from both primary and secondary sources. Data from primary source are collected from a single visit survey in the small scale traditional sector of Madaganya area in Morogoro District.

Secondary data are obtained from NAFCO (mainly Dakawa Rice Farm) reports and accounts. These include, time series data on production, output prices and revenues, variable costs, indirect/overhead costs and other costs of running the farm. Some data on production, marketing and consumption of rice including data on imports, stocks, FOB and CIF prices, prices of substitutes (eg,maize and wheat flour), income, population statistics, consumer price index and exchange rates are obtained from the following

institutions: Marketing Development Bureau (MDB), Food Strategy Unit, Food Security Unit, Early Warning and Crop Monitoring Bureau, Statistics Unit, NMC, Bank of Tanzania (BoT), Bureau of Statistics and Economic Research Bureau.

3.3.1 Questionnaire design

The questionnaire is designed to capture both qualitative and quantitative data. Data collected include, the social demographic characteristics of the household, area under paddy and competing crops, variable inputs and their costs, crop yields, output prices, revenue, marketing and consumption figures for the 1989/90 crop season).

3.3.3 Sampling design

A single visit survey is undertaken using a structured questionnaire as an instrument. A simple random sampling technique is used to obtain 60 households for the study. The target population are households growing paddy.

3.3.4 Data modifications

3.3.4.1 Raw data

Raw data from the survey are converted into respective Standard Internationale (SI) units, coded into variables of interest and summarized using DBASE III computer programme. Four other computer programmes are used in various analyses of the data. These are SPSS, RATS, SUPERCAL 4 (a

spreadsheet) and micro-TSP.

3.2.4.2 Data for tabular analysis

Descriptive statistics are used to obtain summary measures on demographic characteristics of the households, resource utilization and performance.

3.3.4.3 Data for the PAM

The PAM calculations for both small and large scale production systems are done on the spreadsheet computer package. The analysis involves preparation of farm budgets with inputs broken down into imported and non-imported components, and fixed assets.These are further broken down into traded output (obtained by multiplying the domestic output by a conversion factor of 0.65 (to paddy rice equivalence) then by CIF price and the official exchange rate), non-traded inputs, domestic factors, transfers (on traded output and non-traded inputs) and shadow prices for domestic resources (by using correction factors). Other estimation under this are as given in section 3.1.1.

In order to calculate protection and efficiency coefficients, all market prices are converted into their social prices. The official exchange rate in the 1989/90 commercial year is taken as the average exchange rate of Tsh 175 per US $. The equilibrium exchange rate is estimated in the range between Tsh 200 and 300 per US $.

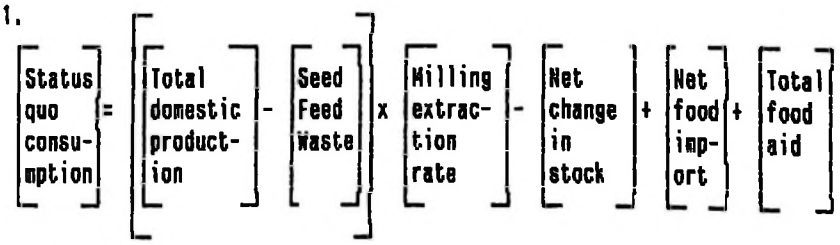
For this analysis it is taken to be the mid-value of Tsh 250 per US $. This rate is assumed to be slightly above the official rate but lower than the parallel market price. The adjustment factor of 0.7 (ie. the ratio between official and equilibrium exchange rate) is used to convert the official exchange rate into shadow exchange rate.

For several local activities which are not internationally traded, a conversion factor can be calculated on the basis of their breakdown into major traded and non-traded components. Ideally, these conversion factors should come from Bureau of statistics in the Planning Commission but no such sets of data are available. The conversion factors adapted in this study, therefore, are based on the experience gathered from past studies (Curry 1987; Ascari 1989). Details of the PAM analyses are given in appendix A1.

3.3.4.4 Data for price elasticity of demand

Average per capita consumption for rice is estimated following Tuck (1985) estimation procedures as given below:

1.



$$2.\quad \begin{bmatrix}\text{Per capita}\\ \text{consumption}\end{bmatrix} = \frac{\text{[Status Quo consumption]}}{\text{[Population]}}$$

Using time series data the analysis is made possible under the following assumptions.

1. Seed and wastage account for 5% and 1% of the total production respectively (Based on the Tanzania Food and Nutrition Centre (TFNC) standards).
2. No rice is used in feed manufacturing.
3. Milling extraction rate is taken as 0.65.

The 1990 NCPI is used to deflate prices and income data.

3.3.4.5 Data for border prices

In the computation of border prices the appropriate border price is taken to be the CIF value plus (in case of consumer border price) or minus (in case of producer border price) the handling and marketing charges and margins up to the point of comparison. CIF value is used because, Tanzania has always been a net rice importer despite the existing potential to produce beyond self-sufficiency and for export. In computing border prices, three production and consumption centres are identified in case of paddy production. Three consumption centres are identified in case of rice consumption. Border prices for each centre are then computed and average values are obtained in both cases. In computing these border prices the data provided on table A2.1 and A2.2 of appendix A2 are appropriately

used. Two types of border prices are computed in each case, a border price without any adjustment to policy induced distortions and a border price with adjustment for currency over-valuation since throughout the early 1980s the Tanzanian official exchange rate was highly overvalued. As with the PAM, the equilibrium exchange rate of Tsh. 250 per US $ against Tsh. 175 for official exchange rate is used in the adjustment procedure (see tables A2.3 to A2.8 in appendix A2 for further details).

The elasticities and border prices obtained from the previous section are used in partial equilibrium analysis. Domestic paddy production is dis-aggregated into production from small scale producers and that from large scale producers. Respective supply elasticities and the border producer price are used to estimate production at world price from each production system. Domestic rice consumption estimation follows the procedures of estimating status quo consumption by Tuck (1985) with similar assumptions as those given in the estimation of per capita rice consumption. Consumption at world price on the other hand is derived by using the elasticity of demand and consumer border price. Weighted average prices for domestic production and consumption are obtained using official and open market prices respectively. Based on the MDB estimates, these estimation are made possible on the following assumptions:

1. Total marketed output is about 50% of total production.
2. Output marketed through the official channel is about 12% of the total production.
3. Output marketed in the open market is 38% of the total output.

Variables from the above estimations are substituted into the respective equations in section 3.14 to complete the analysis (for details see appendix A3).

CHAPTER IV

4.0 RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents and discusses the main findings of the study. Description of small holder and large scale production systems are presented in sections 4.2 and 4.3 respectively. Section 4.4 discusses results on price elasticities while section 4.5 deals with PAM results for the two production systems. The last section presents and discusses results on welfare effects of government intervention in the rice commodity system.

4.2 The Small Holders Rice Production System

4.2.1 Household characteristics

The characteristics under discussion are sex, age and education of household head. Table 4.1 shows the distribution of demographic characteristics among the households. It is observed that 55% of the household heads are females while 45% are males. The majority of them (47%) are between 20-40 years of age followed by those between 41-60 (40%) and those above 60 years (13%). Of the sampled household heads, 41% have primary education, 33.3% have adult education, 21.7% have no formal education and 3.3% have eduction above primary school.

The results imply that women have a bigger say than men in making decision pertaining to the small holder,

agriculture. While the education pattern of the household head allows for the introduction of modern farming techniques on one hand, the performance of agriculture is likely to be negatively affected on the other hand since the majority of household heads are within the active age (20-40) which may also be involved in non-farm, off-farm and social activities other than farming.

Table 4.1.Social-demographic characteristics of sampled small holder farmers in Hadaganya, 1989/90

Characteristics	Frequency	Percent
1. Sex of household head		
male	27	45.0
female	33	55.0
2. Age of household head		
20-40	28	46.7
40-60	24	40.0
>60	8	13.3
3. Education of household head		
No formal education	13	21.7
Adult education	20	33.3
Std I-IV	11	18.3
Std V-VIII	14	23.3
above Std VIII	2	3.3

Source: Sample survey of 60 households (1990).

4.2.2 The production system

Rice production under small holder production system in the survey area is characterized by low level of technology, low inputs use and hence very low yields. Cultivation is done on small plots. A household has an average of 3 plots and one hectare of land under

cultivation. The majority of the households (73.4%) cultivate between 0.5 and 1.5 ha (Table 4.2). Table 4.3 presents results on resource utilization and production performance of small holder producers at Madaganya in Morogoro district for the 1989/90 crop year. For comparison purpose, figures for the major competing crops are also given. It is observed that the households have less than a hectare under each crop per household (ie. 0.4 ha for rice, 0.5 ha for maize and 0.5 ha for sorghum) with average yields of 1258.2, 1023.5 and 1114.7 kg per hectare for rice, maize and sorghum respectively.

Table 4.2. Area under cultivation and number of plots owned by households in Madaganya, 1989/90

Farm size	Frequency	Percent
Total area cultivated (ha)		
0-0.5	7	11.7
0.51-1.0	22	36.7
1.01-1.5	22	36.7
1.51-2.0	6	10.0
) 2.0	3	5.0
Average area under cultivation (ha)	1.0	
Average number of plots owned	2.7	

Source: Sample Survey, 60 households (1990).

The observed yields are low. In the case of rice, the yield of 1258.2 kg/ha is about 58.8% of the national average of 2.1 tones per ha (Food Security Unit 1990). These low yields can be attributed to several factors ranging from the poor technology available to farmers to low use of

inputs. Unlike large scale farms which irrigate their crops, farmers under the small scale production systems rely mainly on rainfall which in most cases is unreliable. Most farmers use simple tools -a hoe and panga which allow the cultivation of only small area of land. The proportion of farmers using tractor power is very small. Tractor hire service was used by only 26.7% of the sampled farmers. A small proportion (31.7%) of the sampled farmers use hired labour. None of the sampled households use fertilizers, herbicides and insecticides in rice production. All sampled households use unimproved seeds, locally available and most likely selected on the basis of eating qualities irrespective of their yield quality. Seed rate per hectare is low (33.3 kg/ha) against, 150 kg/ha used by Dakawa Rice Farm.

