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Agricultural Household-Firm Units: Adjustments to Change

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Summary

This paper assesses agricultural household-firm unit models to determine a useful typology for agricultural policy assessment that draws upon their use. Both standard and bargaining models for analyzing household decisions, including production, consumption, labor, credit, fertility and child schooling, intergenerational transfer, among other key behaviors of households are discussed, as well as data and estimation issues often encountered with household models. Relevant dimensions of a country or region typology are then suggested, focusing on (1) the extent to which markets, particularly labor markets, are perfect, missing or mixed; (2) relevant intra-household and key demographic considerations; and (3) the differentiation of particular household-firm units that are particularly disadvantaged and may be of the most critical policy concern.

KEY WORDS: agricultural households, farm households, labor, labor adjustments, off-farm employment

1 Introduction

Agricultural households in developing and developed countries are faced with a complex set of issues that influence, to a very significant extent, their livelihoods and livelihood strategies (Ellis 1993; Caillavet, Guyomard and Lifran 1994; Carney 1998). Policies focused on the agricultural sector produce effects that influence household behaviors well beyond farm production decisions. Further, given the inseparable nature of most farm household decisions related to farm production, household consumption, and labor supply and demand, among others, policy reform may result in feedback adjustments (Lofren and Robinson 1999, Taylor and Adelman 2003). Other household behaviors and outcomes of concern – nutritional and health status, fertility, educational attainment, and other broader measures of household and individual well-being – are also likely to be influenced by policy reform in agriculture. The latter is particularly true in developing countries where the majority of households remain heavily dependent on own agricultural production for food supply and income. But even in developed countries and the transition economies, the structure of agriculture depends on those policy incentives in place, and other household behaviors are affected by as well as affecting farm production decisions. Further, in both the developing country and developed country cases, the effects on the environment may further complicate the future *spatial* distribution of agriculture and the well-being of households both as producers and consumers.

This paper focuses on agricultural or farm households and the importance of households in the policy debate. The farm household model is shown to be flexible in terms of consideration of relevant effects. Key trends in agricultural households in both developed and developing countries are identified, focusing on changes in household composition and differences in access to key factors of production. Potential indicators for analyzing farm adjustments and adjustments to policy change in a country typology in which households are explicitly considered are then suggested. The focus is on both understanding differences across households in different country and region contexts and on understanding intra-household differences when they exist.

2 Household Models: Understanding Household Behaviors

Chayanov (1925) and Nakajima (1957) are among the first who believed that behaviors of farm households were best understood in a household-firm framework, where potentially important interactions existed between external labor markets (nonfarm labor markets), the farm operation, and household consumption. Becker's (1981) unitary household model forms the foundation for the agricultural household model (Singh, Squire and Strauss 1986), through its assumptions on household decision-making through a single household head. However, the agricultural household model recognizes that agricultural producers both produce and consume the agricultural output produced by the household – i.e., the model assumes that farm output is consumed by producing households, with the surplus being marketed, a reality for most farm households in developing countries (Singh, *et al.* 1986). Further, the model incorporates a farm production function, reflecting the returns to farm self-employment. The agricultural household model assumes a nonlinear farm production function, assuming that the marginal returns to labor decline with increases in production. The simple economic household model typically assumes that households maximize household utility subject to a set of constraints linear in the wage rate – inclusion of a function reflecting farm self-employment returns means that the returns to labor are assumed not constant. Following Singh, *et al.* (1986), the unitary farm household model can be written:

$$MAX U = U^h(C_a^h, C_m^h, L^h)$$

s.t

$$Q = Q(T^h, A)$$

$$P_m C_m^h = P_a(Q - C_a^h) - W^h(T^h - F^h)$$

$$T^h = L^h + F^h$$

where the household's joint utility U is a function of the household's joint consumption of market goods, consumption of home-produced goods, and household leisure. Utility is maximized subject to the production function, the household income constraint and the household total time constraint.

When used in a developed country context where home consumption of own-produced goods typically constitutes a very small portion of total output, the model is typically written following Huffman (1991):

$$MAX U = U^h(C^h, L^h; Z^h)$$

s.t.

$$Q = Q(F^h, X; A, \theta, \tau), \partial Q / \partial F^h > 0, \partial Q / \partial X > 0$$

$$P_c C^h = P_q Q - W^x X + W^h M^h + V^h$$

A number of modifications in the 1980s agricultural household literature built upon the basic model. For example, Iqbal (1986) extended the model to include borrowing behaviors, Roe and Graham-Tomasi (1986) introduced dynamics, and Saha incorporated seasonal variations. In

addition, basic revisions to the household model have been incorporated into the agricultural household model. These include explicit consideration of the quantity and quality of children , incorporation of a household production function (Gronau 1973, 1997), among others.

