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TRANSFER COSTS OF CEREALS MARKETING IN MALI
Implications for Mali's Regional Trade in West Africa

by

Eleni Zaude Gabre-Madhin

A MASTERS THESIS

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ABSTRACT

TRANSFER COSTS OF CEREALS MARKETING IN MALI Implications for Mali's Regional Trade in West Africa

By

Eleni Zaude Gabre-Madhin

This study explores the links between marketing and trade policy and the performance of cereals markets in Mali, with the view that Mali's competitiveness in external markets is influenced by domestic market integration. The study's objectives are to measure and analyze transfer costs of marketing; to assess market integration; and to draw implications of market integration for regional trade flows.

The methodology used applies a Situation-Structure-Performance paradigm to describe markets; decomposes and compares transfer costs to spatial margins; and models market integration by linking spatial margins, costs, and flows.

The descriptive analysis revealed that two circuits out of eight exhibited non-equilibrium conditions. In the cost analysis, transport represented 72% of total costs for both vehicle owners and non-owners, while market coordination costs represented 23% of total costs for vehicle owners. The share of fixed costs for the sample was less than 30%.

The simultaneous modelling of margins, costs, and flows indicated that margins and flows are positively related; costs have an important impact on margins and are subject to significant economies of distance; and, margins are subject to seasonal trends.

The extension of these results for Mali's trade patterns are that Mali's regional exports link interior production to border zones; major trade flows occurred along circuits with very low net margins; the discrepancy between officially registered exports and observed informal flows to Mauritania lead to questions why these clandestine operations persist despite export liberalization policy at the national level.

To

**Bizuwork Bekele,
my mother
whose great love sustains**

and

**Zaude Gabre-Madhin,
my father
whose vision of Africa inspires**

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CHAPTER I

INTRODUCTION

1.1 Problem Setting

The past decade has been marked by a slowly emerging consensus among Sahelian policymakers and researchers that, beyond individual market reforms, a regional approach vis-à-vis the long-term competitiveness of Sahelian agriculture must be defined. Various regional conferences have debated the potential for stimulating production and enhancing food security through concerted efforts to integrate Sahelian and coastal economies, to harmonize marketing and trade policies, and to invest in regional cooperation schemes.

The concern for a long-term perspective of a regional cereals policy in the Sahel is motivated by the past two decades in which this region has experienced chronic and severe food insecurity, as well as by often-stated objectives of African governments to promote regional cooperation and trade (Lagos Plan of Action, 1981). Moreover, policy debates have recently focussed on the issues of the underlying competitiveness of Sahelian agriculture (Gentil and Ledoux, 1989; Shapiro and Berg, 1989), the performance of domestic markets in the wake of reform (Staatz, Dioné, and Dembélé, 1989), the controversial questions of an across-the-board devaluation of the CFA franc, and the potential for a protected cereals "space" in West Africa (Egg, 1989; Coste, 1989).

Within this context, this study is an attempt to explore the linkages between these macro-level policy issues and the micro-level performance of cereals marketing in a particular Sahelian country, Mali. Specifically, the study investigates the impact of transfer costs in cereals marketing on domestic market integration, at a national level,

and the implications of domestic market integration on Mali's actual and potential trade flows, at a regional level.

This analysis contributes to the above policy discussion by adopting the approach that the underlying determinants of Mali's competitiveness in external markets are in fact linked to the factors which influence cereals marketing within Mali. The markets chosen for this analysis are those directly relevant or implicated in Mali's trade in the region.

The institutional context of this study involves the International Food Policy Research Institute, the Office des Produits Agricoles du Mali, and Michigan State University. In particular, the study draws on primary data on transfer costs and market characteristics collected between May and July 1990, data on market prices collected by the Système d'Information des Marchés (SIM), and extensive marketing research carried out by Michigan State University, in collaboration with the Malian Food Strategy Commission (CESA), in Mali since 1985.

1.1.1 Objectives of Study

The specific objectives of this study are:

- (a) to measure and decompose the transfer costs of marketing cereals between key trading points in Mali. Transfer costs are defined within two categories. One subset are costs attributed to the physical transfer aspect of marketing, and are thus determined by the physical or technological relationships in the marketing process. These costs comprise transport, assembly, handling, storage, and physical losses. The second subset of transfer costs are those related to existing "exchange" or "coordination" relationships within the market structure. These costs include regulation, information, barriers to entry and exit, among others.
- (b) to evaluate market integration along certain marketing channels, which are chosen with regard to their importance both in the domestic as well as the regional market. This is particularly important in that the "integration of markets is a necessary condition for a valid aggregation of demand and supply schedules commonly used in price policy analysis" (Ahmed and Rustagi, 1985). The evaluation of integration involves the measurement of

spatial and temporal price differentials, which are perceived as reflections of market structure and efficiency (Ahmed and Rustagi, 1985).

- (c) to link measured transfer costs with market integration. The structure and level of transfer costs have an important impact on the competitiveness of markets. From a national perspective, transport costs help determine a country's comparative advantage, especially for bulky staples with low production costs and high transport costs per unit (Koester, 1986).
- (d) to assess the impact of domestic market integration on regional trade, where domestic markets are evaluated through the joint analysis of spatial equilibria and levels of transfer costs.

1.1.2 General Hypotheses

Within the context of the above objectives, the analysis will focus on three testable hypotheses, drawn from the extensive literature on marketing, transfer costs, and trade theory.

Hypothesis 1: The structure of transfer costs varies by circuit and affects market integration along these circuits.

Hypothesis 2: Road infrastructure has a major impact on transfer costs and the performance of circuits.

Hypothesis 3: Weak integration in domestic markets influences export performance to neighboring countries.

* * *

This chapter will proceed to describe the context in which the study takes place, beginning from a general background of the Malian cereal economy in comparison with its West African trading partners, to a more specific overview of Mali's marketing policy, physical and institutional environment.

In the following chapter, a conceptual framework for the analysis will draw from and tie together the wealth of existing literature on trade, economic integration, marketing efficiency, and transfer costs.

From there, the following three chapters will outline the methodology employed in data collection and analysis, the paradigm of situation, structure, and performance used to describe the markets, and a descriptive analysis of marketing margins and transfer costs.

These chapters will serve as background for the following chapter, which develops a model of price formation and market integration, using the specification of transfer costs. Finally, the results of both the descriptive as well the econometric analysis will be linked to the implications of domestic marketing performance for Mali's regional trade.

* * *

1.2 The Malian Cereals Economy

Production Characteristics

Malian agriculture is highly vulnerable to a semi-arid climate, poor soils, stagnant technology and a limited range of production alternatives (Humphreys, 1986). The agricultural sector, which includes coarse grains, paddy rice, cotton, groundnuts, and livestock, accounted for 57% of GDP and 86% of employment in 1985. Livestock alone accounted for 18% of GDP (Stryker et al., 1987).

The cereals sector is characterized by recurrent drought, subsidized rice production in the Office du Niger, and instability in grain prices due to annual supply fluctuations. Cereals production within the past 5 years has varied from 0.7 million tons in 1984/85 to 2.4 million tons in 1987/88 to 2.2 million tons in 1989/90. Using 1970 as a base year, the index of cereal production varied between 87 (1960), 126 (1979), and 98 (1970) (Stryker et al., 1987).

Another measure of food production instability is a trend-corrected coefficient of variation for the 1963-83 period, which is used as an indicator of production instability.

For Mali, the coefficient of variation of national production around its trend is 16%. The same calculation for the member countries of the Communauté Economique de l'Afrique Occidentale (CEAO) as a whole resulted in 13% production instability, indicating a slightly higher degree of stability for the region than for Mali over the period (Badiane, 1988).

Correlation coefficients between Mali's food production coefficient of variation with those for other countries within the CEAO region, indicated in Table 1.1, do not exceed 63%, revealing that the economies in the region are not subject to identical production patterns, as commonly assumed.

Table 1.1 also indicates an index of the similarity of Malian production in 1981-83 with CEAO member countries, demonstrating that Mali's production varies significantly from that of Côte d'Ivoire and Sénégal, while resembling more closely the production structures of Burkina Faso and Niger.

The food production similarity index, SQ_{ab} , in Table 1.1 is based on comparing shares of a given product in total agricultural production between two countries. Computations for the index are based on 20 products, using FAO production data. The index is based on the formula:

$$SQ_{a,b} = 100 \sum_i (\text{Min}(y_{ia}, y_{ib}))$$

where y_{ia} and y_{ib} are the shares of product i in total agricultural production of countries a and b .

TABLE 1.1. Comparison of Mali's Food Production and Instability with CEAO Member Countries

CEAO Member Country compared to Mali	Food Production Similarity Index	Correlation of Food Instability
	1981-83	1963-83
Burkina Faso	70%	31%
Côte d'Ivoire	26%	63%
Niger	76%	58%
Sénégal	49%	46%
Mauritania	58%	-54%

Source: Badiane, 1988

On the demand side, recent research comparing Mali's regional urban centers shows that while major differences exist among the seven regions of Mali, overall, 70-80% of consumed calories come from cereals, of which coarse grains provide 85% (Rogers and Lowdermilk, 1987). A survey of the nutrition literature covering the four years between 1984/85 and 1987/88 indicates that the percentage of cereals needs (188 kg/person/year) met by consumers varied between 65% in 1984/85 and 99% in 1986/87 (Sundberg, 1988).

Cereals Trade Structure

Prior to the banning of rice imports in 1988, cereals accounted for 97% of food imports, of which rice represented a large share. In the period before the import ban, food imports varied between 2 and 64% of export earnings, with a mean level of 15%. This instability of food imports, reflecting the instability of domestic production, is confirmed by a trend-corrected coefficient of variation of 73% (Badiane, 1988).

In 1981-83, Mali's export shares within the CEAO region were 47% for cattle, 36% for cotton, 12% for sheep and goats, and 1% for seed cotton. An index of Mali's export similarity, based on 29 products in 1981-83, reveals the following: Burkina Faso

(73%), Côte d'Ivoire (6%), Mauritania (59%), Niger (59%), and Sénégal (6%). This index is analogous to the production similarity index above, with

$$SE_{a,b} = 100 \sum_i (\text{Min}(x_{ia}, x_{ib}))$$

where x_{ia} and x_{ib} are the shares of product i in total exports of countries a and b .

These figures confirm the diversity within the region, indicated by the index of production similarity, thus revealing the scope for increased regional trade. What they do not indicate, however, is the potential for increased trade in cereals, which presently do not occupy a significant share of Mali's exports to the region.

Moreover, a note of caution regarding the above figures is that they are based on official trade statistics, which appear to be largely distorted and misrepresentative of actual trade flows, as demonstrated by Egg et al. (1989).

1.3 Marketing and Trade Policy

Market Reform in the 1980's

The national marketing board, the Office des Produits Agricoles du Mali (OPAM), was instituted in 1964 during the first post-independence government of Modibo Keita. From its beginning, OPAM was granted a legal monopoly in grain marketing, which it continued to maintain with a slight interruption in 1969, when the government changed hands, until the initiation of gradual market reform in 1981/82. However, the official monopoly of the OPAM has been described as "fictional", handling only an estimated 20-40% of total volumes marketed and 3-4% of total production (Humphreys, 1986).

The impetus for the market reforms essentially dates to the 1973-74 drought, as a result of which Mali imported large amounts of grain which OPAM sold at concessional prices. The resulting accumulation in budget deficits in the late 1970's led to significant

donor pressure for a restructuring of the market, and the government of Mali agreed to a comprehensive and gradual cereal policy reform package in 1981. The objectives of this reform package were to raise official producer and consumer prices, abolish the monopoly of the OPAM and improve its operational efficiency (Staatz, Dioné, and Dembélé, 1989).

In absence of detailed empirical knowledge about cereals production and marketing, the first phase of the Programme de Restructuration du Marché Céréalière (or PRMC I), between 1981 and 1986, was based on the following assumptions: Mali would continue to have cereals deficits; official producer prices mattered in terms of producer incentives; most farmers were net sellers; private traders could respond quickly to market signals; and the role of OPAM vis-à-vis the provisions to the Army was important. These assumptions have since been proven largely incorrect, except in the case of continuing rice deficits and the importance of the Army (Staatz, Dioné, and Dembélé, 1989).

Contrary to the underlying assumptions of PRMC I, two consecutive good harvests for coarse grains in 1985/86 and 1986/87 led to a collapse of producer prices for coarse grains, which OPAM was unable to sustain budgetarily. The responsiveness of farmers to price incentives was shown to be constrained by the lack of purchased inputs and improved technology. Similarly, the increase in prices adversely affected the large proportion of producers (43%) found to be net grain buyers; and, the liquidity constraints and risk faced by private traders limited their capacity and timeliness in responding to market opportunities.

Given the limited successes of PRMC I in achieving its objectives, the donor-funded market reform entered into a second phase, PRMC II, from 1988 to 1990. This

second phase abandoned the setting and maintenance of producer and consumer prices (except for producer paddy rice prices). With the liberalization of pricing policy, an additional role of the public sector was identified as that of supplying market information, especially prices, to the private sector. This phase has also focussed on opening credit lines to the various market participants, traders and village associations (Vega, 1990).

The results of this second phase are mixed, in view of the poor utilization of credit lines by traders. This poor credit performance is linked to the inability of traders to dispose of stocks due to surplus harvest years in both 1988/89 and 1989/90. Thus, in 1988/89, repayment rates for the wholesaler and semi-wholesaler credit lines were 31% and 9% consecutively. This performance led to a severe restriction in disbursement of credit funds in the following year, reducing the number of traders in the credit program from 19 to 2.¹ The funds disbursed were reduced by 92%, from 1138.5 million FCFA in 1988-89 to 96 million FCFA in the following year (Office de Stabilisation et Régulation des Prix, April 1990).

On the other hand, the objective of providing market information to participants resulted in the establishment of a public market information system, the *Système d'Information des Marchés* (SIM) in 1989, which has successfully disseminated largely good quality price information in a timely manner.

In late 1990, the government of Mali and the donor group established the third phase of the market reform, PRMC III, which is committed to continuing to enhance private participation in the cereals market, to focus on issues of cereals processing and

¹ communication with USAID/Mali staff, July 1990

quality control, to promote exports of cereals within the region, and encourage the coordination of the private sector by diffusing timely information.²

Issues in Marketing Policy in Mali

The importance of production for home consumption and non-market transactions implies a secondary or "residual" nature of grain marketing in Mali. In turn, this characteristic affects all cereals policy in Mali (D'Agostino and Staatz, 1989). The effects of this market "thinness" are volatility of prices, and in the case of traders, limited competition and limited holding of stocks due to the accompanying risk. Recent research reveals that while Malian market liberalization has not solved the problem of market thinness, it has resulted in increased specialization and entry of new firms. However, the shift toward greater dependence on the market for consumption needs is found to vary seasonally and regionally (Mehta, 1989).

Another issue in the discussion of marketing policy is the distributional effect of policies, i.e., who gains and who loses (Humphreys, 1986). In particular, policy changes that result in price increases have adverse impacts on net buyers, who may represent a significant proportion of producers (Dioné, 1989; D'Agostino and Staatz, 1989).

Recent Evolution in Trade Policy

In response to and conditioned by the overall reform of cereals marketing in Mali as well as changes in production patterns, both import and export policies were characterized by a state of constant flux during the late 1980s. In 1988, the government announced a complete ban on rice imports in order to protect domestic rice producers, in particular the government-supported Office du Niger. Later in the same year, this

² Ministère de Finance, "Déclaration d'Intention au Gouvernement de la République du Mali de Certains Bailleurs de Fonds pour une Prolongation du Programme de Restructuration du Marche Cerealier", Bamako, 1990.

policy was changed to a policy of "jumelage," whereby rice imports were conditional upon equivalent purchases of domestic rice. In 1989, rice imports were again banned, continuing until late 1990, when pressure from rising rice prices led to permission for a few limited imports (Dembélé, 1990).

In the wake of two successive good harvests, the government announced in mid-1989 a liberalization of cereals exports, with an accompanying removal of export taxation in the following months. Further encouragement for the liquidation of stocks to neighboring markets was attempted by the donor community (PRMC), with a subsidy on transport to external markets.

It appears, however, that both trade policies have had limited success. The restrictions on imports of rice, still debated within policymaking circles, have resulted in price increases, adversely affecting net buyers of rice, particularly in the urban areas, where rice represents more than 50% of the cereals basket. This raises questions whether the Office du Niger, the state-subsidized domestic rice operation can supply the population's needs at competitive prices.

The export liberalization policies, motivated by estimated surpluses of coarse grains, are also contested within national policymaking fora for reasons related to domestic food security. This is due to arguments that surpluses may be over-estimated or that local deficits in border areas occur at the same time as exports to neighboring countries. In fact, discussions with policymakers at both national and local levels revealed that local food security objectives are perceived to conflict with those expressed at the national level.

At another level, the question of who actually benefits from these policies, and particularly subsidies, must be addressed given the importance of "illegal" or unregistered

trade that is outside the scope of official policy. This issue will be discussed at length in other sections of this study.

CHAPTER II

REGIONAL TRADE, MARKET INTEGRATION, AND TRANSACTIONS COSTS:

Toward A Conceptual Framework

This chapter attempts to construct a conceptual framework of analysis linking regional trade, domestic market integration and the importance of transactions costs. This is done through an overview of both theoretical and empirical aspects of the extensive literature on these subjects, in order to draw out and link salient points relevant for this study.

The approach taken in this review is to progress from a very general perspective of the importance of trade to a focus on regional trade, to a more specific focus on domestic marketing, an underlying determinant of a country's competitiveness in the region, eventually to a discussion of transactions costs, a specific factor influencing marketing performance.

In the same way that the theoretical discussion evolves from the general to the specific, the review of the empirical literature also progresses from a general world view to the case of West African cereals trade to that of cereals marketing performance in Mali.

The deductive approach described above is presented schematically in the Figure 2.1.

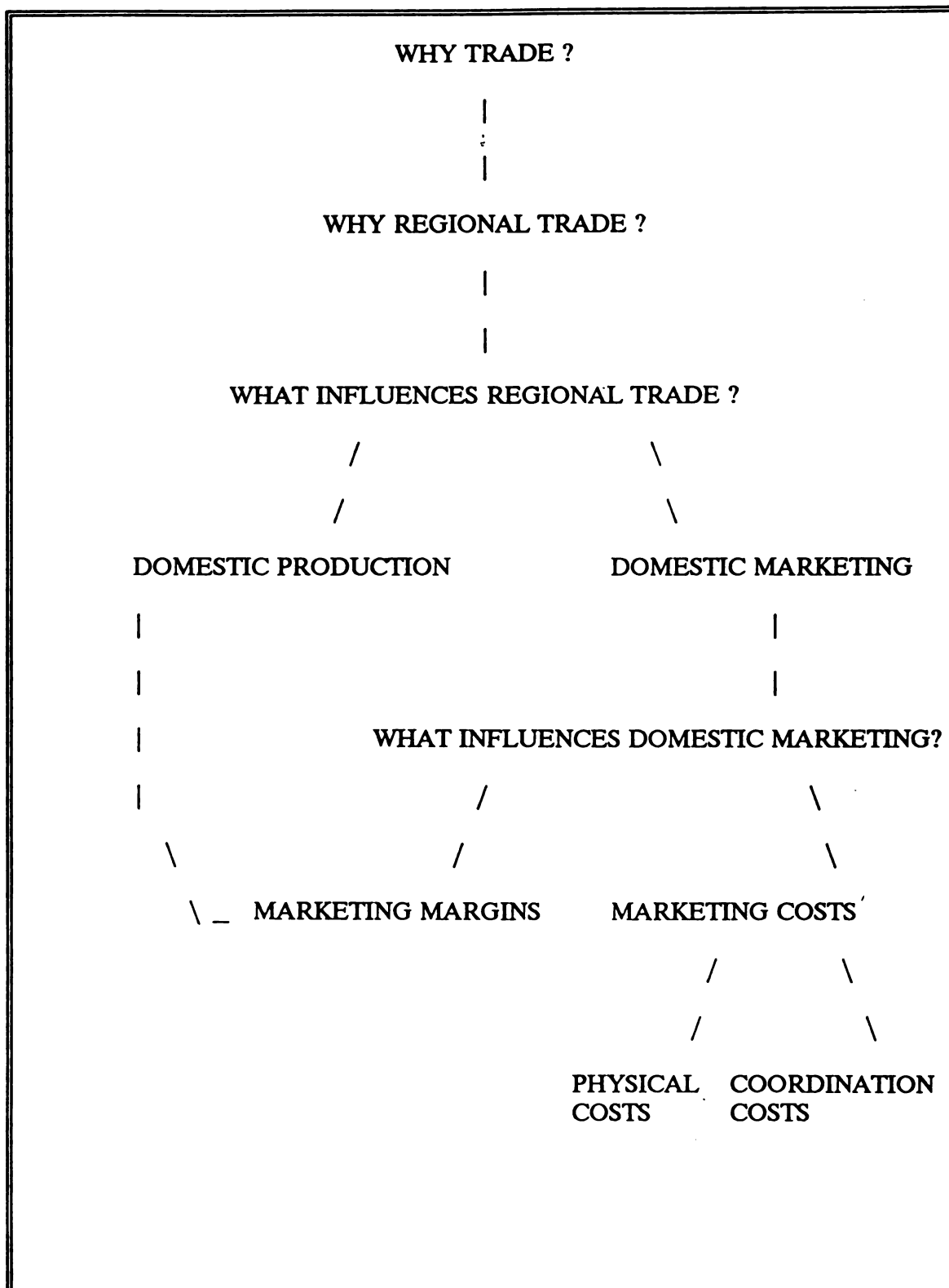


Figure 2.1 Conceptual Framework of Regional Trade, Domestic Marketing, and Transfer Costs

2.1 Trade: The Engine of Growth

In reviewing the economic literature on the linkages between trade and development, it is useful to start with Alfred Marshall's (1920) statement that "the causes which determine the economic progress of nations belong to the study of international trade" and later, the much quoted phrase by D.H. Robertson (1940) that trade is above all "an engine of growth." These statements are supported by the fact that trade from the late nineteenth century has not only accompanied industrial growth, but has increased at a faster pace than world production.

Basic theories of trade driven by comparative advantage presuppose that differences in either technology (Ricardo) or resource endowments (Heckscher-Ohlin-Samuelson) will motivate trade patterns. These models are based on assumptions of perfect competition, constant returns to scale, complete factor mobility between sectors, and full employment of resources. Under these conditions, the economy after trade adjusts costlessly and automatically to new equilibria.

When these rigid assumptions are partly relaxed, trade theory under imperfect competition adds important considerations of transport costs (Brander) and increasing returns to scale (Krugman; Lancaster) as factors determining the ensuing trade patterns.

However, with regard to the experience of the developing countries, a wealth of literature has accumulated in the past forty years disclaiming the virtues of "free" trade as a means of enhancing economic progress for these countries. In this viewpoint, not only has the engine of growth become very slow (Nurkse, 1961) but it seems that development has become the "engine of trade" (Prebisch, 1949) as seen by largely outward-oriented development strategies. Thus, the theory of unequal exchange was

advanced by Myrdal (1956) as well as neo-Marxists such as Emmanuel (1972), Rodney (1972), and Amin (1976), among others.

The structuralist school of thought, stimulated by the work of Raul Prebisch (1950) and others such as Furtado, Sunkel, and Cardoso at the Economic Commission for Latin America, developed the theory of the center-periphery in international trade. Supplemented by independently theorized work by Hans Singer (1949), what has come to be known as the Singer-Prebisch thesis states that: (i) there is a structural imbalance and asymmetry in the international economic system, and, (ii) this asymmetry leads progressively and inevitably toward a deterioration in the terms of trade of the developing countries.

2.2 Regional Economic Integration

Concomitant with the recommendations of the Latin American school to promote industrialization through establishing linkages among developing countries, similar attempts -- but for different reasons -- were being made in Europe. Thus, Jacob Viner (1950) pioneered the classical or orthodox approach to evaluating the process of economic integration in his often-cited theory of the customs union.

The important contribution of this theory was the concept of trade creation and trade diversion. Within an essentially static general equilibrium framework, gains from the specialization in production of certain goods by individual countries are determined by comparative advantage. Trade creation occurs where a less efficient producer in the region imports the good from a lower-cost producer at preferential or zero tariffs. Trade diversion occurs where a good previously imported relatively cheaply from outside the region must, after integration, be imported at higher cost from a regional producer.

According to this theory, the desirability of integration rests on the net balance of welfare gains and losses from trade creating and diverting effects.

This theory was expanded by neo-classical economists to include effects of scale economies, regional terms of trade versus the rest of the world, and factor-price equalization within the region.

The orthodox and Vinerian approach of statically viewing comparative advantage is seen as inadequate by the structuralist perspective, which perceives integration among developing countries as a means of trade expansion per se, regardless of its possible "diverting" effects or inefficiency. This viewpoint is based on the inclusion of dynamic gains from regional integration, which cover both economic and non-economic considerations. These gains include economies of scale over time, "learning by doing," shifts in factor prices and levels, as well non-quantifiable gains of regional cooperation over time (Robson, 1983).

Regional economic integration has long been a central component of the development strategies of both developing and industrialized countries, with varying degrees of success.

In the context of the developing countries, in the period since the forming of the European Economic Community in 1957, numerous attempts to form regional groupings resulted in a period which has been labelled the age of integration (Machlup, 1977) and disintegration (Hazlewood, 1975).

In a survey of what he considers the "crisis" in regional economic cooperation among developing countries, Vaitos (1978) suggests that regional integration should not be viewed as an end in itself, but rather a means of attaining specific goals. He notes the significance of the non-market component of regional integration in determining its

successful outcome, as well as the need to consider issues of potentially conflicting national objectives and the distribution of the gains from regional trade. Another important consideration is the need to focus on areas in which significant gains in production are possible.

The latter point has also been forcefully argued by Lipton (1988) in a study of regional trade in southern Africa, where he concludes that both rising food productivity, on the supply side, and rural incomes or entitlements, on the demand side, are "essential preconditions" to the expansion of regional trade flows. In policy terms, this translates into a focus on production-enhancing measures, prior to instituting pricing and marketing changes.

While this argument would appear to conflict with the "engine of growth" perspective noted above, perhaps the argument can be made that a dual interaction exists between regional trade flows and production, in which rural producers are responsive, although constrained, to changes in the market and opportunities for trade.