4.2.3 Gross margin analysis of small holder producers

Tables 4.4, 4.5 and 4.6 show summaries of gross margin analyses for rice, maize and sorghum on small holder farms based on 1989/90 yields and prices. It is observed that the area under each crop, average production and revenue are higher in households hiring labour and or tractor services than those using family labour only. Contrary to the expectations however, average yield per hectare in households hiring labour and or tractor services is lower than that in households using family labour only.

Table 4.3. Resource utilization and production performance under small holder production at Madaganya, 1989/90

Item/crop	Rice	Maize	Sorghum
1. Number of farmers growing the crop	60	35	40
2. Percentage of total	100	58.3	66.7
3. Average area under the crop	0.4	0.5	0.5
4. Inputs			
a) Tractor hire			
-Number of farmers using tractor services	16	12	5
-Average area under tractor cultivation (ha)	0.4	0.8	0.6
-Average cost of hiring a tractor (Tsh./ha)	5792.3	5519.8	6342.2
b) Labour			
-Total labour (mandays/ha)	210.1	85.7	175.0
-Family labour (mandays/ha)	199.1	76.4	175.0
-Hired labour (mandays/ha)	35.5	46.1	26.6
-Average area under hired labour (ha)	0.5	0.8	0.6
-Cost of hiring labour (Tsh/manday)	133.2	125.0	138.0
-Number of farmers who hired labour	19	8	5
c) Seed			
Seed rate per hectare (kg/ha)	33.3	13.7	15.4
Price of seed (Tsh/kg)	42.0	45.9	30.9
d) Produce transport			
-Number of farmers using hired transport	1	6	-
-Cost of hiring transport (Tsh/ha)	743.0	934.5	-
5. Output			
- Average output (kg/ha)	478.1	501.5	568.5
- Yield per hectare (kg/ha)	1258.2	1023.5	1114.7
- Output consumed at home (kg)	282.7	238.4	312.4
- Output sold in the parallel market (kg)	195.4	263.4	256.1
- Farm gate price (Tsh/kg)	40.2	27.6	26.3
- Parallel market retail price (Tsh/kg)	43.7	30.2	28.9
- Weighted average producer price (Tsh/kg)	41.6	29.0	27.5
- Gross revenue (Tsh/ha)	52377.2	2967.3	30632.2

Source: Sample survey of 60 household (1990).

Poor timing of operations particularly in land preparation is the main contributing factor to this. Land preparation needs to be done before the on-set of long rains since farming is solely dependent on rainfall. In general ploughing is done late because tractors are not available within the village. Hiring of tractors is by booking from owners from other areas, priority being accorded to large farms. Most of the farmers are considered last because of their small farm plots. The effects of such delays are reflected in low yields.

It is observed that gross margins per hectare for rice are Tsh 35,614.70 for households using family labour only and Tsh 53,685.30 for households using hired labour and or tractor services. The respective gross margins per manday are Tsh 195.20 and Tsh 258.20. When paddy is compared with competing crops it ranks the highest in terms of gross margin per hectare and gross margin per manday. When enterprises are compared on the basis of gross margin per shilling of variable costs, paddy ranks first for households using family labour only, but ranks last for households employing labour and or tractor services (Tables 4.4 to 4.6).

4.3 The Large Scale Rice Production System

4.3.1 Resource utilization

The discussion in this subheading focuses on Dakawa

Rice Farm. The production system is characterized by high level of mechanization, irrigation and intensive use of inputs.

Table 4.7 shows cost distribution on labour, fuel and lubricants, machinery, spares, repairs and maintenance, seed, chemicals and other field expenses for the farm during 1989/90 crop season. It also shows the depreciation, over-heads and other indirect costs to the farm. Taking variable production costs alone, it is observed that field salaries and wages account for the largest share of the variable costs (20.3%) followed by fuel, oils and lubricants (18.0%), chemicals and insecticides (16.7%), spares, repairs and maintenance (14.8%), fertilizers (12.5%) seeds (8.5%) workshop consumable (8.2%) and other field expenses (1.2%). On the other hand, if total costs of the farm (ie. direct and indirect costs) are considered, overheads and indirect costs account for the largest share of the cost (37.9%) while total production costs ie. variable costs (37.7%) and depreciation costs (24.4) in total account for 62.1% of the total costs. Overheads and indirect costs seem to be quite substantial and any effort to improve the efficiency of the farm will have to review critically this cost items.

4.3.2 Yield performance

The contribution from the capital intensive farms of

NAFCO to the total rice production in Tanzania is very insignificant. During 1989/90 crop year, NAFCO's total contribution from all its farms was 14,167 tones of paddy (MDB, 1989) while the country's total output stood at 740,150 tones from 346,000 ha of land (Food Security Unit, 1990). The difference between the two (ie. 725,983 tons) is the contribution by small and medium scale producers.

The yield performance for Dakawa Rice Farm during the same crop year was (4.2 tones/ha) well above the national average (2.1 tonnes/ha) and that of small production system at Madaganya (1258.2 kg/ha or 1.3 tonnes/ha (see tables 4.4 and 4.8). Although this performance is comparatively higher, the overall contribution is however, relatively low. The total output of 3152 tonnes is just about 22.3% of the NAFCO's total production.

4.3.3 Gross margin and profitability analysis for Dakawa Rice Farm

Results on gross margin and profitability analysis of the farm are presented in table 4.8. The results are based on the 1989/90 official prices since the farm can only sell its produce to the official marketing agencies. It is observed that the farm recorded a loss of Tsh 36.3 million before tax. The loss is about Tsh 48,847.17 per ha. The data from which these observations are made have been obtained from sources of accounts of the farm and not from

audited profit and loss account figures. Probably audited profit and loss account figures would have different estimates than those given here.

It is observed that the gross margin per hectare is Tsh 29,770.8. This gross margin is lower than that for small scale producers at Madaganya. This difference is attributable to the difference in variable costs per hectare between the two production systems. Dakawa rice farm is capital intensive farm with much higher variable costs per hectare which tend to lower the gross margin as opposed to the small scale producers of Madaganya who use only few inputs (normally labour and seeds).

Table 4.4 Gross margin analysis of small holder rice production system at Hadaganya, 1989/90

Item		Hired labour and or tractor hire	Family Labour only
1.	Average area under paddy (ha)	0.5	0.3
2.	Average production (kg)	524.80	450.10
3.	Yield per hectare (kg/ha)	1166.30	1323.80
4.	Weighted average price (Tsh/kg)	41.60	41.60
5.	Total revenue (Tsh)	21831.70	18724.20
6.	Variable costs(Tsh)		
	a) Cost of hiring labour	2127.90 1/	-
	b) Cost of hiring tractor	2432.80 2/	-
	c) Seed	642.60 3/	471.20 4/
	d) Produce transport	601.83 5/	-
	Total variable cost	5805.10	471.20
7.	Gross margin (5-6) (Tsh)	16026.60	18253.00
8.	Total labour(md)	2.1 6/	70.7 7/
9.	Gross margin per manday (7/8)	195.20	258.20
10.	Gross margin per hectare (7/1)	35614.70	53685.30
11.	Gross margin per shilling of variable costs (7/6)	2.80	38.70

Source: Sample survey of 60 households (1990)

Note: 1/ = 35.5 md/ha x 0.5 ha x 133.2 Tsh/md
2/ = 5972.30 Tsh/ha x 0.4 ha
3/ = 34.0 kg/ha x 42.00 Tsh/kg x 0.5 ha
4/ = 33.0 kg/ha x 42.00 Tsh/kg x 0.3 ha
5/ = 743 Tsh/ha x 0.8 ha
6/ = 182.5 md/ha x 0.3 ha
7/ = 207 md/ha x 0.5 ha

Table 4.5. Gross margin analysis of a small holder maize production at Nadaganya, 1989/90

Item		Hired labour and or tractor hire	Family Labour only
1.	Average area under maize (ha)	0.7	0.4
2.	Average production (kg)	833.50	309.50
3.	Yield per hectare (kg/ha)	1173.90	884.30
4.	Weighted average price (Tsh/kg)	29.00	29.00
5.	Total revenue (Tsh)	24171.50	8975.50
6.	Variable costs(Tsh)		
	a) cost of hiring labour	4725.25[1/]	-
	b) Cost of hiring tractor	4139.85[2/]	-
	c) Seed	459.50[3/]	216.90[4/]
	d) Produce transport	981.20[5/]	-
	Total variable cost	10305.80	216.90
7.	Gross margin (5-6) (Tsh)	13865.70	8758.60
8.	Total labour(md)	80.8[6/]	46.8[7/]
9.	Gross margin per manday (7/8)	171.60	187.15
10.	Gross margin per hectare (7/1)	19529.15	25024.60
11.	Gross margin per shilling of variable costs (7/6)	1.35	40.40

Source: Sample survey of 60 households (1990)

Note:
1/ = 46.1 md/ha x 0.8 ha x 125 Tsh/md
2/ = 5519.80 Tsh/ha x 0.8 ha
3/ = 14.1 kg/ha x 0.7 ha x 45.9 Tsh/kg
4/ = 13.5 kg/ha x 0.4 ha x45.9 Tsh/kg
5/ = 934.50 Tsh/ha x 1.1 ha
6/ = 113.8 md/ha x 0.7 ha
7/ = 133.6 md/ha x 0.4 ha

Table 4.6. Gross margin analysis of a smallholder sorghum production at Madaganya, 1989/90

Item		Hired labour and or tractor hire	Family Labour only
1.	Average area under sorghum (ha)	0.6	0.5
2.	Average production (kg)	591.50	581.50
3.	Yield per hectare (kg/ha)	969.60	1163.00
4.	Weighted average price (Tsh/kg)	27.50	27.50
5.	Total revenue (Tsh)	16266.25	15991.25
6.	Variable costs(Tsh)		
	a) Cost of hiring labour	2092.40[1/]	-
	b) Cost of hiring tractor	3868.70[2/]	-
	c) Seed	341.20[3/]	225.60[4/]
	Total variable cost	6302.30	225.60
7.	Gross margin (5-6) (Tsh)	9963.95	15765.65
8.	Total labour(md)	72.5[5/]	95.6[6/]
9.	Gross margin per manday (7/8)	132.00	164.90
10.	Gross margin per hectare (7/1)	16334.30	31531.30
11.	Gross margin per shilling of variable costs (7/6)	1.58	69.90

