Equity
and
Growth
through
Economic
Research

PROMOTING REGIONAL EXPORTS OF MALIAN RICE

African Economic Policy
Discussion Paper Number 17
April 1999

Abdoul W. Barry, AIRD, (USA)
Salif B. Diarra, Observatoire des Marchés Agricoles (Mali)
Daouda Diarra, Chemonics (Mali)

EAGER

USAID

EAGER

PROMOTING REGIONAL EXPORTS OF MALIAN RICE

African Economic Policy
Discussion Paper Number 17
April 1999

Abdoul W. Barry, AIRD, (USA)
Salif B. Diarra, Observatoire des Marchés Agricoles (Mali)
Daouda Diarra, Chemonics (Mali)

Funded by
United States Agency for International Development
Bureau for Africa
Office of Sustainable Development
Washington, DC 20523-4600

Equity and Growth through Economic Research

EAGER supports economic and social science policy analysis in Sub-Saharan Africa. Its primary goal is to increase the availability and the use of policy analysis by both public and private sector decision-makers. In addition to the goal of achieving policy reform, EAGER seeks to improve the capacity of African researchers and research organizations to contribute to policy debates in their countries. In support of this goal, EAGER sponsors collaboration among American and African researchers and research organizations.

EAGER is implemented through two cooperative agreements and a communications logistics contract financed by the United States Agency for International Development (USAID), Strategic Analysis Division, The Office of Sustainable Development, Bureau for Africa. A consortium led by the Harvard Institute for International Development (HIID) holds the cooperative agreement for Public Strategies for Growth and Equity. Associates for International Resources and Development (AIRD) leads the group that holds the cooperative agreement for Trade Regimes and Growth. The Communications Logistics Contract (CLC) is held by a consortium led by BHM International, Inc. (BHM). Other capacity-building support provides for policy analysis by African institutions including the African Economic Research Consortium, Réseau sur Les Politiques Industrielles (Network on Industrial Policy), Programme Troisième Cycle Interuniversitaire en Economie, and the International Center for Economic Growth. Clients for EAGER research activities include African governments and private organizations, USAID country missions and USAID/Washington, and other donors.

For information contact:

Yoon Lee, Project Officer
USAID
AFR/SD/SA (4.06-115)
Washington, D.C. 20523
Tel: 202-712-4281 Fax: 202-216-3373
E-mail: ylee@usaid.gov

Lisa M. Matt, Senior Advisor
BHM International
1111 North 19th Street
Arlington, VA 22209
Tel: 703-741-0900 Fax: 703-741-0909
E-mail: lmatt@eagerproject.com
Contract AOT-0546-Q-00-5271-00

J. Dirck Stryker, Chief of Party
Associates for International
Resources and Development (AIRD)
185 Alewife Brook Parkway
Cambridge, MA 02138
Tel: 617-864-7770 Fax: 617-864-5386
E-mail: dstryker@aird.com
Contract AOT-0546-A-00-5073-00

Sarah Van Norden, Project Administrator
Harvard Institute for International Development (HIID)
14 Story Street
Cambridge, MA 02138
Tel: 617-496-8237 Fax: 617-496-9466
E-mail: svannord@hiid.harvard.edu
Contract AOT-0546-A-00-5133-00

ABSTRACT

Mali possesses a significant comparative advantage in rice production and commercialization within its national territory as well as in Côte d'Ivoire, Guinea, and Senegal. This comparative advantage is basically the results of government efforts during the last eight years (1990-1998) in the rehabilitation of irrigation infrastructure and the creation of conditions that favor rice production in the Office du Niger river basin. The surpluses combined with devaluation of the CFA franc make Mali a potential rice exporter to West Africa.

Despite Mali's comparative advantage, its rice exports have not done well generally because of the protectionist policies of neighboring countries with respect to rice, the stringent requirements of international markets, cumbersome banking and money transfer mechanisms, and the lack of viable market information systems for both internal and international markets.

To secure a much larger share of the West African market, Mali needs to undertake several steps including the following: encourage subregional organizations to include rice on their list of primary agricultural products and thus exempt it from duties and taxes; specialize in the production and export of high-quality rice and import of low-quality rice; reduce entry duties and taxes levied on transport vehicles, spare parts, and fuel for rice production and consumption areas; promote subregional and international investments in the Office du Niger in order to increase exportable surplus; and encourage the collection and analysis of market information and the transfer of useful market information between market information systems (SIMs).

Authors

Abdoul W. Barry abarry@aird.com is a senior economist and has been with Associates for International Resources & Development (AIRD) since 1995. He received his Ph.D. in agricultural economics from Michigan State University. He has consulted for many bilateral and multilateral organizations including, USAID, World Bank, the United Nations Food and Agriculture Organization (FAO). He advised government officials and private sector economic operators in Africa in the design and implementation of economic and food policies. He has written several articles covering exchange and regional integration in West Africa.

Salif Diarra holds masters degree in agricultural economics from Michigan State University, and is the director of the Observatoire des Marchés Agricoles in Mali. He has gained a deep knowledge of the rice sector in Mali and has served as Chief for the Marketing Division from 1986 through 1988 and the Division of Market Information Service from 1988 to 1990.

Daouda Diarra holds a doctorate of troisième cycle in rural economy from the Centre Ivoirien de Recherches Economiques et Sociales and has been a consultant for Consult-Evaluation-Formation. He participated in the study leading to the privatization of veterinary services in Mali and was the socioeconomist on the fraud study in Mali. He also participated in a study to improve production and preparation of project documents for the textile industry.

Authors' note

We would like to express our gratitude to USAID for funding this study and to the evaluation committee composed of Mrs. Nafissatou Guindo Konaré of the Direction Nationale des Affaires Economiques in Mali, to Mr. Amadou Camara of USAID, Elhadj Oumar Tall of the Délégation Générale in charge of restructuring the Office du Niger, and Amadaou Sylla de KOUMALIM, S.A, .for their comments and contributions to the implementation of the study. We would also like to thank Drs. Dirck Stryker, president of AIRD and director of EAGER/Trade, and Dunstan Spencer, EAGER project coordinator for West Africa, for their constructive criticism.

TABLE OF CONTENTS

TABLES

INTRODUCTION

The structural adjustment programs undertaken in Mali in the 1980s led to the transformation of the Malian economy which had been until that time exclusively dependent on exports of beef, cotton and a few other mineral-based products as a means of generating hard currency. Due largely to economic liberalization and devaluation of the CFA franc in January 1994, Mali's economy has grown more competitive and improved significantly giving rise to increased product diversification in both domestic and export markets. A product that may well benefit from Mali's competitive climate is rice. However rice production remains far below its large potential and rice growers are unable to take advantage of the opportunities offered by today's favorable economic environment.

Rice production in Mali has increased significantly since the 1990s due to several factors : Liberalization of the paddy rice price under the cereal market restructuring program (PRMC), that induced producers and merchants to better allocate and increase the values of their resources. Other factors include proliferation of small mills, which have significantly reduced processing costs, investment in the public sector to rehabilitate production infrastructure and the January, 1994 devaluation of the CFA Franc. Thes above mentioned factors led to significant increases in rice yields and new production records that translate into a notable reduction in cost per unit of production and the improved competitiveness of Malian rice.

Condisering the strength of the rice sector in Mali, this study determines Mali's comparative advantage in the production and marketing of its rice, as well as determines whether rice exports to neighboring countries are sustainable in the short- and long-term. Chapters 1 and 2 look at the evolution of rice production and government policies as well as policies of the neighboring countries. Chapter 3 covers comparative advantage, incentive structures, and the durability of exports on the basis of national supply and demand projection. Chapter 4 discusses constraints to rice production in Mali and formulates some recommendations.

I. PRODUCTION SYSTEMS AND POLICY IMPLICATIONS FOR MALIAN RICE EXPORTS

1.1 Evolution and factors affecting rice production in Mali

Rice is produced on 3 percent of the total land area under cultivation in Mali, mostly in the Niger and Senegal River basins. According to information from the Direction Nationale de la Statistique et de l'Informatique (DNSI), rice production has been increasing at an estimated annual rate of nearly 4 percent. As shown in Graph 1.1, the increase is attributable to rice produced under both irrigated and rain-fed conditions.

An in-depth analysis of DNSI data suggests that an increase in rain-fed rice production in Mali results almost exclusively from the expansion of arable land, whereas increases in irrigated rice production appear to result from intensive production. Graph 1.2 portrays rain-fed and irrigated rice yields. Although other types of rice are produced under irrigated conditions, those reported in Graph 1.1 are limited to the Office du Niger production zone. Rice is also produced under irrigated conditions by controlled submersion in the Operations Riz Ségou and Mopti. This production method is highly inefficient and wastes water, although it produces higher yields compared to those under rain-fed rice.

Graph 1.2 shows that the highest yields occurred in 1990 with annual production reaching 3 tons per hectare. While irrigated rice yields increased and reached 5 tons per hectare, yields under rain-fed conditions stayed at their 1989 levels. It appears that irrigation increased rice production especially in the Office du Niger zone. Although only five percent of potential arable land suitable for irrigation is under cultivation in the Office du Niger zone, it produced 75 percent of total volume exported. Given this potential, the Office du Niger zone is the focus of the present study.

1.2 Production systems in the Office du Niger zones

Rice production in the Office du Niger zones is based on gravity irrigation. Rice is grown as seedlings and then transplanted and irrigated until maturity. Producers use traditional farm tools as well as animal traction (bulls and donkeys) for most of their rice production activities such as seeding, cultivation, and land preparation.

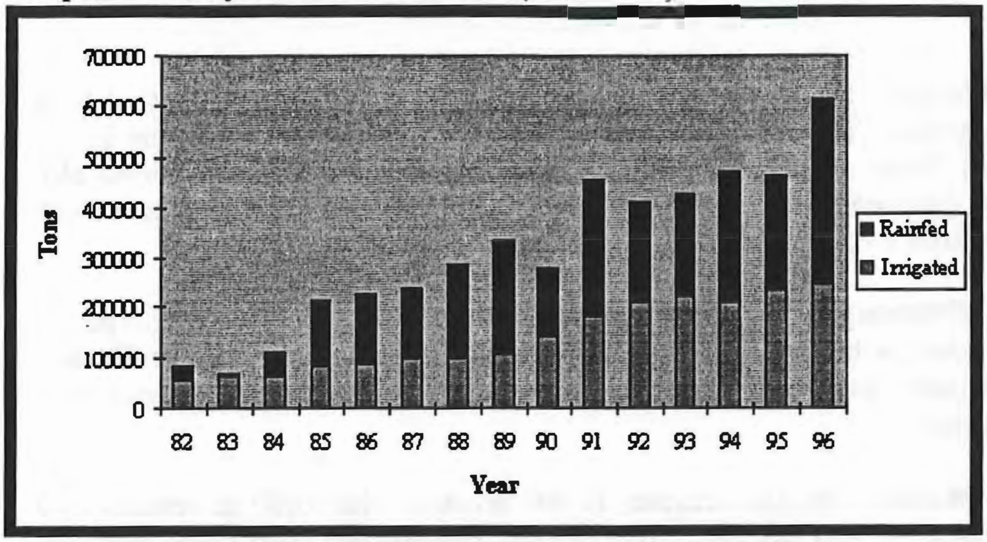
The major zone of the Office du Niger is subdivided into five sub-zones with different production systems based on the infrastructure rehabilitation programs undertaken by the government. The sub-zones are Macina, Niono, Molodo, N'Débougou, and Kouroumary. Each zone possesses unique characteristics with respect to land management, yield per hectare, and road and communication infrastructure.

These characteristics serve as a basis for the analysis of rice production and indicate the extent to which rice could potentially enjoy a comparative and competitive advantage for both domestic markets and regional exports.

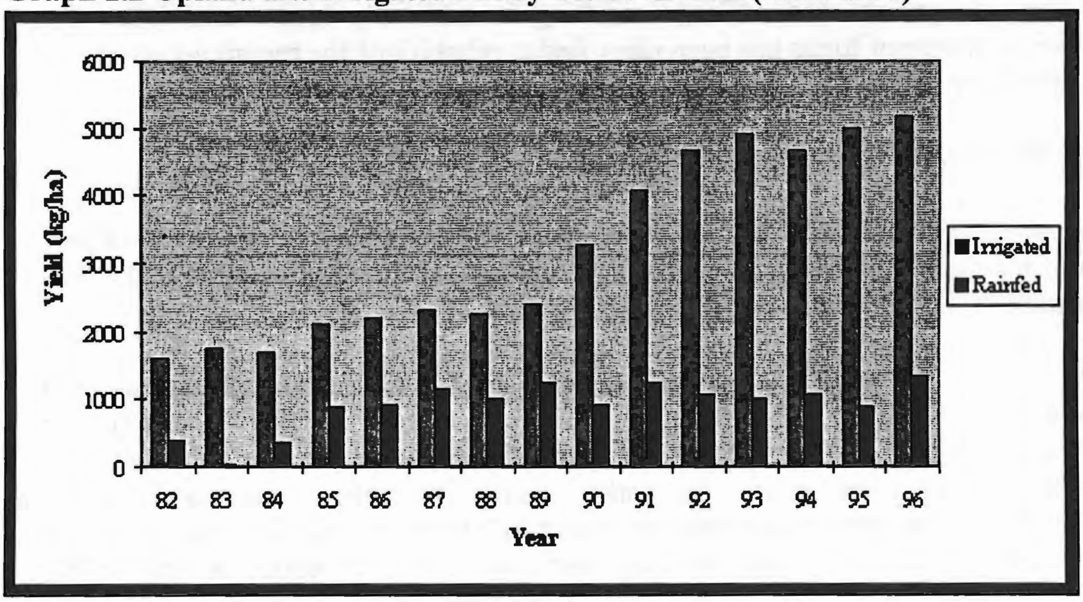
Zone of Kouroumary. Kouroumary occupies 10,400 hectares developed since the 1950s. It was subsequently redeveloped but remained landlocked until 1997. Recently however, funds from the Netherlands have made it possible to open up the region. The major road axis South-North linking Niono to N'Débougou and S8-Dogofry has been rehabilitated. The larger infrastructure rehabilitation program covers upgrading 32 kilometers of distribution irrigation canals in the *casier* of Kogoni; and upgrading the secondary canals of Dogofry.

Despite some of the handicaps mentioned above, Kouroumary possesses a great production potential. Its current yields vary between 4.5 to 5 tons per hectare and will increase significantly when the irrigation infrastructure is fully upgraded.

Graph 1.1 Paddy Production in Mali (1982-1996)



Graph 1.2 Upland and Irrigated Paddy Yields in Mali (1982-1996)



Note: These data relate to irrigated rice produced in the Office du Niger zones only.

Source: Direction Nationale de la Statistique et de l'Informatique.

Zone of Molodo. Molodo which covers 16,000 undeveloped hectares is in much worse condition than Kouroumary.

Molodo possesses better road infrastructure than Kouroumary and does not experience difficulties exporting its rice produce even during severe rainy seasons. Molodo is also supposed to benefit from infrastructure improvement funds similar to those invested in Kouroumary. These improvements promise to raise rice productivity which currently varies between three and 4.8 tons per hectare.

Zone of Niono. Niono covers 7,997 hectares of which nearly 90 percent have been upgraded. The zone produces higher yields than any other zone in the Office du Niger, by approximately 5.5 and six tons per hectare. Niono also possesses good communication infrastructure and is well poised to produce and commercialize its production without difficulty.

Zone of N'Débougou. N'Débougou occupies 3,000 hectares with yields reported at 3,000 tons per hectare. It is located 17 kms from Niono. This short distance makes it more accessible thus enabling producers to buy inputs and sell their products easily.

Zone of Macina. Macina occupies 12,000 hectares with 5,600 ha rehabilitated with funds from ARPON and 2,100 hectares rehabilitated with funds from the European Fund and SATOM. Major constraints include a labor shortage and poor water management and drainage resulting in extremely high water fees. An external source of funds has been identified to rehabilitate the remaining areas. Yields vary between 4.5 and five tons per hectare.

1.3 Major outline of rice policy in Mali

From independence until cereal market liberalization, rice policy in Mali largely consisted of maintaining a balance between medium-term national production and short-term consumption by a growing low-income population.