Thus, from a theoretical as well as an empirical perspective, the issues of supply responsiveness and the structure of production underlie the question of regional trade in a fundamental way.

2.3 Regional Economic Integration in West Africa

In West Africa, regional trade--and the broader issue of regional economic integration--have long been perceived by policymakers as a vital link in addressing the economic problems of the region. This is evidenced by the numerous regional arrangements, varying by degree of integration and membership, that have been put into effect in the past three decades such as ECOWAS, UMOA, CEAO, etc.



Alongside these formal efforts to achieve integration, or in spite of them, historical studies reveal that informal regional trade has flourished actively throughout West Africa since long before European colonial trade, in which traditional trader networks have been maintained despite the legal boundaries and protectionist policies of the individual states after independence (Lambert, 1989). Historically, this "de facto integration" is perceived to be based in longstanding regional complementarities between the savannah and the forested zones, or between the coastal and interior countries of West Africa (Egg, 1989).

The following discussion will consider both aspects of the regional trade issue in the West African context, namely, (a) the importance and desirability of promoting regional trade through policy measures, and (b) understanding the existence and the motivations underlying a significant level of trade already in place, which exists largely outside the direct influence of policy.

2.3.1 The Importance of Regional Trade in West Africa

Recent research has proposed that regional trade in agricultural goods, namely cereals, has the potential to enhance regional food security (Badiane, 1988). Through comparisons of fluctuations in annual food production at the national level with that of the region for the countries in the Communauté Economique de l'Afrique de l'Ouest (CEAO), Badiane suggests that regional grain production is significantly more stable than domestic production for up to two-thirds of the member countries.

Similarly, Lambert and Egg (1989) propose that regional trade will benefit individual countries by expanding domestic markets and facilitating the supply of food in uncertain weather conditions. In addition, trade is beneficial in generating domestic savings through increased trading activity and the allocation of resources according to

comparative advantage at the regional level, such that complementary agricultural sectors will be supported.

Delgado (1989) notes the negative impacts of events over the past decade in world markets for livestock, cotton, and vegetable oils on long-term Sahelian growth. He points to the need to recapture regional markets, in particular between the Sahelian and the coastal countries. However, the regional alternative to world markets needs to be examined in terms of whether a "genuine" and dynamic comparative advantage, based on changing technology, exists.

With regard to this last point, for cereals, Shapiro and Berg (1988) conclude that the physical and technological perspectives for raising cereals yields are weak, with only the very costly possibility of increased irrigated rice production. They note that given weak supply responsiveness to economic incentives, as well as a relatively price-inelastic demand structure in favor of imported rice and wheat, protection on a regional level would have, in fact, quite negative impacts on economic agents.

On the other hand, Gentil and Ledoux (1989) strongly question the above arguments by noting examples in which technology adoption has significantly improved coarse grain yields, particularly in the cotton zones of Burkina Faso and Mali. By distinguishing between real prices and official prices, they find examples where production has proved quite responsive to real market prices in Mauritania, Sénégal, and southern Mali. In addition, they point out that cereal demand rigidity is linked to the level of product transformation and thus is neither irreversible nor necessarily permanent.

Gentil (1989) goes further in suggesting that agricultural production in the Sahel must be distinguished in terms of production zones (irrigated, cotton, cereals with



groundnuts or cowpeas, and cereals alone); farm types (regular cereal surplus, break even, and structural deficit); and the determinants of farmer behavior (factor availability, economic and social objectives). By this classification, it appears that the potential for increased cereal production varies widely and seems complementary with cotton production. He concludes that a stable and remunerative market at the regional level, accompanied by soil improvement, seed, and processing technology, is a decisive factor in increasing cereals production.

2.3.2 Determinants of Regional Trade in West Africa

In addition to, and surpassing in magnitude, the above-mentioned regional trade flows that are based on ecological and resource differences, namely between the Sahelian, forest, and Sudano-guinean zones, Egg (1989) notes the impact of policy disparities among the individual countries in determining cereals trade. There are two types of policy disparities that influence trade, namely, economic policy and monetary policy. Economic policy includes pricing, subsidies, and customs duties. These policies, in his analysis, largely influence trade in re-exported grains (initially imported from world markets).

Egg suggests that monetary policy differences account for major flows between the CFA franc and non-CFA zone. This is explained in that, while the non-franc countries have a wide range of manufactured goods (either re-exported or locally produced in the case of Nigeria) to exchange for cereals, they also are constrained by a foreign exchange deficit. Moreover, recent currency devaluations or parallel market operations in the non-franc countries make their products relatively cheap to franc-zone consumers.

An analogous argument may also be proposed from the finding by Shapiro and Berg (1988) for countries within the franc-zone that the real effective exchange rate, the nominal rate adjusted for changes in relative price levels, varies across countries.

Another dimension of trade based on policy differences is that this market is characterized by instability due to both the effect of frequent policy changes as well as of world market fluctuations that influence mainly re-exports. Lambert and Egg (1989) argue that, while traders gain from this market, re-exports of relatively cheap grains has a significantly negative impact on domestic cereals production.

2.3.3 Measures of Regional Trade in West Africa

Recent empirical investigation of the cereals trade flows in West Africa is based on existing aggregate statistics from UNCTAD, individual ports, and national and customs data, in addition to field surveys of major traders and periodic border markets and the study of national commercial strategies (Coste, 1989). Given the limited reliability of the aggregate data, results obtained are indicative of trends rather than levels, and require further study.

The main features of national border markets are the use of several currencies with parallel market rates, inefficiency and/or complicity of border customs, and the importance of ethnicity over national identity (Igué, 1989). The structure of border trade is that of periodic markets with twin markets on either side of the border, that vary in terms of area served. Secondly, border warehouses function as storage, sales outlets, and collection and distribution centers, within or near border towns, which also have twin towns across the border.

In evaluating the nature of products traded, Egg (1989) distinguishes between trade based on resource complementarity, on production and marketing policy

differences, and on pricing policy differences. Within the first category, he finds that major flows along traditional trader networks (such as the dioula-manda traders) exist between Sahelian and coastal countries in livestock, kola, fish, and cowpeas, as well as border trade in onions, vegetables, tubers, fruits, dried fish, and local cereals. However, this type of trade accounts for only one-third of flows within the region.

Egg finds that trade flows due to production and marketing policy differences are largely flows of re-exports from the relatively open economies of Mauritania, Guinea, the Gambia, and Cameroun to protectionist economies such as Mali, Sénégal, and Nigeria. These re-exports are mainly rice and wheat flour, as well as sugar, tomato paste, maggi cubes, and condensed milk.

Pricing policy differences, namely for export crops such as cocoa (Côte d'Ivoire and Togo) and groundnuts, also result in trade flows.

Egg attributes cereals flows to re-exports due to policy disparities, to projects (large schemes) with inconsistent price support policies, and to currency differences. However, he notes that, in almost all cases of regional trade, agricultural and livestock products are exchanged for local or imported manufactured goods, such that it is difficult to isolate agricultural trade.

Focussing on the magnitude of cereals regional trade, preliminary estimates by Coste (1989) reveal for the overall West African region (18 countries) in 1987 that total cereal transactions were 4 million tons imported from world markets (rice, wheat, and wheat flour) while 3 million tons came from domestic production; thus 43% of total transactions were in regionally produced cereals. Within regional trade, 850 thousand tons of cereals were in the form of re-exports and 400 thousand tons were local grains;

thus, roughly two-thirds of regional cereals traded were re-exports. Finally, he concludes that regional trade constituted 20% of all the cereals transacted in the region.

For local cereals alone, a similar breakdown between total transactions and regional trade reveals that 15% of marketed millet and sorghum, 12% of maize, and 4.5% of marketed paddy rice are traded regionally.

In addition, it is important to note that Coste finds that 83% of cereals available came from regional production, by comparing 20 million tons produced versus 4 million tons of imports from world markets in 1987. Of the 4 million tons imported, roughly 10% of both rice and wheat were for transit flows (officially distributed to interior country), while 26-32% of rice and 22% of wheat were re-exported to mainly Nigeria, Sénégal, and Mali. The estimation of re-exports is through the residual method in which domestic utilization (consumption) is subtracted from resources (national production, stocks, and imports).

2.3.4 Summary of West African Case

Having reviewed the current policy debate regarding regional cereals trade in West Africa, as well the existing empirical evidence of the determinants, structure, direction, and magnitude of regional trade flows, several salient points emerge.

First, in light of the earlier discussion of regional economic integration in which countries attempt to harmonize their policies in order to promote trade, it would appear that West African de-facto "integration" has occurred in spite of, and, in large measure due to its "disintegration" in the sense of widely diverging national policies!

Focussing on cereals, this leads to the important consideration of the effect of potential measures to reconcile or "integrate" cereals policies at the regional level in view of existing or de facto market integration.

Within this consideration, there are two vital distinctions to be made:

(a) trade in local cereals versus trade in imported cereals, and (b) trade due to regional complementarities versus trade due to policy disparities. While it is often the case that trade in local cereals is also trade due to regional complementarities, the empirical results show that this is not necessarily true, as in the case of Mauritanian local paddy rice exports across the river to Sénégal (Coste, 1989).

Finally, in a long-term perspective, it appears that the potential for trade expansion fundamentally lies in the type of trade that is motivated by regional complementarities and that is in locally produced cereals. Moreover, this type of trade, as seen in the empirical findings, is not clearly distinct from trade in non-cereal agricultural and even manufactured goods.

In contrast, trade induced by policy differences is not only highly unstable due to changing policies and international conditions as well as distortive to domestic agriculture, but also seems unsustainable as a trade promotion strategy because it is not based on the economy's actual comparative advantage in a productive sense.

In taking the longer-term perspective mentioned above, it becomes important to determine what underlies the regional complementarities that are perceived to motivate trade. Given conclusions reached by researchers that historical patterns of trade are rooted in these complementarities, this analysis must distinguish the static (or unchanged) factors such as the geo-climate, soil type, and other resource endowments and characteristics from dynamic (or transformable) factors which relate to the structure of production as well as of marketing.

In order to determine the regional complementarities among countries, individual analysis of the factors that underscore or motivate each country's trade flows must be

carried out. This process involves a close examination of the domestic factors in each country's structure of production and marketing, as well as of each country's set of domestic policy interactions with the region.

While this type of analysis is often carried out for a country's production structure, i.e., determining costs of production and supply responsiveness to certain policy or market incentives, it is important that a country's marketing structure also be investigated in terms of the costs of marketing and the responsiveness of marketing agents to market changes. A given country's competitiveness, or basis for complementarity, in the region is comprised of both competitiveness in production as well as in marketing.

Therefore, the following discussion will focus on the determinants and measures of domestic competitiveness in marketing.

2.4 Marketing Theory

2.4.1 Determinants of Marketing Efficiency

Theoretically, at equilibrium, it is assumed that buyers and sellers are located at a single point and that a single equilibrium price is determined by aggregate demand and supply conditions (Tomek and Robinson, 1981).

Marketing margin theory extends the above by defining a set of equilibrium prices at different levels of the market, namely, at the producer and retail level. The difference between these two equilibrium prices is the marketing margin, which itself is determined in equilibrium by the demand and supply relations of marketing services.

With the assumption that markets are competitive, marketing margin changes are reflected through the system in an analogous way, and price has the role of integrating the different market levels.

However, given that markets are observed to be less than perfectly competitive, marketing research has developed the concept of market thinness (Hayenga, 1979). Market thinness is a concept used to describe markets with low trading volumes and low liquidity (Marion, 1986). Thin markets are caused by the following: a limited number of buyers or sellers (either naturally or artificially), scale economies, discontinuities or fixed costs, high costs of arbitrage over space and time, structural elements limiting entry into the market, poor product quality, and/or poor information.

These market conditions can affect market performance through creating large fluctuations or instability of market prices or through the incidence of excessive marketing margins (Hayenga). Both of these results adversely affect consumers.

When the product that is marketed is assumed to be homogenous at both levels (no transformation) within a competitive market, a slightly different approach to marketing margin theory is that of spatial equilibrium (Judge and Takayama). In spatial equilibrium theory, the price difference between the two trading points for a product that is moved from one to the other is just equal to the cost of transferring the product, assuming that there are no barriers to trade and perfect knowledge. Similarly, the price difference between non-trading regions is less than or equal to the transfer cost.

Faminow and Benson (1990) extend this model by adding the dimension that not only do prices differ between regions due to the distance between buyers in one region and sellers in the second region, but also prices differ within regions due to an analogous dispersion of buyers and sellers. This condition creates a situation of spatial oligopolistic competition which alters the conclusions reached with the spatial equilibrium model. In this model, a high degree of market integration between prices is in fact a result of price collusion, which occurs as a result of a "linked oligopoly" with prices at one site set equal

to another site's base price plus the transport costs. This, quite contrary to expected, is indicative of marketing inefficiency.

2.4.2 Tests of Marketing Efficiency

Based on the theory of marketing margins that was described earlier, marketing efficiency can be evaluated by observing the incidence and nature of changes in the margin over time. Since "changes in factor prices, efficiency, and services embodied in farm products change marketing margins," the size of the margin as well as its stability can be analyzed in terms of how efficiently prices are passed along the marketing chain, and the extent to which the demand and supply of marketing services change (Tomek and Robinson, 1981).

Marketing efficiency is very often tested through price analysis, commonly used to measure the degree of market integration, namely, how related prices are between markets.

One approach to testing market integration is to measure the simple bivariate correlation of prices in pairs of markets (Jones, Stigler).

This type of analysis, however, has been criticized by researchers such as Harriss, Delgado, and Ravallion on statistical grounds. They point out that (a) common external factors such as price seasonality and inflation may bias the correlation upward; (b) the variance of price is not fixed but may change over the year, a condition which causes heteroskedasticity and violates the basis of least squares estimation; and (c) spurious correlations such as official price setting may cause illusion of integration.

A possible modification of bivariate correlation analysis is to test heteroskedasticity by comparing price regressions broken down by season with those over the entire data series (year). Additionally, spurious correlation may be corrected by

removing the seasonal and inflation effects by de-seasonalizing and de-trending the data series (Loveridge, 1988).

In the case of seasonality, this process is carried out by computing a seasonal index, based on moving averages, and dividing the data series by the seasonal index (Goetz, 1986).

Another approach to testing marketing efficiency is to determine whether a group of markets exhibit the same seasonal behavior, assuming a geographic homogeneity in production. This "variance components" approach (Delgado, 1986) estimates a given market price at a given point in time and season as a function of the sample mean price in that season, the location effect, and constant weekly time and stochastic interaction effects in that season. The weakness of this approach is that the assumption of geographic homogeneity may be violated because of the variable effects of altitude, climate, population density, and consumption habits (Loveridge, 1988).

Another set of tests of market integration are those based on the theory of spatial equilibrium discussed earlier. A model of spatial price differentials developed by Ravallion (1986) estimates price in local market as a function of a larger, central, market, where the econometric specification of the model rests on the assumption that there is a unidirectional flow of goods from the local to the central market. In a dynamic framework, this model specifies that the change in local price from the last period is a function of the change in central market price in the same period, last period's spatial price differential, last period's central market price, and local market characteristics (Heytens, 1986).

The solution to Ravallion type models rests on the assumptions built into spatial equilibrium theory, namely that products are homogeneous, such that consumers are

indifferent as to the source; production and consumption occur at precisely the same point in each market; there are no physical and institutional barriers to trade; and transfer costs are constant regardless of volume or direction per unit of product. Thus, the model dictates that, where a clear direction of trade from a surplus region to a deficit region exists, the difference between the regional prices should just equal transfer costs. The implication for the volume of trade is that at the spatial equilibrium differential in prices (i.e., just equal to transfer costs), there is an optimum "least-cost" trading pattern given the supply and demand relations in each region. As transfer costs decline, the optimal volume of trade increases until a maximum trade occurs where transfer costs are equal to zero.

Timmer extends the Ravallion model by incorporating generalized distributed lags (1987). This results in the testing of:

- (a) the extent to which local prices are integrated into the central market over the long run. This first test measures long-run integration, as measured by the coefficient attached to the change in the temporal differential in the central market.
- (b) The extent to which short-run changes in local prices are caused by short-run changes in the spatial price differential. This second test measures short-run connection, as expressed in the coefficient attached to changes in the spatial differential between the two markets. In this model, an index of market connection (IMC) can then be computed as the ratio of the coefficient of lagged local market effect to the coefficient of lagged central market effect.³ Thus, market segmentation (lack of integration) is indicated by an IMC which is very large, while IMC less than unity indicates a high degree of market connection. The distinction between long-run integration and short-run connection can thus be perceived by comparing the IMC to the coefficient of temporal differences in the

³ The equation is expressed as:

$$P_t = d_0 + (1 + d_1)P_{t-1} + d_2(R_t - R_{t-1}) + (d_3 - d_1)R_{t-1} + d_4X$$

where P is local market price, R is central market price, and X is the matrix of local market characteristics.

IMC = $(1 + d_1) / (d_3 - d_1)$ which is less than 1 when there is a high degree of market integration.

central market price, which is not included in the computation of the IMC.

While the Ravallion and Timmer approaches provide insights into marketing efficiency, they are limited by the difficulty of determining appropriate central market prices and variables that characterize the local market; by a possible simultaneous equation bias requiring the specification of instrumental variables; and the sensitivity of model parameters to the time length of the data (Heytens, 1986). Heytens also points out that if the direction of the commodity flow reverses seasonally, the model would reject market integration.

More fundamentally, these models are constrained by their focus on a single commodity without regard to cross-elasticities that affect demand and supply in each market, by extensive data requirements (transfer costs, prices, market characteristics, and supply and demand parameters), and by the rigid assumptions underlying the spatial equilibrium theory. In particular, the model's weakness is the assumption of a single point at which buyers and sellers meet in each market.

2.4.3 Institutional Approaches

A complementary approach to viewing market performance has been through the industrial-organization approach, developed by Breimyer, Schmid, Shaffer, and Scherer, among others. This approach is essentially concerned with the conditions of imperfect competition within which markets actually operate, and what influences their performance. The industrial organization literature attempts to explain more fully what affects market processes, how these processes often fall short of desired performance, and what policies may directly or indirectly adjust firms' behavior toward desired ends.

While performance in neo-classical economics is related to the concept of local equilibrium, i.e., the price at which markets clear, the institutional approach uses the

paradigm of structure-conduct-performance (SCP) to derive direct linkages in market performance.

An aspect of marketing largely neglected by the neo-classical approach is the exchange itself, or relationship, between economic agents. Within the institutionalist framework, Schmid and Shaffer (1964) focus on the social context of marketing in which economic interaction between individuals is defined as a transaction, the outcome of which is an exchange. Thus, in their approach, the marketing system includes both the exchange system--governing transactions between individuals that results in the exchange of property rights--and the physical distribution system, which executes the physical transfer of goods over space and time.

This classification of the marketing system enables a clearer insight into the transfer costs that are incurred in the marketing process, which can be separated into the costs incurred in the physical transfer of goods and those incurred through the structure of the exchange. Physical transfer costs are those related to transport, assembly, handling, storage, sacking and grain treatment. Exchange, or coordination, costs are those related to regulation, information, financing, intermediation, negotiation and enforcement of contracts, that is, those concerning the exchange relations between the various market actors.

Policy influences both types of transfer costs. For example, investment in road infrastructure reduces transport costs. However, the interaction between policy and coordination costs appears to be given more attention in policy discussion, perhaps due to its more ambiguous nature. For example, a policy of liberalization dramatically changes the relations between previously "parallel" market operators and the government, although the impact on transfer costs is less identifiable. Similarly, providing public

market information is perceived to reduce transfer costs, although the measurement of its impact on costs may be difficult.

Transaction Cost Economics

Within institutional economics, an important body of knowledge referred to generally as the transaction cost economics perspective is an interdisciplinary approach linking law, economics, and organization theory; its concern is the assessment of alternative institutional arrangements (Williamson, 1985). A major contribution of the transaction cost economics literature is the application of the behavioral assumptions of bounded rationality, defined as behavior that is rational within the confines imposed by imperfect information and limited capacity to process it, and opportunism, defined as self-interest seeking with guile. These assumptions affect economic organization in a fundamental way. Transaction cost economics views the transaction as the basic unit of analysis, instead of prices or output, as is the case in neo-classical economics. The three dimensions viewed by this literature are: asset specificity, uncertainty, and frequency.

This extensive literature thus treats the set of issues which are related to, but not limited to, the costs described above as physical and exchange costs. For this reason, this study attempts to avoid confusion by referring to these costs as transfer costs, rather than transactions costs for the remainder of the text.

2.4.4 Transfer Costs Analysis and Market Efficiency

The relationship between transfer costs and market efficiency or equilibrium can be viewed in the comparison of transfer costs and marketing margins where, in spatial equilibrium, physical transfer costs would just equal the spatial margin.

Analogously, a parity price analysis (Hays and McCoy, 1977) is based on calculating the price spread, defined as the spatial price difference minus transfer costs.

Where price spreads approach zero, it is likely that markets are competitive. However, a price spread of zero may be seen as necessary but not sufficient for market efficiency. While prices are integrated in space, the market may still be inefficient because economies of scale and scope may not be realized due to asset fixity in the short term or unwillingness to assume risk on the part of traders. Thus, this spatial integration of markets may reflect a "second-best" condition, rather than an equilibrium point because the outcome is less desirable than would be the case with realization of economies of scale.

This type of analysis is also commonly used in trade analysis, where import and export parity prices represent the c.i.f. or f.o.b. prices plus or minus the transport costs (Koester, 1986). These two parity prices are commonly compared in order to evaluate whether transfer costs prohibit trade.

Thus, transfer costs can be used to indicate whether marketing efficiency exists. Before returning to these issues, the following section briefly shifts the focus to research undertaken in African marketing.

2.5 Domestic Marketing in Africa

2.5.1 Criteria for Market Performance

According to Jones (1974), marketing research in Africa throughout the 60s and 70s based its hypotheses on the following twelve commonly assumed characteristics of African marketing systems:

- (1) lack of experience in commerce;
- (2) obligations to kinsmen make accumulation of funds for business impossible;
- (3) fragmented cultures/societies inhibit trade and partnerships, and inhibit capital accumulation;

- (4) market participants do not seek economic gain, and are usually unproductively or underemployed;
- (5) excessive intermediaries increase marketing costs;
- (6) excessive seasonal price fluctuations exist because of inadequate storage, high losses, and high post-harvest sales;
- (7) merchants exploit farmers and consumers through monopolistic practices;
- (8) arbitrage over space is imperfect due to inferior communication, lack of public market information, and high transport costs;
- (9) non-economic considerations inhibit access to markets;
- (10) capital rationing to traders constrains efficiency;
- (11) imperfect price discovery exists because of lack of standardized units or quality; and
- (12) effective demand is inadequate to support an efficient system.

These assumptions have been proven largely, although not completely nor all of the time, incorrect in the empirical literature on African marketing.

Shaffer et al. (1983) note that, while extensive research has focussed on pricing efficiency of traditional markets (i.e., whether prices differ over time or space by more than the storage or transport costs), the general conclusion that markets are reasonably price efficient with respect to time and place leads one to ask whether these are relevant questions to evaluating market performance in developing countries. Similarly, they question whether marketing margin analysis, which reveals that margins in traditional markets are low relative to the industrialized economies, is a good measure of market performance by arguing that higher margins that can be attributed to increased services and market coordination may leave the economy better off.

In this analysis, the "efficient but poor" observation of T.W.Schultz (1976) can also be applied to traders and markets, as well as producers. Thus, the relevant criteria

for evaluating market performance are factors such as market thinness that result in major fluctuations in price from small changes in supply, unreliability, unpredictability, and lack of coordination in markets, lack of incentives for specialization and investment, and the increase of storage risk.

This approach places emphasis on the coordination of production and distribution. By noting that the "efficient but poor" hypothesis also held for traders and markets, Shaffer et al. argue that efficiency is a static concept. Historically, events such as the expansion of borders or international trade have led to significant changes in institutional structures through expanded demand and increased production incentives and access to inputs. These changes have led to the stimulation of active coordination in the market, which may move the economy to a different equilibrium point, or level of efficiency.

2.5.2 Measures of Market Performance in Mali

Within the past five years, an important body of research has been undertaken in Mali by the Michigan State University Food Security Project, collaborating with the Malian Food Security Evaluation Commission (CESA). For example, Barry (1989), in a study of 8 retail and 4 wholesale markets, suggests that millet and sorghum markets constitute strongly integrated systems, particularly at the wholesale level.

Mehta (1989) analyzed coarse grain transactions from four wholesale markets, Bamako, Mopti, Koutiala, and Sikasso, from two periods, 1985 and 1988. The study revealed an increase in cereals specialization between the two periods, with the market structure consisting of low-grade oligopolies. Bamako is relatively favored in terms of its access to capital markets and information, compared to the other three markets.

Research undertaken by Dembélé and Steffen (1988) on the performance of markets in the CMDT (cotton zone) and OHV (Operation Haute Vallée) concludes that the CMDT rural markets are better integrated with urban centers, that traders do not engage in significant storage activities, and that spatial margins are highly unstable at each level of the marketing chain. However, given the stability of margins between rural and consumer prices, it appears that the private sector absorbs the brunt of these fluctuations.

Dioné (1989) reports that southern OHV and CMDT rural and wholesale markets are well integrated, with bivariate price correlations between 0.81 and 0.96. The less integrated northern OHV area does not have all-weather roads and therefore is less accessible in rainy months.

2.6 A Conceptual Framework of Analysis

The brief expose of the trends both in theoretical and empirical work on the issues of regional trade, market integration and "efficiency," and the role of transfer costs has revealed that there is scope for extending the linkages between these three separately addressed, yet very much related, topics.

Returning to the schematic representation of these links, it follows that a systematic investigation of the role of transfer costs in influencing market integration can be used to explore the implications of domestic market integration on the potential and actual flows of trade in the region.

From the perspective gained from the above review of the literature, the following assumptions, or norms, form the foundation of the analysis.

Assumption 1: Trade encourages specialization, realization of economies of scale, and ultimately, economic growth.

Assumption 2: Regional trade is a viable and important source of growth and food security for the countries of West Africa.

Assumption 3: The underlying comparative advantage of a country is related to both its domestic production structure and its marketing structure.

Assumption 4: Transfer costs and marketing margins are important reflections of market performance.

