

GRAIN MARKETING DECISIONS
OF SUBSISTENCE FARMERS
IN BURKINA FASO

by

Jacqueline R. Sherman



CENTER FOR RESEARCH ON ECONOMIC DEVELOPMENT
The University of Michigan
Ann Arbor, Michigan 48109

GRAIN MARKETING DECISIONS
OF SUBSISTENCE FARMERS
IN BURKINA FASO

by

Jacqueline R. Sherman*

* * *

Discussion Papers are preliminary materials circulated to stimulate discussion and critical comment. References in publications to Discussion Papers should be cleared with the author to protect the tentative character of these papers.

* * *

*Research Associate, Center for Research on Economic Development,
University of Michigan.

Discussion Paper No. 111, December 1984.
Published by the Center for Research on Economic Development,
University of Michigan, Ann Arbor, MI 48109, U.S.A.

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

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

LIST OF TABLES AND FIGURES

<u>Table</u>	<u>Page</u>
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
6. Net Value Position of Households in Different Wealth Groups Who Both Buy and Sell Grain	20
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

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.

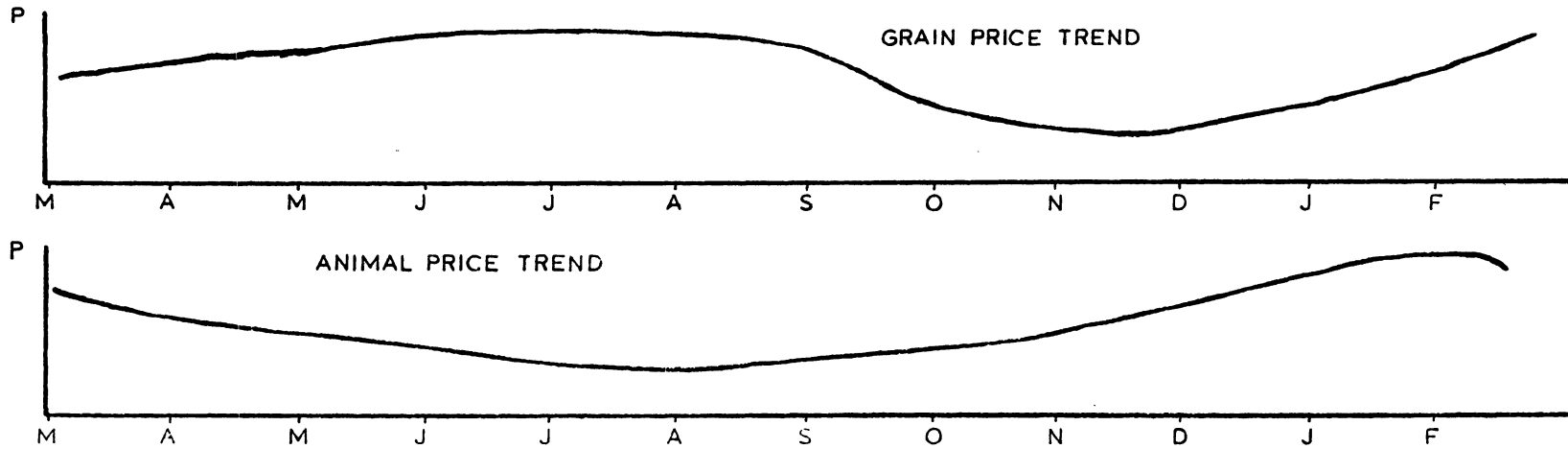
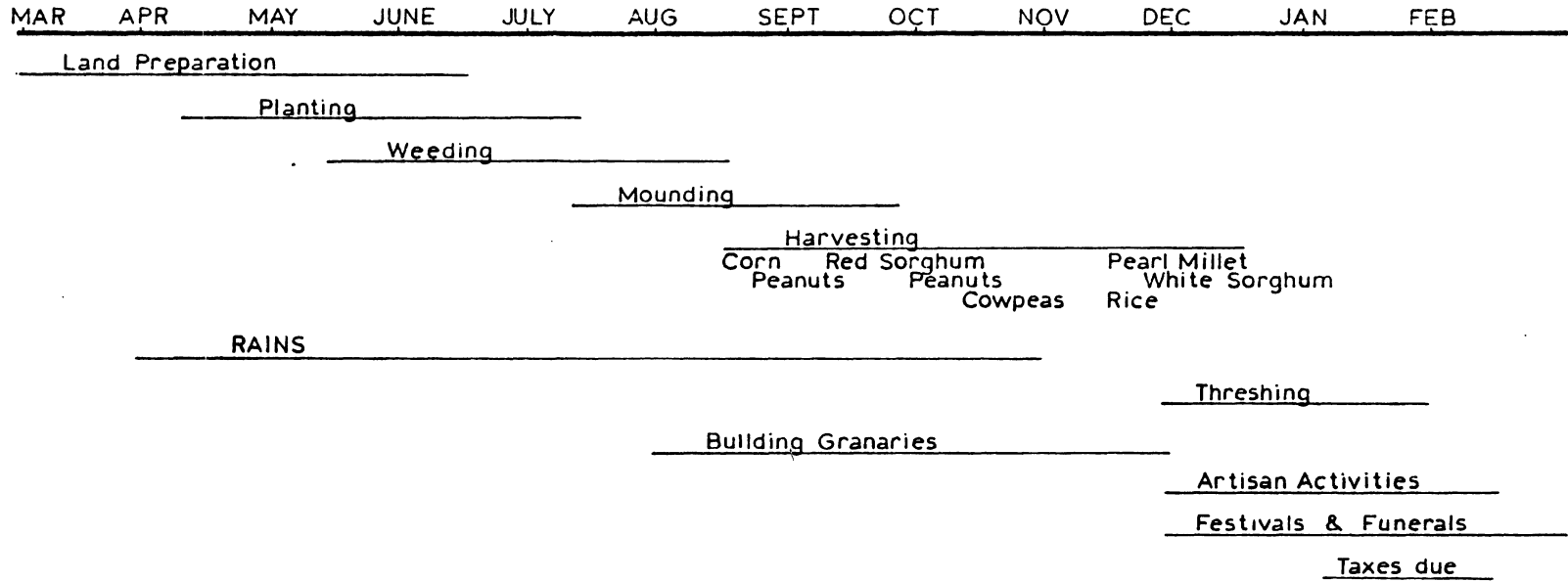
Consumption of agricultural and nonagricultural items occurs throughout the year, though not necessarily in constant amounts. Additional expenditures are made during certain seasons. The period of traditional feasts is from November through March. It includes weddings, baptisms, funerals, circumcisions, 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



