GRAIN MARKETING DECISIONS
OF SUBSISTENCE FARMERS
IN BURKINA FASO

by

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ABSTRACT

In the literature on household marketing behavior there is very little work on within the year variation of grain marketing by individual households, and in particular the effect of their other assets on the marketing of grain. This paper will argue that socioeconomic status affects the timing of grain sales, and that subsistence farmers substitute between grain and other assets for the generation of income. The data comes from weekly budget surveys conducted during 15 months with 118 households in three villages in Manga, a surplus region of Burkina Faso (Upper Volta).

RESUME

La littérature sur le comportement d'un ménage par rapport à la commercialisation peu de la variation saisonnière de la vente de céréales. En particulier, il existe peu de travaux concernant l'influence des autres avoirs d'un ménage sur la vente de céréales. Ce rapport soutient que le niveau socio-économique exerce une influence sur la prise de décision concernant le moment où l'on vend des céréales, et que les paysans dont la production est orientée vers l'autoconsommation substituent d'autres biens aux céréales pour générer du revenu. Les données proviennent des enquêtes hebdomadaires sur le budget. Ces enquêtes ont duré 15 mois et concernent 118 ménages dans trois villages dans Manga, une région du Burkina Faso dont la production est excédentaire.
CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABSTRACT</td>
<td>iii</td>
</tr>
<tr>
<td>LIST OF TABLES AND FIGURES</td>
<td>vii</td>
</tr>
<tr>
<td>INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>I. REVIEW OF METHODOLOGIES AND FINDINGS OF PAST STUDIES</td>
<td>2</td>
</tr>
<tr>
<td>II. AGRICULTURAL CHARACTERISTICS OF THE MANGA REGION</td>
<td>7</td>
</tr>
<tr>
<td>III. A RESOURCE ALLOCATION OF HOUSEHOLD MARKETING BEHAVIOR</td>
<td>10</td>
</tr>
<tr>
<td>IV. INTRAANNUAL MARKETING BEHAVIOR OF MANGA FARMERS</td>
<td>14</td>
</tr>
<tr>
<td>When do Households Market Grain?</td>
<td>15</td>
</tr>
<tr>
<td>Are Farmers Forced to Sell?</td>
<td>18</td>
</tr>
<tr>
<td>Trade-Offs Between Assets to Generate Revenue</td>
<td>25</td>
</tr>
<tr>
<td>V. CONCLUSIONS</td>
<td>27</td>
</tr>
<tr>
<td>BIBLIOGRAPHY</td>
<td>29</td>
</tr>
</tbody>
</table>
LIST OF TABLES AND FIGURES

Table                                                                 Page

1. Annual Grain Transactions of the Sample, October 1979 - September 1980 ........................................ 16

2. Sample Households in Different Net Buyer/Seller Categories ......................................................... 17

3. Net Value Position of Households Who Follow Different Transactions Patterns .................................. 17

4. Net Value Position from Grain Sales of Households in Different Socioeconomic Categories .................. 19

5. Grain Transactions Behavior of Households in Different Socioeconomic Categories .......................... 19


7. Net Value Position in Different Periods for Households in Different Wealth Groups .......................... 20

8. Average Percentage of Annual Grain Transactions in Different Quarters for Households in Different Socioeconomic Groups ................................................................. 22

9. Frequency of Reasons Given for Individuals Grain Sales and Individual Animal Sales .......................... 24

10. Percentage of Revenue Obtained from Different Sources for Households in Different Socioeconomic Groups ........................................................................................................ 26

Figure                                                                                                           Page

1. The Agricultural Calendar (Includes Animal and Grain Price Trends) .... 9
INTRODUCTION

Many of the governments of sub-Saharan Africa intervene directly in their grain markets. Although their market shares vary, the interventions often take the form of fixing uniform buying and selling prices throughout the year for each of the major food staples. There are two important reasons used to justify this policy: (1) the need to provide regular and inexpensive food to urban and other grain deficit regions, and (2) the belief that many farmers are "forced" to sell grain soon after harvest to repay debts and fulfill other financial obligations, which enables traders to buy grain at very low prices at harvest. Some studies have been done to examine whether, and for whom, this second belief is valid, but they have drawn conflicting conclusions. This may be due to the methodologies used to test the hypotheses, rather than because the farmers in different regions behave fundamentally differently. This paper examines the within-year variation of the grain marketing behavior of individual households: when farmers buy and sell grain, why, and how the timing of grain transactions relates to the timing of other economic activities. It specifically addresses the question of whether farmers in Burkina Faso (Upper Volta) are forced to sell grain at harvest.

It is a major premise of this research that when deciding both what to produce and later what to market the farmer takes into consideration all of his assets. Farmers produce many products other than grain, such as cash crops, animals, and artisan goods. Therefore, household behavior with respect to grain must be examined within the context of the entire household economy, not as if grain were an isolated output. In addition, it is important to consider both sales and purchases of grain since many farmers do both. This approach is wholly consistent with economic theories of resource allocation and models of production and consumption behavior. It is different, however, from the standard way in which grain marketing behavior is usually analyzed, which focuses on sales alone. This approach does not lend itself easily to using multiple regression. We examine the data from several angles using a combination of statistical techniques.

Hypotheses about the effect of the household's other assets and its socioeconomic status on marketing behavior were derived from a three-good, two-period model of farmer behavior. These hypotheses are tested using data
from weekly budget surveys collected during 15 months with 116 households in three villages in Manga, a grain surplus region of Burkina Faso.

The paper begins with a review of the methodologies and findings of other studies that have investigated the sales behavior of subsistence producers in West Africa, which points out the ad hoc way this topic has been approached in the past. The second section briefly discusses the agricultural economy of Manga, the research site, focusing attention on areas which are important for developing a model which captures the essential features of the dynamics of the household economy. Section III summarizes the resource allocation model used to develop the hypotheses which are the basis of the analysis. Section IV analyzes the marketing behavior of the sample households.

Section V concludes that there are important differences in marketing patterns among different socioeconomic groups. The poorer households tend to be net buyers of grain, while richer farmers are net sellers. Poorer farmers tend to sell grain at lower prices than wealthier farmers, and they buy grain at prices higher than those at which they sell. The farmers in the sample generate more revenue from animal sales than from grain sales. And finally, it is clear that there are trade-offs between different assets for revenue generation in different periods. Both rich and poor households tend to rely relatively more heavily on grain for revenue in the harvest period, and on animals in the dry season. This behavior is economic given the intraannual changes in relative prices of different products.

