

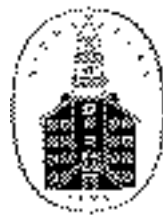
“Social Capital and Consumption among Agricultural Households”

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June 2002

MIDDLEBURY COLLEGE ECONOMICS DISCUSSION PAPER NO. 02-02



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Social Capital and Consumption among Agricultural Households

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This draft: July 2001

Under revision for *Rationality and Society*

This paper develops a life cycle model for agricultural households in which social capital is a fixed input into household production. The intertemporal solutions of the model yield four results that are consistent with recent empirical and qualitative literature on social capital and consumption among agricultural households: commodity consumption will rise for an agricultural household in a village in which public social capital is increasing – even if the household itself has invested little in their own accumulation of social relations; increased inequality within villages is associated with lower social capital; public social capital will decrease significantly in the presence of migration of young from rural communities; and current consumption levels will be less sensitive to increases in income uncertainty when social capital is increasing. The paper uses information on agricultural households in Tanzania to illustrate the model.

Keywords: social capital; household production; local organizations; Tanzania.

JEL Codes: D13, Q12, Z13,

Social Capital and Consumption among Agricultural Households

Recent empirical evidence has shown that the presence of active local organizations is a large and significant determinant of consumption among agricultural households in Tanzania (Narayan and Pritchett 1999) and Indonesia (Grootaert 1999). This paper develops a life cycle model of household production in which accumulated social relations in local organizations increases commodity consumption. The model is based on the hypothesis that utility-maximizing agricultural households simultaneously make allocation decisions about current consumption, expenditures on education, and social relations in local organizations: these decisions are modeled as household production of commodities, investments in one form of human capital, and investments one form of social capital, “the set of elements of the social structure that affects relations among people and are inputs or arguments of the production and/or utility function” (Schiff 1992). Specifically, both household and village-wide social relations in local organizations are modeled as fixed inputs into household production.

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in a village in which public social capital is increasing – even if the household itself has invested little in their own accumulation of social relations; increased inequality within villages is associated with lower social capital; public social capital will decrease significantly in the presence of migration of young from rural communities; and current consumption levels will be less sensitive to increases in income uncertainty when social capital is increasing.

This paper is organized as follows. Section I provides an overview of social relations and social capital. Section II presents an applicable set of definitions and a discussion of how the model applies to rural Tanzania. Section III presents the set-up and assumptions of the model. Section IV presents the intertemporal solutions of the model. Section V concludes with a discussion of the policy implications of the model.

I. Social Relations, Organizations, and Social Capital

It is easily argued that social relations do not belong in an economic framework: nevertheless, an interdisciplinary set of scholars has made progress in integrating social behavior into a rational-choice perspective.¹ Anthropological analyses of human behavior show how dyadic interactions evolve into networks of social interaction and reciprocity (Arensberg 1972). Based on this tradition, Polanyi introduced the concept of ‘embeddedness’ of economic behavior within social structures (e.g., Polanyi, Arensberg and Pearson 1957). In an influential refinement of this concept, Granovetter (1985) rejected sociological and anthropological frameworks in which social relations become ‘epiphenomena’ of the market as well as the neoclassical economics framework in which social relations are absent: he argued that economic action is embedded in ongoing

structures of social relations and that networks of personal interactions “generate trust and discourage malfeasance.” In response, Platteau (1994a,b) contended that more than ongoing social relations are required for the growth of trust in market societies. His detailed thesis--encompassing a thorough review of game-theoretic literature on the origins and maintenance of cooperation (Axelrod 1984, Sugden 1986) and examples from economic history (Greif 1994)--is that a generalized morality, based on “norms and cultural beliefs that are rooted in historical processes” (1994a), is a necessary component for the generation of trust and economic development. ‘New Institutional’ economists have also explored the interaction between social and economic processes at the village (Bardhan 1993), firm (Williamson 1975), and national level (North 1990, Nugent 1993).

Recent work on social capital has focused on integrating social relations into an economic framework². Coleman (1988, 1990) formally introduced the concept (“Social capital is defined by its function. It is not a single entity, but a variety of different entities having two characteristics in common. They all consist of some aspect of a social structure, and they facilitate certain actions of individuals who are within the structure.”) and explored the role of social capital in educational attainment. In his influential study of the economic development of the twenty administrative regions of Italy, Putnam (1993) defined social capital as “features of social organization, such as trust, norms and networks, that can improve the efficiency of society by facilitating coordinated actions.” He found remarkable empirical and case study evidence of the long-lasting role of community organizations in development. Becker, who in a well-known paper used the household production framework to analyze social interactions such as relations within families and contributions to charity (1974)³, embraced the concept of social capital in an

omnibus series of essays (Becker 1996). He defines social capital as “influence of others on a person’s utility” and sketches an accumulation process for social capital that is similar to that of human capital.

How can one incorporate accumulated social relations in local organizations -- a form of social capital -- into a utility-maximizing framework among agricultural households? Figure 1 depicts the standard neoclassical set up, where four households in a village have access to physical capital--both private and public--and to human capital. In the figure, private physical capital is depicted within the rectangles around each household, public physical capital is depicted within the larger rectangle around households 3 and 4, and human capital is depicted in each circle. If each of these capitals can be properly measured, it is relatively straightforward to incorporate them into a system of constrained utility maximization. In a dynamic system, part of the maximization process involves foregoing current consumption for investments in the accumulation of private physical and human capital that will in turn be inputs into household production in the future.

