

**THE IMPACT OF MARKET REFORM ON AGRICULTURAL
TRANSFORMATION IN MALI**

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by

Niama Nango Dembélé and John M. Staatz*

1. INTRODUCTION

Since 1981, the Government of Mali has undertaken a broad range of reforms aimed at transforming the economy by giving a greater role to the private sector and market processes in allocating the nation's resources. These reforms have involved dismantling and sale of state enterprises, permitting the private sector (including independent farmer and trader organizations) to compete in areas formerly reserved for the state, and removal of many barriers to trade, both domestically and internationally. These changes, combined with the liberty of association and expression that came with Mali's democratization starting in 1991, are profoundly affecting the Malian economy and society.

Because of the importance of the cereals subsector in the Malian economy, both as an employer of millions of rural Malians and the major source of basic staples in the country, the government and donors have given high priority to improving the performance of the cereals market. The lead element of the economic reform program since 1981 program has been the liberalization of cereal marketing, which has occurred under the multidonor-financed cereals market restructuring program, known by its French acronym, PRMC (*Programme de Restructuration du Marché Céréalière*).

The purpose of this paper is to review the Malian experience with cereals market reforms over the past 18 years and evaluate its contribution to agricultural transformation in Mali. We especially emphasize the importance of the interaction between sectoral reforms, macroeconomic reforms, and technological change in influencing farmers' and traders' incentives to make the investments necessary for agricultural and food system transformation. The paper draws heavily on a large body of research carried out by Malian, North American and European researchers since 1985 (see, for example, Dioné forthcoming; Dembélé and Staatz forthcoming; Diarra et al. forthcoming) and on a recent evaluation of the PRMC in which the authors participated (Dembélé, Traoré, and Staatz 1999; Shields, Staatz, and Dembélé 1999; Egg, 1999).

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2. A BRIEF HISTORY OF THE PRMC

2.1 Grain Production in Mali

Approximately 70% of the total calories in the Malian diet come from cereals. Millet, maize and sorghum (hereafter referred to as coarse grains) are the major rainfed staples, and, up until the mid 1980s, accounted for about 85% of the cereal calories, with rice providing most of the remaining 15%. Most rural residents produce at least some of their own cereals, with the result that only about 15%-20% of total grain production enters the market. In urban areas, consumers devote on average between 18% and 31% of their total expenditures to cereals (depending on the city); hence, cereals prices strongly influence urban real incomes (Rogers and Lowdermilk 1988). Rice is much more important in the cities than in rural areas, accounting for more than half the cereals calories consumed in urban areas. Because of the importance of the cereals subsector in the Malian economy, donors and the Malian government have given a high priority since the late 1970s to trying to improve cereals production and marketing.

The northern 60% of Mali is desert and semi-desert, so the bulk of agricultural production takes place in the southern third of the country. Millet and sorghum production occurs throughout the agricultural zone, with the bulk of the marketed surplus being produced in the cotton area of the southeast, known as the CMDT zone (after the *Compagnie Malienne de Développement des Textiles*, which has the monopsony cotton marketing rights in the country). [See Figure 1]. Maize is produced mainly in the southernmost areas, particularly around Sikasso, where rainfall exceeds 1200 mm/years. Smallholders who own animal traction equipment and are heavily involved in cotton production account for the bulk of the marketed surplus of coarse grains (Dioné 1989).

Rice is grown both in government-established irrigation projects, predominantly along the Niger and Bani rivers, and in lowland-inland swamps (*bas fonds*), mainly in southern Mali (Dimithè 1997). The oldest and largest of the government-established rice production areas is the Office du Niger (ON), which has historically produced nearly half of Mali's domestic rice production and the majority of the domestic rice entering the market. (Much of the *bas-fonds* production is for home consumption.)

Grain production in Mali has historically been highly variable due to fluctuating rainfall, which also influences river levels and hence irrigated as well as rainfed agriculture. This variability, combined with a low percentage of total production entering the market, makes market prices and quantities highly volatile. For example, during the 1980s and 1990s, millet and sorghum prices sometimes varied by a factor of 1:4 from year to year (Staatz, Dioné, and Dembélé 1989; Dembélé, Traoré, and Staatz 1999). Such instability makes cereal marketing risky, whether carried out by the public or private sector.

Figure 1. Map of Mali



Source: University of Texas map library web site
 (http://www.lib.utexas.edu:80/Libs/PCL/Map_collection/africa/Mali_pol94.jpg)

2.2 Genesis of the Reforms

The history of the Malian government's participation in the coarse grains market dates to 1964, when the state created an official grain marketing agency, the Office Malien des Produits Agricoles (OPAM), and granted OPAM a legal monopoly on the grain trade. Through OPAM the government fixed official producer and consumer prices for cereals, with the stated aim of achieving three objectives: an increase in rural incomes, provision of cheap cereals to urban areas, and extraction of a surplus from agriculture to finance state investment in other sectors. The state's involvement in the rice subsector dates from the 1920s, when the French colonial government heavily invested in the Office du Niger, with the aim of making Mali the rice granary of French West Africa.

Although the private cereals trade was illegal until 1981, OPAM handled only between 20% and 40% of total grain marketed in the country (Humphreys, 1986, p. 5). Since only about 15% of total production was marketed, merely 3-6% of total production moved through OPAM at official prices. OPAM's share of rice marketings was much higher than its share of coarse grains, as rice destined for the market was produced largely in government-run irrigation schemes, such as the Office du Niger (ON). The repression of the private trade, while not enough to eliminate it, undoubtedly increased transaction costs. In general, the government was more tolerant of the private trade during good production years, when supplies were abundant, than during years of shortage.

Up until the mid 1960s, Mali was a net exporter of cereals. During the drought years of the late 1960s and early 1970s, however, Mali had to import large amounts of grain on both commercial and concessional terms. OPAM was obliged to sell the commercial imports at low official consumer prices, which led to an increasing budget deficit. In an effort to stimulate cereal production after the drought, the government raised official producer prices without a proportional increase in consumer prices. As a result, OPAM was forced to absorb the implicit consumer subsidies, and its cumulative budget deficit reached CFAF 20 billion (US \$80 million) by 1976/77, equivalent to three times its annual grain sales (Humphreys 1986, p.7) .

Donor pressure for cereal market reform mounted during the late 1970's as a result of OPAM's accumulating deficits (which the donors were increasingly reluctant to finance), concerns about OPAM mismanagement, and the perception that OPAM's official monopoly and the system of official prices acted as major disincentives to domestic grain production. In March 1981, the government of Mali agreed to a policy reform program that aimed at increasing producer and consumer prices, liberalizing grain trade, and improving OPAM's operating efficiency.

The reforms embodied in the PRMC were based on the idea of using food aid to finance market liberalization. In exchange for a series of proposed reforms, 10 major international agencies and donors pledged multi-year shipments of program food aid. The food aid was sold, with the

receipts going into a common fund used to finance specific market restructuring actions agreed to by the donors and the Malian government.¹

Long-term benefits were expected both at the trader and producer levels. The proponents of the reforms believed that with the removal of official prices, producer prices would rise, creating incentives for farmers to increase production. The advocates of the reforms argued that more remunerative prices would lead farmers to regard cereals as a cash crop, much like cotton, and shift the orientation of grain producers from subsistence to commercial strategies.