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_i} = the amount of A consumed in period i,
 C_{b_i} = the amount of B consumed in period i,
 C_{c_i} = 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.

$$k_a C_{a_1} + k_b C_{b_1} \geq \bar{k}_1 \quad (2)$$

$$k_a C_{a_2} + k_b C_{b_2} \geq \bar{k}_2 \quad (3)$$

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

³This 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,

\bar{k}_i = 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:

$$P_{a_1} C_{a_1} + P_{b_1} C_{b_1} + P_{c_1} C_{c_1} + P_{a_1} I_{a_1} + P_{b_1} I_{b_1} + S \leq P_{a_1} A + P_{b_1} B \quad (4)$$

For period two:

$$P_{a_2} C_{a_2} + P_{b_2} C_{b_2} + P_{c_2} C_{c_2} \leq \alpha S + P_{a_2} I_{a_2} + P_{b_2} (1+\delta) I_{b_1} \quad (5)$$

Where P_{a_i} = price of A in period i.

P_{b_i} = price of B in period i.

P_{c_i} = price of C in period i.

I_{a_1} = amount of good A held as inventory at the end of period 1.

I_{b_1} = amount of good B held as inventory at the end of period 1.

S = the amount of cash saved at the end of period 1.

α = percent of reimbursed cash.

δ = 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."⁴ 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.

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

⁵The 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

prices and what at high prices -- and the relative magnitudes of the transactions.⁶

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.⁷

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 1

ANNUAL GRAIN TRANSACTIONS OF THE SAMPLE
OCTOBER 1979 - SEPTEMBER 1980

	Oct-Dec Harvest	Jan-Mar Dry Season	Apr-June Hot Season	July-Sept Wet Season	Annual Total
Grain Sales: (in kg.)	5409	4136	2735	3831	16116
Percent of Annual Sales	33%	26%	17%	24%	
Grain Purchases (in kg.)	2995	1875	2320	1854	9044
Percent of Annual Purchases	33%	21%	26%	20%	
Net Sales (in kg.)	2414	2261	415	1977	7067
Percent of Annual Net Sales	34%	32%	6%	28%	

TABLE 2

SAMPLE HOUSEHOLDS IN DIFFERENT NET BUYER/SELLER CATEGORIES

	Net Value Buyer	Equal	Net Value Seller
Net Volume Buyer of grain	37	0	0
Equal	0	2 ^a	0
Net Volume Seller of grain	6	0	71

^aThese households made no transactions.

TABLE 3

NET VALUE POSITION OF HOUSEHOLDS
WHO FOLLOW DIFFERENT TRANSACTION PATTERNS

Net Value Categories			
Grain Transaction Categories	Net Value Buyer of Grain	Equal	Net Value Seller
No Transaction	0	2	0
Sells Only	0	0	26
Buys Only	8	0	0
Sells and Buys	35	0	45

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

Net Value Categories	Socioeconomic Groups			
	Group 1 Poorer	Group 2	Group 3	Group 4 Wealthiest
Net Value Buyer N=43	23	9	9	2
Equal N= 2	2	0	0	0
Net Value Seller N=71	12	20	24	15
Total	37	29	33	17

TABLE 5
GRAIN TRANSACTIONS BEHAVIOR OF HOUSEHOLDS
IN DIFFERENT SOCIOECONOMIC CATEGORIES

Grain Transaction Categories	Socioeconomic Groups				Total
	Group 1 Poorest	Group 2	Group 3	Group 4 Wealthiest	
No Transactions	2	0	0	0	2
Sells only	4	8	6	8	26
Buys only	3	2	3	0	8
Sells and Buys	28	19	24	9	80
Total	37	29	33	17	116

TABLE 6

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

Net Value Categories	Socioeconomic Groups			
	Group 1 Poorest	Group 2	Group 3	Group 4 Wealthiest
Net Value Buyer N=35	20	7	6	2
Net Value Seller N=45	8	12	18	7

TABLE 7

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

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

^aUsually 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

$$\begin{array}{l} \widehat{\text{Percent Grain Sales}} \\ \text{in Period 1} \end{array} = .541 - .069 \text{ Wealth} \quad (6)$$

(.075) (.030)

$$N = 116 \quad R^2 = .04$$

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

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

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.