Applications of the agricultural household model and extensions to this model have been widespread. In most cases there has been explicit consideration of the composition of the household – i.e., men, women and children. This allows consideration of differences in labor allocation across the household, although the ‘black box’ assumption holds. Applications of the basic model to developing countries are now common, with early and particularly noteworthy applications including Lau, Lin and Yotopoulos (1978), Kuroda and Yotopoulos (1978), Adulavithaya *et al.* (1979), Barnum and Squire (1978), Strauss (1984), Benjamin (1992), Jacoby (1993), Skoufias (1994), as examples of a large developing country literature. In the developed and transitional economies, examples include Sumner (1982), Lopez (1986), Huffman and Lange (1989), Tokel and Huffman (1991), Kimhi (1994), Corsi and Findeis (2000), Weiss (1996), Schmitt (2001), among many others. Models have used cross-sectional as well as, more recently, panel data to analyze household behaviors, including consumption, (household) labor supply, and (hired) labor demand.

The theoretical models have progressively evolved to reflect the relevant behaviors of farm households. While many applied studies continue to use the unitary model, in the 1990s the focus turned to the utility function itself. Models in the 1990s seek to open the ‘black box’ of the household to better understand household outcomes: consumption, nutrition, labor supply and fertility, gender-targeted credit, intergenerational transfer, as examples (see Chiappori 1988, 1992; Carlin 1991; Bourguignon, Browning, Chiappori and Lechene 1993; Apps and Rees 1996, 1997; Behrman 1997; Fortin and Lacroix 1997; Schultz 2001). Different behavioral models that expand beyond the unitary model can be posited including both the collective and the bargaining (cooperative and noncooperative) models (see Doss, 1996 for a review).

The collective models (‘pluralistic decision-making models’) focus on individuals within the household and relax the assumption of unified or aggregated preferences. These models assume Pareto efficiency in intrahousehold allocations, but they do not assume cooperative or noncooperative behavior by individuals (Chiappori 1988, 1992, 1997). Chiappori (1992) argues that the rule governing a household distribution can be inferred by observing its external behavior, e.g., labor supply and aggregate consumption. The ‘rules’ governing resource allocation are not assumed *a priori* but are estimated from the data as much as possible.

$$MAX \mu U^m(X^m, X^f) + (1-\mu)U^f(X^m, X^f)$$

s.t.

$$Y = p(X^m + X^f)$$

$$MAX U^m(X^m)$$

s.t.

$$pX^m = \theta$$

Finally, a Nash-bargaining model proposed by Manser and Brown (1980), and McElroy and Horney (1981), and later applied by McElroy (1990) can also be used. McElroy and Horney (1981) and Manser and Brown (1980) independently developed the Nash-bargaining models of the household. In the Nash-bargaining model, household members maximize the product of their gains from marriage in excess of their utilities outside of the union. The household utility function is explicitly conflicting and dependent on the fallback positions of the individuals (Katz 1992). These positions are referred to as 'threat points'. In the McElroy and Horney Nash-bargaining model, there are two members of the household, m and f . They receive utility from a pure public good, individual goods and leisure, subject to a set of constraints. For the agricultural household, the Nash-bargained model can be written as follows (drawing on Ott 1992, Mendoza 1997, and Swaminathan 2003):

$$\begin{aligned}
 &MAX N = \\
 &[U^m(C, L^m) - V^m(P_c, P_f, P_x, W^m, I^m; \alpha^m)] \\
 &*[U^f(C, L^f) - V^f(P_c, P_f, P_x, W^f, I^f; \alpha^f)] \\
 &s.t. \\
 &Q_f = (F^m, F^f, X; A, \theta, \tau) \\
 &P_c C = P_f Q + W^m M^m + W^f M^f + I^m + I^f \\
 &T^i = L^i + F^i + M^i, i = m, f
 \end{aligned}$$

Applications of these models to agricultural households or in countries where agricultural households predominate include Jones (1986); Pitt, Rosenzweig and Hassan (1990), Quisumbing (1994), Doss (1996, 2001), Quisumbing and de la Bierre (2000), Findeis and Swaminathan (2002, 2003), Swaminathan (2003), Nankhuni and Findeis (fc). Haddad, Hoddinott, and Alderman (1997) provide a discussion of the policy issues related to intra-household resource allocation.