Figure 2 illustrates the concept of embedding utility-maximizing behavior in a dynamic social structure. Between pairs of nodes are selected sets of line segments that depict the dynamic accumulation through time of social relations between households with a common interest. For example, households 1 and 2 belong to a rotating saving and credit associations (ROSCA); households 1, 3, and 4 belong to a farmers’ group. To paraphrase Coleman, while human capital inheres in the nodes of this Figure (that is, in each household) social capital inheres in the connections between the nodes: the accumulation of social relations among households. Note that their may be a private form

of social capital--household 2 benefits only from accumulated social relations with household 1--and a public form--all households in the village benefit from all accumulated social relations⁴.

Thus, as illustrated by the comparison between these two figures, efforts to incorporate social relations into an economic framework recognize an important set of real assets: the accumulation of social relations among households that (as explored below) may help to smooth consumption, resolve collective action dilemmas, reduce transactions costs, and diffuse knowledge, thereby increasing household utility.

Consider how such a view of social capital accumulation can be applied to agricultural households in Tanzania. First, household production of commodities is an appropriate framework for agricultural households in which family members must make decisions about household and agricultural labor allocations (Deaton and Muellbauer 1980; Singh, Squire and Strauss 1986). In rural Tanzania, the typical household has about five family members, with adults employed in own holding agriculture (65% of total labor input), communal farming (24%) and non-farm activities (9%) (Collier, Radwan and Wangwe 1986). In many regions, variable rainfall considerably affects crop production (Dercon 1996), and one means of consumption smoothing for individual households is farming communal land for drought-resistant crops (Quinn 1995). The primary asset for wealth accumulation is livestock (Dercon 1996), while opportunities and demand for adult education have historically been greater than in surrounding countries (Putterman 1994).

Local organizations play a prominent and productive role among agricultural households in Tanzania. Based on surveys of 600 households in twenty villages in eight

regions, Collier, Radwan and Wangwe (1986) found that households which attended village assemblies and cooperative meetings had income that were 43 percent and 20 percent higher, respectively, than those who did not. Data from field work among households and farmers' associations in two regions supports the hypothesis that membership in member-controlled participatory groups has a significant positive effect on farmers' market orientation and labor efficiency (DeTray 1995). Data from field work among households and local organizations in two regions shows that social obligations in groups lead individuals to share wealth (and to understate income levels in the presence of poorer friends) and that the lack of differential risk-bearing ability hampers group formation (Nagpal 1994). Narayan and Pritchett (1997) find that a measurement of public social capital based on the characteristics of local organizations has a large and statistically significant effect on per capita expenditures. They also find that villages with high levels of public social capital have better publicly provided services, more active community activity on roads, and greater use of credit in agriculture. Isham (2000) finds that that ethnically-based and participatory social affiliations act as a form of social capital in the decision to adopt improved fertilizer.

II. Definitions

The starting point for developing a model of household production that incorporates social capital is the fact that utility-maximizing households in rural villages, in addition to producing household commodities and investing in education, transact with others in social relations.

Definition 1: Social relations are voluntary exchanges of resources with some level of generalized reciprocity.

Less formally, social relations are non-contractual exchanges between households in which resources change hands, with the understanding that additional exchanges are likely in the future. Resources here include not only goods and services, but also other less tangible resources that can be controlled by one household and transferred to another: these include information, personal contacts, and social approval⁵. For example, among rural households, giving food and water to a household visitor (goods) and allowing a neighbor's child to play in the family compound (services) are both examples of social relations. But so too are telling another farmer about an improved hybrid seed (information), introducing a new high-school student to the school director (personal contacts), and participating in the burial ceremony of a village elder (social approval). Note that each of these actions is voluntarily chosen by the (head of the) household, requires market-purchased goods and/or time, and contains an element of generalized reciprocity.

It is useful to classify collections of these relations as bounded sets among selected groups of households.

Definition 2: A bounded set of social relations is a set of recurring social relations among two or more households with a mutual interest.

The boundary of such a set is determined by an identifiable mutual interest: of a group of N households in a community, for example, a subset N^* may form a bounded set of social relations based on their interest in educating their young children⁶.

One of the most important types of bounded sets of social relations in rural villages is the local organization⁷.

Definition 3: A local organization is a bounded set of social relations in which membership entails payment of dues or the contribution of goods and services.

Local organizations have a well-defined list of members⁸: the selection process for organizations may be determined by the active choice of the current members or by some internal rule. Because of their common interest of educating their children, many parents of school-age children in a rural village will join the Parent's Association at the local school. Note that this definition is consistent with two types of mutual interests: explicitly economic (for example, a ROSCA or a water and sanitation users groups) and non-economic (for example, a religious or cultural group)⁹.

Finally, this collection of definitions yields a definition of a social structure.

Definition 4: A social structure is a set of bounded sets of social relations within an arbitrary but well-defined region.

Thus, a village's social structure is the set of bounded sets of social relations, including local organizations, within its borders¹⁰.

Social relations in local organizations are the form of social capital in this model, following the general definition of Schiff (1992). He defines social capital as, "the set of elements of the social structure that affects relations among people and are inputs or arguments of the production and/or utility function." In the model developed in the next two section, social relations within local organizations are fixed inputs into household production functions.

III. Set-up and Assumptions of the Model

Based on the definitions in the attached proposal and the multi-period household production model of Ghez and Becker (1975), this model begins with three assumptions. Each household includes a head whose known lifetime, T , defines the life cycle. The head and other household members have an aggregate utility function. Life cycle utility over an aggregate household commodity (C_t) is additively separable¹¹:

$$U = \sum \beta^t v(C_t, \Omega_t)^{12}. \quad (1)$$

where β is the discount factor¹³, t is the age of household head, $v(\cdot)$ is the individual period subutility function, and Ω_t are “variables that affect the desirability of consumption at different points in the life cycle, household demographic structure being perhaps the most obvious” (Deaton 1992).