Source: Sample survey of 60 households (1990)

Note: 1/ = 26.6 md/ha x 0.6 ha x 138 Tsh/md
2/ = 6342.2 Tsh/ha x 0.6 ha
3/ = 18.1 kg/ha x 0.6 ha x 30.9 Tsh/kg
4/ = 14.6 kg/ha x 0.5 ha x 30.90 Tsh/kg
5/ = 123.8 md/ha x 0.6 ha
6/ = 191.1 md/ha x 0.5 ha

Table 4.7. Costs by Type for Dakawa Rice Farm, 1989/90

Item	Costs/Farm	Costs/Ha	Percentage
Field salaries and wages	7676716.00	10332.05	20.33
Fuels, oils and lubricants	6797225.90	9148.35	18.00
Spare, repair and maintenance	5583906.60	7515.35	14.78
Seeds	3196275.00	4301.85	8.46
Fertilizers	4716259.00	6347.59	12.49
Chemicals and insecticides	6288747.80	8463.99	16.65
Workshop consumable	3101739.10	4174.62	8.21
Other field expenses	407453.00	548.39	1.08
Sub-total	37768322.40	50832.20	100.00
Variable costs	37768322.40	50832.20	37.70
Depreciation costs	24487354.00	32957.41	24.44
TOTAL PRODUCTION COSTS	62255676.40	83789.60	62.14
Overheads and indirect costs	37927788.40	51046.82	37.86
TOTAL COSTS OF THE FARM	100183464.80	134836.43	100.00

Source: Dakawa Rice Farms - Accounts Department (1989/90).

Table 4.8. Gross margin and profitability analysis of Dakawa Rice Farms, 1989/90

Item			Value
1.	Area (ha)		743.00
2.	Average production (Tonnes)		3,152.00
3.	Average yield per hectare (Tonnes/ha)		4.24
4.	Official producer price (Tsh/tone)		19,000.00
5.	Costs of production		62,255,676.00
	a) Variable costs:		
	i)	Salaries and wages	7,676,716.00
	ii)	Fuels, oils and lubricants	6,797,225.90
	iii)	Spares, repairs and maintenance	5,583,906.60
	iv)	Seeds	3,196,275.00
	v)	Fertilizers	4,716,259.00
	vi)	Chemicals and insecticides	6,288,747.80
	vii)	Workshop consumable	3,101,739.10
	viii)	Other field expenses	407,453.00
		Sub- total	37,768,322.40
	b) Depreciation cost of machinery and equipment		24,487,354.00
6.	Overheads/indirect costs		37,927,788.40
7.	Gross revenues (Tsh.)		59,888,000.00
8.	Gross margin (7-5a)		22,119,677.60
9.	Gross margin per ha		29,770.76
10.	Profit before tax (7-5-6) + other incomes		(36,293,449.90)
11.	Profit before tax per ha		(48,847.17)
12.	Profit before tax per kg of paddy		(11.51)

Source: Dakawa Rice Farms, accounts department (1989/90).
Note: Figures in parenthesis indicate loss.

4.4 Price Elasticities

While economic theory suggests the direction of response to price changes, it does not indicate the actual magnitude. For policy analysis, it is crucial to know the degree of responsiveness to price in order to assess the likely magnitude of the impact of a price policy. Economic analysis has to be empirical if it is to give practical guidance. According to Tsakok (1985) a practitioner has two options to guide this assessment: to rely on insights derived from experience and or to obtain quantitative estimates by using econometric techniques. The elasticity estimates are used in policy analysis to estimate the effects of changing price through removal of distortions on production and consumption. They show cost implications of a subsidy or tax directed towards satisfying specified production and consumption goals.

4.4.1 Price elasticity of supply

In most cases, small scale farmers do not share benefits of higher output to the extent that the large scale farmers do. In general, large scale producers respond more flexibly to price changes than the small scale producers who may be constrained in expanding the use of inputs, obtaining credit or shifting resources from production of commodities needed for the families own consumption (Tsakok 1985). The result is that large scale

producers have higher elasticities of supply than the small scale producers. For this reason separate elasticity estimates are made for small and large scale farms.

Table 4.9 summarizes results of elasticity estimates for small scale rice production at Madaganya area in Morogoro. The results give output supply and inputs demand elasticities based on the cross sectional data. The observed results conform with theoretical expectations with regard to the sign associated with the estimated parameters. The results show that the demand for seed and supply of rice are price inelastic.

Table 4.10 gives a summary of regression results and the estimated elasticity of supply for large scale farm based on time series data from Dakawa rice farm. It is observed that the signs associated with the respective parameter estimates conform with theoretical expectations. As in the case of small scale producers, the magnitude of the elasticity is less than one meaning that the supply is price inelastic in the short run. Although supply in both production systems is observed to be price inelastic, the degree of responsiveness for large scale farms is found to be higher than that of small scale farms.

Although the ranges of values reported (ie. 0.1 and 0.3 respectively) seem rather low, they are within the range of values estimated from other developing countries.

Table 4.9. Profit and seed demand functions results for small holder rice production at Nadaganya, 1989/90

Function	Parameter	Variable	Zellner's method with restriction ($A1^* = A1^*$)	Respective supply elasticities
OUP profit function	A_0^*	Constant	9.92 (0.20)	-
	A_1^*	LnP	-0.10 (0.11)	0.10
	A_2^*	lnK	0.39 (0.16)	0.39
Seed demand function	A_1^*	-PSn/πln	-0.10 (0.11)	-0.10

Source: Regression analysis results.

Note: Figures in brackets are standard errors of the associated coefficients.

Krishna (1967) quoted by Tommek and Robbinson (1977) found that price elasticity of supply tend to be as low as 0.1 for subsistence food crops grown in less developed countries. Askari and Cumming (1976) quoted by Scandizzo and Bruce (1980) have observed that elasticity of supply for rice in many developing countries ranges from 0 to 0.33 in the short run.

4.4.2 Price elasticity of demand

Table 4.11 shows a summary of regression results and the elasticity of demand for rice. The results are based on time series data. As expected, the sign associated with

Table 4.10 Output supply response results for Dakawa Rice Farm

Coefficient	Variable	Value	Standard error	T-statistics	Price elasticity of supply
θ_0	Constant	-3278.75	6665.63	-0.49	
θ_1	PR_{t-1}	0.27	0.47	0.57	0.30
θ_2	PC_t	0.12	0.12	0.90	
θ_3	T_t	-47.25	309.03	-0.15	
θ_4	Q_{t-1}	- 0.32	1.00	-0.32	

R^2 = 0.59

F-statistic = 1.07

Source: Regression analysis results.

the estimated coefficients and that on elasticity conform to theoretical expectations.

The results indicate that there is a 5% drop in consumption in response to 10% increase in price of rice. In absolute terms, the observed elasticity is less than one. This is to say that rice demand is price inelastic. The quantity demanded is relatively unresponsive to price changes. The elasticity estimate is within the range of estimates observed in other developing countries (Scandizzo and Bruce 1980).

4.5 Policy Analysis Matrix (PAM) Results

The PAM is used in this study to measure the distortions resulting from government policies. The results are summarized in tables 4.12 to 4.14.

Table 4.11. Tanzania: Price elasticity of demand for rice

Coefficient	Variable	Value	Standard error	T-statistic	Price elasticity of demand
β_0	Constant	10.16	2.88	3.52	
β_1	PR_t	-0.13	0.13	-1.03	-0.50
β_2	PM_t	0.21	0.10	2.06	
β_3	PW_t	0.16	0.12	1.35	
β_4	I_t	-0.0001	9.59	-1.77	

R_2 = 0.53

F-statistic 3.33

Source: Regression analysis results

4.5.1 The transfers

Tables 4.12 and 4.13 summarize PAM results for small and large scale rice production systems respectively. The following are the main inferences from the policy analysis matrix:

1. Transfers on revenue: Small scale paddy production is receiving a positive transfer on output since the domestic producer prices are above the border

prices. The implication is that the producers are being subsidized by the existing system. Large scale production system is experiencing negative transfer on revenues since private revenues are less than social revenues, giving a negative output transfer. Since most small scale producers sell in the open market where the prices higher than the official price, this price differential is responsible for the difference in transfers on revenue between the two production systems.

2. Transfers on tradeable inputs: Under the small scale production system, these transfers carry a neutral value meaning that private costs and social costs on tradeable inputs are all equal. This implies that there is neither a taxation nor subsidy on inputs.In the case of large scale production system, the transfer carry a negative value meaning that private costs of tradeable inputs are greater than social costs of tradeable in inputs. The implication is that the producers are buying tradeable inputs at a price higher than the corresponding world price, meaning that they are being taxed by the existing system. The neutral value in the case of small scale farmers is because of very limited use of tradeable inputs. Those which are used are obtained from the open market where the prices approximate border prices.

Table 4.12. PAM results for small scale rice production at Nadaganya, 1989/90

Analysis	Revenue	Tradeable inputs	Domestic factors	Profit
Private analysis	52.38	0.10	12.00	40.28
Social analysis	45.80	0.10	9.72	35.98
Transfers	6.58	0.00	-2.28	4.30

Source: Table A1.1 of appendix A1.

3. Transfers on domestic factors: In this case both small and large production system experience negative transfers on domestic factors since private costs are greater than social costs on domestic factors. The implication is that prices for local resources used by the two systems are above their opportunity cost.
4. Transfers on profit: Profit transfer in the case of the small scale production system is positive meaning that the system is making more profit than would be the case in the absence of government intervention. The large scale production system receives negative profit transfers meaning that it is making less profit than it would do under no government intervention. This can be seen as disincentive to increase paddy production.

Table 4.13. PAM results for large scale rice production at Dakawa Rice Farm, 1989/90

Analysis	Revenues	Tradeable inputs	Domestic factors	Profit
Private analysis	80.56	48.17	29.01	3.38
Social analysis	154.34	43.45	24.04	86.85
Transfers	-73.78	-4.72	-4.97	-83.47

Source: Table A1.2 of appendix A1.