As shown above, the models are quite flexible with regard to the behavioral assumptions reflected in the utility function and the constraint set. Households of different types and over different time horizons can be modeled in this framework, to derive measures (elasticities) appropriate for determining impacts as well as adjustments over time. Variations in farm household impacts and responses to policy change will likely vary depending on their access to the different factors of production.

2.1 Separability or Nonseparability: A Central Issue

At the core of household models is the issue of separability, i.e., whether the household's production, consumption and labor decisions are simultaneously or jointly determined (nonseparable) or if they are recursive or separable. If perfect markets exist for all outputs and factors of production, then prices are exogenous to the household. In this case, transactions costs are zero, and the opportunity cost of any output or factor is its market price. As pointed out by Sadoulet and de Janvry (1995), under these conditions it is immaterial if the household consumes all of its outputs or sells them, uses its own labor or sells its own labor, replacing it in farm production with hired-in labor. Perfect markets are a sufficient but not necessary condition for separability.

Separability implies that production decisions of the household are not affected by consumption and labor supply decisions. However, labor supply and consumption decisions are not independent of production decisions. Production decisions are assumed to be made in the first stage optimization problem, allowing solution of factor demands, output supplies and optimal profit. Given the optimal level of profit determined in the first stage, the second stage consumption problem is solved. Leisure demands for all household members and the demands for other commodities are determined, given the first stage results.

However, in many contexts, market failure exists, resulting in nontradable outputs or factors of production (Sadoulet, de Janvry and Benjamin (1996). Realistically, in many contexts households face mixed markets, where tradables as well as nontradables exist (Taylor and Adelman 2003). When markets are missing (or there are other context-specific characteristics such as the presence of risk), the household-firm model is rendered nonseparable. In this case, decisions at the two levels of the household – production and consumption – must be jointly determined and simultaneously estimated. Failure to consider this simultaneity will result in estimates of effects that are statistically inconsistent (Singh et al. 1986). The further the household's context is from 'perfect', the more likely that measured effects will be inconsistent with actual responses.

In most countries and regions, it is difficult to argue for separability. In developing and transition economies, the lack of markets, the existence of mixed markets, and the presence of risk are well-accepted problems. However, even in the developed countries the assumption of separability should be questioned and tested, since (as examples) the substitutability of labor between farm family labor and hired labor may be far from perfect, and risk exists. These issues are even more likely to arise when intra-household effects are considered – i.e., when the household' black box' is opened.

2.2 Estimation Issues Related to Agricultural Household Models

The broad application of household-firm models in the literature for both developing and developed countries provides a better understanding of how households behave under different constraints and in different contexts. However, it should be recognized that there are data and estimation issues that need to be confronted.

The models that have been estimated to date have taken either a reduced-form approach (see discussion in Huffman 1991) or a systems approach. Even with the systems approach there are differences in the level of aggregation for the different components of interest in the estimation: consumption behaviors, labor supply and demand decisions, farm production decisions, among others. The systems approach is the most preferable of the two approaches. However, the systems approach poses significant demands for data reflecting production, consumption and labor decisions. Extensions of the model similarly pose the need for data on (for example) sources of formal and informal credit, fertility and schooling behaviors, nutritional status, among other behaviors or decisions of particular interest. At the same time, household-firm models have the ability to provide answers to important questions.

Early models often used cross-sectional data (typically single year) on a region or country. More recent models have used multiple production periods, to reflect the seasonality of production that is often critical when understanding household behaviors. Other recent studies have used panel data that allow assessment of adjustments in household behaviors over time, allowing analysis of life-cycle effects, for example. A significant advantage of data going beyond a single time period is the variation in prices that is observed. An unfortunate attribute of cross-sectional data applied to a region, for example, is the often-lacking variation in input and output prices.

A second problem encountered frequently in the estimation of farm household-firm models is the existence of corner solutions. At aggregate levels (e.g., in Lopez 1986), this is not a problem since high level of aggregation of commodities and inputs resolve the issue. However, in reality, the diversity of production choices means that not all outputs are produced consistently across all households and not all households use the same set of inputs. The same is the case for consumption and labor decisions where households may differ markedly in their consumption of different products or in their choices of different forms of work. The econometric issues implied by these realities of farm household-firms are well known (see Goetz, Weaver).