To maximize life cycle utility, each household i in village j allocates time and market goods for three production activities¹⁴: (a) household production of commodities (with time and goods inputs of L_t and X_t respectively); (b) accumulation of human capital (H_t) through production of education (with time and goods inputs of N_t^h and X_t^h), and (c) accumulation of social capital (S_t) through social relations in local organizations (with time and goods inputs of N_t^s and X_t^s). Each household must also allocate time for: (d) income generation (time inputs of N_t).

(a) Household production of commodities is defined by:

$$C_t = \Psi_t F(X_t, L_t). \quad t = 1, 2, \dots, T \quad (2)$$

where $F(\cdot)$ is twice differentiable and homogenous of the first degree. Ψ_t is an index that aggregates all fixed inputs into household production:

$$\Psi_{t=\Psi_0} K_j^{\phi_1} S_j^{\phi_2} K_t^{\phi_3} S_t^{\phi_4} \quad (3)$$

where Ψ_0 is a constant; K_j and S_j are public physical and social capital in village j at time t ; K_t is physical capital of household i in village j at age of the household head t ; and the ϕ 's are the respective efficiency parameters¹⁵.

What is the role of each of these fixed inputs? In rural villages of the developing world, private physical capital includes durable goods such as automobiles, bicycles, and household appliances; public physical capital includes feeder roads, health clinics, and water and sanitation facilities. More of each of these fixed inputs reduces the amount of consumption goods and time required to achieve a given level of commodities¹⁶. In order to focus on human and social capital, the dynamics here are simplified by assuming that both of these inputs are given: each village has a fixed amount of public physical capital; and each household starts with a fixed amount of durable goods and makes no subsequent investments in private physical capital¹⁷.

Private social capital includes accumulated social relations by household i in local organizations to which it belongs; public social capital includes the accumulated social relations among all households in village j . What justifies modeling private and public social capital as fixed inputs into household production? How do they reduce the amount of consumption goods and time required to achieve a given level of commodities? As discussed above, accumulated social relations of each household can yield a flow of goods and services, information, personal contacts, and social approval¹⁸. This view of personal social capital accumulation is consistent with the rational-choice perspective of Coleman (1990) and the economic embeddedness thesis of Granovetter (1985), in which

each household's social relations "generate trust and discourage malfeasance" with reciprocating households.

Streeten (forthcoming) distinguishes among five different aspects of social capital and social investment (additions to the stock of capital): non-durable consumption goods; non-durable production goods; durable capital goods; durable investment goods for non-marketed activities; and durable consumption goods. The form of social capital that is modeled here corresponds to the fourth and fifth classification – and thereby does not explore the inherent (as opposed to instrumental) value of many kinds of social relations.

Likewise, village-wide accumulated social relations can lower collective action dilemmas, reduce transactions costs, and diffuse information¹⁹. All households in villages with high levels of these characteristics would require less consumption goods and time to achieve a given level of commodities. This view of public social capital is consistent with approaches of Putnam (1993) and Platteau (1994a,b), in which social relations produce civic networks and generalized reciprocity among all households in a region.

(b) Human capital accumulation is defined by:

$$H_{t+1} = [1-d^h] H_t + h_t \quad (4)$$

$$h_t = a_{ij}^h h(X_t^h, N_t^h), \quad (5)$$

where d^h is the depreciation rate on human capital; h_t is the amount of human capital generated in period t ; a_{ij}^h is a productivity index associated with characteristics of the human capital accumulation process available to household i (for example, proximity of schools); and $h(\cdot)$ is the production function for increments of human capital, which is concave in both arguments.

(c) Social capital accumulation is modeled in a similar fashion:

$$S_{t+1} = [1 - d^s] S_t + s_t \quad (6)$$

$$s_t = a_{ij}^s s(X_t^s, N_t^s) \quad (7)$$

where d^s is the depreciation rate on social capital; s_t is the amount of social capital generated in local organizations in period t ; a_{ij}^s is a productivity index associated with characteristics of the social capital accumulation process available to household i (for example, membership composition of local organizations); and $s(.)$ is the production function for increments of social capital, which is concave in both arguments.

Less formally, this form of social capital is accumulated each period through social relations with other households in local organizations: the amount of goods and time allocated by each household to these social relations, along with selected characteristics of these organizations, determine the amount of social capital generated per period. As further discussed below, each household takes as fixed the amount of S_j ; it does not take into account the effect of its own social relations on the accumulation of public social capital.

There are advantages and disadvantages to modeling social capital accumulation like human capital accumulation. Allocation decisions about social relations can be readily integrated into an established life-cycle model of household production²⁰; in addition, social capital of this form can be measured with selected data on local organizations (Narayan and Pritchett 1999, Grootaert 1999, and Isham and Kähkönen 2000). However, this modeling does impose a relatively simple form on a complex aspect of human behavior.

(d) Income generation per period ($e_{ijt}H_tN_t$) is a product of a random efficiency parameter e_{ijt} for household i in village j ; the current level of human capital; and time allocated for income generation. Each household in period t knows e_{ijt} , but all future observations are unknown²¹. This is the source of uncertainty in the model: it captures the idiosyncratic shocks that affect real incomes of agricultural households, including those resulting from variability of local weather conditions²².

Finally, life cycle maximization is constrained by limits on time availability in each period (θ) and by the intertemporal accumulation of assets:

$$L_t + N_t + N_t^h + N_t^s = \theta \quad t = 1, 2, \dots, T \quad (8)$$

$$A_{t+1} = [1+r][A_t + e_{ijt}H_tN_t - p_tX_t - p_t^hX_t^h - p_t^sX_t^s], \quad (9)$$

where A_t are assets at age t ; r is the constant rate of interest; and p_t , p_t^h , and p_t^s are the respective price indices for goods used in household production, production of human capital, and production of social capital. Thus, each household begins each period t with assets of $[1+r]A_{t-1}$: after the realization of e_{ijt} , the household then allocates goods and time to produce household commodities, human capital, and social capital and time to earn income, finishing the period with assets of A_t .