I. REVIEW OF METHODOLOGIES AND FINDINGS OF PAST STUDIES

There is a diverse literature on the marketing behavior of agricultural households in West Africa. Some studies focus on marketing, usually including a section on household behavior, and one on the regional or national distribution system. Others focus on production, but include an analysis of marketing behavior. A third group, interested in examining the relationships and mechanisms which affect the farmer's socioeconomic status, looks at marketing patterns and their effect on the economic status of households.

Within these groups, the analysis of marketing behavior falls into one of three categories, according to its principal objective: to describe the
marketing patterns and interactions of individual households in the market; to examine the marketing behavior of different producers, and the economic effect of these various patterns on the household; and to explain observed social phenomena like poverty cycles and reinforced class structure. Within each category, the analyses use variations of the same methodology.

There are relatively few studies whose stated purpose is to understand or describe household marketing behavior, and they are usually coupled with work on a regional or national marketing system. In each of the works reviewed, a major purpose is to describe the peasant's interaction with the market, and to assess the constraints which the marketing system imposes on the producer.

For West Africa, Hays' (1977) study of marketing of foodgrains in northern Nigeria is the major example. Hays looks at patterns with regard to the timing and quantity of sales. He is specifically interested in analyzing whether or not peasants are forced to sell soon after harvest, when prices are low -- an explanation often given for the large quantities available on the market during that period. To address this question he calculates the percent of sales occurring in each of two six-month periods: postharvest, from September to February; and preharvest, from March to August. Finding that very little is sold at harvest, he concludes that the peasant is not forced to market. Approximately 70% of the grain destined for sale is held off the market until the last six months before the harvest. This, he states, is consistent with Gilbert's (1970) findings for northern Nigeria: that farmers held their surpluses for sale in the latter half of the year. This technique is often used in production studies to describe marketing behavior, in addition to presenting summary statistics on the quantities and proportion of the harvest marketed.

In a recent study of the farming system of the eastern region of Burkina Faso, using a slightly different technique, Michigan State (1980) confirms the hypothesis of "forced sales". Looking first at the proportion of sales and purchases occurring in 13 four-week periods, they compare the ratio of sales to purchases in each period. From this data they conclude that sales occur primarily at harvest, and purchases during the preharvest hungry season.

Ross (1979), in his study of village level grain transactions in Senegal, found that most sales (66%) occur in the six postharvest months. Nevertheless, because sales are divided over this period and occur throughout
the entire year, he concludes that these data do not support the hypothesis about "forced sales".

Matlon's (1976) study of income distribution among farmers in northern Nigeria is an excellent example of research that looks broadly at the household economy and focuses on the interaction of its various components, of which marketing of agricultural output is one. Households in different income strata are presumed to have different marketing patterns. He develops two different approaches to analyze the differential impact of marketing patterns on revenue or income, each based on a different assumption about the effect of price changes on household behavior.

Based on the assumption that household consumption is price elastic, he calculates a price-adjusted value of the harvest by applying monthly grain prices to the proportion of each crop sold and domestically consumed in a given month. Looking at the production shares of each crop stratified by income class, he infers the distribution of gains and losses due to price changes. For each income stratum he calculates the gross value of production less purchases of each crop. Expressed as the percentage of net household income, this reflects the changes in real income which accompany price movements. From these statistics he concludes that price changes in foodgrains affect lower income households more proportionally.

The second approach is based on the assumption that price changes affect the household's purchasing power. Combining sales and purchase data to estimate the net impact of price changes on real income, he finds that the sales/purchases ratio increases with income. He concludes that the poorest households market a greater proportion of their crop than wealthier households and also purchase a larger amount.

Matlon also tests a variation of the "forced sales" hypothesis: that lower income farmers market a greater proportion of their crops soon after harvest than higher income farmers. Elaborating on the relationship between the timing of sales and the proportion sold at a particular time, he hypothesizes that the disposal of a greater proportion of marketed crops immediately following the harvest coincides with the price-trough period. This implies a loss in real sales revenues to poorer households relative to wealthier ones for equivalent volumes marketed. To test this hypothesis he looks at the proportion of sales by month for each crop.
Matlon finds that during the observation period there was no consistent and significant price advantage accruing to higher income households due to late sales. He also concludes that the difference in net sales revenues between the richest and poorest households due to timing of sales is not great. Although not explicitly stated, these conclusions bear on the discussions about the cycle of poverty, and intensified inequality, themes of much of the anthropological work on the rural economy in West Africa.

The major works which address the grain economy at the household and village levels are about the Haussa (Sutter, 1982; Raynaut, 1973; Hill, 1972). Both Raynaut and Hill look at the role of grain trading in intensifying inequality between actors in the rural economy. Raynaut focuses on the transactions of a small sample of farmers within a village. He shows that a large volume of trade does not indicate wealth, but in fact, the opposite. Not only is a surplus unnecessary for trade to occur, but often trade takes place because grain stores are insufficient. The terms of trade are not advantageous to the producer, and therefore his situation is made worse. Hill also focuses on inequality within the village. She examines grain transactions as a potential cause of inequality. Both carefully describe grain trading in the village, including the relationships between transacting partners.

Sutter is interested in the processes that lead to rural differentiation. He tries to show that crop production and the level and timing of sales differ between economic groups, and that those differences are important factors in the process of inequality. To examine differences in grain sales and purchase behavior between groups, he divides his sample into four economic groups, according to the size of household grain stores at harvest (as judged by prominent villagers). He finds a positive association between sales as a percentage of net harvest value and relative poverty. In the context of the small amount (1-3%) of the harvest that was sold, poorer households make a significantly higher percentage of their sales in the low price period, than do richer ones. There is a 20 CFA/kg difference in the price received by richer and poorer households. He concludes that timing of sales is indicative of a process within which rural inequality becomes intensified. Similarly, poor households paid a higher price (5 CFA/kg more) for equivalent volumes purchased. Almost everyone purchased some grain -- in small amounts and at
frequent intervals. He found a direct relationship between cash outlay on grain and economic strata.

All three of these studies conclude that there is a difference between different groups of farmers in the timing of their grain marketing activities, and that this increases economic inequality within the village. These conclusions are similar to those of the production and marketing studies discussed earlier. It is worth noting that the more detailed the analysis, the more specific are the conclusions, and the clearer are the distinctions between economically different behaviors.

The description of the first group of studies is useful for understanding the various disposal patterns. The model of household behavior presented in Section III, for example, includes many of the relationships that are highlighted in the above descriptions: the relationship between the sales of grain, the need for cash, and the level of household expenditures, or the sales of grain and the sales of other goods. We need a methodology to formally examine the relationships between these variables.

