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DETERMINANTS OF MARKETED SURPLUS IN RURAL HOUSEHOLDS:
TOWARD AN APPLIED RESEARCH AGENDA FROM
AN AFRICAN POLICY PERSPECTIVE

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As author, I alone lay claim to responsibility for any shortcomings or errors of fact or analysis.

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INTRODUCTION

African governments are increasingly interested in understanding factors affecting the marketing of staple food grains by rural households which produce partially for home consumption. Food security depends not only on aggregate production, but also the distribution of production by income group, social class and geographical area. The availability of food to nonagricultural producers and those who produce insufficient amounts to satisfy their subsistence requirements is influenced by the interaction of variables affecting the allocation of production between sales and other disposals, consumption and storage. Grain which is added to disposals limits household consumption as well as security provided by on-farm stocks. At the same time, if sold, it adds to income, affecting both consumption and security.

Marketed surplus, in conjunction with gifts and in kind exchanges, comprises the disposable or marketable surplus component of output. Understanding the behavior of marketed surplus and the variables affecting it can be of major importance in the development of sound policies with respect to agricultural marketing and prices, imports and exports, national reserves and overall rural and national development objectives.

At the present time, many African governments are involved in or contemplating involvement in the marketing of staple food products. International organizations and agencies are investing increasing

amounts of money in food security and agricultural development assistance schemes, arguing for the urgency of meeting "basic needs".¹

An understanding of the determinants of marketed surplus is an essential element of effective planning and program design. Yet the literature with respect to marketed surplus is sparse for the world in general and exceedingly scarce for the African continent in particular.

This paper is an outgrowth of an attempt to estimate simple supply and demand functions for staple food grains in a West African country [Newman, 1977]. The use of time series production data as a proxy for marketed surplus presents serious difficulties. In times of crisis, such as the Sahelian drought, the assumption that marketed surplus is a constant proportion of production would seem highly unrealistic. As the coefficients and elasticities resulting from estimations under such an assumption are biased, their value for policy is questionable. Further attention to the underlying factors influencing marketed surplus seems essential.

This paper involves a review of available literature dealing with marketed and marketable surpluses. This is placed in perspective with an initial review of the policy variables which may influence and/or be influenced by the determinants of marketed surplus. An agenda of issues meriting further consideration is presented in the context of future research necessary to permit empirical analysis of the concerns presented herein. The overall aim is to stimulate interest in the understanding of an area of rural household behavior, leading toward

¹For a discussion of the "basic needs" concept, see International Labor Office [1976, 1977] and Streeten and Burki [1977].

an improved theoretical base from which the differential impacts of policy decisions on various groups can be better judged.

MARKETED SURPLUS BEHAVIOR AS IT INFLUENCES POLICY

In non-market subsistence agriculture, production beyond that required for consumption could be distributed between gifts, in kind transfers and storage. With increasing penetration of the exchange economy into traditional societies in Africa, sales of surplus food grains have increased in importance. The introduction of cash crops and growth of nonfarm employment have increased the demand for staple food grains as a result of both labor reallocation and income changes. Improvements in transportation between regions, as well as urbanization and rural-urban migration, have encouraged increasing trade of food grains. Changes in the traditional household or family structure and traditional relations between sedentary and nomadic peoples have increased the role of the market in the transfer of subsistence food staples.

Consumption patterns in both urban and rural areas are also in a state of flux. Increases in demand for imported foodstuffs and other goods result in greater demand for cash. Additionally, when faced with high internal marketing and transportation costs, governments have sometimes found it easier to feed urban areas with imported food grains, some of which could be produced locally. Production of cash crops for export has been encouraged in order to pay for these imports.

In the period since the Arusha declaration of 1967 and the Sahelian drought of 1968-73, African nations have increased their

articulated dedication to such goals as self-reliance, self-sufficiency and food security.² Food security has been recognized as an important goal the world over, as indicated by the resolutions of various World Food Conferences, the establishment of the World Food Council, etc. In the determination of macro-level policies which can help to attain these and other goals, an understanding of micro-economic behavior at the household level is an essential base upon which to build. An understanding of the way in which producers and consumers respond to changes in such factors as prices, income, transportation and marketing costs, risk and uncertainty is necessary.

As national marketing boards play an increasing role in the commercialization of both cash and food crops, decisions as to farm gate prices, marketing margins, timing, and location of purchasing and sales stations will influence farmers' production and consumption decisions. The impact such policies will have, as well as the predictability of such impacts, will depend upon the degree of understanding of rural household behavior, particularly with respect to marketed surplus. Improved information will facilitate perception of the distribution of costs and benefits resulting from a given decision.