From the above, it follows that an examination of the relationship between transfer costs and marketing margins, hence market integration, is a relevant contribution toward better exploring the linkages between domestic marketing and regional competitiveness.

CHAPTER III

SURVEY METHODOLOGY AND DATA COLLECTION

3.1 Identification of "Axes Céréalières"

The cereals marketing channels or "axes" identified in terms of their importance to regional trade are those which connect certain production zones with border markets, ultimately destined for external markets, passing through one or more transit wholesaler markets. Generally, a marketing axis is composed of a producer market, a wholesaler market and, or simultaneously, a border market. Within each axis, two markets are linked within what is referred to hereafter as a market circuit. Thus, each market axis is composed of one or more market circuits. Figure 3.1 indicates where the markets under study are located on a map of Mali.

3.1.1 The Components of the Market Axis

The producer market is defined as the rural market, most often weekly, where cereals are sold by farmers to traders, likely to be collectors from a larger market.

The wholesaler market is the market where cereals are sold by the rural collectors to wholesalers or semi-wholesalers, who then expedite the cereal toward consumer markets or to other wholesaler markets, or to border markets.

The border market is the meeting place of buyers from neighboring countries who come to Mali to procure grain with the local traders. In certain cases, the border market is also a producer market where the external buyers purchase directly from farmers.

A special case of border markets, as well as certain wholesaler markets, is that they also function as transit points. Thus, the cereal passing through these markets has

not been transacted by the traders in place. Rather, traders based elsewhere buy the grain directly from the farmers or from rural collectors. Secondly, not only are the traders involved not based in the market, but the destination of the sales is also elsewhere. Thus, a wholesaler from another market may deposit funds with his representatives in a given market. These representatives buy directly from the farmers and send the cereals to the market where the trader is based. In this case, given that the cereals were not actually transacted in the market from which they are sent, either in the purchase or the sale, the problem lies in determining the transaction price since the local market price may not be a perfect indicator of the value of the grain involved in this operation.

It is clear that the cereals "axes" identified for purposes of this study are not fixed from year to year, nor even within the course of the marketing year. These axes depend on the current production outlook in the various areas, as well as the demand situation in the markets of destination.

One must also bear in mind that the flows through the marketing channel are not limited to a single direction, as implied in the general and simplified description above. In fact, a market which functions as a wholesaler market for the domestic market may also be a transit point for the regional market, especially if this market is also a border market. Similarly, the producer market may also be a border market, etc.

Therefore, the same cereals "axis" may comprise several "sub-axes," in view of the multiple roles of certain markets. This complexity of cereals marketing channels in reality makes the characterization of market flows more difficult. For this reason, we start by qualifying the markets included in this study by the typology presented below, in order to identify the multiple roles of each market. The identification of these roles by



market will enable a fuller description of the marketing "axes" chosen for the study.

3.1.2 Typology of Cereals Markets

The markets comprising the marketing channels were identified in terms of their roles through interviews with traders in each market and discussions with local officials.

Market:	Producer	Wholesaler	Transit Point	Border
Badinko	X	X		
Kita		X	X	
Kayes		X	X	
Nara	X	X	X	X
Kolokani	X	X	X	
Zangasso	X			
Koutiala			X	X
Bamako			X	X

Figure 3.2 Typology of Cereals Markets in 1989-90

As figure 3.2 above indicates, it is rare for a market to be limited to only one function, as is the case for Zangasso. In the case of Nara, all four roles are identified. Figure 3.3 presents a schematic description of the marketing axes, and within each axis, the various market circuits that link two markets.

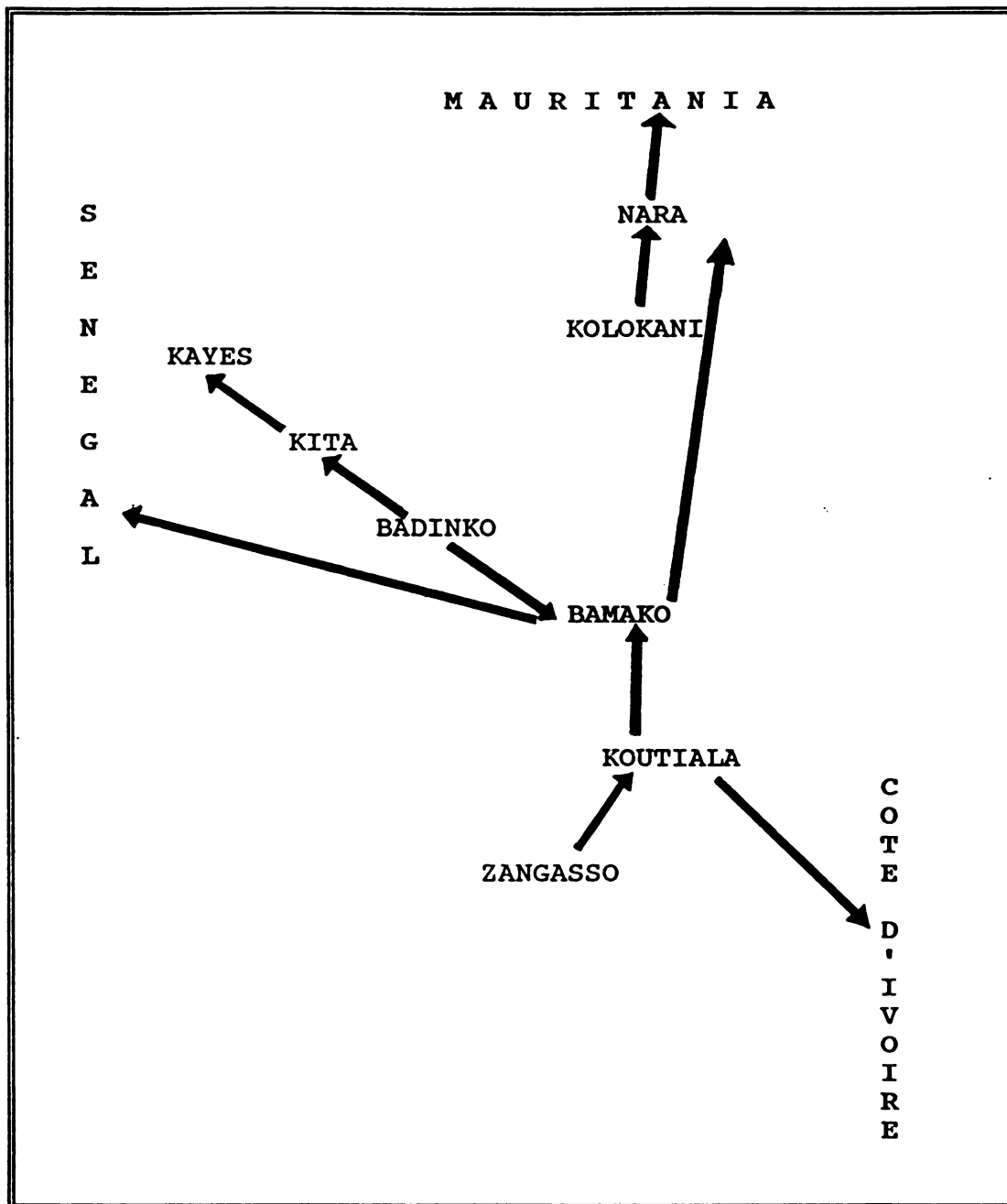


Figure 3.3 Cereal Marketing Axes

3.1.3 Description of Cereals Marketing Axes

The preceding figure gives a global presentation of the flows between the indicated markets. However, one can distinguish between these flows those which

represent major circuits in terms of their importance to domestic and external trade in the region.

These circuits are:

- (1) Badinko - Kita
- (2) Badinko - Bamako
- (3) Kita - Kayes
- (4) Bamako - Sénégal
- (5) Kolokani - Nara - Mauritania
- (6) Bamako - Nara - Mauritania
- (7) Zangasso - Koutiala - Côte d'Ivoire
- (8) Koutiala - Bamako

Circuits (1) and (2) are located on the rail line and, in the first circuit, link a producer market with a wholesaler market. In the second circuit, a producer market is linked to an urban consumption center.

Circuit (3) is a relatively important channel in terms of volumes transacted, namely between the wholesaler market of Kita and the wholesaler/consumer markets of Kayes. Through this channel, there are also flows from Kayes to Sénégal and to Mauritania, although the volumes involved do not appear important. There are more important volumes, however, exported to Sénégal, through the circuit directly linking Bamako and Dakar, along the railway.

Circuit (5), which links Kolokani to Nara, is a very important circuit in terms of the volume of exports. Nara is also supplied by traders in Bamako, along circuit (6). This axis was particularly important in 1990 due to the production shortfalls in the Nara area resulting from locust attacks.

Finally, the circuit linking the wholesaler market of Koutiala and the Ivoirian market was less important in 1990 compared to previous years. The reasons underlying this situation may be the loss of competitiveness of Malian millet relative to other exporters in the region, such as Ghana, with whom trade may appear more attractive as it is outside of the franc zone. Koutiala also functions as a transit market for traders in Bamako, who export directly to Côte d'Ivoire by way of Koutiala. In addition, Koutiala-Bamako is a principal circuit for domestic marketing.

3.2 Market Prices

3.2.1 Survey Methodology and Sample

Market prices used in this study were collected by the *Système d'Information des Marchés (SIM)*, based in the *Office des Produits Agricoles du Mali (OPAM)*. The SIM price data collection covers 58 markets, of which 47 are collected by SIM agents and 11 markets are collected by agents of the *Système d'Alerte Précoce (SAP)*. The enumerators collect prices at three levels: producer, wholesale, and consumer prices, for six cereals: millet, sorghum, rice "RM40" (40% broken, domestic and imported), rice "BB" (100% broken, domestic and imported) and paddy rice.

The methodology used for the weekly price collection throughout the period of analysis (November 1988 through July 1990) is based on random sampling techniques. Thus, for the day of the week considered to be the survey day, 10 respondents are chosen at random among the sample population of traders present in the market.

This methodology takes into consideration two hypotheses:

- (1) the ideal case in which the traders collaborate with the enumerator. In this case, the enumerator composes an exhaustive list of traders in the market, from which he randomly (by lottery) selects ten each week for the survey.

- (2) the case in which the traders are unwilling to be included in a permanent list of respondents. In this event, the enumerator is obliged to count the traders in the market each week, and if the number exceeds 10, he divides the total by 10 to get the sampling frequency.

After determining the sample, the enumerator collects the different prices, either purchase or sale, depending on the actors. The enumerator asks the following:

- have you purchased or sold grain on the market today?
- if so, from (to) whom?

On the basis of the above, the enumerator determines whether the price is either producer (bought from producer), wholesaler (bought from trader), or consumer (sold to consumer).

3.3 Transfer Costs

3.3.1 Survey Methodology

Within the context of the collaborative research project between the SIM, the International Food Policy Research Institute (IFPRI), and Michigan State University (MSU), a one-shot survey between May and July 1990 was conducted with the objective of determining the transfer costs of cereals marketing.

The methodology for this survey, in the markets identified as important for the regional market, was essentially purposive-type sampling with as complete as possible a sampling of all wholesalers and semi-wholesalers in each market.

The survey was conducted in two rounds for each market. The objectives of the first round were:

- (1) to identify the market "axes" and circuits;
- (2) to determine the sample of wholesalers and semi-wholesalers in each market;
- (3) to establish contact with local administration officials and para-governmental structures; and,

- (4) to pre-test the questionnaire with certain traders.

Thus, as noted earlier, on the basis of interviews and discussions, the market circuits identified for the study are:

- (1) Badinko-Kita
- (2) Kita-Kayes
- (3) Kolokani-Nara
- (4) Zangasso-Koutiala
- (5) Koutiala-Bamako
- (6) Kolokani-Bamako
- (7) Badinko-Bamako
- (8) Bamako-Nara

The second round of the survey had the following objectives:

- (1) to submit the questionnaire to the traders identified in the first round; and
- (2) to complete supplementary information obtained from interviews with local officials.

3.3.2 The Questionnaire

The questionnaire retained for the structured interviews, after modifications after pre-testing, is divided into three principal categories:

- (1) general information on principal activity, cereals traded, origin and destination of transactions;
- (2) the frequency and volume of transactions; and
- (3) the costs of transactions.

In the third category, there are 4 principal elements covered by the questionnaire, for which precise questions are asked: the costs of transport, storage, treatment of stocks, and the costs of acquisition/financing/regulation. While the first three are

essentially physical costs, the latter grouping represents the costs of coordination within the marketing system, or "exchange" costs.

Approximately 90% of the interviews were carried out by a team composed of the MSU/IFPRI researcher, the director of SIM, and the local SIM agent, leading to a better control of the information entered and a reduction of error. The interviews were carried out in Bambara and lasted between 30-45 minutes.

3.3.3 The Sample

The sample of traders obtained for the survey totals to 82 traders, wholesalers and semi-wholesalers, out of a population of 86, according to the census of traders available from both the SIM operation as well as the first round surveys in each market.

The distribution of traders surveyed across the markets reflects the large differences between these markets, namely between producer markets and wholesaler markets, and between Bamako and the rest of the markets.

TABLE 3.1. Number of Respondents by Market

MARKET	NUMBER OF RESPONDENTS
Sagabary	2
Badinko	3
Kita	9
Kayes	9
Nioro	5
Nara	7
Kolokani	6
Koutiala	8
Bamako	32
TOTAL	81

CHAPTER IV

SITUATION, STRUCTURE, AND PERFORMANCE OF CEREALS MARKETING

4.1 Methodology of Analysis: The Subsector Approach

The methodology employed in this chapter is based on an application of the following paradigm: situation - structure - performance (SSP), applied to each administrative circle and market for the 1989-90 harvest year. The theoretical approach underlying subsector studies implies the idea of a chain of causality linking the basic conditions constituting the situation of supply and demand with those constituting the structure of the market, the conduct of economic actors, and the performance in economic terms of the market.

Within this approach, two schools of thought can be distinguished: the structuralist vs. the conduct perspective. In the former, more importance is attributed to the structure of the market as determining the market performance, while the latter perceives conduct as being pivotal to the economic performance of markets.

The approach taken in this study conforms more closely to the structuralist perspective, with additional emphasis on the aspect of "situation," without knowledge of which an attempt to evaluate the performance of markets will fall short. However, aspects of conduct will also be noted where it seems appropriate.

(1) Situation

The situation of the marketing system can be understood as the set of basic factors characterizing a given market. Among these basic elements, one aspect is that of the local supply, the level of local production of the exchanged good.

A second aspect is that of the local demand. Implicitly, knowledge of local demand is required in order to determine the level of marketable surplus/deficit relative to the local needs, tastes and preferences, for the exchanged good.

Another factor is the degree of diversification into alternative sources of income, that is, the importance to farmers of the market relative to other possibilities.

A fourth dimension is that of the proportion of non-private actors, i.e., government parastatals, cooperatives or non-government organizations, relative to the private sector in the market.

Another physical element basic to the marketing system is that of the access to markets, related to the physical distances between points of transfer.

In addition, the situation or basic conditions of the market are significantly affected by the nature of the product that is exchanged. In the case of cereals, one aspect is the storability of grains for up to two years, depending on the infrastructure and ability of operators to use effective phytosanitary treatment. Secondly, cereals are bulky and therefore are likely to incur high handling and transport costs, with the opportunity for economies of scale.

The degree of fixed assets required to operate cereals trade is also another aspect of the market situation.

Finally, the flows of information between market agents and, generally, prevailing in the economy, also has an important influence on the market situation.

(2) Structure

According to the chain of causality embodied in the SSP paradigm, the factors comprising the market structure are linked, although not necessarily entirely due, to the elements of the market situation. In contrast to the quantitative elements of market

situation, structure is based on more qualitative factors, such as the characterization of economic agents in the market. Thus, one element of market structure is a typology of traders, in terms of their level of operations.

A second factor is the period or length of marketing activity, which may vary depending on basic elements such as supply and demand as well as market access.

The exchange system employed by the traders, i.e., cash, barter, credit or a combination of these, also constitutes an element of the structure of markets.

Linked to the above-mentioned typology of actors as well as to the period of activity is the degree of specialization of traders and the degree of trader concentration existing in each market. Specialization in cereals trade is influenced by a number of factors. In particular, the nature of existing contractual arrangements is affected by the degree of market thinness as well as the type of institutions existing in the market. Contractual arrangements between traders can take the form of agent-wholesaler relations within a single operation or supplier-buyer relations between two separate entities. These factors take the aspect of market conduct, and will be discussed as such.

(3) Performance

Within the SSP paradigm, market links are evaluated both quantitatively and qualitatively. However, the evaluation of market performance becomes problematic in light of what constitutes "good" versus "bad" performance. One approach to solving this normative issue has been to identify standards of "efficiency" in relation to which performance may be judged. Frequently, norms are drawn from the model of perfect competition. However, this approach has been weakened by the restrictive conditions required to meet those norms, which are hardly fulfilled in reality. In fact, these conditions are themselves based on normative judgements of the ideal conditions for

markets. Generally, the conditions for perfect competition are that (1) information flows freely and "perfectly"; (2) there are no barriers to entry or exit to the market; (3) products are homogenous; (4) there are many buyers and sellers in the market; and, (5) there are no price setters (Debertin,1986).

In this section, this theoretical debate is temporarily bypassed by a simple characterization of markets without attributing norms of performance.

A first element in the qualification of performance is the estimation of volumes marketed. Another factor is the capacity and means by which traders transport and store the traded good.

A very important factor in the qualification of market performance is the stability, as well as the level, of market prices, which are clearly linked to both elements of situation as well as structure.

Similarly, linked to the level of prices as well the basic conditions underlying the market and the structure of the market, the level of marketing costs is an integral element of the functioning of markets.

The last two elements of market performance will be treated in depth in the analysis of margins and costs in the following chapter.

Figure 4.1 presents schematically the paradigm which has been briefly described above.

The characterization of markets by the above paradigm will be carried out comparatively for three specific axes, which are located in different zones, with aspects of transport infrastructure, local supply and demand, and external market access, unique to each of the three.

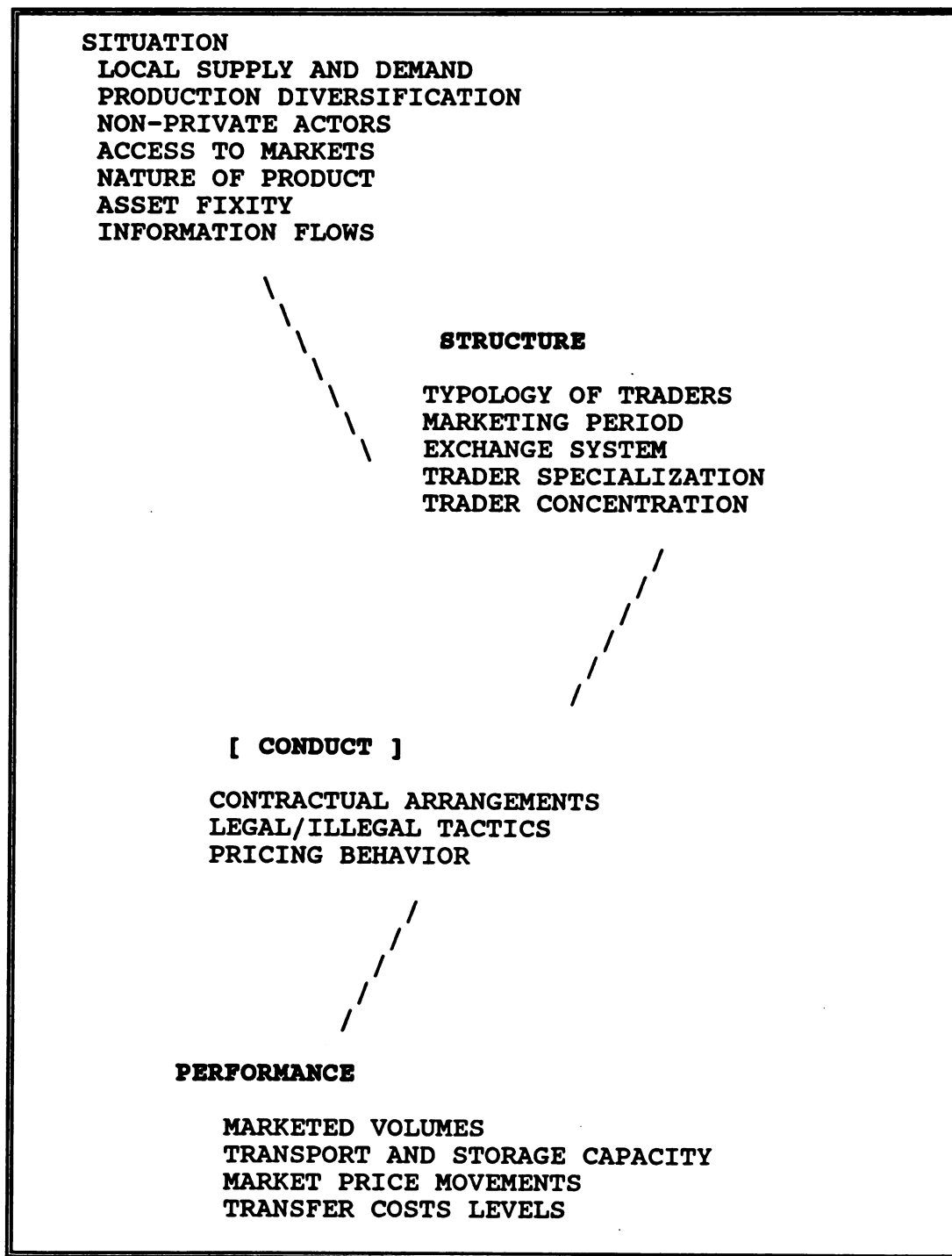


Figure 4.1 Situation - Structure - Performance

The first of these axes is Badinko-Kita-Kayes, with access to transport by train, a slight cereals surplus, and proximity to both Senegalese and Guinean borders.

The second axis, Bamako-Kolokani-Nara, is connected by a gravel road, with difficult passage in the rainy season. This axis is located in a deficit zone, particularly in Nara, and with access to an important external market, that of Mauritania.

The third axis, Zangasso-Koutiala-Bamako, contrasts with the other two in terms of its superior road infrastructure and a very important cereals surplus. The external market to which it has access is that of Côte d'Ivoire.

Thus, the following descriptive analysis begins by a characterization of the administrative circles in which these axes are located, followed by a comparative analysis of their market structures and performance.

4.2 Situation By Administrative Circle

4.2.1 Kita Circle

The circle of Kita is one of the two surplus pockets in terms of cereals production amongst the circles covered in the study. Total cereals production in 1989-90 was estimated at 54,098 tons by the local authorities in the rural development organization (ODIPAC), representing 2.5% of the gross production of Mali (Office de Stabilisation et Régulation des Prix, May 1990).

The cereals surplus represented 8.7% of the circle's production in 1989-90. The level of non-private sector marketing, by 68 village associations, was relatively weak in 1989-90, according to local officials. Only 303 tons, or 19% of the 1567 tons originally planned, were bought by the associations. Including stocks recycled from the last year, the total marketed volume by these structures was 649 tons, representing 14% of the cereals surplus in 1989-90. This weak performance is attributed to the administrative

delays in the disbursement of PRMC credit by the Banque Nationale du Developpement Agricole (BNDA), whose funds arrived to the associations in March 1990, when prices were considerably higher than the November-December period when they were to have arrived.

Recorded statistics by local officials of the volumes transported since the harvest out of Kita by train as well as by road reveal that 77% of the recorded trade is by train, with a total amount as of early June 1990 of 1,273 tons. This amount, in addition to the volume marketed by the village associations, represents 1,922 tons or only 41% of the cereals surplus for the circle.

In fact, in light of this somewhat weak rate of commercialization, local officials noted considerable non-marketed stocks at the producer level. This has led to difficulty in certain production areas, such as Sagabary, of farmers to meet tax payments. Weak trader activity is linked to what was perceived as a second consecutively good harvest, resulting in traders holding unliquidated cereals stocks from the previous year.

In addition to cereals production, the circle of Kita is a highly productive zone for groundnuts, with an estimated production of 29,800 tons, or 55% of cereals tonnage. Valued in market prices (1987 average producer prices, World Bank 1989), groundnuts represented 69% of cereals production. Since groundnut production is almost entirely destined for cash revenues, the farmers in this circle have access to a relatively diversified income base.

In spite of the inadequacy and the extremely poor condition of roads in this circle, the wholesaler market of Kita is linked to several rural markets within close proximity, such as Sagabary (80 kms), Segouna (105 kms), Lambidou (155 kms),

Kokofata (65 kms), Bafin Makana (125 kms), Namala (40 kms), Bangassikoro (56 kms) and Djidian (22 kms), as well as, by rail, Badinko (30 kms) and Sebekoro (65 kms).

The markets to which sales from Kita are destined, such as Bamako and Kayes, are accessible by rail, or in the case of Nioro, by poor road at a distance of 250 kms. Finally, the Guinean markets of Siguiry and Balato are located 180 kms and 155 kms, respectively, from the border market of Sagabary.

4.2.2 Kayes Circle

The circle of Kayes had a slight surplus in cereals production in 1989-90, with a total volume of production estimated at 32,500 tons, of which a marketable surplus of 1,000 tons, or 3%, existed in that year.

However, the volume marketed by the village associations was relatively high in comparison to the surplus, 324 tons, or 32% of the cereals surplus.

As in the case of Kita, the circle of Kayes has a diversified production base, with 11,755 tons of groundnut production in 1989-90, representing 23% of cereals production in value terms. The low proportion of groundnuts in value terms was due to the high prices of cereals in Kayes.

The Kayes market is supplied mainly by train, principally from the Kita market for traditional cereals (millet and sorghum), and from Bamako and the Office du Niger for domestic rice. The markets of destination for grain transported out of the Kayes market are Yelimane (151 kms), Nioro (255 kms) and Kenieba (250 kms).

