PART II

Conceptual Framework

2 Conceptual Framework

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Definitions

In this chapter, the basic theoretical relationships and definitional issues related to the commercialization of agriculture are described. Simply speaking, cash crops can be defined as crops for sale. The listing of typical agricultural processing enterprises in chapter 9 gives a rough overview of cash crops (also, see von Braun and Kennedy 1986). Yet, commercialization of agriculture as a process and a characteristic of agricultural change is more than whether or not a cash crop is present to a certain extent in a production system. Commercialization of subsistence agriculture can take many different forms. Commercialization can occur *on the output side* of production with increased marketed surplus, but it can also occur *on the input side* with increased use of purchased inputs. Commercialization is not restricted to just cash crops: The so-called traditional food crops are frequently marketed to a considerable extent, and the so-called cash crops are retained, to a substantial extent, on the farm for home consumption, as, for instance, groundnuts in West Africa. Also, increased commercialization is not necessarily identical with expansion of the cash economy when there exist considerable in-kind transactions and payments with food commodities for land use or laborers. Finally, commercialization of agriculture is not identical with commercialization of the rural economy. The deviation between these two processes becomes all the more obvious when off-farm nonagricultural employment already exists to a large extent in a certain setting.

At the household level we may thus specify forms of commercialization and integration into the cash economy from at least three different angles and measure the extent of their prevalence at the household level with the following ratios:

$$\text{(1a)}\quad \text{Commercialization of agriculture (output side)} = \frac{\text{Value of agricultural sales in markets}}{\text{Agricultural production value}}$$

$$(1b)\quad \text{Commercialization of agriculture (input side)} = \frac{\text{Value of inputs acquired from market}}{\text{Agricultural production value}}$$

$$(2)\quad \text{Commercialization of rural economy} = \frac{\text{Value of goods and services acquired through market transactions}}{\text{Total income}}$$

$$(3)\quad \text{Degree of integration into the cash economy} = \frac{\text{Value of goods and services acquired by cash transactions}}{\text{Total income}}$$

Specific characteristics of cash crops of a certain land may, under defined circumstances, imply certain household food security and nutritional effects (Longhurst 1988, 34).

Basic Relationships[1]

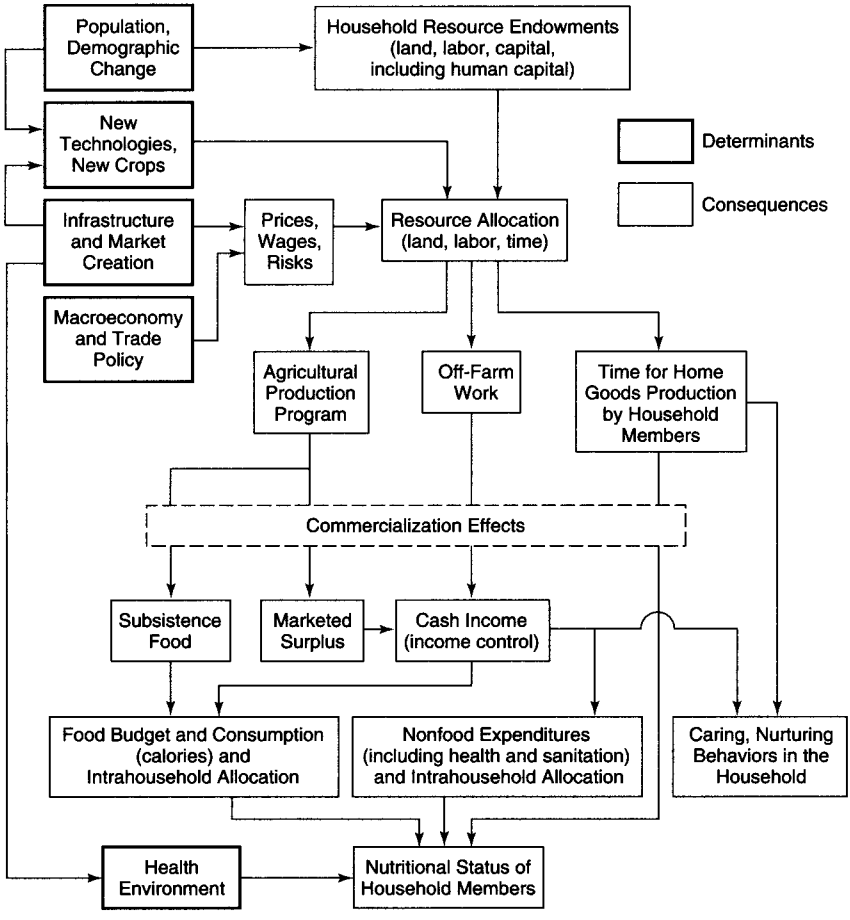
The effects of commercialization on income, consumption, and nutrition are mediated through complex relationships at household and intrahousehold levels. Generally speaking, the improvement of the status of a food-deficient and malnourished person has to come about by an improvement in the ability to acquire more food or better quality food, or both, hence, through the growth of income. An expected increase of production capacity and income motivates a household or individual household members to enter the exchange economy and become more commercialized. Thus, insofar as increased sale of produce, purchase of inputs, and off-farm employment occur on a voluntary basis, and insofar as the responsibilities and preferences within a household ensure sharing of gains, it can be expected that commercialization contributes to a household's food security. In other words, food consumption benefits are assured for all when markets do exist and intrahousehold conflicts do not. The relationship is more complex when it comes to the real world of rural households and thin and volatile rural markets, often characterized by structural imbalances and institutional constraints.

In spite of dynamic interdependencies of causes and effects, it may facilitate the analysis if exogenous factors that determine commercialization are separated from endogenous factors that tend to affect the influence of commercialization on income and nutrition. Figure 2.1 describes major relationships between both groups of factors.