IV. Derivation and implications of intertemporal solutions.

As shown in Deaton (1992) with a single state variable, dynamic programming effectively yields solutions of a life cycle model. Here I use this procedure with three state variables: assets, human capital, and social capital.

This procedure begins with a Bellman's equation defined over a value function:

$$V(A_t, H_t, S_t) = v(C_t, Z_t) + \beta E_t V(A_{t+1}, H_{t+1}, S_{t+1}), \quad (10)$$

where E is the expectations operator. In any period t , the maximized value function equals the maximized value of the two terms on the right hand side: utility in the same period and the discounted expected value of the state variables in the next period.

Maximizing (10) over three sets of choice variables: X_t, N_t ; X_t^h, N_t^h ; and X_t^s, N_t^s -- after substituting the expressions for household production (2 and 3); time constraints (8); asset accumulation (9); human capital accumulation (4 and 5); and social capital accumulation (6 and 7) -- yields:

$$\begin{aligned} \frac{\partial v}{\partial C_t} &= \beta E_t V_A (A_{t+1}, H_{t+1}, S_{t+1}) [1 + r] \pi_t, \\ \pi_t &= \frac{e_{ijt} H_t}{\psi_t \partial f / \partial L_t} = \frac{P_t}{\psi_t \partial f / \partial X_t} \end{aligned} \quad (11)$$

$$\begin{aligned} EV_H (A_{t+1}, H_{t+1}, S_{t+1}) &= \\ EV_A (A_{t+1}, H_{t+1}, S_{t+1}) [1 + r] \pi_t^h, & \quad (12) \\ \pi_t^h &= \frac{e_{ijt} H_t}{a_i^h \partial h / \partial L_t^h} = \frac{P_t^h}{a_i^h \partial h / \partial X_t^h} \end{aligned}$$

$$\begin{aligned} EV_S (A_{t+1}, H_{t+1}, S_{t+1}) &= EV_A (A_{t+1}, H_{t+1}, S_{t+1}) [1 + r] \pi_t^s, \\ \pi_t^s &= \frac{e_{ijt} H_t}{a_j^s \partial h / \partial L_t^s} = \frac{P_t^s}{a_i^s \partial h / \partial X_t^s} \end{aligned} \quad (13)$$

where all partial derivatives of the value function are expressed with a sub-script (e.g., $V_a(\cdot)$). The second expression in (11) defines π_t as the marginal cost of current consumption. Intuitively, this is the product of the price of an input (the opportunity cost of time and the price of the good, respectively) and the amount of the input required to produce a marginal amount of the commodity. Comparable expression in (12) and (13) are similarly defined: π_t^h and π_t^s are the marginal costs of human capital and social capital, respectively, generated in period t .

From (11), the marginal utility of consumption equals the expected marginal value of commodity inputs carried over as assets. From (12) and (13), the expected marginal value of each form of capital equals the expected value of commodity inputs carried over as assets.

All intertemporal trade-offs can be expressed in terms of the basic elements of the model by substituting out the value function. Differentiating (10) with respect to A_t by the envelope theorem yields:

$$V_A(A_t, H_t, S_t) = \beta E_t V_A(A_{t+1}, H_{t+1}, S_{t+1})[1 + r]. \quad (14)$$

Substituting (14) into (11), shifting forward one period, and substituting back into (11) yields the Euler equation:

$$E_t \frac{\frac{\partial v}{\partial C_t}}{\frac{\partial v}{\partial C_{t+1}}} = \frac{1 + r}{1 + \delta} \frac{\pi_t}{\pi_{t+1}}. \quad (15)$$

Differentiating (10) with respect to H_t by the envelope theorem yields (16):

$$V_H(A_t, H_t, S_t) = \beta E_t V_A(A_{t+1}, H_{t+1}, S_{t+1})[1 + r][e_{ijt} N_t] \\ + \beta E_t V_H(A_{t+1}, H_{t+1}, S_{t+1})[1 - d^h]$$

Substituting from (12) and (14), shifting forward one period, rearranging, and substituting from (12) yields:

$$1 + r = \frac{[e_{ijt+1} N_{t+1} + [1 - d^h] \pi_{t+1}^h]}{\pi_t^h} \quad (17)$$

Similar steps (beginning with differentiating (10) with respect to S_t) yield:

$$1 + r = \frac{E_t [\pi_{t+1} \phi_4 \frac{C_{t+1}}{S_{t+1}} + [1 - d^s] \pi_{t+1}^s]}{\pi_t^s} \quad (18)$$

Equation (15) captures the intertemporal trade off between consumption in two consecutive periods. Equations (17) and (18) determine the expected time paths of assets, human capital, and social capital.

Based on the set-up and results of this model, how do public and private social capital affect consumption levels of utility-maximizing agricultural households? First, as modeled here, each household takes as fixed the amount of S_j : it does not take into account the effect of its own social relations on the accumulation of public social capital. If S_j is an increasing function of the accumulated social capital of all households in village j , the social planner's solution to this intertemporal maximization would include an additional term in the numerator of (18), the marginal product of households i 's social

capital in the next period as a fixed input into commodity production of all other households.

The presence of this production externality raises two potentially important points about the accumulation of social capital in rural villages. From (15), when the interest rate is greater than or equal to the discount rate and the marginal cost of commodity consumption is falling, commodity consumption will be rising. When the price of consumption goods are unchanged, these conditions for marginal costs will be met when fixed inputs into household production are rising: that is, when levels of physical capital or social capital are increasing.²³ *Ceteris paribus*, commodity consumption will rise for an agricultural household in a village in which public social capital is increasing – even if the household itself has invested little in their own accumulation of social relations. This result is consistent with the empirical findings of Narayan and Pritchett (1999) and Grootaert (1999): greater consumption levels among agricultural households in villages with higher public social capital in Tanzania and Indonesia, respectively.