TABLE 4.1. Cereals Production in 1989-90 by Circle (tons)

CIRCLE	MILLET/SORGHUM	MAIZE	RICE	TOTAL
Kita	38,300	14,900	898	54,098
Kayes	21,154	10,168	1,180	32,502
Nara	13,846	0	0	13,846
Kolokani	21,046	814	0	21,860
Koutiala	90,870	24,620	0	115,490
TOTAL	199,143	50,765	2,195	252,103

Sources: ODIPAC,Kita; Direction Regional d'Agriculture, Kayes; Secteur d'Agriculture, Nara; ODIPAC, Kolokani; CMDT, Koutiala

TABLE 4.2. Cereals Surplus in 1989-90 by Circle (tons)

CIRCLE	PRODUCTION	SURPLUS¹	DEGREE OF SURPLUS
		(% Surplus/Prod'n)	
Kita	54,098	4,710	9%
Kayes	32,502	1,000	3%
Nara	13,846	-4,163	-30%
Kolokani	21,860	551	3%
Koutiala	115,490	61,376	53%

Sources: ODIPAC,Kita; Direction Regional d'Agriculture, Kayes; Secteur d'Agriculture, Nara; ODIPAC, Kolokani; CMDT, Koutiala

4.2.3 Nara Circle

Cereals production in the circle of Nara was severely reduced in 1989-90 by a locust attack in the harvest season, especially of the millet harvest, resulting in a significant cereals deficit of 4,163 tons, with a total volume of production of 13,846 tons.

¹ Surplus data were obtained from local authorities who based these figures on estimates of consumption for the local population which varied between 167 to 222 kg by person by year.

Millet production in this area is principally destined for Mauritanian markets, while local demand is partially met by sorghum.

Given the poor harvest, no PRMC/BNDA funds were disbursed for the village associations to buy cereals. These funds are one component of the donor-assisted market restructuring program, by which credit is made available toward purchase of cereals at the village level, in order to provide farmers liquidity right after the harvest and to support producer prices.

Groundnut production in the circle was relatively weak, with 310 tons, or 2% of cereals production in 1989-90, hardly compensating for losses in cereal incomes caused by locust damage.

Due to the production deficit in the circle, the Nara market was supplied in 1989-90 from outside markets such as Bamako (374 kms), Kolokani (240 kms), and Banamba (204 kms) for coarse grains, and Niono (218 kms) as well as by Mauritanian traders for rice.

The Nara market represents a focal point in the exchange of cereals from interior markets, namely Bamako and Kolokani, to Mauritanian markets. In normal harvest years, this trade is secondary to trade in millet from the circle of Nara itself, while in 1989-90, traders in Bamako profited from the expanded trade opportunity afforded by the locust attack in Nara.

The Mauritanian market closest to Nara is that of Adel-bagoro (55 kms), where much of Malian cereals transit before being expedited to the interior of Mauritania. Thus, the market of Nara is a focal point of departure for important volumes of millet exports to the interior of Mauritania. This is demonstrated by the use of large 30-ton

trucks to transport cereals from Nara into Mauritania, observed typically on the market day.

Road conditions make access to Mauritanian markets with large vehicles difficult, if not impossible, in the rainy season, limiting the potential of this transit market.

4.2.5 Kolokani Circle

Cereals production in the circle of Kolokani was also subjected to a locust attack in 1989-90, resulting in only a weak cereals surplus in a normally highly surplus zone. Total cereals production was 21,860 tons in 1989-90, with a surplus relative to demand of 551 tons, or 3% of production.

As in the case of Kita, the participation of the village associations in cereals marketing was greatly reduced by administrative delays in the disbursement of credit funds by the BNDA. When funds became available in April 1990, only 7 out of the 29 proposed associations chose to take the credit. Fears that the rise in cereals prices would prohibit sales and, thus, cause problems of repayment, in addition to certain associations' inability to meet bank conditions, led to this poor performance. Only 56 tons, representing 10% of the surplus, was bought by the associations.

Groundnut production represented 35% of cereals production in value terms, with 4,345 tons produced. This ratio is thus likely to be lower in good cereals harvest years.

Several rural markets in close proximity supply the Kolokani market, namely Guiyoyo (25 kms), Toumanibougou (35 kms), Tioribougou (25 kms), Gueledo, and Sabougou. The markets of destination are principally Bamako (130 kms) and Nara (240 kms), with more difficult access in the rainy season.

TABLE 4.3. Non-Cereal Crop Production in 1989-90 (tons)

CIRCLE	GROUNDNUTS	COTTON	DEGREE OF DIVERSIFICATION ²
Kita	29,800	0	69%
Kayes	11,750	0	23%
Nara	310	0	2%
Kolokani	4,345	0	35%
Koutiala	46,750	0	84%

Sources: ODIPAC, Kita; Direction Regional d'Agriculture, Kayes; Secteur d'Agriculture, Nara; ODIPAC, Kolokani; CMDT, Koutiala

4.2.6 Koutiala Circle

The circle of Koutiala, located in the high rainfall zone of Mali, is a very important cereals production area, with 115,490 tons estimated output in 1989-90, constituting 5.4% of the total cereals production of Mali.

The sizeable cereals surplus, estimated at 61,376 tons, represented 53% of production. This indicates cereals yields per inhabitant clearly superior to the other circles in this study. This high yield in cereals production has been linked to the highly viable cotton production in this area (Dioné, 1989).

In contrast to Kita, the other surplus circle, the village associations did not participate at all in buying cereals during 1989-90, given unsold stocks of 1791 tons from the preceding year.

As mentioned above, the circle of Koutiala is a very important cotton zone, with 46,750 tons of output in 1989-90. This output, in value terms, represented 84% of

² % (value of non-cereals/value of cereals), valued at average 1987 producer prices for groundnuts and cotton (from African Economic and Financial Data, World Bank, 1989) and 1989-90 average producer prices for cereals for each circle.

cereals production, constituting a very important source of diversified income to Koutiala farmers. Also, it is likely that, given the higher incomes of this zone, non-farm activities are more important in this area.

The rural markets which supply the Koutiala market and the markets of destination are linked by excellent all-weather roads, in sharp contrast to elsewhere in the study. The major rural markets linked to Koutiala are Zangasso (35 kms), Togolasso (40 kms), Bogola-Zangasso (60 kms), Kimparana (80 kms), M'Pessoba (63 kms) and Molobala (45 kms). The markets to which output is destined are Bamako (400 kms), Mopti (365 kms), and Sikasso (130 kms).

**TABLE 4.4. Cereals Purchases by Village Associations
in 1989-90 by Circle (tons)**

CIRCLE	PRODUCTION	PURCHASES BY VILLAGE ASSOCIATION		
		Level	% Production	% Surplus
Kita	54,098	649	1.2%	13.8%
Kayes	32,502	324	1.0%	32.4%
Nara	13,846	0	0.0%	00.0%
Kolokani	21,860	56	0.3%	10.2%
Koutiala	115,490	0	0.0%	00.0%

Sources: ODIPAC, Kita; Direction Regional d'Agriculture, Kayes; Secteur d'Agriculture, Nara; ODIPAC, Kolokani; CMDT, Koutiala

4.2.7 Comparative View of Three Axes

In terms of supply and demand conditions, the first axis, Badinko-Kita-Kayes (extending over two administrative circles, Kita and Kayes), with the weak cereals surplus, contrasts with the second axis, Kolokani-Nara, which has a weak surplus in Kolokani and a deficit in Nara, and even more sharply with the circle of Koutiala, in which both Zangasso and Koutiala markets are located.

The surplus/deficit situation appears to be linked to the degree of diversification into other crops, in that the same pattern is followed for the three axes. While the deficit axis has very little diversification, the circle of Koutiala is highly diversified into cotton production. This may reflect an important link with rainfall patterns, which also vary by regions and circuits.

However, the relationship between semi-private marketing and production differs from the above pattern in that no village associations were active in buying cereals this year in both the deficit axis (Kolokani-Nara) and the surplus axis (Zangasso-Koutiala).

4.3 Market Structure

In keeping with the comparative focus on the three axes of interest, the following analysis attempts to identify key structural characteristics for each market along the three axes, that can be evaluated comparatively.

Thus, the structure of the specific markets will be viewed separately, with an emphasis on the points of comparison between the Badinko-Kita-Kayes, Kolokani-Nara, and Zangasso-Koutiala-Bamako axes.

4.3.1 Badinko

Badinko is principally a producer market, located alongside the railway. The traders in place assemble cereals from farmers who come to Badinko on the weekly market day, as well as in nearby rural markets.

There are 3 traders engaged in this assembly activity, mainly for sorghum, who then sell the cereal at the side of the railway tracks to collectors from Kita, Kayes or Bamako who arrive on the train on the market day.

The period in which the assembly of cereals takes place is constrained by the condition of roads between Badinko and other rural markets. Marketing activity is essentially limited to between November and July.

The exchange system prevailing between Badinko traders and farmers as well between Badinko traders and outside traders is usually cash.

The degree of specialization of traders in cereals marketing is relatively weak, with only 1 of the 3 traders in Badinko indicating that cereals trade is the principal activity. This is explained by two factors: the priority given to agricultural activity, given that Badinko is a small rural market, and the constraints to marketing imposed by the road conditions.

Similarly, the degree of competition between traders can be qualified as relatively weak since local traders operate within established and longstanding working relations with the collectors from outside, based on trust and loyalty. These links effectively present a barrier to unknown newcomers from other areas.

4.3.2 Kita

With 3-4 wholesalers and 8 semi-wholesalers, as defined by the *Système d'Information du Marché (SIM)* in terms of operators' size, the market of Kita represents an important center for assembly and dispatching of cereals to the markets of Kayes and Bamako, as well as Nioro.

The transport of cereals from rural markets to Kita is also constrained by the quality of roads, limiting the period of marketing activity to from November to July.

The degree of specialization in cereals marketing is relatively high, with 78% of traders indicating cereals trade as their major activity. However, cereals marketing is

integrally linked to groundnut marketing, with the same set of traders engaged in both activities.

The degree of competition among traders, due to their larger number, is also potentially high. However, according to field interviews, traders have worked out among themselves a system to counteract competition by establishing informal "territories" of rural supply markets. These rural markets are usually within a 50-100 km radius of Kita. Given the poor condition of roads, it is not likely that farmers have the option of going to alternative markets to seek better prices.

4.3.3 Kayes

In the Kayes market, there are 4 wholesalers and 4 semi-wholesalers, with the large operators specialized almost exclusively in rice marketing.

Given the accessibility by train throughout the year, commercial activity is year-round in Kayes.

The system of exchange between Kayes and Kita traders for coarse grains trade is mainly cash payments, while the large rice traders benefit from purchases on credit.

Moreover, the larger capacity of traders in Kayes, the local market near-deficit and the access by train are perhaps linked to the relatively high degree of specialization (89%) in cereals marketing. Here, also, cereals trade and groundnut trade are linked and complementary.

4.3.4 Kolokani

The market of Kolokani, which is comprised of 7 wholesalers, is located in a normally high-production area, with important flows of cereals to Bamako as well as Nara.

TABLE 4.5. The Economic Actors by Market

MARKET WHOLESALERS	NUMBER OF MARKETING	PERIOD OF ACTIVITY	PRINCIPAL CER. (%)
Badinko	3	Nov-July	33%
Kita	12	Nov-July	78%
Kayes	8	all year	89%
Nara	7	Nov-Aug	17%
Kolokani	7	Nov-July	50%
Koutiala	12	all year	78%
Bamako	32	all year	75%

Source: field interviews

The most active period of marketing is between January and March, although trade occurs throughout the year.

While exchanges between Kolokani and the rural supply markets are in cash, barter is the dominant system of exchange with Mauritanian traders between Kolokani traders who transact in the Nara market. Recently, given the increasingly severe repression by the Malian government of smuggled goods, traders indicate a strong preference for cash payments.

Due to the shortfall in cereals production in 1989-90, commercial activity was relatively more concentrated in the groundnut trade. However, 50% of cereals wholesalers still indicated cereals marketing as their principal activity.

4.3.5 Nara

Nara, a border market as well as a wholesaler and transit market, seems to operate in a more structured manner, with larger volumes of trade than the other border markets viewed in the study. There are 7 traders in place, who, in good harvest years, supply themselves in the circle of Nara, and, in bad years as in 1989-90, purchase from

traders in Bamako. The Nara traders are linked to numerous Mauritanian wholesalers who are regularly present in the market of Nara to purchase and transport significant volumes of millet for the domestic Mauritanian market.

These ties are based on kinship or longstanding bonds of confidence, which represent barriers of entry to other entrants. Inasmuch as the trading activities are considered clandestine, they are undertaken at night with considerable risk of seizure by the local authorities. In fact, despite the relatively intense export activity, there is not a single trader in Nara with an official export license.

The period in which marketing takes place is unrestricted for exchanges between Nara and the markets of Bamako and Kolokani, but the rainy season renders access into Mauritania difficult between July and September.

In contrast to other border markets engaged mainly in barter, the dominant exchange system prevailing between Nara traders and Mauritanians is in cash, resulting in an active parallel market between the Mauritanian ouguiya and the CFA franc. This is confirmed by the different parallel market rates for the CFA franc on the two sides of the border. In July 1990, traders indicated during interviews that, while the CFA franc sold for 0.44 ouguiya in Nara, it sold for 0.33 ouguiya on the Mauritanian side, demonstrating the higher demand for the franc by Mauritanian traders buying Malian millet in Nara.

Alongside the large-scale operations that are observed in Nara, there are smaller-scale exchanges between traders from Kolokani and Mauritanians based near the border. These exchanges are more likely to be barter.

Alongside grain marketing, traders in Nara are engaged in trade of Mauritanian goods, obtained either through barter or bought from Mauritanian traders. This is confirmed because only 17% of traders indicated a specialization in cereals marketing.

Competition existing in this market is at the level of the items imported informally from Mauritania, which sell at a lower price than their Malian substitutes, as they are usually re-exported goods. This explains the official repression of exchanges with Mauritania, which counteract Malian protectionist policies for manufactured items such as cloth, as well as rice.

4.3.6 Koutiala

Koutiala is located in the most productive and commercial zone of Mali by far, from where major flows of cereals to the interior of the country originate. There are at least 12 traders in place who assemble cereals from rural markets such as Zangasso and M'Pessoba. A unique aspect of traders' activities, in comparison to others in this study, is that they undertake the transport of purchased cereals, not only between the rural markets and Koutiala, but also between Koutiala and the markets of destination, that is, to wholesalers in Bamako, Mopti, and Sikasso. Thus, the Koutiala traders are more involved in the marketing chain, as they capture the entire margin between the rural market to the urban wholesaler markets.

As far as their trade with Ivoirian traders is concerned, exchanges take place in Koutiala with incoming traders. This trend was reversed in 1988-89, with a large number of Malian traders from Koutiala transporting their cereals directly to Ivoirian urban markets.

Another unique aspect of the Koutiala market, relative to others in this study, is the excellent condition of the roads, enabling year-round marketing activity.



While the exchange system between farmers in rural markets and traders is in cash, traders in rural wholesale markets may be using a "credit fournisseur," or supply credit, obtained from a larger trade in Bamako or Kayes. In this case, the larger traders supply funds for purchases to smaller operators, from whom they obtain cereals for a given commission.

The degree of specialization of traders in Koutiala is relatively high (78%) due to good roads, high volumes of local production, and, importantly, access to PRMC credit.

Despite active marketing in Koutiala, competition among traders does not seem high due to possible informal price-fixing of rural market prices, which appear stable at 5 FCFA/kg below the Koutiala market price, as well as contractual type arrangements between Koutiala traders and their buyers in Mopti and Bamako. However, these arrangements may be based on a competitive equilibrium, and will be investigated in the following chapter.

4.3.7 Bamako

There is a very large difference in terms of number and capacity of traders in Bamako relative to elsewhere in this study. Thus, there are 32 cereals (including rice) wholesalers in Bamako, with the capacity to supply the urban consumer market and engage in official export activities.

Marketing is not limited to a particular period of the year, and depends principally on the following axes: Koutiala-Ségou-Bamako, Niono-Bamako, Bamako-Kolokani-Nara, or by train, Bamako-Kita-Kayes.

Exchanges with traders in satellite markets such as Koutiala or Ségou are predominantly in cash. Alternatively, Bamako traders place funds for purchase of grain with collectors in rural markets in these zones.

The degree of specialization is relatively high, 75%, linked in part to traders' access to PRMC credit.

On the surface, given the large number of traders and local markets within the city, there appears to be a higher level of competition between traders. However, this market is characterized by a low-grade oligopoly in which a few "giants", especially with regard to rice marketing operations and official exports of coarse grains to the neighboring countries, dominate the market. Evidence suggests that between 1986 and 1988, four wholesalers accounted for approximately 40% of the cereals marketed. (Mehta, 1989).

4.3.8 Comparative View of Three Axes

For all three axes, the above discussion reveals that there is a higher degree of specialization along the Badinko-Kita-Kayes and the Koutiala-Bamako axes compared to that of Kolokani-Nara, where traders are engaged in trade of other goods, imported clandestinely from Mauritania.

Given that transport infrastructure determines the period of marketing activity, the Badinko-Kita-Kayes and Koutiala-Bamako axes function throughout the year, while the period is shorter along the Kolokani-Nara axis.

4.4 Market Performance

4.4.1 Market Volumes

The actual volumes bought and sold by traders are actually very difficult to estimate in a one-shot type of survey for a number of reasons, such as the fact that there are hardly any written records kept by the traders and that the marketing period varies inter-annually.

In addition, there is a seasonality pattern in marketing over the year. A bi-modal trend in marketing activities exists, with two marketing peaks. One peak occurs in the period immediately following the harvest, when prices fall due to the flooding of grain into rural markets. This is due to the farmers' need for cash to meet tax and other payments. The second peak occurs in the roughly two-month period immediately prior to the period of heavy rain, when prices are rapidly rising as farmers' stocks become liquidated and the threat of impassable roads leads to increased stocking by traders as well as by consumers. The period in between these two, extending from February to April, is essentially that in which marketing activities are stable with gradually increasing prices.

The approach taken in the survey was to estimate the most typical or average volumes purchased by the trader in a month since the beginning of the harvest year. In the event where the traders indicated two typical "cases", for each of the bi-modal peaks, the average between the two was used.

Thus, Table 4.6 indicates a large variation in average volumes of coarse grains purchased per trader among the markets in the study, as well as among traders within each market. Clearly, Bamako is very important in terms of volumes, given the relatively very high level of transactions and the greater number of traders. However, the variation among traders is also very high, with a coefficient of variation of 1.42. This is explained by two linked factors: (1) access to the PRMC credit line of only 2 operators in 1989-90 compared to 19 the preceding year, and (2) the greater financial capacity of certain very large traders, due to the increase in liquidity provided by returns from other commercial activities.

In Bamako, of the 31 traders surveyed, only 7 indicated monthly purchases above the average of 256 tons. Among these 7 respondents, only 3 purchased above 1,000 tons/month. On the other end of the spectrum, among the 24 surveyed traders with below the 256 ton average, 16 respondents had average monthly purchases below 100 tons. This demonstrates a very skewed distribution among the surveyed traders, confirming the existence of a few "giants" in the market, as discussed in the preceding section.

TABLE 4.6. Selected Indicators of Performance by Market

MARKET	NO. OF TRADERS	AVER. MONTHLY PURCHASES BY TRADER (tons (CV)) ⁴	MAXIMUM STOCKED IN 1989-90³ (tons (CV))	OWN VEHICLE (%)
Badinko	3	17 (0.35)	3 (1.73)	0%
Kita	9	39 (1.02)	28 (1.27)	33%
Kayes	9	81 (1.12)	241 (1.82)	0%
Nara	7	80 (1.50)	27 (0.81)	0%
Kolokani	6	12 (0.88)	58 (1.21)	17%
Koutiala	9	70 (0.57)	22 (0.58)	11%
Bamako	31	256 (1.42)	402 (1.58)	13%
TOTAL	75	132 (1.89)	203 (2.26)	16%

Source: Author's surveys

In Nara and Kayes markets, traders also indicated significant volumes of monthly purchases. In the Nara market, these volumes represented considerable exports to

³ This indicates the maximum held in stock at one time.

⁴ CV is coefficient of variation, equal to standard deviation divided by the mean.

Mauritania. Local officials in Nara informally estimate that 60% of cereals entering the market are expedited to Mauritania.

In Kayes, the mean amount indicated is biased upward by the important volumes of rice purchased by the larger operators. It is very difficult to estimate for this market the proportion that exits towards either Sénégal or Mauritania, by rail or on the Sénégal river.

There appears to be relatively less variation in the quantities purchased by traders in Badinko, Kolokani, and Koutiala. In particular, it is striking, given the surplus supply in the Koutiala zone, that the volumes marketed are not more significant. Koutiala traders invest more in marketing because they are engaged in moving cereals from rural markets up to end destinations, such as Bamako or Mopti (unlike in other markets where wholesalers only move cereals from rural markets up to the given wholesale market). Given the additional investment, they may be restricted to lower volumes, due to a limited financial capacity. At the same time, they gain from a larger share of the margin between the rural markets and Bamako, because they capture both rural-Koutiala and Koutiala-Bamako margins. Volumes purchased in Bamako correspond roughly, within a 30% band, to mean volumes in 1986/87 obtained by Mehta (1989).

Finally, it is clear that the variation over the entire sample is larger than within each market, given major differences among the markets in terms of financial capacity, physical infrastructure, and market structures.

Viewed by axis, it appears that the three axes follow similar patterns, with the supply markets in each, such as Badinko, Kita, and Kolokani, involved in lower volume transactions in comparison to the "end" markets in each axis, such as Kayes, Nara,

Koutiala, and Bamako. This is logical in that the "end" markets each have more than one supply point.

4.4.2 Storage Capacity

Instead of viewing the potential storage capacity per trader, that is the physical capacity of their warehouses, the survey noted their actual financial capacity to stock cereals as indicated by the maximum stocks held in 1989-90. In certain cases, this presented a problem because traders did not distinguish maximum stocks from those held usually.

As in the case of purchasing capacities, Bamako traders clearly demonstrate higher capacities for storage than elsewhere in the study. However, Kayes traders also have high storage capacity, despite a large variation among the traders. This is explained by the division of traders into two groups: larger rice specialists and smaller coarse grains traders. This also explains the relatively high average stocks, of which a large proportion are stocks of imported rice held from the previous year. Thus, while two traders held maximum stocks of 500 and 1,250 tons, the remaining traders in Kayes did not stock beyond 100 tons.

The markets of Kita, Nara, and Koutiala have similar performance in storage capacities, with also relative homogeneity among traders. The high storage performance of Kolokani traders is in contrast to the small purchase quantities noted earlier. This behavior was confirmed by observations by local officials that lack of credit to the village associations had led to traders accumulating stocks gradually in the hopes of eventual price rises.

Koutiala, on the other hand, has a surprisingly low performance in storage capacity, in view of the traders' access to PRMC credit and the relatively large quantities

purchased. However, as noted earlier, Koutiala is a dispatching center for weekly movements of cereals to the urban consumption markets. Another reason for the low average storage by Koutiala traders is that they have a greater investment in transport per unit, given that they expedite the cereals from producer markets to urban wholesalers. Unlike other wholesalers such as in Kita or Nara, who obtain cereals in rural markets and store them until a wholesaler comes to purchase their stock, Koutiala traders themselves transport the cereals to the next level in the marketing chain. Therefore, they do not hold stocks for longer than the time it takes to accumulate enough cereal to send by truck, usually a week.

These results correspond to findings by Mehta (1989) that Koutiala traders store for only approximately one week, on the average, and in small quantities.

Viewed by axis, it appears that storage in the "end" markets varies, with larger volumes stored in Kayes and Bamako than in Nara or Koutiala. Moreover, the Kolokani-Nara axis is the only one in which storage is higher for the supply market than for the "end" market, probably because cereal stocks in Nara are quickly expedited across the border to warehouses in Adel-Bagoro (Mauritania), in order to avoid notice by local authorities.

4.4.3 Means of Transport

In general, the use of self-owned vehicles for cereals transport is low for the sample, with only 16% of traders having access to this type of transport. Among the markets, only Kita has above 20% of traders using their own vehicles. This may be linked to poor road conditions, which make vehicle rental more unreliable, as well as less available.

The markets of Kayes and Nara did not have any traders who used their own means of transport. In the case of Kayes, this is due to the existence of the railway and otherwise, relatively impassable roads. In the case of Nara, this is less clear, except by the established routine of Mauritanian trader influx into the Nara market.

Kolokani, Koutiala, and Bamako have similar levels of traders using their own means of transport. In the case of Bamako and Koutiala, the importance of trading activity and traders' access to PRMC credit have not resulted in investment in transport capacity, also confirmed by Mehta (1989).

In fact, in the case of Bamako, traders who owned vehicles indicated a preference not to use them for cereals transport, but rather for other commercial operations. Another point of note is the very high cost of spare parts, on one hand, and the numerous road blocks and "under the table" payments incurred by owners of vehicles. While these costs may be reflected in rental rates, traders with limited financial liquidity are not in a position to acquire their own transport. In both the cases of Koutiala and Bamako, favorable road conditions make access to the various markets easy and relatively cheap.

Comparing axes, it seems that supply markets employ more owned vehicles than do the end markets, for both Kita-Kayes and Kolokani-Nara axes. The opposite is true for the Koutiala-Bamako axis. In the first two instances, this is due to the need for access from the supply market to surrounding rural markets, usually linked by difficult roads. In the case of the Koutiala-Bamako axis, Mehta(1989) also found that Bamako wholesalers own more vehicles than Koutiala traders. One reason might be that Koutiala is connected to its rural markets, such as Zangasso, by all-weather roads, for which rented transport is cheap and readily available.

4.4.4 Price Trends

The variation of prices is an often used indicator of the performance of cereals markets as well as of the basic supply and demand situation. The analysis of producer and wholesaler prices, marketing margins, and the estimation of market integration along certain axes are the subjects of the next two chapters. In this section, a brief presentation of the evolution of prices in the survey period for the axes under study is linked to the understanding developed thus far of the situation and structure of these markets.