Similarly to other Sub-Saharan African countries, Mali's decision-makers allotted resources to the subsidization of consumption. The government's primary objective was to ensure affordability of basic foodstuffs, particularly rice, by price subsidies that lowered price of rice well below its market value. The policy was based on the assumption that private economic operators would inflate the price and create shortages leading to higher market prices and enabling merchants to reap disproportionately higher benefits.

Despite the government's strong desire to satisfy politically powerful urban consumers, decision-makers made additional efforts to promote national rice production in order to protect local rice from outside competition. In particular, policy-makers implemented several measures to discourage rice entry and dumping. Measures included higher entry and custom taxes and total suspension of rice imports. The Office of Regulation and Price Stabilization levied variable taxes on rice imports to provide local rice with additional protection (Coelo, 1989.).

In addition to protectionist policies, local rice benefited from material and technical inputs to promote its production. Mali's rice policy eventually led to establishment of the Office du Niger in 1932, an entity charged with rice production and marketing. Rice production in Mali underwent several changes over the years and may be considered in terms of the following phases:

1. During the last two decades of independence, the Malian government controlled cereal production and exercised even tighter control over the rice sector. Government dominance discouraged the formation of private networks in cereal and rice production. In addition, the establishment of an entity that regulated rice production resulted in inefficiencies such as poor delivery mechanisms for inputs, poor irrigation canals and water supply, as well as in inadequate knowledge of production technologies. These inefficiencies resulted in poor yields of just 2.4 tons per hectare between 1973 and 1978.

2. Government-led interventions began to fail toward the end of the 1970. In response, a special conference on the Office National was organized in Ségou in November 1979. The conference led to the formulation of a new strategy that gave producers some responsibilities and choices in their operations. In 1984, the first phase of the strategy abolished the policing agency thus allowing producers to sell their paddy at a fixed price on any market. The government also created the Evaluation and Food Security Commission (CESA) and implemented the second phase of the Cereal Market Restructuring Program (PRMC).

3. In 1984, significant changes took place in agricultural communities. Several village-based organizations were established to manage inputs and other marketing arrangements on behalf of their members. The joint venture between the Office National and bilateral organizations helped establish credit lines for producers. The Fund for Agricultural Inputs (FIA) was created in 1985 but was replaced by the Fund for Village Development (FDV) which was funded by the Netherlands. It provided the means for producers to purchase farm-related inputs such as seeds and tools through village-based associations. The National Bank for Agricultural Development was established in 1988 and helped provide credits to the rice sector.

In terms of investments, the Office du Niger implemented a large rehabilitation program in rice production areas. The program benefited from funds from ARPON, the Netherlands, RETAIL of the Caisse Française de Développement, the European Fund and, the World Bank. The investments were responsible for the rehabilitation of 9,880 hectares in the 1988-1989 campaign (3,875 hectares in Macina and 6,005 hectares in Niono). By the end of the 1994-1995 growing season, four assistance projects rehabilitated a total of 18,830 hectares (40 percent of total land under cultivation), of which 59 percent was financed by ARPON, (11,300 hectares), 16 percent by the World Bank (13,000 hectares), 13 percent by RETAIL (2,400 hectares), and 11 percent by the European Fund (2,100 hectares). These rehabilitation projects were accompanied by improvements in extension services, improved cultural practices, introduction of betteradapted rice varieties such as the short-stem and non photosensitive B.G 90-2, higher doses of fertilizers, and much improved post-harvest technologies (mostly provided by ARPON). The number of post-harvest technologies, especially small mills, increased significantly, largely because of funds provided by the Netherlands. This increase played a significant role in reducing post-harvest processing costs in the Office National's production zones.

The results from the rehabilitation investment phase led the government to cease its intervention in the rice sector. State subsidies and agencies such as the Agricultural Tools Assembly Plant were dismantled in 1991 and the rice agencies closed in 1995. The Office de Niger's role was relegated to providing extension advice on production and water management issues. The result of this restructuring became part of the overall rural development framework and was seconded by the office of the Prime Minister.

The government also revisited its land tenure policies that granted the state exclusive rights to the land. The Office du Niger managed the land on behalf of the state by giving producers certain rights to farm if they paid fees based on plot size. Producers who resided in the Office du Niger zones enjoyed privileges not extended outside zones. This disparity was corrected in the new land tenure code, giving equal rights to anyone including foreigners, wanting to invest in rice production.

The new code was subdivided into distinct categories as follows:

1. annual production contract;
2. long-term contract transferable to other generations (assuming contract clauses are respected)
3. long-term (from 18 to 100 years) contract conferring real rights subject to mortgage (collateral);
4. and ordinary lease.

It is important to note that bilateral and multilateral organizations, particularly the Netherlands, the World Bank, the French Cooperation, and USAID, played a major role in introducing reforms into the rice sub-sector. Through the Cereal Market Restructuring Program, the donors have encouraged price liberalization and free markets as well as the adoption of national rice promotion policies. Discussions between donors and the government led to the 1992 adoption of official policies for the rice sector. As such, USAID, along with other donors, contributed toward the redistribution, redeployment and training of personnel involved in the rice sector. The effort laid the foundation for the privatization of the four rice factories of the Office du Niger and resulted in a new land management decree permitting both nationals and foreigners to invest in the rice sector. USAID also provided assistance in rehabilitating nearly 1,000 hectares of community-based rice perimeters in zones outside the Office du Niger. The assistance resulted in considerable improvements in the rice sector and made Malian rice more competitive.

1.4 Implications of regional policies on Malian rice exports

The severe drought of the 1970s led to exorbitant price increases of primary commodities on the international market and spurred African countries in the region to implement protectionist policies in the belief that this would help attain food self-sufficiency. This strategy resulted in heavy public investments in irrigated rice production and strong protectionist import policies intended to ensure the financial viability of local rice. As a result of these policies, little rice was exported and any potential exports were considered an impediment to national stock security.

Despite self-sufficiency strategies, rice imports increased over the years, especially imports from neighboring countries. Imports bridged the gap between inadequate local production, an expanding population and the escalating rate of urbanization. Available data suggest that population growth and increased urbanization spurred renewed economic development leading to higher rice consumption which in turn improved prospects for Malian rice exports. Nevertheless, Mali could not realize those prospects if Malian rice did not demonstrate a competitive and a comparative advantage for future rice production in the sub-region.

The entry taxes levied by the sub-regional countries on rice from international markets, place Malian rice at a significant advantage that may become even more important if sub-regional countries enforce their tax policies. Malian rice exports to the region would then become even more dominant in the future, since Economic Community for West African States (ECOWAS) members plan to levy a 20 percent tax on rice imported from international markets. It is unclear whether Malian rice exported to neighboring countries will be taxed as well. In the event that it is not taxed, ECOWAS member countries would face lack of revenues due to exemption of Malian rice. An important question about regional marketing policies remains. How can countries be persuaded to look beyond national self-sufficiency interests and consider what is best for the entire region.

II. MALI'S COMPARATIVE ADVANTAGE AND MALIAN RICE COMPETITIVE ADVANTAGE

This section discusses Mali's comparative advantage in rice production and domestic and sub-regional commercialization. It also examines the degree to which Malian government rice policies have an impact on rice competitiveness. The analyses in this section are based on the Domestic Resource Cost (DRC) method.

2.1 Initial hypothesis for the analysis of comparative advantage

The current study bases its findings on the hypotheses described below:

1. The international market price of rice from Thailand with 35 percent foreign material is equivalent to the 1996 price of $275 per ton for Malian rice called RM 40 (USDA Economic Research Service, 1998). An additional tax of 10 to 20 percent is levied by

Côte d'Ivoire and Guinea on rice from Thailand to stimulate consumer preference for locally produced rice.

2. Given that Mali imports rice to close the gap created by the low local production capacity, both Malian and sub-regional markets consider Malian rice an import substitution commodity. The economic analysis uses the CAF price (customs and freight) of imported rice as a base. Mali's competitive advantage in the sub-region is determined by taking into account the taxes levied by sub-regional countries on imported rice from the international markets. In addition, Mali has no influence over those countries' internal policies, which are likely to continue into the future. The study assumes that rice imported by Mali is shipped to the port of Abidjan instead of Dakar. Abidjan is selected because overland transport is more frequent between Bamako and Abidjan than between Bamako and Dakar.

3. The official exchange rate used in the conversion of the CAF rice price is 500 FCFA/$1 US and analysis assumes that the rate is neither overvalued nor undervalued. However, the relationship between the FCFA and the Guinean franc is valued at 2 Guinean francs to FCFA. The exchange rate between the Guinean franc and the US dollar is 1,000 Guinean franc to $1 US, the currency is assumed to be overvalued at a rate of 9 percent.

4. An interest rate of 11 percent is charged by BDNA for its loans to village-based organizations. Producers in the Office du Niger zones use these loans to purchase inputs, mainly chemical fertilizers. This interest rate assumes no distortions and therefore represents the social cost of capital.

5. Investments made to rehabilitate production zones in the Office du Niger are considered sunk costs and thus are disregarded when determining paddy rice production costs and Malian rice comparative advantage in various regional markets.

2.2 Analysis of comparative advantage

The comparative advantage of Mali in the production and commercialization of its rice is informed by calculating its domestic resource cost. This is the ratio of the economic and non-tradable goods and the tradable inputs' value added with respect to international market prices. A positive DRC less than 1 indicates that Mali possesses a comparative advantage in a given market where it is more economically advantageous for Mali to produce and sell rice rather than import it from international markets. A DRC > 1 means that Mali does not have a comparative advantage. The derivation of the coefficient and the conceptual framework are included in Annex A.

Malian national markets considered in the comparative advantage analysis are Niono, Bamako, Sikasso, and Kayes. Several other markets located in neighboring countries were also selected for the analysis. They are:

- Côte d'Ivoire: Korhogo, Bouaké and Abidjan;
- Guinea: Siguiri, Kankan and Conakry;

- Niger: Tillabery and Niamey;
- Senegal: Tambacounda, Kaolack, and Dakar.

The study did not consider Mauritania and Burkina Faso due to lack of data on transportation and rice for these countries.

Table 2.1. Baseline Domestic Resource Cost Coefficients

	Production Systems			
	Niono	Kanabougou	Kouroumary	Molodo
Mali				
Farm Gate	0.39	0.40	0.43	0.50
Rural Market	0.47	0.48	0.51	0.58
Bamako	0.59	0.61	0.64	0.72
Sikasso	0.68	0.70	0.73	0.82
Kayes	0.76	0.80	0.84	0.93
Gao	0.54	0.56	0.61	0.67
Guinea				
Siguiri	0.50	0.52	0.54	0.66
Kankan	0.52	0.54	0.56	0.69
Conakry	0.71	0.74	0.77	0.92
Côte d'Ivoire				
Korhogo	0.60	0.63	0.66	0.74
Bouaké	0.66	0.69	0.72	0.81
Abidjan	0.73	0.77	0.80	0.90
Senegal				
Tambacounda	0.69	0.72	0.76	0.84
Kaolack	0.73	0.76	0.80	0.89
Dakar	0.76	0.79	0.83	0.92
Niger				
Tillabery	0.76	0.80	0.85	0.92
Niamey	0.83	0.87	0.92	1.01

Note: Mali's comparative advantage in the following domestic markets is evaluated on the basis of world market rice imported from :

- Côte d'Ivoire– Farm Gate, Rural Market, Bamako, et Sikasso;
- Senegal –Kayes; and
- Niger – Gao.

Source: Computed by authors.

Results of the DRC presented in Table 2.1 indicate that in general, Mali possesses a distinct comparative advantage in the production and commercialization of rice. Mali would be able to export rice to most countries in the sub-region. This advantage is mostly due to donor-funded assistance that helped Mali privatize and improve its rice production infrastructures. Gains that have increased over the years were also stimulated by liberalization and privatization policies implemented by the government. These changes encouraged the lucrative use of land to produce and export rice.

Table 2.2. Domestic Resource Cost Coefficients Ignoring Customs Duties and Consumer Preferences for Local Rice

	Production Systems			
	Niono	Kanabougou	Kouroumary	Molodo
Mali				
Farm Gate	0.39	0.41	0.43	0.50
Rural Market	0.46	0.48	0.51	0.58
Bamako	0.58	0.61	0.64	0.72
Sikasso	0.67	0.70	0.74	0.83
Kayes	0.76	0.80	0.84	0.93
Gao	0.54	0.56	0.61	0.67
Guinea				
Siguiri	0.74	0.78	0.81	0.99
Kankan	0.78	0.82	0.86	1.04
Conakry	1.23	1.31	1.35	1.63
Côte d'Ivoire				
Korhogo	0.79	0.84	0.88	0.98
Bouaké	0.88	0.93	0.97	1.09
Abidjan	1.00	1.07	1.11	1.24
Senegal				
Tambacounda	0.82	0.87	0.91	1.02
Kaolack	0.88	0.93	0.97	1.08
Dakar	0.92	0.97	1.01	1.13
Niger				
Tillabery	0.86	0.91	0.96	1.05
Niamey	0.94	1.00	1.06	1.15

Note: Mali's comparative advantage in the following domestic markets is evaluated on the basis of world market rice imported from

Côte d'Ivoire–: Farm Gate, Rural Market, Bamako, and Sikasso
Senegal – Kayes; and
Niger – Gao.

Source: Computed by authors.

Table 2.3. Domestic Resource Cost Coefficients with 50 Percent Reduction in Transportation Costs

	Production Systems			
	Niono	Kanabougou	Kouroumary	Molodo
Mali				
Farm Gate	0.44	0.46	0.49	0.57
Rural Market	0.53	0.56	0.59	0.67
Bamako	0.64	0.67	0.71	0.80
Sikasso	0.70	0.74	0.78	0.88
Kayes	0.74	0.78	0.82	0.92
Gao	0.61	0.56	0.61	0.67
Guinea				
Siguiri	0.74	0.77	0.81	1.00
Kankan	0.76	0.80	0.83	1.03
Conakry	0.95	1.00	1.04	1.28
Côte d'Ivoire				
Korhogo	0.74	0.79	0.82	0.93
Bouaké	0.78	0.83	0.87	0.98
Abidjan	0.83	0.89	0.93	1.04
Senegal				
Tambacounda	0.77	0.82	0.86	0.96
Kaolack	0.80	0.85	0.89	0.99
Dakar	0.82	0.87	0.91	1.02
Niger				
Tillabery	0.72	0.91	0.96	1.05
Niamey	0.76	1.00	1.06	1.15

Notes: The exchange rate is changed from 500 F CFA = $1.00 to 600 F CFA = $1.00.
Mali's comparative advantage in the following domestic markets is evaluated on the basis of world market rice imported from
Côte d'Ivoire– Farm Gate, Rural Market, Bamako, and Sikasso
Senegal – Kayes; and
Niger – Gao.

Source: Computed by authors.

These results are different from those reported by Barry in 1994. The 1994 results indicated that Mali's comparative advantage is restricted to exports to the northern region of Côte d'Ivoire. Those results were influenced by low yields per ha in the Office du Niger's zones and by the value of imported rice from international market that was not subjected to fiscal pressure exercised by the public sector. Several additional factors contributed to the improvement of the comparative advantage of Malian rice on markets in Côte d'Ivoire since the publication of Barry's report. First, the price of rice imported from international markets and used as a base for the analysis of local rice was significantly higher in the previous study by as much as 25 percent. Secondly, consumers from Côte d'Ivoire now prefer fresh and locally produced rice. This in turn made the price of rice imported from the international market higher than price of locally produced rice. The results of these factors give Mali a distinct comparative advantage on markets of Côte d'Ivoire, Guinea, and Senegal.

To verify the robustness of Mali's comparative advantage in neighboring countries, a second analysis was conducted, comparing the effect of fiscal pressure on rice from international markets and consumer preference of local rice. The results shown in Table 2.2 indicate that rice produced in Niono, Kanabougou and Kouroumary could be exported beyond Bouakè and Kaolack located in the center of Côte d'Ivoire and Western Senegal respectively. With respect to Guinea, the results indicate that Mali's comparative advantage diminishes. This is due to the relatively high cost of transportation between the two countries. High transportation costs account for a significant portion of loss Mali encounters when it sells its rice in the neighboring counties, especially when transported and sold in urban centers. These preliminary indicators of high transportation costs led a simulation to determine the effects when the transportation costs are reduced by 50 percent. The results, shown in Table 2.3, indicate that a 50 percent reduction increases Mali's comparative advantage significantly in neighboring countries' urban centers. This advantage however is lost in Molodo as well as in Conakry due to high transportation costs and difficult access.