4.5.2 Efficiency and protection coefficients results

Table 4.14 shows the results on efficiency and protection coefficients for large and small scale rice production respectively. The coefficients are derived using respective PAM elements given in tables 4.11 and 4.12. For each coefficient, adjusted value (adjusted for currency overvaluation) are also given since the Tanzania's official exchange rate is not an equilibrium exchange rate. It is observed that the adjusted values are slightly lower than unadjusted values.

4.5.2.1 Protection coefficients

In the case of small scale production, it is observed that when an adjustment is made for currency overvaluation the EPC is reduced to a value less than one. This indicates that currency overvaluation is a significant tax on smallholder production.

Table 4.14. Efficiency and protection coefficients results

Coefficient	Small scale production		Large scale production	
	Unadjusted	Adjusted	Unadjusted	Adjusted
NPC	1.14	0.80	0.52	0.37
EPC	1.14	0.80	0.29	0.20
DRC	0.21	0.15	0.22	0.15

Source: Compiled from tables A1.1 and A1.2 of appendix A1.

In large scale production both unadjusted and adjusted values indicate negative protection. By considering only adjusted values, these results indicate that both large and small scale producers are being taxed by the existing country's pricing and exchange rate policies. As a result, both production systems are facing negative incentives. Revenues accruing to the systems are 20% and 63% less than what they would be in the absence of price distortions. It should be noted however, that small holder farmers sell their paddy in open market at prices slightly higher than those in the official market a situation which lead to unadjusted NPC of greater than one.

It is also observed that in the small holder production system, the EPC follows a similar pattern with similar inferences to those of the NPC when an adjustment is made for currency overvaluation. In large scale production system, both adjusted and unadjusted EPCs, show negative

protection. Essentially, this is to say that both production systems are experiencing negative protection. The combined effects on transfers on revenues and tradeable inputs are decreasing the profitability of the system above the optimal level, the disincentives being to the tune of 20% and 80% respectively.

Experience has shown that, more generally, NPCs and EPCs will tend to be highly correlated if one or several of the following exist (Tsakok 1985): Traded inputs are small component of total value of output; policy affect prices of output and inputs in the same direction; or policy affects only output prices. Information in all the three is given by farm budgets and diagnosis of price implied by policy. Also, in practice, since the ratio of purchased inputs to gross output is much lower in developing agriculture, in many cases, NPCs do not differ markedly from EPCs (Norton 1988).

Empirical studies have shown that a high correlation does exist between NPCs and EPCs (Givisinger and Schydlowsky 1970 quoted by Tsakok op cit). Although NPC and EPC obtained lead to the same inference, the information content in the EPCs is higher than that of the NPCs since they allow the estimation of price distortion for inputs. By comparing the adjusted NPC and EPC it can be inferred that taxation on traded inputs is not significant.

4.5.2.2. Domestic Resource Cost (DRC)

DRC measures the overall efficiency of an economic system by comparing social costs of using domestic resources with net flow generated by the system measured at social prices. In a given economic system, the process of maximizing DRC is equivalent to the process of maximizing value added at world price per unit of domestic resource employed.

The results in table 4.14 indicate that DRCs for both production systems are less than one implying that both systems are efficient. The opportunity cost of using domestic resources is less than the value added measured at world prices. Paddy production is therefore socially profitable. In the absence of government intervention, paddy production would generate more than enough value added to renumerate factors of production at their opportunity cost. The production consumes less domestic resources to generate a value added of one unit of foreign exchange. Under such a situation the country enjoys comparative advantage in paddy production. However, should the government then encourage a major expansion of this activity on pure efficiency consideration? Tsakok (1985) points out two additional steps before making such a major policy and public investment recommendation. These are:

1. The need to compute a set of DRC rather than rely on just one. The set should cover a number of time periods or incorporate alternatives assumptions about

key parameters of DRC such as yields and exchange rates (some form of sensitivity analysis).

2. To undertake a full benefit cost analysis to see whether the costs or benefits identified are supportive of broader objectives.

4.6 Welfare Effects of Government Intervention

4.6.1 Border prices computations

4.6.1.1 Border producer prices

Table 4.15 shows producer border prices and their respective NPCs (gross and adjusted values) for rice produced in Dar es Salaam and Coast regions and consumed in Dar es Salaam; rice produced in regions and consumed in regional capitals and rice produced in regions and consumed in Dar es Salaam. With the exception of the paddy produced in the regions and consumed in Dar es Salaam, other two centres had their border prices well above the domestic producer prices.

It can be observed that both the gross and adjusted NPCs show that rice produced in Dares salaam and Coast regions and consumed in Dar es Salaam and that produced in the regions and consumed in the regional capitals was fetching lower price than its border price. When adjustments are made for currency overvaluation, the producer price of price produced in the hinterland and consumed in Dar-es-salaam is reduced to a value below its

border price by 37%. On average, producer price for the three centres falls below the border price by 55%. This implies that currency overvaluation is a significant price disincentive which is causing taxation to producers. This fact is also revealed by adjusted NPCs for the three centres which are all less than one.

Table 4.15. Tanzania: Boarder producer price for paddy (Tsh/kg)

Production/consumption centre	Border price		N P C	
	Unadjusted	adjusted	Unadjusted	Adjusted
Dar- and Coastal region/DSH	29.27	44.87	0.65	0.42
Regions/Regional Capitals	46.08	61.68	0.41	0.30
Regions/DSH	14.34	29.94	1.33	0.63
Average value	29.89	45.49	0.79	0.45

Source : Compiled from tables A2.3, A2.4 and A2.7 of appendix A2.

4.6.1.2 Border consumer prices

Table 4.16 summarises the results of the border consumer prices and their respective NPCs for Dar es Salaam, Regional capitals and village level. It is observed that, while the gross border price (Tsh 76.84) for rice in Dar es Salaam centre is slightly below the official domestic price (Tsh 90.00), the values for the other two centres are above the official domestic prices. Their

respective gross NPCs are 1.17, 0.96 and 0.84 respectively while adjusted NPCs are 0.88, 0.75 and 0.68 respectively. Based on gross NPCs, these results imply a tax of 17% for consumers in Dar es Salaam and subsidy of 4% and 16% for regional and village level consumers respectively. With currency overvaluation adjustments, consumers experience 12%, 25% and 32% subsidy in the three centres respectively.

Table 4.16. Tanzania: Border consumer price for rice (Tsh/kg)

Consumption centre	Border price		N P C	
	Unadjusted	Adjusted	Unadjusted	Adjusted
Dar-centre	76.84	101.92	1.17	0.88
Regional capitals	94.19	119.27	0.96	0.75
Village level	106.70	131.78	0.84	0.68
Average value	92.58	117.66	0.99	0.77

Source: Compiled form tables A2.6, A2.7 and A2.8 of appendix A2.

These results suggest that only Dar es Salaam consumers are better off when consuming imported rice. Regional capitals and village level consumers are better off when consuming domestic rice, particularly with adjustments of policy induced distortions. At village level, imported rice is subjected to heavy internal marketing, transport and handling costs above its landed cost at regional capitals. As a result, it looses its competitiveness against locally produced rice.

4.6.2 Production and consumption effects of distortions

Table 4.17 summarises the results on production and consumption effects of distortions. The border values are obtained using the average weighted prices and the respective estimated elasticities of supply and demand. It is observed that the domestic producer price is lower by about 19.3% than the border producer price, while consumer price is lower by a margin of up to 34%. In the absence of price distortion rice production would have been above present level by 2% while consumption would have been 14.5% below the present level ceteris paribus. This is to say that producers are being taxed while consumers are being subsidized as a result of price distortions. With lower domestic prices therefore, producers are worse-off because they receive less revenue from current production. Experience has shown that the loss to producers are from two sources: direct transfer to the government in the form of tax or most likely a subsidy to the various marketing agencies and loss from production efficiency (ie. "dead-weight efficiency loss"). It is noted however, that, all price policies incur efficiency losses (Tsakok 1985), and some, like the dead-weight efficiency losses can be sustained by the society (Timmer 1986).

Table 4.17. Production and consumption effects of distortion ('000 metric tonnes)

	Production	Consumption
Official prices (Tsh/kg)	19.00	90.00
Open market prices (Tsh/kg)	42.27	72.39
Weighted average domestic prices (Tsh/kg)	36.69	76.62
Border prices (Tsh/kg)	45.49	117.66
Domestic production/consumption	710.15	471.79
Production/consumption at border prices	725.29	552.07
Difference between domestic and production/consumption at border price	-14.86	80.28

Source: Compiled from tables A3.1, A3.2 and A3.3 of appendix A3.

4.6.3 Partial Equilibrium Model Results

Table 4.18 provides a summary of results on partial equilibrium analysis for the rice sector. Gains/losses sustained by the three parties concerned - ie. producers, consumers and the public due to government price and marketing policy interventions are given. The results indicate that the economy of the country incurs large annual welfare loss due to missallocation of resources resulting from the existing pricing policy. The loss depends linearly on the estimated elasticities and quadratically on the size of price distortion measured by

proportion of tax rate. Net social loss is the sum of the net social loss in production and in consumption. The results also show that the most sizeable effects of agricultural policies are the welfare transfer between consumers and the producers. Consumers welfare gain is estimated to be Tsh 17,283.3 x 10^3 while producers welfare loss is estimated to be Tsh - 6,578.7 x 10^3.

It is also observed that the government suffers a revenue loss of Tsh 12,377.15 x 10^3 from its interventionist policies. These results are based on the implicit assumption that the entire price distortion is attributable to taxes or subsidies. From the partial equilibrium analysis, it is observed that economy looses Tsh 8,769.76 x 10^3 in terms of foreign exchange earnings through protectionist policies. This is particularly serious in that foreign exchange availability represents a major bottleneck for Tanzania. These observations are true for many developing countries in a similar economic development stage like Tanzania. Empirical results by Bale and Lutz (1980) reveal this fact. However, it should be noted that, these results have been obtained from a partial equilibrium model and hence capture only partial effects. It is clear that the distortions of the size discussed here would have repercussions in other sectors of the economy as well. Thus the general equilibrium analysis would produce estimates of social costs larger than those estimated here.