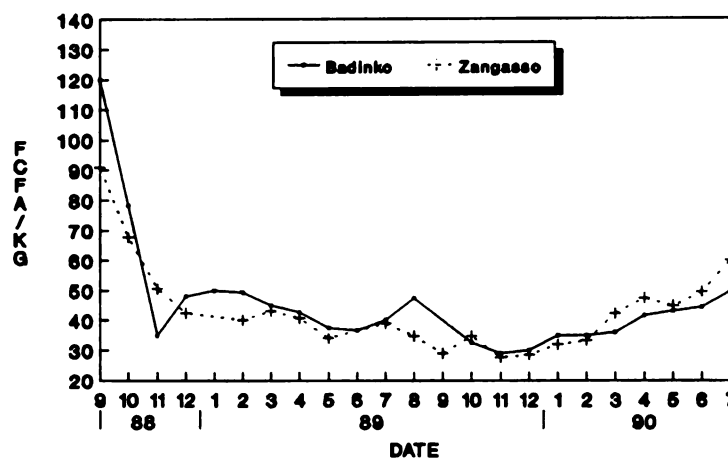
4.4.4.1 Producer Prices

Millet and sorghum producer prices in the rural markets of Badinko and Zangasso in three harvest years, between September 1988 and July 1990, are characterized by large intra-annual variation (Figure 4.2). While prices were high in September-October 1988, due to a poor harvest in 1987-88, the following year's prices show a declining trend, even in the rainy season, when they normally would have risen. This decline in prices explains the inability of traders and village associations to liquidate stocks. In contrast, the third year, 1989-90, was characterized by an upward trend in prices as the rainy season approached, although not as dramatic as that of 1987-88. The unexpected aspect of this upward trend is its contradiction with the very good harvest and estimated surpluses of cereals in this year.

4.4.4.2 Wholesale Prices

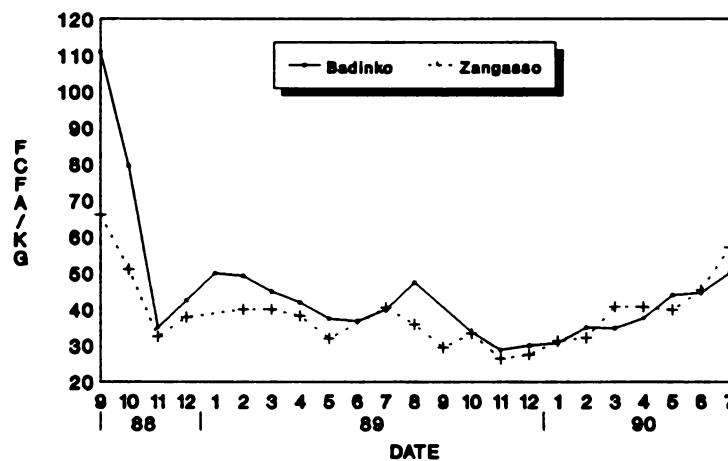
The wholesale prices for millet and sorghum, for Badinko, Kita, Kayes, Kolokani, Koutiala, Nara, and Bamako are indicated in Figures 4.3-4.4, for the period between April 1989 and July 1990.

PRODUCER PRICES -- MILLET Sept 1988 - July 1990



Source: SIM

PRODUCER PRICES -- SORGHUM Sept 1988 - July 1990

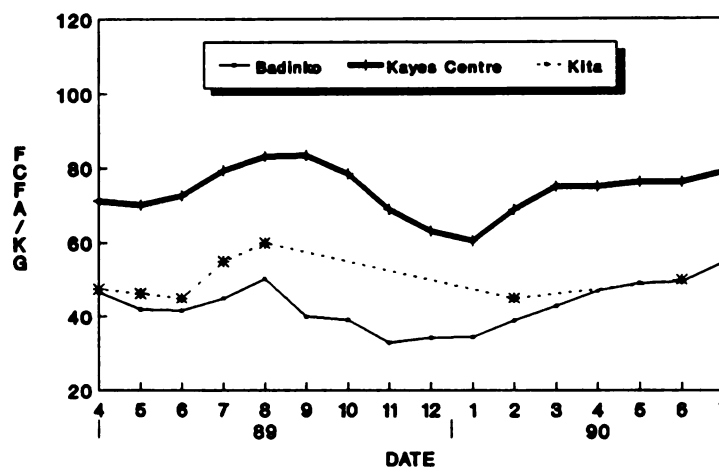


Source: SIM

Figure 4.2 Producer Prices for Millet and Sorghum: Badinko and Zangasso

WHOLESALE PRICES -- MILLET

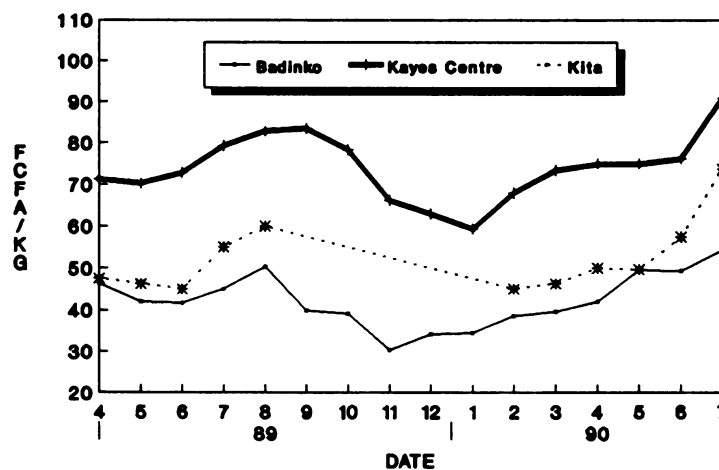
April 1989 - July 1990



Source : SIM

WHOLESALE PRICES -- SORGHUM

April 1989 - July 1990

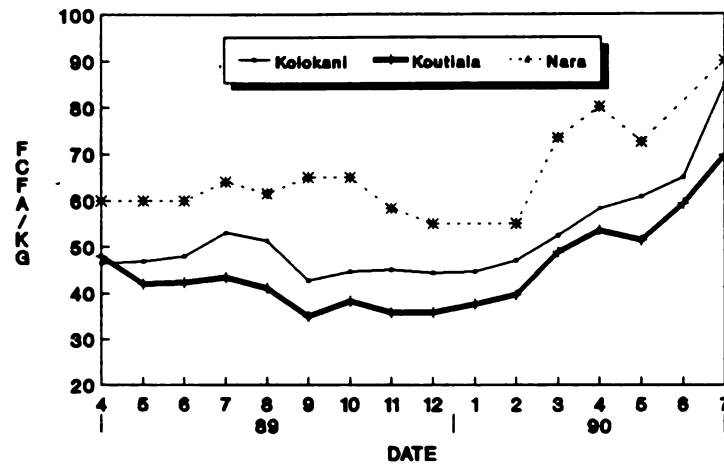


Source : SIM

Figure 4.3 Wholesale Prices for Millet and Sorghum: Badinko, Kayes, Kita

WHOLESALE PRICES -- MILLET

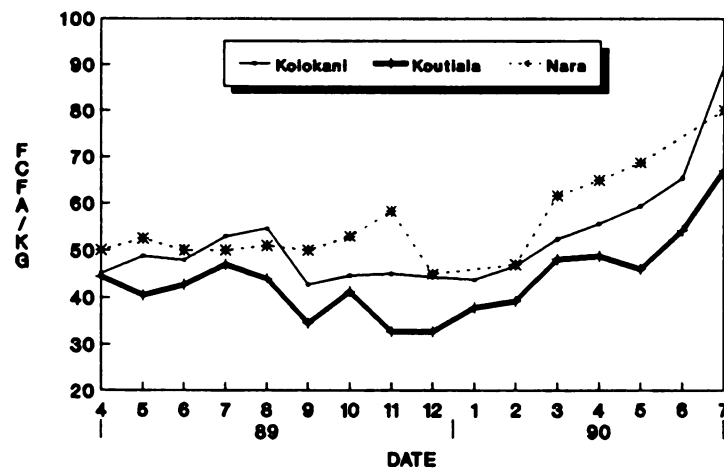
April 1989 - July 1990



Source: SIM

WHOLESALE PRICES -- SORGHUM

April 1989 - July 1990



Source: SIM

Figure 4.4 Wholesale Prices for Millet and Sorghum: Kolokani, Koutiala, Nara

In the case of millet, the figures reveal clearly higher wholesale prices for Nara and Kayes. This is directly linked to cereals deficits in these areas, higher transport costs, and for Nara, particularly, the effect of external demand in the market.

In the case of sorghum, it is important to note that price trends are closely similar to those of millet for Badinko, Kita, and Kayes. Sorghum prices in Koutiala and Nara, on the other hand, are clearly inferior to millet prices. This observation seems to confirm that millet is the export crop, both to Ivoirian or Mauritanian markets.

In comparing the relative stability of prices between markets, it appears that the coefficients of variations over the period fall between 9% and 21% for markets. Of these, Kayes and Kita appear to be the most stable markets, while prices in Koutiala and Kolokani have the highest coefficients of variations.

Finally, it can be noted that the tendencies for wholesale prices correspond to the trends observed for the producer prices, along the axes: Zangasso-Koutiala, and Badinko-Kita-Kayes.

4.4.5 Transfer costs

This section is a general presentation of the transfer costs obtained through the survey, which will be treated in greater depth in the following chapter.

One way to distinguish or classify transfer costs is to identify those which are variable, that is varying by volume of transactions, versus those which are considered fixed, that is unchangeable in the short to medium term (i.e., by month or year). Obviously, in the long term, all fixed costs eventually become variable.

There are also certain cases when these definitions are misleading, such as when costs usually classified as fixed are in reality variable. An example of this, observed

occasionally in the survey, is the case where the rental of warehouse space was by sack instead of by month.

4.4.5.1 Variable Costs

The major types of variable costs are those incurred through transport, in terms of quantity and distances; treatment of damaged sacks or cereals over the course of transport or storage; the costs of handling; and losses of grain incurred from transport or storage, as well as the opportunity cost of capital tied up in cereals purchases.

Transport

Table 4.7 indicates the transport rental rates along the circuits identified for analysis, with both actual and kilometric costs per kilogram. There are economies of distance in transport costs. In addition, these rental rates are also very much influenced by the type of transport that is used.

TABLE 4.7. Vehicle Rental Rates by Circuit (FCFA/kg)

CIRCUIT (KMS)	RENTAL COST	DISTANCE	COST/KG/KM
Badinko-Kita	5.0	30	.167
Kita-Kayes	8.0	300	.027
Kolokani-Nara	10.0	240	.042
Zangasso-Koutiala	2.5	35	.071
Koutiala-Bamako	7.5	400	.012
Kolokani-Bamako	5.0	130	.038
Badinko-Bamako	5.0	170	.029
Bamako-Nara	10.0	374	.027

Source: Author's surveys

Thus, the Badinko-Kita circuit has by far the highest transport costs, while the Koutiala-Bamako circuit has very low transport costs, due to excellent all-season roads,

economies of distance, and a greater availability of transporters. Several circuits have similar kilometric costs, despite differences in the type of transport infrastructure available. For example, the train transport circuits: Kita-Kayes, and Badinko-Bamako, are very closely similar to the gravel road transport on the Bamako-Nara, Kolokani-Bamako, and Kolokani-Nara circuits.

Treatment of Sacks

The costs of treating damaged sacks include the cost of the sack as well as the cost of labor. The need for this treatment depends largely on the condition of the original sacks, road conditions, other items transported in the same vehicle, the condition of the cereal itself, and the length of storage.

The cost of treatment depends on the quality of sacks, the number of times the sacks are recycled, and the need to use hired labor. In major dispatching centers such as Kita and Kolokani, these costs are relatively high because traders are obliged to change many sacks due to difficult roads coming from the rural markets (Table 4.8). Although Koutiala is also a dispatching center, re-sacking is less of an issue because of good roads linking it to rural markets and low labor costs, due perhaps to higher labor supply in a more active trading environment.

Handling

The costs of handling, mainly involving labor to load and unload sacks to and from vehicles and warehouses, do not vary widely between markets, nor within markets. The only exception is the need for additional handling when using rail transport, raising handling costs for traders in Kita and Kayes (Table 4.8).

TABLE 4.8. Variable Transfer Costs by Trader⁵ (FCFA/kg (CV))

MARKET	SACK TREATMENT	HANDLING (%)⁶	LOSSES
Badinko	---	1.2 (0.28)	2.5% (0.00)
Kita	9.8 (2.14)	2.4 (0.24)	1.7% (0.52)
Kayes	0.5 (1.42)	2.4 (0.24)	0.0% (0.05)
Nara	0.5 (0.26)	0.4 (0.64)	1.5% (0.47)
Kolokani	3.0 (1.28)	0.9 (0.14)	6.0% (0.00)
Koutiala	0.4 (0.94)	1.2 (0.19)	1.1% (0.71)
Bamako	0.6 (1.13)	0.8 (0.39)	1.6% (0.72)
SAMPLE MEAN	1.9 (4.10)	1.2 (1.05)	1.6% (0.80)

Source: Author's survey

Losses

Storage and transport losses are very difficult to estimate because the majority of traders do not record these quantities, judging that they can recuperate what they lose by other means. In the case of transport losses, they recuperate losses in the following ways: often sacks in rural markets are not weighed on scales and in reality weigh 5 to 30 kgs higher than the 100 kgs for which they were bought. Secondly, in wholesale markets, sacks are standardized at 101 kgs instead of 100 kgs, given the provision of losing 1% in the course of transport.

In the case of storage losses, traders attempt to recover losses by selling torn sacks in retail amounts, at more favorable prices per kilogram.

⁵ excluding transport which has been indicated per circuit in Table 5.2.

⁶ This indicates the quantities (as opposed to value) lost on volumes either stored or transported.

In terms of quantities lost, the sample average was 1.6%, which compares with other estimates of 2% in previous studies (Mehta, 1989; Dembelé, 1990).

As expected, these losses vary widely within the sample, from very low losses on rail transport for Kayes to very high losses on unfavorable roads for Kolokani and Badinko.

4.4.5.2 Fixed Costs

Fixed costs are those for which the operator has relatively less flexibility or control in the short term, such as the rent of the warehouse, the monthly wages of personnel, interest payments on loans, and annual taxes.

The major fixed costs are warehouse rental, taxation and regulation. Surveyed traders complain of excessive tax rates, as well as licensing and fees, depending on their category of trade.

Large differences exist between surveyed traders in terms of the costs of regulation, reflecting the important differences among traders in size of operations. It is difficult to estimate conclusively the level of "under the table" payments of which traders indicated having rough knowledge or were unwilling to communicate.

Warehouse and Personnel Costs

There is an important difference in the costs of traditional type (banco) warehouses and modern cement structures. Thus, differences observed between the markets reflect differences in infrastructural development.

The costs of personnel indicated in the following table are for wages of outside hired labor, usually non-family members. However, since a great deal of the labor used in marketing is in reality family labor, these costs do not reflect true labor inputs.

Among the entire sample of traders, only 3 indicated having made interest payments on formal credits in 1989-90. While other traders indicated having access to informal credit, these loans were remunerated in ways other than interest, generally through profit sharing. Generally, however, monetary loans are quite rare.

TABLE 4.9. Fixed Transfer Costs by Trader ('000 FCFA/year (CV))

MARKET RENTAL	WAREHOUSE SALARY	PERSONNEL	INTEREST	TAXES	TOTAL
Badinko	---	---	---	17 (0.59)	17 (0.59)
Kita	156 (0.34)	---	---	247 (0.77)	334 (0.63)
Kayes	496 (0.51)	255 (0.08)	75 (0.00)	251 (1.18)	633 (0.83)
Nara	100 (0.93)	76 (0.79)	---	244 (0.87)	273 (0.98)
Kolokani	72 (0.23)	186 (1.32)	---	98 (0.99)	184 (1.29)
Koutiala	163 (0.54)	180 (0.00)	400 (0.00)	135 (0.48)	347 (0.66)
Bamako	1,454 (0.89)	768 (1.23)	---	2,084 (1.42)	3,802 (1.05)
SAMPLE MEAN	849 (1.31)	566 (1.45)	237	1,073 (2.07)	1,851 (1.71)

Source: Author's survey

4.4.5.3 The Opportunity Cost of Capital

An important aspect of transfer costs that has not been included in the above cost calculations is that of the opportunity costs of both traders' capital and labor. The difficulty in estimating these costs lies in the choice of an appropriate interest rate or wage rate by which to value the investment in cereals marketing and value of the traders' own labor. This is particularly the case in Mali, where a very small proportion of the population has access to formal banking. However, it is possible to use rough estimations of prevailing interest rates. Unfortunately, in the case of labor markets, it is unlikely that a reliable estimation of a market wage rate for a trader can be obtained. Thus, the following discussion focusses on the opportunity cost of capital.

The opportunity cost of capital can be calculated as the rate of return to operator's capital through a cost budgeting exercise. A more explicit measure of the opportunity cost of capital is to multiply the purchase price by an estimate of the prevailing market interest rate. Table 4.10 indicates this second measure for the markets under study, using an average annual interest rate of 24%, based on rough estimates.⁷ This calculation indicates that the opportunity cost of capital represents roughly FCFA 10-12/kg per annum.

TABLE 4.10. The Opportunity Cost of Capital in 1989-90 (FCFA/KG)

MARKET	AVERAGE PURCHASE PRICE ^a	ANNUAL OPPORTUNITY COST ^b	LENGTH OF STORAGE ^c	PRO-RATED OPPORTUNITY COST
Badinko	45	10.8	0	---
Kita	40	9.6	22	0.58
Kayes	51	12.2	20	0.68
Nara	51	12.2	15	0.49
Kolokani	48	11.5	28	0.88
Koutiala	41	9.8	8	0.22
Bamako	44	10.6	35	1.01
SAMPLE AVERAGE (C.V.)		10.8 (0.08)	24 (1.92)	0.17 (1.89)
^a Average purchase price is the producer price for Badinko, Kita (in Sagabary), Kolokani, and Koutiala (in Zangasso) or the wholesale price for Kayes (in Kita), Nara (in Bamako), or Bamako (in Koutiala). ^b Average market interest is assumed to be 24% per year. ^c Number of days, obtained from survey in 1990.				

Source: calculated from SIM data

⁷ Estimates based on previous work by CESA/MSU team in Mali. See Dembele, Dioné, and Staatz, 1986.

Since most wholesalers do not hold stocks for an entire year, the figures are also pro-rated for the average length of storage in each market, with a sample average of 0.71 FCFA/kg. The length of storage varied between no storage in Badinko to 35 days in Bamako, with an average of 24 days for the sample of traders.

4.5 Comparison of Market Performance by Axis

In terms of market volumes, there appears to be one market in each set of axes that is the "mover" of large volumes of cereals. In the first axis, this market is Kayes; for the second axis, it is Nara, and for the third axis, this market is Koutiala. Bamako plays a very important and distinct role in this aspect because it is, in a sense, a "central" market, relative to almost all of the markets in this study. This is understandable in view of the extremely large volumes that pass into and through Bamako.

Storage performance does not necessarily follow the above trends, given the important exceptions of Nara and Koutiala with weak storage behavior, and Kolokani with relatively important storage volumes.

Price trends vary between the three sets of axes in one important aspect. In comparing millet and sorghum, prices trends for both products in the Badinko-Kita-Kayes and Zangasso-Koutiala-Bamako set of axes appear to be similar in contrast to the Bamako-Kolokani-Nara axis. This suggests that the Bamako-Nara axis is externally oriented, unlike the other two, with millet exports to Mauritania.

Finally, several points emerge from a comparison of transfer costs between circuits, broken down by transport and other costs. First, regarding transport costs, there appear to be important economies of distance along all three axes. However, in terms of per-volume costs, the markets located on the paved road benefit from the lowest costs, while the markets on the gravel road face the highest costs, as would be expected.

Secondly, as regards the costs of re-sacking, handling, and losses, it is not obvious that there are differences between the axes, with the exception of handling, which appears to be more costly along the railway, due to the double loading and unloading that takes place. However, for the set of transfer costs, it seems more plausible that the existence of economies of scale is an important factor in determining differences between markets. Thus, the larger markets, Kayes, Nara, Koutiala, and Bamako, have lower per kg costs than the markets of Badinko, Kita, and Kolokani.

This chapter has attempted to highlight and focus on some of the important structural and behavioral characteristics of these markets that have bearing on what is judged to be their performance. Essentially, it has been shown that, beyond their access to a particular type of transport infrastructure, market performance is very much linked to the supply and demand conditions initially prevailing and the size of the market itself.

CHAPTER V

SPATIAL MARKETING MARGINS AND TRANSFER COSTS

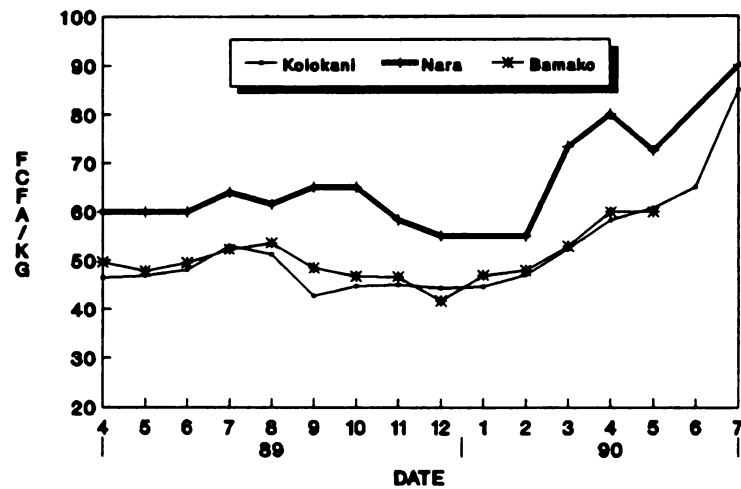
This chapter analyzes spatial margins in terms of price differentials for the circuits identified earlier, that is, Badinko-Kita-Kayes, Kolokani-Nara, Bamako-Nara, and Zangasso-Koutiala-Bamako. These spatial price differentials represent gross spatial margins. The analysis will focus on the levels and the variation in these spatial price differentials.

In the second part of this chapter, transfer costs obtained from survey data are calculated for the above axes. The analysis will address the levels of these costs along the various circuits, as well as the decomposition of the costs into fixed versus variable costs, and physical versus coordination costs. In addition, a decomposition of the transactions, separately for vehicle owners and non-owners, will reveal the importance of various types of costs in the overall structure of transfer costs.

Thirdly, this chapter will integrate the information on spatial price differentials with that on transfer costs by comparing the levels of both for the same circuits. This will give an indication of net spatial margins, represented by the gross margin minus the transfer costs. In theory, the net margin should approach zero under competitive equilibrium conditions. If the net margin is significantly higher than zero, there are opportunities for profit which, in absence of barriers of entry, will increase market participation (i.e., increase supply of product) until the price is bid down, reducing the gross margin. If the opposite is true, where net margins are significantly below zero, the economic actors operate at a loss, and will exit the market, resulting in higher prices and a higher gross margin.

PRICE TRENDS FOR MILLET

Kolokani - Nara - Bamako

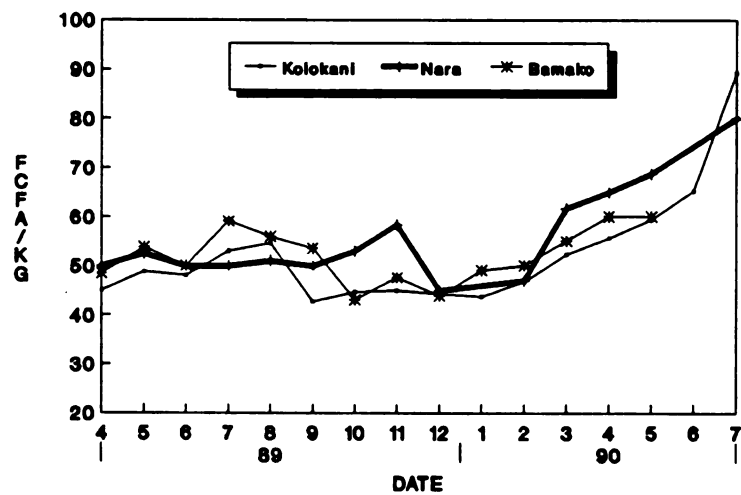


Source: SIM

Figure 5.1 Price Trends for Millet: Kolokani, Nara, and Bamako

PRICE TRENDS FOR SORGHUM

Kolokani - Nara - Bamako

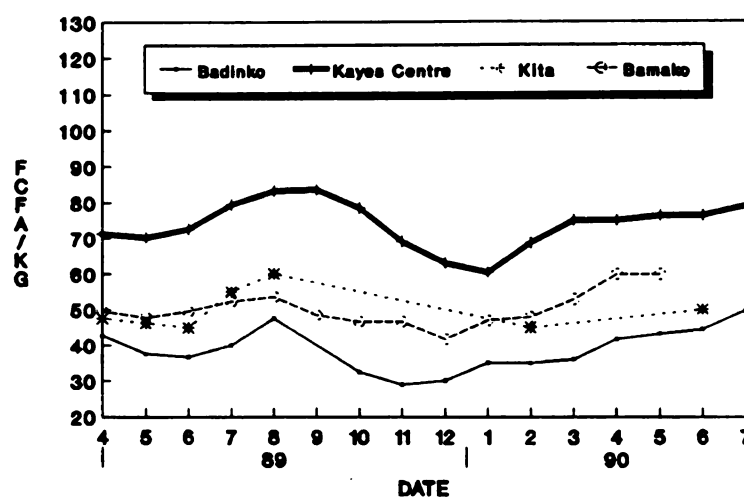


Source: SIM

Figure 5.2 Price Trends for Sorghum: Kolokani, Nara, and Bamako

PRICE TRENDS FOR MILLET

Badinko - Kita - Kayes - Bamako

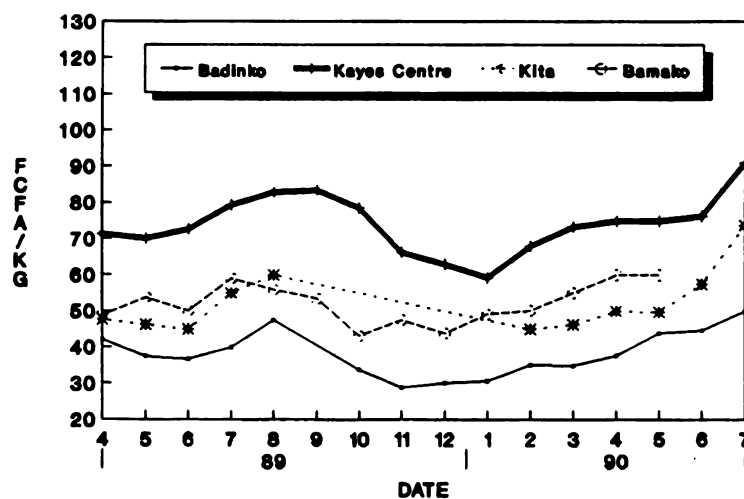


Source : SIM

Figure 5.3 Price Trends for Millet: Badinko, Kita, Kayes, Bamako

PRICE TRENDS FOR SORGHUM

Badinko - Kita - Kayes - Bamako



Source: SIM

Figure 5.4 Price Trends for Sorghum: Badinko, Kita, Kayes, Bamako

5.1 Spatial Margins by Circuit

Millet and sorghum market prices for each circuit over the survey period are presented in figures 5.1 - 5.6. These figures reveal varying levels of spatial price differences among the markets as well as varying degrees of stability of these differentials.