While the idea of dividing the year into periods because of the change in prices over time is a good one, six-month periods are too long, and the households are too varied for the conclusions to be significant. None of the studies, except Matlon's, recognize that socioeconomic differences between households may influence the timing of sales (though they all recognize the converse).

The methodologies used in the economic anthropology literature are particularly important because they fit grain marketing activities into the larger socioeconomic environment of the household. In doing so they identify important relationships between people, and between activities. The data presented, however, are often too limited for the conclusions drawn.

The works reviewed all attempt to describe the grain marketing patterns of households, and some try to explain the differences. In general, however, they are not very comprehensive, perhaps because intraannual grain marketing behavior is not their focus, but rather one piece of a larger analysis. More importantly, their analyses are somewhat ad hoc. The hypotheses come from either the conventional wisdom or implicit models that are not well explained, and thus there is no way to evaluate their logic. Before we present our model, however, Section II discusses the characteristics of the West African farming economy.
II. AGRICULTURAL CHARACTERISTICS OF THE MANGA REGION

The major agricultural activities in the research area are crop production and herding, supplemented by poultry raising.¹ All the Mossi peasants grow crops, even if only in small amounts. Those who can also raise goats, sheep, and cattle. Almost all courtyards have some poultry. The cattle of the nomadic herders also graze in the village and surrounding bush lands.

There are two distinct seasons: dry and wet. The dry season lasts from November through April and the wet season from May through October, though the first sporadic rains (the mango rains) begin in late March and April.

The predominant food crops are red and white sorghum, pearl millet, maize, and peanuts, supplemented by rice, cowpeas, and bambara nuts (pois de terre). Red sorghum, used to make beer, also serves as a cash crop. Farmers may grow condiments, such as leaves and okra, and vegetables.

The nature of subsistence farming is such that foodcrops are both the production and consumption goods of the agricultural household. Even commercially oriented farms produce foodcrops for home consumption. Members of the nuclear or extended family constitute the producing and consuming units, although the composition of each unit may differ for each activity, and may vary between families. Production and disposal (consumption and distribution) occur simultaneously and continuously.

Although production occurs throughout the year, cropping activities, including cultivating, planting, weeding, ridging, and finally harvesting and threshing are concentrated between April and December. Soil preparation may begin as early as February. Because the ideal planting date and growth pattern for each crop are different, families can stagger their work on each. At the end of the growing season new granaries are built and old ones repaired. Once the rainfed crops are harvested and threshed, general household repairs begin. Dry season production activities include gardening, weaving, ceramics, forging, leather working, and sewing, as well as the year-round raising of poultry and livestock.

In mid-August maize matures. This serves as the security crop for farmers who do not produce enough of the other grains or who have sold too much during

¹These are the major activities of all peasant groups in Burkina Faso, though the mixture of crops varies. Herders' activities are different.
the year. The maize harvest is followed by early peanuts, and then in late September/early October red sorghum is cut, dried and harvested. A late variety of peanuts is ready in October, as are cowpeas and bambara nuts. In mid-to-late November the pearl millet and white sorghum mature and are harvested.

Consumption of agricultural and nonagricultural items occurs throughout the year, though not necessarily in constant amounts. Additional expenditures are made during certain seasons. The period of traditional feasts is from November through March. It includes weddings, baptisms, funerals, circumcisions, and chief's festivals, and sometimes Moslem holidays. Christmas is celebrated by everyone. All of these events require special expenditures for meals, beverages, new clothes and incidentals.

The prices of agricultural products have annual cycles. Grain prices fall at harvest and rise steadily throughout the dry season and early parts of the rainy season, peaking about a month before the first harvest. A similar trend exists for other crops -- peanuts, cotton, and cowpeas. Animal prices are lowest in May/June and begin to rise as grass becomes more abundant in the rainy season. They peak in January/February.

The following list summarizes the household's major production and consumption activities. Figure 1 depicts the timing of the activities in relation to each other, and the price cycles of grains and animals.

1. Cropping activities result in a harvest which begins in August and continues through December. The particular mix of crops depends on tastes, soil characteristics, labor availability, other inputs, and planning for future marketing needs.

2. The family may raise livestock and poultry.

3. Income earning activities include: selling grain, other crops, livestock, poultry, artisan goods, vegetables, gathered products, and labor and doing commerce.

4. Regular expenditures are made for household necessities: cola nuts, tobacco, sauce materials, cloth, batteries, and other consumer items.

5. Seasonal expenditures are made for feasts, taxes, and production equipment.
FIGURE 1 THE AGRICULTURAL CALENDAR

MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC JAN FEB

- Land Preparation
- Planting
- Weeding
- Mounding
- Harvesting
  - Corn
  - Red Sorghum
  - Peanuts
  - Pearl Millet
  - White Sorghum
  - Cowpeas
  - Rice

- RAINS
- Threshing
- Building Granaries

- Artisan Activities
- Festivals & Funerals
- Taxes due

GRAIN PRICE TREND

ANIMAL PRICE TREND
III. A RESOURCE ALLOCATION OF HOUSEHOLD MARKETING BEHAVIOR

Consider the following stylized story. A mixed farming household begins the year (postharvest) with an amount of grain and a herd of animals which it must allocate to different activities. It likes (and needs) to consume some combination of grain, animals and other goods. The household's objective is to maximize its well-being. The household knows that the prices of its goods vary during the year. Its animals grow, reproduce, and die. If it has cash, neighbors and relatives may try to borrow money, which may not be reimbursed. This is the story behind the model discussed below.

The time frame of the model is one year, which is divided into two periods.\(^2\) We assume that the household produces two goods, A and B -- grain and animals. It begins the year with a "harvest" or endowment of each good A and B.\(^3\) The household can consume, store or sell each of them. It also consumes C, a nonhome produced item available at the market.

The household seeks to maximize its welfare which is a function of the consumption of A, B, and C in each period. We shall assume an additively separate utility function.

\[
\text{Max } U(C_{a_1}, C_{b_1}, C_{c_1}) + U(C_{a_2}, C_{b_2}, C_{c_2}) \quad (1)
\]

where

\[
C_{a_1} = \text{ the amount of A consumed in period } i,
\]

\[
C_{b_1} = \text{ the amount of B consumed in period } i,
\]

\[
C_{c_1} = \text{ the amount of C consumed in period } i.
\]

To subsist, the household must consume at least some minimum combination of A and B in each period.

\[
k_a C_{a_1} + k_b C_{b_1} \geq k_1 \quad (2)
\]

\[
k_a C_{a_2} + k_b C_{b_2} \geq k_2 \quad (3)
\]

\(^2\)Clearly the year can be divided into more periods, but from two we can generalize to more.