In addition, as income increases for some households (because of either increases of private human capital or an upward exogenous shift of the efficiency parameter e_{ijt}), these households may substitute away from social relations – because the technology for the generation of social capital in (7) is likely to be time-intensive, and the opportunity cost of time increases with greater incomes. Since this substitution would lead to lower levels of public social capital, it opens the possibility of increased inequality (in terms of household production of commodities) within villages: one set of households would increase commodity consumption through higher incomes, while another set would have less commodity consumption as productive stocks of public social capital decrease. This

result is consistent with the empirical findings of La Ferrara (1998): higher inequality is associated with lower levels of social capital in Tanzania.

From (18), the return of assets equals the expected return of social capital: the sum of the value of the marginal product of social capital in the next period and the marginal cost of producing the same amount of social capital (net of depreciation) in the next period, divided by the marginal cost. The second term in the numerator captures the value of the carried over social capital stock in all subsequent periods: this implies that, *ceteris paribus*, social capital accumulation will be greater during the early stages of the household's life cycle.²⁴ This is consistent with the observation (Schiff 1992) that public social capital will decrease significantly in the presence of migration of young from rural communities.

Finally, what does this model imply regarding risk-averse behavior among agricultural households? As discussed by Deaton (1992, 1994), intertemporal optimality conditions such as those derived above offer guidance on behavior among risk-averse rural households that face different levels of uncertainty. Consider a household in village j that faces greater uncertainty (in terms of a mean preserving spread around e_{jt}) than another household in village j . Where the marginal utility of consumption is decreasing and convex, the increase in spread will increase the expected future value of marginal utility: in order to preserve the equality in (14), savings will increase and current consumption will fall²⁵. Accordingly, when private and public social capital are rising -- thereby accelerating the consumption path -- current consumption levels will be less sensitive to increases in income uncertainty: *ceteris paribus*, the expected future value of marginal utility will be falling with increases of social capital.

V. Policy implications of the Model

This paper has developed and solved a dynamic model of household production that incorporates social capital. The paper's main results are to illustrate how the presence of active local organizations can affect the consumption levels of utility-maximizing agricultural households. The empirical results which are consistent with this paper (Narayan and Pritchett 1999; Grootaert 1999; La Ferrara 1998) as well as other recent empirical work on development outcomes and social capital (Isham and Kähkönen 2000, forthcoming; Grootaert *et. al.* forthcoming) imply that policy makers can not ignore the composition of local social structures when designing projects to improve well-being among agricultural households in the developing world.

Policy makers are increasingly investing in social capital by supporting local organizations comprised of agricultural households (Narayan 2000; Bebbington, Guggenheim, and Woolcock forthcoming). For example, FAO's 'Special Programme for Food Security' in the Dodoma and Morogoro regions of Tanzania helped to form 78 participatory farmers' groups which pooled the resources of 1116 farmers into a ROSCA, thereby improving their negotiation position towards input suppliers and traders (FAO 2000).

The results of this paper give guidelines for the consideration of such investments. In particular, because of their external effects, potential investments in social capital should be considered alongside potential investments in physical and human capital during the planning of most development projects. Using this household production framework leads to the conclusion that only in some cases will investments in social

capital be called for -- depending, among other criteria, on the relative values of the parameters ϕ_1 and ϕ_2). Based on this model, a policy maker that is trying to maximize the utility of a representative agricultural household should allocate resources to physical and social capital until their respective marginal rates of substitution are equal. And even where investments in social capital may not be called for, the potential effect of social capital on a proposed development project should be assessed in the first phase of planning of most projects -- since social capital may be a complement (or a substitute) to other fixed inputs that affect well being.

Assessing the composition and effects of local social capital can be achieved with social assessments, “systematic investigations of the social processes and factors that affect development impact and results”(World Bank 1996). Since the early 1990s, they have been used in a wide range of development initiatives to identify key local stakeholders; to assure that social differences are taken into account in the design of development projects; and to assure that social differences do not limit service delivery (McPhail and Jacobs 1995a). Social assessments are relatively inexpensive: the average cost of social assessments in 42 reviewed development projects was less than \$100,000 (McPhail and Jacobs 1995b).

In agricultural communities with growing inequality and increased migration of the young, the share of poor households may be rising -- as public social capital is deteriorating. By using ‘social assessments’ and by considering the economic returns to investments in a range of agricultural villages, development practitioners may advocate, in selected cases, that projects undertake no activity at all in low social capital villages – unless guided by equity considerations. Under such circumstances, policy makers may be

required to increase, at the margin, their investments in public forms of capital that act as fixed inputs into household production of poor households – including investments in the organizational capacity of the poor (Narayan 2000).