Table 4.18. Partial equilibrium model results

Model	Value in 10^3 Tsh
Net social loss production	68.36
Net social loss in consumption	1607.21
Total net social loss	1673.59
Welfare gain by producers	-6578.70
Welfare gain by consumers	17283.27
Change in foreign exchange	-8769.76
Change in Government revenue	-12377.15

Source: Table A3.5 of appendix A3.

CHAPTER V

5.0 SUMMARY AND CONCLUSION

5.1 Introduction

The specific objectives of the study are (1) to review the main policies that have affected production, marketing and consumption of rice in Tanzania (2) to estimate price distortions resulting from government intervention (3) to measure welfare effects resulting from government intervention. This chapter presents a summary of the main findings in relation to the above objectives, evaluates the implications of the findings and makes policy recommendations to improve rice industry. The last part of this chapter identifies the main limitations of the study and presents suggestions for future research work.

5.2 Summary of the Results in Relation to Study Objectives

5.2.1 Policies affecting rice production, marketing and consumption

Major policies under this can be summarized as follow:

1. The villagization programme which was introduced after the 1967 Arusha Declaration to organize people into ujamaa villages under communal agriculture production so as to exploit economies of scale and facilitate provision of social services. In 1976 the villages legally became production and marketing co-operatives. Due to physical

reallocation of households and the lack of incentives to engage in communal production, the programme contributed to the slow down in food production.

2. A three-tier-single channel marketing system of 1963 with NAPB as the apex had the monopoly powers in commercial purchases of food grains. The objectives were to quarantee incentive prices to farmers, increase efficiency in the marketing and distribution of grains, maintain reserves against farming and development of agriculture in general.

3. Bringing the milling functions under the state control and the establishment of NMC in 1973 to handle purchasing, processing and distribution of grains countrywide, maintain strategic grain reserves and import and export of food grains functions.

4. The abolishment of co-operatives and the establishment of a two-tier-singe channel marketing system in 1976 to replace a three-tier -single channel marketing system to share the previous functions of co-operative among crop authorities, RTCs, DDCs and the newly established village co-operatives. These changes had significant implications on food marketing efficiency.

5. The re-establishment of co-operatives in 1984 with objectives of improving performance of co-operatives for better incentives so as to maximize the marketed output.

6. The introduction of pan-territorial pricing in 1974 which aimed at encouraging farmers in the remote areas to

produce for the market, reducing inter-regional income differences and increase output by fixing into-store prices.

7. The regional pricing policy introduced in 1982 to replace the pan-territorial pricing policy which was inefficient in resource allocation aimed at boosting production of food crops by giving premium prices to areas of high production potential and marginal prices to areas of lower potential.

8. Between 1976 and 1984 producer prices of major staples were greatly influenced by the government's policy of protecting cost of living of urban consumers by keeping prices of food low through subsidies. The result was a decline in real producer prices despite their increase in nominal terms.

9. Maintenance of fixed exchange rate regime until 1984 in which the disequilibrium exchange rate was an implicit tax to producers and subsidy to consumers.

10. Between 1984 and 1986 a number of policies have been instituted in the food sector:

-substantial increase in producer prices in order to correct for historical declines in production, induce overall supplies and provides for sustainable food security;

- removal of consumer subsides especially on maize so as to reduce government budgetary deficit resulting from

paying NMC losses;

- imposition of import tax on rice so as to discourage importation of rice;
- removal of agricultural input subsidies especially on fertilizer so as to reduce government expenditure on subsidies; and
- devaluation of the shilling by 26% in dollar terms so as to reduce overvaluation of currency.

The above policies were further reinforced following the adoption of the Economic Recovery programme in June, 1986. The policy changes were :

- exchange rate adjustment via crawling peg to correct further overvaluation of the shilling, remove bias against exports, reduce losses in marketing boards and co-operatives that purchases and export agricultural products;
- further raising producer prices by 5% in real terms annually or paying 60-70% f.o.b prices, whichever is higher in order to adjust producer prices to counter impacts of inflation;
- Further liberalization of marketing of food crops and reduction in prices control, and nominal increase in resource allocation to agriculture in an attempt to restructure marketing institutions.

11. As from 1989/90 marketing season, the consumer price

of rice was left for the market forces so that competitive prices in the wake of liberalization of trade could be set.

5.2.2 Distortionary effects of government intervention

The results show that government intervention in agriculture through pricing and foreign exchange rate policies had negative effects to producers and encouraged increased consumption of rice. The implicit taxation of producers as manifested by the policies kept revenue and rice production at a lower level than what would prevail under a free trade environment.

The observed net NPCs, EPCs and DRCs for both production systems are less than one. In the case of small scale production system, NPC and EPC have equal magnitudes which imply a net tax of 20% to producers, while in the case of large scale production system NPC and EPC imply net tax of 63% and 80% respectively. DRCs for both production systems carry a net value of 15% indicating that rice production is efficient and socially profitable and that the country has a comparative advantage in producing rice internationally.

5.2.3 Welfare effects of government intervention

The results indicate that the economy of the country incurs large annual welfare losses due to missallocation of

resources. The magnitude of income transfers (between producers and consumers) and efficiency losses are significant both as absolute numbers and as a proportion of agricultural income. The results which are based on the implicit assumption that entire price distortion is attributable to taxes (or subsidies) show that welfare transfers between consumers and producers are large. Producers incur welfare losses of Tsh 6,578 x 10^3 while consumers incur large gain of Tsh 17,283.27 x 10^3. Government looses revenue (Tsh 12,377.15x10^3) and foreign exchange (Tsh 8,769.76 x 10^3) as a result of interventionist policies. Production levels of rice have been maintained at a lower level while consumption has been maintained at a higher level than would have been in the absence of intervention.

5.3 Implications of the Results and Recommendations

5.3.1 Implications of the findings

What emerges from this study is that full potential in terms of allocation efficiency, production and consumption is not been realized. In many cases, the estimated changes in production and consumption have greatly deviated from the intended objectives.

Despite the fact that the official marketing system lacked capacity for effective handling of grains and had various forms of inefficiency which discouraged the

producers to market their produce through the official channel, the monopolistic marketing and producer price control caused an acute shortfall in food grains and a decline in the officially marketed output. The cost of marketing inefficiencies was born not by the parastatals but directly by the producers (through reduced prices) and partly by the public by subsidizing parastatal's losses and consumer prices. This resulted into tremendous squeeze on real resource as government deficit widened every year, further aggravating inflanatory pressure since the subsidies were mainly absorbed by government through budget deficit.

The observed net nominal and protective coefficients and welfare effects evidently show how government intervention affects rice production and private profitability. The government is -de-facto transferring resources from rice producers to consumers. Price and exchange rate policies adopted are contributing factors.

The policy of subsidizing rice imports (mainly through overvalued exchange rate) caused the domestic price of rice for both producers and consumers to be less than the world price. The quantity of rice produced domestically has failed to keep pace with domestic demand. As a result, imports have been expanding.

5.3.2 Recommendations

Recommended under this section are some suggested policy options on how to improve the production and marketing of rice in Tanzania.

5.3.2.1 Pricing policy

1. Producer prices

It should be noted that, sound pricing policies are pre-requisite to raising production . The level of prices offered to farmers should reflect the opportunity cost of using resources. Only in this way will production incentives be maintained and costly misallocation of resources be prevented. "Getting prices right" should therefore be the first priority in pricing policy. The policy to be designed and implemented should lead to efficiency in allocation of resources and should depart as little as possible from "market prices" that is, those prices that would prevail in the absence of government interventions.

To facilitate this, the policy of administering prices should be ended and instead, let the producers and buyers freely negotiate on prices. However, together with this deconfinement, the government should continue to provide an indicative price which will actually be a "floor price". Such a price should be set in such a way that it will reflect seasonal price changes and spatial variations due

to transport costs for different rice growing areas. And, instead of considering only border prices based on cif Dar es Salaam, border prices for major producing areas should also be considered.

If well announced before planting season, these prices will give farmers an indication of price levels they can expect and assure them that even at- or shortly after harvest prices will not drop below the stated levels and when prices rise later in the year, or in case of the poor harvest, farmers will benefit from higher unit returns. Furthermore, this will also results into an introduction of market flexibility, and allow prices to vary according to demand, distance from the market, time of the year etc, However, this will depend greatly on how effectively it is implemented.

Since the observed Domestic Resource Cost (DRC) in this study is less than one, then rice production need not to be subsidized whether through producer prices or inputs prices.

2. Input prices:

What the farmer finally pay for his inputs and whether the right type is available at the right time, depends on the pricing policy as well as on the marketing arrangements. The efficiency of a marketing agency, marketing margins and the effectiveness of the distribution

system are crucial to the amount of input used and whether the increase of food production is achieved. Getting prices right is therefore a necessary but not sufficient condition for increasing rice production. Other policy measures include among others prompt inputs delivery. Under this policy, emphasis should be placed on the liberalization of inputs delivery and the adoption of a multi-channel system in which private institutions, and individuals should be allowed to produce, import and distribute agricultural inputs. As with producer prices, input prices need not be subsidized explicitly or implicitly through transport subsidy. Farmers will have to buy inputs by cash or through credit - a situation which calls for an effective credit system.

The Government will have three important roles to play in order to facilitate the implementation of this policy. First, the Government should direct resources towards the improvement of a basic infrastructure particularly, roads, transport as well as marketing information. Secondly, the Government should ensure that information on inputs and available agricultural technology are centrally collected and disseminated to producers, consumers and marketing agents. Thirdly, the Government should create conducive environment for domestic producers of inputs to produce them through attractive investment policy.

It is anticipated that in the presence of credit

availability and other back-up services, adequate inputs supplies at the right time and at reasonable prices to farmer will definitely encourage farmers to increase rice production to a greater extent.