\(^3\)This assumption, that the goods are harvested at the same time, is only somewhat realistic. Crops are not harvested simultaneously. The difference in harvest time between crops may be an important reason for the sale of one versus another — lack of availability.
where \( k_a, k_b \) = the caloric content of A and B respectively,

\[ k_i = \text{the minimum caloric requirement for the household in period } i. \]

Prices of all goods can vary between periods. There is a budget constraint in each period. The value of what is consumed, held in inventories, and cash saved must be less than or equal to the value of the endowment at the beginning of that period.

For period one:

\[
P_{a1} C_{a1} + P_{b1} C_{b1} + P_{c1} C_{c1} + P_{a1} I_{a1} + P_{b1} I_{b1} + S \leq P_{a1} A + P_{b1} B
\]  \[ (4) \]

For period two:

\[
P_{a2} C_{a2} + P_{b2} C_{b2} + P_{c2} C_{c2} \leq \alpha S + P_{a2} I_{a2} + P_{b2} (1+\delta) I_{b1}
\]  \[ (5) \]

Where

\( P_{a1} = \text{price of A in period 1.} \)

\( P_{b1} = \text{price of B in period 1.} \)

\( P_{c1} = \text{price of C in period 1.} \)

\( I_{a1} = \text{amount of good A held as inventory at the end of period 1.} \)

\( I_{b1} = \text{amount of good B held as inventory at the end of period 1.} \)

\( S = \text{the amount of cash saved at the end of period 1.} \)

\( \alpha = \text{percent of reimbursed cash.} \)

\( \delta = \text{net rate of growth of animals from period 1 to period 2.} \)

Because the solution to this problem is rather involved, we only summarize the results. To maximize its welfare, the household decides how much of its wealth to consume today, and how much to transfer to the future. Both the consumption and inventory decisions depend entirely on the expected rates of
wealth to consume today, and how much to transfer to the future. Both the consumption and inventory decisions depend entirely on the expected rates of return of its various assets, A, B, and cash, taking into account the expected growth in the herd (B), and expected depreciation of cash held due to unreimbursed loans. The solution involves converting (by sale) all assets into the one whose expected return is highest. Only if the highest expected return is the same for two or more of the assets will the household hold a combination of the goods.

Although this model allows us to examine the role of prices in the household's decision of what goods to sell at different times during the year, the deterministic form of our model has some severe limitations. Usually, a household does not sell all its grain to invest in animals (or vice versa). Few households have an all-or-nothing sales strategy. This type of behavior is inconsistent with the reality of rural life.

The model presented includes no risk aversion, and it considers all goods as totally "fungible." Farmers are risk averse, however. The use of grain for subsistence affects a producer's decision whether to sell all his produce at one point in time because he knows he will need cash to buy grain later during the year.

A similar model with risk aversion would result in the household holding a more balanced portfolio from one period to the next. The inventory of each good would change in response to relative prices, but it would not be an all-or-nothing adjustment. A household would sell the good whose relative price was expected to increase the least. Regardless of whether it is animals or grain, we would not expect a household to sell it all. The balance in the portfolio would be maintained both because the farmer cannot be absolutely sure of future prices, and because of the security value of grain and the savings value of animals. Farmers' decisions would reflect the trade-offs among income, security and risk.

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4Another limitation of the model is the fact that it covers only one year. We know that in reality farmers make decisions regarding carry-over stocks. This is particularly important in the pre-harvest period, when the prices of crops are high. The farmer must make choices between immediate revenue, storage costs, and the risk that his coming harvest will be insufficient to meet his family's consumption needs. To be more realistic, the welfare function in the model should include these trade-offs.
There is no explicit sales variable in this model. The key decision variables are inventories. However, this does not mean that sales are absent from the model. Selling (or buying) is a means by which households adjust their inventories to their desired levels: if the household wants to hold less than it has, it sells; if it wants to hold more, it buys. It is not possible to obtain a determinate solution for the effect of prices on sales without knowing the utility function.

Another important result from our model is that the solution is independent of the size of the endowment. Therefore, for a given price regime the optimal strategy is the same regardless of the household's endowment or wealth. No doubt, the household's endowment does affect the absolute amount of each good consumed and the amount of goods held from one period to the next. It does not, however, affect the choice of good.

We can extend this result to households with different levels of wealth (socioeconomic status), or different initial asset mixes. It implies that all households facing the same rates of return for the different assets will hold inventories in the same goods.

What can we say about sales patterns? Marketing patterns depend on the interaction between desired inventories and endowment (initial inventories). Therefore, sales patterns are a function of prices (which determine inventory strategy), endowments, and consumption patterns.

Consider the following example. Prices are such that the desired pattern of inventories is to hold grain and not animals or cash. In such a situation all households will sell their animals and buy grain. Obviously, those with more animals will sell more, and therefore increase their inventory of grain by more than will households with fewer animals. In the second period, everyone will sell grain. How much will depend upon the level of consumption of each in both periods. A more determinate result is unfortunately not possible.

Thus, the results of the model predict that the relative prices of the different goods a household produces affect the relative quantities of inventories of each good in the different periods. In the first period the household will convert some of its assets into the good whose relative price is expected to rise the most.\(^5\) It also predicts that although the amounts

\(^5\)The precise balance depends on a combination of risk and the expected return of the different assets.
of other goods available to the household do not influence which goods are held, they do affect the magnitude of the inventory changes. Marketing grain is one way the household adjusts its inventories to their desired levels. We hypothesize that the same variables which affect inventory behavior also affect grain sales.

Specifically, we hypothesize that:

1. The marketing patterns for grain reflect the relative price of grain vis-à-vis the other revenue generating opportunities farmers have.

Referring to Figure 1, we note that the price of grain relative to animals is higher in the harvest period than in February or March. Thus if farmers are responding to relative prices, and have animals which they could sell, it would be more economic to sell grain just after harvest than in the festival season (January-March). This leads us to the following hypothesis about forced sales.

2. Socioeconomic status of farmers has an important effect on grain marketing patterns in so far as it is a proxy for the alternatives farmers have.

   a) Wealthier farmers, because they have other means of generating income, can sell grain when it is most advantageous, in terms of relative prices.

   b) Poorer farmers, because they have fewer revenue alternatives, must sell grain at less opportune times.

IV. INTRAANNUAL MARKETING BEHAVIOR OF MANGA FARMERS

Although the model predicts that each household has the same strategy, the marketing patterns which result from the execution of this strategy differ according to the economic constraints within which households operate -- the resource endowments, and the prevailing price regime. The amount of a good sold in the first period depends on its price, its expected price change, the total amount of each good available, and of course the individual household's utility function.