As far as the exogenous determinants of commercialization (left-hand side of figure 2.1) are concerned, among the most important

1. The sections on basic relations and theoretical foundations draw on von Braun, de Haen, and Blanken 1991.

FIGURE 2.1 Commercialization at the household level: determinants and consequences for income, consumption, and nutrition



Source: Derived from von Braun, de Haen, and Blanken (1991).

driving forces are population change, availability of new technologies, infrastructure and market creation, and macroeconomic and trade policy. Some of these factors, which are briefly discussed below, may have more immediate effects on farmers' decisions to become more integrated in the market, whereas others may only have long-term effects. Figure 2.1 cannot capture the respective time subscripts.

Demographic change is certainly a key long-term determinant of commercialization. It may facilitate or impede commercialization, de-

pending on the availability of resources. If an expansion of the cultivated area is still possible, and if the marginal labor productivity exceeds the marginal subsistence requirements, population growth may in fact enable an increase of the marketable surplus. However, this situation has certainly become rare. With no concurrent change in the preferences for a high degree of self-sufficiency in staple food (due to perceived food security risks) on the one hand, population growth might lead to a reduced volume of marketed surplus in relative or even absolute terms in regions with deficient market connections. On the other hand, an increased person-land ratio might lead to an increased demand for off-farm employment in order to generate cash income, of which a high proportion will be spent on food.

The availability of new technologies, such as improved seeds and agronomic practices, and investment in infrastructure and policies for market creation are key factors that facilitate the commercialization process. Increased commercialization can occur without technological change in agriculture, but technological change without increased commercialization seems unlikely because the increased use of purchased inputs and specialization are inherent elements of most technological innovations in agricultural production. Policies for the promotion of commercialization and technological change may focus on either one or—in a more complex, dynamic fashion—on both. Technological change implies increased total factor productivity. Policies that generate technological change focus on human capital improvement, research and extension, and related institution building. In order to have a sustainable effect on the food security of the poor, the income streams resulting from technological change must reach them, directly or indirectly, through employment expansion, returns to their resources, or favorable food-price effects. Commercialization implies increased market transactions for capturing the gains from specialization. Policies that foster commercialization focus on facilitating an open international and domestic trade environment, improving hard and soft infrastructure for opening up new market opportunities, and ensuring legal security.

Ideally, policies to speed up commercialization and technological change move jointly in a reinforcing way. Policies for increased commercialization facilitate the generation and diffusion of new production technology. The latter reinforce the gains from specialization. However, there exists much concern with the potential risks of commercialization for the food security of the poor. These potential risks are derived from a host of potential market failure and policy failure problems[2] relating not

2. Comprehensive reviews of the arguments are provided in von Braun and Kennedy (1986) and *IDS Bulletin* (1988).

only to food and cash crop markets, but to deficiencies in land and financial markets, and to absent insurance markets as well. Addressing these deficiencies promises high payoffs for policy-oriented research.

Commercialization can also be enforced by direct government action, namely, by various forms of compulsion related to the establishment of plantations, execution of certain management practices and input use, or forced procurement of produce. Examples of such aberrations are presented in Part V.

It is now well understood that nutritional improvement is often constrained by the health and sanitation environment, which is partly a function of related hard infrastructure (for example, water) and soft infrastructure (for example, health centers). These factors are endogenous to government policy and development but are treated as exogenous to our discussions of the household decision-making process.

The endogenous consequences of commercialization for consumption and nutrition are also indicated in figure 2.1. They relate to three different but linked types of decision making within the households. One affects the allocation of income for food and nonfood expenditures and how household members spend their time. It may be hypothesized that a reduced share or a reduced absolute volume of subsistence production will motivate a rise in the volume of purchased food and vice versa. The second decision level relates to how the available food budget is actually spent, that is, which types and which quantities of food are purchased and how these purchases are distributed intertemporally. The third decision level concerns how the available food and other consumption items are distributed among household members.

To understand how these decisions may be affected by the commercialization process, the other indirect consequences of commercialization, such as changes in the time allocation of men and women and in the control over household resources and cash income, need to be fully considered. For instance, when men's involvement in market production or off-farm work increases, women may have to spend more time in own-farm production and so may have less time for child care and home-based work and less control over their household resources. Since men and women and younger and older people have different preferences in the allocation of household income (for example, for health care and nutrition), commercialization may differently affect the welfare of various family members, depending on how work responsibilities and control over income within a household change.

Finally, caring or nurturing activities within the household may be critically important in influencing child health. This encompasses activities such as breast-feeding and weaning practices, child care, and other nurturing activities, all of which may be affected if the commercializa-

tion of agriculture increases or reduces demands on the time of household members, particularly that of women. Time allocation studies indicate that, on average, women in developing countries put in more hours per day in nonleisure activities than do men. Not only are women actively engaged in own-farm production and wage-earning activities, but a substantial amount of their day is devoted to home production activities such as food preparation, child care, cleaning, and water and fuelwood collection. These home production activities may be a key factor influencing child health. Few studies have looked at the link between the modernization of agriculture and caring. A number of the chapters in this book will fill some of these gaps.

Theoretical Foundations

The complexity of the relationships just described suggests that a comprehensive model of the rural household would be essential in deriving hypotheses about the process of transition from subsistence to more market integration.