Mali's comparative advantage and prospectives are good. Its export potential resides in the fact that the labor cost in the Asian countries has been increasing while rice production has stagnated. This, in turn, has led to higher production costs and rice price increase on the international markets. Mali also possesses a second advantage since the US dollar used in international transactions has been gaining strength since 1996. The exchange rate between the US dollar and the FCFA increased from 500 FCFA/$US to 600 FCFA/$US, strengthening Mali's comparative advantage. Additional results shown in Table 2.4 indicate that Mali holds a comparative advantage and could export its rice to neighboring countries except Conakry. Transporting Malian rice from its production zones to Conakry becomes quite expensive.

The development of the international exchange rate seems to indicate that Mali's comparative advantage will be strengthened in the future. This observation is based on the assumption that the US dollar will remain strong compared to the EURO, which has not yet established itself as a strong competitor to the US dollar. The European countries appear to have internal budgetary deficits, thus making the EURO less competitive against the US dollar. Given this, the US dollar will maintain its dominance on the international market as well as its strength against the FCFA. The price of rice will remain high given the strong demand but production levels of rice exporting countries tend to diminish. This trend occurred in India where its exports dropped significantly when it had to cut back exports to meet domestic demands.

Thailand, one of the most important rice exporters, has dropped its exports by 300 metric tons in the first half of 1998. This was mostly due to significant decrease in Thai consumers' revenues, which resulted in substitution of rice for other foodstuffs. Given the evolution of the international market that responds to internal pressures, it is safe to assume that Malian rice holds great promise. This advantage could be maximized in exporting

Table 2.4. Domestic Resources Cost Coefficients in Case of FCFA at 600 to the Dollar

	Production Systems			
	Niono	Kanabougou	Kouroumary	Molodo
Mali				
Farm Gate	0.34	0.35	0.38	0.44
Rural Market	0.40	0.42	0.44	0.50
Bamako	0.49	0.52	0.54	0.61
Sikasso	0.56	0.59	0.62	0.69
Kayes	0.62	0.65	0.69	0.77
Gao	0.47	0.53	0.52	0.67
Guinea				
Siguiri	0.63	0.65	0.68	0.83
Kankan	0.65	0.68	0.71	0.87
Conakry	0.96	1.00	1.04	1.25
Côte d'Ivoire				
Korhogo	0.65	0.68	0.71	0.80
Bouaké	0.71	0.75	0.78	0.87
Abidjan	0.79	0.84	0.87	0.97
Senegal				
Tambacounda	0.67	0.70	0.74	0.82
Kaolack	0.71	0.74	0.78	0.87
Dakar	0.74	0.77	0.81	0.90
Niger				
Tillabery	0.70	0.63	0.78	1.05
Niamey	0.76	0.65	0.85	1.15

Note: Mali's comparative advantage in the following domestic markets is evaluated on the basis of world market rice imported from

Côte d'Ivoire –Farm Gate, Rural Market, Bamako, and Sikasso
Senegal – Kayes; and
Niger– Gao.

Source: Computed by authors.

rice to neighboring countries if transportation costs between Malian rice production zones and neighboring countries' urban centers could be reduced.

When production systems are compared, the analysis shows that as yield increases, Mali's comparative advantage increases as well. For example, Mali's comparative advantage is much more pronounced with rice from Niono with higher yields than with rice from Molodo. This observation led us to conclude that if Mali were to rehabilitate its rice production infrastructure especially in Molodo, Kanbougou and Kouroumary, it would increase its comparative advantage on its domestic markets as well as in neighboring countries.

The viability of rehabilitating less productive areas will be determined by the cost of rehabilitation. According to the data from the World Bank, production costs in the Office du Niger production zones varied between $5,000 and $7,000 in the 1990s. These investments did not include economic production costs, since they could not be recovered as residuals. However, future investments do have an opportunity cost. Even when the actual value of minimum costs is included in the simulation and is extended over a 25-year span, Mali still holds a comparative advantage in almost all regional markets. Mali looses its comparative advantage in neighboring countries' large urban centers when the simulation is considered for 20 years. By investing, for instance, $20,000 to upgrade production infrastructure, Mali would lose its comparative advantage even on its domestic markets if yields are not higher than 6 tons/ha. Mali would maintain its comparative advantage only if yields reach 10 tons/ha. On the basis of that hypothesis, rice producers in Mali would contribute toward reaching food self-sufficiency.

2.3 Incentives in the rice sector and competitiveness of Malian rice

The concept of incentives implies a whole spectrum of implicit and explicit measures likely to enhance the productivity and commercialization of rice. This concept is best measured by an index of the difference between market price and the sum of intermediary production inputs and consumption costs. The efficiency index determines the extent to which an economic operator produces rice or abandons it for other economic opportunities. The economic operation will stay in rice production if the index is positive but will abandon rice production if the index is negative.

The analysis of the competitiveness of Malian rice in neighboring countries' markets is based on the average market price of local rice taken in 1996. Lack of data for 1995 excluded Guinea from the analysis. The results of the analysis shown in Table 2.5 indicate that Malian rice is competitive on its domestic markets except in the town of Gao. Malian rice would not be competitive on the Korhogo market in Côte d'Ivoire which produces irrigated rice as well as sorghum and maize. However, Malian rice regains its competitiveness beyond that region as well as in markets in Senegal where consumers prefer broken rice. Despite this preference, Senegal has a middle class with sufficient purchasing power to consume whole-grain rice from Mali that is purchased when targeted appropriately.

Targeting this segment entails the establishment of viable market information and communication channels likely to enhance the competitiveness of Malian rice. Mali should also target markets in Kankan and Suguiri in Guinea where rice is sold at a premium price due to isolation and higher transportation costs between those markets and Conakry. Rice constitutes the basic foodstuff in these regions and is in high demand. Securing a larger part of Guinea markets entails that Malian entrepreneurs must meet the rigorous requirements of Guinean consumers accustomed to consuming steam rolled rice with much higher production costs than rice produced and consumed in Mali. This large group of consumers with diversified tastes should provide ample opportunities to Malian entrepreneurs to produce and dominate the regional rice markets. Mali should enhance its strategy by opening its markets to products from neighboring countries and lower its entry taxes as well. These policies would certainly go a long way toward making Mali more competitive on the regional and international markets as well as importing rice to satisfy its own deficits when necessary.

Table 2.5. Financial Profitability of Malian Rice (F CFA/kg.)

	Production Systems			
	Niono	**Kanabougou**	**Kouroumary**	**Molodo**
Mali				
Farm Gate	63	62	57	33
Rural Market	38	34	28	7
Bamako	42	33	27	11
Sikasso	36	27	21	4
Kayes	59	65	45	29
Gao	-31	-39	-48	-61
Guinea				
Siguiri	156	148	142	111
Kankan	120	112	106	75
Conakry	12	4	-2	-34
Côte d'Ivoire				
Korhogo	2	-7	-12	-28
Bouaké	24	15	9	-7
Abidjan	81	72	67	51
Senegal				
Tambacounda	2	32	-12	-28
Kaolack	-11	14	-26	-42
Dakar	-19	31	-34	-49
Niger				
Tillabery	16	7	-1	-14
Niamey	64	55	47	34

Note: The financial profitability of rice in markets is the difference between the price of rice and the sum of its production and marketing costs. For the market denoted "Farm Gate", where paddy is produced, financial profitability is expressed in rice equivalents by using the processing coefficient of 65 percent.

Source: Computed by authors.

It is important to note that Malian rice would contribute to food security in the sub-region if transportation costs between rice production zones in Mali and neighboring countries could be lowered. Transportation costs in West Africa are considered high by the National Research Institute on Transportation and their Security-Transportation

Economics' Laboratory (INRET-LET). INRET reported in 1989 that these high costs were partially due to higher taxes levied on utility vehicles and their spare parts. According to INRET, these taxes represent more than 60 percent of their value. The combination of these and other factors contribute to two thirds of cereals marketing costs in West Africa as show by several studies (Camara, 1992; Gabre-Madhin, 1992; Gaye, 1992; and Savadogo et al., 1992). In addition, the transportation sector suffers from high taxes on fuel. Taxes constitute more than one third of the price of diesel fuel in Bamako.

Even though higher taxes and duties are meant to reduce hard currency outflows and provide a favorable trade balance, their results do not necessarily measure up to the objectives. These taxes have contributed to higher transportation and marketing costs in the region. Poor road conditions, especially during the rainy season have also added to the high costs. These factors lead economic operators to raise prices to amortize their investments in a much shorter period of time. These factors lead to more expensive rice throughout the regions thus decreasing sales and rice consumption in both urban and rural areas and increasing risk of food insecurity.

Malian rice competitiveness would be strengthened on sub-regional markets if production costs of rice paddy could be further reduced. To attain this objective, policy makers should drop custom duties levied on intermediary inputs for paddy rice production. The 5 percent levied on their imports increase production costs and will have a negative impact on the competitiveness of Malian rice.

III. ANALYIS OF THE SUSTAINABILITY OF MALIAN RICE EXPORTS

The objective of this chapter is to evaluate how long Mali can sustain an increasing demand for its export-based rice production to neighboring countries. Although Mali possess a comparative advantage in production and export of rice to neighboring countries, it is important to analyze and determine the extend to which Mali can produce to satisfy domestic demand, as well as export its surpluses to neighboring countries. Before analyzing in depth the short and long term implications of rice exports, we propose certain assumptions that may help us better understand constraints and potentials that may underline the rice sector.

3.1 Macro-economic assumptions

The basis for projecting production and demand of rice rests on the premise that structural adjustment program-led reform policies to liberalize the rice sector will continue in the future. As a corollary, these policies will lead to breaking barriers that hinder intra-regional or international commerce. Those barriers have resulted in rigid commercial policies and exchange rate. Liberalization policies lead to the removal of distortions that made financial incentives less compatible with opportunity costs and efficient resource allocation by producers. Establishing an enabling environment would clearly lead to increases in investment in production and higher supply of agricultural products. This would encourage the private sector to become an active participant in production and commercialization of agricultural commodities. Active private sector participation can free up government resources for research, extension and infrastructure upgrade. These improvements may lead to an increased of national production.

The structural adjustment programs along with improved sector policies have led to progressive and positive economic growth in Mali. As a result, the analysis assumes that Mali's economy should grow by at least 1 percent over the next few years. The study also projects an optimistic scenario of a 3 percent annual growth and a worse case scenario that the economy will stagnate.

3.2 Demand assumption

The projection of total demand for rice is based on the equation described below:

$$C_t = C_o * (1+E_i*g)^t$$

C_t- per capita consumption at time t;
C_o- per capita consumption in the base year;
E_i- income elasticity of the good under consideration;
g- the year average real per capita income growth rate, and
t- the year number beginning with the base year.

The income elasticity is assumed to be 0.60. In other words, demand will increase by 60 percent if revenue increases by 100 percent from one period to another and other factors remain constant. The elasticity of demand is derived from a study performed by the West African Enterprise Network (REAO) and AIRD in 1996 to assess the potential for intra-regional cereal trade in West Africa. The present analysis draws on the conservative findings of the REAO/AIRD (1996) study of average per capita rice consumption of 34 kg in 1998. This estimate, drawn from FAO data, is lower than estimates done by the Budget Consumption Survey of 1988-1989 that estimated consumption at about 42 kg per capita for the same period. Therefore, a simulation to measure the impact of per capita annual rice consumption on exportable rice potential was performed.

Information on rural and urban populations came from the United Nations database and 1990 provides the basis for annual projections. The annual growth rates used to project rural and urban populations were extracted from a study on the long-term population prospects in West Africa conducted by CINERGIE. That study was funded by the Organization for Economic Cooperation and Development (OECD), the African Development Bank (AFDB), and the Permanent Inter-State Committee on Drought Control in Sahel (CILSS). When per capita consumption is projected, annual domestic rice demand for a specific year becomes the result of annual per capita consumption and level of overall population for the year under consideration.

Based on assumptions and data described above, several demand projection scenarios are considered. The first scenario assumes average rice consumption of 34 kg per capita and a real annual income growth rate of almost 1 percent. The second and third scenarios assume the same quantities consumed in 1988 but use pessimistic and optimistic annual income growth rates of 3 percent and 0 percent respectively. These rates are then applied to the average per capita consumption of 42 kg in 1988 to calculate new total rice demand projections for Mali.

3.3 Production assumptions

Domestic rice supply is based on a projection of land under cultivation and yield per unit area. These parameters draw from the significant changes and improvements made on rice producing areas between 1990 and 1997. Projection exercises began in 1998, but data on Mali's real rice production were available before that date.

Assumptions have been made concerning land areas under cultivation and yields. The underlying assumption is that area under cultivation cannot grow more than total cultivable land in Mali. Irrigated land areas are based on the 1997 estimates and surface areas for rain-fed rice production are based on the average of 1990-1997. The use of this average helps reduce plot size variations observed during the same periods. It also considers the possibility that producers of rain-fed rice could exercise the option of abandoning rain-fed rice production and seize an available opportunity in irrigated rice or grain production.

Similarly to land area, rain-fed rice yields are projected based on 1990-1997 averages, whereas yields of irrigated rice are based on the 1997 production level. However, yields are constrained by an upper limit of 8 tons per hectare for irrigated rice for the Office du Niger zones and 5 tons per hectare for rain-fed rice. These upper limits take into consideration previous investments that rehabilitated production infrastructure in the Office du Niger zones and maximum yields that took place in other countries under similar ecological zones and production techniques comparable to those in Mali.

3.4 Analysis of the projections

The results of Mali's domestic rice supply and demand projection are presented in tables 3.1, 3.2 and 3. They indicate that average rice deficit in Mali reached almost 67 metric tons in years 1990-1997. This deficit explains rice related social tensions and price increases that occurred on domestic markets. These disturbances disappeared progressively due to the spectacular gains in rice production and yields Mali experienced since 1996. Mali's rice production reached almost 50,000 metric tons of surplus in 1997. If this trend continues, Mali's rice production is expected to yield almost 230,000 metric tons by 2005 according to most conservative estimates. This in turn will position Mali as a potential rice exporter in West Africa. These results, therefore, foresee a promising future for Malian rice sub-sector.

The results discussed above, however, stand in contrast to those shown in Tables 3.4 through 3.6, which assumed a per capita annual consumption of 42 kg in 1998. These results indicate that Mali has a marginal rice deficit. In the event of high demand, Mali could export 11,000 metric tons of rice to neighboring countries by 2001 and 145,000 metric tons by 2005. Mali could produce an exportable surplus of more than 4,000 metric tons if irrigated land rose to 56,000 hectares by the year 2000. This amount of land would result in 15 percent increase during the period 1997-2000. The results point to the need for new investments to rehabilitate production zones in the Office du Niger. These would rehabilitate irrigation infrastructure currently in ruin as well as place new irrigated land in cultivation.

It should be noted, however, that these investments would have a negative effect on Mali's competitiveness if producers were to assume the cost of these investments. The problem will be further exacerbated if producers take loans with high interest. The subject of investment brings up the question of the role of the government and the private sector. On one hand, the government is taking on a facilitating role with the private sector taking a more active role in the development and improvement of the Office du Niger area. However, the private sector is not capable of financing large-scale projects.

A possible long-term solution to this investment dilemma may be found in making the rice sector more attractive to both domestic and foreign investors. The State should implement incentives such as a liberal tax policy that will attract potential players and modernize rice production. The Office du Niger would also have to have flexible policies and allow private sector farmers to seek other opportunities if and when they determine that rice production is not profitable.

An alternative to irrigated land expansion would be crop intensification by practicing double cropping, using two crops in the same season on the same piece of land, instead of rice monoculture. Less than 25 percent of producers practice double cropping in the Office du Niger production zones. It would be useful to determine such factors as whether rice produced in the dry season is less profitable than vegetables; whether double cropping is constrained by lack of labor availability or insufficient irrigation water; and if lack of water is a problem, what impact does it have on producers located on the river downstream and on the environment These questions require an in-depth study to determine the extent to which production zones in the Office du Niger could be more productive once these constrains are addressed.