The marketing pattern is the combination of marketing activities that occur during the year: the juxtaposition of the buying and the selling of grain, and the buying and selling of other goods produced by the household. It incorporates the timing of marketing activities -- what occurs at low
First we examine the data on types of transactions, socioeconomic status, and the net marketing position of households to determine whether and how the marketing patterns of households differ. Then we look at whether the timing of sales supports the forced sales hypothesis, and whether wealth explains differences in the timing of sales. Finally, to examine which households can be considered forced to sell, we look at the timing of other revenue-generating activities in relation to grain sales. Through the individual analyses we have a more complete picture of the relationship between grain sales, other economic activities and household wealth.

When Do Households Market Grain?

To begin, we consider the grain sales of the entire sample together (Table 1). The largest percentage of grain is sold during the harvest season. Sales then taper off until prices reach their peak in July/August when there is an increase in sales until the next harvest. Almost 60% of all grain is sold during the first six months after harvest. This behavior is in contrast to Hays' findings for Nigeria (30% sold in the first six months).

The data show a relatively even flow of purchases throughout the year, with a slightly higher percentage in the first and third quarters. Further analysis will show the pattern of different subgroups within the sample.

We classify the household's aggregate marketing pattern according to two criteria: what kind of transactions are made (sells only, buys only, buys and sells, or doesn't trade); and whether the household is a net seller, net buyer, or neither.

The net seller/buyer categories can be defined either by the volume sold or by the value sold. Table 2 compares these two categorizations for our sample. Six households are net volume sellers but net value buyers. They are from the two poorest wealth groups. The other 110 households remain in the same category regardless of the method of calculation.

6An additional dimension is the particular crop that is traded. Hays, for example, found that large and small households in Northern Nigeria choose differently between millet and sorghum when deciding which to sell.

7The reader is reminded here that neither the village nor the sample is a closed system.
<table>
<thead>
<tr>
<th></th>
<th>Oct-Dec Harvest</th>
<th>Jan-Mar Dry Season</th>
<th>Apr-June Hot Season</th>
<th>July-Sept Wet Season</th>
<th>Annual Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Grain Sales:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(in kg.)</td>
<td>5409</td>
<td>4136</td>
<td>2735</td>
<td>3831</td>
<td>16116</td>
</tr>
<tr>
<td>Percent of Annual</td>
<td>33%</td>
<td>26%</td>
<td>17%</td>
<td>24%</td>
<td></td>
</tr>
<tr>
<td>Annual Sales</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Grain Purchases:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(in kg.)</td>
<td>2995</td>
<td>1875</td>
<td>2320</td>
<td>1854</td>
<td>9044</td>
</tr>
<tr>
<td>Percent of Annual</td>
<td>33%</td>
<td>21%</td>
<td>26%</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td>Annual Purchases</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Net Sales:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(in kg.)</td>
<td>2414</td>
<td>2261</td>
<td>415</td>
<td>1977</td>
<td>7067</td>
</tr>
<tr>
<td>Percent of Annual</td>
<td>34%</td>
<td>32%</td>
<td>6%</td>
<td>28%</td>
<td></td>
</tr>
<tr>
<td>Annual Net Sales</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### TABLE 2
SAMPLE HOUSEHOLDS IN DIFFERENT NET BUYER/SELLER CATEGORIES

<table>
<thead>
<tr>
<th>Net Value Category</th>
<th>Net Value Buyer</th>
<th>Equal</th>
<th>Net Value Seller</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net Volume Buyer of grain</td>
<td>37</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Equal</td>
<td>0</td>
<td>2(^a)</td>
<td>0</td>
</tr>
<tr>
<td>Net Volume Seller of grain</td>
<td>6</td>
<td>0</td>
<td>71</td>
</tr>
</tbody>
</table>

\(^a\)These households made no transactions.

### TABLE 3
NET VALUE POSITION OF HOUSEHOLDS WHO FOLLOW DIFFERENT TRANSACTION PATTERNS

<table>
<thead>
<tr>
<th>Grain Transaction Categories</th>
<th>Net Value Buyer of Grain</th>
<th>Equal</th>
<th>Net Value Seller</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Transaction</td>
<td>0</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Sells Only</td>
<td>0</td>
<td>0</td>
<td>26</td>
</tr>
<tr>
<td>Buys Only</td>
<td>8</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Sells and Buys</td>
<td>35</td>
<td>0</td>
<td>45</td>
</tr>
</tbody>
</table>
Table 3 shows the net value position of the sample households who follow different transaction patterns. The majority (90%) of the sample either sells only or both buys and sells grain during the year. Tables 4 and 5 present the transaction and net value categories (respectively) for households who are in different socioeconomic groups.8

It seems clear from these tables that in general poorer households are net purchasers of grain and wealthier households are net sellers. Of the households who both buy and sell about 35% are in the poorest category. From Table 6 we see that 71% of them are net value buyers. Proportionally more of the wealthier households are net sellers than net buyers.

Finally we look at the net value position of households in different wealth groups during different times of the year, Table 7.

Wealthier households are net sellers throughout the year. Poorer households are net sellers early in the year and net buyers in the last two quarters. The households in the two middle wealth groups also tend to sell early, but a smaller proportion of them are net buyers in the last two quarters.

It is clear from these tables that there are important differences in the marketing behavior of households who are in different socioeconomic groups. We observe a tendency for poorer households to sell proportionally more of their grain earlier in the year than wealthier households, and to purchase proportionally more later in the year. Wealthier households seem to sell at both the beginning and end of the year (only two households in group 4 are net buyers).

Are Farmers Forced to Sell?

The conventional wisdom is that "farmers are forced to sell grain just after the harvest when prices are low." The term "forced sales" refers to an assertion that the farmer is selling grain to meet financial obligations which come immediately after the harvest, such as repaying loans and paying for traditional feasts and funerals. It implies that the farmer would prefer to sell something else but sells grain because he has nothing else to sell, and needs cash. We shall examine two variations of this hypothesis.