An understanding of marketed surplus behavior is also important in determining the size, placement and rules for release of reserve stocks. If price stability results in increased sales and repurchases of food grains and decreased farm level storage, the level of required reserves to be held by the public sector will be greater than if such

²See, for example, Club des Amis du Sahel [1976] which specifies such goals as "food self-sufficiency" and "self-sustaining development".

behavior were not to be expected. If faced with the alternatives of food imports or changes in farm-gate prices of food grains, knowledge that marketed surplus response to price is strong and positive, may permit major savings of foreign exchange costs. If the relation were negative, an opposite effect might be expected. Understanding the differences between short and long run responses could also facilitate effective decisions with respect to price policy. In addition to aggregate response data, information by income level and region is important in permitting decisions to reflect recognition of the potential impacts on the welfare of different groups.

Knowledge of the key behavioral relationships involved in the determination of marketed surplus can be of major importance in the improvement or development of national agricultural information systems. As authors since Hegel have pointed out, the mere collection of data does not imply the availability of useful information. Analysis is a necessary intermediate step [Bonnen, 1975; Mitroff and Pondy, 1974]. Furthermore, an essential step in the development of a data collection program is analysis of expected interrelationships and linkages. Specifically, the lack of depth in the literature seems to indicate the need for an understanding of the dynamics of output allocation between consumption, sales and stocks in addition to those of allocation of time between alternative production, consumption and leisure activities. A review of the literature on marketed surplus will provide insight into a measurable variable through which some of these interactions can be viewed.

THE LITERATURE IN PERSPECTIVE

Marketed Versus Marketable Surplus

Many authors fail to distinguish between marketed and marketable surplus in their analysis [Krishna, 1965; Toquero, Duff, Anden-Lacsina and Hayami, 1975]. Confusion as to definitions and distinctions employed greatly complicates comparisons between authors. Some define marketable surplus as all disposals other than consumption. This might include barter and in kind transfers, gifts, and storage for seed or reserves in addition to sales. Krishna defines marketable surplus as the "marketed part of the output". Matlon includes all production above that necessary to satisfy some basic nutritional requirements in estimating some "minimum potential crop sales".

Marketed surplus has generally been defined as that portion of production which actually enters the market. Some authors include the barter component in this category [Chinn, 1976 and Sharma and Gupta, 1970]. Distress sales, where grain is sold soon after harvest in order to satisfy prior obligation and then repurchased or replaced later on, are included in some definitions of marketed surplus, but subtracted out of marketable surplus. In such case, marketed surplus would be a gross term and marketable surplus the net amount after repurchases. Where no repurchases occur, marketable surplus could be greater than actual marketed surplus. For purposes of this paper, the term marketed surplus will be used to denote that portion of production which actually enters the market, including distress sales. Marketable

surplus will include marketed surplus as well as gifts, in kind transfers and savings, less any repurchases.

The value of the distinction between marketed and marketable surplus lies in the degree of responsiveness to price and the ability to collect data which, upon analysis, can yield information useful in explaining the decision making process of rural households producing partially or primarily for home consumption. From a behavioral standpoint, marketed surplus is important within the constraints of marketable surplus as well as total output.

It might be expected that with the increasing integration of subsistence farmers into the market economy, the percentage of marketed surplus which is actually sold (as opposed to barter or transfers) would increase. With increasing penetration of the cash economy it might further be expected that the exchange value of subsistence food staples involved in in kind transfers or bartered exchange would increasingly approximate their market price. In such cases, an understanding of the determinants of marketed surplus would be of increasing relevance as a variable for planning purposes.

Evolution of the Study of Marketed Surplus

Much of the available literature concerning marketed surplus behavior is from India. The initial interest in understanding such behavior appears to have arisen out of, or simultaneously with, concern for the impact of United States P.L. 480 disposals and food price regulation on agricultural production [Olson, 1962; Mathur and Ezekiel, 1961; Khatkhate, 1962; Witt, 1964].

In his 1962 "Note on the Elasticity of the Marketable Surplus of a Subsistence Crop", Raj Krishna pointed to the critical importance

of understanding the behavior of marketed supply of food crops grown partly for home consumption. He commented that in a growing economy, "the rate of growth of the urban industrial sector depends on the availability of food from the rural, agricultural sector" [Krishna, 1962].