TABLE 9

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

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

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 10
 PERCENTAGE OF REVENUE OBTAINED FROM DIFFERENT SOURCES
 FOR HOUSEHOLDS IN DIFFERENT SOCIOECONOMIC GROUPS

	Oct-Dec Harvest	Jan-Mar Dry Season	Apr-June Hot Season	July-Sept Wet Season
Group 1 - Poorest				
Grain	.29	.22	.07	.12
Animals	.41	.45	.40	.27
Other Crops	.16	.11	.12	.27
Off-Farm Income	.14	.22	.41	.34
Mean Revenue (in CFA)	4542	4110	4600	5295
Group 2				
Grain	.27	.25	.14	.15
Animals	.39	.48	.41	.23
Other Crops	.18	.07	.09	.27
Off-Farm Income	.16	.20	.36	.36
Mean Revenue (in CFA)	10368	8665	12491	8591
Group 3				
Grain	.16	.27	.26	.11
Animals	.50	.36	.34	.33
Other Crops	.18	.10	.17	.21
Off-Farm Income	.16	.27	.23	.35
Mean Revenue (in CFA)	15176	11404	8020	9372
Group 4 - Wealthiest				
Grain	.36	.23	.28	.35
Animals	.41	.58	.33	.17
Other Crops	.07	.04	.09	.29
Off-Farm Income	.16	.15	.29	.18
Mean Revenue (in CFA)	12609	18786	11082	18592

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

¹³A 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.

BIBLIOGRAPHY

- Center for Research on Economic Development (CRED). 1977. Marketing, Price Policy and Storage of Food Grains in the Sahel: A Survey, prepared for Comité Permanent Inter-Etats de Lutte Contre la Sécheresse dans le Sahel/Club du Sahel and sponsored by the U.S. Agency for International Development. Ann Arbor: University of Michigan.
- Chambers, R.; Longhurst, R.; Bradley, D. and Feachem, R. 1979. "Seasonal Dimensions to Rural Poverty: Analysis and Practical Implications," Journal of Tropical Medicine and Hygiene 82:156-171.
- Chayanov, A.V. 1966. The Theory of Peasant Economy. Homewood (Illinois): Richard D. Irwin, Inc.
- Gilbert, E.H. 1970. "Marketing of Staple Food in Northern Nigeria: A Study of Staple Food Marketing Systems Serving Kano City." Ph.D. dissertation, Stanford University.
- Hays, H.M., Jr. 1975. The Marketing and Storage of Food Grains in Northern Nigeria. Institute for Agricultural Research, Samaru Paper No. 50. Zaria, (Nigeria): Ahmadu Bello University.
- Hill, P. 1972. Rural Hausa: A Village and Setting. Cambridge: Cambridge University Press.
- Matlon, P.J. 1977. "The Size Distribution, Structure, and Determinants of Personal Income Among Farmers in the North of Nigeria." Ph.D. dissertation, Cornell University.
- Michigan State Team in Fada Ngourma (MSU). 1980. "1978-1979 Farm Survey Results," Papers No. 27, 28, 29, 30 and 32.
- Ouedraogo, I.S. 1983. "A Socioeconomic Analysis of Farmers' Food Grain Marketing Linkages and Behavior in Eastern Burkina Faso." Ph.D. dissertation, Michigan State University.
- Raynaut, C. 1973. "La Circulation Marchande des Céréales et les Mécanismes d'Inégalité Economiques: Le Cas d'Une Communauté Villageoise Haoussa," Cahiers des Centres d'Etudes et de Recherches Ethnologiques 2.
- _____. 1976. "Transformation du Système de Production et Inégalité Economique: Le Cas d'Un Village Haoussa," Canadian Journal of African Studies 10:279-306.
- Ross, C.G. 1979. "A Village Level Study of Producer Grain Transactions in Rural Senegal," Discussion Paper No. 81. Ann Arbor: Center for Research on Economic Development.
- _____. 1980. "Grain Demand and Consumer Preference in Senegal," Food Policy 5:273-31.
- Sutter, J.W. 1982. Peasants Merchant Capital and Rural Differentiation: A Nigerian Hausa Case Study. Ithaca: International Studies in Planning, Cornell University.

PUBLICATIONS

CRED publications can be obtained by writing to the Publications Coordinator. Payment should accompany your order, unless otherwise indicated.

NEWSLETTER

CRED publishes a periodic newsletter entitled "CREDITS" which is available free of charge. To have your name placed on this mailing list, write to the Publications Coordinator

PROJECT REPORTS

1. Berg, Elliot J. The Economic Evolution of the Sahel. 1975. 258 p. \$7.50. [Out of Print.]

2. Berg, Elliot J., et al. Marketing, Price Policy and Storage of Food Grains in the Sahel: A Survey - Volume I, Synthesis with Statistical Compilation and Annotated Bibliography. 1977. 152 p. \$8.00.

3. Berg, Elliot J., et al. Marketing, Price Policy and Storage of Food Grains in the Sahel: A Survey - Volume II, Country Studies. 1977. 105 p. \$10.00.

4. Berg, Elliot J., et al. Commercialisation, Politique des Prix et Stockage des Céréales au Sahel: Etude Diagnostique - Tome I, Synthèse avec Compilation Statistique et Bibliographie Annotée. 1977. 164 p. Tome II, Etudes des Pays. 1977. 129 p. [Tome II - Out of Print.]