8The households were grouped according to relative amounts of capital goods — bicycles, plows, other agricultural equipment, furniture, etc.
### TABLE 4
NET VALUE POSITION FROM GRAIN SALES OF HOUSEHOLDS IN DIFFERENT SOCIOECONOMIC CATEGORIES

<table>
<thead>
<tr>
<th>Socioeconomic Groups</th>
<th>Group 1 Poorer</th>
<th>Group 2</th>
<th>Group 3</th>
<th>Group 4 Wealthiest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net Value Buyer N=43</td>
<td>23</td>
<td>9</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>Equal N= 2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Net Value Seller N=71</td>
<td>12</td>
<td>20</td>
<td>24</td>
<td>15</td>
</tr>
<tr>
<td>Total</td>
<td>37</td>
<td>29</td>
<td>33</td>
<td>17</td>
</tr>
</tbody>
</table>

### TABLE 5
GRAIN TRANSACTIONS BEHAVIOR OF HOUSEHOLDS IN DIFFERENT SOCIOECONOMIC CATEGORIES

<table>
<thead>
<tr>
<th>Grain Transaction Categories</th>
<th>Socioeconomic Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Group 1 Poorest</td>
</tr>
<tr>
<td>No Transactions</td>
<td>2</td>
</tr>
<tr>
<td>Sells only</td>
<td>4</td>
</tr>
<tr>
<td>Buys only</td>
<td>3</td>
</tr>
<tr>
<td>Sells and Buys</td>
<td>28</td>
</tr>
<tr>
<td>Total</td>
<td>37</td>
</tr>
</tbody>
</table>
### TABLE 6

**NET VALUE POSITION OF HOUSEHOLDS IN DIFFERENT WEALTH GROUPS WHO BOTH BUY AND SELL GRAIN**

<table>
<thead>
<tr>
<th>Net Value Categories</th>
<th>Socioeconomic Groups</th>
<th>Group 1 Poorest</th>
<th>Group 2</th>
<th>Group 3</th>
<th>Group 4 Wealthiest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net Value Buyer N=35</td>
<td></td>
<td>20</td>
<td>7</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Net Value Seller N=45</td>
<td></td>
<td>8</td>
<td>12</td>
<td>18</td>
<td>7</td>
</tr>
</tbody>
</table>

### TABLE 7

**NET VALUE POSITION IN DIFFERENT PERIODS FOR HOUSEHOLDS IN DIFFERENT WEALTH GROUPS**

<table>
<thead>
<tr>
<th>Socioeconomic Groups</th>
<th>Net Value Position</th>
<th>Oct-Dec Harvest</th>
<th>Jan-Mar Dry Season</th>
<th>Apr-June Hot Season</th>
<th>July-Sept Wet Season</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1 Poorest N=37</td>
<td>Net Buyer</td>
<td>6</td>
<td>9</td>
<td>24</td>
<td>18</td>
</tr>
<tr>
<td>Equal*</td>
<td>6</td>
<td>13</td>
<td>9</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Net Seller</td>
<td>25</td>
<td>15</td>
<td>4</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Group 2 N=29</td>
<td>Net Buyer</td>
<td>3</td>
<td>5</td>
<td>9</td>
<td>15</td>
</tr>
<tr>
<td>Equal*</td>
<td>5</td>
<td>4</td>
<td>6</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Net Seller</td>
<td>21</td>
<td>20</td>
<td>14</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Group 3 N=33</td>
<td>Net Buyer</td>
<td>10</td>
<td>6</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Equal*</td>
<td>3</td>
<td>5</td>
<td>8</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Net Seller</td>
<td>20</td>
<td>22</td>
<td>13</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Group 4 Wealthiest N=17</td>
<td>Net Buyer</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Equal*</td>
<td>2</td>
<td>3</td>
<td>8</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Net Seller</td>
<td>13</td>
<td>12</td>
<td>7</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

*Usually equal means did not transact.
3a. Poorer farmers are less able to take advantage of the price cycle for grain than wealthier farmers. They make a larger proportion of their grain sales in the harvest period, when prices are low, than wealthier farmers.

3b. Wealthier farmers make a larger proportion of their sales just before the harvest when prices are higher.

Hypothesis 3a is tested by doing an ordinary least squares regression with "proportion of grain sold in period 1" (the harvest period) as the dependent variable and the wealth indicator (the four socioeconomic groups) as the independent variable. If the coefficient on wealth is less than zero then we cannot reject the hypothesis.\(^9\)

\[
\hat{\text{Percent Grain Sales}} = .541 - .069 \text{ Wealth in Period 1}
\]

\[
\text{N} = 116 \quad \text{R}^2 = .04
\]

These results show that we cannot reject the hypothesis that poorer families probably do make a larger proportion of their sales in the period just after harvest than do wealthier ones.\(^10\)

Table 8 shows the percentage of grain sales and purchases occurring in different periods for each socioeconomic group. We note that households in wealth groups 1, 2, and 4 all make the largest proportion of their grain sales in the first quarter.\(^11\) During the first half of the year the poorest two groups make about 70% of their sales, and the wealthiest two groups about 50% of their sales.

Using chi-squared statistics we can test the hypothesis that households in the different socioeconomic groups behave similarly. The chi-squared statistics for the percent of grain sold and the percent of grain bought show that households in different socioeconomic groups do behave differently. The statistics also show that there are significant differences within each of the

---

9The standard errors are in parentheses.

10The results do not change significantly when we omit the households which never sell during the year, although the \(R^2\) increases to .08.

11If we do an analysis of variance, the mean for wealth group 3 in period 1 is not significantly different from the mean for period 2, so we could generalize this statement to all groups.
TABLE 8

AVERAGE PERCENTAGE OF ANNUAL GRAIN TRANSACTIONS
IN DIFFERENT QUARTERS
FOR HOUSEHOLDS IN DIFFERENT SOCIOECONOMIC GROUPS

<table>
<thead>
<tr>
<th>Group</th>
<th>% of Grain Sold</th>
<th>% of Grain Bought</th>
<th>% of Net Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1 - Poorest</td>
<td>% of Grain Sold</td>
<td>% of Grain Bought</td>
<td>% of Net Sales</td>
</tr>
<tr>
<td>Oct-Dec Harvest</td>
<td>32 57 27 5 11</td>
<td>31 16 17 39 28</td>
<td>35 25 26 54 -4</td>
</tr>
<tr>
<td>Jan-Mar Dry Season</td>
<td>29 43 33 13 11</td>
<td>21 12 14 33 41</td>
<td>29 182 17 -82 -17</td>
</tr>
<tr>
<td>Apr-June Hot Season</td>
<td>30 31 33 19 17</td>
<td>29 26 18 23 33</td>
<td>33 33 23 26 18</td>
</tr>
<tr>
<td>July-Sept Wet Season</td>
<td>32 34 21 14 31</td>
<td>17 29 28 6 37</td>
<td>17 8 48 32 12</td>
</tr>
<tr>
<td>Group 2</td>
<td>% of Grain Sold</td>
<td>% of Grain Bought</td>
<td>% of Net Sales</td>
</tr>
<tr>
<td>Group 3</td>
<td>% of Grain Sold</td>
<td>% of Grain Bought</td>
<td>% of Net Sales</td>
</tr>
<tr>
<td>Group 4 - Wealthiest</td>
<td>% of Grain Sold</td>
<td>% of Grain Bought</td>
<td>% of Net Sales</td>
</tr>
<tr>
<td>% of Grain Sold</td>
<td>17 34 21 14 31</td>
<td>9 29 28 6 37</td>
<td>17 8 48 32 12</td>
</tr>
<tr>
<td>% of Net Sales</td>
<td>17 34 21 14 31</td>
<td>9 29 28 6 37</td>
<td>17 8 48 32 12</td>
</tr>
</tbody>
</table>