TABLE 5.1. Stability of Spatial Gross Margins

CIRCUIT	TRANSPORT TYPE	COEFFICIENT OF MILLET	VARIATION: SORGHUM
Badinko-Kita	TRAIN	0.39	0.44
Kita-Kayes	TRAIN	0.06	0.13
Kolokani-Nara	GRAVEL ROAD	0.39	*
Zangasso-Koutiala	PAVED ROAD	0.25	0.18
Koutiala-Bamako	PAVED ROAD	0.40	0.41
Kolokani-Bamako	GRAVEL ROAD	*	*
Badinko-Bamako	TRAIN	0.29	0.32
* For these axes, the existence of negative margins for up to 40% of observations biases the coefficient upward and is therefore excluded.			

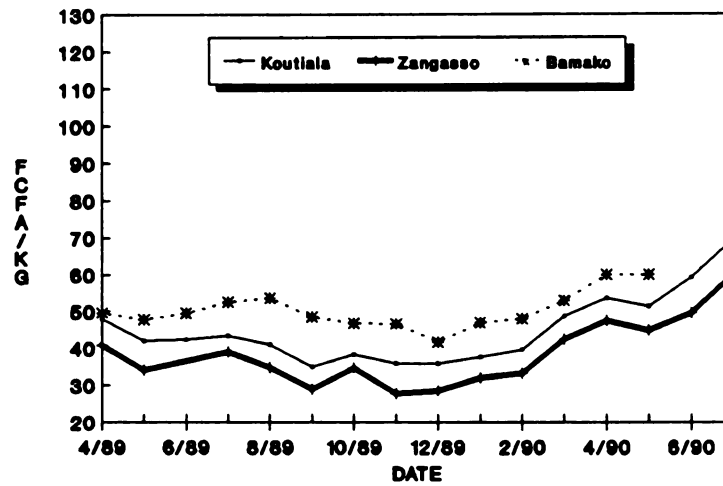
Source: SIM

It appears that the circuits located on both the train line and those on the paved road are quite stable and similar for the two crops, with coefficients below 50%.

The circuits located on the gravel road are characterized by differences between millet and sorghum. In the case of sorghum, a large incidence of negative margins makes the analysis of coefficients of variation unreliable. For the Kolokani-Bamako circuit, the presence of negative margins may indicate either that no transfers took place along this circuit, or that transfers may reverse direction seasonally, or that there may only be transfers at certain times of the year.

PRICE TRENDS FOR MILLET

Zangasso - Koutiala - Bamako

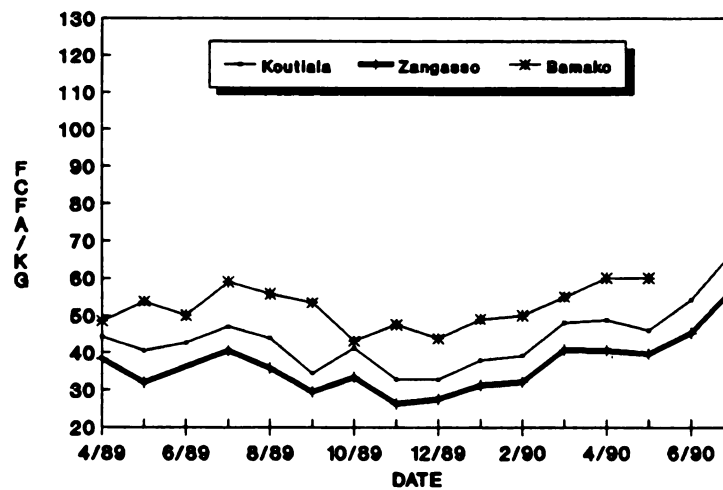


Source: SIM

Figure 5.5 Price Trends for Millet: Koutiala, Zangasso, and Bamako

PRICE TRENDS FOR SORGHUM

Zangasso - Koutiala - Bamako

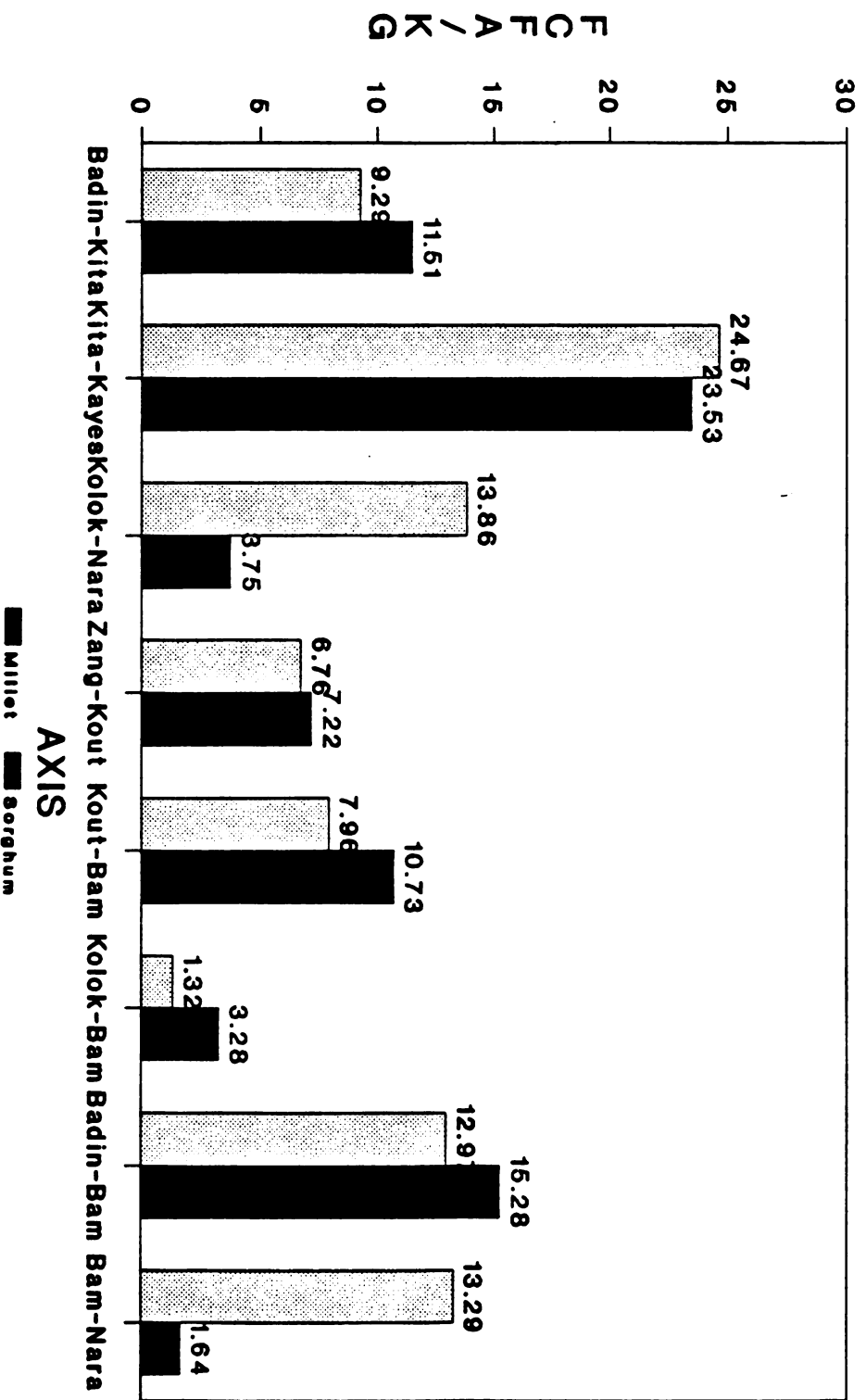


Source: SIM

Figure 5.6 Price Trends for Sorghum, Koutiala, Zangasso, and Bamako

SPATIAL MARGINS--MILLET/SORGHUM BY AXIS

April 1989 - July 1990



Source: SIM

Figure 5.7 Spatial Margins - Millet/Sorghum by Axis

Comparison of Price Differentials Between Circuits

Figure 5.7 presents a comparative view of spatial (gross) margins, averaged over the survey period, for millet and sorghum. For the circuits of Kita-Kayes, Kolokani-Nara, Koutiala-Bamako, Kolokani-Bamako, and Bamako-Nara, spatial gross margins are calculated between wholesale levels. In the case of Badinko-Kita, Zangasso-Koutiala, and Badinko-Bamako, spatial gross margins are calculated between producer and wholesale levels.

The level of price differentials varies dramatically between circuits, in some cases. Gross margins for Kita-Kayes and Badinko-Bamako are the highest, perhaps due to low production in Kayes and the upward pressure of local market demand on its prices. This is particularly the case for Kita-Kayes, with gross margins of FCFA 23-24/kg. This axis is located on the railway line, leading to one hypothesis that this implies relatively higher costs, which is tested in later sections.

A second hypothesis regarding these relatively high gross margins, also characterized by stable trends, is that -- given that the wholesale price margin represents the difference in sale prices between wholesalers -- the upward pressure on prices from consumer demand in Kayes is passed on to the wholesale level in the Kayes market. However, under competitive conditions, this demand effect should be passed on to the wholesale prices in Kita, and result in lower margins, which is not the case.

A third hypothesis is that Kayes traders may be price fixing, or pegging, at a certain minimum differential with the Kita price.

The markets of the second axis, Kolokani-Nara, Bamako-Nara, and Kolokani-Bamako, are linked by a gravel road, with difficult access in the rainy season. The spatial margins between these markets varies widely between the individual circuits.

Thus, margins are roughly similar, and relatively lower than the Kita-Kayes circuit, for Kolokani-Nara and Bamako-Nara. In contrast, the Kolokani-Bamako circuit has very low spatial margins.

In the case of the low spatial margins between Kolokani and Bamako, it is clear that trade along this circuit may be weaker than for the other two circuits. In fact, among surveyed traders in Kolokani, only one trader was transferring sorghum to Bamako. While this circuit may be more active in other years, it seems likely that the locust attack in the harvest year 1989-90 reduced this link.

As regards the other two circuits, whether the relatively lower margins (compared to the first set) are due to a different transport infrastructure or due to other factors will be explored further.

Finally, the third axis, Zangasso-Koutiala and Koutiala-Bamako, linking a major production zone with the largest urban center of the country, are connected by an all-weather paved road. Gross margins for these circuits are lower than both the other circuits.

Comparison of Price Differentials Between Products

There is no singular trend emerging from Figure 5.8 in terms of differences between millet and sorghum for all the circuits. However, it is evident that, in the case of the Kolokani-Nara and Bamako-Nara circuits, the dramatically higher margins for millet indicate that it is the principal product exchanged, namely to Mauritanian markets. This is especially true for transfers between Bamako and Nara, where the differential is extremely low for sorghum.

In the case of the other circuits, there is little difference between the two products, with sorghum margins slightly higher for Badinko-Kita, Badinko-Bamako, Zangasso-Koutiala, and Koutiala-Bamako circuits.

Summary

The above observations have highlighted several key points:

- (a) gross spatial margins appear higher where local demand is high relative to local supply, and where barriers to entry to increasing marketed supply appear to exist, as seems possible in the case of the Kita-Kayes circuit;
- (b) high gross spatial margins at border markets, such as Kayes, do not necessarily imply heavy flows of exports, which may be lowered by high unit transfer costs; and,
- (c) where differences between products exists, relatively higher spatial margins for millet indicate flows of millet to export markets, in the case of circuits located on the gravel road.

5.2 Transfer Costs

Definitions

The following analysis of transfer costs is based on primary data collected between May and July 1990, in a survey of 82 wholesalers and semi-wholesalers, covering 3 regions of Mali as well as the district of Bamako.

Among the choice of definitions of transfer costs, the definition used in this analysis of transfer costs considers these to be costs incurred directly or indirectly in the marketing process. An alternative definition considers transaction costs as only those related to human interaction, such as contractual costs, information, and regulation costs (Schmid, 1987). The definition used in this analysis includes both the above set of costs as well as those considered "marketing" costs. The two subsets of costs are distinguished by classifying the traditional marketing costs (transport, etc.) as physical costs, and the interaction costs as exchange costs.



Generally, the entire set of transfer costs includes transport, storage, handling, product treatment, acquisition, financing, and regulation.

Another way to decompose the set of transfer costs is to distinguish fixed and variable costs. Fixed costs are independent of the volume of transactions, and are linked to time factors (monthly, annual costs, etc.). Variable costs vary with the quantity, distance, or number of transactions. This decomposition of costs indicates the flexibility a trader disposes in his or her operations. Thus, the operation is characterized by a certain degree of "fixity" (Johnson and Quance) in the event that the trader has a high proportion of fixed costs, which are immovable in the short term, and which influence the traders' market behavior. The implication of this fixity is that, the trader is less likely to quickly adjust to market signals.

Returning to a decomposition into physical and exchange costs, it is clear that this breakdown has important implications for the performance of markets. One reason that these costs are important is that coordination, or exchange, costs are those attributed to market imperfections, and are mainly ignored by economists assuming that markets operate without opportunism, inefficiency, or formal and informal contracts. High levels of coordination costs (relative to physical costs) can be perceived as limiting the performance of markets.

Methodology

The methodology employed in the subsequent analysis is based on the conversion of transfer costs into FCFA/kg terms. In the case of variable costs, which are expressed by traders per sack or per ton, the conversion is based on the weight traders indicate for their sacks. However, in the case of fixed costs, usually expressed either per month or per year, the conversion is based on estimating traders' annual volume of transactions by

extrapolating from information traders provided about their monthly transactions and the months of the year that they operate.

A second methodological issue is how to estimate transfer costs per circuit of analysis. While the survey had been carried out in each market, with a certain set of principal circuits in mind, the trader clearly is not limited to one circuit in his or her operations. Therefore, it was impossible for respondents to distinguish costs pertaining to one specific circuit, other than transport costs, of course. However, these other costs actually vary between the markets. In Kayes and Nara, all traders indicated acquiring all of their cereals only in Kita and Bamako, respectively. Thus, the set of transfer costs they indicated pertains entirely to the Kita-Kayes and Bamako-Nara circuit. In the case of the other markets, the method employed was to calculate the set of non-transport costs (per kg) relevant to their cereals operation (on all circuits) and add these to the transport cost (per kg) traders indicated for the specific circuit. This approach assumes that per-unit non-transport costs do not vary widely by circuit, which is plausible.

5.2.1 Transfer Costs by Circuit

The transfer costs indicated in Figure 5.8 vary considerably between the circuits. Comparing between the three axes identified earlier, it is difficult to distinguish major trends, with the exception of Kolokani-Nara, in the second axis (on the Bamako-Nara gravel road), with the highest cost (FCFA 16.3/kg) and Zangasso-Koutiala, in the third axis (on the all-weather road), with the lowest cost (FCFA 6.4/kg).

However, if these costs are calculated per kilometer, the figures indicated in Table 5.2 reveal important economies of distance, resulting in the extremely high kilometric costs for both Badinko-Kita and Zangasso-Koutiala circuits.

These results are analogous to the transport costs per kilometer viewed in the previous chapter. A comparison of cost can be made for roughly similar distances between the three different types of transport infrastructure. The longer distances on train, gravel, and paved road have very similar kilometric costs (FCFA .03/kg - .04/kg). On the other hand, for short distances, costs for train transported cereals is nearly double that of paved road costs (FCFA .34/kg vs. FCFA .18/kg).

TABLE 5.2. Transfer Costs Per Kilometer

CIRCUIT	DISTANCE (FCFA/KG/KM)	TRANSFER COSTS
Badinko-Kita	30	.34
Kita-Kayes	300	.04
Kolokani-Nara	240	.07
Zangasso-Koutiala	35	.18
Koutiala-Bamako	400	.03
Kolokani-Bamako	130	.07
Badinko-Bamako	170	.06
Bamako-Nara	374	.03

Source: Author's surveys

Another important determinant of the level of transfer costs is potential economies of scale in storage, acquisition, etc. Thus, the important volumes transacted on the Kita-Kayes, Bamako-Nara, and Koutiala-Bamako circuits would imply lower per volume costs. This is, in fact, the case in Table 5.2. However, it is difficult to distinguish the effects of scale economies from those of distance in this instance, because the circuits with longer distances are also those with higher volumes, indicating a fuller use of fixed assets in both cases.

5.2.2 Fixed vs. Variable Costs

As is evident from Figure 5.8, variable costs are significantly greater than fixed costs for all circuits. This implies that costs incurred in longer term investments in cereals marketing are limited. Fixed costs are low particularly for two circuits characterized by high transaction volumes, Kita-Kayes and Bamako-Nara. For both of these circuits, transport is entirely by rented transport, either train or trucks, respectively for the two circuits.

On the other hand, the Kolokani-Nara circuit has the highest level of fixed costs, due to either relatively high storage in Kolokani or to the effect of higher costs due to the trader employing his or her own vehicle in the sample. However, since this case is represented by only one respondent in Kolokani, these observations are not conclusive.

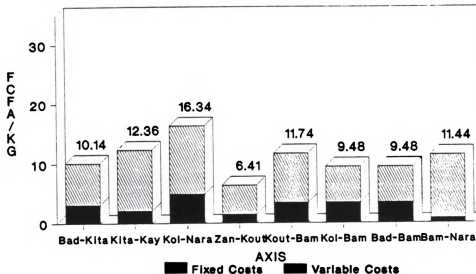
5.2.3 Transfer Costs by Vehicle Ownership

The above points raise an important issue with regard to the importance of using rented or owned vehicles in marketing. In other words, does using rented transport reduce the share of transport in overall transfer costs? Secondly, does using rented transport reduce the share of fixed costs in overall transfer costs?

Figure 5.9, broken down by market and ownership, reveals that, in fact, transfer costs for owners are higher, except in the case of Bamako, where costs are roughly equal. In addition, fixed costs appear to be considerably higher for vehicle owners than non-owners, in all cases, including Bamako. This implies greater asset fixity in cereals marketing for vehicle owners, as well as reflecting a diversified commercial strategy. Whether or not the share of transport is reduced for non-owners of vehicles will be addressed in the following section.

TRANSFER COSTS PER KG BY AXIS

Fixed and Variable Costs
(unweighted average)



Source: author's surveys

Figure 5.8 Transfer Costs Per Kg by Axis

5.2.4 Composition of Transfer Costs

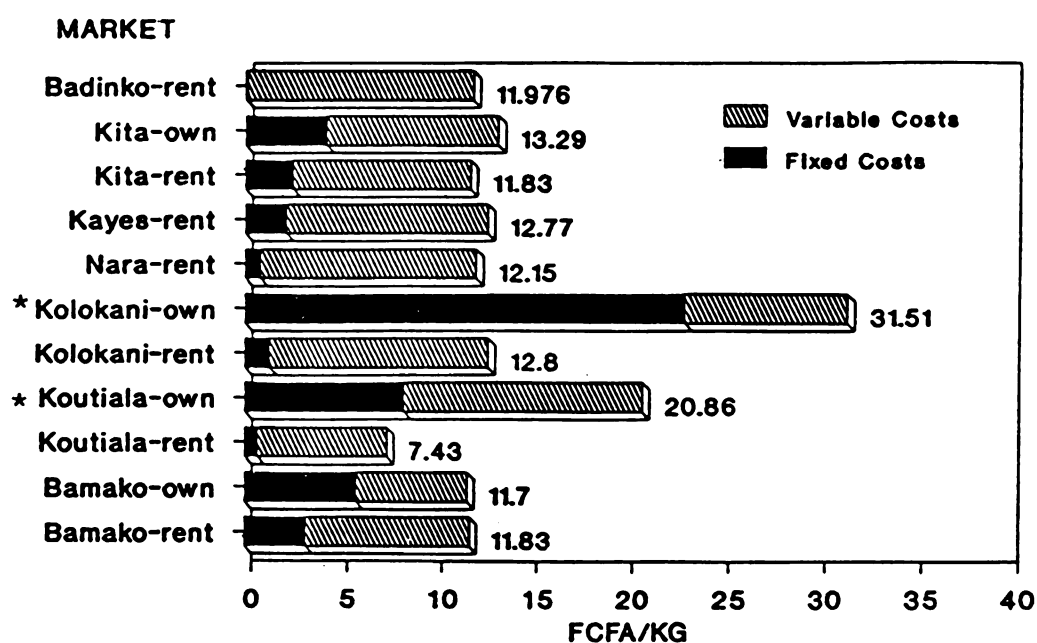
Following the above separation of vehicle owners and non-owners for the sample as a whole, the following figures indicate the shares of several categories of activities in overall transfer costs.

Transport

The share of activities comprising transport is limited to transport rental in the case of non-owners and, for owners, includes fuel, driver, vehicle maintenance and amortization, and road stops. (See Figures 5.10 and 5.11.) In the case of non-owners, the share of transport is 72% of total costs, while the sum of the shares of the above categories for non-owners is also 72%.

FIXED AND VARIABLE TRANSACTIONS COSTS

For Owners of Vehicles vs. Non-Owners
(unweighted averages by market)



Source: see text

* N=1, potential outliers.

Figure 5.9 Fixed and Variable Transactions Costs

The parity of shares between owners and non-owners indicates that regulatory costs are reflected in rental rates, and that transport markets function competitively. Generally, the levels of transport costs are similar between owners and non-owners, except in the case of Kolokani and Koutiala. In both of these markets, there is only one vehicle owner, whose operation is not likely to be limited to cereals marketing.

Coordination Costs

The share of non-physical costs, such as taxes, interest payments on credit, payments to collectors, and road stops, has been discussed earlier as an important indicator of market performance. In the sample, the sum of the shares of the above categories varies dramatically between vehicle owners and non-owners. For vehicle owners, the coordination costs are 23%, of which more than half is the share of road stops. The corresponding coordination costs for vehicle non-owners is 10%. This suggests that the vehicle rental rate accounts for the cost of road stops, as also noted by the respondents. Given the earlier inclusion of road stops in the calculation of the share of transport for vehicle owners, it appears that reducing this cost would result in lower transport costs for both sets of operators.

As expected, the share of taxes is higher for owners, who presumably pay regulatory fees for operating their vehicle.

Transport and Storage Losses

Losses, presented as a share of total transfer costs, constitute between .6 and 1 percent for vehicle owners and non-owners respectively. Losses are lower for owners, who are perhaps able to exert more control over losses in their own vehicles.

Also, when viewed in physical terms, as opposed to their share in costs, losses were approximately 2% of total volumes.

Storage, Re-Sacking, and Handling Costs

Vehicle owners and non-owners exhibit opposite patterns regarding their respective shares of storage and re-sacking. While owners spent 8% of costs in storage, and 2% in re-sacking, vehicle non-owners spent only 3% of costs in storage and 7% in re-sacking.

The reasons for this difference, in contrast to roughly similar shares for other costs, are not immediately obvious. One hypothesis is that vehicle owners are forced to hold existing stocks until there is a sufficient supply to fill the vehicle. Secondly, vehicle owners have more control over losses from damage to sacks, etc., and therefore do not need to spend as much on re-sacking their supplies at the final destination.

These costs are nearly identical between the two sets of operators, representing roughly 9% of costs. In the case of vehicle non-owners, this is the second most important cost, after transport.

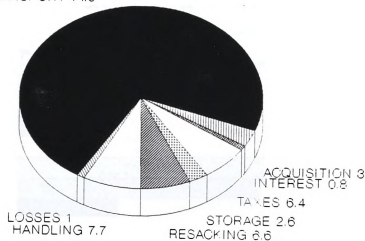
5.3 Comparison between Spatial Margins and Transfer Costs by Circuit

Figure 5.12 indicates average gross spatial margins and transfer costs for the survey period, along the same circuits viewed earlier. The hypothesis is that gross margins and costs become close to equal, or net margins become close to zero, when markets operate at near equilibrium. This is the simple spatial equilibrium concept discussed in earlier chapters. A more formal price formation model, incorporating cost and other elements, will be presented in Chapter VI.

A preliminary overview of the different circuits reveals three likely scenarios. The first is where gross margins and costs are roughly equal. Secondly, costs are higher

COMPOSITION OF TRANSFER COSTS (average % shares for sample)

TRANSPORT 71.9

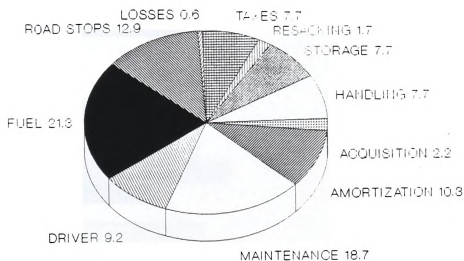


Vehicle Non-Owners

Source: author's surveys

Figure 5.10 Composition of Transfer Costs - Vehicle Non-Owners

COMPOSITION OF TRANSFER COSTS (average % shares for sample)



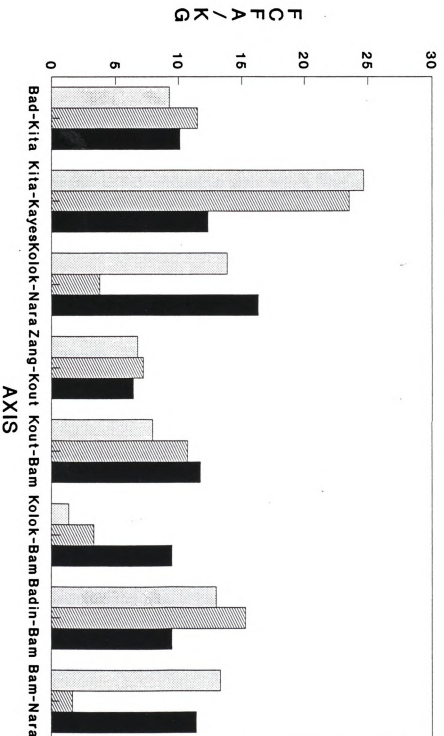
Vehicle Owners

Source: author's surveys

Figure 5.11 Composition of Transfer Costs - Vehicle Owners

COMPARISON--MARGINS AND COSTS BY AXIS

April 1989 - July 1990



Source: author's surveys

Margin-Mil Margin-Sorg Costs

Figure 5.12 Comparison - Margins and Costs by Axis

than spatial margins, prohibiting trade. Third, spatial margins are considerably higher than costs, implying positive net margins, leading to new entrants in the market if there are no significant barriers to entry.