According to the FAO data (1997), Mali's current production levels are sufficient to allow it to target markets in neighboring countries of Guinea, Côte d'Ivoire, and Senegal. FAO reports that these countries imported almost 1 million tons of rice during the period 1990-1997 (see Table 3.7). Targeting markets in those countries requires that Mali implement a dual and judicious policy framework to stimulate rice production for both domestic consumption and exports. The objective could be achieved in the Office du Niger production zones. The Office du Niger possesses efficient water management system, allowing it to produce and export Malian rice before neighboring country rice matures. The strategy should also focus on the production of high quality rice preferred by the Ivorian and Senegalese middle class.

TABLE 3.1. RICE DEMAND AND PRODUCTION PROJECTION UNDER THE HYPOTHESIS OF AN AVERAGE PER CAPITA CONSUMPTION OF 34 KG/YEAR (BASE: 1% PER CAPITA INCOME GROWTH RATE)

YEAR				1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
TOTAL RICE DEMAND PROJECTION (1000 TONS)						317.0	325.4	334.1	343.0	352.2	361.7	371.5	381.6	392.0	402.8	413.9	425.4	437.3	449.5	462.2	475.3
PROJECTION OF TOTAL RICE PRODUCTION (1000 TONS)						183.6	295.3	266.5	277.9	304.9	300.8	399.1	431.1	473.5	520.0	571.2	627.7	689.9	746.2	803.2	866.1
1/ Coefficient of rice transformation				0.65																	
PROJECTION OF SURPLUS TOTAL NET RIZ (1000 TONS)						-133.5	-30.1	-67.6	-65.1	-47.3	-61.0	27.6	49.5	81.4	117.2	157.3	202.3	252.6	296.7	341.0	390.9
RICE DEMAND PROJECTION																					
Population Growth (1000 inhabitants)						1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Urban						1765	1841	1920	2002	2088	2177	2271	2368	2470	2576	2686	2802	2922	3047	3178	3314
Rural						7449	7561	7674	7789	7906	8025	8145	8267	8391	8517	8645	8775	8906	9040	9175	9313
Total						9214	9401	9594	9791	9994	10202	10416	10636	10861	11093	11331	11576	11828	12087	12353	12627
Hypothesis																					
Population Growth (	1990	90-2020																			
Urban	1765	4.29%																			
Rural	7449	1.50%																			
Per Capita Consumption (kg/person/year)				34																	
Per Capita Income Growth Rate				1%																	
Income-Elasticity				0.60																	
Per capita demand projection					34.20	34.41	34.62	34.82	35.03	35.24	35.45	35.67	35.88	36.10	36.31	36.53	36.75	36.97	37.19	37.42	37.64
TOTAL RICE DEMAND PROJECTION (1000 TONS)						317	325	334	343	352	362	372	382	392	403	414	425	437	450	462	475
PADDY PRODUCTION PROJECTION																					
Land Area (1000 ha)			Annual Growth		1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Paddy			90-97																		
Irrigated 97		49	1.39%			43.9	44.4	44.8	45.4	45.0	46.4	47.7	48.6	49.3	50.0	50.7	51.4	52.1	52.8	53.6	54.3
rainfed (95-97)		264	7.10%			152.7	218.6	188.4	201.1	239.0	256.3	276.5	258.0	276.4	296.0	317.0	339.5	363.6	389.4	417.1	446.7
Yield		Maximum	Annual Growth																		
Paddy (ton/ha)			90-97																		
Irrigated 97	5.78	8	6.33%			3.28	4.07	4.65	4.90	4.67	5.00	5.16	5.78	6.15	6.53	6.95	7.39	7.86	8.00	8.00	8.00
rainfed (95-97)	1.24	5	3.89%			0.91	1.25	1.07	1.02	1.08	0.90	1.33	1.48	1.54	1.60	1.66	1.73	1.79	1.86	1.93	2.01
PROJECTED TOTAL PRODUCTION (1000 TONS)																					
Paddy						282.4	454.3	410.0	427.6	469.1	462.7	614.0	663.2	728.4	800.0	878.8	965.7	1061.3	1148.1	1235.6	1332.5
Irrigated						143.9	180.9	208.5	222.6	210	232.2	246.1	281.0	303.1	326.8	352.3	379.8	409.4	422.7	428.6	434.6
Rainfed						138.5	273.4	201.5	205	259.1	230.5	367.9	382.3	425.3	473.2	526.5	585.9	651.9	725.3	807.0	898.0

Note: Yields per hectare of irrigated rice result from a single crop at the Office du Niger

TABLE 3.2. RICE DEMAND AND PRODUCTION PROJECTION UNDER THE HYPOTHESIS OF AN AVERAGE PER CAPITA CONSUMPTION OF 34 KG/YEAR (3% PER CAPITA INCOME GROWTH RATE)

YEAR				1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
PROJECTION OF TOTAL RICE PRODUCTION (1000 TONS)						324.7	337.2	350.3	364.0	378.2	393.0	408.5	424.6	441.4	458.9	477.2	496.3	516.2	537.0	558.8	581.4
PROJECTION PRODUCTION TOTALE RIZ (1000 TONNES)						183.6	295.3	266.5	277.9	304.9	300.8	399.1	431.1	473.5	520.0	571.2	627.7	689.9	746.2	803.2	866.1
1/ Coefficient of rice transformation				0.65																	
PROJECTION OF TOTAL RICE NET SURPLUS (1000 TONS)						-141.1	-41.9	-83.8	-86.0	-73.3	-92.3	-9.4	6.5	32.1	61.1	94.0	131.4	173.6	209.2	244.4	284.7
RICE DEMAND PROJECTION																					
Population Growth (1000 inhabitants)						1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Urban						1765	1841	1920	2002	2088	2177	2271	2368	2470	2576	2686	2802	2922	3047	3178	3314
Rural						7449	7561	7674	7789	7906	8025	8145	8267	8391	8517	8645	8775	8906	9040	9175	9313
Total						9214	9401	9594	9791	9994	10202	10416	10636	10861	11093	11331	11576	11828	12087	12353	12627
Hypothesis																					
Population	1990	90-2020																			
Urban	1765	4.29%																			
Rural	7449	1.50%																			
Per Capita Consumption (kg/person/year)				34																	
Per capita income growth rate				3%																	
Income-Elasticity				0.60																	
RICE DEMAND PROJECTION					34.61	35.24	35.87	36.51	37.17	37.84	38.52	39.22	39.92	40.64	41.37	42.12	42.87	43.65	44.43	45.23	46.05
TOTAL RICE DEMAND PROJECTION (1000 TONS)						325	337	350	364	378	393	408	425	441	459	477	496	516	537	559	581
PADDY PRODUCTION PROJECTION																					
Land area (1000 ha)			Annual growth		1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Paddy			90-97																		
Irrigated 97		49	1.39%			43.9	44.4	44.8	45.4	45.0	46.4	47.7	48.6	49.3	50.0	50.7	51.4	52.1	52.8	53.6	54.3
rainfed (95-97)		264	7.10%			152.7	218.6	188.4	201.1	239.0	256.3	276.5	258.0	276.4	296.0	317.0	339.5	363.6	389.4	417.1	446.7
Rendement		Maximum	Annual growth																		
Paddy (ton/ha)			90-97																		
Irrigated 97	5.78	8	6.33%			3.28	4.07	4.65	4.90	4.67	5.00	5.16	5.78	6.15	6.53	6.95	7.39	7.86	8.00	8.00	8.00
rainfed (95-97)	1.24	5	3.89%			0.91	1.25	1.07	1.02	1.08	0.90	1.33	1.48	1.54	1.60	1.66	1.73	1.79	1.86	1.93	2.01
PROJECTED TOTALE PRODUCTION (1000 TONS)																					
Paddy						282.4	454.3	410.0	427.6	469.1	462.7	614.0	663.2	728.4	800.0	878.8	965.7	1061.3	1148.1	1235.6	1332.5
Irrigated						143.9	180.9	208.5	222.6	210	232.2	246.1	281.0	303.1	326.8	352.3	379.8	409.4	422.7	428.6	434.6
Rainfed						138.5	273.4	201.5	205	259.1	230.5	367.9	382.3	425.3	473.2	526.5	585.9	651.9	725.3	807.0	898.0

Note: Yields per hectare of irrigated rice result from a single crop at the Office du Niger

TABLE 3.3. PROJECTION OF RICE DEMAND AND PRODUCTION UNDER THE HYPOTHESIS OF AN AVERAGE PER CAPITA CONSUMPTION OF 34 KG/YEAR (0% PER CAPITA INCOME GROWTH RATE)

Year				1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
PROJECTED TOTAL RICE DEMAND (1000 TONS)						313.3	319.6	326.2	332.9	339.8	346.9	354.1	361.6	369.3	377.2	385.3	393.6	402.2	411.0	420.0	429.3
PROJECTED TOTAL RICE PRODUCTION (1000 TONS)						183.6	295.3	266.5	277.9	304.9	300.8	399.1	431.1	473.5	520.0	571.2	627.7	689.9	746.2	803.2	866.1
1/ Coefficient of rice transformation				0.65																	
PROJECTED TOTAL NET RICE SURPLUS (1000 TONS)						-129.7	-24.4	-59.7	-55.0	-34.9	-46.1	45.0	69.5	104.2	142.8	186.0	234.1	287.7	335.3	383.2	436.8
PROJECTED RICE DEMAND																					
Population growth (1000 inhabitants)\						1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Urban						1765	1841	1920	2002	2088	2177	2271	2368	2470	2576	2686	2802	2922	3047	3178	3314
Rural						7449	7561	7674	7789	7906	8025	8145	8267	8391	8517	8645	8775	8906	9040	9175	9313
Total						9214	9401	9594	9791	9994	10202	10416	10636	10861	11093	11331	11576	11828	12087	12353	12627
Hypothesis																					
Population	1990	90-2020																			
Urbam	1765	4.29%																			
Rural	7449	1.50%																			
Per capita consumption (kg/person/year)				34																	
Per capita income growth rate				0%																	
Income-Elasticity				0.60																	
Projection de la demande par tête					34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00
DEMANDE TOTALE PROJETÉE DU RIZ (1000 TONNES)						313	320	326	333	340	347	354	362	369	377	385	394	402	411	420	429
PROJECTION PRODUCTION PADDY																					
Superficie (1000 ha)			Croissance annuelle		1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Paddy			90-97																		
Irrigué 97		49	1.39%			43.9	44.4	44.8	45.4	45.0	46.4	47.7	48.6	49.3	50.0	50.7	51.4	52.1	52.8	53.6	54.3
pluvial (95-97)		264	7.10%			152.7	218.6	188.4	201.1	239.0	256.3	276.5	258.0	276.4	296.0	317.0	339.5	363.6	389.4	417.1	446.7
Rendement		Maximum	Croissance annuel																		
Paddy (ton/ha)			90-97																		
Irrigué 97	5.78	8	6.33%			3.28	4.07	4.65	4.90	4.67	5.00	5.16	5.78	6.15	6.53	6.95	7.39	7.86	8.00	8.00	8.00
pluvial (95-97)	1.24	5	3.89%			0.91	1.25	1.07	1.02	1.08	0.90	1.33	1.48	1.54	1.60	1.66	1.73	1.79	1.86	1.93	2.01
PRODUCTION TOTALE PROJECTÉE (1000 TONNES)																					
Paddy						282.4	454.3	410.0	427.6	469.1	462.7	614.0	663.2	728.4	800.0	878.8	965.7	1061.3	1148.1	1235.6	1332.5
Irrigué						143.9	180.9	208.5	222.6	210	232.2	246.1	281.0	303.1	326.8	352.3	379.8	409.4	422.7	428.6	434.6
Pluvial						138.5	273.4	201.5	205	259.1	230.5	367.9	382.3	425.3	473.2	526.5	585.9	651.9	725.3	807.0	898.0

Note: Les rendements par hectare du riz irrigué sont pour une seule culture à l'Office du Niger

TABLE 3.4. PROJECTION OF RICE DEMAND AND PRODUCTION UNDER THE HYPOTHESIS OF AN AVERAGE PER CAPITA ANNUAL CONSUMPTION OF 42 KG (1% PER CAPITA INCOME GROWTH RATE)

YEAR				1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
PROJECTED TOTAL RICE DEMAND (1000 TONS)						391.6	402.0	412.7	423.7	435.1	446.8	458.9	471.4	484.3	497.6	511.3	525.5	540.2	555.3	571.0	587.1
PROJECTED TOTAL RICE PRODUCTION (1000 TONS)						183.6	295.3	266.5	277.9	304.9	300.8	399.1	431.1	473.5	520.0	571.2	627.7	689.9	746.2	803.2	866.1
1/ Coefficient de transformation riz				0.65																	
PROJECTED TOTAL RICE NET SURPLUS (1000 TONS)						-208.1	-106.7	-146.2	-145.8	-130.2	-146.1	-59.8	-40.3	-10.8	22.4	59.9	102.2	149.7	190.9	232.2	279.0
PROJECTED RICE DEMAND																					
Population growth (1000 inhabitants)						1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Urban						1765	1841	1920	2002	2088	2177	2271	2368	2470	2576	2686	2802	2922	3047	3178	3314
Rural						7449	7561	7674	7789	7906	8025	8145	8267	8391	8517	8645	8775	8906	9040	9175	9313
Total						9214	9401	9594	9791	9994	10202	10416	10636	10861	11093	11331	11576	11828	12087	12353	12627
Hypothesis																					
Population	1990	90-2020																			
Urban	1765	4.29%																			
Rural	7449	1.50%																			
Per capita consumption (kg/head/year)				42																	
Per capita income growth rate				1%																	
Incoem-Eleasticity				0.60																	
Projected demand per capita					42.25	42.51	42.76	43.02	43.28	43.53	43.80	44.06	44.32	44.59	44.86	45.13	45.40	45.67	45.94	46.22	46.50
PROJECTED TOTAL RICE DEMAND (1000 TONS)						392	402	413	424	435	447	459	471	484	498	511	526	540	555	571	587
PROJECTION PRODUCTION PADDY																					
Superficie (1000 ha)			Croissance		1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
			annuelle																		
Paddy			90-97																		
Irrigué 97		49	1.39%			43.9	44.4	44.8	45.4	45.0	46.4	47.7	48.6	49.3	50.0	50.7	51.4	52.1	52.8	53.6	54.3
pluvial (95-97)		264	7.10%			152.7	218.6	188.4	201.1	239.0	256.3	276.5	258.0	276.4	296.0	317.0	339.5	363.6	389.4	417.1	446.7
Rendement		Maximum	Croissance																		
			annuel																		
Paddy (ton/ha)			90-97																		
Irrigué 97	5.78	8	6.33%			3.28	4.07	4.65	4.90	4.67	5.00	5.16	5.78	6.15	6.53	6.95	7.39	7.86	8.00	8.00	8.00
pluvial (95-97)	1.24	5	3.89%			0.91	1.25	1.07	1.02	1.08	0.90	1.33	1.48	1.54	1.60	1.66	1.73	1.79	1.86	1.93	2.01
PRODUCTION TOTALE PROJECTÉE (1000 TONNES)																					
Paddy						282.4	454.3	410.0	427.6	469.1	462.7	614.0	663.2	728.4	800.0	878.8	965.7	1061.3	1148.1	1235.6	1332.5
Irrigué						143.9	180.9	208.5	222.6	210	232.2	246.1	281.0	303.1	326.8	352.3	379.8	409.4	422.7	428.6	434.6
Pluvial						138.5	273.4	201.5	205	259.1	230.5	367.9	382.3	425.3	473.2	526.5	585.9	651.9	725.3	807.0	898.0

Note: Les rendements par hectare du riz irrigué sont pour une seule culture à l'Office du Niger

TABLEAU 3.5. PROJECTION DE LA DEMANDE ET DE LA PRODUCTION DE RIZ SOUS L'HYPOTHESE D'UNE CONSOMMATION MOYENNE DE 42 KG/AN PAR TETE (3% CROISSANCE DU REVENU PAR TETE)