Chi-squared for among group differences:
Sales: 1029.18 with 9 degrees of freedom
Purchases: 718.62 with 9 degrees of freedom

Chi-squared for within group differences:
Sales: 7177.79 with 315 degrees of freedom
Purchases: 4755.95 with 261 degrees of freedom

*aWe computed percentages only for households which did the type of transaction at least once during the year.
different groups. Because the data on percent of net sales include negative values, we cannot use the chi-squared test. However, by inspection it seems that the same conclusions apply.

Hypothesis 3b is the flip side of 3a. To test whether wealthier farmers sell proportionally more grain than poor farmers in the fourth quarter we use an equation similar to 6, but with "the proportion sold in period 4", the wet season, as the dependent variable.

\[
\text{Percent Grain Sales in Period 4} = 0.0057 + 0.062 \text{ Wealth} \quad (7)
\]

\[
N = 116 \quad R^2 = 0.08
\]

Equation 7 suggests that wealthier farmers do sell proportionally more in period 4, when grain prices are highest.\(^\text{12}\) The results from testing hypotheses 3a and 3b suggest that wealthier farmers are better able to take advantage of the grain price cycle in choosing when to sell grain.

To shed further light on the question of forced sales we consider the reasons why farmers said they sold their grain. Table 9 indicates the frequency with which farmers said they made a sale for different reasons. The table presents the reasons for selling grain and for selling animals. The major reason for selling grain is to purchase necessities for the household. Second in importance is to pay for a feast or ceremony, and third is to save money. Little grain is sold to reimburse loans, to buy livestock, to invest in agriculture, or to pay taxes. In addition to financing household necessities, feasts and ceremonies, major reasons for animal sales are to buy grain (especially between April and September), to pay taxes, and to save money. The general temporal patterns of the reasons are similar. Most sales of both goods occur in the first and second periods.

These data suggest that although we find that households do make a large portion of their grain sales in the first two periods, they are not for the reason supposed in the conventional wisdom: reimbursing loans and paying taxes. In general, it seems that animals are sold when larger sums of money are needed, and grain is sold to obtain smaller sums.

\(^\text{12}\text{These results do not change significantly when we omit the households that never sell.}\)
### TABLE 9

**THE FREQUENCY OF REASONS GIVEN FOR INDIVIDUAL GRAIN SALES AND INDIVIDUAL ANIMAL SALES**

<table>
<thead>
<tr>
<th>Reason</th>
<th>% of Grain Sales for a Given Reason</th>
<th>% of Animal Sales for a Given Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N=565</td>
<td>N=770</td>
</tr>
<tr>
<td></td>
<td>Oct-Dec Harvest</td>
<td>Jan-Mar Dry Season</td>
</tr>
<tr>
<td>Buy Food</td>
<td>1.2 1.2 0 0 0 9.0 2.3 .9 2.7 3.1</td>
<td>1.6 0 .5 .9 .2 3.0 .1 .9 1.0 1.0</td>
</tr>
<tr>
<td>Pay Taxes</td>
<td>12.5 2.5 4.2 3.9 1.9 4.5 .8 1.4 1.0 1.3</td>
<td>58.7 23.4 18.6 8.8 7.9 52.5 21.5 13.6 9.1 8.3</td>
</tr>
<tr>
<td>Buy Household Necessities</td>
<td>1.5 .2 .4 .7 .2 1.9 .3 .6 .9 .1</td>
<td>12.5 2.5 4.2 3.9 1.9 4.5 .8 1.4 1.0 1.3</td>
</tr>
<tr>
<td>Pay for Ceremonies</td>
<td>1.5 .2 .4 .7 .2 1.9 .3 .6 .9 .1</td>
<td>12.5 2.5 4.2 3.9 1.9 4.5 .8 1.4 1.0 1.3</td>
</tr>
<tr>
<td>Buy Livestock</td>
<td>5.0 .9 .6 1.3 2.2 3.7 .9 .4 1.5 .9</td>
<td>5.0 .9 .6 1.3 2.2 3.7 .9 .4 1.5 .9</td>
</tr>
<tr>
<td>Invest in Agriculture</td>
<td>.6 .4 .2 0 0 .8 .5 .1 .1 .1</td>
<td>.6 .4 .2 0 0 .8 .5 .1 .1 .1</td>
</tr>
<tr>
<td>Reimburse Loan</td>
<td>.6 .4 .2 0 0 .8 .5 .1 .1 .1</td>
<td>.6 .4 .2 0 0 .8 .5 .1 .1 .1</td>
</tr>
<tr>
<td>Purchase Gift</td>
<td>.6 .4 .2 0 0 .8 .5 .1 .1 .1</td>
<td>.6 .4 .2 0 0 .8 .5 .1 .1 .1</td>
</tr>
<tr>
<td>Pay School Fees</td>
<td>.6 .4 .2 0 0 .8 .5 .1 .1 .1</td>
<td>.6 .4 .2 0 0 .8 .5 .1 .1 .1</td>
</tr>
<tr>
<td>Pay Traditional Healer</td>
<td>3.2 1.4 1.8 0 0 3.4 2.1 .9 .4 0</td>
<td>3.2 1.4 1.8 0 0 3.4 2.1 .9 .4 0</td>
</tr>
<tr>
<td>Save Money</td>
<td>5.8 1.4 1.4 .7 2.3 8.2 3.6 3.1 .5 1.0</td>
<td>5.8 1.4 1.4 .7 2.3 8.2 3.6 3.1 .5 1.0</td>
</tr>
<tr>
<td>Other</td>
<td>6.6 1.8 3.0 .5 1.3 10.0 2.1 5.3 1.8 .8</td>
<td>6.6 1.8 3.0 .5 1.3 10.0 2.1 5.3 1.8 .8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100.0 33.9 33.4 16.9 15.8</strong></td>
<td><strong>100.0 35.3 28.2 19.2 16.9</strong></td>
</tr>
</tbody>
</table>
Trade-offs Between Assets to Generate Revenue