REFERENCES

- Arensberg, Conrad M. 1972. "Culture as Behavior: Structure and Emergence." *Annual Review of Anthropology* 1: 1-26.
- Axelrod, Robert. *The Evolution of Cooperation*. New York: Basic Books.
- Bardhan, Pranab. 1993. "Analytics of the Institutions of Informal Cooperation in Rural Development." *World Development* 21 (4): 633-39.
- Baron, James N., and Michael T. Hannan. "The Impact of Economics on Contemporary Sociology." *Journal of Economic Sociology* 32 (3): 1111-46.
- Bebbington, Anthony, Scott Guggenheim, and Michael Woolcock. Forthcoming. *Practical Theory, Reflective Action: Integrating Social Capital into Development Policy and Projects* Oxford: Oxford University Press.
- Becker, Gary S. 1974. "A Theory of Social Interactions." *Journal of Political Economy* 82 (6): 1063-93.
- Becker, Gary S. 1996. *Accounting for Tastes*. Cambridge, MA: Harvard University Press.
- Betancourt, Roger R. 1996. "Growth Capabilities and Development: Implications for Transition Processes in Cuba." *Economic Development and Cultural Change* 44 (2): 315-31.
- _____ and David Gautschi. 1992. "The Demand for Retail Products and the Household Production Model." *Journal of Economic Behavior and Organization* 17: 257-75.
- Blau, Peter M. 1975. *Approaches to the Study of Social Structure*. New York: The Free Press.
- _____. 1986. *Exchange and Power in Social Life*. New Brunswick, NJ: Transaction Books.
- Collier, Paul, Samir Radwan, and Samuel Wangwe. 1986. *Labor and Poverty in Rural Tanzania*. Oxford: Clarendon Press.
- Coleman, James S. 1988. "Social Capital in the Creation of Human Capital." *American Journal of Sociology* 94 (supplement): S95-S120.

- _____. 1990. *Foundations of Social Theory*. Cambridge, MA: The Belknap Press of Harvard University Press.
- Deaton, Angus. 1992. *Understanding Consumption*. Oxford: Clarendon Press.
- _____. 1994. "The Analysis of Household Surveys: Microeconomic analysis for development policy." Mimeo. Princeton University.
- _____ and John Muellbauer. 1980. *Economics and Consumer Behavior*. Cambridge: Cambridge University Press.
- Dercon, Stefan. 1996. "Risk, Choice, and Savings: Evidence from Tanzania." *Economic Development and Cultural Change* 44 (3): 485-513.
- DeTray, Stephen. 1995. "Top-Down Versus Bottom-Up Organizations: An Analysis of Institutional Obstacles to Development in Rural Tanzania." Doctoral Dissertation. Department of Political Science: University of Washington.
- Esman, Milton and Norman Uphoff. 1984. *Local Organizations: Intermediaries in Rural Development*. Ithaca: Cornell University Press.
- FAO (Food and Agricultural Organization of the United Nations). 2000. 'Case Study: Tanzania extends the SPFS to new areas.' <http://www.fao.org/spfs/urt-e.htm>
- Ghez, Gilbert R. and Gary S. Becker. 1975. *The Allocation of Time and Goods over the Life Cycle*. New York: National Bureau of Economic Research.
- Gleason, Suzanne. 1996. "The Determinants of Male/Female Survival in India: Theory and Evidence." *Department of Economics Working Paper Series* No. 95-15. College Park: University of Maryland.
- Grootaert, Christiaan. 1999. "Social Capital, Household Welfare and Poverty in Indonesia." *Local Level Institutions Working Paper* No. 6. Washington, DC.
- _____, Gi-Taik Oh, and Anand Swamy. "Social capital, education, and credit markets: empirical evidence from Burkina Faso." Forthcoming in Isham, Jonathan, Sunder Ramaswamy and Thomas Kelly, Eds. *Social Capital, Economic Development and the Environment*. London: Edward Elgar Publications.
- Granovetter, Mark. 1985. "Economic Action and Social Structure: The Problem of Embeddedness." *American Journal of Sociology* 91 (3): 481-510.

- Greif, Avner. 1994. "Cultural Beliefs and the Organization of Society: A Historical and Theoretical Reflection on Collectivist and Individualist Societies." *Journal of Political Economy* 102 (5): 912-50.
- Hardin, Russell. 1982. *Collective Action*. Baltimore: Johns Hopkins University Press
- Helliwell, John F. 1996. "Economic Growth and Social Capital in Asia." *NBER Working Paper* No. 5470. Cambridge, MA.
- Isham, Jonathan. 2000. "The Effect of Social Capital on Technology Adoption: Evidence from Rural Tanzania." *IRIS Working Paper #235*. College Park, MD
- _____ and Satu Kähkönen. 2000. "Institutional Determinants of the Impact of Community-Based Water Projects: Evidence from Sri Lanka and India." *IRIS Working Paper #* . College Park, MD: The IRIS Center.
- _____ and _____. "How Do Participation and Social Capital Affect Community-Based Water Projects? Evidence from Central Java, Indonesia." With Satu Kähkönen. Forthcoming in *Social Capital and Development*, Christian Grootaert and Thierry Van Bastelaer, Eds. Cambridge: Cambridge University Press.
- La Ferrara, Eliana. 1998. "The Effect of Inequality on Group Participation; Evidence from Rural Tanzania." Paper presented at the North East Universities Development Conference. New Haven, CT.
- McPhail, Kathryn and Sue Jacobs. 1995a. "Social Assessment." *Environment Department Dissemination Notes*. Washington, DC: The World Bank.
- McPhail, Kathryn and Sue Jacobs. 1995b. "Social Assessment Structured Learning: Preliminary Findings." *Environment Department Dissemination Notes*. Washington, DC: The World Bank.
- Nagpal, Tanvi. 1994. "From Household Survival to Nation Building: Institutional Determinants of Group Formation in Rural Tanzania." Doctoral Dissertation. Department of Political Science, Brown University.
- Narayan, Deepa. 2000. *Voices of the Poor: Can Anyone Hear Us?* Oxford: Oxford University Press.
- Narayan, Deepa, and Lant H. Pritchett. 1999. "Cents and Sociability: Household Income and Social Capital in Rural Tanzania." *Economic Development and Cultural Change* 47(4): 871-97.