Household and Intrahousehold Decisions

Since Tschajanow (1923) first developed a theory of subjective household equilibrium, many researchers have refined the model of the peasant household. According to Tschajanow, a peasant family does not try to maximize a monetary profit, but a subjective utility. Maximum utility is reached when the marginal drudgery of family labor in various activities is equated with the marginal goods and services gained from the labor input. Nakajima (1970, 1986), stimulated by Tschajanow, developed a set of much more sophisticated subjective equilibrium models that postulate the same basic behavioral rules, with and without exchange with the external labor market. Not only did Nakajima specify a more formal mathematical structure that made it possible to trace the consequences of external changes, such as variations in wages, prices, and productivities on household labor allocation, he also specified certain properties of a household's indifference curves with a lower limit of income ("minimum subsistence"), below which leisure has zero marginal utility, and an upper bound ("achievement standard of living"), above which income generated from further work has a marginal utility of zero. While Nakajima's models identify the specific factors that determine the decision of household members to be engaged in wage employment or to employ hired labor in the farm household, they unfortunately do not explicitly specify the factors that influence a household's allocation of resources between subsistence and market production. Implicitly,

his subjective equilibrium models assume a fully commercialized farm where a price can be imputed to all commodities.

Modeling the commodity side of the transition process requires (1) introducing the distinction of subsistence and market production at the level of resource use (including labor), (2) specifying the underlying causal determinants, such as risk aversion, preferences for tasks, and habits, that may motivate a household to maintain a certain degree of self-sufficiency even at the cost of market income forgone, and (3) assigning a common nonmonetary utility index to nonmarketable household goods and services as well as market goods.

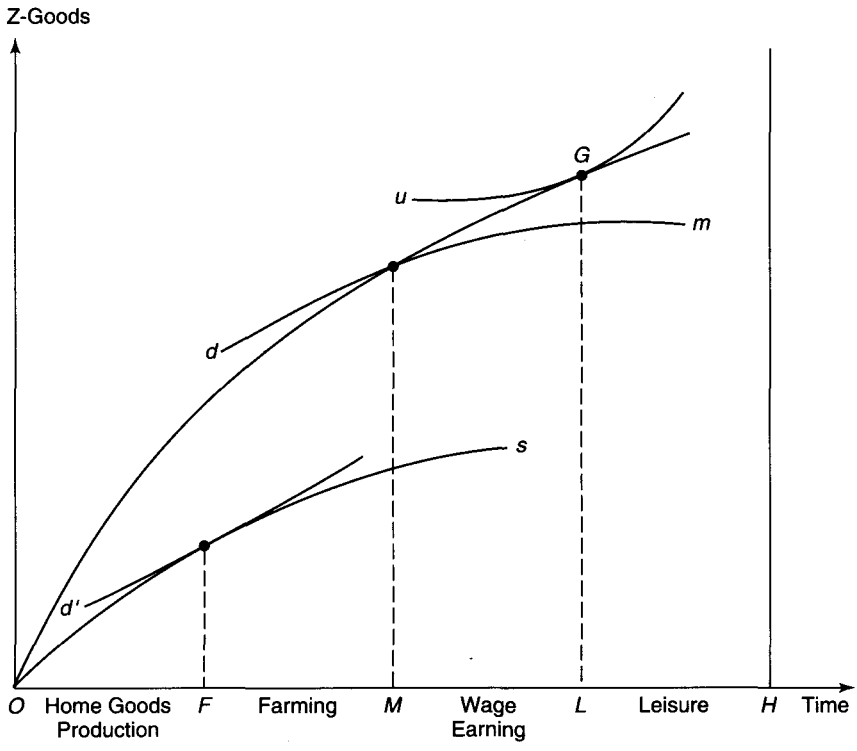
The specification of a household's utility function in nonmonetary terms is one of the strengths of the modern theory of household economics, originating from Becker (1965) and Lancaster (1966). Models based on this theory postulate that a household's utility function is directly specified by a set of goods and services acquired in the market or produced at home. These so-called Z-goods are produced using assets owned by the household, in combination with the time input of household members. Maximization of a household's utility subject to a full-income constraint is then equivalent to minimizing the costs of producing a set of Z-goods, including leisure.

Figure 2.2 portrays the basic structure of Evenson's (1978) model of the peasant household. The composite Z-good is measured along the vertical axis, whereas the horizontal axis measures the working time, with the remainder of the full-time capacity (OH) being leisure. Curve s traces the production function for home goods, and curve m describes the combined production function of the household where agricultural production is added on the home production function. The basic assumption is made that the composite Z-good can be produced at home or purchased in the market.[3] Purchased goods might not be identical but would be close substitutes for home-produced Z-goods. Thus, line d measures the opportunities in terms of Z-goods offered by the labor market. Its slope is defined as the wage rate divided by the goods price, indicating the purchasing power of the off-farm wage in terms of Z-goods (d' is the parallel to d). Finally, curve u shows the indifference curve in terms of Z-goods and leisure.

At equilibrium the household would have LH leisure time and LG Z-goods for consumption. It would spend OF units of time (and corresponding household resources) for home goods production, FM units of

3. It is possible to include the part of the subsistence production from household's resources that cannot be used to produce market goods. This would normally include house and shelter, cooking facilities, and maybe a small home garden.

FIGURE 2.2 Allocation of household time between home goods production, farming for the market, wage earning, and leisure



Source: von Braun, de Haen, and Blanken (1991).

time for farm production, and ML units of time for wage earning. Thus the model postulates principally the same equilibrium conditions as the Nakajima model (Nakajima 1970, 1986): the marginal productivities of time in various activities in and outside the household are equated to the off-farm wage rate. But in addition, the ratio of marginal utility of leisure over the marginal utility of Z-goods is set equal to the wage rate over the price of the Z-good. For the one-person household (as reported in figure 2.2; or for a household where everyone is similar in terms of productivities and preferences), the equilibrium condition may be stated as

$$\frac{\text{Wage}}{P_Z} = \frac{MU_{\text{LEISURE}}}{MU_Z} = \frac{MP_{\text{FARM}}}{P_Z} = \frac{MP_{\text{HOME}}}{P_Z}.$$

Under the assumption that leisure is a normal good, if income increases for any reason while the marginal cost of leisure remains constant (that is, a constant wage), then leisure will increase.