And finally, the issue of model separability is critical.

3 Typology Development

The agricultural household model suggests that there are a number of parameters that could serve to define a useful typology for classifying farm household adjustments. Three dimensions of a country typology from a household-farm model that deserve attention include:

1. The existence of perfect, mixed or missing input (labor, capital and land) and output markets using a unitary household approach;
2. The existence of intrahousehold differences in resource allocations, including labor/leisure and consumption; and
3. Impacts on disadvantaged populations or populations of particular societal concern, e.g., poor agricultural households in low-income countries.

3.1 Labor markets

The nonseparability of production and consumption decisions in an agricultural household model is most often argued on the basis of the lack of perfect labor markets. The ability of households to adjust to policy change in part reflects their ability to make adjustments within the household-firm unit. Lack of consideration of these effects may reduce the ability of models to result in meaningful measurements of impacts of different policy scenarios (Lofgren and Robinson 1999).

The existence of perfect labor markets implies that households are able to buy and sell labor in response to policy change. Two markets are critical: the market for hired farm labor and the market for off-farm labor. Considering first markets for hired farm labor, under a price support regime, an increase in support prices is expected to result in increases in the allocation of labor resources to farming. However, as farm household-firm income increases, the expectation is a greater time allocation to leisure by the household and the use of more hired labor, given that labor can be hired to substitute for farm operator labor. If *substitutable* labor cannot be hired, the allocation of time to leisure may not occur. Alternatively, under a decoupled direct payment scenario, the impact should be on household leisure, bypassing farm production decisions. A comparison of the results from the two scenarios provides an assessment of the impacts of increased price supports (or decreased price supports) vs. increased direct payments (or decreased direct payments). As shown in the first case, the scenario comparison breaks down when hired labor markets are missing or incomplete (see discussions in Sadoulet *et al.* 1998 and Taylor and Adelman 2003).

Alternatively, if perfect markets exist for farm household labor family employed off the farm, then an increase in wages due to a greater demand for employment in off-farm labor markets should result in labor being reallocated to off-farm work from farm work. When off-farm labor markets are incomplete, underemployment of labor resources on the farm occurs (Olfert 1992). Both the existence of markets to allow the absorption of additional labor in the farm sector and to release labor from this sector should exist.

But the reality is that in many rural areas of developing countries, and in fact in most places where households depend on agriculture for their livelihoods, perfect markets are not observed (Sadoulet *et al.* 1998) Even in transition economies and developed economies, the existence of separability should be questioned (see Anton 1999). As a result, the adjustments differ from those that would be expected under a 'perfect' scenario. However, the responsiveness of individual countries or regions can be tested to determine their responsiveness to policy change under different scenarios.

3.2 Labor themes

In many developed countries there has been a significant increase in the prevalence of off-farm employment (Hallberg, Findeis and Lass 1991; Bryden, et al. 1992; Caillavet, Guyomard and Lifran 1994; OECD 2001). Labor resources have been absorbed by external labor markets from farm households, reducing the underemployment problem for farm household labor that historically existed (see discussion Olfert 1992). Off-farm employment among both farm men and women in developed countries is common, and has increased in the last half decade. Participation rates among farm women, in particular, have increased markedly, as women in the general population have moved into the formal labor force. The overall result has been an increasing dependence of farm households on off-farm income (Mishra *et al.* 2003). In the U.S. specifically, off-farm participation rates have increased from 37 percent among women and 48 percent among men in 1980 (Rosenfeld 1985), to 53 percent and 52 percent among men and women, respectively, in 2001. Among the working-age farm population, the percentages are even higher – 62 percent for U.S. farm women and 59 percent for farm men (Findeis and Swaminathan 2003). These statistics reflect an active U.S. off-farm labor market that provides both full-time and part-time work within commuting distance. Few farm households in the U.S. are characterized by long-distance labor migration (although farm family partnerships, in a sense, allow for the possibility of extension of the farm household into multiple distant labor markets).