5. Shapiro, Kenneth H. Livestock Production and Marketing in the Entente States of West Africa: Summary Report. 1979. 528 p. \$12.50.

6. Delgado, Christopher L. Livestock versus Foodgrain Production in Southeastern Upper Volta: A Resource Allocation Analysis (Monograph I, Livestock Production and Marketing in the Entente States of West Africa Project). 1979. 427 p. [Out of Print.]

7. Staatz, John M. The Economics of Cattle and Meat Marketing in Ivory Coast (Monograph II, Livestock Production and Marketing in the Entente States of West Africa Project). 1979. 589 p. \$15.00. [Out of Print.]

8. Eddy, Edward D. Labor and Land Use on Mixed Farms in the Pastoral Zones of Niger (Monograph III, Livestock Production and Marketing in the Entente States of West Africa Project). 1979. 493 p. [Out of Print.]

9. Herman, Larry A. The Livestock and Meat Marketing System in Upper Volta: An Evaluation of Economic Efficiency (Monograph IV, Livestock Production and Marketing in the Entente States of West Africa Project). 1983. 266 p. \$10.00.

10. Shapiro, Kenneth H. La Production et la Commercialisation du Bétail dans les Pays du Conseil de l'Entente: Rapport de Synthèse. 1980. 445 p. \$15.00.

11. Delgado, Christopher K. L'Elevage par Rapport à l'Agriculture au Sud-Est de la Haute-Volta: Analyse de l'Allocation des Ressources au Niveau de l'Exploitation (Monographie I, La Production et la Commercialisation du Bétail dans les Pays du Conseil de l'Entente). 1980. 405 p. [Out of Print.]

12. Staatz, John M. L'Economique de la Commercialisation du Bétail et la Viande en Côte d'Ivoire (Monographie II, La Production et la Commercialisation du Bétail dans les Pays du Conseil de l'Entente). 1980. 536 p. \$15.00.

13. Eddy, Edward D. L'Utilisation de la Terre et de la Main-d'Oeuvre à l'Interieur des Exploitations Agricoles Intégrées de la Zone Pastorale Nigérienne (Monographie III, La Production et la Commercialisation du Bétail dans les Pays du Conseil de l'Entente). 1980. 406 p. [Out of Print.]

14. Ariza-Niño, Edgar J.; Herman, Larry A.; Makinen, Marty; & Steedman, Charles. Synthesis: Upper Volta (Volume I, Livestock and Meat Marketing in West Africa Project). 1980. 204 p. \$15.00.

15. Josserand, Henri P., and Sullivan, Gregory. Benin, Ghana, Liberia, Togo (Volume II, Livestock and Meat Marketing in West Africa Project). 1980. 446 p. \$15.00.

16. Delgado, Christopher L., and Staatz, John M. Ivory Coast and Mali (Volume III, Livestock and Meat Marketing in West Africa Project). 1980. 439 p. \$15.00.

17. Ariza-Niño, Edgar J., and Griffith, J.L.P. Suppliers: Argentina, Australia and New Zealand (Volume IV, Livestock and Meat Marketing in West Africa Project). 1979. 239 p. [Out of Print.]

18. Ariza-Niño, Edgar J.; Manly, D.W.; and Shapiro, Kenneth. The World Meat Economy: Other Supplier and Consumer Countries (Volume V, Livestock and Meat Marketing in West Africa Project). 1980. 183 p. [Out of Print.]

19. Ariza-Niño, Edgar J.; Herman, Larry A.; Makinen, Marty; et Steedman, Charles. Rapport de Synthèse; Haute-Volta (Tome I, La Commercialisation du Bétail et de la Viande en Afrique de l'Ouest). 1981. 258 p. \$15.00.

20. Josserand, Henri P., et Sullivan, Gregory. Bénin, Ghana, Libéria, Togo (Tome II, La Commercialisation du Bétail et de la Viande en Afrique de l'Ouest). 1980. 441 p. \$15.00.

21. Delgado, Christopher L., et Staatz, John M. Côte d'Ivoire et Mali (Tome III, La Commercialisation du Bétail et de la Viande en Afrique de l'Ouest). 1981. 567 p. [Out of Print.]

22. Ariza-Niño, Edgar J. et Griffith, J.L.P. Les Fournisseurs - Argentine, Australie, Nouvelle-Zélande; et Ariza-Niño, Edgar J.; Manly, D.W. et Shapiro, Kenneth H. L'Economie Mondiale de la Viande: Autres Pays - Fournisseurs et Consommateurs (Tome IV/V, La Commercialisation du Bétail et de la Viande en Afrique de l'Ouest). 1981. 476 p. \$15.00.

23. Makinen, Marty and Ariza-Niño, Edgar J. The Market for Livestock from the Central Niger Zone (Niger Range and Livestock Project). 1982. 55 p. \$7.50.

24. Makinen, Marty et Ariza-Niño, Edgar J. La Marché Offert au Bétail dans la Zone Nigérienne Centrale (Le Projet de Gestion des Paturages et de l'Elevage). 1982. 63 p. \$7.50.

25. Barlow, Robin (editor). Case Studies in the Demographic Impact of Asian Development Projects. (Contributors: J. Anderson, H. Barnum, J. Bauer, P. Gosling, A. Jain, H. Mohtadi, and E. Mueller.) 1982. 204 p. \$10.00.