Similar rationales have been cited by more recent authors, including Bardhan and Bardhan [1971], Dixit [1969], Zarembka [1972] and Medani [1975]. Medani also mentions the importance of knowledge of the magnitude and sign of the elasticity of "marketable surplus" in the formulation of specific policies on "agriculture and overall growth". With growing concern for meeting "basic needs", understanding marketed surplus behavior becomes important in the context of inter and intra household, as well as inter sectoral, welfare.

Focus on the feeding of urban centers and the feeling of industrial growth resulted in emphasis on the determination of aggregate price elasticities. The use of the term "surplus" can be viewed as an indication of the orientation of interest toward that which could be extracted out of rural areas and toward the urban.

As Askari and Cummings note, there is a tendency for the literature to concentrate on estimating elasticities with little analysis of the conditions determining them. Some authors recognize that the subsistence farmer as a producer and consumer of staple foods is influenced by price effects in both areas. However, the literature is generally deficient in its treatment of the simultaneous impacts of a change in price on supply and demand and the accompanying feedback effect on price

In considering variables affecting marketed surplus, discussion is divided along the lines of price and income effects, and interactions between the two. Further refinement can be added through the introduction of temporal issues, such as seasonal and interannual fluctuations of price, consumption and stock levels. Empirical estimation problems also merit discussion. With respect to data, level of disaggregation is of concern as is the mere availability of data. This latter point has given rise to several indirect as well as direct procedures for estimation of marketed surplus response.

In his 1962 "Note", Krishna developed a "simple model" incorporating market supply (M) as a function of output (Q) and consumption (C):

$$M = Q - C$$

so that

$$\frac{dM}{dP} = \frac{dQ}{dP} - \frac{dC}{dP}$$

where P is a "relative price". This is combined with a "home consumption function":

$$\frac{dC}{C} = g \frac{dP}{P} + h \frac{dy}{y}$$

where g is the elasticity of substitution effect on consumption; h is the elasticity of the income effect; and y is total income.

Finally, to reflect the fact that the farmer is a consumer as well as a producer, Krishna derives the total change in income resulting from a price change as:

$$\frac{dy}{y} = \frac{M}{Q} k \frac{dP}{P} \qquad k = \frac{PQ}{y}$$

where k is the fraction of total income made up by production of the subsistence crop [Krishna, 1962].

As explained by the Krishna model, the elasticity of marketed surplus is thus a function of price elasticity of output and the income and substitution components of the elasticity of consumption.

Price Response of Marketed Surplus

Schools of thought regarding price responsiveness of marketed surplus span the spectrum from positive response to irrational behavior. Surveys of various viewpoints are presented in Behrman [1968] and Askari and Cummings [1976]. Some contend that supply is inversely related to price. This thesis is generally based on the hypothesis that subsistence households have a fixed demand for money, and thus sell only enough to satisfy that demand [Newmark, 1959; Mathur and Ezekiel, 1961; Khatkhate, 1962; Boeke, 1953; Krishna, 1965; Ferris and Suh, 1972].

The reasoning employed by Mathur and Ezekiel [1961] is that subsistence farmers save in kind, rather than in money. Their demand for money is assumed fixed by predetermined obligations and commitments, implying inelastic demand for nonfood goods. A change in price inversely affects the necessary sales of food staples and thus a backward bending supply curve would logically follow. Ferris and Suh [1972] found this consistent with empirical observation in Korea.

An alternative thesis, also providing for instances where a negative marketed surplus response to price could be exhibited, is that an increase in income resulting from an increase in price results in a larger demand for increased consumption of the food staple than the accompanying negative substitution effect on consumption and positive output supply effect [Krishna, 1965; Bardhan, 1970; Olson, 1960].

The elasticity of marketed surplus will be positive if the elasticity of supply is greater than the price elasticity of home consumption. Among those postulating a positive supply response to price changes, there are some authors who assume zero income and price elasticities of demand in their estimation procedure [Behrman, 1966, 1968], thus making the elasticity of marketed surplus equivalent to the price elasticity of production or output.

If subsistence farmers are assumed to respond positively to price changes, and their behavior is consistent with economic theory, then the price elasticity of supply (output) would be expected to be greater than zero. If such is the case, and income and price elasticities of demand are assumed to be zero, then the elasticity of marketed surplus must by definition be positive. While this simplifies statistical specification of the models, it limits the reliability of the results in understanding the small farmer decision-making process.