- Nugent, Jeffrey B. 1993. "Between State, Market and Households: A Neoinstitutional Analysis of Local Organizations and Institutions." *World Development* 21 (4): 623-32.
- North, Douglass C. 1990. *Institutions, Institutional Changes and Economic Performance*. Cambridge, UK: Cambridge University Press.
- Olson, Mancur. 1965. *The Logic of Collective Action*. Cambridge: Harvard University Press.
- Ostrom, Elinor. 1990. *Governing the Commons: The Evolution of Institutions for Collective Action*. Cambridge, UK: Cambridge University Press.
- _____. 1994. "Investing in Capital, Institutions and Incentives." Mimeo. Paper presented at the conference: *Economic and Political Institutions for Sustainable Development: Implications for Assistance*, sponsored by the IRIS Center. College Park, MD.
- Platteau, Jean-Phillippe. 1994a. "Behind the Market Stage Where Real Societies Exist - Part I: The Role of Public and Private Order Institutions." *The Journal of Development Studies* 30 (3): 533-77.
- _____. 1994b. "Behind the Market Stage Where Real Societies Exist - Part II: The Role of Moral Norms." *The Journal of Development Studies* 30 (4): 753-817.
- Polanyi, Karl, Conrad M. Arensberg, and Harry W. Pearson. 1957. *Trade and Market in the Early Empires: Economics in History and Theory*. Chicago: Henry Regnery.
- Putnam, Robert D. 1993. *Making Democracy Work*. Princeton: Princeton University Press.
- _____. 1995. "Comment on 'The Institutions and Governance of Economic Development and Reform,' by Williamson." *Proceedings of the World Bank Annual Conference on Development Economics 1994*. 198-200.
- Putterman, Louis. 1994. "Social Capital and Development Capacity: Relating Cultural Change and Economic Development with an Application to Rural Tanzania." *IRIS Working Paper* No. 121. College Park, MD.
- Quinn, Michael Joseph. 1995. "Essays on Education and Rural Market Failure in Rural East Africa (Kenya, Tanzania)." Doctoral Dissertation. Department of Economics: Princeton University.

- Rauch, James E. 1996. "Trade and Search: Social Capital, Sogo Shosha, and Spillovers." *NBER Working Paper* No. 5618. Cambridge, MA
- Sandler, Todd. 1992. *Collective Action: Theory and Application*. Ann Arbor: University of Michigan Press.
- Schiff, Maurice. 1992. "Social Capital, Labor Mobility, and Welfare: The Impact of Uniting States." *Rationality and Society* 4 (2): 157-175.
- Singh, Inderit, Lyn Squire, and John Strauss, editors. 1986. *Agricultural Household Models*. Baltimore: The Johns Hopkins University Press, published for the World Bank.
- Smelser, Neil J. and Richard Swedberg, Editors. 1994. *The Handbook of Economic Sociology*. Princeton: Princeton University Press.
- Sugden, R. 1986. *The Economics of Rights, Cooperation, and Welfare*. Oxford: Basil Blackwell.
- Steeten, Paul. "Reflections on Social and Antisocial Capital." Forthcoming in Isham, Jonathan, Sunder Ramaswamy and Thomas Kelly, Eds. *Social Capital, Economic Development and the Environment*. London: Edward Elgar Publications.
- Townsend, Robert M. 1995 "Consumption Insurance: An Evaluation of Risk-Bearing Systems in Low-Income Economies." *Journal of Economic Perspectives* 9 (3): 83-102.
- Williamson, Oliver. 1975. *Markets and Hierarchies: Analysis and Antitrust Implications*. New York: The Free Press.
- Winship, Christopher and Sherwin Rosen. 1988. *Organizations and Institutions: Sociological and Economic Approaches to the Analysis of Social Structure*. Supplement to the *American Journal of Sociology* 94. Chicago: University of Chicago Press.
- Woolcock, Michael. 1998. "Social Capital and Economic Development: Toward a Theoretical Synthesis and Policy Framework." *Theory and Society* 27(2): 151-208.
- World Bank. 1996. *World Bank Participation Sourcebook*. Washington, DC.

Diagram 1: Physical and human capital.

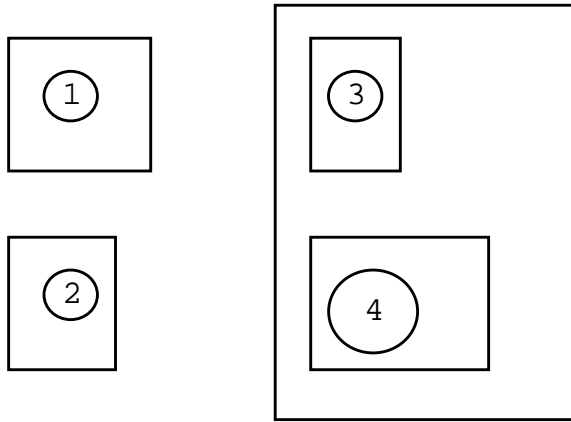
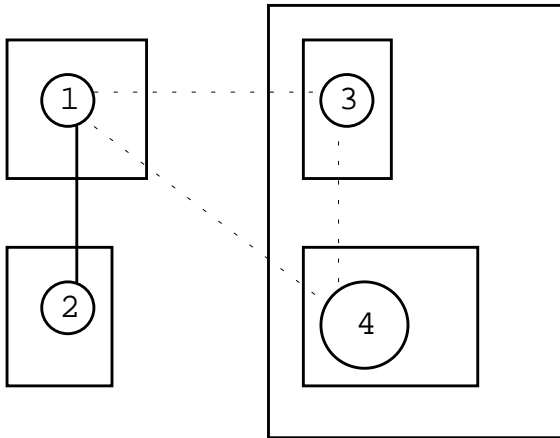


Diagram 2: Physical, human and social capital.