The matrix below (table 2.1) gives the patterns of time allocation effects under different exogenous changes, which may result from commercialization promotion.

Illuminating conclusions can be derived from this simple model:

- Increasing the wage rate raises the opportunity costs and hence motivates a reduction of the volume of home as well as farm production. It increases the incentive to seek wage employment and, depending on the position of the indifference curve, may also affect the overall time allocation between work and leisure.
- Increasing the price of the Z-good reduces leisure time (income goes down; leisure is assumed to be normal good), and more time is spent in the work force. The wage and marginal productivity in farm and household work remain equated if time does not change in the farm and household work.
- Increasing the productivity of farm work causes an upward shift of the overall production function. It motivates more on-farm work and reduced off-farm work. Time allocated to home production is not much affected.
- Increasing the productivity of home goods production will have a symmetrical effect, increasing time spent in the household and reducing off-farm work; leisure increases, and farm work remains largely the same.
- Increasing the family size will have complex implications for the household, depending on the effect on the labor force and the Z-goods requirements, respectively. The impact on the demand for Z-goods includes needs for additional food, child care, and other household goods and services. This may increase the family's prefer-

TABLE 2.1 Patterns of time allocation effects under different exogenous changes

	Direction of Change in Time Allocation			
Exogenous Change/Policy	Leisure	Wage Labor	Farm Production	Home Production
A. Increase in wage	?	+	−	−
B. Increase in P_Z	−	+	0	0
C. Increase in farm productivity	+	−	+	0
D. Increase in income	+	−	0	0

ences for Z-goods instead of leisure. Also, if additional employment cannot be found or can only be found at a reduced wage in areas under population pressure, the household would perceive reduced opportunity costs of labor and intensify the time spent in home and farm production.

While a number of conclusions can be drawn from this simple model, some of the aforementioned aspects of commercialization cannot be easily incorporated. Essentially the model assumes a complete separation of a household's resources for home production from those for farm production. Only the household's labor is being allocated between different types of activity. The model does not explain how land and other resources are allocated to market and subsistence production. We therefore expand the discussion in two different directions: first, we elaborate the issue of different players in the household (for example, husband and wife) and, second, we discuss the role of risk for subsistence orientation and commercialization.

A simple example for a two-person household in the appendix demonstrates one possible economically driven explanation for why household members tend to specialize in types of activities when new work opportunities arise. The naive example of a household with its members cooperating for maximum income may only reflect a partial reality. Conflicts may arise over "fair" work burden-sharing by task and—not addressed above—the sharing of benefits. The issue of balance between cooperation (adding to total availabilities) and conflict (dividing total availabilities among members of the household) constitutes bargaining problems. For the case studies, we particularly address the issue of how women and children fare under different socioeconomic and cultural circumstances in these "cooperative conflicts" (Sen 1985).

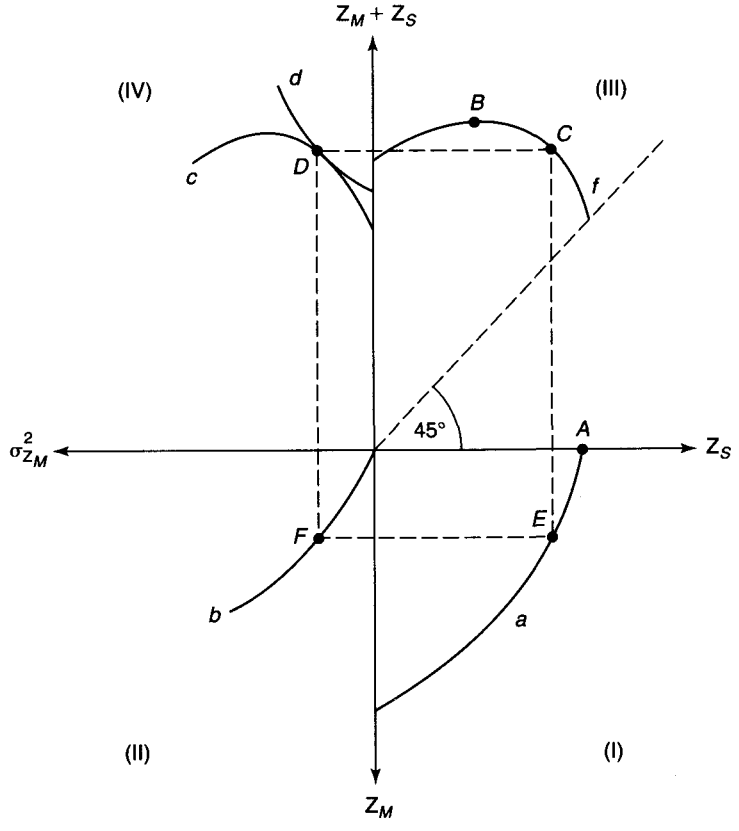
The Role of Risk

Subsistence food production is essentially an insurance and credit market substitute.[4] It is, thus, much a function of (perceived) *risks* of food markets (prices, availability), of factor markets, and of related income streams. Static concepts cannot properly capture those relationships. In order to derive preliminary hypotheses as to what motivates a household to adjust the share of resources determined for market production, the risks involved would at least have to be accounted for. Figure 2.3 portrays a simple model addressing this issue.

The household's production possibilities are indicated in section I of the figure. Curve *a* shows the transformation between Z-goods, namely

4. It also avoids the margin between farmgate and retail prices, which may be substantial.

FIGURE 2.3 Resource allocation to market versus subsistence production under risk



Source: von Braun, de Haen, and Blanken (1991).

food, that the household can directly produce for subsistence (Z_S), and Z-goods that the household can obtain by producing cash products and exchanging them for goods from the market (Z_M). Hence the curve's slope is not only determined by the physical production functions for subsistence and cash products, but also by the net price (gross margin) of the marketed crop divided by the net price of the Z-good.