There is a body of literature which proposes that subsistence producers respond randomly or irrationally to price, or respond to habit, cultural influences, etc. [Becker, 1962; Dalton, 1962]. Although little empirical evidence is available on subsistence crops, statistical testing for cash crops marketed through official channels indicate a tendency for supply response to be positive and rational [Helleiner, 1975; Barber, 1960; Bauer, 1954; Dean, 1966].

Most authors have estimated short and long run elasticities of output and marketed surplus using indirect methods as proposed by Krishna [1962], Behrman [1966, 1968] and Bardhan and Bardhan [1969]. Krishna used his "simple model" to estimate plausible ranges for

elasticities of Punjabi wheat [Krishna, 1962]. In addition, the model was used in several other indirect estimation attempts [Mubyarto, 1965; Mangahas, Recto and Ruttan, 1966].

Behrman [1966] developed an alternative model for use of time series data in the estimation of price elasticity of marketed surplus of Thai rice. Among his criticisms of the Krishna model were Krishna's (1) failure to distinguish between actual and expected income and actual and expected production; (2) failure to incorporate income other than that from the sale of the subsistence crop in the demand for on-farm consumption; and (3) the implicit assumption that complete, rather than partial, adjustment to a change in price occurs in a single period.

Behrman [1966] used a Nerlovian distributed lag model in his formulation, and claims to take account of total net income in the determination of on-farm consumption. However, as noted previously, his estimations for Thai rice are based on the assumption of zero income and price elasticities of per capita rice consumption, hence negating the effect of a more complete accounting for income.

In Behrman's [1966] comparison of plausible ranges of price elasticity for Punjabi wheat generated by the Krishna and Behrman models, it was found that while the models converged when most of production was marketed, they could actually differ in sign, as well as magnitude, when less than 50 percent of output was marketed. A large part of the difference is attributed to the differing income formulations.

An indirect estimation procedure employed by Bardhan and Bardhan [1969] began with an estimation of rural and urban nonagricultural production. These figures were multiplied by national per capita consumption of cereals estimates and government distributions were

subtracted out, the residual being an estimate of the amount marketed by the agricultural population. This was then expressed as a percentage of total cereals output and used to construct time series estimates of marketed surplus.

There are several shortcomings in the application of such a methodology. In addition to the basic concern about the data, aggregation limits the usefulness of any findings in explaining variation between income groups, by regions, or in Bardhan's case, by crop. While macro-economic policies may depend on aggregate response in terms of changes in output, an accompanying understanding of micro-level effects and the variables associated with them is essential to understanding distributional impacts.

Several authors have employed direct estimation procedures which permitted some disaggregation. Among these are Bardhan [1970] in northern India, Toquero, Duff, Anden-Lacsina and Hayami [1975] in the Philippines and Medani [1975] in the Sudan. Bardhan [1970] computed short run price elasticities of marketed surplus of food grains in Northwest India and found a negative relationship. The impact of change in price on total output was found to be positive in the relatively long run, allowing for lagged adjustment. The negative price elasticity of marketed surplus was found to be smaller in magnitude for wealthier subgroups of farmers, but the coefficient remained negative.

Haessel [1975] used Bardhan's [1970] data to recompute elasticities based upon the criticism that the latter neglected to account for the feedback effect of supply on price. In Haessel's model, marketed surplus was treated as a residual after the home consumption decision was made based upon price and income. He found marketed

surplus response to be positive and found price and income responsiveness to be greater among large farmers, though not substantially so.

Medani directly estimated elasticities of marketable surplus for Sudanese sorghum producers grouped in a sampling of 600 rain-fed farms stratified according to the percentage of their total production marketed and technology employed. The data were collected during 1966-69. Findings presented in three articles [Medani, 1970, 1972, 1975] indicate a positive relationship between price and supply in the short and long runs, as well positive price elasticities of marketable surplus. In his 1975 article, aggregate price elasticity of marketed surplus estimates for the short and long runs are .21 and .30 respectively at the .05 significance level. He found, however, that the elasticity varied significantly among his sample strata.

Medani's 1975 article employs an adaptive expectations model and a system of five structural equations which are reduced to two in the elimination of unobservable variables. The dependent variables are marketable surplus and on-farm consumption. Marketable surplus is fit as a linear function of lagged price and consumption, lagged and expected yield, lagged marketable surplus and a disturbance term. On-farm consumption is fit as a function of price and family size as well as several lagged variables including price, income, family size and consumption.