DISCUSSION PAPERS

CRED normally publishes 5-8 discussion papers annually, which provide preliminary reports on the research (institutional or personal) of its senior research staff. In many cases, revised versions of these papers are later published in academic journals or elsewhere. Individual discussion papers can be purchased for \$3.00 each; an annual subscription (based on a July 1 - June 30 subscription year) is available for \$15.00. Subscriptions are also available on an exchange basis for publications from other institutions.

1. Berg, Elliot J. "Wage Structure in Less-Developed Countries," January 1968. 51 p. (Republished in Wage Policy Issues in Economic Development, edited by Anthony D. Smith, International Institute for Labour Studies, Geneva, 1969.)

2. Eckstein, Peter C. "Accounting Prices as a Tool of Development Planning," February 1968. 84 p.

3. Stolper, Wolfgang F. "Economic Growth and Political Instability in Nigeria: On Growing Together Again," November 1968. 38 p. (Republished in Growth and Development of the Nigerian Economy, edited by Carl K. Eicher and Carl E. Liedholm, Michigan State University Press, East Lansing, 1970.)

4. Berg, Elliot J. "Industrial Relations Systems in Colonial West Africa: A Comparative Analysis of French West Africa and the Gold Coast," December 1968. 50 p. (Republished in African Dimensions: Essays in Honor of William O. Brown, edited by Mark Karp, Boston University, Boston, 1975.)

26. Ariza-Niño, Edgar J., et al. Consumption Effects of Agricultural Policies: Cameroon and Senegal - Part I: Country Reports; Part II: Methodology. 1982. 465 p. \$15.00.

27. Ariza-Niño, Edgar J., et al. Effets Nutritifs de Politiques Agricoles: Cameroun et Sénégal - Partie I: Rapport de Pays. 1982. 369 p. \$8.00. Partie II: Méthodologies d'Analyse et Modalités d'Enquête. 1982. 284 p. \$7.00.

28. Shapiro, Kenneth H., et al. Agroforestry in Developing Countries. 1984. 195 p. \$12.00.

29. Sherman, Jacqueline R. Grain Markets and the Marketing Behavior of Farmers: A Case Study of Manga, Upper Volta. April 1984. 317 p. \$20.00.

30. Josserand, Henri et al. Eastern Senegal Range and Livestock Project: Final Monitoring and Evaluation Report (Part I, Synthesis; Part II, Range Management; Part III, Soils and Water Engineering; Part IV, Socioeconomic Study). 1985. 454 p. \$25.00.

These prices include postage and handling charges. Please refer to the Project Report Number (PR#) when placing an order.

5. Berg, Elliot J. "Trade Unions and Wage Levels - The Nigerian Case," January 1969. 19 p. (Republished in Economic Development and Cultural Change, Volume 17, No. 4, July 1969.)
6. Porter, Richard C. "Some Implications of Post-War Primary Product Trends," February 1969. 17 p. (Republished in Journal of Political Economy, Vol. 78, No. 3, May-June 1970.)
7. Eckstein, Peter C. "Quantitative Measurements of Development Performance: A Critique by Peter Eckstein and a Reply by Irma Adelman and Cynthia Taft Morris," April 1969. 37 p. (Republished in American Economic Review, Vol. 60, No. 1, March 1970.)
8. Porter, Richard C. "The Effectiveness of Tax Exemption in Colombia," July 1969. 41 p. (Republished in Weltschaftliches Archiv/Review of World Economics, Vol. 108, No. 3, September 1972.)
9. Eckstein, Peter C. "Toward an Integrated Theory of Tariffs," August 1969. 41 p.
10. Stolper, Wolfgang F. "Limitations of Comprehensive Planning in the Face of Comprehensive Uncertainty: Crisis of Planning or Crisis of Planners," October 1969. 44 p. (Republished in Weltschaftliches Archiv, Vol. 107, No. 1, March 1971.)
11. Porter, Richard C. "Birth of a Bill Market," August 1970. 20 p. (Republished in Journal of Development Studies, Vol. 9, No. 3, April 1973.)
12. Adalemo, Isaac Aylinde. "Distribution of Market Centers, Market Periodicities and Marketing in Northwestern Nigeria," August 1970. 57 p. (Republished in African Urban Notes, Vol. 5, No. 2, Winter 1970.)
13. Berg, Elliot J. "Wages and Employment in Less-Developed Countries," December 1970. 23 p. (Republished in The Challenge of Unemployment to Development and the Role of Training and Research Institutes of Development, OECD, Paris, 1971.)
14. Hutcheson, Thomas L. and Porter, Richard C. "The Cost of Tying Aid: A Method and Some Colombian Estimates," January 1971. 58 p. (Republished in Princeton Studies in International Finance, No. 30, March 1972.)
- * 15. Andriamananjara, Rajaona. "Labor Mobilization: The Moroccan Experience," April 1974. 119 p.
16. Aho, C. Michael. "The Use of Export Projects in Allocating Foreign Aid Among and Domestic Resources Within Developing Countries," July 1971. 59 p. (Republished in Journal of Development Studies, Vol. 10, No. 3/4, April/July 1974.)
17. Kennedy, Michael. "An Empirical Evaluation of the Two-Gap Model of Development," November 1971. 29 p.
18. Naranjo, John and Porter, Richard C. "The Impact of the Commonwealth Preference System on the Exports of Latin America to the United Kingdom," March 1972. 37 p. (Republished in Journal of Development Studies, Vol. 9, No. 4, July 1973.)
19. Fields, Gary S. "Private Returns to Investments in Higher Levels of Education in Kenya," April 1972. 16 p. (Republished in Education, Society and Development: New Perspectives from Kenya, edited by David Court and Dharam P. Ghai. Oxford University Press, Nairobi, 1974.)