For traders, potential benefits included a reduction in transaction costs, as private merchants no longer would be forced to operate clandestinely. This, in turn, was expected to lead to an increase in the scale and degree of specialization in trader's operations, thereby reducing marketing costs (Berg 1978, pp 165-169; Wilcock, Roth and Haykin 1987). Reducing the risk of trading cereal would stimulate entry into cereal marketing, thereby increasing farm level demand and hence farmers' incentives to produce cereals for the market. Eliminating restrictions on inter-regional grain shipments would allow equilibration of supply and demand over space, thereby helping eliminate localized gluts and shortages. This in turn would contribute to a more stable market, thereby encouraging greater private investment in grain production and marketing (Staatz, Dioné, and Dembélé 1989).

2.3 Relation of the PRMC to Mali's Structural Adjustment Program

The PRMC was related to, but not officially part of, a broader structural adjustment program (SAP) in Mali supported by the World Bank and the IMF. The SAP aimed first to re-establish macro-economic balance by cutting government expenditures and improving revenue collection, as well as improving the efficiency of government services. These changes implied layoffs of government workers, changes in tax codes and collection policies, and closing of state enterprises, all of which affected the cereals subsector. At the same time, the SAP promoted a liberalization of the economy, which aimed at promoting three distinct, but related, transitions in the economy (Griffon 1998):

- A transition from an administered economy to a market economy. Addressing this challenge was one of the first activities of the SAP, and involved the selling of state enterprises and the abolition of official monopolies, and the opening of various domains of the economy, including the cereals trade, to competition.
- A transition from an economy dominated by a few oligopolies to a more competitive structure. Even during the period of "state control" of the Malian economy prior to 1981, state enterprises did not have sufficient control to monopolize all trade. Rather, they tended to work with a few large traders in each sector, who acted as agents for the state

¹The international agencies and donors included the World Food Programme (the project secretariat), Belgium, Canada, the European Community, France, Great Britain, the Netherlands, the United States, West Germany, and Austria. Over the period 1981-98, as Mali's grain production has increased, many of the donors have replaced their food aid with cash contributions to the PRMC.

enterprises. Moving from such a structure to a more competitive economy is a major challenge for a reform process, as it is much more complex than simply “getting the government out of the market.” The government must be fully engaged in putting in place a set of rules of the game that promotes free and fair competition, reduces barriers to entry into the market, and facilitates speedy resolution of commercial disputes.

- A transition from a subsistence economy to a commercial economy. This is a longer-term and more fundamental transition than the other two other transitions just discussed. The transition from a subsistence to a commercial economy is essential for sustained economic growth because, as Adam Smith noted over two centuries ago, the key to economic growth is specialization and trade. Bringing about such specialization and trade involves: (a) increasing the productivity of farming and other rural activities in order that rural residents can produce a surplus for the market and (b) just as importantly, reducing the costs and risks to these people of engaging in trade. Without reliable input and output markets, as well as well-functioning markets for consumer goods, rural households will have few incentives to move away from trying to produce everything for themselves towards a system where they try to increase their incomes through specialization and trade (Staatz 1994).

Although the reform of cereals marketing played a key role in the broader process of economic reform undertaken as part of the structural adjustment process, the philosophy of the PRMC was not identical to that of the Bretton Woods institutions supporting the SAP (Egg 1999). The World Bank and the IMF focused mainly on getting the state out of direct buying and selling activities in the economy and refocusing it on the production of facilitating services (effective law enforcement and other public goods), both to help reduce the government deficit and to open the economy to market forces. The PRMC, rather than just calling on the state to withdraw from the cereals market, attempted to “accompany” the state as it changed its role, through supporting government actions to reform the management of the grain board; to establish and manage a national emergency grain stock; to provide market information to consumers, farmers, and others in the private and public sectors; and to develop tools, such as the food crisis early warning system (*Système d’Alerte Précoce*), to prevent and mitigate disasters. Occasionally, this more supportive attitude towards government action put the PRMC in disagreement with the Bank and the IMF regarding the levels and types of government expenditures that should be accepted.

A key tool used by the both PRMC and the World Bank in fostering economic reforms was the concept of the “contract-plan.” These were management agreements between the state and a state enterprise, such as OPAM or the Office du Niger, that was undergoing reform. The contract-plan defined the mission of the restructured organization and set specific performance goals that the organization had to meet if it was to continue to receive state funding for agreed-upon activities. The Bank and the PRMC often also made their financial support contingent on the state enterprise’s meeting the objectives set out for it in the contract-plan.

2.4 Relation of the PRMC to the CFA Franc Devaluation

Mali is a member of the West African Monetary and Economic Union (UMEOA), which uses a common currency, the CFA Franc (CFAF), whose value is linked to that of the French Franc (FF). From 1947 until January, 1994, the parity rate of the CFAF to the FF was fixed at 1 FF = 50 CFAF. This remarkably long stability in the exchange rate, which was guaranteed by the French treasury, gave the UMEOA countries a freely convertible currency and eliminated all exchange rate risk for trade with France and other countries of the franc zone. However, it also eliminated any independence of monetary policy for these countries and made their exchange rate subject to fluctuations between the FF and other major world currencies, which often had little relation to the economic performance of the UMEOA countries.

Unlike many other countries, the structural adjustment programs adopted by Mali and other countries in the CFA zone in the mid 1980s did not include any exchange rate adjustment, as that was considered a separate matter between the UMEOA countries and France. Yet increasing overvaluation of the CFA franc increasingly hindered the competitiveness of these countries beginning in the mid 1980s. The agricultural sector was particularly hurt, as the overvalued exchange rate made imports of cereals (particularly rice) very cheap and hindered the competitiveness of exports, most of which were agricultural (Yade et al. 1999).

On January 14, 1994, the countries of the UMEOA devalued the CFA franc by 50% relative to the French franc (i.e., from 1 FF= 50 CFAF to 1FF = 100 CFAF). This change in the parity rate immediately increased the competitiveness of Malian cereals (which are tradeable goods) and stimulated expanded production and trade, described in more detail below. Thus, while the devaluation was not part of the PRMC program per se, it clearly influenced the evolution of the reforms. Equally important, the capacity of the Malian economy to respond to the new opportunities opened up by the devaluation was conditioned by the sectoral reforms carried out under the PRMC during the 13 years prior to the devaluation.

2.5 Phases of the Reforms

Since 1981, the PRMC has gone through 5 phases. The objectives for each phase were mutually agreed to by the Malian government and the donor agencies supporting the reforms. These objectives fell into three main categories (Egg 1999):

- **Sectoral adjustment measures:** these involved changing the roles of the state in cereals production and marketing, largely through the restructuring of OPAM and the Office du Niger. The PRMC helped negotiate changes in their mandates (including elimination of their statutory monopolies in grain trade), provided assistance to improve their management through the use of contract-plans, financed severance pay to the large number of employees of that were laid off, and helped cover the organizations' operating deficits as long as they met agreed-upon benchmarks for reform.
- **Strengthening the market,** through assistance to the private sector as it took on greater responsibilities in the newly reformed markets. The PRMC financed supporting services to

the private sector, such as the establishment of a public cereals market information system (SIM-*Système d'Information sur le Marché*), subsidized marketing credit to private traders and village associations, tested improved techniques for cereals cleaning and processing, and, for a brief time in the late 1980s, provided export subsidies.

- **Food crisis prevention and mitigation.** The overall goal of the PRMC was to improve food security of the country by improving incentives to produce and market cereals efficiently. But in addition to this broad goal, the PRMC also supported activities aimed at dealing with short-term food crises. These activities included the financing of the national security stock, the food crisis early warning system, and the transport of food aid to areas requiring emergency food distribution.

