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An Economic Theory of Family Groups

Working Paper

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Abstract

This paper combines elements of bargaining and evolutionary theories to analyze economic behavior in family networks. The goal of this paper is to reformulate the theory of demand for goods that reflects varying degrees of ownership-production-consumption possibilities.

JEL Classifications: J10, J12, J13

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1 Introduction

The institutional setting implied in neo-classical economic theory is that of individual property, perfect markets and the separation of production and consumption. All goods are individually owned and consumed. As a result of market imperfections, the distinction between production and consumption units fizzles and various ownership-consumption possibilities emerge. Due to transaction costs, particularly in labor markets, the household became the locus of both production and consumption. The development literature recognizes this. Household members consume both private goods and public goods. To the extent that other markets are functioning, households are independent economic units. However, market imperfections extend beyond labor markets. Insurance and credit markets are missing in most low income societies. To substitute for these markets, households resort to pooling risk and resources in family and social groups. The treatment of the family groups and their functions is an area where the economics literature is still underdeveloped. Although, the economics literature recognizes family and kinship groups as important risk-sharing institution (see Rosenzweig (1988), and Foster and Rosenzweig (2001)), it remains limited in recognizing the other aspects of the gamut of economic functions performed by the groups. While the extended family facilitates risk-sharing, it does not exist solely for that purpose. Members of an extended family share genetic links and common property rights, two features that carry enormous implications for the functioning of the group. The extended family is a system where each member sees his welfare in the well-being of the group. Through implicit contracts, the most prominent economic function of the lineage group is joint production and sharing of public goods, namely defense and social security. As these public goods are services that flow from children, the prominent function of the extended family is childrearing. The extended family jointly produces (raises) children and jointly consumes the services that children provide in their adulthood. Thus, children become quasi-public goods in the lineage.

2 Model

Neo-classical economic theory usually begins with the assumption of perfect markets and individual property rights. Instead, we begin with the assumption of imperfect markets and collective property rights. The essential insights to be delivered are the following:

1. Production-consumption arrangements are more complex than the intra-household literature and there are ways to reconcile them.
2. The Slutsky matrix includes cross-household elements with non-trivial implications.
3. The size of the family group sharing a particular good raises quality through contributions but decreases accumulation through consumption, may generate insights about how population affect economic growth.

4. As transactions costs diminish, markets and private property develops, the optimal group size reduces and accumulation is allowed.

We draw from Buchanan (1965) economic theory of clubs and treat family groups as clubs that jointly produce and consume a set of n goods $g_1, g_2, ..., g_n$. A family group is made up of n households each of which consists of an individual and is the locus of production of a good. Rather than classify these goods as private and public for each household, we treat each good as public to all members of the family and define the extent of publicness by a spectrum of production-consumption possibilities.

2.1 Preferences

The utility of a member is determined by the quantity of all the n goods produced in the family

$$U = U(c_1, c_2, ..., c_n) \tag{1}$$

where c_i depends on g_i. The amount of goods consumed by an individual depends on the quantity of goods available for consumption to the group and the number of persons who will share in its benefits, including the individual whose utility is being examined. Two goods may be identical in nature but produced in different households. Such goods are stated as different goods in the utility function. This is a result of differences in production-consumption configuration of the goods. For example, child services provided by children raised in a particular household are treated as separate from those provided by children raised in another household in the group. Although children may provide similar old-age consumption to adults, for example, these goods differ in their production-consumption configuration. Thus

$$c_i = c(g_i, t_i^c) \tag{2}$$

where g_i represents both the quantity and services flowing from good i and $t_i^c = [t_{(i,j)}^c]_{1\times n}$ is a vector of the good's consumption time. Each component $t_{i,j}^c$ represents the fraction of time good i is consumed by household j. The sum of the elements of this vector yields the number of persons that share in consuming the good. Our specification has not assumed any particular manner of sharing. The production function for g_i is given by

$$g_i = g_i(x_i, t_i^p) \tag{3}$$

where $x_i = [x_{i,j}]_{1\times n}$ is a vector of aggregate market goods allocated by household $j = 1, 2, ...n$ to production of good i. In addition to market inputs, the quantity of good i produced depends on the number of persons who contribute to its production. The specification we assume here is that $t_i^p = [t_{i,j}^p]_{1\times n}$ where each component $t_{i,j}^p$ represents the fraction of time endowment that household j contributes to production of good i. Again, summing the elements of this vector provides the number of persons that contribute to its production. For example, production of an agricultural good depends on farm inputs and family labor. Production of human capital in children requires input of market goods as well as adults' time.

We exclude the possibility of joint production in respect of market input goods but allow for joint production in respect of time allocation. For example, the amount of food allocated to a child is consumed solely by that child, but adult time spent with children may jointly improve the quality of two or more children at the same time. This is the essence of joint child-rearing that is often observed in lineage-based societies. No resources are wasted; every household allocates all resources into producing goods and services in the group.