Curve *b* (section II) indicates the market risks associated with an increased intensity of market exchange. Note that only those risks related to fluctuations of prices or availability of quantities are indicated here. Production risks are assumed to be identical in market and subsistence production. They do not enter the theoretical analysis here but are considered in the empirical analyses in this volume.

Curve *f* (section III) represents the aggregate availability of Z-goods from subsistence and market exchange, as a function of the volume of subsistence production. The aggregate quantity is equivalent to the household's income. As the transformation curve is nonlinear, the aggregate has a maximum (*B*) somewhere between 0 and *A*—that is, at a degree of subsistence (subsistence divided by the total aggregate income) between 0 and 1. Obviously, any extreme specialization on either subsistence or market production would be suboptimal due to declining marginal productivities (curve *a*).

Finally, section IV portrays how the household might arrive at a decision concerning resource allocation for subsistence and market production by equating the marginal utility per unit of incremental aggregate production (curve *c*) with the marginal disutility due to the additional risks involved (curve *d*). A series of additional hypotheses can thus be derived about a household's decision making once market risk is introduced:

- Risk-averse families may tend to keep subsistence production beyond the maximum income point (*B*)—say, at *C* or *E*—in order to keep the risk of market integration low (at *F*).
- A reduction of marketing risks—say, by improved infrastructure—(downward shift of curve *b*) and an increase in the profitability of marketing (downward turn of curve *a* through *A*) would both reduce the preference for a high degree of subsistence.
- Increasing a household's total resources (right shift of curve *a*) would most likely motivate a decline in the degree of subsistence, probably going along with an increased absolute volume of subsistence production.

The hypotheses advanced above have been studied in the literature.[5] Finkelshtain and Chalfant (1991) and Fafchamps (1992) use the agricultural household model framework (Singh, Squire, and Strauss 1986) to show that risk-averse semisubsistence households may produce more of the risky subsistent good (as compared to production under the no-risk situation) under certain conditions. Both studies show that this situation holds when the consumption effect exceeds the income effect. The consumption effect is defined as the amount by which expenditures would have to change after a shock to keep marginal utility constant. It is shown to depend on the share of risky crop out of total consumption, income elasticity of demand of risky crop, risk preferences, and covariance between the risky crop's consumption price and its revenue. The

5. Kene Ezemenari contributed substantively to this section on risk and subsistence orientation.

income effect is defined as the change in income due to a shock. It is shown to depend on the proportion of income of risky good out of total income and degree to risk (covariance between prices and revenue for the risky crop) (Fafchamps 1992; Finkelshtain and Chalfant 1991). When the consumption effect and the income effect are equal, then the household is made risk neutral with respect to the shock. Therefore, households with enough resources at their disposal are able to diversify risk and maintain a risk-neutral attitude toward shocks. If the consumption effect is greater (less) than the income effect, the household produces more (less) of the risky staple (Finkelshtain and Chalfant 1991).

Fafchamps (1992, 93) explains the intuition behind this result. The result depends on the share of the risky crop in consumption and on the covariance between price and revenue from that crop: the larger the share and the larger the covariance, the more likely a more risk-averse producer is to shift production toward the risky crop. This is because when consumption prices and crop output are correlated positively, growing a particular crop serves as insurance against consumption price. A household's decision to commercialize depends, therefore, on the sum of the consumption effect and income effect.

It should be noted, however, that other factors, such as food habits, and agronomic conditions may also be reasons for farmers to retain some subsistence production.

Wiebe (1992) examined the impact of change in wealth (given risk, risk preferences) within a lexicographic framework and found that changing attitude toward risk without improving the resource endowment of semisubsistence households is unlikely to have a favorable effect on commercialization.

Given the above discussion, a simple model of the decision to commercialize can be estimated. Following Chavas and Holt (1990), the proportion of land allocated to various crops can be expressed as a function of the key variables identified above, which may influence commercialization decisions:

$$l_{it} = \alpha_0 + \alpha_{it} \cdot W + \Sigma_j K^j_{it} \cdot P^j_{it} + \Sigma_k \beta^k_{it} \cdot R_{it} + \gamma_{it} \cdot S_{it}. \qquad (2.1)$$

The subscript t may represent either a time series of aggregate variables for a given country or region or a cross section of households at a point in time, where

l_{it} is the proportion of crop i allocated to land;
W is wealth;
P^j is the expected return per unit of cropped land for the jth crop ($j = 1 \ldots i \ldots N$);
R_{it} is the interaction terms between income elasticity of demand for crop i, subsistence orientation in consumption for

*t*th household, proportion of crop i income out of total household income, and the covariance between price and total revenue, and coefficient of risk aversion;

S_{it} is socioeconomic factors such as proportion of dependents in household, age, education, and years of farming of head of household, and so forth.

The above may be estimated as a system of equations for the $i = 1 \ldots M$ crops. Identification of the system depends on the restriction that the proportion of land allocated to each crop sum to 1.

While commercialization is largely being dealt with as exogenous in chapter 3, this is not the case in several of the case studies (Part V), where approaches of the above design are employed to explain commercialization processes. Some of the hypotheses derived from the preceding analysis will be subject to empirical tests in the case study chapters in Part V. While time use and risk are two of the most widely researched topics in the general area of household resource allocation, other more complex conceptualizations of the household decision-making process have been formulated. Examples include incorporation of individual health production functions as constraints (such that better nutrition becomes an input into increasing household productivity, not merely a desirable outcome), intrahousehold bargaining (who within the household earns income affects how resources are allocated), and allocation of household resources across extended time periods (the manner in which inheritance customs will result in a transfer of resources to young children several years hence may affect present period resource allocation). Each of these improvements, while resulting in models that are seemingly more realistic, increases the complexity of interactions and, so, the amount of information and effort required to understand the nature of the allocation process (Singh, Squire, and Strauss 1986).