¹ Smelser and Swedberg (1994) provide an invaluable collection of essays on economic sociology, Baron and Hannan (1994) review the literature on the impact of economics on sociology, and Winship and Rosen (1988) edit a collection of pertinent essays on sociological and economic approaches to the analysis of social structure.

² How is social capital defined? As noted above, I adopt the definition of Schiff (1992). According to a recent sampling, social capital is the “‘ties’ that are used to exchange information” between firms (Rauch 1996), a country’s “social glue” (Helliwell 1996), and: “the shared knowledge, understandings, institutions, and patterns of behavior that a group of individuals brings to any activity” (Ostrom 1994). See Woolcock (1998) for a further discussion of definitions of the term based on an extensive literature search.

³ Becker (1974) notes that social interactions “emphasized in the contemporary sociological and anthropological literature [were] considered the cornerstone of behavior by several prominent nineteenth-century economists,” including Marshall and Pigou.

⁴ The first form corresponds to the social capital explored by Coleman (1988, 1990) and Granovetter (1985), the second form to that of Putnam (1993) and Platteau (1994a,b).

⁵ This discussion of resources is partially based on Coleman (1990), particularly chapter 2, and Blau (1986). Including less tangible resources within this definition undoubtedly stretches the bounds of ‘economic’ analysis. See Olson (1993) for an exploration of the place of non-market exchanges in economics and other social sciences.

⁶ See Coleman (1990) for a discussion of closed networks, another important form of bounded sets of social relations in rural villages. With perfect information, one could identify M bounded sets of social relations within a village, and then identify each of the households that belongs to each set.

⁷ Esman and Uphoff (1984), Nugent (1993), Ostrom (1990).

⁸ North (1990) defines organizations as “groups of individuals bound by some common purpose to achieve objectives” and notes that it is always clear who is a member.

⁹ Esman and Uphoff (1984) provide a detailed classification of types of local organizations found in the developing world.

¹⁰ The term “social structure” has many definitions within the different traditions in sociology. Blau (1975) offers a helpful introduction: he notes that one tradition (e.g., of Talcott Parsons) is based on extant social systems, while a second (e.g., of Coleman) is based on individual behavior. The second tradition is consistent with the definition presented here.

¹¹ Leisure is assumed to be an element in the aggregate household commodity. With the simplifying assumption of additively separable utility (as discussed in Ghez and Becker (1975) and Deaton (1992)), the marginal rate of substitution between consumption of commodities in any two periods is unaffected by consumption in any other period.

¹² The symbol Σ without sub- and super-scripts implies the summation from $t=1$ to T .

¹³ And $\beta = [1+\delta]^{-1}$, where δ is the discount rate.

¹⁴ For notational simplicity, the subscripts i and j are subsumed here.

¹⁵ Using this form, the four capital inputs are complements. In addition, Hicks neutrality as used here implies that the ratio of marginal products of consumption goods and time is constant, and factor shares are unchanged. Using Harrod neutrality could allow for relatively higher marginal productivity of consumption time with higher levels of private social capital.

¹⁶ Betancourt (1996) showed that public goods could be viewed as fixed inputs into household production functions of consumers. Gleason (1996) tested the effects of health care services on child survival using this approach, based on the model of distribution services developed by Betancourt and Gautschi (1992).

¹⁷ The latter assumption is consistent with a inter-generation life cycle framework where the final period assets of one household are endowed as consumer durables for the first period of a household in the next generation.

¹⁸ Note that it is accumulated social relations within local organizations, not economic benefits produced by these organizations that yield this flow. To preserve the focus on accumulated social relations (as opposed to the provision of collective goods, as in Olson (1965), Hardin (1982), and Sandler (1992)), the outputs of economic local organizations (e.g., water and sanitation user associations) are omitted here.

¹⁹ In a comment on a paper by Oliver Williamson, Robert Putnam delineated four means by which “networks of civic engagement” reduce transactions costs and increase the flow of information: (i) reduce the attractions of opportunism; (ii) foster robust norms of generalized reciprocity and social trust; (iii) amplifying the flow of information and transmitting reputations; and (iv) providing templates for future collaborations (Putnam 1995).

²⁰ The approach here is similar to that of Becker (1996), which includes a human capital accumulation process defined as $H_{t+1}^i = X^i + [1-d]H_t^i$ and a social capital accumulation process defined as $S_{t+1}^i = X^i + [1-d]S_t^i$, “where d is the depreciation rate on social capital and $X (= \sum x^j)$ is the effect of choices by the j members of i ’s network on his social capital.” The model here is fully consistent with the ideas explored in his essay, while narrowing the focus to social capital accumulation through social relations in local organizations.

²¹ The size and quality of land holding is notably omitted from the underlying model here. According to Collier, Radwan and Wangwe (1986), “in most of Tanzania land is abundant, so that its distribution is determined mostly by the availability of household labor.”

²² In the previous draft of this paper, this parameter was defined for villages, so that all households in village j would be exposed to the identical shock. But according to Townsend’s review of the literature of consumption insurance and risk-bearing systems (Townsend 1995), recent work shows that households within agricultural villages tend to face idiosyncratic shocks. Moreover, he finds little evidence in the literature that households diversify in their choice of income generation in order to mitigate risk.

²³ Since, from (11), $\frac{\partial \pi^i}{\partial \phi^i} < 0$.

²⁴ From (17), a similar conclusion can be reached about the accumulation of human capital.

²⁵ Deaton (1994) notes that in general “the convexity of marginal utility of consumption--which characterizes how prudent or cautious people are--is not the same thing as the concavity of the utility function--which characterizes the degree of risk aversion.” However, in the case of the standard isoelastic utility function (as adopted here), which implies a constant coefficient of relative risk aversion, consumers who are more risk averse are also more cautious.