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RECENT EVIDENCE CONCERNING HOUSEHOLD BEHAVIOR AND NUTRITION IN DEVELOPING COUNTRIES

by

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October 2, 1989

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ABSTRACT

This paper reviews some of the recent major research findings concerning the effect of household behavior on food consumption and nutrition. Important extensions to the understanding of household behavior have been made in the areas of the impact of income and price changes, agricultural households, the effects of agricultural commercialization, the new household economics, and particularly the effect of time as a scarce economic resource, the intrahousehold allocation of food, and the determinants of nutritional status. This knowledge is important because the response by households determines the ultimate impact of economic changes and government actions on the nutritional status of the population.

RECENT EVIDENCE CONCERNING HOUSEHOLD BEHAVIOR AND NUTRITION IN DEVELOPING COUNTRIES

The ultimate impact of economic changes and government policies and programs on nutrition is determined by the response of households. The household functions as an intermediary between policies and programs and their impact on individuals. The results of government actions based on a naive idea of how households will respond are likely to be disappointing. The predicted reaction of households to an intervention should be a crucial factor in assessing the merits of various policy alternatives. Recent research has greatly enriched our understanding of household behavior concerning food and nutrition. This knowledge should hopefully improve the ability of governments to design sound food and nutrition policies and programs that fulfill their intended objectives.

As highlighted by figure 1, the nutritional and health status of the individual is influenced by the household's ability and desire to obtain food, its intrahousehold distribution, and the physiological utilization of the ingested nutrients, which both affects and is affected by the individual's health status. The major additions to our knowledge concerning household behavior have occurred in the area of income and price effects, particularly disaggregated elasticities, agricultural household models, the effects of agricultural commercialization, new household economics models, intrahousehold decision-making and food allocation, and nutritional status (health) production functions. The first four topics primarily pertain to household food acquisition

behavior. The intrahousehold and nutritional status topics clearly are related to the last two links in the determination of nutritional status in figure 1.

Income and Price Elasticities

A knowledge of the relevant income and price elasticities is crucial to the development of sound food and nutrition policies for a country. Income elasticities suggest how food consumption patterns will change in response to economic growth and cyclical changes in the economy. Policies which affect food prices are pervasive in developing countries and price elasticities indicate their impact. Governments intervene in most countries in ways which influence the price consumers pay for food. In many countries, the consumer price is reduced below its free-market level by explicit or implicit subsidy programs (Mellor and Ahmed, 1988; Pinstrup-Andersen, 1988; and Timmer, Falcon and Pearson, 1983).

Estimated price and income elasticities for foods are now available for most countries, although their reliability may vary significantly, given the quality of the underlying data. Food price policy has important implications, not only for the nutrition of low-income households, but also their real income since they typically spend 60-80% of their income on food. In some countries, one staple accounts for 40-60% of food expenditures (Pinstrup-Andersen, 1985, p. 70).

Recent research does suggest that increasing incomes may not improve the nutrient intake of the poor as much as previously thought (Behrman, 1988 and Behrman, Deolalikar and Wolfe, 1988, pp. 307-308). For each country in table 1, the income elasticity with respect to food

expenditure substantially exceeds the elasticity for energy (calories) for both the urban and rural poor. Household behavior does not conform to "optimal" behavior from a strictly nutritional perspective. Even people at low-income levels want to increase the variety and quality of their diets and not just maximize nutrient content. Low-income households buy more expensive foods as their incomes rise and in particular, they typically increase their meat consumption (Pinstrup-Andersen, 1986).

The estimation of disaggregated income and price elasticities for specific population groups, and particularly income-class specific elasticities, has important implications for food price and subsidy policy. Following the initial work in this area of Pinstrup-Andersen et al. (1976) and Timmer and Alderman (1979), disaggregated income and price elasticity analyses have now been conducted for numerous countries. Alderman (1986) provides a good review of these studies. The estimation of disaggregated income and price elasticities requires either the imposition of highly restricted and quite unrealistic assumptions about preferences or the availability of cross-sectional or longitudinal household-level data with sufficient price variation, either geographically and/or over the period of survey data collection.

The income and price elasticities for food commodities have been found to vary significantly by income stratum. The income elasticities for the major food staples are typically substantially higher for lower income than higher income households (Alderman, 1986, pp. 81-90). The absolute magnitudes of the price elasticities are also greater for lower income families. Table 2 gives the price elasticities of demand for rice for low- and high-income households from several studies for different

countries. The income percentile of the low-income households is indicated in the first column and of the high-income households in the third. In each case, the response to a price change is much greater at the low income level.

The absolute value of the price elasticity of demand for foods is often greater than one for low-income households. Food price changes clearly cause much greater adjustments in the consumption patterns of the poor. A knowledge of disaggregated price elasticities may identify a commodity(ies) for which a price subsidy would automatically be targeted to the poor. Such a self-targeting commodity would have a large (in absolute magnitude) price elasticity for low-income households and a small elasticity for higher-income families (Timmer, Falcon, and Pearson, 1986, pp. 69-72 and Pinstrup-Andersen, 1988).