In all of these models, allocation decisions/outcomes (such as what to produce, what to consume, intrahousehold distribution of food, and individual health outcomes) are treated as simultaneously determined. Econometrically, a common practice is to estimate a set of reduced-form equations with an extended list of exogenous explanatory variables that affect any of the structural relations. This approach is not followed in this book, in part because of data limitations. More important, because it is not possible to identify structural coefficients from these reduced-form estimates, it is not possible to draw any firm conclusions about the specific impact of crucial variables in the system at each particular link. Thus, it is difficult to gain an understanding of the process through which nutrition is affected by changes in the production system, or to identify the key factors that drive that process, which is the objective of

this book. As outlined below, the approach, rather, is to focus on selected structural relationships (which combine exogenous and endogenous variables as explanatory variables) that will illuminate these key factors and processes.

Approach and Issues

The actual analysis at the household level is carried out as sketched in figure 2.1 in an attempt to trace the relevant exogenous forces of commercialization to their effects on resource allocation, patterns of commercialization, consumption, and nutrition.

Agricultural Production/National-Level Food Availability

Many developing countries are pursuing a policy of stressing the increased production of export crops as well as food crops for domestic consumption. Indeed, an emphasis on export crops has typically been one component of macroeconomic policy reforms. However, critics of accelerated export crop production argue that national-level food security will deteriorate because of falling domestic food supplies.

The extent to which national food availability will be affected depends on the competition for scarce resources—land, labor, water, and capital—between food crops consumed domestically and crops for export. If land that has been devoted to basic staples is replaced by nonedible cash crops, food availability may drop. However, even under this scenario, national-level food supplies need not be affected; if the foreign exchange generated from the sale of export crops is used to increase food imports, national-level food availability may remain unchanged or even increase. This topic is taken up again in chapter 6, where analysis of data from 90 countries shows that in the majority of countries studied, an increase in nonfood production was accompanied by an increase in food supply.

However, national-level food availability is a poor predictor of food security at the community or household level. The Malawi case study (chapter 20) indicates that, while the country has historically had an enviable record of achieving national-level food self-sufficiency, this aggregate picture masks widespread food insecurity at the household level. This phenomenon can be generalized to a large number of countries. Countries that have achieved food self-sufficiency often have a significant proportion of their populations with inadequate food intakes because these households do not have access to the available food (von Braun, Bouis, Kumar, and Pandya-Lorch 1992).

The analyses in this book focus primarily on the effects of cash crop production on producers and nonproducers in the areas undergoing commercialization. However, households outside of those areas are also likely to be affected by the commercialization process because of linkages between the various sectors of the economy. For example, foreign exchange earnings from agricultural exports make possible investments in entirely different regions and sectors of the economy, which can stimulate their growth and employment. Any complete evaluation of the income, employment, health, and nutrition effects of the commercialization process would require construction of economy-wide models disaggregated by employment and income groups. This type of analysis is beyond the scope of this book.

Community-Level Food Availability

The availability of food at the national level is a necessary but not a sufficient condition for food security at the community and household levels. Some of the most vocal criticisms of an export-oriented food policy have been related to its perceived negative effect on local food supplies.

Here, again, there is no inherent reason why cash crop production should have a negative effect on local food supplies. Expanded cash crop production is likely to influence local food supplies in one of two ways. First, to the extent that land is shifted out of basic staples and into crops for sale outside the community, the volume of marketed food supplies could decrease, which could exert an upward pressure on food prices. These higher local food prices could be offset by movement of food supplies from other regions of the country or from food imports. However, many countries restrict the movement of food supplies from one area to another and, thus, a sufficient inflow of food into the affected region may not occur to offset the rising food prices.

Second, if incomes of agricultural laborers increase as a result of more commercialized production, the demand for food will increase in the local area. This increased demand for food may occur simultaneously with declining marketed food supplies. Infrastructure's key role comes into play in this context. Higher food prices induced by increased nonfood cash cropping may also stem from deficient rural infrastructure, including poorly developed transportation systems (chapter 8).

Employment and Income Effects

The discussion thus far has assumed that most of the effects of cash cropping will be on the households participating directly in commercia-

lization. However, there may be major positive or negative effects of commercial agriculture on employment opportunities within the communities. The effects will depend in large part on whether the new crop is more or less labor intensive than the crop it replaces. The commercialization of agriculture may have a substantial effect on the demand for labor in a given area. If cash crop production increases, the need for hired labor and, hence, the incomes of landless laborers may increase. Increased production of labor-intensive crops is an attractive way of reaching the landless poor who are often not reached by other development projects. The net employment effects of a range of cropping strategies are summarized in chapter 3.

In the conceptual framework, the primary link between agricultural production patterns or income-generating strategies, on the one hand, and household food intake on the other hand, is through household income. Proponents of cash crop production assume that household income will increase as a result of the transition to a more commercialized agriculture. Each of the case studies in Part V evaluates the income effects of cash crop production, and chapter 3 provides a synthesis of this information.

Household Food Availability and Consumption Effects

A primary concern of the research described in this book was to document the links between the transition to commercial agriculture and household-level food security. The decisions about how to allocate household resources—land, labor, time, and capital—have implications for the ultimate impact of commercialization on household food supplies.

The potential negative impacts of commercialization on household food security can be short term or long term. In the short- to medium-term, the decision to allocate land to a cash crop—particularly a nonfood cash crop with a long growing cycle—can decrease the food supplies available to a household. If the household has other sources of off-farm income available, this money could be used to supplement food purchases. The worst-case scenario is one where a household allocates a disproportionate share of available farmland to a nonedible cash crop with a long gestation period and is trapped when other income sources become less available and the terms of trade for the cash crop develop unfavorably. This volume contains examples of cash crops that would fall into the category of long gestation periods—sugarcane in Kenya (chapter 16) and the Philippines (chapter 13) and tree crops in Sierra Leone (chapter 21).