20. Osayimese, Izevbuwa G. "An Application of Control Theory to Rural-Urban Migration and Urban Unemployment," May 1972. 19 p. (Republished in Geographical Analysis, Vol. 4, No. 2, April 1974.)

21. Johnson, George E. "The Determinants of Hourly Earnings in Urban Kenya," May 1972. 36 p.

22. Staelin, Charles P. "The Cost and Composition of Indian Exports," May 1972. 41 p. (Republished in Journal of Development Economics, Vol. 1, No. 2, June 1974.)

23. Heller, Peter S. "A Model of Public Sector Expenditure Dynamics in Less-Developed Countries: The Kenyan Case," May 1972. 50 p. (Republished in Quarterly Journal of Economics, Vol. 88, No. 2, May 1974.)

24. Heller, Peter S. "The Strategy of Health-Sector Planning in the People's Republic of China," July 1972. 62 p. (Republished in Medicine and Public Health in China, edited by M. Wegman and T. Lin, Josiah Macy Foundation, New York, 1973.)

25. Winegarden, Cal R. "Determinants of International Differences in Educational Effort," September 1972. 31 p. (Republished in Eastern Economic Journal, Vol. 2, No. 1, January 1975.)

26. Staelin, Charles P. "A General Equilibrium Model of Tariffs in a Non-Competitive Economy," March 1973. 29 p. (Republished in Journal of International Economics, Vol. 6, No. 1, February 1976.)

* 27. Barlow, Robin. "Planning Public Health Expenditures with Special Reference to Morocco," April 1973. 68 p. (Republished in International Journal of Health Services, Vol. 6, No. 1, February 1976.)

28. Dia Bondo, Theophil Lukusa and Porter, Richard C. "A Constant Market-Share Look at African Exports in the 1960s," June 1973. 25 p.

29. Porter, Richard C. "Labor Migration and Urban Unemployment in Less-Developed Countries: Comment," July 1973. 19 p.

30. Heller, Peter S. "An Econometric Analysis of the Fiscal Behavior of the Public Sector in Developing Countries: Aid, Investment and Taxation," October 1973. 39 p. (Republished in American Economic Review, Vol. 65, No. 3, June 1975.)

31. Porter, Richard C. "Some Doubts About Kenya's Future as an Exporter of Manufactures," October 1973. 30 p. (Republished in Eastern Africa Economic Review, Vol. 6, No. 1, June 1974.)

32. Weisskopf, Thomas E. "Sources of American Imperialism: A Contribution to the Debate between Orthodox and Radical Theories," November 1973. 46 p. (Republished in Review of Radical Political Economics, Vol. 6, No. 4, Fall 1974.)

33. Hoopengardner, Thomas. "Rural-Urban Migration: A Dynamic View," January 1974. 15 p.

34. Porter, Richard C. and Staelin, Charles P. "On the Rationality of 'Cascaded' Export Subsidies and Taxes," March 1974. 9 p.

35. Weisskopf, Thomas E. "American Economic Interests in Foreign Countries: An Empirical Survey," April 1974. 56 p.

36. Shapiro, Kenneth H. and Muller, Jurgen. "Sources of Technical Efficiency: The Roles of Modernization and Information," April 1974. 40 p. (Republished in Economic Development and Cultural Change, Vol. 25, No. 2, January 1977.)
- * 37. Stolper, Wolfgang F. "Investments, Employment and Output per Man in the Tunisian Economy, 1961-1971," September 1974. 112 p. (Republished in Weltschaftliches Archiv, Vol. 114, No. 3, September 1978, and in Annales Economiques, No. 14, 1980, in French.)
38. Porter, Richard C. "Measuring the Cost of Granting Tariff Preferences," September 1974. 44 p.
39. Herman, Barry M. "Multi-national Oligopoly in Poor Countries: How East Africa Got Its Petroleum Refineries," September 1974. 32 p. (Republished in Journal of Development Economics, Vol. 2, 1975 and in Readings on the Multinational Corporation in Kenya, edited by Raphael Kaplinsky, Oxford University Press, Nairobi, 1978.)
40. Elliott, Howard J.C. "Animation Rurale and Encadrement Technique in the Ivory Coast," September 1974. 33 p.
41. Weisskopf, Thomas E. "China and India: A Comparative Survey of Economic Performance," October 1974. 43 p. (Republished in Economic and Political Weekly, Vol. 10, Nos. 5-7, February 1975.)
42. Heller, Peter S. "Factor Endowment Change and the Structure of Comparative Advantage: The Case of Japan, 1956-1969," January 1975. 23 p. (Republished in Review of Economics and Statistics, Vol. 58, No. 3, August 1976.)
43. Heller, Peter S. "An Analysis of the Structure, Equity and Effectiveness of Public Sector Health Systems in Developing Countries: The Case of Tunisia, 1960-1972," February 1975. 105 p.
44. Blake, Robert. "Import Controls and Production in Tunisia During the 1960s," March 1975. 41 p.
45. Kleve, Jacob G. and Stolper, Wolfgang F. "Changes in Income Distribution, 1961-1971 (Tunisia)," March 1975. 30 p.
46. Kleve, Jacob G. "The Financing of Investments in Tunisia, 1961-1971," March 1975. 41 p.
47. Ketkar, Suhas L. "Economics of Education in Sierra Leone," April 1975. 37 p. (Republished in Manpower Planning and Utilization in West Africa, International Labor Organization, 1979.)
48. Berg, Elliot J. "Some Problems in the Analysis of Urban Proletarian Politics in the Third World," March 1976. 17 p. (Republished in Comparative Urban Research, Vol. 4, No. 1, April 1976.)
49. Monson, Terry D. and Pursell, Gary G. "An Evaluation of Expatriate Labor Replacement in the Ivory Coast," April 1976. 75 p. (Republished in Actualité Economique, Vol. 53, No. 2, April-June 1977, in French, and in Journal of Development Economics, Vol. 6, No. 1, March 1979.)
50. Kendrick, Robin, J. "A Survey of Labor Relations in Cameroon," May 1976. 39 p. (Republished in Industrial Relations in Africa, edited by Ukandi G. Damachi, International Institute for Labor Studies, Geneva, 1979.)