ANNÉE				1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
PROJECTION DEMANDE TOTALE RIZ (1000 TONNES)						401.0	416.6	432.7	449.6	467.2	485.5	504.6	524.5	545.3	566.9	589.5	613.1	637.7	663.4	690.2	718.2
PROJECTION PRODUCTION TOTALE RIZ (1000 TONNES)						183.6	295.3	266.5	277.9	304.9	300.8	399.1	431.1	473.5	520.0	571.2	627.7	689.9	746.2	803.2	866.1
1/ Coefficient de transformation riz				0.65																	
PROJECTION SURPLUS TOTAL NET RIZ (1000 TONNES)						-217.5	-121.3	-166.2	-171.7	-162.3	-184.7	-105.5	-93.4	-71.8	-46.9	-18.3	14.6	52.1	82.8	112.9	147.9
PROJECTION DEMANDE RIZ																					
Croissance de la population (1000 habitants)						1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Urbaine						1765	1841	1920	2002	2088	2177	2271	2368	2470	2576	2686	2802	2922	3047	3178	3314
Rurale						7449	7561	7674	7789	7906	8025	8145	8267	8391	8517	8645	8775	8906	9040	9175	9313
Totale						9214	9401	9594	9791	9994	10202	10416	10636	10861	11093	11331	11576	11828	12087	12353	12627
Hypothèses																					
Population	1990	90-2020																			
Urbaine	1765	4.29%																			
Rurale	7449	1.50%																			
Consommation par tête (kg/tête/an)				42																	
Taux de croissance du revenu par tête				3%																	
Élasticité-revenu				0.60																	
Projection de la demande par tête					42.76	43.53	44.31	45.11	45.92	46.75	47.59	48.44	49.32	50.20	51.11	52.03	52.96	53.92	54.89	55.87	56.88
DEMANDE TOTALE PROJETÉE DU RIZ (1000 TONNES)						401	417	433	450	467	485	505	524	545	567	590	613	638	663	690	718
PROJECTION PRODUCTION PADDY																					
Superficie (1000 ha)			Croissance annuelle		1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Paddy			90-97																		
Irrigué 97		49	1.39%			43.9	44.4	44.8	45.4	45.0	46.4	47.7	48.6	49.3	50.0	50.7	51.4	52.1	52.8	53.6	54.3
pluvial (95-97)		264	7.10%			152.7	218.6	188.4	201.1	239.0	256.3	276.5	258.0	276.4	296.0	317.0	339.5	363.6	389.4	417.1	446.7
Rendement		Maximum	Croissance annuel																		
Paddy (ton/ha)			90-97																		
Irrigué 97	5.78	8	6.33%			3.28	4.07	4.65	4.90	4.67	5.00	5.16	5.78	6.15	6.53	6.95	7.39	7.86	8.00	8.00	8.00
pluvial (95-97)	1.24	5	3.89%			0.91	1.25	1.07	1.02	1.08	0.90	1.33	1.48	1.54	1.60	1.66	1.73	1.79	1.86	1.93	2.01
PRODUCTION TOTALE PROJECTÉE (1000 TONNES)																					
Paddy						282.4	454.3	410.0	427.6	469.1	462.7	614.0	663.2	728.4	800.0	878.8	965.7	1061.3	1148.1	1235.6	1332.5
Irrigué						143.9	180.9	208.5	222.6	210	232.2	246.1	281.0	303.1	326.8	352.3	379.8	409.4	422.7	428.6	434.6
Pluvial						138.5	273.4	201.5	205	259.1	230.5	367.9	382.3	425.3	473.2	526.5	585.9	651.9	725.3	807.0	898.0

Note: Les rendements par hectare du riz irrigué sont pour une seule culture à l'Office du Niger

TABLE 3.6. PROJECTION OF RICE DEMAND AND PRODUCTION UNDER THE HYPOTHESIS OF AN AVERAGE PER CAPITA CONSUMPTION OF 42 KG/YEAR PER HEAD (0% PER CAPITA INCOME GROWTH RATE)

YEAR				1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
PROJECTED TOTAL RICE DEMAND (1000 TONS)						387.0	394.9	402.9	411.2	419.7	428.5	437.5	446.7	456.2	465.9	475.9	486.2	496.8	507.7	518.8	530.3
PROJECTED TOTAL RICE PRODUCTION (1000 TONS)						183.6	295.3	266.5	277.9	304.9	300.8	399.1	431.1	473.5	520.0	571.2	627.7	689.9	746.2	803.2	866.1
1/ Coefficient of rice transformation				0.65																	
PROJECTED TOTAL RICE NET SURPLUS (1000 TONS)						-203.4	-99.6	-136.4	-133.3	-114.8	-127.7	-38.4	-15.6	17.3	54.1	95.3	141.5	193.1	238.6	284.3	335.8
PROJECTED RICE DEMAND																					
Population growth (1000 inhabitants)						1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Urban						1765	1841	1920	2002	2088	2177	2271	2368	2470	2576	2686	2802	2922	3047	3178	3314
Rural						7449	7561	7674	7789	7906	8025	8145	8267	8391	8517	8645	8775	8906	9040	9175	9313
Total						9214	9401	9594	9791	9994	10202	10416	10636	10861	11093	11331	11576	11828	12087	12353	12627
Hypothesis																					
Population	1990	90-2020																			
Urban	1765	4.29%																			
Rural	7449	1.50%																			
Per capita consumption (kg/head/year)				42																	
Per capita income growth rate				0%																	
Income-Elasticity				0.60																	
Projection de la demande par tête					42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00
DEMANDE TOTALE PROJETÉE DU RIZ (1000 TONNES)						387	395	403	411	420	428	437	447	456	466	476	486	497	508	519	530
PROJECTION PRODUCTION PADDY																					
Superficie (1000 ha)			Croissance		1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
			annuelle																		
Paddy			90-97																		
Irrigué 97		49	1.39%			43.9	44.4	44.8	45.4	45.0	46.4	47.7	48.6	49.3	50.0	50.7	51.4	52.1	52.8	53.6	54.3
pluvial (95-97)		264	7.10%			152.7	218.6	188.4	201.1	239.0	256.3	276.5	258.0	276.4	296.0	317.0	339.5	363.6	389.4	417.1	446.7
Rendement		Maximum	Croissance																		
			annuel																		
Paddy (ton/ha)			90-97																		
Irrigué 97	5.78	8	6.33%			3.28	4.07	4.65	4.90	4.67	5.00	5.16	5.78	6.15	6.53	6.95	7.39	7.86	8.00	8.00	8.00
pluvial (95-97)	1.24	5	3.89%			0.91	1.25	1.07	1.02	1.08	0.90	1.33	1.48	1.54	1.60	1.66	1.73	1.79	1.86	1.93	2.01
PRODUCTION TOTALE PROJECTÉE (1000 TONNES)																					
Paddy						282.4	454.3	410.0	427.6	469.1	462.7	614.0	663.2	728.4	800.0	878.8	965.7	1061.3	1148.1	1235.6	1332.5
Irrigué						143.9	180.9	208.5	222.6	210	232.2	246.1	281.0	303.1	326.8	352.3	379.8	409.4	422.7	428.6	434.6
Pluvial						138.5	273.4	201.5	205	259.1	230.5	367.9	382.3	425.3	473.2	526.5	585.9	651.9	725.3	807.0	898.0

Note: Les rendements par hectare du riz irrigué sont pour une seule culture à l'Office du Niger

In the short term, these strategies could cause shortage and tension on domestic markets during some parts of the year. To mitigate these problems, decision-makers should adopt a dual strategy of exporting high quality rice and importing low quality rice. This strategy has the benefits of stabilizing price throughout the year thus reducing tensions that have persisted since the 1990s and after the devaluation of the CFA Franc. This dual strategy would afford Malian businessmen the opportunity to increase their revenues in neighboring countries without inflating price on local markets.

Table 3.7. Rice Import Levels in Mali and Neighboring Countries

Year	Mali	Niger	Mauritania	Burkina	Guinea	Côte d'Ivoire	Senegal
1980	531	36,424	51,000	30,222	128,000	253,136	301,439
1981	235	60,736	48,000	15,001	77,600	335,278	335,576
1982	711	34,540	40,734	33,424	46,536	356,742	358,600
1983	648	15,138	65,194	37,720	77,020	382,606	338,700
1984	2,566	9,879	69,774	77,880	80,000	320,801	371,447
1985	1,140	73,400	105,100	104,022	70,000	342,246	342,372
1986	1,291	28,226	54,000	79,691	80,000	361,066	378,320
1987	500	40,000	63,100	60,602	90,000	479,270	306,670
1988	703	28,330	82,391	85,734	193,468	266,247	333,082
1989	505	28,954	77,486	90,453	195,444	322,801	370,829
1990	200	28,145	44,600	69,654	182,158	308,432	391,513
1991	1,284	38,000	57,383	73,465	182,158	317,572	399,000
1992	400	40,000	60,279	86,600	246,493	277,216	374,321
1993	315	50,000	88,587	80,000	213,632	387,197	384,888
1994	320	40,000	56,182	74,800	278,679	253,008	348,380
1995	380	40,000	70,000	62,300	290,700	404,248	441,205
1996		40,000	122,000	62,300	231,652	300,395	541,219
Average (1990-1996)	483	39,449	71,290	72,731	232,210	321,153	411,504

Source: FAO.

The dual import and export framework is justified because traditional grains have not been a good substitute for rice in urban centers as demonstrated by several studies (Coussy et al., 1991; Barry, 1989; Bricas and Sauvinet, 1989; Delgado, 1989, and Reardon et al., 1992). Barry (1989) and Bricas and Sauvinet (1989) reported that availability of grains on urban market had little influence on price of rice since this price is determined by exogenous factors including international market price. However, rice exerts a strong influence on price of dried grains sold on urban markets. Urban dwellers have become increasingly accustomed to consuming rice to the detriment of traditional grains. This may be due to the fact that opportunity costs of traditional housewives has been increasing (Dibley et al., 1995; Kennedy and Reardon, 1994; Reardon et al., 1988).

IV. MARKET EFFICIENCY AND CONTRAINTS TO EXPORTING MALIAN RICE

This analysis demonstrates that Mali possesses a comparative advantage in the production and marketing of its rice on domestic markets and markets in neighboring countries. The following section draws from these conclusions and examines the distribution and marketing systems on domestic markets and those of neighboring countries. It looks at the extent that changes in supply and demand are transmitted from one market to another. This analysis is extremely important. It determines the level of effort Malian decision-makers should undertake with respect to intensification and exports of rice to neighboring countries. First, however, light is shed on sub-regional rice marketing and how this might be mirrored in the export process.

4.1 Distortions introduced by the devaluation of the CFA Franc

The Permanent Inter-State Committee on Drought Control in the Sahel (CILSS) has been debating cereal and particularly rice transactions as well as regional integration since the 1980s. CILSS funded several studies to shed light on these subjects. The results of a study conducted by INRA/UN/IRAM under the guidance of Johnny Egg and John Igué in 1991 showed strong evidence of important cereals transactions among countries in West Africa. An overvalued CFA Franc was a partial cause of these transactions and provided convertible currency to non-CFA-zone members. This phenomenon was demonstrated by a study conducted by the West African Enterprise Network and AIRD in 1995. The study revealed that non-rice producing countries, especially Mauritania and Guinea exported large quantities of rice to West African countries that are members of the CFA zone. According to the same study, these countries re-exported rice they bought at a cheaper price on the international market and sold it to CFA countries to reap benefits from the over-valued CFA Franc. These activities ceased shortly after the CFA Franc was devalued in January 1994 and, in fact, trade started to move in the opposite direction.

4.2 Efficiency of rice marketing

The analysis of market operation efficiency rests on the premise that market performance is a function of market structure and economic operators' behavior. Market performance is enhanced by the presence of large number of economic operators and a robust and efficient supply and demand information network. In a competitive market, price becomes a function of efficient allocation of resources by economic operators who seek maximum profits. Thus, market price becomes the basic element in the analysis of market efficiency.

Market prices can be analyzed in time and in space. The price of goods over time needs to include storage costs. In practical terms, the price margin of the two distinct periods should be equal to storage cost of the good under consideration plus a reasonable remuneration of the fixed capital. These should be closely related to real interest rate of the national economy. Time series is well suited for a single market but becomes too cumbersome as the number of markets increases.

In the context of several markets, market operation efficiencies could be analyzed better with the use of spatial margins, i.e. the difference in price from two distinctly separate markets. These margins are assumed to reflect the transfer cost from one market to another under perfectly competitive environment. Spatial margin analysis assumes flexible and efficient information flow and exchange resulting from supply and demand pressures. For example, a demand increase for rice in a deficit market X would create a concomitant price increase in market Y until equilibrium is reached between the two markets. Any obstacle to information flow between the two markets would result in poor and inefficient resource allocation by society, thus reducing its wellbeing. Several factors may contribute to this phenomenon. These may include lack of marketing infrastructure (road, railroads, etc.) and insufficient or inefficient means of communication (trucks, telephones, etc.).

This study uses the spatial method to evaluate the efficiency of the marketing system. The presence of several markets in the region justifies the use of the method. After the evaluation of the marketing system, factors likely to influence information exchange between domestic markets and those in the neighboring countries are examined.

Several methods have been used to examine spatial market integration. One of these methods is based on the correlation coefficients, which measure the variation of prices on two markets. This approach suffers from some weaknesses. For example, a strong correlation coefficient can be found between two markets even when they do not exchange any merchandise. Another criticism is that results are very sensitive to inflationary effects and this tends to inflate the correlation coefficients between two markets even when there is little integration.

To avoid the previously mentioned problems, econometric models such as those proposed by Ravaillon (1986) and Timmer (1987) have been used. These models are based on the premise that the time margin from a rural market is a function of the time margin of the urban market, the time margin between the two markets and a certain number of exogenous variables. It is worth noting that the formulation of this concept does not draw from any known economic theory. It was derived as an intuitive approach of price behavior, applicable only to certain and limited economic environments. Gordon (1993) proposed a more formal approach to the analysis of market integration. Gordon's model is described in the Annex.

4.2.1 Hypotheses of the model

The basic principle of the Gordon Model is that supply and demand of an agricultural commodity is based on perfect equilibrium. Assuming a deficit urban market and a surplus rural market, the model stipulates that the total quantity of the agricultural commodity demanded by the urban market is equal to the surplus quantity supplied by the rural market (surplus of supply over demand of the same quality). On the basis of supply determinants on both the rural and urban markets, the equilibrium expressed in terms of price can be presented in the following equation.

$$P_{it} = \alpha_0 + \alpha_1 P_{it-1} + \alpha_2 P_{lt\alpha} + _3 P_{lt-1} + \alpha_4 X_{it} + E_t$$

P_{it} = price of rice in urban market at time t;
P_{lt} = price of rice in the supplier market at time t;
X_{it} = other factors likely to influence rice supply in the supplier market;
E_t = error term.

The variable X_{it} represents non-quantifiable factors likely to influence rice supply on urban market and is divided into two distinct sub-variables. These two sub-variables are specific to rice in Mali. They are: policy change resulting from the devaluation of the CFA franc in 1994, and tax reduction on rice imports from June to October each year stabilizing rice price on domestic market. These sub-variables are shown below.

$$P_{it} = \alpha_0 + \alpha_1 P_{it-1} + \alpha_2 P_{lt} + \alpha_3 P_{lt-1} + \alpha_4 \mathrm{DEVA} + \alpha_4 \mathrm{TAXE} + E_t$$

DEVA = Dummy variable representing policy changes after the devaluation

TAXE = Dummy variable accounting for tax reduction on rice imports from June to October.

E_t = Error term.

The last equation represents the general form of Gordon's model used in our study. Monthly wholesale and retail prices from January 1993 through April 1996 were used to construct the model. Prices were collected by the SIMs (Systemes d'information du marche) of Mali, Senegal, Côte d'Ivoire, and Guinea. Wholesale price series from Guinea and Niger were difficult to obtain. We resorted to retail prices to analyze spatial integration between Mali and those two countries.

The logarithmic method was used to estimate the α coefficients used as percentages.

Market segmentation
Markets are said to be segmented if changes in supplier market prices have no short-term and long-term influence on urban market prices. Thus when markets are segmented, the coefficient value depends solely on its price from the preceding period.

Short-term perfect integration
The short-term perfect integration assumes that price changes on the supplier market are immediately conveyed to urban market without the effects of any delay on future prices. Price on the demand market depends only on, at most, 50 percent of the supply market price.

Long-term integration
Long-term integration exists if the delayed supplier market price influences demand market price by more than 50 percent.

4.2.2 Results of the analysis

The results of the analysis from the econometric regressions are in logarithmic form. They are presented in Table 4.1a, 4.1b, 4.2a, and 4.2b. Tables 4.1a and 4.1b are based on simple regressions and those in Tables 4.2a, and 4.2b include silent variables discussed above. We discuss the integration results within the national context and then between domestic markets and those in neighboring countries.