In order to simplify the analysis, we make the assumption that production exhibits constant returns to scale in labor, so that $g_i = t_i^p f(x_i)$. Combining equations (2) and (3), the amount of good i consumed by an individual is given by

$$c_i = c(g_i(x_i, t_i^p), t_i^c) = c(t_i^p f(x_i), t_i^c). \tag{4}$$

The sizes of the production and consumption groups for each commodity combine to endogenously determine the "domestic" price of each good. This price increases as the size of the consumption group increases, and decreases as the production group increases in size. It is straightforward to note that higher domestic prices result in low per-capita consumption of that good whereas goods with low domestic prices are consumed at high levels per-capita. Define the metric

$$d_i = d_i(t_i^c, t_i^p) = \frac{i \cdot t_i^c}{i \cdot t_i^p} = \frac{\sum_{j=1}^{n} t_{i,j}^c}{\sum_{j=1}^{n} t_{i,j}^p} = \frac{N_i^c}{N_i^p} \tag{5}$$

the ratio of consumption group to producer group as the domestic price that possesses the above characteristics. Goods that are publicly consumed would have endogenous prices of $d_i > 1$. In effect, d_i is a measure of the publicness in the consumption of the good. If $d_i = 0$ then the good is not produced because there are no consumers for it. When $0 < d_i < 1$, more members contribute to producing the good than to consuming it. When $d_i = 1$, equal numbers of members consume the good as those producing it, and such goods are likely to be privately produced and consumed. When $1 < d_I < \infty$, consumers exceed producers of the good, therefore those goods are publicly consumed. Defining these prices in the consumption set yields

$$c_i = c_i[f(x_i), d_i] \tag{6}$$

The structure of equation (6) is quite intuitive. Consumption of a good by an individual depends on allocation of aggregate market goods to its production, the number of people sharing in its consumption and number of people contributing to its production. Addition of members to the production group reduces the price to each member and makes more of the good available, thereby increasing individual consumption. On the other hand, addition to the consumer group reduces the amount of consumption available to each consumer and raises the price of the good to each individual.

2.2 Budget

The aggregate market inputs x_i are tradable in the market at price p_i. An individual j divides his time endowment of one unit between labor market t_j^L and home production $t_{i,j}^p$. Taking w_j as his shadow wage rate, individual member's budget constraints are:

$$0 \leq t_{i,j}^p \leq 1; x_{i,j} \geq 0 \tag{7}$$

$$\sum_{i=1}^{n} t_{i,j}^p + t_j^L = 1 \tag{8}$$

$$\sum_{i=1}^{n} p_i x_{i,j} = w_j t_j^L \tag{9}$$

Combining equations (6) and (7) to obtain the full income equation, the individual faces a budget constraint given by

$$\sum_{i=1}^{n} p_i x_{i,j} = w_j \left(1 - \sum_{i=1}^{n} t_{i,j}^p\right) \tag{10}$$

Equation (8) states that income earned from market wage employment by an individual is spent entirely in purchasing market goods. To simplify the discussion, we assume that the production function is linear, that is, $f(x_i) = x_i$. We also assume that individual consumption of a good is a product of output and the ratio of consumers to producers. This leads to a simple form of equation (6) where the consumption of good i is given by*

$$c_i = \left(\frac{\sum_{j=1}^{n} t_{i,j}^p}{\sum_{j=1}^{n} t_{i,j}^c}\right) \sum_{j=1}^{n} x_{i,j} = \frac{N_i^p}{N_i^c} \sum_{j=1}^{n} x_{i,j} = d_i \sum_{j=1}^{n} x_{i,j} \tag{11}$$

2.3 Utility Maximization

The optimization problem to be solved by individual j is given by

$$\max_{x_{i,j}, t_{i,j}^p} \; U\left(d_1 \sum_{j=1}^{n} x_{1,j}, d_2 \sum_{j=1}^{n} x_{2,j}, ..., d_n \sum_{j=1}^{n} x_{n,j}\right) \tag{12}$$

subject to constraints (5) and (8). The Lagrangian of the problem is given by

$$L = U\left(d_1\sum_{j=1}^{n}x_{1,j}, d_2\sum_{j=1}^{n}x_{2,j}, ..., d_n\sum_{j=1}^{n}xn, j\right) + \lambda_j\left[w_j\left(1-\sum_{i=1}^{n}t_{i,j}^{p}\right)-\sum_{i=1}^{n}p_i x_{i,j}\right] \tag{13}$$

The first order conditions yield the result for all i, j and k

$$\frac{\frac{\partial U}{\partial c_i}}{\frac{\partial U}{\partial c_k}} = \frac{s_i}{s_k}\cdot\frac{p_i\sum_{j=1}^{n}x_{i,j}}{p_k\sum_{j=1}^{n}x_{k,j}} \tag{14}$$

This condition states that the ratio of marginal utilities of good i and good k is equal to the ratio of total group income allocated to the goods multiplied by a factor representing their relative publicness.