51. Berg, Elliot J. "The Economic Impact of Drought and Inflation in the Sahel," May 1976. 35 p.

52. Shapiro, Kenneth H. "Efficiency Differentials in Peasant Agriculture and Their Implications for Development Policies," June 1976. 13 p. (Republished in International Association for Agricultural Economics Occasional Paper No. 1, November 1977.)

53. Saulniers, Alfred H. "Unit Equivalent Scales for Specific Food Commodities: Kinshasa, Zaire," August 1976. 22 p.

54. Saulniers, Alfred H. "The Economics of Prestation Systems: A Consumer Analysis of Extended Family Obligations with Application to Zaire," August 1976. 27 p.

55. Elliott, James A.M. "Will Rising Wages in the Controlled Sector Increase Total Employment in Less-Developed Countries?," August 1976. 37 p. (Republished in Journal of Development Studies, Vol. 16, No. 1, October 1979.)

56. Barlow, Robin. "A Test of Alternative Methods of Making International Product Comparisons," September 1976. 15 p. (Republished in Economic Journal, Vol. 87, September 1977.)

57. Heller, Peter S. "Interactions of Childhood Mortality and Fertility in West Malaysia: 1947-1970," September 1976. 33 p.

58. Heller, Peter S. and Drake, William D. "Malnutrition, Child Morbidity and the Family Decision Process," September 1976. 43 p. (Republished in Journal of Development Economics, Vol. 6, No. 2, June 1979.)

59. Staelin, Charles P. and Jurado, Gonzalo M. "The Impact of Export Incentives and Export-Related Policies on the Firms of the Less-Developed Countries: A Case Study of the Philippines," September 1976. 29 p.

60. Porter, Richard C. "A Model of a South African-type Economy," October 1976. 42 p. (Republished in American Economic Review, Vol. 68, No. 5, December 1978.)

61. Montgomery, Barbara B. "The Economic Role of the Ivorian Woman," February 1977. 49 p.

62. Heller, Peter S. "A Model of the Demand for Medical and Health Services in West Malaysia," October 1976. 52 p. (Republished in Social Science and Medicine, Vol. 16, 1982.)

63. Monson, Terry D. "A Note on Measuring Educational Returns in LDCs," February 1977. 12 p. (Republished in Journal of Developing Areas, Vol. 13, No. 4, July 1979.)

64. Lopez, Michael. "The Determinants of Income and Its Distribution in four Villages in India," February 1977. 76 p.

65. Cross, John G. "A Stochastic Learning Model of Migration," February 1977. 17 p. (Republished in Journal of Development Economics, Vol. 5, No. 2, June 1978.)

66. Weisskopf, Thomas E. "Dependence as an Explanation of Underdevelopment," February 1977. 32 p.

67. Heller, Peter S. "Issues in the Allocation of Resources in the Health Sector of Developing Countries," February 1977. 33 p. (Republished in Economic Development and Cultural Change, Vol. 27, No. 1, October 1978.)

68. Porter, Richard C. "Economic Sanctions: The Theory and Evidence from Rhodesia," March 1977. 19 p. (Republished in Journal of Peace Science, Vol. 3, No. 2, Fall 1978.)

69. Henning, Peter H. "The Urban Popular Economy and Informal Sector Production," March 1977. 66 p.

70. Nziramasanga, Mudziviri T. "Production from an Exhaustible Resource Under Government Control in LDCs," December 1977. 17 p.

71. Barnum, Howard N. and Squire, Lyn. "Labor Heterogeneity and Rice Production in Malaysia," December 1977. 11 p.

72. Bloch, Peter C. "Labor Relations in Senegal - History, Institutions and Perspectives," January 1978. 41 p.

73. Barnum, Howard N. and Squire, Lyn. "Consistent Aggregation of Family and Hired Labor in Agricultural Production Functions," January 1978. 12 p.

74. Delgado, Christopher L. "An Investigation of the Lack of Mixed Farming in the West African Savannah: A Farming Systems Approach for Tenkodogo, Upper Volta," November 1978. 71 p.

75. Pinckney, Annette M. "An Analysis of Grain Storage in Three Interior Sahel Countries," January 1979. 75 p.

76. Berg, Nancy and Elliot J. "Graduate Training of LDC Economists in U.K. Universities - A Statistical Note," January 1979. 35 p.