What is particularly interesting about the trend toward off-farm employment is its pervasiveness – the trend has been observed in the majority of developed countries. Gardner notes the importance of technical change in releasing labor from farm production; technical change has similarly released labor from household production. Increasing off-farm wage rates in off-farm labor markets, smaller average family sizes, and levels of education among farm families becoming comparable to the education level of households more generally in some countries have also contributed to the trend, particularly for women. Farm women report that they are attracted to off-farm labor markets for financial reasons: to cover household expenses, to finance the farm operation, to develop and maintain job skills, and to have a source of income under their own control. Those U.S. farm households where there is no multiple job-holding or dual job-holding appear to be those in the more remote regions where off-farm jobs are less accessible. There are also a significant number of farms in the U.S. that do not participate in off-farm labor markets due to (advanced) age of farm owners.

Markets also exist for hired farm labor, although there are likely to be locations even in developed countries where hired labor markets are not well developed. The U.S. is particularly

dependent on hired farm labor, in some cases substituting hired farm labor for farm family labor in urban off-farm labor markets (Findeis and Lass 1992). This behavior was observed in urban-adjacent labor markets where farms have ready access to urban consumers (and simultaneously to higher-wage off-farm employment). However, in most cases, at least in France (Benjamin and Kimhi 2003) and the U.S., hired farm labor and farm household labor are observed to be substitutes.

In contrast, in developing countries, there is significant variation in the prevalence of off-farm employment. Shand and Otsuka and David provide evidence of off-farm activity in a number of Asian countries. Hsu (1997) analyzed off-farm employment decisions under alternative rice production regimes in a nonseparable model for West Bengal India, and Mukherjee (1999) found significant effects in the same region over the period of liberalization in India, comparing 1991 to 1997 household data. In Africa, Abdulai and Delgado (1999) and Swaminathan (2003) have analyzed nonfarm employment, in the latter case as related to gender-directed credit receipt for micro-enterprise development. For Mexico, Ortega-Sanchez (2001) reports important gender-differences in the labor regimes of men vs. women, with men migrating long distances to off-farm employment and women employed in local labor markets while maintaining (lower levels) of farm production.

Studies undertaken in developing countries on off-farm employment generally have shown that the off-farm job opportunities that farm households face are, in general, low-wage opportunities, except in some cases where self-employment in a nonfarm business enterprise is observed to pay higher returns to labor. For example, in Malawi, the opportunities for working off the farm for women are limited except for *ganyu* labor which is low status and low income (Swaminathan and Findeis 2003). In Gambia, off-farm employment opportunities, especially for women, are limited and generally low-wage (Mugalla 2000). In many cases, off-farm employment means hired farm employment (Mukhopadhyay 1994).

The discussion above suggests that there are substantive differences between labor markets in which farm households buy and sell labor in developed and developing countries that deserve consideration in typology development. The presence or absence of markets, as well as the wage structure, will influence the extent to which farm households can combine off-farm employment with farm work as a livelihood strategy. Policy reform that resulted in greater off-farm employment in the New Zealand case, for example, may also be more likely in other similar contexts. However, the ability to adjust is likely to vary significantly in country comparisons.

Finally, it should be recognized that labor resources within farm households as well as labor markets differ substantially across countries. The extent to which labor markets exist and function influence farm household-firm adjustments but adjustments are also a function of the labor resources available to the household. The prevalence of AIDS/HIV in many countries and especially in sub-Saharan Africa severely threatens adjustment through labor markets that might otherwise be possible. Illness or death of household members severely erodes the productive labor resources of agricultural households (Mutangadura, Mukurazita, and Jackson 1999; Rugelema 2001; Topouzis 2000, 2001; Stokes 2003). As shown by Stokes (2003), the negative impacts on human, social, financial, physical and natural capital are pervasive. Health status of households will moderate the effects of any policy interventions dependent on shifts of labor resources into different productive uses.

3.3 Interactions between labor and land markets

The existence of land markets and the household's access to land and other natural resources that support alternative livelihood strategies should be additional dimensions of any typology to differentiate countries in terms of adjustment to policy reform. Forms of land access (private ownership, rental, allocation from an *alkalo*, and other forms of land allocation) markedly differ across countries and even regions. Sizes, productivities, and environmental capacity of landholdings also vary markedly.

Due to the capitalization of farm program benefits into land, farm household wealth in many developed countries is dependent on land ownership and productivity as well as on the magnitude of program payments (transfers). Reducing payments or even the expectation of reduced payments may reduce land values, reducing farm household-firm wealth. The balance between the cash income from farm profit and other earnings versus the wealth holdings through land is likely a critical dimension of being a farm household for many farm families in developed countries. Even in developing countries with land ownership, wealth holding very typically takes the form of land. When land is not owned but is allocated for use by the household (as is the case in Gambia, for example), other assets such as cattle, horses, sheep and goats constitute the store of wealth. Changes in agricultural policies have the potential for affecting the land and asset (wealth) holdings in most situations.