As seen in Figure 5.12, 6 out of 8 circuits fall into the first scenario: Badinko-Kita, Badinko-Bamako, Zangasso-Koutiala, Koutiala-Bamako, Bamako-Nara, and Kolokani-Nara. Along these circuits, costs and spatial gross margins are within 4 FCFA/kg.

One circuit falls into the second scenario, with a large negative net margin, and thus a disincentive to trade. This circuit is Kolokani-Bamako. From observation in the field, it is known that this circuit is less used, especially in the present survey period due to a weak harvest.

There is one circuit that falls into the third scenario described above, that of large positive net margins. This circuit, located on the train route, is Kita-Kayes, which is a major circuit. This circuit has a very dramatic difference between gross margins and transfer costs.

It is difficult to explain how this net margin can be maintained, given that there would be opportunities for new entrants into the market to eventually reduce these margins.

One hypothesis is that it is possible that the use of train transport can present a barrier to entry, given constraints on wagon space and time. In addition, an unquantified dimension of costs is that of acquiring the contacts among the railway staff, authorities, bribes for wagon space, etc., in order to facilitate timely transfer of product and reduce losses.

The above argument is strengthened by the fact that there is, in reality, no viable alternative transport infrastructure. For this circuit, roads are virtually out of use, with very difficult access between Kita and Kayes.

The Badinko-Kita circuit, also on the rail line, is identified among the equilibrium circuits. Unlike the Kita-Kayes circuit, where margins are influenced upward in excess of costs because of high urban consumer demand in the Kayes market and possibly maintained because traders do not have alternatives to train transport, the Kita market is located in a producing region where consumer demand is low relative to Kayes, and where the market can be supplied from Badinko by road as well as train.

Observations regarding Spatial Equilibrium

To summarize the above points, it appears from the graphical analysis that 6 of 8 circuits are characterized by "spatial equilibrium", as it has been defined above.

Comparing between types of transport infrastructure, the performance of the circuits is not limited to one particular type of transport. Thus, both circuits located along the paved road fall into this category, as well as the Badinko-Kita and Badinko-Bamako circuits on the railway, and Kolokani-Nara and Bamako-Nara on the gravel road.

On the other hand, circuits characterized by disequilibrium are located in the first and second axis. Along the gravel road, the Kolokani-Bamako circuit seems to operate "irrationally," with large negative net margins. This may indicate that reversals of flows occurred throughout the harvest year along this circuit, and in particular, in a poor harvest year such as 1989-90.

Secondly, the Kita-Kayes circuit located on the train line appears to also perform "non-economically," with significantly high positive margins. However, it is difficult to

ascertain whether this is a case of artificial price fixing by traders, or a result of the basic structure of the market with high barriers to entry to train transported markets.

In the following chapter, the question of what factors are important in the formation of prices, and specifically of the gross margins observed for the above circuits, is explored more systematically in the context of an econometric model. Thus, the tentative conclusions reached on the basis of the above graphical "snapshots" will be explored further.

CHAPTER VI

AN ANALYSIS OF FACTORS INFLUENCING GROSS SPATIAL MARGINS

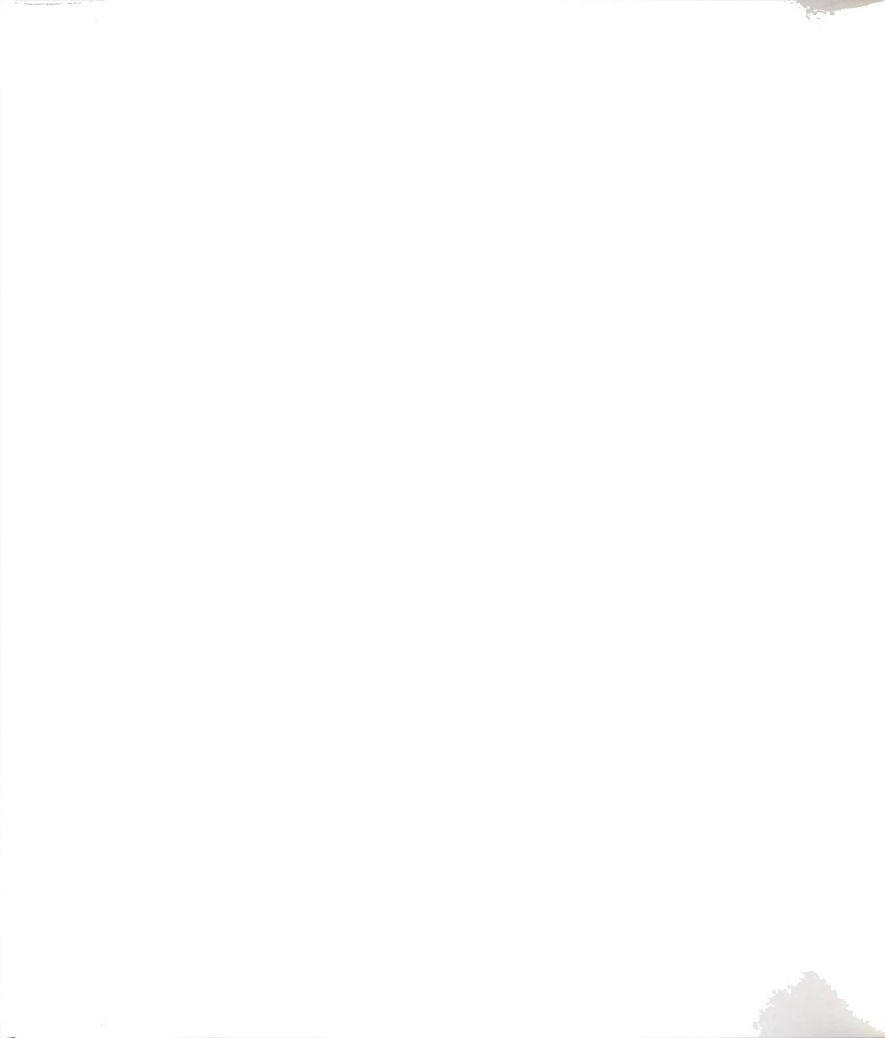
The preceding two chapters provided an in-depth description of the axes under study. From this descriptive analysis, it appears that a variety of factors have bearing on the relationship between spatial margins and transfer costs. This relationship itself can be viewed as indicating market performance.

These factors are the basic supply and demand conditions prevailing in the area in which the markets are located, the quality and distance of transport links, the number and competitiveness of traders, and the aspect of seasonality in cereals marketing.

This chapter attempts to explore these issues further through a formal testing of the above relationships, based on a model of spatial equilibrium developed by Ravallion (1986) and extended by Timmer (1987).

In Mali, previous work on market integration has shown significantly high bivariate correlations between rural and wholesale markets in two zones, the CMDT and OHV (Dioné, 1989). These results are important in revealing differences between the two zones in terms of market performance, in addition to comparing pre- and post-liberalization market performance.

However, the approach of determining market integration through bivariate price correlations between isolated market pairs is generally criticized for a number of reasons. Critics argue that factors common to all markets such as seasonality or inflation will bias the correlation upward, that variances of prices are not constant over the year, and that



high correlation may result from a spurious relationship, such as official price fixing (Harriss, 1979). Moreover, what seems of interest is that "the system of markets be integrated and not that a particular pair be integrated at any one time" (Delgado, 1986, p.971). Thus, one aspect of the proposed model is its joint testing of integration for eight market circuits, consistent with the three axes comparatively analyzed in preceding chapters of the study.

Secondly, due to data constraints, very few models of market integration include non-price variables, or what may be specified as local market characteristics. These models usually assume that variables such as transfer costs and flows of goods are constant between markets as well as within given time periods.

However, the graphical presentation of costs and spatial margins in the previous chapter reveals that, in reality, costs certainly vary between circuits, and, moreover, make a difference to margins and flows, and vice versa.

A set of pre-Ravallion market integration studies that include transport and other transfer costs were carried out in northern Nigeria by Hays and McCoy (1977). A comparative analysis of spatial and temporal price differences and costs indicated that non-zero parity price spreads (parity price spreads being equal to price spreads minus costs) result from market imperfections, inherent to the system, rather than monopolistic competition. In this analysis, costs varied between markets but were constant over time. However, this approach did not formally model these relationships.

The static model of price differentials used by Ravallion assumes a spatial market structure in which there is one central market and many local markets. The central market price drives local market prices, and, under competitive equilibrium, the difference between the prices would be the transfer cost from the local to the central

market. Thus, the local market price is perceived as a function of the central market and the local market characteristics, i.e.,

$$p_i = f(P_1, X_i), \text{ for } i = (2, \dots, N)$$

where p_i is local market price, P_1 is central market price, and X_i is matrix of local market characteristics for market i

$$\text{and } P_1 = f(P_2, \dots, P_N, X_1)$$

where $P_2 \dots P_N$ are other "central" market prices.

Timmer's approach, based on the above model, tests the extent to which local prices are integrated with the central market in the long-run and the extent to which short-run changes in the local market price are caused by short run changes in the margin between local and central market prices.

The formulation of Timmer's model incorporating generalized distributed lags is as follows:

$$P_t - P_{t-1} = d_0 + d_1 (P_{t-1} - R_{t-1}) + d_2 (R_t - R_{t-1}) + d_3 R_{t-1} + d_4 X + e_t$$

where P is local market price, R is central market price and X is matrix of local market characteristics.

A static expression of the above is essentially the Ravallion model above, and a simple algebraic manipulation results in the following, expressed in period t :

$$P_t - R_t = a + b X + e$$

Thus, the spatial margin is on the left hand side and the independent variables are the components of factors known as local market characteristics.

The model presented below attempts to highlight the importance of these local market characteristics. Furthermore, it expands this set of factors to include



characteristics specific to the circuit instead of just the local market, in addition to characteristics of the central market.

In this model, both transfer costs and estimated volumes of flows, varying between market circuits but constant for the survey period, are included in the econometric formulation of gross spatial margins.

A third aspect of the model is an issue briefly touched on in the preceding paragraph, that is, the inter-relationship between margins, flows and costs. Theoretically, there is causality in both directions, because traders respond to changes in margins while, simultaneously, margins adjust to changes in flows. Thus, the relationships between spatial margins and flows as well as costs are modelled as a simultaneous system of three equations, with margins, flows between markets, and costs considered endogenous to the system.

6.1 The Model

The proposed model is based on the Ravallion approach of regressing local market price on central market price and local market characteristics. It is expressed as a simple three equation simultaneous system, reflecting the inter-relationship between spatial margins and aggregate flows, as well as the factors determining costs. The three equation system is written as:

- (1) **MARGIN** = $a_{10} + b_{11} \text{ AGGFLOW} + b_{12} \text{ COST} + b_{13} \text{ TRADI} + b_{14} \text{ TRADJ} + b_{15} \text{ HYR}$
 $+ b_{16} \text{ TRAIN} + b_{17} \text{ MOIS1} + b_{18} \text{ MOIS2} + b_{19} \text{ MOIS3} + b_{110} \text{ MOIS4} + b_{111}$
 $\text{MOIS5} + b_{112} \text{ MOIS6} + b_{113} \text{ MOIS7} + b_{114} \text{ MOIS8} + b_{115} \text{ MOIS9} + b_{116} \text{ MOIS10}$
 $+ b_{117} \text{ MOIS12} + b_{118} \text{ MIL} + b_{119} \text{ AXISSRG}$
- (2) **AGGFLOW** = $a_{20} + b_{21} \text{ MARGIN} + b_{22} \text{ SURPLI} + b_{23} \text{ SURPLJ} + b_{24} \text{ KM} + b_{25} \text{ COST}$
- (3) **COST** = $a_{30} + b_{31} \text{ AGGFLOW} + b_{32} \text{ KM} + b_{33} \text{ KM2} + b_{34} \text{ TRAIN} + b_{35} \text{ TRADI}$



where **MARGIN** = gross spatial margins between markets i,j

AGGFLOW = aggregate flows between markets i,j

COST = transfer costs between markets i,j

TRADI = number of traders in market i

TRADJ = number of traders in market j

SURPLI = cereal surplus in zone i

SURPLJ = cereal surplus in zone j

KM = kilometric distance between markets i,j

KM2 = **KM** squared

with the following set of dummy variables:

TRAIN (1=train)

HYR (1= Nov 1989 - July 1990)

and 11 monthly dummy variables.

Two additional dummy variables are also included in the model specification in order to distinguish crop effects, that is, differences between millet and sorghum. Thus, variable **MIL** is equal to one when the product is millet and is zero otherwise. The variable **AXISSRG** is equal to one where the product is sorghum and the circuit is either the Kolokani-Nara or the Kolokani-Bamako circuit, otherwise it is zero. This dummy variable is included to distinguish the special case where field interviews revealed that practically no transfers of sorghum were made from Kolokani to Nara or Bamako.

6.1.1 The Data

The model was estimated for the following circuits: Badinko-Kita, Kita-Kayes, Kolokani-Nara, Zangasso-Koutiala, Koutiala-Bamako, Kolokani-Bamako, Badinko-Bamako, and Bamako-Nara. Gross spatial margins were computed using monthly wholesale and producer prices, collected by the Systeme d'Information du Marche (SIM), as well as by the CESA-MSU Food Security Project (for Bamako wholesale prices).

The period covered by the data extends from April 1989 to July 1990, covering 7 months in harvest year 1989 and 9 months in harvest year 1990.

Data on transfer costs, volumes of flows, cereals production and surplus, as well as other local market characteristics such as kilometric distances, type of transport infrastructure, and number of traders were obtained through an IFPRI-funded survey carried out in collaboration with the Systeme d'Information du Marche between May and July 1990.

6.1.2 Estimation Techniques

Viewed as a system of equations, the model has three endogenous variables, MARGIN, AGGFLOW, and COST, and is simultaneous, since MARGIN appears on the right hand side of the flow equation; AGGFLOW and COST appear on the right hand side of the margin equation; and, AGGFLOW appears on the right hand side of the COST equation.

It can be seen that all three equations are identified without solving for the reduced form. The margin equation is exactly identified because there are three exogenous variables in the system that do not appear in the margin equation. The flow equation is overidentified because there are 18 variables in the system that do not appear in the flow equation. Similarly, the cost equation is overidentified because there are 17 variables in the system that do not appear in the cost equation.

All of the equations were estimated using two stage least squares (2SLS). This estimation technique is useful in obtaining unique estimates of the values of structural parameters in overidentified equations (Pindyck and Rubinfeld, 1981, p.191).

The assumption underlying ordinary least squares estimation is that the independent variables are uncorrelated to the error term. This assumption breaks down in a simultaneous equation system where one or more of the independent variables is determined in part by the dependent variable.

In the above case, estimation is possible by replacing the variables measured with error with new variables, called instruments. Essentially, two stage least squares estimation creates a new variable, MARGIN-hat, which is used as an instrument in the estimation of the second equation.

The estimation procedure obtains the reduced form equation of MARGIN in the first stage by regressing margin on all exogenous variables in the system through ordinary least squares. The fitted values of MARGIN (i.e., MARGIN-hat) are thus linearly related to the predetermined variables and are independent of the error term in the flow equation.

In the second stage, the flow equation is estimated using the fitted values of MARGIN (MARGIN-hat) from the first stage, instead of MARGIN.

Analogously, the cost equation is estimated using the fitted values of AGGFLOW (AGGFLOW-hat) from equation 2, instead of AGGFLOW, with the fitted values of AGGFLOW independent of the error term in the cost equation.

Finally, both linear and log-linear forms of the equations were estimated. The linear specification yielded a better fit and is reported below.

6.13 Choice of Instrumental Variables

The choice of instruments for the 2SLS model depended largely on knowledge of the marketing system as well as data availability.

The instruments used in the three-equation system include both time-specific, circuit-invariant variables as well as time-invariant, circuit-specific variables.

Time-invariant, Circuit-specific Variables

Through the survey carried out in May-July 1990, several useful data specific to each circuit were obtained. In addition to information on the flows of cereals between



markets and transfer costs, data were collected on the distances between markets, the number of traders in each market, and the marketable surplus in the zone in which each market is located.

The inclusion of the above variables is based on hypotheses regarding the effect of certain variables on margins and flows. In the case of transfer costs, one hypothesis is that costs are positively related to spatial margins, since margins are composed of costs and profit.

Another hypothesis is that per-unit costs are negatively related to aggregate flows, implying that economies of scale exist.

It is expected that there are higher costs where the distances are greater. At the same time, economies of distance seem to exist from the analysis in Chapter V. Thus, this hypothesis will be tested through including a quadratic for KM in the cost equation.

In the case of the number of traders, it is posited that a higher number of traders in both markets along a circuit would result in a higher degree of competition and thus lower margins. A related hypothesis is that this occurs because costs decrease where more traders exist in the supply market.

Finally, one expects that the volume of marketable surplus in the exporting market will have a positive effect on aggregate flows of cereals and the reverse effect in the case of a surplus in the importing market.

Time-specific, Circuit-Invariant Variables

In cases where cross-sectional and time-series data are pooled, the assumption that parameters are constant for all sample observations breaks down. These parameters may vary in some either random or systematic manner across sample data (or subsets

therein). The non-constancy of parameters violates the statistical properties of the least squares estimators, and their interpretation becomes unclear (Judge et al., pp.420-442).

The usual way to test for parameter changes due to external effects such as the passage of time, among other factors, is through the use of dummy variables.

In the model presented above, three sets of dummy variables have been chosen to reflect the dimensions of seasonality, inter-annual variability, as well as the effect of different types of transport infrastructure. There are 11 monthly dummy variables, a harvest year dummy variable, and a dummy variable for train transport. The omitted month for the monthly dummy variables is November (month 11), chosen because this month marks the start of the marketing year. The omitted harvest year is 1988-89.

6.2 Summary and Interpretation of Results

Tables 6.1 - 6.3 provide results of estimations of the linear model described above. In addition to the coefficients, standard errors, and t-statistics for each included variable, elasticities at the mean for the non-dummy variables are also reported.

6.2.1 Summary of Results

Several key points are worth noting. First, the effect of aggregate flows on margins is positive and statistically significant. Correspondingly, in the second equation, margin has a highly significant and positive effect on aggregate flows. These relationships may be expected because higher margins increase flows, while, in the short run, prices in the demand market are high, raising margins. In both equations, the relationship between aggregate flows and gross spatial margins is highly inelastic, with point elasticities of .23 and .19 in equations (1) and (2).

TABLE 6.1. Two Stage Least Squares Regression Equation 1

Dependent Variable:	MARGIN		
Mean of Dep.Var.:	9.73		
Std. Dev. of Dep. Var:	7.38		
Std. Error of Regr:	4.53		
Sum of Squared Resid:	3729.08		
<hr/>			
R-squared:	.66		
Adjusted R-squared:	.62		
<hr/>			
Variable	Coefficient (Std.Error)	T-ratio*	Elast
Constant	3.500 (2.690)	1.301	
AGGFLOW	0.005 (0.001)	3.564**	0.23
COST	0.984 (0.225)	4.372**	0.91
TRADI	-0.053 (0.050)	-1.052	-0.09
TRADJ	-0.255 (0.033)	-7.661**	-0.45
TRAIN	8.078 (0.822)	9.818**	
HYR	1.970 (0.942)	2.091**	
JAN	-2.064 (2.081)	-0.991	
FEB	-4.981 (1.739)	-2.864**	
MAR	-1.151 (1.784)	-0.644	
APR	-2.343 (1.634)	-1.433	
MAY	-2.229 (1.634)	-1.364	
JUN	-3.366 (1.808)	-1.862*	
JUL	-2.974 (2.785)	-1.666	
AUG	-3.421 (1.980)	-1.738	
SEP	2.157 (2.163)	0.997	
OCT	-0.303 (2.074)	-0.146	
DEC	-4.366 (1.848)	-2.362**	
MIL	-0.613 (0.740)	-0.828	
AXISSRG	-10.159 (1.393)	-7.290**	
<hr/>			
*5% significance		** 1% significance	

TABLE 6.2. Two Stage Least Squares Regression Equation 2

Dependent Variable:	AGGFLOW		
Mean of Dep. Var.:	328.018		
Std. Dev. of Dep. Var.:	313.442		
Std. Error of Regr.:	136.246		
Sum of Squared Resid.:	3639323		
<hr/>			
R-squared:	.82		
Adjusted R-Squared:	.81		
<hr/>			
Variable	Coefficient (Std. Error)	T-ratio*	Elast
Constant	-80.429 (111.847)	-0.694	
MARGIN	6.467 (1.627)	3.974**	0.19
COST	-8.246 (12.346)	-0.668	0.37
SURPLI	0.006 (0.001)	9.763**	0.34
SURPLJ	-0.003 (0.001)	-3.049**	-0.08
KM	1.613 (0.141)	11.409**	1.08
<hr/>			
*5% significance		** 1% significance	

As hypothesized, transfer costs have a highly significant and positive impact on spatial margins, as is expected in the case of gross margins. In the flow equation, costs have a negative effect on flows, although the coefficient is not significant. Conversely, in the cost equation, flows have a negative and significant relationship with costs. Viewed in in terms of elasticities, spatial margins appear to have almost a unit elasticity to changes in costs (elasticity equal to .91), which may suggest that as costs increase, traders absorb a small proportion of the increased cost in lower margins. Aggregate flows seem quite inelastic in relation to costs (elasticity equal to -.37), while the converse is also true, that costs are unresponsiveness to flows, with an elasticity of -.04 for flow in the cost equation. These results imply that there are small economies of size in transfer costs.

TABLE 6.3. Two Stage Least Squares Equation 3

Dependent Variable:	COST		
Mean of Dep. Var.:	10.33		
Std. Dev. of Dep. Var.:	1.99		
Std. Error of Regr.:	1.06		
Sum of Squared Resid.:	220.15		
<hr/>			
R-squared:	.72		
Adjusted R-squared:	.72		
<hr/>			
Variable	Coefficient (Std.Error)	T-ratio*	Elast
Constant	6.700 (0.228)	29.365**	
AGGFLOW	-0.001 (0.001)	-2.245**	-0.04
KM	0.026 (0.002)	9.983**	0.36
KM	2-2E-05 (8E-06)	3.065**	
TRADI	-0.013 (0.136)	-0.936	-0.01
TRAIN	0.837 (0.175)	4.785**	
<hr/>			
*5% significance		** 1% significance	

The number of traders can be perceived as a proxy for the degree of competition in each market. As posited, higher competition lowers spatial margins significantly. The elasticities for traders in the originating and destination markets are -.09 and -.45, respectively, indicating an inelastic response of margins to changes in the number of traders. In particular, margins appear less responsive to changes in the number of traders in the supply market than the end market.

The hypothesis that a greater number of traders in the supply market reduces transfer costs, through potential competition for marketing services, is not confirmed in the cost equation, with a negative but non-significant coefficient for number of traders in

market i . As in the case of margins, costs appear extremely unresponsive to changes in the number of traders in the supply market, with an elasticity of $-.01$.

The hypothesis that distance increases transfer costs is demonstrated with a highly significant and positive coefficient for distance (KM) in the cost equation, although this relationship is inelastic with an elasticity of $.36$. In addition, the posited economies of distance are demonstrated by the negative and highly significant coefficient for KM-squared. This indicates that costs increase at a decreasing incremental rate as distance increases.

The relationship between distance and aggregate flows reveals that long-distance trade corresponds to higher volumes. This may be related to the observed economies of distance in costs per kg in the cost equation (Table 6.3).

Train transport has a highly significant and positive relationship with spatial margins. This is further supported by the result that the train dummy variable is significant and positively related to cost, in the third equation. Thus, it appears that higher margins on the railway line are not only due to higher costs along this line, but also other effects that independently raise margins. This finding may be interpreted in several ways, which are discussed below.

The harvest year dummy variable for the 1989-90 harvest is positive and significant, indicating lower spatial margins in 1988-89. This may be explained by the better harvest recorded for 1988-89.

The monthly dummy variables provide useful information about seasonality trends in margins. The impact on margin for the months between September and February is varying and important. From the harvest season (September-November), where margins are at their highest, margins sharply decrease in the post-harvest season,

December to February, when they are at their lowest level in February. They remain fairly constant between March and August. The only significant coefficients are for December, February and June.

A previous study of market integration in Northern Nigeria found that coarse grain prices exhibited a "bump" in October, analogous to the peak of margins found here in September-November (Delgado, 1986). A possible explanation forwarded for this bump in the Northern Nigerian case was the differentiation made by consumers between old and new grain on the market. Thus, in this analysis, September prices are pushed downward by rushed sales of old grain, while October prices rise as the new, and better, grain reaches the market. In the Malian case, as the "hungry" season, or soudure, peaks in September, and markets shrink, which has a potential upward pressure on margins. Whether this interpretation holds will be addressed in the following section.

The crop dummy variable in the margin equation was negative and insignificant, indicating that overall for the circuits, no differences in margins existed between crops.

In the case of the dummy variable that was included to correct for circuits with little flows, as in the case of sorghum from Kolokani to Bamako and to Nara, the impact is highly negative and significant, as expected. Thus, the downward pressure on margins for these circuits (where descriptive analysis in the previous chapter revealed low or negative margins) is captured by this dummy variable.

Finally, in the flow equation, the impact of cereals surplus in the zone in which the markets are located has a small although highly significant impact. In the case of the sellers' market, as expected, higher surplus leads to higher flows, while the reverse is true for the buyers' market. However, despite the significant relationship, aggregate flows are relatively inelastic in response to surpluses in either market.

6.2.2 Direct and Indirect Impacts on Margins

By placing the spatial margin, as opposed to the local market price, on the left hand side of the equation, factors that influence the margin directly can be distinguished from those that affect either local or central market price individually.

Factors that influence margins directly are the level of transfer costs, the type of transport infrastructure, and the volume of flows. Factors that influence margins through their effect on either or both market prices are the number of traders in each market and seasonality.