Finally, whether or not households are forced to sell grain depends on their alternatives for generating revenue. Thus, we consider grain sales within the larger context of the household economy. The household earns income by selling grain, other crops, and animals, and by selling its labor for agriculture, making artisan products, selling household goods, etc. The model predicts that there is a trade-off in the use of these different assets for generating revenue, and that the asset used depends on current and expected relative prices of all the different assets. Therefore we expect a trade-off between the use of grain and other individual assets for revenue generation at different times during the year. For example, during the first quarter, from October through December, although grain prices are at their annual low and will rise in all the subsequent periods, animal prices are also rising and will begin to fall again in March/April. Therefore we would expect animals to be sold in preference to grain in the second quarter, the dry season. Grain might very well be sold in preference to animals at harvest, the first quarter. In spite of the fact that grain prices are at their annual low, it could be more economic to sell grain and hold onto animals for several more months. Obviously if the household does not have animals it cannot choose not to sell them. It would sell grain in period 1 without saving animals to sell in period 2.

Because of our relatively small sample, and the multidimensional nature of these hypotheses, they are very difficult to test in a rigorous way. Table 10 shows the relative importance of these different sources of revenue in the four different time periods. For the three lower socioeconomic groups, grain sales are always less than 30% of the revenue for the period. Animals, on the other hand, represent an average of 35-57% of revenue generated in the first three quarters and 13-32% in the fourth quarter. Nonagricultural revenue is important for the poorer three socioeconomic groups in the fourth quarter. Sales of other crops (cowpeas, peanuts, shea nuts, etc.) are most important in the fourth quarter relative to other periods.

In addition to the hypotheses derived from the model we would like to be able to address two basic questions:

1. Do the different socioeconomic groups behave similarly in each period? Do they use their assets similarly?
<table>
<thead>
<tr>
<th>TABLE 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>PERCENTAGE OF REVENUE OBTAINED FROM DIFFERENT SOURCES</td>
</tr>
<tr>
<td>FOR HOUSEHOLDS IN DIFFERENT SOCIOECONOMIC GROUPS</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Group 1 - Poorest</td>
</tr>
<tr>
<td>Grain</td>
</tr>
<tr>
<td>Animals</td>
</tr>
<tr>
<td>Other Crops</td>
</tr>
<tr>
<td>Off-Farm Income</td>
</tr>
<tr>
<td>Mean Revenue (in CFA)</td>
</tr>
<tr>
<td>Group 2</td>
</tr>
<tr>
<td>Grain</td>
</tr>
<tr>
<td>Animals</td>
</tr>
<tr>
<td>Other Crops</td>
</tr>
<tr>
<td>Off-Farm Income</td>
</tr>
<tr>
<td>Mean Revenue (in CFA)</td>
</tr>
<tr>
<td>Group 3</td>
</tr>
<tr>
<td>Grain</td>
</tr>
<tr>
<td>Animals</td>
</tr>
<tr>
<td>Other Crops</td>
</tr>
<tr>
<td>Off-Farm Income</td>
</tr>
<tr>
<td>Mean Revenue (in CFA)</td>
</tr>
<tr>
<td>Group 4 - Wealthiest</td>
</tr>
<tr>
<td>Grain</td>
</tr>
<tr>
<td>Animals</td>
</tr>
<tr>
<td>Other Crops</td>
</tr>
<tr>
<td>Off-Farm Income</td>
</tr>
<tr>
<td>Mean Revenue (in CFA)</td>
</tr>
</tbody>
</table>
2. How do the marketing patterns (percent of revenue earned from each source) differ from one period to another?

For periods 1, 2, and 3 all the wealth groups seem to use their assets similarly. In period 4, however, the wealthiest households seem to deviate from the patterns of the other three groups. They earn almost 70% of their income from selling crops.13

To address the question of trade-offs between different sources of income during the year, we look at the relative importance of specific sources at different times. Except for group 3, animals are most important in the dry season, behavior consistent with the price structure discussed above. Off-farm income is especially important in period 3, when people have time and when the larger farms are paying to have their fields prepared. For groups 1, 2, and 3, it is also important in the wet season, for similar reasons. Other crops play a very small role in revenue generation except for the wealthiest households in the fourth quarter.

V. CONCLUSIONS

Although the poorest households in the sample have alternatives to selling grain in the first quarter, that is when they make a large proportion of their grain sales. Wealthier households make a smaller proportion of their sales at harvest, but do earn a substantial portion of their revenue from grain sales at that time.

The households that can be considered "forced to sell" in the extreme are the 35 households who both buy and sell during the year, but are net buyers. For all of them the prices at which they sell are lower than the prices at which they buy. They definitely need the grain for consumption. Twenty-eight of them, 80%, are in the poorest category.

Why does the poor farmer not buy grain when prices are low? To buy grain one must have cash. The poor farmer uses his grain in the first two quarters to generate cash, as well as his available animals and cash crops. He has few opportunities for off-farm income between October and March. Therefore, he

13 A profile analysis of these data support these conclusions. The patterns in periods 2 and 3 are not significantly different for the different socioeconomic groups. In the fourth quarter group 4 does behave significantly differently.
must sell to meet his minimum obligations. He then buys when other revenue generating opportunities are more abundant — and when grain is more expensive.

If we assume that each household approximates an optimal allocation of its resources to different activities, what can we say about the difference in their marketing patterns? Wealthier households have more of all assets and interact more in the market. Wealthier households obtain proportionally more of their revenue from grain sales than do poorer households. Poorer households rely more heavily on off-farm income. Although the Manga area is surplus in grain production, households earn a larger proportion of their income from selling animals than from selling grain or from any other activity, regardless of wealth.

And finally, it should be obvious from the analysis and from the data presented that marketing patterns themselves are very difficult to categorize and to analyze. Grain is only one of many ways to earn money and only one of many assets which must be managed. The poorer farmer may have some of each asset, but he has less of them all. He is more constrained in his execution of globally optimal strategies. The wealthier farmer, less constrained by subsistence, can use each of his assets more optimally.

The substitution between assets points to the importance of coordinating policies in the crop and livestock subsectors. Price policies which favor grain over livestock will have repercussions on the sales of livestock and vice versa. In a similar vein, these results have implications for policies which tend to favor cash crops over subsistence crops (as for cotton producing areas in Burkina Faso). Among poor producers increased cash crop production is likely to reduce grain sales; for wealthier producers increases in cash crop production may lead to increases in grain sales.
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