4.2.2.1 Level of integration between domestic markets

Nioko market is considered the main supplier of rice to markets in Bamako, Segou, and Sikasso. We did not include Kayes, Mopti, Tombouctou and Gao in the analysis due to lack of complete wholesale market price data.

In general, the results indicate a short-term good integration between Niono and the three markets mentioned above. Regression coefficients are 0.70 for the axis Niono-Bamako; 0.75 for Segou-Niono; and 0.69 for Sikasso-Niono. This means that a 100 percent price change in Niono leads to 70 percent change on markets mentioned above. These coefficients are slightly higher when silent variables are included in the model. The coefficients become 72 percent for Bamako-Niono, and 73 percent for Sikasso-Niono. These changes suggest that the devaluation may have induced some benefits on the exchange rate. This in turns made the local rice more competitive than rice imported from international markets as demonstrated by the urban consumers who prefer to buy rice produced in the Office du Niger production zones.

4.2.2.2 Integration between Malian and Ivorian markets

The analysis draws from the relation between Sikasso market in Mali and those of Korhogo and Bouake in Cote d'Ivoire. The results indicate that the correlation between Sikasso and the two markets is explained by coefficients below 50 percent, demonstrating the presence of segmentation. However, prices in Korhogo and Bouake are explained by 80 percent of the delayed prices on those markets. Inclusion of the dummy variables lend support to the integration of the two markets. The correlation coefficient of Sikasso goes from 22 percent before the devaluation to 71 percent after the devaluation when the devaluation effect is taken into account. Bouake and Sikasso remain segmented even when the dummy variables are taken into account. This demonstrates the lack of market exchange between Malian and Ivorian markets.

These findings are supported by results from survey data that demonstrate that market exchange between Mali and Cote d'Ivoire was much weaker prior to the devaluation. Cote d'Ivoire imported rice from international markets and re-exported rice to Mali. This explains the increase in the correlation coefficient of Korhogo when Sikasso is regressed on Korhogo compared to simple correlation coefficients between Korhogo and Sikasso. Sikasso became an important relay center serving northern Cote d'Ivoire where urban consumers prefer fresh Malian rice. This relationship accounts for the larger value of the correlation coefficient of Kohrogo against Sikasso. Interviews with some economic operators indicated that market rice exchange between Sikasso and northern Cote d'Ivoire took place informally and were minimal. This explains the weak correlation coefficient.

4.2.2.3 Integration between Malian and Senegalese markets

Lack of time series data from Kayes market makes Bamako the preferred rice market supplier to Tambacounda and Kaolack markets in Senegal.

The results lend support to our hypothesis that markets between Bamako and those in Senegal are segmented prior to and after the devaluation of the CFA franc. This segmentation may be due to poor communication infrastructure between the two countries. In fact, a single poor quality rail line connects Mali to Senegal. Traffic is slow and irregular thus discourages commercial transactions between the two countries. Rice may not be transported from Mali to Senegal because consumers in Senegal are used to "broken" rice with high percentage of inconsistency, while the Malian rice is of a far superior quality. This superior quality makes Malian rice too expensive for the majority of Senegalese consumers. Even if Malian rice were to be purchased cheaply on Bamako market, the high transportation costs would price it beyond the range acceptable to most Senegalese consumers.

4.2.2.4 Integration between Malian and Guinean markets

Markets of Seguiri and Kankan that are also close to Bamako were chosen as destination markets for products from Bamako. Unlike previous analyses, data used comes from retail market prices covering the period extending from January 1993 through December 1995.

Results from Siguiri-Bamako axis confirm the segmentation hypothesis between the two markets even when dummy variables are taken into account. However, results from the Kankan-Bamako axis show a strong spatial integration in the short term even after the devaluation. These results seem unreasonable given that Siguiri is much closer to Bamako than Kankan. The short-term integration between Kankan and Bamako could be explained by exchanges between the two markets. According to Guinean economic operators interviewed in the Djikoroni market west of Bamako, Malian rice is transported by boat from Bamako. Maritime transport is much preferred to ground transport, due to poorly maintained Guinean roads. Kankan urban market appears better integrated with Bamako than Siguiri. Thus, it is more attractive to Guinean economic operators, even though the quantities of rice exchanged are small. Malian rice export is much more important post devaluation than pre-devaluation as demonstrated by the 1991 INRA/IRAM study mentioned earlier.

4.2.2.5 Integration between markets from Mali and Niger

Retail market data from January 1993 through December 1993 were used in the analysis for the following markets: Niamey-Gao; Niamey-Ansongo; Tillabery-Gao; and Tillabery-Ansongue. The results indicate a strong segmentation between markets from Mali and their counterparts in Niger. This segmentation appears to be due to poor communication channels between the two countries. This also has been confirmed by the economic operators.

In summary, domestic Malian markets are generally well integrated even if some bottlenecks still exist. Markets integration became stronger after the devaluation of the CFA Franc making Malian rice competitive. These markets, as well as those in neighboring countries, are not well integrated because of lack of rice exchange as well as high transportation costs. These factors will be further discussed in the following chapters. The level of integration between markets in Mali and neighboring countries improved after the devaluation of the CFA Franc in January 1994. Mali has become a net supplier of rice to those countries.

4.3 Constraints to Malian rice exports

In addition to high transportation costs, several other factors impede Malian rice exports. These include institutional constraints, notably protectionist policies, lack of financing of agricultural commercial activities, poor and complicated money transfer mechanisms, dysfunctional judicial and legal mechanisms, and lack of information exchange among entities charged with its collection and dissemination.

4.3.1 Institutional constraints

4.3.1.1 Protectionist rice policies in the sub-region

Mali and its neighbors belong to regional organizations whose objective is to promote free circulation and exchange of goods and services among member countries. This, however, has not been accomplished to the fullest extent possible. Free circulation and exchange activities have stagnated since the creation of sub-regional organizations in West Africa. This is due in part to development policies implemented by each country. Some countries have created protectionist barriers to protect rice produced locally. For example, Mauritania, Guinea and Burkina Faso have duties on rice of 45 percent, 27 percent, and 18 percent respectively. In addition to protectionist policies, these countries apply high tariffs to raise money for their development projects. Thus, it is difficult to promote regional rice trading. The majority of urbanites in most of the aforementioned countries consumed rice at a rate much greater than the capacity of their individual countries to satisfy through domestic production. Rice exchange was rendered even more difficult given that rice was not considered a raw material accepted by the Economic Development Community of West African States (ECOWAS), to which Mali belongs. These incompatibilities provide each country the opportunity to fix duties and taxes as they see it fit.

Malian policy-makers should undertake steps to promote free circulation and exchange of their rice in the sub-region. They should capitalize on the fact that rice is consumed by a large majority of urbanites in most of countries in the sub-region. As such, countries should drop any taxes on rice when exported by any country belonging to the sub-regional organizations. This proposal is acceptable since the value added on rice is small. It could be incorporated into the formulation of policy on the Common Tariff of the Monetary Union of West African States currently under consideration. The objective of this group is to reinforce economic cooperation and to support the creation of a viable commercial network. These countries should also open their markets to international competition allowing a more dynamic exchange of goods and services likely to result in lower production and marketing costs and ensure food security stocks in the sub-region.

4.3.1.2 Financing and money transfer constraints

Lack of financing mechanisms for the marketing of agricultural commodities and inadequate money transfer mechanisms exist in Mali as well as most West African countries. The small amount of credit lent to borrowers at nominally exorbitant interest rates of 20 percent, while inflation is relatively low. These high interest rates are partially due to a dysfunctional national financial market and poor judicial and legal system. Agricultural production and distribution also lack financing and merchants are forced to use their own limited resources. These problems need to be alleviated to allow economic operators and producers to undertake much larger scale rice production. Lenders should also be encouraged to take greater risks as well.

As already indicated, money transfer appears to be one of the most constraining elements in the promotion of free exchange in the sub-region. According to participants of the 1995 conference organized by REAO, money transfer takes several weeks between banks and their branches in other region within a country, but may take up to three months from a bank in one country and its correspondent in another country. This process takes much longer if a bank does not have a corresponding institution in another country and fees paid throughout the transfer are high. This complicates the transfer and discourages economic transactions, leading to the establishment of the informal sector.

These problems led REAO to undertake several discussions with countries in the sub-region with much success. This initiative constitutes the starting point of a much larger mechanism likely to render money transfer much easier. Countries in the sub-region should double their efforts to facilitate monetary integration since their currencies lose their value outside their national borders.

4.3.1.3 Constraints related to legal and contractual issues

Results from discussions with economic operators in neighboring markets revealed that most rice business transactions take place on an informal basis. They negotiate agreements verbally and, as such, are subject to many surprises. Some may delay delivery or refuse to honor verbal agreements altogether. It is reasonable for commodity transactions, especially rice, a commodity that is very important for the national welfare, to be based on a standard legal framework established by policy-makers. The future of Mali's rice exports depends on safeguards established to sustain trade.

4.3.1.4 Lack of market information and information exchange between countries

Many countries in West Africa and especially Mali have made significant efforts to ensure that market information is available to economic operators so that they can make better decisions. These efforts have been taking place since the structural adjustment programs. Most countries in the sub-region have Market Information Systems. These MIS collect and disseminate market information on agricultural products. Despite these efforts, each MIS disseminates market information only to national economic operators. Cross-border information exchange is poor, despite cost reductions from the Internet.

MIS should collect and disseminate information to economic operators on a daily basis. This will allow economic operators to make better use of the information in the allocation of their resources and arbitration. These MIS should also be linked to the Internet so they can diffuse information daily. They can also diffuse information daily on national radios and newspapers. This will however require additional resources not readily available given national governments' tendency to cut costs. Reducing the frequency, collection of data, and the dissemination of information may be a better alternative, especially if focused on selected markets.

MIS may look into the possibility of collecting information on volume exchanged on a market instead of collection information on price alone. It would be useful to reduce the number of markets on which information is collected and focus on major markets for maximum impact. MIS could serve a better purpose if they make supply and demand information from regional markets available to allow economic operators to make better decisions in allocating their resources.

4.3.2 Constraints linked to international markets

Small mills have proliferated in Mali since the liberalization of the rice sector. These small mills reduced transformation costs significantly in the production zones in the Office du Niger. They also displaced large mills. These small mills also had the disadvantage of processing rice with higher percentage of breakage, thus reducing its quality. Only Senegalese consumers consume lower quality rice whereas consumers in Guinea and Cote d'Ivoire prefer whole grain rice of higher quality. To capture those markets, Malian policy-makers and economic operators should produce homogeneous rice and target those consumers. These consumers can afford to buy expensive rice due to their higher purchasing power and to the fact that they are used to consuming high quality rice from Asian countries.

Table 4.1a. Results of Econometric Regressions without the Dummy Variables

1. Bamako-Niono Axis
LBKO = 0.69 – 0.20 LBKO(-1) + 0.7 LNIONO + 0.38 LNIONO (-1)
0.19 0.19 0.06 0.21

2. Segou-Niono Axis
LSEGOU = 0.44 + 0.01 LSEGOU(-1) + 0.75 LNIONO + 0.15 LNIONO(-1)
0.19 0.18 0.09 0.17

3. Sikasso-Niono Axis
LSKSSO = 0.17 + 0.64 LSKSSO(-1) + 0.69 LNIONO – 0.35 LNIONO(-1)
0.32 0.18 0.11 0.19

4. Sikasso-Bamako Axis
LSKSSO = 0.01 + 0.70 LSKSSO(-1) + 0.80 LBKO – 0.50 LBKO(-1)
0.23 0.16 0.09 0.16

5. Korhogo-Sikasso Axis
LKGHO = 0.21 + 0.81 LKGHO(-1) + 0.22 LSKSSO – 0.08 LSKSS(-1)
0.60 0.19 0.17 0.16

6. Sikasso-Korhogo Axis
LSKSSO = -1.08 + 0.69 LSKSSO(-1) + 0.30 LKGHO + 0.23 LKGHO(-1)
0.66 0.12 0.23 0.29

7. Bouaké-Sikasso Axis
LBKE = 0.04 + 0.86 LBKE(-1) + 0.20 LSKSSO – 0.07 LSKSSO(-1)
0.47 0.13 0.15 0.15

8. Dakar-Bamako Axis
LDKAR = 0.12 + 0.78 LDKAR(-1) + 0.44 LBKO – 0.25 LBKO(-1)
0.62 0.36 0.12 0. 25

Table 4.1b. Results of Econometric Regressions with the Dummy Variables

9. Tambacounda-Bamako Axis

$$LTAMBA = \underset{0.25}{0.73} + \underset{0.10}{0.99}\, LTAMBA(-1) + \underset{0.13}{0.20}\, LBKO - \underset{0.12}{0.20}\, LBKO(-1)$$

10. Kaolack-Bamako Axis

$$LKLACK = \underset{0.37}{0.13} + \underset{0.16}{0.90}\, LKALACK(-1) + \underset{0.15}{0.28}\, LBKO - \underset{0.14}{0.20}\, LBKO(-1)$$

11. Kankan-Bamako Axis

$$LKKAN = \underset{0.37}{2.06} + \underset{0.16}{0.44}\, LKKAN(-1) + \underset{0.15}{0.74}\, LBKO - \underset{0.14}{0.46}\, LBKO(-1)$$

12. Siguiri-Bamako Axis

$$LSGUIRI = \underset{0.52}{0.94} + \underset{0.15}{0.65}\, LSGUIRI(-1) + \underset{0.25}{0.23}\, LBKO - \underset{0.26}{0.02}\, LBKO(-1)$$

13. Niamey-Gao Axis

$$LNIAMY = \underset{0.27}{0.20} + \underset{0.07}{0.88}\, LNIAMY(-1) + \underset{0.09}{0.05}\, LGAO - \underset{0.09}{0.02}\, LGAO(-1)$$

14. Niamey-Ansongo Axis

$$LNIAMY = \underset{0.28}{0.16} + \underset{0.06}{0.93}\, LNIAMY(-1) + \underset{0.06}{0.05}\, LSANGO - \underset{0.06}{0.01}\, LANGO(-1)$$

15. Tillabery-Gao Axis

$$LTIBER = \underset{0.29}{0.62} + \underset{0.09}{0.92}\, LTIBER(-1) + \underset{0.12}{0.19}\, LGAO - \underset{0.11}{0.22}\, LGAO(-1)$$

16. Tillabery-Ansongo Axis

$$LTIBER = \underset{0.30}{0.62} + \underset{0.08}{0.93}\, LTIBER(-1) + \underset{0.08}{0.05}\, LSANGO - \underset{0.07}{0.10}\, LSANGO(-1)$$