Notably absent from the PRMC's activities were any actions aimed directly at improving farm-level food production. The PRMC defined its domain of action "from the farmer's field to the cooking pot," leaving issues of increasing farm-level productivity to others.

As shown in table 1, the share of the PRMC's financial resources devoted to these three objectives varied markedly in the different phases of the program. During the first seven years of the program (PRMC I), over 70% of the resources were devoted to sectoral adjustment activities, such as the improvement of OPAM's and the ON's management. During this period, OPAM still tried to defend an official floor price for cereals, and the state required traders to have licenses to import or export coarse grains. The restrictions on the rice trade were removed even more slowly than those on the coarse grains, as the state tried to protect the value of its investments in the Office du Niger by continuing to protect the domestic rice industry. It was only in 1987 that farmers in the ON were allowed to sell their rice to anyone other than the Office.

The high proportion of PRMC resources going to sector adjustment activities led some observers (e.g., Humphreys 1986) to remark that it seemed ironic that a "market reform" program devoted the bulk of its assistance to the state marketing board. Yet at least some of this assistance was probably necessary to build the political support for allowing the private sector to play a greater role in the system. (E.g., some of the laid-off employees used their severance pay to finance their entry into private business and thus became supporters of a more liberalized market).

Table 1. Allocation of the PRMC Budget by Major Category of Activities (in millions of CFA francs)

Objective	Phase I (1981-87)	Phase II (1988-90)	Phase III (1991-93)	Phase IV (1994-96)	Phase V (1997-99)
Sectoral Adjustment	11,051 (72%)	1,316 (11%)	2,311 (17%)	20 (0.4%)	525 (8%)
Strengthening the Market	1,102 (7%)	5,939 (51%)	5,958 (45%)	1,109 (25%)	658 (11%)
Food Crisis Prevention & Mitigation	1,526 (10%)	2,272 (19%)	4,426 (33%)	2,925 (65%)	4,928 (80%)
Other ^a	1,636 (11%)	2,185 (19%)	527 (4%)	448 (10%)	32 (0.5%)
Total	15,267 (100%)	11,721 (100%)	13,222 (100%)	4,502 (100%)	6,143 (100%)

Source: Egg (1999)

^a Includes mainly operating costs of the PRMC.

The subsequent six years of the program (PRMC II and III, 1988-93) devoted roughly half the budget to strengthening the role of the private sector through the provision of supporting services, such as credit and market information. Particularly important during this period was the establishment of the SIM, set up in 1989 to provide consumers, farmers, and traders with an independent source of information on market prices and conditions. This information, broadcast weekly on the radio and television in French and local languages and published in newspapers, fundamentally changed the bargaining power between farmers and traders and contributed to greater market integration (see below).²

As the liberalization consolidated its gains, the PRMC shifted its attention to helping those believed to have been bypassed by the reforms (poor consumers) or those at risk from the continuing instability in the market. During PRMC IV and V (1994-99), the majority of the budget has gone to food crisis and mitigation activities. Malian officials have become much more concerned about the vulnerability of the poor to such crises in recent years because of the large number of refugees returning to the Northeast following the settlement of the northern rebellion of the early 1990s and because grain prices rose sharply following the 50% devaluation of the CFA franc in January 1994.

²In 1998, the SIM's mandate was broadened to cover horticultural, livestock and fish products in addition to cereals, and the system was renamed the *Observatoire du Marché Agricole* (OMA).

3. RESPONSES TO THE REFORMS

The basic hypothesis underlying the reforms was that by opening up the market to private competition, traders and processors would invest in the trade and compete for grain supplies, thus creating incentives for farmers to increase cereals production. In this section we examine how these various actors did in fact react, both for the coarse grains subsector and the rice subsector.

3.1 Response of the Coarse Grains Subsector

3.1.1 Response of Cereal Traders

Up until 1981, OPAM enjoyed an official monopoly for all cereals transactions. While private traders in the coarse grain trade were usually tolerated, they either worked openly as grain assemblers for OPAM (under contract) or clandestinely, through networks of personal relationships with other traders and with agents of the state.

To understand the dynamics of trader response to the reforms, it is important to recognize that there were two distinct groups of merchants involved in the coarse grains trade. The private marketing structure comprises two substructures, which Dembélé (1994) refers to as the “core” and the “periphery.” The core and the periphery differ by their scale of operations, their managerial ability, their access to formal credit markets and to the court system, and by the type of markets they serve.

The core comprises small-scale traders who lack sophisticated managerial skills. These traders also typically lack access to formal credit and to the court system to enforce contracts. The core deals in the domestic market, assuring the spatial and temporal allocation of grain in the domestic market. Thus, the core is responsible for the coordination of production and domestic consumption. Traditionally, these are the traders who had, in the days of the OPAM monopoly, operated on a small scale to supply local towns with grain, but were not heavily involved in contracting with OPAM or with international trade.

The periphery comprises large-scale and skilled traders, many based in Bamako, who have access to formal credit market and to the court system to enforce contracts. They are often also involved in the import-export business and the rice trade. The periphery connects the domestic market to the international markets. It is responsible for most of the large scale cereals exports and imports. Prior to the liberalization, many of these traders worked hand-in-glove with state enterprises.

Expanded Entry into Cereals Marketing. As OPAM gradually withdrew from cereals marketing in the early and mid 1980s, wholesale coarse grain traders already in the market expanded operations and others entered the trade. The number of traders grew more rapidly in Bamako (the main urban consumption market) than in secondary cities, such as Koutiala (in the main surplus

producing zone) and Mopti (the main redistribution market for the grain-deficit northeast).³ For example, research showed that in 1985/86, 51% of Bamako coarse-grain wholesalers had entered the market after liberalization, with many of these specialized in the grain trade. (Prior to the reforms, many grain traders diversified their operations to include other goods to reduce the risks involved in this illegal trade.) In contrast, only about a third of the wholesalers in Koutiala, Sikasso, and Mopti had entered the markets after the reforms the reforms (Mehta 1989, p. 40). Subsequent research in 1988/89 documented an expansion of market entry into the coarse grains trade in these other cities later in the decade and increased specialization in the grain trade compared to the mid 1980s (Dembélé 1994).

Many of the initial entrants into the grain trade were smaller-scale traders in the core. These were the actors for which the former barriers to entry had been most daunting. Among the periphery, there was some restructuring of the trade, particularly as medium-sized urban firms formed joint ventures in an effort to improve their access to bank and PRMC credit (Mehta 1988). A more recent phenomenon has been the entry of younger, recent graduates of secondary and post-secondary schools into the grain trade, particularly in the rice trade, but also coarse grains. These new entrants, operating on a smaller scale but with many of the stronger managerial skills of the periphery traders, may eventually serve as a bridge between the two groups.

As a result of the increased entry, the wider availability of market information, increased specialization, and removal of movement restrictions, the coarse grains trade became more competitive. Between 1986 and 1992, marketing margins for millet and sorghum between Bamako and its two major supplying areas (Zangasso and Sirakorala) fell by 20% (Staatz and Dembélé 1992). Most evidence suggests that the reduction in marketing margins was passed back to farmers in the form of higher prices (Egg 1999).

Expanded Investment in the Cereals Trade. A major objective of the reforms was to increase the private sector's investment in the grain trade in order to improve efficiency and, it was hoped, increase market stability by inducing the private sector to hold greater stocks of grain. While it was anticipated that large traders would lead the way in making these investments, it was actually the smaller traders (the "core") who responded most dramatically. The lower margins in the grain trade, due to the greater competition, and the increased opportunities in other areas of the more liberalized economy, probably induced the larger traders in the periphery to invest elsewhere.⁴

³ In the secondary towns, particularly in the main production zones, new entrants needed time to develop networks of assemblers to buy from farmers, and government officials may have been slower in implementing the reforms.