5.3.2.3. Agricultural credit.

A streamlined agricultural credit system which will allow for expanded production and investment to the sector is necessary. Policies to induce the establishment of an economically viable credit system for agriculture inputs therefore, need to be designed. Where necessary, farmers should be given credit in kind eg. in terms of physical inputs such as fertilizers, seeds herbicides, machinery etc. Depending on the existing situation for acquiring credit the system should be established within the existing financial and lending institutions (eg. The National Bank of Commerce and Cooperative and Rural Development Bank) and farmers organizations (eg. Tanzania Farmers Association). The System of scrutinizing and approving credit applications both at the level of farmers' credit committee and at the financing institutions should be fairly simple, less bureaucratic and very efficient. The delivering system need to be quite efficient so that farmers receives the required inputs in time.

5.3.2.3. Marketing arrangement

However best designed, pricing policies are bound to fail and will not benefit farmers unless implemented through an effective marketing system. Without farmers having ready access to the market, at renumerative pricing policies, such policies remain academic and will not encourage the required increase in production. Therefore, in order to give farmers the much needed confidence and minimize risks connected to greater efforts, pricing and marketing policies must be established on long term basis.

Following the current policy of trade liberalization, marketing of rice should be liberalized totally to enable the interested public and private institutions and traders to freely compete. Truly, this may lead to more efficiency as all enterprises will have to cut their cost to attract and maintain as much business as possible. Here a note of warning appears necessary. It should be noted that no government is known to have left production and distribution to the market forces entirely. Good as they may be in the allocation of resources and fostering in growth, market forces have their short comings. The economically disadvantaged groups in the society are usually left out in enjoying the benefits of growth provided by the market competition.

The Government will have a number of roles to play in order to facilitate the implementation of this polic·

First, the government should ease entry conditions, indeed eradicating all restrictions on free participation of interested parties so as to increase competition and efficiency. Secondly, government parastatals (NMC) and co-operative monopoly should be ended in order to remove illegal parallel markets which are associated with high costs that may be due to the risks involved. Thirdly, a massive investment in rural infrastructure (eg. roads leading to rural areas, storage and processing facilities etc.) is needed in order to improve not only the produce marketing but inputs marketing as well as general mobility and transmission of information to end users and producers.

Where they exist, farmers organizations have a very important role to play in ensuring that appropriate policies are adopted. It is equally important that they should continuously monitor the actual implementation of these policies and make timely representation when the rice marketing sector does not function effectively.

The impacts of implementing this policy are many. It is anticipated that price differentials which existed in the early 1980s between the official and parallel markets will be eliminated. More efficient agents that can procure, market and distribute rice from surplus to deficit areas at relatively lower costs than say NMC will emerge. Consequently, these will result into, markedly improved supply situation in the food markets at more competitive

prices and into the stabilization of consumer pries to almost unit prices which are by far out-competing those of NMC.

Following increased production of rice as well as, freeing of markets in the procurement, marketing and distribution, the stabilization in prices, and the markedly improved supply, the consumers can now plan more discriminatively to suit their tastes and preferences and will have access to better rice.

Indirectly, the policy of liberalizing rice marketing will encourage further production increase in rice as well as farm income. Since commercial traders including NMC will no longer be bound to purchase all rice from farmers, a sufficient room will be left for the procurement of stocks for food security considerations. Furthermore, the devolving of the role of NMC from securing food security stocks and placing the later under the Food Security Department is expected to bring better management of food security stocks, reduce management costs and consumer prices far better than would have happened under NMC. The latter will also act as a buyer of last resort for SGR in order to clear production in case of the excess capacity in the open market.

It should therefore be noted that an ideal solution rarely exists and the various policy options have advantages, and disadvantages. It is therefore often

difficult to decide which is the most appropriate policy option. In any case, effective implementation of whatever policy or market system chosen is obviously crucial. The implementation of policies and the performance of the marketing system must be evaluated in the context of the general economic and social condition of the country. The political system, the degree of central government control, standards of efficiency, and honesty all have a substantial bearing an what policy is preferable and what operation is most likely to succeed.

5.4 Limitations of the Study and Direction for Future Research

5.4.1 The limitations

The study has attempted to measure the effects of government intervention on rice production, marketing and consumption. While the results shed light on the effects and implications of government intervention to the rice industry, the study is constrained by the following limitations.

1. The results are based on partial equilibrium models. These do not take into account feedback and indirect effects to the other sectors of the economy. It is therefore less comprehensive than a general equilibrium model.

2. The reliability of distortion and efficiency estimates can be questionable given that these are based on one year data.

5.4.2 Direction for future research

Since policy interventions in the food and agricultural sector are inevitable and since the likely consequences of such interventions are unknown at the time of implementation, policy analysts/researchers have a vital role to play in defining, quantifying issues involved and pass the findings to appropriate policy makers. At least, policy makers need to know the likely effects of certain policy objectives not only in relation to the targeted objective but also to the other components in the sector or the economy at large. Based on the observed limitations, this study has the following recommendations for future research work:

1. The need to compute a set of DRC rather than rely on just one. The set should either be over time or incorporate alternative assumptions about key parameters to indicate whether there is a good case for exploring the efficiency aspect of expanding commodity in question.
2. To undertake a full cost benefit analysis to see whether the costs or benefits identified are supportive to broader objective and hence

modifications where necessary.

3. The need to build a policy analysis framework around the general equilibrium approach rather than partial equilibrium approach. The national objective may be to become self-sufficient in rice production and the pricing policy may be used as an instrument to achieve this objective. Under such a situation policy analysis is required to show the level of price support that would be required to attain the objective, and the effects of such support to other sectors of the economy.

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7.0 APPENDICES

APPENDIX A.I

PAM Analyses

Table A1.1 PAM analysis for small scale rice farms

1. Farm budget

Average yield (Kg/ha)		1258.15
Average weighted producer price (Tsh/kg)		41.63
Total revenue ('000 Tsh/ha)		52.38
Imported inputs		0.00
-		0.00
Non-imported inputs		7.19
Seed		1.40
Others/miscellaneous		5.79
Domestic factors		4.75
Labour (35.7x133.16)		4.75
Fixed assets		0.16
Tools		0.16
Net revenue		40.28

2. Breakdown of the budget into main components

Imported inputs		0.00
Import duty		0.00
Transport and handling		0.00
Border price		0.00
Fixed assets (tools and implements)	100%	0.16
Taxes and duties	15	0.02
Imported items	65	0.10
Labour	10	0.02
Others	10	0.02

3. Farm budget in terms of main categories

Traded output (1.25815x0.65x320x175)	45.80
Traded inputs	0.10
Chemicals etc.	0.00
Imported items	0.10
Non -traded inputs	7.23
Miscellaneous/others (5.79+0.02)	5.81
Seed	1.40

Transport and handling	0.00
Domestic factors	4.77
Labour (4.75+0.02)	4.77
Transfers	
On output (52.38-45.80)	6.58
On traded inputs (0.10+(-0.10)	0.00
On non-traded inputs (taxes and duties)	0.02

4. Shadow prices for domestic resource

	C.F	
Others/Miscellaneous	0.81	4.70
Labour	0.70	3.34
Seed	1.20	1.68
		9.72
Domestic resource cost at shadow price		9.72

5. The PAM

Analysis	Revenue	Tradeable inputs	Domestic factors	Profit
Private analysis	52.38	0.10	12.00	40.28
Social analysis	45.80	0.10	9.72	35.98
Transfers	6.56	0.00	-2.28	4.30

6. Efficiency and protection coefficients

	Unadjusted	Adjusted	
NPC	= 52.38/45.80 = 1.14	52.38/45.80x0.7$^{\$}$	= 0.80
EPC	$\frac{(52.38-0.1)}{(45.8-0.1)}$ = 1.14	$\frac{(52.38-0.1)}{(45.8-0.1)x0.7^{\$}}$	= 0.80
DRC	= 9.72/(45.8-0.1) = 0.21	9.72/(45.8-0.1)x0.7$^{\$}$	= 0.15

Note: $ = correction factor- a ratio between the official exchange rate and equilibrium exchange rate (ie. 175/250)

Table A1.2 PAM analysis for large scale rice farms

1. The farm Budget		
Basic parameters		
Average yield (tones/ha)		4.24
Official producer price ('000Tsh/tone)		19.00
Total revenue ('000Tsh/tone)		80.56
Imported inputs		31.48
Chemicals		8.46
Fertilizers		6.35
Spares		7.52
Fuel, oil, and lubricants		9.15
Non-imported inputs		4.85
Seed		4.30
Others/miscellaneous		0.55
Donestic factors		10.33
Unskilled labour		6.55
Skilled labour		3.78
Fixed assets		30.52
Tools and implements		30.52
Total cost on input		77.18
Net revenue		3.38
2. Breakdown of the budget into main component		
Imported inputs (Chemicals. etc.)	100%	31.48
Import duty	15	4.72
Transport and handling	10	3.15
Border price	75	23.61
Fixed assets	100%	30.52
Taxes and duties	15	4.58
Imported items	65	19.84
Unskilled labour	7	2.14
Skilled labour	3	0.92
Others	10	3.05
3. Farm budget in terms of main categories		
Traded output (4.24x0.65x320x175)		154.34
Traded input		43.45
Chemicals etc.		23.61
Imported items		19.84
Non -traded inputs		11.05

Others/miscellaneous (3.05+0.55)	3.60
Seed	4.58
Transport and handling	3.15
Donestic Factors	13.38
Skilled labour (0.91+3.78)	4.69
Unskilled labour (2.14+6.55)	8.69
Transfers	
On output	-73.78
On traded inputs (45.35+4.72)-45.31	4.72
on non-traded inputs (taxes and duties)	4.53

4. Shadow prices for domestic resources

	C.F	
Others/miscellaneous	0.81	2.92
Transport and handling	1.20	3.78
Skilled labour	1.36	6.19
Unskilled labour	0.70	6.06
Seed	1.28	5.16

Donestic resource cost at shadow price		24.04
		-------

5 The PAM

Analysis	Revenue	Tradable inputs	Donestic Factors	Profit
Private analysis	80.56	48.17	29.01	3.38
Social analysis	154.34	43.45	24.04	86.85
Transfers	-73.78	-4.72	-4.97	-83.47

6. Efficiency and Protection Coefficients

	Unadjusted		Adjusted	
NPC =	80.56/154.34	= 0.52	$80.56/145.34x0.7^{*}$	= 0.37
EPC =	(80.56-48.17)/(154.34-43.45)	= 0.29	(80.56-48.17)/(154.34-43.45)$x0.7^{*}$	= 0.20
DRC =	24.04/(154.34-43.45)	= 0.22	$24.04/(154.34-43.45)x.7^{*}$	=0.15

Note: * = correction factor- a ratio between the official exchange rate and equilibrium exchange rate (ie. 175/250)

APPENDIX A2

Border Prices Estimation

In computing border prices, the data provided in table A2.1 and A2.2 of this appendix are appropriately used. The equilibrium exchange rate of Ths 250 per US$ against Tsh 175 for the average official exchange rate during 1989/90 crop season is used. The assumed equilibrium exchange rate is higher than the official exchange rate but lower than the rates prevailing in the parallel market.