If expected real income gains materialize, the ability of the farmer to

acquire food should be higher under cash crop production. However, the income–food consumption relationship is influenced by more than just total household income. The form of income (lump-sum versus periodic, cash versus kind) and the control of income within the household may be as important in understanding the ultimate effects of income on household food consumption. A number of the case studies in Part V show the influence of these income-related variables on household consumption, and chapter 4 provides a synthesis of these consumption-related effects.

Semisubsistence agriculture frequently produces a rather constant flow of income in the form of food and some cash, whereas income from cash crops, such as sugarcane, often comes in one lump-sum payment. In the absence of well-integrated rural financial markets, income in the form of lump-sum payments may be used in a different manner than a smaller, more continuous flow of income. Lump-sum payments, typically, are associated with the purchase of consumer durables, whereas continual forms of income are more likely to be spent on food (von Braun and Kennedy 1986). In addition, who controls the income within the household may partly explain why lump-sum payments may be used differently than some periodic forms of income.

Income is one of the key determinants of household food consumption. Therefore, one would expect that increases in household income associated with cash crop production would result in increases in household food consumption. However, caloric intake at the household level may increase more slowly than income for two reasons. First, there is a tendency as incomes increase for households to move toward the purchase of more expensive calories, although this trend is less pronounced in the African case studies. Second, as incomes increase, there is also a movement toward the purchase of more nonfood items. How total household income is spent may be influenced by who within the household earns the income. Intrahousehold earning patterns may change with commercialization. Similarly, how consumption items are distributed within the household may again vary with who controls income.

Much of the research analyzing the effects of agricultural policies and programs on food consumption tended to limit analyses to macronutrients—mainly calories and, to a lesser extent, protein. The assumption was that these were the nutrients most limiting in the diet and that an improvement in energy consumption would lead to a concurrent increase in intake of other nutrients. However, this may not always be true or, at least, not for all nutrients. For example, in Kenya, some recent evidence suggests that as preschooler energy consumption increased, there was a decrease in vitamin A intake, due to shifting

dietary patterns (Kennedy and Oniang'o 1993). Beta carotene–rich foods were being replaced by higher status foods.

The case studies presented in this volume tend to concentrate on calories. However, it is clear that other measures might also be appropriate to capture the full range of dietary changes associated with the commercialization of agriculture.

Health and Nutritional Status of Women and Children

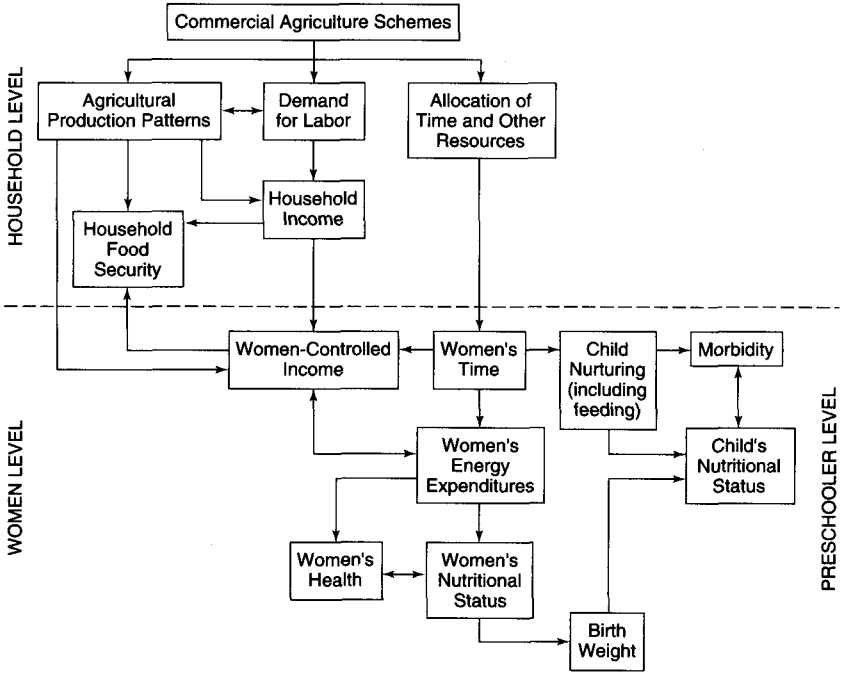
As evident from the richness and complexity of the household model, caloric intake is but one link through which the commercialization of agriculture can potentially influence an individual's nutritional status. For preschooler nutritional status, other factors such as morbidity patterns—and how these are influenced by changes in the health and sanitation environment, breast-feeding, and weaning practices—as well as allocation of time and other resources to the child can be as important as the diet in affecting the overall welfare of the child.

Gender issues have rarely been included in the analysis of commercial agriculture schemes. However, even where they have been included, much of the analysis has been limited to the impact of cash cropping on women's income or on women as the primary caretakers of children. Virtually no information exists on the direct effects of agricultural commercialization on women's health and nutritional status. Until recently, much of the evidence related to the commercialization of agriculture and its effects on women has been anecdotal. In contrast, some of the case studies on commercialization of agriculture reported in this volume allow a gender-disaggregated assessment of the effects of commercialization on women's nutrition.

There are complex linkages between households and women. Figure 2.4 assumes that the entry of a household into commercial agriculture can affect women—either positively or negatively—through its impact on their income, time, or energy expenditures. These factors can ultimately influence women's health and nutritional status, which, in turn, can also influence children's health.