⁴ Because of the dispersed nature of farmers' marketed surplus and of consumer demand in Mali, cereals marketing requires labor-intensive techniques at the rural assembly and urban retailing levels. Low-skilled and small-scale traders from the core are ready to supply the necessary labor at low returns because they lack alternative employment. Thus, labor supply within the core is likely to be less responsive to changes in marketing margins. In contrast, traders from the periphery have alternative uses for their skills and their capital. Thus, the supply of skills and capital within the periphery may be very responsive to changes in marketing margins.

Overall, coarse grains merchants increased their investments in transport and infrastructure dramatically in response to the reforms. Dembélé (1994) found that for a sample of 18 coarse-grain wholesalers from Bamako, Koutiala, and Mopti, net real investment in trucks and storage facilities grew at an annual rate of 19% between 1981 and 1989, with the increase in net investment split equally among the two. However, because there had been much less investment in trucks than storage facilities by traders prior to the reforms, the annual rate of increase in trucking investment was much larger (53%) than for storage capacity (11%).

Average total storage capacity per trader (both rented and owned) rose from 61 tons to 761 tons between 1981 and 1989 for traders operating in Bamako, Koutiala, and Mopti, with the rate of growth of owned storage facilities outpacing the growth in use of rented facilities (Dembélé 1994). The increase in owned storage capacity may reflect a growing confidence of traders in the permanence of the market reforms and an improvement in incentives brought about by the overall liberalization of economic activities.

Two characteristics of the increased investment were particularly striking. First, in areas where feeder roads were good, wholesalers tended to substitute investment in trucking for investment in warehouse space. In other words, they found it more profitable and less risky to continue to have the bulk of the grain be held in storage at the farm level, and draw it off the farm as needed through purchases, than to buy and hold the grain themselves. Farmers probably preferred this approach as well, as they typically want to hold a substantial reserves in case the next year's rains are poor. In 1988, 74% of wholesalers and semi-wholesalers operating in major southern markets stored cereal for 1.5 weeks or less. Only sixteen percent of wholesalers and 13% of semi-wholesalers in 1988 stored cereal for more than 3 months (Dembélé 1994). The preference of traders for rapid turnover over stock holding reflects not only the need to reduce the risk of storage activities that results from unexpected adverse price changes, but also the desire to reduce the cost of financing. A rapid turnover of cereals stocks constitutes an effective strategy to reduce the high interest costs of informal loans for traders with no access to formal credit markets. In contrast, in areas of poorer roads and limited physical access, particularly in the Northeast, traders have invested much more in storage capacity and hold grain for much longer periods, frequently up to three months (Steffen 1995).

Second, the bulk of the new investment in storage and trucking facilities came from the smaller, more traditional traders (the "core"). Whereas traders in the periphery accounted for 93% of the net investment in storage before the reforms, that share had fallen to 55% by 1989. Similarly, traders who relied on relational contracting (informal or formal long-term agreements with trading partners, either within the country or outside), accounted for the bulk of net investment in storage and transport prior to the reforms, but their share fell dramatically after the reforms, as traders who relied on the spot market for sales increased their investments substantially (Dembélé 1994).

The picture that emerges is that prior to the reforms, the bulk of the investments were held by larger, more "modern" traders (the periphery) who were well linked in to the official marketing system and the import-export business. Meanwhile, the more traditional wholesalers, who had a network of rural assembly agents to buy cereals from farmers and distribute them within the country, were forced to operate in a more clandestine manner that discouraged investments in

visible assets such as warehouses and trucks. Trade was conducted in the shadows, with little reliance on the open spot market, at least for wholesale transactions. The reforms, by allowing these traders to operate more openly, stimulated their investments in storage and trucking, which likely allowed them to gain scale economies. The reforms also allowed greater use of the spot market to coordinate economic activity. This, in turn, encouraged new entrants into the trade, as one now did not have to invest as much in developing a series of highly personalized relationships with other traders to succeed in the business. All of these changes lowered marketing costs, contributing to the to the reduced marketing margins discussed above.

3.1.2. Response of Coarse Grain Producers

As shown in table 2, while millet and sorghum production increased during the period of the reforms, the average annual rate of increase was only 2.7%, roughly the same as the rate of population growth. The production increases were due entirely to growth in area planted; average millet yields fell from 857 kg/ha in 1984-87 to 659 kg/ha in 1994/97, while sorghum yields fell from 1,057 kg/ha to 866 kg/ha over the same period (République du Mali 1998).

Table 2. Share of Various Cereals in Mali's Total Grain Production

Cereal	Annual Rate of Growth 1980-97 (%)	Share of Total Production in 1980 (%)	Share of Total Production in 1997 (%)
Millet & Sorghum	2.7	80	56
Maize	12.5	6	16
Rice	9.0	14	27
Total	4.7	100	100

Source: Egg 1999, p. 17.

The bulk of the production increase likely resulted from better-equipped farmers in the cotton zone expanding their acreage. Dioné (forthcoming) found that:

even following the two relatively abundant harvests of 1985 and 1986, up to 43 percent of the farm households of two of the best agricultural zones of Mali (CMDT and OHV) were net grain buyers.... These results are striking in that Mali is generally perceived as having a fairly egalitarian distribution of land. Only 53 percent of the farms were net grain sellers, and 90 percent of the total quantity of net sales came from only 28 percent of the farms. Most of the net cereal-buying households had poor access to extension services, input markets and formal credit. As a result of their low investment capacity, these farmers used low-productivity technologies. The net sellers of cereals, in contrast, were essentially farm households located in the more humid southern part of the CMDT zone,

with good access to improved farming techniques through relatively efficient systems of agricultural research, extension, input supply and credit, and heavily engaged in cotton production.

Thus, although the reforms led to Malian millet and sorghum being more widely traded, particularly in regional markets following the devaluation, the lack of high-yielding, fertilizer-responsive varieties, and poor infrastructure and water-conservation technology in many of the areas where these crops are produced, limited the supply response to the reforms.

In contrast, the production response of maize, particularly following the devaluation, was dramatic. Between 1980 and 1997, production increased at 12.5% annually (albeit from a small base), and maize's share of total Malian grain production jumped from 6% to 16% (table 2). Again, the production increase was concentrated in the southern part of the CMDT region, where farmers grow maize and cotton in rotation. As with millet and sorghum, the production increase came about purely by area expansion: over the period 1984/87 - 1994/97, average yields remained stable at 1.3 m.t./ha (République du Mali 1998).

In reality, this stable yield masks two separate maize booms characterized by increased yields: one stretching from the late 1970s until 1986; and the second beginning in 1994. The first boom corresponded with efforts by the CMDT to promote intensified maize production within the cotton zone. During this period, the CMDT provided a whole package of inputs to farmers on credit and offered a guaranteed market for the maize, which the CMDT bought at the official producer price on behalf of OPAM. When OPAM abandoned its defense of official producer prices in 1986, maize prices collapsed, and farmers largely abandoned sole cropping of maize and shifted back to their traditional practices of intercropping. Thus, maize yields fell during the late 1980s and early 1990s (Boughton 1994). The second maize boom occurred following the CFA franc devaluation in 1994, when demand for Malian maize shot up, both for local consumption (as a low-cost substitute for other cereals) and in export markets, especially Senegal, for use as livestock feed. Maize area and yields both shot up 16% in the three years immediately following the devaluation in response to the new market opportunities (Yade et al. 1999).