A shortcoming of the Medani approach is that it deals with marketable as opposed to marketed surplus (though he never defines the term). His goal is to provide information on the magnitude and sign of the price elasticity in order to assist in rational agricultural policy formulations and evaluation of the effects of specific policies

on agriculture and overall growth. It would seem that the portion of marketable surplus which is actually marketed would be a more relevant variable for analysis of price elasticity. Medani states that his sample has been stratified according to the percent of marketable surplus and by technology employed. The procedure used in doing this is not explained, though it would be likely to bias the coefficients he obtained.

Toquero, Duff, Anden-Lacsina and Hayami [1975] analyzed elasticity of marketable surplus using the results of a three year sample survey of rice producers in the Philippines. They found that price has a negligible effect on the allocation of output between home consumption and market sale. They did, however, find a high and positive output elasticity, resulting in a total price elasticity in the supply of marketable surplus which was positive. Their market supply price elasticity was between 0 and +0.3, while the partial price elasticity of home consumption ranged between 0 and -0.4.

Toquero, Duff, Anden-Lacsina and Hayami [1975] found strong support for their hypothesis that marketable surplus increases "more than proportionally with output when the home consumption demand for rice is near a point of saturation". This information might be valuable if it were possible to measure a saturation point in consumption. It once again points up the need for integration of factors affecting household consumption demand out of production.

Non-Price Variables

In addition to price, a number of other factors have been suggested as influencing marketed surplus. Among these are farm size and production, income, wealth, family size, risk and uncertainty, debts and obligations, desire for leisure, etc. In studies of India, land holding size often serves as a proxy for income. While some studies in Africa employ this procedure [Massell, 1969], there is substantial reason to believe that such a relationship would not hold where land is not an overriding constraint.

Some research findings point out that large and medium sized farmers supply most of the marketed surplus [Parthasarathy and Rao, 1964]. However, when marketed surplus is measured as a proportion of output, there is some empirical evidence that the proportion marketed is greatest for very small and very large farms, with medium sized farms marketing a smaller proportion. This results in a U-shaped marketed surplus function. Such behavior can be interpreted as distress sales by smaller farmers and increasing marketable surplus for larger farmers as satiation in food grain consumption occurs.

In India, Narain [1961] found that marketed surplus decreased as holding size increased to 15 acres and then increases with holding size [Krishna, 1965]. When income groups were compared for Northern Nigeria, Matlon [1977] found a similar relationship. King and Byerlee [1977] inferred a like relation in Sierra Leone using subsistence ratios showing the proportion of consumption which is home produced.

Sharma and Gupta [1970], studying peasant families in India, found a positive relation between holding size and the amount of

grain retained for consumption per family member. This could be viewed as a wealth effect. Holdings were stratified into (1) 0 to 2.6 ha.; (2) 2.61 to 5.2 ha.; (3) 5.21 to 7.8 ha.; and (4) greater than 7.8 ha. Regression equations were fit with marketed surplus as the dependent variable. The resulting Y axis intercept terms were all negative, indicating a minimum level of retention of bajra (a millet) for consumption purposes. These were calculated on a per person basis as 74 kg. for holdings, 2.6 to 5.2 ha.; 140 kg. for the third group and 154 kg. for the final group. Contrary to the U-shaped marketed surplus response hypothesis, marketed surplus was assumed zero in the smallest size holdings, so no minimum retention was calculated.

The wealth effect is further evident in the authors' findings that production and family size were the most significant variables, "accounting for 93 percent of the variation in the marketed surplus of bajra." The relation of family size to marketed surplus was found to be negative, while the elasticity of sale with respect to production was positive and large (1.74).

While positive correlations have generally been found to exist between larger farm size and greater marketed surplus, for a given family size, this might be explained as a result of increasing satiation of desires for staple food crops. If food staples are either normal or inferior goods (i.e., the income elasticity of consumption demand is less than one), we would expect an increasing amount to be marketed (or at least less consumed) as income increases result from larger production.

Risk and uncertainty are often presented as important forces in explaining discrepancies between predicted and actual farmer behavior.

Roumasset [1976] recently warned that risk aversion may serve as too easy a scapegoat for methodological shortcomings. One hedge against risk and uncertainty in the context of the rural household is the retention of village level stocks and stores of staple food grains. Behrman [1966] noted that in the estimation of consumption and marketed surplus in Thailand, "the major inadequacy in the data is the absence of reliable estimates of changes in rice stocks". Stocks provide a key to understanding of intertemporal allocation patterns. Because they have been neglected in the marketed surplus literature, they are treated separately in the following section.