Table 4.2a. Results of Econometric Regressions with the Dummy Variables

1. Bamako-Niono Axis

$$LBKO = 0.71 - 0.18\ LBKO(-1) + 0.72\ LNIONO + 0.34\ LNIONO(-1) - 0.0005DEVA + 0.03\ TAXE$$

0.23 0.20 0.08 0.22 0.02 0.03

2. Segou-Niono Axis

$$LSEGOU = 0.61 + 0.004\ LSEGOU(-1) + 0.73\ LNIONO + 0.16\ LNIONO(-1) + 0.02\ DEVA + 0.03\ TAXE$$

0.25 0.20 0.10 0.19 0.02 0.05

3. Sikasso-Niono Axis

$$LSKSSO = 0.23 + 0.59\ LSKSSO(-1) + 0.73\ LNIONO - 0.36\ LNIONO(-1) - 0.01DEVA + 0.08\ TAXE$$

0.41 0.19 0.12 0.20 0.02 0.06

4. Sikasso-Bamako Axis

$$LSKSSO = 0.40 + 0.25\ LSKSSO(-1) + 0.82\ LBKO - 0.14\ LBKO(-1) - 0.02DEVA + 0.03\ TAXE$$

0.71 0.59 0.12 0.55 0.04 0.05

5. Korhogo-Sikasso Axis

$$LKGHO = -0.09 + 0.53\ LKGHO(-1) + 0.71\ LSKSSO - 0.23\ LSKSS(-1) + 0.02DEVA - 0.07\ TAXE$$

0.45 0.18 0.15 0.23 0.03 0.07

6. Sikasso-Korhogo Axis

$$LSKSSO = -1.26 + 0.60\ LSKSSO(-1) + 0.25\ LKGHO + 0.39\ LKGHO(-1) + 0.05DEVA - 0.10\ TAXE$$

0.86 0.13 0.23 0.29 0.03 0.10

7. Bouaké-Sikasso Axis

$$LBKE = 0.77 + 0.81\ LBKE(-1) + 0.14\ LSKSSO - 0.10\ LSKSSO(-1) + 0.05DEVA + 0.08\ TAXE$$

0.56 0.13 0.14 0.14 0.03 0.07

8. Dakar-Bamako Axis

$$LDKAR = 0.79 + 0.74\ LDKAR(-1) + 0.35\ LBKO - 0.26\ LBKO(-1) + 0.09DEVA + 0.06\ TAXE$$

0.45 0.18 0.12 0. 13 0.04 0.04

Table 4.2b. Results of Econometric Regressions with the Dummy Variables

9. Tambacounda-Bamako Axis

LTAMBA =1.35 + 0.66 LTAMBA(-1) + 0.17 LBKO – 0.10 LBKO(-1) + 0.13 DEVA + 0.04 TAXE
0.50 0.14 0.11 0.11 0.04 0.04

10. Kaolack-Bamako Axis

LKLACK = 1.23 + 0.67 LKALACK(-1) + 0.18 LBKO – 0.10 LBKO(-1) + 0.12 DEVA + 0.03 TAXE
0.55 0.17 0.14 0.13 0.05 0.04

11. Kankan-Bamako Axis

LKKAN = 1.33 + 0.44 LKKAN(-1) + 0.81 LBKO – 0.37 LBKO(-1) - 0.14 DEVA + 0.10 TAXE
2.47 0.48 0.30 0.39 0.08 0.06

12. Siguiri-Bamako Axis

LSGUIRI = 1.37 + 0.66 LSGUIRI(-1) + 0.15 LBKO + 0.003 LBKO(-1) + 0.04 DEVA + 0.04 TAXE
0.77 0.16 0.27 0.26 0.05 0.06

13. Niamey-Gao Axis

LNIAMY = 0.74 + 0.79 LNIAMY(-1) + 0.002 LGAO – 0.07 LGAO(-1) + 0.04 DEVA + 0.05 TAXE
0.35 0.08 0.09 0.09 0.02 0.03

14. Niamey-Ansongo Axis

LNIAMY = 0.67 + 0.84 LNIAMY(-1) + 0.04 LSANGO – 0.01 LANGO(-1) + 0.04 DEVA + 0.06 TAXE
0.35 0.07 0.05 0.05 0.02 0.03

15. Tillabery-Gao Axis

LTIBER = 0.42 + 0.70 LTIBER(-1) + 0.18 LGAO – 0.17 LGAO(-1) + 0.10 DEVA + 0.02 TAXE
0.42 0.13 0.10 0.09 0.04 0.03

16. Tillabery-Ansongo Axis

LTIBER = 1.49 + 0.70 LTIBER(-1) + 0.09 LSANGO – 0.09 LSANGO(-1) + 0.11 DEVA + 0.03 TAXE
0.41 0.11 0.06 0.06 0.04 0.03

CONCLUSIONS AND RECOMMENDATIONS

The study demonstrates that Mali possesses a comparative advantage on its domestic markets and is well positioned to export rice to markets in neighboring countries. Surprisingly, Mali holds a comparative advantage in big urban centers in coastal countries that have implemented protectionist policies for their local rice in order to secure significant financial resources. Malian rice exports to the sub-region hold many prospects for several reasons. First the External Common Tariff of the Monetary Union of West Africa in which Mali is a member will be implemented in the near future. This will protect local products and intensify exchanges in the sub-region. Second, the economic crisis that occurred in Asia will likely make Asian rice more expensive to import.

These factors coupled with the devaluation of the CFA franc in January 1994 made Malian rice more competitive in the sub-region, especially since Malian rice production has resulted in higher yields since the 1996-1997 agriculture campaign. These surpluses appear to be weak but could be solidified if additional efforts are taken to augment cultivable land. It would be important to determine the amount of water available for irrigation before developing additional land. In case water is not a limiting factor, policy-makers should pay closer attention to economic and environmental issues located downstream. A better management strategy would likely lead to efforts that mitigate degradation and compensation for farming populations.

Malian economic operators should seize the challenging opportunities in rice production and commercialization to satisfy a diverse consumer base with different consumption and tastes. Consumers in Guinea prefer steam rolled rice much more expensive than broken rice but with limited purchasing power. Consumers in Senegal prefer broken rice that is much cheaper than whole-grain rice. Consumers in Cote d'Ivoire are more selective and require high quality rice. In order for Malian economic operators to benefit from such diverse set of opportunities, they need to adopt a long-term strategy to maximize their gains. To maximize Mali's position in the sub-region, the study proposes the following recommendations:

(a) *Encourage the regional organizations to include rice in the list of primary products so that it can be exempt from duties and taxes.* Mali's exports are much smaller than those from Cote d'Ivoire and Senegal whose industrial fabrics are much denser. Since Mali serves as a vast market for products from those countries, it should use its position to leverage its rice production and exports to those countries. It should also bring those countries to include rice on the list of primary products issued by regional organizations such as West African Monetary Union. This proposition is important and will exempt Malian rice from custom duties, making it more competitive than rice from the international market. The success of such proposal would be a framework likely to be a basis for other organization in the sub-region such as Economic Community of West African States (ECOWAS).

(b) *Specialization of Mali in exporting high quality rice and importing low quality rice.* Given the diversity of rice consumers in West Africa Malian economic operators should target markets in Cote d'Ivoire where higher revenues and middle class consumers prefer high quality and fresh rice. Capturing this market would confer a reputable position and make Mali the uncontested exporter of rice in the sub-region. Similarly Malian policy-makers should lower taxes on rice imports so they can buy rice much cheaper to close the deficit created by high local demand and low supply.

(c) *Exempt inputs from custom duties and taxes.* This will render Malian rice more competitive if intermediate consumption is used in rice production.

(d) *Reduce custom duties and taxes on vehicles and spare parts.* Given that high custom duties and taxes exacerbate transportation costs and given that these in turn affect the competitiveness of Malian rice, it would be advisable for Malian policy-makers to lower these taxes.

(e) *Encourage commercial banks to finance rice sector activities.* Malian decision-makers should encourage local banks to provide loans to those involved in the rice sector so they can produce and sell rice for both domestic markets and in neighboring countries.

(f) *Promote investments in the rice sector in the Office du Niger by business people in the sub-regions as well as from international market.* Since the land tenure code has been improved significantly, additional efforts should be made by Malian decision-makers to attract investors from the sub-region and international markets to promote rice production. The Internet and/or the international investors' forums can be used for this purpose.

(g) *Encourage the rapid collection, exchange and dissemination of useful market information and between the MIS.* Since MIS are present in each West African country, they should be encouraged to collect and disseminate information to economic operators daily. MIS should also make information available to economic operators so they use it for arbitration and decision-making.

The analyses are based on the cost of domestic resource costs (coût des ressources internes). They suggest that in general Mali has a significant comparative advantage in production and commercialization of rice both on its national territory and in neighboring countries of Côte d'Ivoire, Guinea and Senegal. This comparative advantage is credited mostly to government efforts during the last eight years. These efforts mostly targeted irrigation infrastructure in rice producing areas under the authority of the Office du Niger. They created favorable conditions that improved both rice production and commercialization. Malian rice also benefited from higher prices of rice on the international markets as well as the devaluation of the CFA Franc in January 1994. These advantages hold equally well for domestic markets as well as those in the sub-region.

The results from the analysis also reveal that Mali's comparative advantage in rice export toward large urban centers in the costal countries diminishes when transportation costs are taken into account. These results led the team to run some simulations on the effect of transportation costs on the relative advantage of Malian rice when sold on different markets in the subregion.

Using cost effectiveness as a measure of competitiveness, the results indicate that Malian rice is competitive on all internal national markets except the town of Gao. Malian rice is also competitive on most markets in Côte d'Ivoîre. However, Malian rice is not competitive in Senegal and this is due in part to the fact that Senegalese consumers prefer broken rice, which is much cheaper than rice that is only 35 percent broken. Notwithstanding this preference, Malian rice is preferred by middle class and urbanite Senegalese. This urban and middle class has a much higher purchasing power and could be targeted to buy more of the whole Malian rice. This could be enhanced by better communication and market information systems. Mali should also target markets in Upper Guinea (Kankan and Siguiri) since rice consumption in that region is much higher due largely to isolation and higher transportation costs. Securing a much larger share of the Guinean markets entails that Malian entrepreneurs satisfy preferences of Guinean consumers who are used to eating steamrolled rice, usually requiring much higher production cost than rice consumed in Mali.

Malian enterpreneurs should take advantage of these opportunities to penetrate and dominate regional markets with multiple consumer preferences at various levels. This disparity could also be considered an opportunity for diversification in rice production in Mali. To take advantage of those opportunities to realize their full potential and benefits, Mali must adopt a much more liberal market policy for both subregional and international commerce. Mali should also lower its taxes to facilitate rice import in case of deficits. Although rice production is seasonal, it is consumed constantly throughout the year. This situation in turns creates conjectural deficits. Given that rice storage is extremely costly, Mali should export its rice just after harvest and import some from abroad during the year to stabilize prices throughout the year.

Projection of supply and demand of Malian rice

Rice supply and demand projections are undertaken independently. Projection results show that, due to a spectacular rice production, Mali has had an increasing surplus since 1996, reaching approximately 50,000 metric tons in 1997. If the observed rice production trend of the 1990's continues in the future, this surplus will reach 230,000 metric tons by 2005 even by the most pessimistic prediction. This is in turn will make Mali a potential and credible rice exporter in West Africa.

Rice commercialization efficiency

On the basis of the rice supply and demand model, the assessment of rice commercialization efficiency shows a good integration between the Niono and other three Malian domestic markets. The Malian market integration appears stronger after, rather than before, the CFA franc devaluation. This is partially responsible for the improvement in the local rice competitiveness, which encouraged rice transfers between the production areas of the Niger Office and the consumer markets. Contrary to this strong integration, the results generally indicate segmentation between the domestic markets and the neighboring countries. This observation is verified through field surveys.

Recommendations of the study

To help Mali toward securing a larger share of the vast West African market, the study proposes the following recommendations:

A) *Encourage sub-regional organizations to consider rice a local product and have it exempted from customs duties and taxes*

Mali exports much fewer products to but imports more from countries in the sub-region such as Côte d'Ivoire and Senegal whose industrial fabric is relatively dense. Mali also serves as a vast market for those countries' industrial products. Given this, Mali should leverage its position to negotiate better terms for its rice exports and include rice among other products considered local by the subregional organizations, especially EMUWA. This proposal is important because it will make Malian rice exempted from customs, duties and taxes when traded in the subregion, and will make it more competitive against rice imported from the international markets. The success of this mechanism will certainly serve as a reference that other sub-regional organizations such as ECOWAS may take into account.

b) Specialization of Mali as high quality rice exporter and low quality rice importer

Given the diversity in rice consumption in West Africa, Malian traders should focus on the Ivoirian market where income is relatively higher and an increasing middle class that has developed an appetite for fresh and high quality rice. Exporting such high quality rice will help establish Mali's reputation and will help it dominate other markets in the sub-region. By the same token, efforts should be undertaken by Malian decision-makers to impose low tax rates on rice imported from the international market, allowing them to import rice in order to close the gap between the local supply and demand when needed.

c) Exempt inputs from customs duties and taxes

To strengthen and improve its rice competitiveness, the Malian government should exempt rice imports used for intermediate consumption during rice production from duties and taxes.

d) Reduce customs duties and taxes on utility vehicles and their spare parts

Given that transportation costs are mostly induced by the high customs duties and taxes and that, in turn, they adversely affect the competitiveness of the Malian rice, it would be desirable that Malian decision-makers consider reducing those duties and taxes.

e) Encourage national commercial banks to finance the rice sector

The Malian decision-makers should encourage local commercial banks to grant loans to the rice sector in order to promote its production and facilitate its distribution at the national as well as sub-regional levels.

f) Promote sub-regional and international investments at the Niger Office

Given that the land tenure code has been completely changed to encourage investments at the Niger Office, it would be advisable for the Malian Government to undertake an aggressive campaign at the sub-regional and international levels to attract private investors to promote rice production. This campaign could be carried out through the use of the Internet or by participating in international investors' forums and symposiums.

g) Encourage useful and rapid market information gathering and information exchange between the MIS

Since the MIS are present in all West African countries, they should be encouraged to gather market information and make it available to users on a daily basis. Providing timely and useful information exchange through MIS is also important to information flows in the sub-regions and enables traders to conduct arbitrage on a reliable basis.

REFERENCES

Baris, P., J. Coste, A. Coulibaly, and M. Dème, "Analyse de la filière rizicole de la zone de l'Office du Niger et les perspectives à moyen et long termes," Report funded by the French Development Bank and French Cooperation Agency for the General Delegation for the Restructuring of the Office du Niger, Office of the Prime Minister, IRAM, Paris, 1996.

Barry, Abdoul, "Comparative Advantage, Trade Flows and Prospects for Regional Agricultural Market Integration in West Africa: The Case of Côte d'Ivoire and Mali," Ph.D. dissertation defended at the Agricultural Economics Department, Michigan State University, East Lansing, Michigan, 1994.

Barry, A, D. Stryker, and L. Salinger, "Incitations, avantages comparatifs et échanges régionaux de céréales dans le sous-espace ouest: Cas de la Guinée, du Mali et du Sénégal," Club du Sahel, Paris, 1991.

Benz, Hélène, Jean-Louis Fusillier, Salmou Hassane, Laurent Liagre, Patricio Mendez del Villar, and Jean-Michel Sourisseau, "Les Premiers effets de la dévaluation sur les filières riz irrigués au Sahel – (Sénégal, Niger, Mali)," Synthesis, IER/CIRAD, September 1995.

Bricas, N., and R. Sauvinet, "The Trend towards Diversification in Sahelian Food Habit," Paper presented at the Seminar on Regional Cereals Trade in West Africa, organized in Lome by the CILSS/Club du Sahel, 1989.

Camara, Aïssata, "Les coûts de commercialisation des produits vivriers en Côte d'Ivoire," CIRES, Abidjan, 1992.

CILSS/Club du Sahel, "Cereals Policies in Sahel Countries: Act of the Mindelo Conference," CILSS/Club du Sahel/OECD, Paris, 1987.

Club du Sahel, "Le Nigeria et les perspectives d'intégration régionale en Afrique de l'Ouest," OECD, Paris, 1994.

Coelo, Serge, "Un exemple de protection: La régulation des importations de riz au Mali," Presentation at the CILSS/Club du Sahel Seminar on Regional Cereals Areas in West Africa, November 6-11, 1989, Lomé, 1989.

Coussy, J, P. Hugon, and O Sudrie, "Urbanisation et dépendance alimentaire en Afrique sub-saharienne," SEDES, Paris, 1991.

Delgado, C., "Why Is Rice and Wheat Consumption Increasing in West Africa?" Paper presented at the European Agricultural Economists Seminar, Montpellier, France, 1989.

Dème, Moustapha, "La filière riz au Mali: Situation – problèmes– perspectives," Report presented at the Meeting on Collective Food Security and Endogenous Development in West Africa following the CFA Devaluation, Paris, April 14-15, 1994, SOCETEC, Bamako, 1994.

Diarra, Salif, "The Role of Small Rice Mills in the Rice Subsector of the Office du Niger, Mali," master's thesis, Michigan State University, East Lansing, Michigan, 1994.

Dibley, D., D. Boughton, and T. Reardon, "Processing and Preparation Costs of Rice and Coarse Grains in Urban Mali: Subjecting an Ipse Dixit to Empirical Scrutiny," *Food Policy*, Vol. 20, No. 1, February 1995.

Dioné, Josué, "Informing Food Security Policy in Mali: Interactions between technology, Institutions and Market Reforms," Doctoral thesis, Michigan State University, East Lansing, Michigan, 1990.

FAO, "Etude de l'impact de la dévaluation du franc CFA sur la compétitivité des productions rizicoles dans les pays de l'UEMOA," Report 107/94, September 1994.

FAO, *FAO Trade Yearbook*, Food and Agriculture Organization, Rome, 1997.

Gabre-Madhin, Eleni, Salif Diarra, and John Staatz, "La problématique des coûts de transfert dans le cadre de la commercialisation des céréales au Mali," Presented at the seminar organized by PRISAS on regional food security, Bamako, Mali, March 22–27, 1992.