3.2 Response of the Rice Subsector

The reform of rice marketing, particularly in the Office du Niger (ON), began only in 1987, in contrast to the coarse-grains reforms, which started in 1981. Until 1987, the state, through OPAM, and the ON, continued to monopolize rice marketing and milling within the Office.⁵ In part, the heavy state involvement in rice marketing in the ON was an attempt to protect the domestic rice industry from international competition, given the substantial investments the state had made in irrigation infrastructure in the ON, especially during the early 1980s.

⁵Technically, private merchants were allowed to begin buying main-harvest paddy in the ON midway through the 1986 marketing year. Since the bulk of the paddy had already been sold by then to the government rice mills, our analysis treats 1987 as the first year of "effective" liberalization of paddy marketing.

Although the reforms of rice marketing were implemented later than the coarse grains reforms, the response of the rice subsector to the market reforms was much more dramatic, constituting one of the great success stories of Malian agriculture over the past two decades. Domestic production shot up dramatically, growing at an annual rate of 9% between 1980 and 1997, largely due to substantial yield increases in the irrigated area of the Office du Niger. As a result, national rice production more than tripled between 1985 and 1998, from 214,000 m.t. (paddy) to 688,000 m.t. (Egg 1999), and the country's rate of self-sufficiency in rice climbed from 50% to nearly 90%. At the same time, new macroeconomic and sectoral policies transformed the marketing system from a tight oligopoly that extracted rents from both consumers and producers to a competitive system that reduced marketing costs and effectively transmitted production incentives to farmers. Since the most dramatic changes in the rice subsector occurred within the Office du Niger, the following discussion focuses on that production area.

3.2.1 Structure of Production Prior to the Reforms

Small-scale farming (4.7 to 8 hectares per household) predominates in the Office. Households lease a specified number of hectares on an annual basis from the Office and agree to pay for water supply, the use of irrigation facilities and other services. Until the mid 1990s, the Office, in return, delivered fertilizer and seed, offered credit to purchase farm equipment, maintained the irrigation and guaranteed the purchase of paddy. In other words, the state controlled all input and output marketing, and paid an official price to farmers that did not fluctuate either seasonally or according to the quality of paddy produced.

Paddy in the ON destined for the market was processed in one of four state-owned large-scale mills, which had a capacity of about 80,000 tons of paddy per year. Rice destined for home consumption was predominantly hand pounded. Private commercial milling of rice within the ON was illegal.

3.2.2 Structure of Rice Wholesaling Prior to the Reforms

During the early and mid 1980s, the competitive position of Malian rice on the domestic market was hurt not only by the overvaluation of the CFA franc and the high costs of production in the ON (due to low yields and weak management of the irrigation facilities and the state-run rice mills), but also because of the oligopolistic structure of the domestic rice wholesaling trade. In the 1980s, rice imports were highly concentrated in the hands of the four largest rice traders in Bamako, who in 1988 were responsible for three-fourths of all rice imports (Ceolo 1990).⁶ This same small oligopoly of rice traders also held most of the contracts to buy domestic rice from OPAM (to whom the ON sold), or later, directly from the ON. They thus could tightly control retail rice prices, as semi-wholesalers and retailers had to go to these large wholesalers to get their rice, be it imported or domestic. As we will see below, one of the major benefits of the liberalization of rice milling in the ON was to break the power of this oligopoly.

⁶ In contrast, in 1987/88, the four largest coarse grain traders handled only 42% of the coarse grains sold in Bamako (Mehta 1989).

3.2.3 Organization of the ON Rice Subsector Prior to 1987

Prior to the paddy market liberalization in 1987, the Office handled all paddy assembly and processing within its boundaries. This included assembly in the fields and transport to the milling plants in the Office. Once processed, the rice was marketed exclusively through the state marketing board, OPAM, that in turn worked with the four major wholesalers to offer milled rice to consumer cooperatives, retailers, the army, and other public organizations. OPAM also received all food aid rice imported into the country, while the same four wholesalers dominated the commercial imports as well. During this time, both producer and consumer prices were fixed by a national commission. These prices were set in relation to domestic production costs in the ON, not (cheaper) world prices, and as a result, the four major rice importers were able to earn substantial profits on their rice imports.

3.2.4 The 1987 Reforms

Under strong pressure from the PRMC donors and the World Bank, the Malian government agreed to a broad set of reforms in the operation of the ON, which were implemented beginning in 1987. The changes were embodied in a contract-plan between the state and the Office. Two key elements of the contract-plan were more decentralized management of the irrigation perimeters and liberalization of paddy marketing. The liberalization allowed farmers in the Office to sell their paddy to whomever they pleased and abolished the Office's monopoly on rice milling within its boundaries. In addition, the Office was now required to market its rice directly to wholesalers rather than selling its grain to OPAM, which previously had handled the wholesaling operations for the ON. The marketing and milling reforms were strongly supported by the Dutch, whose foreign assistance programs began making small rice dehullers available to village associations and women's cooperatives in the Office in the late 1980s.

As a result of the marketing and milling reforms and the efforts of the Dutch and of various NGOs to promote small-scale rice mills in the ON, small dehullers began to appear in the Office in 1987. The mills were rapidly adopted by village associations (*associations villageoises*, or AVs), private entrepreneurs (typically farmers or local traders), and women's cooperatives. Between 1987 and 1992, the number of small mills operating in the ON grew from one to 383, with a total milling capacity of approximately 210,000 m.t. As the small mills spread, the volume passing through the state mills fell due to the large mills' inability to offer prices as high as the small mills were paying for paddy.

The small mills ranged in capacity from about 2 tons of paddy per day up to 30 tons/day. They had several advantages compared with the large state mills. Many of these small plate mills could be moved from village to village, which reduced the costs of hauling paddy long distances for processing. While the ON continued to pay a fixed price of 70 CFAF/kg of paddy, regardless of quality, the small mills were free to vary their prices according to market conditions. In practice, this meant that the small mills paid higher prices for paddy, particularly paddy of higher quality (e.g., paddy that had been carefully dried and therefore converted to milled rice at a higher rate, due to fewer broken kernels). The small mills also offered higher prices to farmers located closest to major markets, where transport costs were lowest.

The small mills operating costs were well below those of the large mills. A survey conducted in 1992 showed that it cost the small mills, on average, 4.3 CFAF to mill a kg of rice, compared with 17.6 CFAF/kg for the large state mills (Diarra 1994, p. 96). These cost differences were due to the lower capital and labor costs per kg of the small mills, their higher milling ratios (which reflected the poor state of repair of the state mills and the ability of the small mills, through their differential pricing, to attract better quality paddy), and their generally higher capacity utilization. As the small mills continued to attract more paddy from the state mills, the latter's unit costs continued to rise due to the large mills' falling capacity utilization.

The rapid spread of the small mills in the ON had profound effects on the organization of the rice subsector in the ON. The large number of mills competed not only with the ON mills but also among themselves for paddy, which forced them to pass their cost savings back to farmers in the form of higher prices. In early 1992, for example, most of the small mills could afford to pay farmers an average price of between 72 and 82 CFA F/kg for their paddy and still earn a profit, compared to the 70 F CFA F/kg offered by the ON mills (Diarra 1994, p. 98).