A number of the case studies (Part V) provide detailed information on the microenvironment affecting preschoolers. Many constraints to the production of satisfactory children's health and nutrition are context specific. However, it is clear from almost every case study presented that the causes of malnutrition are multifaceted; relieving one factor associated with malnutrition does little unless other causal factors are also simultaneously addressed. The net effects of commercialization on energy consumption, morbidity, and other factors affecting women's and

FIGURE 2.4 Commercialization of agriculture: potential pathways through which women's and preschoolers' health and nutritional status may be influenced



children's health and nutritional status are summarized for a number of the case studies in chapter 5.

APPENDIX

An example for the two-person household demonstrates one possible (economically driven) explanation for why household members (husband and wife) tend to specialize in certain broad types of activities when a new work opportunity arises, be it a cash crop available for men because of gender-biased extension or market institutions or male off-farm work opportunities at higher wage rates for men than for women.[6] We observe frequently that men work on cash crops or in the off-farm labor force, while women perform domestic chores. Certainly there are other reasons why this occurs, but the point is to show, among other

6. The monetary values shown in this appendix are developed solely for the purpose of illustrating the examples. They do not refer to any case study in this volume.

TABLE 2.2 Assumed production function per plot

Labor Inputs Per Day	Value of Net Output (cents)	Implied Marginal Value Product Per Additional Hour (cents)
2.00 hours	30	
2.75 hours	47	
3.00 hours	50	20
3.75 hours	58	11
4.00 hours	60	10

NOTE: Values for labor inputs and net output are expressed on an average daily basis over the production cycle.

things, one set of economic forces that is operating. Several assumptions are made:

- Husband's wage in the labor force is 20 cents per hour; wife's wage in the labor force is 10 cents per hour.
- Husband's and wife's labor in agricultural production and home production are perfectly substitutable.
- Household has two plots of farmland that are identical, with the production function for each plot shown in table 2.2.
- Household has two sets of domestic chores that have identical production functions (table 2.3).
- Objective of the household (husband and wife) is to maximize total income.
- Each agrees to work eleven hours a day.

Stage 1

No specialization: husband and wife agree to split the types of work. Each gets one plot of farmland and one set of household chores to do. In essence, these are two one-person households. Husband and wife individually set their marginal products in all three types of activities equal to one another. Equilibrium is reached as shown in table 2.4.

TABLE 2.3 Assumed production function of domestic chores

Labor Inputs Per Day	Value of Net Output (cents)	Implied Marginal Product Per Additional Hour (cents)
0.00 hours	0	
0.75 hours	17	
1.00 hours	20	20
1.75 hours	28	11
2.00 hours	30	10

TABLE 2.4 Farming and household chore equilibrium (Stage 1)

	Time					
	Labor Force	Plot 1	Plot 2	Chores 1	Chores 2	Total
Husband	7 hours (20)	3 hours (20)		1 hour (20)		11 hours
Wife	5 hours (10)		4 hours (10)		2 hours (10)	11 hours

NOTES: Marginal product is in parentheses (in cents).
Husband's income (in cents per day) = (7 hours × 20) + 50 + 0 + 20 + 0 = 210
Wife's income (in cents per day) = (5 hours × 10) + 0 + 60 + 0 + 30 = 140
Total income (in cents per day) = 350

Stage 2

The wife is working for 10 cents per hour; yet she could be more productive by switching some of her time to plot 1 and chores 1. The husband tells his wife: "You put in two hours on plot 1 and two hours in chores 1 and reduce your time in the labor force by these four hours. I will reduce my time in plot 1 and chores 1 by one hour and put in two extra hours in the labor force. We both still work eleven hours a day, but we will be better off." The result is shown in table 2.5.

Stage 3

The wife says to her husband: "You're beginning to catch on, but you haven't quite got it right. Why don't you put in all your time in the labor force, and I will take care of all the farm work and household

TABLE 2.5 Allocation of time for improved profitability (Stage 2)

	Time					
	Labor Force	Plot 1	Plot 2	Chores 1	Chores 2	Total
Husband	9 hours (20)	2 hours (10)				11 hours
Wife	1 hour (10)	2 hours (10)	4 hours (10)	2 hours (10)	2 hours (10)	11 hours

NOTES: There is a total profit of 40 cents from plot 1, which both husband and wife have earned together. Marginal product is in parentheses (in cents).
Husband's income (in cents per day) = (9 hours × 20) + 30 + 0 + 0 + 0 = 210
Wife's income (in cents per day) = (1 hour × 10) + 30 + 60 + 30 + 30 = 160
Total income (in cents per day) = 370

TABLE 2.6 Labor specialization and income maximization (Stage 3)

	Time					
	Labor Force	Plot 1	Plot 2	Chores 1	Chores 2	Total
Husband	11 hours (20)					11 hours
Wife		3.75 hrs (11)	3.75 hrs (11)	1.75 hrs (11)	1.75 hrs (11)	11 hours

NOTE: Marginal product is in parentheses (in cents).

Husband's income (in cents per day)	= (11 hours × 20) + 0 + 0 + 0 + 0	= 220
Wife's income (in cents per day)	= (0 hours × 10) + 58 + 58 + 28 + 28	= 172
Total income (in cents per day)	=	392

chores. As things stand now (Stage 2), you are not using those two hours on plot 1 as productively as you might." The final result is shown in table 2.6.

As a result, by agreeing to cooperate, the husband and wife have increased total household income, which is maximized by specialization. The real world is, of course, much more complex, as is our conceptual framework of study of commercialization effects for women (see below). The above analysis assumes that both husband and wife will continue to work eleven hours a day even though income is higher. This is not a realistic assumption, as is later shown by the empirical studies as well. Again, abstracting from considerations of leisure, note that it is the wife who will reallocate her time when there is a change in farm productivity or household productivity (see Low 1986 on this issue). If some utility is derived from work in the labor force (by the wife), or from work on one's own fields (by the husband), the Stage 3 solution will not be reached.

PART III

Household-Level Effects: A Synthesis