Adjustments to policy reform are likely to vary depending on the extent to which land markets exist. However, interactions at the farm household level between land and labor markets may moderate any impacts that might be expected. For example, for households able to work off the farm, farm exits may be less likely in response to changes in land prices.

3.4 Labor and capital markets: access to credit

A similar situation to that described above for labor can be constructed for capital markets. That is, if a change in policy implies the need for additional capital in agriculture, credit markets can serve to facilitate this adjustment. Constraints on access to credit are well-known in developing countries (Swaminathan 2003). Even in the developed countries, capital borrowing to support farm production can be the norm.

Access to capital to engage in agricultural production or to finance the development of other nonfarm self-employment activities may be affected by policy reform through declining land values that reduce the ability of farmer's to secure borrowed capital. In developing countries, access formal credit is often rationed and access to informal credit is commonly linked to kinship ties, again a function of the household (Swaminathan 2003).

At the same time, capital-labor linkages exist. The out-migration that occurs to access labor earnings may in part be a response to tight credit in local credit markets (Massey *et al.* 1989).

4 Intrahousehold effects

The advantage of adding intrahousehold effects to models is that there are likely to be important differences across individuals comprising agricultural households that play out in terms of the effects of policy. Behaviors may vary by the gender composition of the household or by age composition, as examples. Behaviors, and the ability to bear risk, may also depend on household size.

4.1 Gender

In some countries women are not allowed to work in off-farm labor markets, and the ability of household labor to respond to policy signals is restricted. In many countries, men's and women's work on the farm is strictly defined by crop or task (Doss 1996). Income earned by men and women may be pooled or not, depending on household structure (Mugalla 2000). Gender also has been shown to be increasingly important in understanding resource allocation decisions within households (Pitt *et al.* 1990)

The allocation of labor across types of work (own farm work, nonfarm self-employment, wage work and home economic production) as well as the allocation of work within the household by gender are important considerations, since the household's well-being and the well-being of its individuals depend on the income generated through work, the receipt of employer-provided benefits, as examples. Further, because labor resources are mobile, the allocation of household labor resources across space also can result in important effects, raising questions of remittances, seasonal variations in time allocations that mean that some household members are not available for farming, and the possibility of a significant dispersion of farm household members to different work activities – to off-farm local employment, cross-border to other destinations with jobs, and on the farm itself. Indicators of household well-being are very often a function of the household's quantity and quality of labor resources and labor time allocation choices to the set of income-generating activities of the household.

4.2 Age

The age distribution of the household can also have important effects. One major function of agricultural households is to supply labor to meet farm needs. Over the life-cycle, the individual's ability to supply productive labor to farm varies, and gradually declines in the later stages of the cycle. Population profiles by age show that in most developed countries the profile is flat and extended into older age groups than is the case in other countries throughout the world – most other countries have a bell-shaped population profile, heavily weighted toward the young and much narrower in the older age groups.

The 'aging of the population' observed in many developed countries is a relevant trend that can be analyzed when a household perspective is taken. To maintain the farm, intergenerational transfer issues become important for maintaining a consistent farm labor supply and may cause major adjustments in the farm operation. Major changes in reliance on earned versus unearned income as well as major adjustments in livelihood strategies can occur as age progresses – the ability of farm households to secure the same level of income from off-farm employment or nonfarm businesses, changes in intergenerational relationships between parents and children within the extended household, and adjustments in household expenditure patterns.

Potential Indicators: Discussion

Given the discussion above, potential indicators can be suggested for developing a useful typology. Since it is likely that external labor markets may have key effects, potential indicators include measures of participation in off-farm employment and the level of off-farm wages/income. The prevalence of nonfarm self-employment activity or micro-enterprise development are also potential indicators, since these activities may be substitutes for farm work. Given a household perspective, these indicators by selected characteristics (e.g., gender) provide the most realistic understanding of the effects that may occur in response to policy reform.

Further, indicators that reflect land size and asset holdings, forms of access to land, and access to credit (all measures affected by and/or affecting household labor availability and use), should be included. These measures serve to reflect household access to natural resources needed for agricultural production. Finally, demographic indicators should be included in any typology to analyze policy reform. Examples include the age structure of the population, household size and the prevalence of major diseases (e.g., AIDS/HIV).

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