Farm and Village Level Stocks and Storage
in a Marketed Surplus Perspective

Most analyses of marketed surplus fail to confront the question of changes in the level of stocks of staple food grains at the household level. Production is often viewed in a static context and assumed to be allocated either to consumption or disposals. Farm or village level stocks serve as an important interface between production and ultimate use, permitting a lagged allocative decision or intentional saving. As a result, an understanding of marketed surplus behavior in a dynamic context at the farm or household level requires an understanding of why stocks are held and the determinants of the amount to be held.

While stocks can be viewed simply as savings, they serve as such, alternatively, though not mutually exclusively, in at least five respects:

1. They provide short run security in consumption, assuring food availability between harvests. If sufficient, they last through the "hungry season" preceding the next harvest.
2. They serve as a store of value (liquidity). They can be used in sale, barter, or transfers to satisfy demands for goods not produced at home.
3. They provide social status and a means to satisfy social and customary obligations through ceremonial participation, assistance to extended family members, etc.
4. They serve as a hedge against uncertainty in the longer run, providing protection against a bad harvest or the means to respond to an emergency.
5. They serve a speculative purpose in that deferred satisfaction of non-subsistence consumption demands permits speculation on the ability to reap gains greater than storage costs through response to interseasonal price fluctuations under imperfect market conditions.

The distinction among roles may be of value in that households at varying income and productivity levels may respond in a different manner to each of the roles. A low income household might be able to store for short term security in consumption, but production might prove inadequate to permit stores to serve more than marginally in any of the additional roles.

Alternatively, a high income producer might be able to satisfy short and long term consumption needs as well as social obligations, while at the same time saving grain for liquidity and speculative purposes.

A major gap in the knowledge of rural household behavior exists in this area. While authors are free to speculate on the importance of each of the stated roles for subsistence farmers, there is little empirical evidence upon which to base conclusions. There are profound implications for marketed surplus behavior in an understanding of the role of farm level stores.

The basis of Mathur and Ezekiel's [1961] hypothesis of a backward bending supply curve was the contention that savings are held in kind, rather than in cash balances. The degree to which the supply of food grains in local markets is assured would affect the use of storage to satisfy short and long run security in consumption (roles one and four). The potential for seasonal scarcity would tend to reinforce the maintenance of stocks as a store of value and for speculative purposes (roles two and five). Additionally, in societies where communal obligations tend to inhibit conspicuous consumption of cash, the full granary may be a very reasonable form of savings which simultaneously permits satisfaction of role three. While the introduction of cash crops may have resulted in some changes in the perceived role of money, the secrecy which often surrounds the size of actual household stocks would seem indicative of their performance of more than a short term consumption role.

Linked to roles that farm-level stocks play is the time preference of subsistence households in terms of consumption of staple food crops versus consumption of other goods necessitating sale or exchange of the staple. As Matlon's [1977] research findings have indicated, stocks and storage are important from an income perspective because poorer farmers may not only sell a larger proportion of their production than medium sized farmers, they do so at lower prices. Empirical evidence demonstrates the tendency of farmers, especially smaller subsistence farmers, to sell a portion of their production soon after harvest in order to satisfy debts or other prior obligations (distress sales). Other sales can be categorized in terms of the degree to which the demand for goods necessitating them are effective or postponable.

Sales followed by repurchases of grain can be explained as either necessitated by distress sales or representative of utility functions which place higher utility on possession of cash balances or consumption of other goods.

Repurchases are important in dealing with marketed surpluses because they make possible the differentiation between net and gross quantities marketed. Amount of repurchases is dependent upon initial distress sale requirements, costs and risk associated with the holding of stocks and frequency of harvests, as well as cash crop and non-farming sources of household income. Matlon employs a ratio of food grain purchases to sales in comparing income groups. In his particular sample, those in the lowest income group were net purchasers of food grains because they produced and sold a cash crop--groundnuts.

Three scenarios might explain the decision to make sales followed by repurchases:

1. The household might have planned for the resources with which to repurchase necessary quantities later in the season (often the "hungry season").
2. The household might expect that early sales would enable greater repurchases than later sales, given storage costs, including losses.
3. Sales resulting from prior obligations or the need to satisfy ceremonial or social obligations reduced reserves to less than sufficient levels, necessitating unplanned borrowing or other means of financing repurchases.

All of the above situations would influence the degree of variance between gross and net marketed surplus.

While one can speculate on the amount and timing of sales and their distributional impacts, the empirical evidence in the African context is sparse. On-farm stock levels may provide a locus for

observation of the simultaneous actions of a subsistence household as a consuming and selling unit of food staples.