Table A2.1. Weighted average into store price of paddy (Tsh/tone), 1989/90

Producer price	19000.00
1. Society levy	1140.00
2. Union levy	1330.00
3. Transport cash and crop	3500.00
4. Bags and twines	1700.00
5. Cash and crop insurance	150.00
6. Crop insurance	-
7. Fumigation	200.00
8. Handling	400.00
9. Local authority	-
10 Stamp duty	-
11 Godown rent	-
12 Into-store price	29350.00

Source: MDB (1989).

NB: Into-store price went up by 8%

Table A2.2. Rice costing for the year 1989/90.

Ex-Union Paddy (Tsh/tone)	
1. Into store cost	29350.00
2. NMC cost:	
1. Shrinkage ad spillage	750.00
2. Bags and twines	-
3. Transport to NMC godowns	-
4. Fumigation	140.00
5. Handling costs	400.00
6. Insurance	750.00
7. Branch operating expenses	2540.00
8. HQ-operational expenses	150.00
9. Interbranch expenses	6000.00
10. Interest on overdraft	5890.00
Total NMC Cost	15600.00
3. NMC Ex-store Costs.	45350.00
1. Into-store milling costs (65% milling extraction rate)	70692.00
2. Milling costs	4100.00
3. Total NMC ex-mill cost	74792.00
4. Capital recovery expenditure	1858.00
Total NMC ex-store costs	76650.00
5. NMC margin 2.5%	1870.00
6. NMC price to whole sellers	78520.00
7. Whole sellers cost + margin(8%)	6282.00
Whole sale price	84802.00
8. Retailers cost + margins (4.5%)	3816.00
9. Retail price	88816.00
10. Retail price rounded to	90000.00

Source: HDB (1989)

Table 3. Cost of imported rice , 1989/90

Cost	Tsh/tone
Cost of rice CIF Dar es Salaam in US$	320.00
Cost of rice CIF Dar es Salaam at Tsh 175/=	56000.00
Marketing costs	7525.00
Import tax (15%)	8400.00
Landed cost to Dar es Salaam	71925.00

Source: HDB (1989/90)

Estimation of Border Producer Prices

Three locations of production and consumption have been identified and the relevant border prices for each of them calculated. The computations start with milled rice and end with paddy. Essentially, the steps are:

Step 1. CIF value of rice is converted into shilling equivalent by multiplying it with official exchange rate (for unadjusted border price) and equilibrium exchange rate (for adjusted border price).

Step 2. Add the port handling and NMC marketing cost and whole sale margin to arrive at the cost of imported rice at NMC ware house in Dar es Salaam.

Step 3. Deduct milling cost and then multiply by the paddy/rice extraction rate of 0.65 to get landed price of imported rice in paddy equivalent at NMC ware house.

The border producer price at a given centre is obtained

by adding or subtracting the necessary marketing costs and margin depending on where production/consumption is taking place.

The rice produced in the coast villages and Dar es Salaam rural is internally exported to the city where it is competing with imported rice. All marketing charges and handling margins incurred in moving rice from the villages to Dar es Salaam are deducted from landed cost of imported rice at NMC ware houses in Dar es Salaam. The residual is the farmgate border price of rice. The marketing charges include those of cooperative unions (see table A2.3).

The rice produced in the hinterland (including Coast region and Dar es Salaam rural) is competing with imported rice in Dar es Salaam. Its border price is obtained by subtracting from the landed cost of rice at NMC warehouse in Dar es salaam the marketing and handling charges of moving rice from Dar es Salaam up to the farm gate in the villages. The marketing and handling charges referred here are those charged by NMC for moving rice from Dar es Salaam up to regional capitals and those of cooperative unions and cooperative societies for moving the product from the region to the farm gate (see table A2.4).

The imported rice at the regional capitals (close to the cites of production) is compared with the domestic rice. The imported rice (converted to paddy) is moved from Dar to regional capitals while domestic paddy is moved from farm gates to regional capitals. The border price at farm gate is obtained under the following steps:

Step 1. Add to the landed cost of paddy at NMC ware house in Dar es Salaam the marketing and handling charges necessary to move paddy from Dar es Salaam to regional capitals and vice versa.

Step 2. Deduct marketing and handling charges for moving paddy from the farm gate to the regional capitals.

The cost element in step 1 above is controlled by NMC, the official marketing institution which moves rice beyond regional capitals, while that in step 2 is controlled by cooperative unions and cooperative societies responsible for moving rice from the regional capitals to farm gate respectively (see table A2.5)

Table A2.3. Border producer price for paddy consumed as rice in Dar es Salaam, 1989/90

Cost item	Unadjusted	Adjusted	
CIF Dar es Salaam US$	320.00	320.00	
Official/Shadow exchange rate	175.00	250.00	
CIF value in Tsh	56000.00	80000.00	
Marketing and handling margin up to NMC godowns	7525.00	7525.00	
Total landed cost of rice	63525.00	87525.00	
Less milling costs	4100.00	4100.00	
Sub-total	59425.00	83425.00	
Paddy equivalent (at 65% extraction)	38625.00	54225.25	(A)
Internal Marketing costs:			
1.Dar es Salaam /Kibaha to farm gate			
Transport to farm gate*	1750.00	1750.00	
Society levy	1140.00	1140.00	
Union levy	1330.00	1330.00	
Crop insurance	150.00	150.00	
Handling	400.00	400.00	
Fumigation	200.00	200.00	
Godown rent	00.00	00.00	
Bags and twines	1700.00	1700.00	
Sub-total	6670.00	6670.00	
2. NMC operating costs	2690.00	2690.00	
Total internal costs	9360.00	9360.00	(B)

Border price of paddy at farm gate (A-B)	23266.25	44366.25
Official producer price	19000.00	19000.00
NPC =off. price/border price	0.65	0.42

Note: * Estimated as 50km (Dar es Salaam-Kibaha) at Tsh 35/km.

Table A2.4 Border producer price of domestic paddy consumed as rice in Dar es Salaam, 1989/90

Cost item	Unadjusted	Adjusted
CIF Dar es Salaam US$	320.00	320.00
Official/Shadow exchange rate	175.00	250.00
CIF value in Tsh	56000.00	80000.00
Marketing and handling margin up to NMC godowns	7525.00	7525.00
Total landed cost of rice	63525.00	87525.00
Less milling costs	4100.00	4100.00
Sub-total	59425.00	83425.00
Paddy equivalent (at 65% extraction)	38626.25	54226.25(A)
Internal Marketing costs:		
1. NMC costs Dar es Salaam to Region		
Fumigation and handling	540.00	540.00
Transport Dar to Regions	6000.00	6000.00
Insurance	750.00	750.00
Operating costs	2690.00	2690.00
Interest	5890.00	5890.00
Sub-total	15870.00	15870.00(B)
2. Cooperative Unions and Society costs		
Regions to Farm Gate		
Transport to farm gate	3500.00	3500.00
Society levy	1140.00	1140.00
Union levy	1330.00	1330.00
Crop insurance	150.00	150.00
Handling	400.00	400.00

Godown rent	00.00	00.00
Bags and twines	1700.00	1700.00
Sub-total	5420.00	5420.00(C)
Border price of paddy at farm gate (A-B-C)	14336.25	29926.25
Official producer price	19000.00	19000.00
NPC =off. price/border price	1.33	0.63

Table A2.5 Border producer price for domestic paddy produced in the regions and consumed as rice in regional capitals, 1989/90

Cost item	Unadjusted	Adjusted
CIF Dar es Salaam US$	320.00	320.00
Official/Shadow exchange rate	175.00	250.00
CIF value in Tsh	56000.00	80000.00
Marketing and handling margin up to NMC godowns	7525.00	7525.00
Total landed cost of rice	63525.00	87525.00
Less milling costs	4100.00	4100.00
Total cost	59425.00	83425.00
Paddy equivalent (at 65% extraction)	38626.25	54226.25 (A)
Internal Marketing costs:		
1. NMC costs Dar es Salaam to Region		
Fumigation and handling	540.00	540.00
Transport Dar to Regions	6000.00	6000.00
Insurance	750.00	750.00
Operating costs	2690.00	2690.00
Interest	5890.00	5890.00
Sub-total	15870.00	15870.00(B)
2. Cooperative Unions and Society costs		
Regions to Farm Gate		
Transport to farm gate	3500.00	3500.00

Society levy	1140.00	1140.00
Union levy	1330.00	1330.00
Crop insurance	150.00	150.00
Handling	400.00	400.00
Godown rent	00.00	00.00
Bags and twines	1700.00	1700.00
Sub-total	6420.00	6420.00(C)
Border price of paddy at Regional capitals (A+B-C)	45676.25	61676.25
Official producer price	13000.00	19000.00
NPC =off. price/border price	0.41	0.30

Estimation of Border Consumer Price

Step 1. CIF value of imported rice is converted into Tsh equivalent by multiplying it with the official exchange rate (for unadjusted border price) or equilibrium exchange rate (for adjusted border price).

Step 2. Add to the port handling charges marketing fees up to godown Dar es Salaam and 8% whole sale margin.
This gives the landed cost of imported rice plus the whole sale margin.

Step 3. Add 4.5% retail marketing cost and margin. The sum of this and the total cost arrived in step 2 is what the consumers would pay for imported rice in Dar es Salaam.