Even more important, the spread of the small mills broke the market power of the four major rice importers, who had previously dominated the Malian rice market, both for domestic production and imports. The emergence of the small mills gave smaller distributors an alternative source of supply, and many wholesalers and semi-wholesalers began buying directly in the ON from village associations and other owners of small mills. The competition for supplies helped bid up the prices paid to the small mills, and because of competition among the millers, these higher prices got passed back to farmers. On the retail side, competition among sellers, now freed from having to buy exclusively from the old oligopoly, led to lower marketing margins, thus holding down prices to consumers.

Because millers and retailers were now free to pay different prices for different qualities of paddy, millers began offering higher prices for varieties that consumers preferred and for paddy that had been carefully dried and hence would mill with fewer broken kernels. The ability of the market to pay premiums for higher quality rice led to a dramatic change in rice production technology. Farmers began to search for the varieties that consumers preferred (rather than focusing solely on agronomic yield), and adopt improved post-harvest techniques to preserve paddy quality. The Office had tried in vain to extend such techniques prior to the liberalization, but now that farmers were being paid according to the quality of their paddy, Office extension agents found themselves deluged with farmers wanting to learn about these practices. This demand for new production technology complemented reforms launched in 1991 to involve farmers more in the management of the irrigation perimeters, making farmers more active participants in the basic decisions governing rice production in the Office.

As part of the marketing reforms, farmers were also given the freedom to pay their water and other input charges to the ON in cash, rather than in paddy (at the official price). Farmers argued strongly for this right so that they could take advantage of the higher cash prices offered by the small mills. Once denied this secure source of paddy, the large mills market share began to fall sharply.

As a result of all these changes, the small mills quickly became farmers' preferred outlet for their grain. The small mills offered custom milling services (milling farmers' rice for a fee), and many also began buying paddy directly, milling it, and reselling it themselves to wholesalers and retailers. In 1985/86, the year before the reforms, the ON marketed 65% of the total paddy produced in the Office (most of the remainder went to home consumption). By 1989/90, the ON's share had fallen to 48%, and then plunged the following year to 13% (in part due to breakdowns in its mills). While the ON was able to increase its share back to 23% of total production in 1991/92, the recovery was temporary. By 1994/95, the Office was no longer able to attract enough paddy to the large mills to make it economic to operate them, and the mills were closed in 1995. They remained closed until 1997, when they were sold to private entrepreneurs, including one of the former large rice importers. Yet even under private ownership and substantial refurbishing, the mills could not effectively compete with the small mills for paddy in 1998, and shut down again that year.

3.2.5 Devaluation and the Rice Subsector

The 1994 devaluation led to a doubling of the CFA franc border price of imported rice, thereby making Malian rice much more competitive on domestic markets and in neighboring countries. The increase in import prices was quickly felt in the retail market: the price of local rice in Bamako, for example, jumped 23% in the two weeks immediately following the devaluation (SIM, unpublished data).

The price increases led policy makers and the general public to fear that wholesalers were engaged in price-gouging, eager to take advantage of the higher import prices. Research by the Malian agricultural market information system (SIM), however, quickly demonstrated that because of the competitive market structure that had resulted from the earlier reforms in the ON, almost all the increase in the consumer prices was being passed back to farmers in the ON. Within two weeks of the devaluation, the ON farmers' share of the Bamako consumers' final expenditure on rice jumped from 67% to 82%, while the wholesalers' share increased only from 2% to 3%. (The increase in the wholesalers' share was due primarily to higher costs, particularly transport, resulting from the devaluation) (SIM, 1994a). This analysis quickly changed the policy debate. Instead of arguing about how to stop price gouging, debate focused on whether Malian rice could compete with imports not only in Mali but in neighboring countries as well (SIM 1994b; Barry, Diarra and Diarra).⁷

The higher prices resulting from the devaluation combined with the production and milling reforms initiated in the late 1980s to boost Malian rice production and yields even further. ON farmers increased rice yields substantially by switching from broadcast seeding to transplanting rice started in nurseries and by using more organic and inorganic fertilizer. There was also increased diversification into dry-season horticultural products such as onions and tomatoes. This

⁷The fact that the Malian government had the data-collection and analytic capacity to carry out these studies so soon after the devaluation is itself a tribute to the market reforms. The PRMC and USAID had funded the creation of the SIM in 1989 and strongly supported its development of local analytic capacity.

diversification and input use increased the annual productivity of land and irrigation investments well beyond what could be produced with a single rice crop (or even a double rice crop, because dry-season rice yields are quite low). Both rice intensification and diversification into horticulture were stimulated by increased demand for the products. This demand came not only from Malian consumers but also from other countries in the region, primarily Cote d'Ivoire, but also Ghana (Yade et al. 1999; Mariko, Chohin-Kuper and Kelly 1999).

As Mali's rice production increased, it began to export small quantities of its higher quality rice to neighboring countries, particularly Côte d'Ivoire and Burkina Faso, while continuing to import lower-cost Asian broken rice, which is consumed by low-income urbanites. This trade strengthens Mali's food security, as the country is able to use the export receipts from the high-quality rice to import a greater quantity of rice calories than it exports, due to the low cost of the Asian broken rice, which is considered a milling byproduct in most rice-consuming countries (Yade et al. 1999).

The higher prices and increased productivity of Malian rice producers has allowed the government to eliminate the main import taxes on rice. Although the elimination of the import taxes removed a government a source of revenue, it has also helped hold down consumer prices and is a sign that the Malian rice subsector can now compete without special tariff protection.

3.2.6 The Problem of Production Credit

Although the reforms have boosted production, there remains a serious challenge: developing a sustainable system of production credit. Prior to the reforms, the ON automatically recovered production credit through its monopsony marketing of the paddy. After the liberalization, banks began extending credit through village associations, but this system collapsed in part because of the inexperience of the AVs in marketing and the lack of reliable contract enforcement between the AVs and traders. Several AVs sold paddy on credit to traders who failed to repay them, leaving the AVs with no funds to repay their production credit. Other AVs held paddy late into the season, hoping to benefit from the higher prices, but in so doing, failed to repay their credit on time. The farmers complained that the banks had conspired with traders to require repayment of production credit within one month of harvest (typically in March), which forced all the AVs to sell at that time, depressing prices.

Members of AVs that defaulted on their loans no longer had access to group credit and were forced to seek individual loans to purchase their inputs. This has caused serious problems of access to inputs, particularly for smaller farmers. Thus, a major challenge in the ON, as in much of sub-Saharan Africa, is to develop effective input delivery and credit systems to replace the automatic credit recovery that was a feature of the state monopoly marketing system (Kelly et al. 1999).

3.3 Impact on Reforms on Market Integration

As a result of the freedom of traders to operate openly on the market, the improved market information, strengthened market infrastructure, and traders' investments in transport and storage,

the integration of coarse grains markets with each other increased dramatically. For example, the average correlation of retail millet prices across major urban markets in Mali increased from .70 in the mid 1980s to .97 during the 1990s, while markets for other coarse grains showed similar increases (Dembélé, Traoré, and Staatz 1999).⁸

Evidence also suggests that Malian markets became more integrated regionally and internationally, particularly following the CFA franc devaluation. Yade et al. (1999) report markedly higher correlation of retail coarse grains prices among regional capitals throughout the Sahel following the devaluation, and Barry et al. (1998) note the increasing integration of Malian rice markets with other markets throughout the region.