Secondly, the incorporation of simultaneity allows one to distinguish factors influencing margins indirectly through their effect on aggregate flows or on costs, incorporating simultaneously the reverse effects of margins on flows, and flows on costs. These factors are the marketable surplus in each zone, and the effect of costs and distances on flows. Secondly, margins are influenced indirectly by the effect of flows, as well as distances, transport infrastructure, and competition, on transfer costs.

Direct Impacts on Margins

Among the factors directly affecting spatial margins, it appears that train transport has a large positive influence on margins. This may be interpreted as a result of relatively high barriers to using this means of transport, due to limited space and frequency of transport. This limit enables those who do have access to maintain high margins. Alternatively, the rent from the effective monopoly on train transport may be captured by railway transporters in the form of bribes, etc., that were not fully expressed by traders in field surveys. Finally, the effect of this dummy variable may in fact be interpreted as a signal that, unrelated to the train itself, there are other factors characterizing the behavior of traders in this circuit that push margins upward. One

possibility is the issue raised in Chapter V that the observed margins in this circuit are maintained under short-term disequilibria, and persist in a non-competitive environment (with potential price fixing practices). However, it is difficult to go beyond speculation as to this issue without further investigation of both the business practices of traders in this circuit, as well as the full extent of costs incurred in train transport.

Another important factor influencing margins is that of costs, which, as expected, has a relatively large and positive impact. While an inverse relationship between costs and net spatial margins is expected, a positive relationship with gross margins follows from the straightforward definition of margins, which are composed of cost and profit. In the previous chapter, the descriptive analysis pointed to several circuits where costs are higher than margins when there are little or no transfers of a particular cereal. This effect is captured by the AXISSRG dummy variable, which takes a very large negative value to account for cases where there are no transfers of sorghum along certain circuits, leading to low or negative spatial margins.

Finally, among the variables having a direct impact on margins, aggregate flows appear to have the least important effect. The coefficient is positive, which confirms the hypothesis that higher flows correspond to higher margins.

Indirect Impacts on Margins

The number of traders plays a role in determining the competition between traders in each market, which will theoretically influence prices. In the above model, the hypothesis that a higher number of traders drives prices down, and indirectly reduces margins, is supported by the empirical estimates.

The distance between markets has a significantly positive, although small, impact on both flows and costs. Clearly, the further markets are apart, the higher costs of

transfer will be. However, it is less intuitive that flows increase with distance. In considering the circuits under study, this result seems to be linked to the important volumes traded between Bamako and Koutiala as well as Bamako and Nara, both separated by relatively large distances.

Among the dummy variables indicating time, several monthly dummy variables have relatively very large impacts on margins. In particular, February has a significantly negative impact on margins, while margins appear higher in the harvest season. This pattern corresponds closely to information provided by traders during field interviews to the effect that marketing activities begin in November and are fully under way in December and January. As markets become saturated by February, margins are at a very low level. The pattern of producer and wholesale prices in this period confirms the above. Producer prices rise in the immediate post-harvest period between December and February (see Fig. 4.2), while wholesale prices decline or remain constant in the same period (see Fig. 4.3-4.4).

As for the rise in margin levels in the harvest period, a plausible explanation would be that producer prices and wholesale prices in producing zones fell as harvested grain entered the market, in addition to the effect of the expectation of an abundant harvest in 1989-90. However, a corresponding decline in wholesale prices in the larger, more distant urban markets, was lagged by a month, given the delay it takes for the grain to reach these markets.

There are several variables that have a significant impact on flows. The impact of margin on flows is relatively large and positive. However, the responsiveness of flows to higher gross margins is low, indicated by a low elasticity of 0.05. If costs are assumed to be constant (where all gross margin changes would be exactly equal to net margin

changes), this would, in effect, translate to a sluggishness in responding to market signals. However, in reality, changes in gross margins do not necessarily correspond exactly to changes in net margins, as indicated by the elasticity of margins with respect to costs equal to .91, instead of exactly 1.

Distance between markets has a relatively important and positive impact on aggregate flows. While distance would presumably be inversely related to flows, it is also plausible that the relationship is positive because, in the sample, the circuits with the highest flows are those separated by the greatest distances (i.e., Koutiala-Bamako and Kita-Kayes).

While marketable surpluses in both markets have the expected signs and are significant, their impact on flows is relatively small. The effect of surplus in the exporting market is more important in increasing flows than is the negative effect of surpluses in the importing market. This can be interpreted as indication that trade is not necessarily only from surplus to deficit markets, but may occur between markets with different levels of surplus (and therefore a price differential in excess of transfer costs). Secondly, this may indicate that the importing "surplus" market may be exporting part of its own surplus as well as the imported cereal to another market.

Finally, the relation between costs and flows appears to be negative in both flow and cost equations, although this result is not significant in the flow equation. In the cost equation, the low elasticity for flow (-0.04) indicates that costs hardly respond to changes in scale.

The above discussion has focussed on the interpretation of the results from the simultaneous model to test the factors influencing market integration along the 8 circuits. The results point to transport infrastructure, costs, and seasonality as having important

impacts on margins. Indirectly, through their impact on flows and costs, distances and surpluses in each market are also important.

The following chapter attempts to integrate these findings into a discussion of the implications for Malian exports of cereals to its neighbors--Mauritania, Côte d'Ivoire, and Sénégal. This analysis will tie in findings from the preceding chapters on the description of the marketing system and the comparison of costs and margins into the econometric work carried out above.

CHAPTER VII

IMPLICATIONS OF MARGIN ANALYSIS FOR REGIONAL TRADE

The preceding chapters revealed that several important factors have bearing on gross spatial margins. These factors are

- (i) the type of transport infrastructure linking markets (e.g., train),
- (ii) transfer costs in marketing cereals between markets,
- (iii) external effects such as seasonality and inter-annual variation, and (iv) the indirect effects of marketable surpluses and distance that affect flows of cereals between markets.

In this chapter, an attempt is made to extend these findings by exploring how they influence Mali's interests in terms of regional trade in cereals. This discussion is structured according to the following questions:

- (1) Which axes matter for Mali's present trade patterns, both officially registered and informal?
- (2) Is there a relationship between Mali's present trade patterns and the factors influencing spatial margins?
- (3) What are possible changes to margins that would influence trade patterns?

7.1 Mali's Present Trade Patterns

In discussing Mali's exports of cereals to the West African region in 1989-90, the discussion must distinguish between officially registered flows, which are accounted both in the customs statistics as well as those of the Direction Nationale des Affaires Economiques, from unofficial flows, for which data were obtained through a survey of traders and informal interviews with officials carried out between May and July 1990.

This distinction is important for several reasons. In the first place, data obtained regarding both unofficial and registered trade indicates that these two types of trade are

passing through different axes. Secondly, it also appears that these two types of trade involved completely different operators. Finally, it is also evident that these two types of trade are destined to different countries.

7.1.1 Officially Registered vs. Informal Exports

Among the eight axes viewed in this study, field interviews revealed that, generally, the most important axes for informal exports of cereals in 1989-90 were Bamako-Nara and Kolokani-Nara, destined for Mauritania.

These observations can be compared to the data obtained for officially declared "intentions" to export cereals, presented in Table 7.1 for the period under study, which also coincides with the period since the official liberalization of cereals exports from Mali.

TABLE 7.1. Officially Registered Export Intentions March 1989 - July 1990

PERIOD	QUANTITY (tons)	NUMBER OF INTENTIONS	NUMBER OF TRADERS		
Mar-Dec 1989	19,632	73	37		
Jan-July 1990	10,147	32	14		
=====					
TOTAL	29,779				
=====					
DISTRIBUTION BETWEEN COUNTRIES					
PERIOD	COTE D'IV.	SENEGAL	MAURIT. FASO	NIGER	BURKINA
Mar-Dec 1989	75%	22%	<3%	<3%	<3%
Jan-July 1990	36%	63%	<1%	<1%	<1%

Source: Direction Nationale des Affaires Economiques, 1990

The export liberalization policy reform implemented in March 1989 consisted of the removal of export taxes (8%), and in 1990, a PRMC-funded export subsidy on transport costs of 10 FCFA/kg.

In contrast to the patterns in informal exports noted above, officially registered exports appear to have been principally destined to Sénégal and Côte d'Ivoire in 1989-90.

Exports to Mauritania were almost entirely within the informal sector, given the very low officially registered exports. This suggests that the actors and mechanisms for this particular channel were very different from those for exports to Sénégal and Côte d'Ivoire.

In Table 7.1, it is clear that traders involved in officially registered exports may obtain more than one "intention". Thus, there appears to have been a high concentration of actors (particularly in 1990) and a larger scale of operations within registered trade. This was in contrast to the situation observed in the informal sector, where many small traders were involved in small transactions.

Another important aspect of officially registered exports is that they were almost entirely based in Bamako, and did not involve traders at the borders of either Sénégal or Côte d'Ivoire. Although exports to Sénégal passed through Kayes, they did not involve the Kita-Kayes axis which has been under study. These exports were of grains obtained elsewhere in the country, marketed by Bamako traders.

Exports to Côte d'Ivoire were somewhat different from the Sénégal case in that, while the actors were also Bamako traders, exported cereals originated in the Koutiala region and thus involved the Zangasso-Koutiala axis under study. For these operations, traders in Bamako commissioned agents in Koutiala to collect given amounts of cereals for Ivoirian markets. There were also certain cases of Koutiala traders who engaged in

registered exports to Côte d'Ivoire, as well as Ivoirian traders who purchased grain directly in Koutiala.

In effect, then, the distinctions between officially registered and informal sectors can be summed up in the following manner:

- (1) the axes of importance to registered trade were Bamako-Sénégal and Zangasso-Koutiala (Bamako traders)-Côte d'Ivoire, while the axes of importance to informal trade were Bamako-Nara and Kolokani-Nara;
- (2) the operators in Mali's registered exports were mainly large Bamako-based wholesalers, while those in the informal trade were small wholesalers based in the border market of Nara;
- (3) the destination of registered exports were principally Sénégal and Côte d'Ivoire, while informal trade was directed mainly to Mauritania;
- (4) the size of registered exports was large-scale and benefitted from PRMC transport subsidies, while informal operations were small-scale, and continuous throughout the year;
- (5) finally, for both registered and informal exports, Bamako was the source of important flows of cereals to neighboring countries. There were three distinct cases in which this occurred:
 - in the case of exports to Mauritania, the cereal was brought into Bamako from production zones by Bamako traders and was moved from Bamako by Nara traders;
 - in the case of exports to Sénégal, the cereal also came from elsewhere and was moved by Bamako traders through Kayes directly into Sénégal; and,
 - in the case of exports to Côte d'Ivoire, the cereal did not come to Bamako, but was assembled by Bamako traders in Koutiala and moved directly to external markets.

In all three cases, the exported cereal was assembled from producer zones in the areas of Koutiala and Ségou. Therefore, this implies a strong link between the domestic marketing and exports of cereals to neighboring countries.

7.1.2 Comparison of Recorded and Informal Exports to Mauritania

An estimation of informal exports can be obtained by extrapolating monthly average purchases indicated by traders in field surveys in the border markets of Nara and Nioro to the periods of March-December 1989 and January-July 1990 (taking into consideration that there are no flows between August and November due to rains). Local officials in these markets indicated that they considered that 66% and 45% of cereals purchased by traders in Nara and Nioro, respectively, was exported clandestinely to Mauritania. In Table 7.2, these estimates of exports are compared to the volume of officially recorded trade destined to Mauritania, which is estimated from percentages of total intentions to export indicated in Table 7.1 (for Mauritania, a maximum 3% for March-December 1989 and 1% for January-July 1990 of total recorded intentions). In effect, Table 7.2 demonstrates that these official intentions are only 17% and 3% of actual trade flows, respectively for the two periods.

**TABLE 7.2. Comparison of Registered and Informal Exports to Mauritania
(tons)**

PERIOD	REGISTERED EXPORTS ^a	INFORMAL FLOWS ^b
March-December 1989	589	3529
January-July 1990	101	3087
a obtained from Table 7.1 figures for registered flows and distribution of exports by country.		
b calculated from survey data and field interviews for Nara and Nioro markets.		

Source: Direction Nationale des Affaires Economiques, author's surveys.

The estimates presented in Table 7.2 reveal a large difference between registered and informal flows to Mauritania in the survey period, as posited from field observations, with an order of magnitude of at least 6 times higher informal than registered flows.

Although these calculations should only serve to highlight a sense of the magnitudes involved, they confirm the earlier suggestions that Mauritania is an important, and unaccounted, trading partner of Mali. Also, the above figures for informal flows may have been underestimated because they only account for the trade in the two border markets of Nara and Nioro, although field observations revealed that exports to Mauritania occurred at a large number of points along the border in smaller markets.

7.1.3 Domestic Marketing and Regional Exports

The Case of Informal Trade

The link between domestic marketing and regional trade is especially interesting because of the perspective taken in the previous chapter of viewing market integration for a system of markets, rather than a pair of markets. Specifically, it is clear then that the integration of Koutiala and Bamako was as important as the Bamako-Nara axis for the flow of cereals from Mali to Mauritania through Nara.

Secondly, this link challenges the view that exports between Sahelian countries are only a border phenomena. In many cases, this still holds true, especially where actors on both sides were small-scale traders or producers, and the markets are located in isolated areas. However, the Nara market appears to be a central market in the exchange between Mali and Mauritania.

An interesting issue that arises from the above is why, given these links, cereals do not flow directly from the Koutiala region to Nara, for exports to Mauritania. In part, this is explained by the lack of road infrastructure, facilitating access between Nara and the producer zones. Thus, while the present system involves a high level of transfer costs, there may be no less costly alternatives.

However, another aspect may be that, even if traders in Nara routed the cereals through Bamako, they may prefer to avoid the risk of higher involvement in the assembly of cereals, given their lack of official authorization to export cereals. Conversely, this may also explain why Bamako traders do not export directly to Mauritania, as they do to other countries. The clandestine nature of the transactions between Nara traders and their Mauritanian counterparts may act as a barrier to entry of new participants, such as the Bamako or Koutiala traders.

A further explanation of why trade with Mauritania remains clandestine, and therefore impenetrable to outside traders, is perhaps because the non-convertibility of the Mauritanian currency (ouguiya) forces barter transactions. Restrictions on both sides of the border for the exchange of goods such as rice, wheat flour, sugar, and cloth imply that the operation was necessarily clandestine. These goods were either re-exported items (imported at subsidy by the Mauritanian parastatal SONAMEX from world markets in the case of rice and sugar) or food aid, in the case of wheat flour. The restrictions existed because the trade diverted government resources on the Mauritanian side and competed with local goods on the Malian side.

Another explanation for this situation may be that, according to results from field interviews, it appears the Bamako-Nara axis is less used in years when the Nara area has a relatively good harvest of millet. Thus, in these years, exports to Mauritania would be less linked to the system of domestic cereals markets than was the case in 1989-90.

The Case of Officially Registered Exports

For registered trade flows, such as to Sénégal and Côte d'Ivoire, the domestic markets (Kayes and Koutiala, respectively) bordering these countries were hardly involved in the exchanges in 1989-90. The domestic markets of importance were the

rural markets supplying the grain and the Bamako market, where the export operations were based.

A pertinent question is why Kayes traders don't compete with Bamako traders in exporting cereals to Sénégal. One reason may be that while traders in Bamako had access to credit and export subsidies, traders in Kayes did not. Secondly, traders in Bamako were likely to have more access to the necessary formalities, i.e., paperwork, for which transactions costs are likely to be higher in Kayes. Thirdly, while Mauritanian and Ivoirian traders were engaged in marketing activities directly in Malian border markets, field interviews in Kayes revealed no Sénégalaise presence in this market. Thus, the costs as well as the risk of exporting to Sénégal may have been higher than that which Kayes traders were willing or able to support.

7.2 A Comparison of Net Margins by Axis

A quick review of the comparative analysis between transfer costs and spatial margins carried out in Chapter V indicates that the difference between spatial gross margins and transfer costs varies considerably in magnitude between the various axes. This essentially confirms the finding in Chapter VI that factors other than cost influence gross spatial margins. Table 7.3 summarizes net spatial margins, equal to gross margins minus transfer costs, by axis and crop.

Table 7.3 provides a view of the variation in margins between axes. It indicates that gross margins are composed of factors other than cost. Through this comparison, it is possible to highlight several implications for Mali's export interests in the region.

The first point is that, for millet, both the Bamako-Nara and the Kolokani-Nara circuits exhibited net margins that were close to zero. This coincides with the conclusion from field interviews that this axis was clearly the most important for Mali's exports in

the region. The two other circuits where net margins were very close to zero are the Zangasso-Koutiala and Badinko-Kita axes, for both products. The Zangasso-Koutiala axis was also linked to the export of cereals to Côte d'Ivoire.

Secondly, the high levels of net margins for Kita-Kayes coincide with the absence of links to trade with Sénégal. In the long run, it is expected that these high margins will be pushed downward by new entrants in the market. However, in Chapter V, margins along this axis were shown to be relatively stable over the year under study. This indicates that, possibly, other factors may hold margins constant.

In the preceding discussion, the question arose as to why Kayes traders do not engage in cereals exports to Sénégal. Another argument may be that they were likely to gain more from selling on the local Kayes market than from exporting given these high net margins. This hypothesis requires an investigation of margins between Kayes and Senegalese markets, compared to Kita-Kayes margins.

In summary, it appears that axes with relevance to external trade flows had net margins close to zero, as theory would suggest is the case where competitive markets exist. On the other hand, highly positive net margins occurred where virtually no export activity existed, or where they may have been barriers to entry, i.e., the Kita-Kayes circuit. In the latter case, the potential for expansion to external markets exists, although at present, it has not been exploited.

7.3 Does Policy Matter?

The actual impact of the export liberalization policy on trade flows and margins is difficult to measure, given the lack of comparable data prior to the reform. However,

TABLE 7.3. Average Net Spatial Margins by Axis (FCFA/KG)

	Cost of Capital		Cost of Capital ⁸	
	Millet	Sorghum	Millet	Sorghum
I. TRAIN				
Badinko-Kita	0.85	1.37	-1.43	0.79
Kita-Kayes	12.31	11.17	11.63	10.49
Badinko-Bamako	3.43	5.80	2.42	4.79
II. GRAVEL				
Kolokani-Nara	-2.48	-12.59	-3.36	-13.47
Kolokani-Bamako	-8.16	-6.20	-9.04	-7.08
Bamako-Nara	2.42	-7.69	1.93	-8.18
III. PAVED				
Zangasso-Koutiala	0.35	0.81	0.13	0.59
Koutiala-Bamako	-3.78	-1.01	-4.00	-1.23

Source: Author's calculation based on surveys

this snapshot view of cereals markets in the first year of the reform can point to certain observations.

The effect of export policy liberalization, in concrete terms, seems to have had a perceptible impact only on registered trade. This effect would be largely attributed to the relative easing of the burden of exporting through officially recognized channels. On the other hand, it does not seem that the March 1989 liberalization reform had any impact on the unofficial trade destined toward Mauritania.

⁸ This figure is based on pro-rated opportunity cost of capital, using estimated interest rate of 24 % and survey information on length of storage.

The reasons behind this are twofold. The first issue is why, if exports were legalized and no longer taxed, clandestine activities continued. That is, why have traders who operated informally in past years not been encouraged to register their operations? Field interviews indicated that traders have a deep-seated mistrust of the authorities and therefore did not disclose their activities. Secondly, there appears to be a communication transfer problem at regional and sub-regional administration levels, demonstrated by the fact that border officials, including the customs and border patrol, were not informed of the change in export policy. Finally, there is the more plausible explanation that, although export taxes were lifted, an import-export license -- at a cost eight times higher than a domestic commercial license -- was still required in order to export legally. Thus, it appears that there remains a disincentive to operate within official channels as long as the export policy reform is not accompanied by a concession on trade licenses for cereals exports.

From the perspective of Mauritanian traders, there are also plausible explanations why trade remained clandestine. On the one hand, the issue of the non-convertibility of the Mauritanian currency seems to encourage barter rather than cash transactions, which in turn violates import rules in Mali aimed at protecting domestic industry. On the other hand, the Mauritanian government control of the re-export of subsidized imports and food aid forces the barter operation into the informal economy. In fact, much of Mauritanian trade within West Africa remains very much within tightly knit informal commercial networks, which extend as far as the Canary Islands. Paradoxically, while the government did not impose restrictions on imports of coarse grains, the weak ouguiya was the basis for the shadow operations.

The second issue involves traders who did have import-export licenses. Why have they not taken more advantage of the liberalization policy, and, specifically, why were there hardly any registered exports to what seemed a solid market in Mauritania? An important factor was that exports to Mauritania are based on long-standing and traditional networks of trade. Thus, ethnic and even familial ties may exist between traders in Mauritania and those in Nara. This is a mechanism that enables trade to continue outside of official boundaries, particularly in the period prior to liberalization. However, as revealed in field interviews, traders based elsewhere in the country still perceived, at present, the Nara-Mauritania market as impenetrable due to the nature of the closed relations among traders.

Beyond the March 1989 export policy reform, the promotion of Malian cereals exports in the region can be influenced by policies directed at strengthening domestic marketing. In particular there appear three areas in which policy may play an important role.

One role for policy is in the reduction of transfer costs, of which 72% was shown to be transport related. Transport costs were thus a very large part of total costs, and were themselves related to road infrastructure and regulatory payments on the road.

Secondly, the econometric analysis carried out in the preceding chapter indicated that there was a seasonality pattern in margins over the year. This seasonality was related to the constraint on marketing activities imposed by road conditions in the rainy months, as well as to patterns in production. The decomposition of transfer costs in Chapter V revealed that while transport shares were very high, the share of storage in transfer costs was in fact relatively low.

As transport costs are lowered from policies directed at transport activities, the transport share should also fall as the investment in storage increases as a result of policies to encourage storage, such as the PRMC credit program in 1988-90. However, this program needs to be directed at strengthening the capacity of traders interested in cereals exports, including those located in border markets. The issue remains, however, why this storage is not taking place currently without government or donor subsidies, which are unsustainable in the long term. Traders, in the course of field surveys, appear keenly interested but financially incapable of investing in storage. It is unclear whether this lack of financial capacity was due to the non-profitability of storage in Malian cereals marketing (given its volatility) or whether traders simply lack the resources to exploit the market fully.

Finally, a third observation is that specialization in cereals marketing appears to be negatively related to export activities, at least for traders engaged in informal trade. The implications of this are that, in the first place, export activities may be linked to either re-exports of imported items in neighboring countries, or that cereals exports were used to compensate or "mask" other commercial activities. The diversified business practices of traders located in border markets appeared to be tied to the weakness of the Mauritanian currency, as well as being perhaps an important risk management strategy. An interesting question is what will happen as the government's import substitution campaign, "consommer Malien" continues to clamp down on border markets. Several traders in Kolokani expressed frustration at not being able to sell the bartered goods easily. There were two effects of these tightened controls. On the one hand, the shadow market rate for the CFA rose relative to the ouguiya, in 1989-90, with the CFA rising from .25 ouguiya to .33 ouguiya, according to traders in the market. On the other hand,

the value of the "contraband" barter goods also rose as the supply was restricted due to higher transfer costs involved in smuggling operations. The possible impact of this will be that the profitability of these operations is lowered, as the price gap between local goods and imports narrows, causing demand for imported goods to fall. Thus, the tendency of border trade would appear in favor of non-barter transactions over the long term. In fact, field surveys confirmed that this process was taking place, with the major operations in Nara occurring in cash and small scale exchanges with traders in Kolokani typically in barter terms. In terms of a farsighted trade strategy, it seems unlikely that officially registered trade to Mauritania can expand without relaxing restrictions on the imports of Mauritanian goods, which enable Mauritians to earn the CFA needed for their transactions with Mali.

7.4 Lessons and Issues for Further Research

Marketing in Mali

In viewing the cereals marketing system in Mali, from a domestic perspective, the question of how net margins for the Kita-Kayes circuit can be maintained at very high levels merits further investigation. This entails a closer investigation of the structure of transfer costs in order to test whether the costs obtained in this survey were underestimated. Secondly, an in-depth investigation of the transactions costs of using train transport needs to be carried out in order to test whether high profits are absorbed by the railway authorities through bribes or by the traders in Kayes, through artificially fixed prices.

As regards the cross-border trade between Mali and Mauritania, further investigation needs to be taken, identifying which traders are engaged in either barter or cash transactions, in order to distinguish (a) how the barter market functions and (b)

what the effects of the "consommer Malien" campaign are likely to be on future trade patterns.

In terms of understanding the pattern of trade in West Africa, this study would benefit from two follow ups. First, similar studies of the marketing systems of Mali's trading partners, namely Sénégal, Côte d'Ivoire, and Mauritania, would provide useful reference points for the analysis carried out in this study. Secondly, expansion of the list of products studied to include groundnuts and livestock would provide a more accurate picture of the magnitude and linkages within trade patterns in the region.

Methodology of Cost Analysis

From a methodological standpoint, the analysis of costs revealed that the proportion of transport costs between vehicle owners and non-owners is roughly equal, implying that transport markets operate competitively. At the same time, the question of backhaul was not addressed in this study. It would be useful in follow-up research to determine how to quantify and account for the revenue of backhaul along the various circuits, and to test how this effect changes the real costs of vehicle owners.

Another issue regarding the measurement of transfer costs is in the share of coordination costs, which in this study were not distinguished as official versus "under the table". Thus, while coordination costs represented 23% of total transfer costs for vehicle owners, it is not clear what proportion is due to unofficial payments that result indirectly from official policy.

Given the complexity of the Malian marketing operation, another important area of further "untangling" is related to attributing costs to a given circuit, a given product, and to a given volume. In the typical case where the trader's operation is based on a large number of circuits and a large variety of products, the measurement of costs will be

biased upward if they are not scaled to the proportion due to a given product along a given circuit. This scaling requires careful measurement of the entire commercial operations of the trader, including backhaul. This scaling can be based on either revenue from transactions, or volume/frequency of operations, or, alternatively, the allocation of labor.

Finally, the econometric analysis demonstrated that a Ravallion type model could be enriched by (a) including a measure of transfer costs and (b) modeling a simultaneous system of margins, flows, and costs. Two further steps that would shed light on the question of market integration would be (a) to obtain seasonally and annually variant costs, through at least a two-season survey of traders (ideally, in the immediate post-harvest and the pre-rainy seasons), and (b) to model a dynamic system in which margins and costs in the previous period are included as right hand variables.



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