Gaye, Matar, "Le commerce informel des produits de l'agriculture Sénégalaise: Cas des céréales traditionnelles et de l'arachide," Presented at the IFPRI/ISRA Conference on the Regional Integration of West African Agricultural Markets, Saly Portudal, Senegal, December 2-4, 1992.

Gittinger, P., *Economic Analysis of Agricultural Projects*, Second edition, published for World Bank Development Institute, Johns Hopkins University Press, Baltimore and London, 1982.

Gordon, H., "Grain Marketing Performance and Public Policy in Tanzania," Ph. D. dissertation presented at the Fletcher School of Law and Diplomacy, Tufts University, Somerville, Massachusetts, 1994.

Hibou, Béatrice, "Analyse comparée des politiques de protection et de régulation des marchés céréaliers ouest-africains: Le cas des pays du 'sous-espace' ouest ", IRAM/INRA/UNB, Paris, 1990.

Humphreys, Charles P., and Patricia L. Reader, "Rice Policy in the Ivory Coast," in *Rice in West Africa: Policy and Economics*, edited by Scott Pearson et al. University Press, Stanford University, Palo Alto, California, 1981.

INRETS-LET, "Politiques de réduction des coûts du camionnage en Afrique sub-saharienne", Cases of Côte d'Ivoire and Mali," Lyon, France, 1989.

IRAM-INRA-UNB, "Echanges céréaliers et politiques agricoles dans le sous-espace Ouest," Paris, 1991.

Kennedy, E. and T. Reardon, "Shift to Non-Traditional Grains in the Diets of East and West Africa: Role of Women's Opportunity Cost of Time in Prepared-Food Consumption,"*Food Policy*, Vol. 19, No. 1, February 1994, pp. 45-56.

Le Gal, P.Y., "Le développement de la double culture irrigué au Sahel: Contraintes et perspectives pour les agriculteurs," in *Irrigated Rice in the Sahel: Prospects for Sustainable Development*, edited by K.M. Miézan et al. Association for the Development of Rice Production in West Africa, Dakar, Senegal, 1997.

Louis Berger International, "Etude de la filière riz," final report, 1990.

OECD/AfDB/CILSS, "Description du peuplement de l'Afrique de l'Ouest: Commentaire de la base de données," Long-term prospective study for West Africa funded by EEC with the support of CIDA, ADB, World Bank, French Cooperation Agency, Netherlands Cooperation Agency, and USAID, Working Document No. 1, OECD, Paris, 1994.

Office of the Director of Studies and Programming, "L'impact de la dévaluation du FCFA sur le secteur rural nigérien," Ministry of Agriculture and Livestock, Niamey, Niger, 1994.

Office of the Regional Agricultural Director, Gao, "Rapport mensuel sur l'état d'avancement du programme de contre-saison de riz," July 1996.

Rassas, Bechir, and Thierry Loutte, "Niger: Rice and Cotton Policy," Technical Report No. 106, Prepared for USAID/Niger under APAP Project, Phase II, Abt Associates, Bethesda, Maryland, 1989.

Ravallion, M., "Market Integration during the Famine," in *Markets and Famines*, Clarendon Press-Oxford, New York, 1987.

Reardon, T., T. Thiombiano, and C. Delgado, "La substitution des céréales locales par les céréales importées: La consommation alimentaire de ménages à Ouagadougou, Burkina Faso," Research Results Series, No. 002, CEDRES, University of Ouagadougou, Ouagadougou, Burkina Faso, 1988.

REAO and AIRD, "Réalisation du commerce régional en Afrique de l'Ouest," study funded by USAID under APAP Project, Associates for International Resources and Development Cambridge, Massachusetts, 1996.

Sall, Abdoulaye, "L'organisation du monde rural du Mali: évolution et perspectives," 1988.

Sarr, Malick, "Le riz: quelle politique pour le Sénégal," Presented at the conference held at the THIES National Agricultural School, 1995.

Savadogo, Kimseyinga, Alison T. Slack, and Christopher Delgado, "Long-Distance Food Transfer Costs in Burkina Faso," Presented at the IFPRI/ISRA Conference on the Regional Integration of West African Agricultural Markets, Saly Portudal, Senegal, December 2-4. 1992.

Stryker, Dirck, "Nontraditional Export Growth in Response to Policy Reform in Sub-Saharan Africa," Associates for International Resources and Development, Cambridge, Massachusetts, 1991.

Stryker, Dirck, Lynn Salinger, and Jeffrey Metzel, "A Regional Strategy for Trade and Growth in West Africa: Sectoral Analyses and Action Plan," Study funded by the U.S. Agency for International Development (USAID), Contract No. PDC-0095-Z-00-9053-00, within the framework of the Consulting Assistance on Economic Reform Project, Associates for International Resources and Development, Cambridge, Massachusetts, 1994.

USDA/Economic Research Service, "Rice Outlook," U.S. Department of Agriculture, No. RCS-0398, June 1998.

Wilcock et al. "Senegal Rice Policy Reform Program: Second Situation Report," Report No. 12 published jointly by the Agricultural Policy Unit (UPA) of the Ministry of Agriculture of Senegal and the Agricultural Policy Analysis Project (APAP III), 1997.

To Order Policy Briefs or Other EAGER Publications

EAGER Publications/BHM
1111 North 19th Street, Suite 505
Arlington, Virginia 22209
Tel: 703-741-0900 Fax: 703-741-0909
e-mail: spriddy@eagerproject.com

EAGER Publications can be downloaded from www.eagerproject.com

Policy Briefs based on EAGER research funded by the U.S. Agency for International Development:

1. Can Mali Increase Red Meat Exports? Metzel, Jeffrey, Abou Doumbia, Lamissa Diakite, and N'Thio Alpha Diarra. *Prospects for Developing Malian Livestock Exports.* Cambridge, MA: Associates for International Resources and Development, 1997.

2. The Livestock Sector in Mali - Potential for the Future. Metzel, Jeffrey, Abou Doumbia, Lamissa Diakite, and N'Thio Alpha Diarra. *Prospects for Developing Malian Livestock Exports.* Cambridge, MA: Associates for International Resources and Development, 1997.

3. Mali's Manufacturing Sector: Policy Reform for Success. Cockburn, John, Eckhard Siggel, Massaoly Coulibaly, and Sylvain Vezina. *Manufacturing Competitiveness and the Structure of Incentives in Mali.* Cambridge, MA: Associates for International Resources and Development, 1997.

4. Growth and Equity: Gemstone and Gold Mining in Tanzania. Phillips, Lucie Colvin. *Gemstone and Gold Marketing for Small-Scale Mining in Tanzania.* Arlington, VA: International Business Initiatives, 1997.

5. Financial Services: Key Component for Poverty Alleviation. Ndour, Hamet, and Aziz Wane. *Financial Intermediation for the Poor.* Cambridge, MA: Harvard Institute for International Development, 1997.

6. Need to Promote Exports of Malian Rice. Barry, Abdoul W., Salif B. Diarra, and Daouda Diarra. *Promotion of the Regional Export of Malian Rice.* Cambridge, MA: Associates for International Resources and Development, 1997.

7. Trade Policy Reform: A Success? Metzel, Jeffrey, and Lucie Phillips. *Bringing down Barriers to Trade: The Experience of Trade Policy Reform.* Cambridge, MA: Associates for International Resources and Development, 1997.

8. Excise Taxes: A Greater Role in Sub-Saharan Africa? Bolnick, Bruce, and Jonathan Haughton. *Tax Policy in Sub-Saharan Africa: Reexamining the Role of Excise Taxation.* Cambridge, MA: Harvard Institute for International Development, 1997.

9. Status of Financial Intermediation for the Poor in Africa. Nelson, Eric. *Financial Intermediation for the Poor: Survey of the State of the Art.* Bethesda, MD: Development Alternatives Incorporated, 1997.

10. Foreign Direct Investment and Institutions. Wilhelms, Saskia. *Foreign Direct Investment and Its Determinants in Emerging Economies.* Cambridge, MA: Associates for International Resources and Development, 1997.

11. Strong Institutions Support Market-Oriented Policies. Goldsmith, Arthur. *Institutions and Economic Growth in Africa.* Cambridge, MA: Harvard Institute for International Development, 1997.

12. Reducing Tax Evasion. Wadhawan, Satish, and Clive Gray. *Enhancing Transparency in Tax Administration: A Survey.* Cambridge, MA: Harvard Institute for International Development, 1997.

13. Can Africa Take Lessons from the U.S. Approach to Tax Evasion? Gray, Clive. *Enhancing Transparency in Tax Administration: United States Practice in Estimating and Publicizing Tax Evasion.* Cambridge, MA: Harvard Institute for International Development, 1997.

14. Estimating Tax Buoyancy, Elasticity and Stability: Predicting Changes in Tax Revenues. Haughton, Jonathan. *Estimating Tax Buoyancy, Elasticity, and Stability.* Cambridge, MA: Harvard Institute for International Development, 1997.

15. Estimating Demand Curves for Goods Subject to Excise Taxes. Jonathan Haughton. *Estimating Demand Curves for Goods Subject to Excise Taxes.* Cambridge, Mass.: Harvard Institute for International Development, 1997.

16. Fixed or Floating Exchange Rates? Amvouna, Anatolie Marie. *Determinants of Trade and Growth Performance in Africa: A Cross-Country Analysis of Fixed Versus Floating Exchange Rate Regimes.* Cambridge, MA: Associates for International Resources and Development, 1997.

17. Review of Results of EAGER Research on Trade. Stryker, Dirck J. *Trade and Development in Africa.* Cambridge, MA: Associates for International Resources and Development, 1997.

18. Increasing Employment in SA: Policy Recommendations. Stryker, J. Dirck, Fuad Cassim, Balakanapathy Rajaratnam, Haroon Bhorat, Murray Leibbrandt, *Increasing Demand for Labor in South Africa.* Cambridge, MA: Associates for International Resources and Development, 1998.

19. Structural Adjustment: Implications for Trade. Barry, Abdoul W., B. Lynn Salinger and Selina Pandolfi. *Sahelian West Africa: Impact of Structural Adjustment Programs on Agricultural Competitiveness and Regional Trade.* Cambridge, MA: Associates for International Resources and Development, 1998.

20. The Uruguay Round: Impact on Africa. Hertel, Thomas W., William A. Masters and Aziz Elbehri. *The Uruguay Round and Africa: A Global, General Equilibrium Analysis.* Cambridge, MA: Associates for International Resources and Development, 1998.

21. Are Formal Trade Agreements the Right Strategy? Radelet, Steven. *Regional Integration and Cooperation in Sub-Saharan Africa: Are Formal Trade Agreements the Right Strategy?* Cambridge, Mass.: Harvard Institute for International Development, 1997.

22. Women in South African Clothing Industry. Flaherty, Diane P., and B. Lynn Salinger. *Learning to Compete: Innovation and Gender in the South African Clothing Industry.* Cambridge, MA: Associates for International Resources and Development, 1998.

23. What Africa Can Learn from East Asian Trade Promotion. Engel, Karen. *Lessons of East Asia for Promoting Trade in Africa.* Cambridge, MA: Associates for International Resources and Development,

24. Government and Bureaucracy. Goldsmith, Arthur. *Africa's Overgrown State Reconsidered: Bureaucracy and Economic Growth*, Cambridge, MA: Harvard Institute for International Development, 1998.

25. Contract Enforcement. Kähkönen, Satu and Patrick Meagher. *Contract Enforcement and Economic Performance.* College Park, MD: IRIS, 1998.

26. Financial Programming in East and Southern Africa. Workshop held in Lilongwe, Malawi. June, 1999.

African Economic Policy Discussion Papers

1. Kähkönen, S., and P. Meagher. July 1998. *Contract Enforcement and Economic Performance.*

2. Bolnick, B., and J. Haughton. July 1998. *Tax Policy in Sub-Saharan Africa: Examining the Role of Excise Taxation.*

3. Wadhawan, S.C., and C. Gray. July 1998. *Enhancing Transparency in Tax Administration: A Survey.*

4. Phillips, L.C. July 1998. *The Political Economy of Trade Policy Reform: Exploring an African Paradigm.*

5. Metzel, J., and L.C. Phillips. July 1998. *Bringing Down Barriers to Trade: The Experience of Trade Policy Reform.*

6. Salinger, B.L., A.M. Amvouna, and D.M. Savarese. July 1998. *New Trade Opportunities for Africa.*

7. Goldsmith, Arthur. July 1998. *Institutions and Economic Growth in Africa.*

8. Flaherty, Diane P., and B. Lynn Salinger. July 1998. *Learning to Compete: Innovation and Gender in the South African Clothing Industry.*

9. Wilhelms, Saskia K.S. July 1998. *Foreign Direct Investment and Its Determinants in Emerging Economies.*

10. Nelson, Eric R. August 1998. *Financial Intermediation for the Poor: Survey of the State of the Art.*

11. Haughton, Jonathan. August 1998. *Estimating Tax Buoyancy, Elasticity, and Stability.*

12. Haughton, Jonathan. August 1998. *Estimating Demand Curves for Goods Subject to Excise Taxes.*

13. Haughton, Jonathan. August 1998. *Calculating the Revenue-Maximizing Excise Tax.*

14. Haughton, Jonathan. August 1998. *Measuring the Compliance Cost of Excise Taxation.*

15. Gray, Clive. August 1998. *United States Practice in Estimating and Publicizing Tax Evasion.*

16. Cockburn, John, Eckhard Siggel, Massaoly Coulibaly, and Sylvain Vézina. August 1998. *Measuring Competitiveness and its Sources: The Case of Mali's Manufacturing Sector.*

17. Barry Abdoul W., Salif B. Diarra, and Daouda Diarra. April 1999. *Promotion of Regional Exports of Malian Rice.*

18. Amvouna, Anatolie Marie. July 1998. *Determinants of Trade and Growth Performance in Africa.*

19. Stryker, Dirck. June 1999. *Dollarization and Its Implications in Ghana.*

20. Radelet, Steven. July 1999. *Regional Integration and Cooperation in Sub-Saharan Africa: Are Formal Trade Agreements the Right Strategy?*

21. Bbenkele, E.C. June 1998. *Enhancing Economic Development by Fostering Business Linkages Between the Pharmaceutical Companies and the Traditional Medicines Sector.*

22. Anim, FDK and CL Machethe. June 1998. *Promoting the Growth of Micro and Small Enterprises through Business Linkages in the Northern Province.*

23. McEwan, T., Mead, M.D.C. and N.M. Ndolovu. June 1998. *Business Linkages Involving SMMEs With Umgeni Water and Hulett Aluminium in Kwalulu-Natal.*

24. Skae, F.O. June 1998. *Linkage Promotion in South Africa: Insights from Research Conducted in Durban and Richards Bay. An Exploratory Study.*

25. Strydom, B. June 1998. *The role of Business Linkages in Restructuring the Footwear Industry in the Greater Pietermaritzburg Metropolitan Area.*

26. Mead, D.C. June 1998. *Small Enterprise Growth through Business Linkages in South Africa.*

Copies of African Economic Discussion Papers cost $8 each (including postage) for addresses outside Africa and are free for countries within Africa.

Other EAGER Publications

McPherson, Malcolm F. and Arthur Goldsmith. Summer-Fall 1998. Africa: on the Move? *SAIS Review, A Journal of International Affairs*, The Paul H. Nitze School of Advanced International Studies, The John Hopkins University, Volume XVIII, Number Two, p. 153.

Metzel, Jeffrey, Abou Doumbia, Lamissa Diakite, and N'Thio Alpha Diarra. July 1998. EAGER Research: *Prospects for Developing Malian Red Meat and Livestock Exports.*

Barry, Abdoul W., Salif B. Diarra, and Daouda Diarra, 1998. EAGER Research: *Promoting Regional Exports of Malian Rice.*

Cockburn, John, Eckhard Siggel, Massaoly Coulibaly, and Sylvain Vézina. October 1998. EAGER Research. *Measuring Competitiveness and its Sources: The Case of Mali's Manufacturing Sector.*

Sparrow, F.T. and Brian H. Bowen. July 1999. EAGER Research. *Modeling Electricity Trade in South Africa, User Manual for the Long-Term Model.*

EAGER Regional Workshop on the Implementation of Financial Programming. Lilongwe, Malawi. June 10-11, 1999.

EAGER