In a study of marketing in three villages in Northern Nigeria during 1970-71, Hays [1975] broke down production into sales and gifts, with consumption the assumed residual. He found that 70 percent of the millet and sorghum sold by large farmers was stored for at least six months after harvest, while small farmers made 50 percent of their millet sales and 69 percent of their sorghum sales in the first six months after harvest.

Small farms in the study were those with an average household size of 8.3 people and an average field area of 2.1 hectares. Large farms averaged 13 people and 7.4 hectares [Hays, 1975].

Hays found that timing of sales was dictated by need for money in 65 to 70 percent of the cases he studied. Price was a much lesser determinant of sales, according to those he interviewed.

An additional finding of the Hays study was that both small and large farmers *purchased* staple food grains soon after harvest. He found little evidence of distress sales. Hays did not explain how all producers could buy grain and none sell, nor did he mention any alternative sources of income which would permit subsistence producers to make purchases. However, Matlon's study in the same region of Nigeria mentioned that low income farmers found a comparative advantage in the production of groundnuts as a cash crop, and use of the revenues for the purchase of food grains. This information places the Hays results in perspective while demonstrating the need for comparable studies in areas where cash crop production is developed at differing levels. Such differential intervention of

cash crops complicates generalization of behavior within the African continent, or even between regions of the same country, as well as inhibiting direct comparison with behavior on other continents.

Hays collected data on stock levels throughout the year in addition to marketed surplus. While the analysis is not presented in great detail, it does indicate large disparities in the amount of grain marketed and stored by members of the large and small farmer classifications. He states that 24 percent and 29 percent respectively of the small farmers were responsible for 50 percent of the millet and sorghum marketings, while 14 percent and 17 percent respectively of the large farmers accounted for half of the millet and sorghum marketings [Hays, 1975]. This would seem to imply that further disaggregation of the size groupings would facilitate distinguishing factors affecting marketed surplus.

The fact that marketed surplus is disposed of at varying rates throughout the year would appear to support the hypothesis that an understanding of on-farm storage decisions is closely linked to an understanding of marketed surplus behavior.

Like consumption and sales, on-farm stock level fluctuations are also important from a policy perspective in that they influence market prices and the availability and distribution of food. Inter-seasonal and interannual stock levels are widely acknowledged to exert an effect on price stability. The study of such variables is difficult, effective understanding requiring the availability of both cross-sectional and time-series data. Yet for the policy maker, such information is an essential tool in preparing a strategy for the assurance of food security while simultaneously addressing certain

developmental goals with respect to production, marketing and infrastructure development, income distribution and the satisfaction of basic human needs.

FROM POLICY ISSUES TOWARD A RESEARCH AGENDA

An understanding of marketed surplus behavior and its determinants can facilitate the structuring of incentives and regulations in such a manner that their impacts are more readily predictable. There is, however, neither conclusive evidence nor general agreement within the literature, even with respect to the sign or magnitude of price response.

Failure to reach a consensus in the literature results in part from the changing reasons for the study of marketed and marketable surplus. As interest has evolved from concentration on a means to permit urban industrial growth to recognition of the need to view marketed surplus from the perspective of overall national welfare and development, the kinds of information sought by researchers has changed. Current focus on the satisfaction of basic needs increases the necessity for studying marketed surplus in the context of simultaneous production and consumption decisions in rural households, as well as at more aggregated levels.

African countries which currently import food grains in order to satisfy demand in urban areas face major dilemmas. Governments must weigh the tradeoffs between the "cheap food" policies which contribute to urban political stability and the need to decrease rural-urban income differentials and reduce rural outmigration through

improvement of the living standard for the large proportion of their populations residing in rural areas.

Many government marketing boards have experience in the marketing of cash crops with primarily export uses. They find different sorts of problems when attempting to control the marketing of foodstuffs, as they can be consumed as well as sold. Faced with the inability to totally isolate staple food markets, an important alternative is to gain an improved understanding of the behavioral variables influencing marketed surplus, as well as consumption and storage.

In meeting long term demand for staple foods, understanding consumer behavior is important. Will urban consumers be permitted to continue to consume increasing quantities of subsidized imports of wheat and rice, paid for by taxes on cash crops produced in rural areas? Will certain constraints be put on such demand in order to strive toward the meeting of basic needs for the population as a whole, as suggested in a recent IBRD issues paper [Streeten and Burki, 1977]? Answers to these questions hinge in part on the marketed surplus response of subsistence producers, as this is one source of alternatives to food imports.