Regional trade flows of cereals (which are poorly captured in official statistics) appear to have increased sharply since the CFA franc devaluation of 1994, which made Malian grains much more competitive in the region compared with imports from throughout the CFA franc zone (Observatoire du Marché Agricole 1999; Egg 1999). This increased regional market integration has had both positive and negative effects:

- It has resulted in more effective transmission of production incentives (in the form of prices) back to farmers and opened profitable new market opportunities for Malian traders and grain producers;
- It has led to greater physical availability of grain in food-deficit areas.
- It has put Malian consumers more clearly in competition with consumers in neighboring countries (particularly Côte d'Ivoire and Senegal) who have higher purchasing power, raising the risk that some Malian consumers may be priced out of the market.
- It has meant that market instability in neighboring countries such as Niger, where production is more unstable than in Mali, now spills over more into the Malian market.

Each of these effects is discussed in the following section.

3.4 Impact of the Reforms on Market Prices and Availability

Nominal retail prices for coarse grains increased during the early years of the reform (1981-85), which were poor rainfall years (figure 2). They subsequently dropped in 1986 and fluctuated substantially from year-to-year between 1986 and 1993, but showed no distinct trend. Following the 1994 devaluation, nominal producer prices for coarse grains roughly doubled, as did consumer prices in Bamako. (If one takes a slightly longer-term perspective, nominal retail millet in

⁸ The figures refer to the mean of pairwise correlations of retail market prices between Bamako, Mopti, Sikasso, and Ségou, and between those cities and the other regional capitals. Correlations for retail sorghum and maize prices showed very similar trends. The correlation coefficients for the 1980s may be biased downwards slightly due to the weaker quality of price data that existed before the creation of the cereals market information system (SIM).

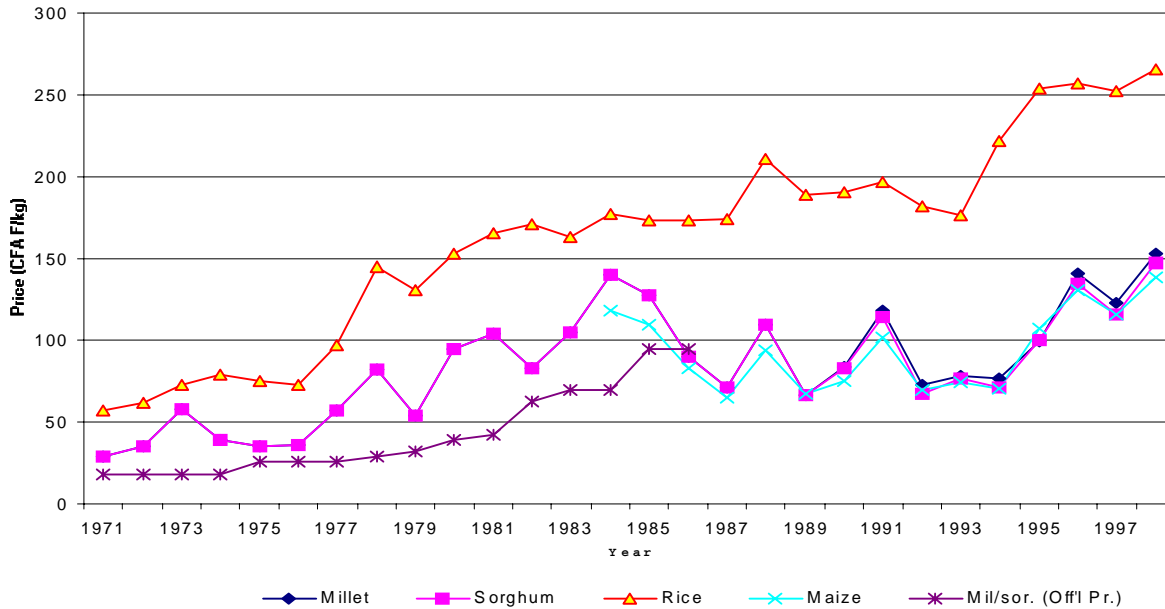
Bamako increased only by approximately 25% between 1990/93 and 1994/97; the increase immediately after the devaluation was more dramatic because prices had been exceptionally low in 1993). In addition, coarse grain prices became significantly more variable following the devaluation (Dembélé, Traoré, and Staatz). Indeed, one of the most striking features of coarse grain prices throughout the past 18 years has been their high degree of instability. Producer prices showed a similar pattern, and they were more volatile in percentage terms than were retail prices.

In contrast, retail rice prices were stable during the early years of the PRMC reforms, as the government used imports to stabilize domestic supply. With the fall in coarse grains prices beginning in 1986, the gap between rice and coarse grain prices widened. As was the case with coarse grains, nominal retail rice prices increased dramatically following the 1994 devaluation. Rice prices have also shown more instability since the devaluation, with the coefficient of variation of monthly prices increasing from 7% in the 1990-93 period to 12% in the 1994-97 period (Dembélé, Traoré, and Staatz 1999).

When prices are expressed in real terms (i.e., when nominal prices are deflated by the GDP deflator), a different pattern emerges. Real retail prices of coarse grains in Bamako fell by approximately 20% during the period 1981/82 and 1997/98, while real rice prices fell by a third. There were still substantial year-to-year fluctuations, however, especially for coarse grains. Real producer prices for coarse grains showed a slight downward trend (but with substantial inter-annual variation) from 1981 until the CFA franc devaluation in January 1994; thereafter, real producer prices show an upward trend. Real rice prices tended upwards between 1981 and 1992, reflecting the tariff protection afforded the rice industry until recently. They fell sharply in 1993, then began to increase again after the devaluation (Egg 1999). The rise in real producer prices for cereals since 1994 while consumer prices were still falling implies that marketing margins were falling, with the benefits being shared by both consumers and producers.

Even though real consumer prices of cereals were falling, they may not have seemed lower to many urban consumers, particularly in the post-devaluation period, because these consumers' incomes were falling even faster. The broader structural adjustment programs and the devaluation strongly turned the urban-rural terms of trade in favor of the countryside, reversing years of urban

Figure 2. Nominal Retail Cereal Prices in Bamako, 1971-97



Source: Egg 1999.

Note: Prices prior to 1987 for millet reflect official prices and thus probably understate volatility during this period.

bias in Malian agricultural pricing policies. As the price of internationally traded goods, such as cereals, increased following the devaluation, the purchasing power of urban salaries eroded. Tefft, Staatz, and Dioné (1997) estimated that the real income of an average Malian civil servant fell by 19% between 1994 and September 1997. Thus, many urban residents associate the PRMC with higher, not lower, real prices.

The physical availability of cereals in most markets improved with the reforms, due to greater competition, improved flows between deficit and surplus areas, and improved consumer information about prices. This improved availability was especially important for rural grain-deficit households. During interviews carried out in 1987/88, members of such households southern Mali (the OHV and CMDT zones) cited improved, less costly access to cereals in the markets as the major benefit to them of the reforms (D'Agostino 1988).

4. LESSONS LEARNED AND REMAINING CHALLENGES

Several conclusions emerge from this review of the response of Malian grain subsectors to the PRMC reforms:

- 1. Effective market reform needs to be seen as an ongoing process, not a one-time event.** The PRMC has gone on now for nearly two decades, and the willingness of the

Maliens and donors to continue to work on the process of reinventing the market has been an important key to the program's success. In contrast to reforms undertaken in some other countries, the PRMC did not focus on just the first-stage issues of sectoral adjustment ("getting the state out of the market"). It went on to tackle the much more challenging tasks of building an effective market system by redefining the rules of the game and providing supporting services to the private sector (such as improved market information). It also addressed the "second-generation" problems of the needs of those left behind by the reforms.