77. Porter, Richard C. "The Potential Impact of International Trade and Investment Sanctions on the South African Economy," February 1979. 80 p. (Republished in Journal of Conflict Resolution, December 1979.)

78. Barnum, Howard N. and Barlow, Robin. "Reducing Mortality When Diseases are Interdependent," August 1978. 25 p.

79. Berg, Elliot J. "Reforming Grain Marketing systems in West Africa," June 1979. 50 p.

* 80. Ross, Clark G. "Grain Demand and Consumer Preferences: Dakar, Senegal," June 1979. 26 p. (Republished in Food Policy, Vol. 5, No. 4, November 1980.)

* 81. Ross, Clark G. "A Village Level Study of Producer Grain Transactions in Rural Senegal," June 1979. 51 p. (Republished in African Studies Review, V. 25, # 4, December 1982.)

82. Barlow, Robin. "Economic Growth in the Middle East, 1950-1972," June 1980. 41 p. (Republished in International Journal of Middle East Studies, Vol. 14, 1982.)

83. Eddy, Edward D. "Prospects for the Development of Cattle Production on Mixed Farms in the Pastoral Zone of Niger: A Summary," June 1980. 91 p.

84. Berg, Elliot J. "Alternative Strategies for Zimbabwe's Growth," June 1980. 27 p.

85. Ross, Clark G. "A Modeling of the Demand and Supply of Food Grains in Senegal," June 1980. 68 p.

86. Staatz, John M. "The Economics of Cattle and Meat Marketing in Ivory Coast: A Summary," June 1980. 84 p.

87. Ranney, Susan I. "The Open Door Policy and Industrialization in Egypt: A Preliminary Investigation," August 1980. 47 p.

88. Ranney, Susan I. "A Note on the Proletarianization of the African Peasantry in Rhodesia," August 1980. 18 p.

89. Barnum, Howard N. "The Economic Cost and Benefits of an Immunization Program in Indonesia," January 1981. 37 p.

90. Makinen, Marty; Herman, Larry A.; Staatz, John M.. "A Model of Meat Versus Live-animal Exports from Upper Volta," February 1981. 27 p.

91. Grosse, Scott D. "A Skeptical Perspective on Income Redistribution and Poverty Reduction in Sri Lanka," May 1981. 27 p.

92. Kemal, A.R. and Porter, Richard C. "Learning by Doing While Remembering Forgetting, With Reminders From Pakistan Manufacturing Data," May 1981. 21 p.

93. Berg, Elliot J. "Inter-governmental Health Assistance in Francophone West Africa," June 1981. 46 p.

94. Ranney, Susan I. "Terms of Trade and Domestic Distribution: A Comment," July 1981. 11 p.

95. Porter, Richard C. "Apartheid, the Job Ladder, and the Evolutionary Hypothesis: Empirical Evidence from South African Manufacturing, 1960-1977," September 1981. 34 p.

96. Makinen, Marty. "A Benefit-Cost Analysis of Measles Vaccinations in Yaounde, Cameroon," November 1981. 20 p. (Republished in Social Science and Medicine, FORTHCOMING ISSUE, 1984?)

97. Thomas-Peterhans, Randall. "The Stratification of Livestock Production and Marketing in the Zinder Department of Niger," September 1982. 39 p.

98. Berg, Elliot J. and Ainsworth, Martha. "A Strategy for Health Care in West Africa," November 1982. 35 p.

99. Josserand, Henri P. and Brazee, Richard J. "Domestic and Foreign Effort Applied to a Fish Stock: Getting the Most Over Time, for a Change," May 1983. 14 p.

100. Ranney, Susan I. "Time Allocation and Remittance Flows: The Case of Temporary Mexican Migration to the U.S.," June 1983. 25 p.

101. Ranney, Susan I. "International Capital Transfers and the Choice of Production Technique: A Simple Two-Country Model," June 1983. 21 p.

102. Ranney, Susan I. "Economic Models of Planned Temporary Migration," June 1983. 26 p.

103. Grosse, Scott D. "Rural Development and Rural-Urban Migration: The Elusive Relationship," June 1983. 47 p.

104. Gordon, David F. "Which Way for Zimbabwe: Development Dilemmas and Prospects," August 1983. 27 p.

105. Josserand, Henri P. "Small Stock, Large Dividends: Sheep and Goats in Sub-Saharan Africa," October 1983. 30 p.

106. Chambas, Gerard. "Rural Income Distribution in Senegal: Changes and Indicators," December 1983. 43 p.

107. Ranney, Susan I. and Kossoudji, Sherrie. "Historical Migration Patterns and Current Temporary Migration: The Case of Mexican Migration to the U.S.," December 1983. 35 p.

108. Gordon, David F and Parker, Joan C. "The World Bank and Its Critics: The Case of Sub-Saharan Africa," March 1984. 43 p.

109. Kouassi, Bernard Y. "Urban Consumption of Beef in the Ivory Coast," September 1984. 22 p.

110. Kouassi, Bernard Y. "Toward An Adoption Decision Model for Processed Foods in Developing Nations," November 1984. 34 p.

111. Sherman, Jacqueline R. "Grain Marketing Decisions of Subsistence Farmers in Burkina Faso," December 1984. 29 p.

Please refer to the Discussion Paper Number (DP#) when requesting one of these titles. Postage and handling charges are included in the individual and subscription prices.

*Available in French and English.