Among the factors requiring consideration in any plan of research are the potential costs and benefits inherent in the search for the marginal refinement of the available data. Resources allocated to the understanding of problems often subtract from those available to deal with them. One aim of research should be to facilitate comparisons across geographical and political boundaries, leading to some limited ability to generalize about behavior.

Much of the literature currently available on marketed surplus behavior deals with the Indian subcontinent. One might legitimately expect some behavioral differences in subsistence agriculture where land is the constraining factor and in areas of Africa where seasonal labor constraints present more of a problem. Within Africa there is also much variation in the degree to which these and other factors are constraints.

Research on marketed surplus behavior of African rural households can be approached from several perspectives. We can seek new answers from existing data, or broaden our inquiry to include new data sources. Both are obviously beyond the scope of this paper, though we can attempt to identify some research questions with implications for both categories.

What is the response of subsistence household consumption to price and income? Though Behrman and others have preferred estimations under the assumptions of zero elasticities of price and income for staple food grains, King and Byerlee [1977], using data from Sierra Leone, Mellor [1966] in India and others have found expenditure elasticities approaching unity [Newman, 1977]. This would markedly influence the marketed surplus response function as previously presented in the literature.

What roles do household level stocks of staple food grains play for different groups? To what extent do these stocks serve as in kind savings instead of cash? How do household stock levels fluctuate both seasonally and interannually? How does this vary by income group?

Answering these key questions would require household surveys over a prolonged period time. In the Sahel, the lagged response of food

grain prices to the drought of 1968-73 might have resulted in part from the depletion of stocks at the village level, prior to intervention by international relief agencies. Information on these stock levels is not available, so that speculation and hypotheses must remain untested. The fact that the 1976-77 drought in Northern Ghana resulted in rapid price rises in neighboring Upper Volta might be advanced as evidence that stock levels had not been reestablished, though the data do not permit statistical testing. The point is, employment of partial adjustment coefficients for policy purposes requires an understanding of the underlying factors causing or associated with that adjustment.

The positive response of output to price has been documented in much literature with respect to Africa [Helleiner, 1975; Dean, 1966 and others]. *How is production response allocation between consumption, sales and stores?* Barter and gift components also bear consideration. Furthermore, these individual questions all feed back to the major issue of simultaneous interactions between price and consumption, storage and disposal activities. In such relationships there are major difficulties in the identification of dependence and independence.

These research questions can be approached beginning with an analysis of the role of marketed surplus in the theoretical context of various household behavior models developed in the literature.³ The concerns presented in this paper can be integrated to develop a theoretical base upon which to build empirical analysis.

³For example, Hymer and Resnick [1969]; Jorgenson and Lau [1969]; Lau, Lin and Yotopoulos [1975].

Investigation of marketed surplus behavior must involve consideration of overall resource allocation in the household. Careful attention should be paid to changes in stock levels, sales, barter and gifts without neglecting alternative production, income earning and consumption opportunities. Changes in stock levels should be recorded over an entire crop year, beginning with the period immediately preceding a harvest and following through until the same harvest in the following year. Data on stocks may be no easier to collect than data on income and monetary savings. Obtaining price information for village markets and at the "farm gate" also present problems. In spite of the inherent difficulties, data on stock level changes at the household level are an essential tool in understanding marketed surplus behavior. Ideally, such data should be collected over a number of years in order to permit study of the short and long run variables affecting amount and timing of changes in sales, stores and consumption.

The obvious implication is that such a study should be viewed within the context of overall improvement of national supply, demand and sales statistics. Individual researchers cannot provide the multidisciplinary information necessary to satisfy long term planning needs. Their initiatives may be able to assist in the development of programs for its collection as well as helping to provide the theoretical base upon which to construct sound analysis.

With an improved understanding of how subsistence farmers behave and why they do it, consideration should be given to alternatives open to the public sector for making use of this knowledge in the development of strategies to assure the satisfaction of the basic

needs of every household, and within all households. Improved understanding of behavior can permit a more precise evaluation of the costs, both social and economic, involved in a given policy alternative.

Information, however, must be recognized as a potentially two-edged sword. It can be used to facilitate redistribution and/or to reinforce an existent distribution. The availability of improved information on the determinants of marketed surplus can in no way be expected to substitute for the political will to improve the well being of households producing partially for home consumption. It might, however, serve to facilitate policies aimed at encouraging it.

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