This willingness to see reform as an ongoing process has fostered greater collaboration between the donors and the Malian government, on the one hand, and between the government and the private sector, on the other. The approach has also encouraged learning-by-doing, as the PRMC, other donors, and the Malian government have largely avoided doctrinaire approaches, preferring to invest in research to learn more about market processes, and to strengthen local analytic capacity to monitor and analyze agricultural markets, particularly through the SIM.

2. **Market reforms were effective in increasing competition, lowering costs and improving physical access to coarse grains by consumers.** The removal on restrictions on who could legally trade grain led to an influx of new entrants and a greater reliance on the open market for coordinating economic activity. The increased competition, combined with better market information provided through PRMC-supported activities, led to lower marketing margins, which benefitted both consumers and producers. In addition, food deficit households in rural areas reported that it was now easier to find grain to buy when they needed it, as they no longer had to get authorizations to buy from OPAM and could buy in whatever quantities they needed.
3. **Once convinced of the permanence of the reforms, coarse-grains traders invested substantially in market infrastructure.** The greatest investments were in trucks and warehouses, with the type of investment depending critically on the state of the roads in the area where the trader operated. In areas of good roads, most coarse grain storage continues to take place at the farm, with traders focusing more on truck ownership than investment in warehouses. In areas of poor infrastructure, such as the northeast, the lack of reliable transport requires traders to hold stocks for much longer periods, and hence they put more of their investments into expanded warehouse facilities.

The need of northern traders to hold stocks for longer periods puts them at greater risk of losses due to food aid distributions. These findings imply that food-aid distribution in infrastructure-poor areas of the country should be well-managed to avoid disrupting normal commercial storage activity.

4. **The response of the rice subsector to the reforms illustrates that:**

- *Market incentives can play a critical role in inducing farmers to invest in their agricultural enterprises.* The marketing reforms in the ON were essential in

assuring that the higher prices that consumers were willing to pay for better-quality rice and the higher retail prices that resulted from the devaluation were effectively transmitted to farmers. The strong demand by farmers for improved production and post-harvest technologies following the reforms, in contrast to farmers' indifference to extension programs that tried to spread these technologies prior to the reforms, testifies to the importance of the market incentives in spurring farmers' interest and investment in new technologies.

- *The phasing of sectoral reforms and macroeconomic reforms was crucial in stimulating increased rice production.* The marketing reforms introduced in 1987 broke the power of the small oligopoly that had previously dominated Malian rice markets, thereby creating a much more competitive marketing system within the ON. Had these reforms not taken place *before* the CFA franc devaluation of 1994, it is likely that most of the higher prices resulting from the devaluation would have been captured by the oligopolists, and not have been passed back to farmers. The competitive marketing system was thus essential in assuring that the increased production incentives reached farmers, and thereby helped stimulate the dramatic production increases that followed devaluation. This suggests that sectoral reforms often need to precede major macroeconomic reforms in order to give economies the flexibility they need to respond to the new macroeconomic incentives.
- *Small, labor-intensive rice mills can effectively compete with large industrial mills* in the Malian setting because they offer farmers low-cost milling services, flexibility (e.g., some are mobile, and thus can be moved from village to village), and job creation. There may be a role for the newly privatized industrial mills, but their dominance of the market is not assured. It will be important for policy makers to avoid automatically favoring the large mills (viewing them as “modern”), but instead assure a level playing field between the two types of technologies.
- *While the reforms have greatly improved output marketing, access to inputs and credit remains a problem.* Lack of effective enforcement mechanisms (such as bonding of traders) and inexperience of AVs in marketing output pose serious challenges in assuring farmers in the ON reliable access to production inputs.

5. The contrast between the impact of policy reforms on rice production and its impact on coarse grain production illustrates the synergies between changes in technologies, institutions governing production and marketing, and macro-economic policy in transforming agricultural production systems. The PRMC led to important marketing reforms for both coarse grains and rice, and the devaluation boosted demand for both types of cereals. Yet production of coarse grains--which are grown under rainfed conditions, with fewer improved technologies, and often in places where the basic transportation infrastructure is much weaker than in the ON-- has grown at less than 3%

per year following the reforms, compared to a 9% annual growth rate for rice.⁹ The marketing reforms in the ON were effective largely because farmers in the zone had the technical capacity to respond quickly by intensifying production. In areas where structural constraints are more binding (e.g., areas of variable rainfall, poor water control, and bad roads), policy reform by itself will be a much weaker instrument to increase agricultural production.

6. Market reforms did not resolve all the problems of cereals marketing and food security in Mali. The market reforms were effective in reducing the costs of grain distribution, particularly in the south, where transport infrastructure was relatively good. They also substantially reduced the unsustainable government budget deficits incurred by the old official marketing system. Yet substantial problems remain in assuring reliable access of consumers to cereals in Mali. Most of these problems are due to *structural problems* in coarse grain production and transportation in Mali. These are problems that a program like the PRMC, which limits its actions just to marketing issues, is unlikely to resolve. These problems include:

- Instability of millet and sorghum production, which are highly dependent on rainfall. Production of these crops remains highly variable, and growth in their production has resulted from area expansion, not yield increases. Until more improved, shorter cycle varieties become available and technologies to conserve water and stabilize yields are more widely adopted, the erratic nature of sorghum and millet production is likely to remain.
- Poor transport infrastructure in many areas of the country, which continues to limit access and contribute to local market instability. Although the PRMC reforms were very effective in strengthening the integration of coarse grain markets between major cities and within the rural areas of the south that benefitted from a good network of feeder roads, the integration remained much weaker in more remote areas, particularly in the Northeast (Steffen 1994). Poor roads raise traders' costs and discourage trade, whether it is legal or not. A better use of food aid in these areas, as food for work devoted to the building of roads, could help ameliorate this situation.
- Poverty continues to limit access to cereals in Mali. While the PRMC reforms were effective in lowering marketing costs (and thus helping hold down cost of basic staples to consumers), there remain a large number of poor consumers in Mali who lack the purchasing power to assure their access to an adequate diet.

⁹The production increases for coarse grains after the devaluation were also limited because farmers in the CMDT zone apparently shifted land out of these cereals and into cotton, whose price also shot up after devaluation. But even the increases in cotton production came about entirely through increases in area planted, in contrast to rice, where higher yields (intensification) was the main source of production growth (Yade et al. 1999).

The problem has become more acute as the Malian cereals markets have become better integrated with markets in Côte d'Ivoire and Senegal, countries with higher purchasing power whose consumers can outbid the Malian poor for available supplies. A market, no matter how efficient, only responds to those with *effective demand*, i.e., needs backed up with purchasing power. Assuring the poor's access to adequate cereals will require a much broader effort to reduce poverty and develop targeted social safety nets in Mali. Promoting well-functioning markets for basic staples needs to be an important part of that strategy, but it cannot do the job by itself.

- The threat of major drought remains. The PRMC has yet to be tested by a major drought. Although the early years of the reforms (1981-85) were very low-rainfall years, the reforms were in their nascent stages, OPAM was very active in the market, and the market was far from liberalized. Now, however, Malians rely almost entirely on the market for their grain supplies. It remains an open question whether, when faced with a major food crisis, the political support to maintain the market reforms would remain. This will depend in part on the rules that evolve to help the market deal with such a crisis. The temptation to restrict grain shipments, either to neighboring countries or across boundaries of the newly created rural communes, in order to maintain local supplies, could be very great. It is appropriate that the most recent phases of PRMC have focused much of their resources on crisis prevention and mitigation, for it is likely that a major drought will be the ultimate test of how committed Malians are to the reforms carried out since 1981 under the PRMC.

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