Assumption. Transport and marketing activities of rice in Dar es Salaam are effected by NMC, the official channel where imported rice will compete with domestic rice (see table A2.6).

Imported rice has to compete with domestic rice in the regional capitals which are much closer to the production

centres than Dar es Salaam). Though Dar es Salaam (especially in the rural areas) produces a little amount of rice, bulky production takes place in the hinterland of the country.

The additional cost in this case includes the marketing and transportation cost incurred to move rice from NMC ware house in Dar es Salaam to ware house in regional capitals. This cost is added to the landed price of imported rice in NMC ware house in Dar es Salaam. Other wise, steps 1, 2 and 3 are the same as for the Dar es Salaam centre above. This results into the cost of imported rice at regional capitals (see table A2.7).

At village level, the imported rice is subjected to heavy internal marketing and transportation costs and handling margins that makes it lose competitiveness against locally produced rice. Thus, additional cost to that at regional level is included to the landed price of rice at regional capitals. This is the transportation and handling charges plus the retail margin from the regional capital to the retailers in the village. Marketing and transportation of rice from regional capitals to the villages is assumed to be the domain of cooperative unions. Other than the additional costs from the regional capitals to the villages, the rest of the steps (ie. 1 to 3) are the same as for the regional capitals (see table A2.8).

Table A2.6 Border consumer price of rice consumed in Dar es Salaam, 1989/90

Cost item	Unadjusted	Adjusted
CIF Dar es Salaam US$	320.00	320.00
Official/Shadow exchange rate	175.00	250.00
CIF value in Tsh	56000.00	80000.00
Marketing and handling margin up to retail shops in Dar es Salaam	17535.00	17535.00
Sub-total	73535.00	97535.00
Add 4.5% retailers cost plus margin	3309.08	4389.08
Border consumer price Dar es Salaam	76844.08	101924.08
Official consumer price	90000.00	90000.00
NPC-DAR = off. price/border price	1.17	0.88

Table A2.7 Border consumer price of rice in Regional capitals, 1989/90

Cost item	Unadjusted	Adjusted
CIF Dar es Salaam US$	320.00	320.00
Official/Shadow exchange rate	175.00	250.00
CIF value in Tsh	56000.00	80000.00
Marketing and handling margin up to retail shops in Dar es Salaam*	17535.00	17535.00(A)
NMC marketing cost from Dar es Salaam to Regions		
Shrinkage and spillage	730.00	730.00
Fumigation and handling	540.00	540.00
Insurance	750.00	750.00
Operating expenses	2590.00	2690.00
Average transport cost(Inter branch)	6000.00	6000.00
Interest on overdraft	5690.00	5690.00
sub-total	16600.00	16600.00(B)
Total cost of imported rice in the Region (A+B)	90135.00	114135.00
Add 4.5% retailer cost margin	4056.06	5136.06(C)
Retail price in the region (A+B+C)	94191.06	119271.08
Official retail price	90000.00	90000.00
NPC =Off. price/border price	0.96	0.75

NB: * Includes 8% whole sale margin

Table A2.8 Border consumer price of rice at village level, 1989/90

Cost item	Unadjusted	Adjusted
CIF Dar es Salaam US$	320.00	320.00
Official/Shadow exchange rate	175.00	250.00
CIF value in Tsh	56000.00	80000.00
Marketing and handling margin up to retail shops in Dar es Salaam	17535.00	17535.00(A)
NMC marketing cost to regions	16600.00	16600.00
Sub-total (NMC costs Dar es Salaam to regions)	34135.00	34135.00(B)
Cooperative unions marketing costs to villages		
Transport cash and crop	3500.00	3500.00
Union levy	1330.00	1330.00
Cash and crop insurance	150.00	150.00
Crop insurance	0.00	0.00
Handling	400.00	400.00
Fumigation	200.00	200.00
Shrinkage	500.00	500.00
Local authority	0.00	0.00
Stamp duty	0.00	0.00
Godown rent	0.00	0.00
Bags and twines	1700.00	1700.00
Sub-total	7780.00	7780.00(C)
Marketing cost of paddy/rice equivalent. (65% x C)	11969.23	11969.23(D)
Total cost of imported rice at the village level (A+B+D)	102104.23	126104.23
Add 4.5% retailers cost and margin	4594.69	5674.69
Border retail price	106698.92	131778.92
Official retail price	90000.00	90000.00
NPC =Off.price/border price	0.84	0.68

APPENDIX A3

Partial Equilibrium Model

Table A3.1 Estimation of Average Weighted Prices for Paddy/rice

Basic Assumptions Based on MDB (1989) Standards.

i. Total marketed output is about 50% of total domestic production.

ii. Output marketed through the official market is about 12% of the total domestic production.

iii. Output marketed through open market is about 38% of the total domestic production.

1. Average weighted domestic producer price (Tsh/kg)

	('000 tones)
Total domestic production	740.15
Total marketed output (50%)	370.08
Official price (Tsh/kg)	19.00
Amount sold in official market (12%)	88.82
Amount sold in open market (38%)	281.26
Average open market price (Tsh/kg)	42.27

$$AWP_C = \frac{(19.00 \times 88.82) + (42.27 \times 281.26)}{370.08} = 36.69$$

2. Average weighted consumer price (Tsh/kg)

Official sales of rice to consumers (88.82 x 0.85) + imports =(88.82 x 0.85) +19.56	77.29
Open market sales of rice = 281.26 x 0.65	182.82
Open market retail price (Tsh/kg)	72.39
Official retail price (Tsh/kg)	90.00

$$AWP_C = \frac{(90.00 \times 77.29) + (72.39 + 182.82)}{260.11} = 77.62$$

Table A3.2 Estimation of domestic consumption of rice

1. Domestic paddy production	('000 tones)
Production from small scale producers	725.98
Contribution from NAFCO farms	14.17
Total domestic production	740.15

2. Domestic rice consumption

Basic assumptions (based on TFNC standards)

i. about 5% of total production is used for seed
ii. Wastes account for about 1% of total production

Thus,

Amount used for seed (0.05x740.15)	37.00
Wastes (0.01x740.15)	7.40
Total domestic supply of paddy (Total production - seed - waste)	695.75
Total domestic supply of rice (0.65x695.75)	452.24
Imports	19.56
Domestic consumption (dom.supply + import) C_d	471.79

Table A3.3 Derivation of production and consumption at border prices

These are not observable. They are therefore derived using the respective elasticities as follow:

1. Production at world price (Q_w)

This employs elasticity of supplies for small scale farms (E_{ss} = 0.1) and large scale farms (E_{sl} = 0.3).

$$E_s = dQ/dP \times P/Q = \frac{(Q_d - Q_w)}{Q_d} \Big/ \frac{(P^b - P^d)}{P^b}$$

Thus the formula becomes,

$$Q_w = Q_d - E_s \times \frac{(P^b - P^d)}{P^b} \times Q_d$$

a) Small scale production at world price (Q_{ws})

$$Q_{ws} = Q_{ds} - E_{ss} \times \frac{(P_d - P_d)}{P^b} \times Q_{ds}$$

$$= 725.98 - 0.1 \times \frac{(45.49 - 36.69)}{45.49} \times 725.98 = 711.94$$

b) Large scale production at world price (Q_{wl})

$$Q_{wl} = Q_{dl} - E_{sl} \times \frac{(P^b - P_d)}{P_b} \times Q_{dl}$$

$$= 14.17 - 0.3 \times \frac{(45.49 - 36.69)}{45.49} \times 14.17 = 13.35$$

Therefore,

$$Q_{wt} = Q_{ws} + Q_{wi} = 711.94 + 13.35 = 725.29$$

2. Consumption at world price (C_w)

This employs elasticity of demand for rice (E_c =-0.5)

$$E_d = \frac{(Cd-Cw)}{C_d} \Big/ \frac{(P_b-P^d)}{P^b}$$

thus,

$$C_w = C_d - (-E_d) \times \frac{(P^b-P_d)}{P^b} \times C^d$$

$$= 471.79 - (-0.5) \times \frac{(117.66 - 77.62)}{117.66} \times 471.79 = 552.07$$

Table A3.4 Basic Data for Partial Equilibrium Models

Production at domestic price (Q_d)	740.15
Production at world price (Q_w)	725.29
Border producer price (P_b^b)	45.49
Border consumer price (P_c^b)	117.66
Price faced by domestic producer price (P_p)	36.69
Price faced by consumer price (P_c)	77.62
Consumption at domestic price (C_d)	471.79
Consumption at world price (C_w)	552.07

Table A3.5 Partial equilibrium models

1. Net social loss in production (NSLP)

$NSLP = 0.5(Q^{*} - Q_{w})(P_{p}^{b} - P_{p})$

$= 0.5(725.29-740.15)(45.49-36.69) = 65.384 \times 10^{3}$

2. Net social loss in consumption (NSLC)

$NSLC = 0.5(C^{*}-C_{d})(P_{c}-P_{c}^{b})$

$0.5(552.07-471.79)(77.62-117.66) = 1607.2056 \times 10^{3}$

3. Net social loss (NSL)

$NSL = NSLP + NSLC = 65.384 + 1607.205 = 1672.589 \times 10^{3}$

4. Welfare gain by producers (GP)

$GP = Q_{d}(P_{p}-P_{p}^{b}) - NSLP$

$740.15(36.69-45.49) - 65.384 = -6578.704 \times 10^{3}$

5. Welfare gain by consumer (GC)

$GC = C_{d}(P_{c}^{b}-P_{c}) - NSLC$

$471.79(117.66-77.62) - 1607.2056 = 17263.266 \times 10^{3}$

6. Change in Foreign exchange (ΔFE)

$FE = -P_{p}^{b}(Q_{w} - Q_{d}) + P_{c}^{b}(C_{d}-C_{w})$

$= -45.49(725.29-740.15) + 117.66(471.79-552.07$

$= \underline{-8769.7634 \times 10^{3}}$

7. Change in Government revenue (ΔGR)

$GR = Q_{d}(P_{p}^{b}-P_{p}) - C_{d}(P_{c}^{b} - P_{c})$

$= 740.15(45.49-36.69) - 471.79(117.66-77.62)$

$= \underline{= -12377.1516 \times 10^{3}}$