Agricultural Household Models

A substantial portion of the population in most developing countries, including a large portion of the poor and malnourished, resides in semi-subsistence farm households. The response of these households, which both produce and consume agricultural commodities, to food price changes can be considerably more complex than that of other groups. Agricultural household models which integrate a farm family's production and consumption decisions into a unified theoretical framework have been widely applied for developing countries (Barnum and Squire, 1979; Singh, Squire and Strauss, 1986). In these models, the demand equations are obtained from the maximization of a household utility function, which typically contains an agricultural commodity(ies), a market-purchased

good(s), and leisure, subject to a cash income constraint containing farm profits, a time constraint for household members, and a farm production function.

In a typical non-farm household, the effect of a price increase for a food commodity can be expected to lead to a reduced consumption of that item. The own-price effect will be negative in all but very rare circumstances. However, in a farm household that produces a food commodity partly for sale and partly for consumption, the price increase would also have an impact on farm profits, and hence household income. This profit effect could counteract and even completely off-set the traditional negative price effect. If the impact on a farm's profits was large, and the income elasticity of demand was high for the commodity, a price increase might result in an increased consumption of the product by the farm household (Singh, Squire and Strauss, 1986, pp. 3-46).

In a review of seven different agricultural household studies for various African and Asian countries, Singh, Squire and Strauss (1986, pp. 25-26) report that in four, the own-price elasticity for the agricultural commodity (food) was positive because of the strength of the profit effect. The three elasticities that were negative are small in absolute magnitudes. If the impact on profits is ignored, the price elasticity would have been negative in all seven cases.

The implication for nutrition is that higher food prices may actually lead to an improvement in the nutrition of farm household members, because of the effect of profits on income. Even if the consumption of the commodity for which the price has increased declines, the increased profits and income can be used to buy increased amounts of other food

stuffs, the result being an improvement in nutrient intake. Strauss found that the caloric intake of low-income agricultural households in Sierra Leone would improve if specific agricultural commodity prices were increased (Singh, Squire and Strauss, 1986, p. 37). Lower food prices raise the welfare and likely the nutrition status of urban households, at least in the short run. However, higher prices may improve the welfare and nutrition intake of agricultural households, and possibly even rural non-farm families whose income depends on agriculture, such as agricultural laborers.

The Commercialization of Agriculture and Nutrition

The modernization and commercialization of traditional, smallholder agriculture is a necessary part of successful agricultural development efforts. Integration of smallholders into the market economy typically requires a shift from producing subsistence food crops to cash crops. The expansion of cash crop production and agricultural exports is also a key component of the structural adjustment programs in many countries. However, critics have argued that the shift from food to cash crops can disrupt traditional economic and social relationships and can have a detrimental impact on the incomes, food consumption and nutritional status of the rural poor, at least in the short-run. With this criticism in mind, the International Food Policy Research Institute (IFPRI) launched a series of studies in a number of different countries on the impact of smallholder commercialization at the household level. Particular attention was given to the effects on nutrition (Von Braun and Kennedy, 1986; Von Braun, 1989; and IFPRI, 1989).

Some general conclusions can perhaps be drawn from the recent IFPRI studies. The shift to commercial crops raises the income of the rural poor in most cases, which should improve their food security. Incomes increase because of the greater profitability of the commercial crops and the expansion in agricultural employment. However, the employment effects are particularly dependent on the crop and technology adopted (Von Braun, 1989). The higher incomes resulted in increased household food expenditures and calorie acquisition. However, the nutritional improvement, as measured by the increase in calories available for household consumption, was not as great as might be expected given the magnitude of the rise in income. This may be partly explained by the greater control men exercise over the income generated by the new cash crops, a topic which will be discussed in the section on intrahousehold issues. In many cases, the shift to cash crops was only partial and the households continued to also produce subsistence food crops for their own use, which reduced risk and provided greater food security (Von Braun, Hotchkiss, and Immink, 1989).

The shift to commercial crops had a beneficial, but small, effect on the nutritional status of preschoolers in most cases, and did not have a detrimental impact in any of the study areas. In the studies for the Gambia, Guatemala, the Philippines and Rewanda, a 10% increase in the incomes of poor households was found to result in a 1 to 2.5% improvement in the weight for age of preschoolers (IFPRI, 1989, p. 43). In the Kenyan study, commercialization had no effect on the nutritional status of preschoolers despite an increase in incomes, perhaps because of the very poor health and sanitation conditions in the area (IFPRI, 1989, p. 43 and

Kennedy and Cogill, 1987). This result suggests the multi-dimensional determination of health outcomes and nutritional status, which will be discussed in a later section, and the need to improve health and sanitation conditions in rural areas to reduce malnutrition.

The New Household Economics

A major contribution of the "new household economics" is to highlight the role of productive activity within the household and of time as a scarce economic resource. The theoretical foundation for this research area was largely provided by Gary Becker (1965). "New household economics" models are typified by the inclusion of household produced goods in the utility function and a full income constraint, which combines the traditional budget constraint with a restriction which accounts for the limited time available to family members to allocate among various activities, including leisure.

The value or opportunity cost of time, especially of women, has important implications for household behavior as it affects food consumption and nutrition in developing countries (Senauer, 1988). Even in very poor households, time must be viewed as a scarce resource, not just income. Women in rural, low-income families in most cases work incredibly long hours when their household tasks are added to their agricultural and/or labor force activities (Evenson, 1978, p. 328). The value of a person's time is typically measured by their market wage rate. If they are not employed, a potential wage rate may be estimated based on their characteristics (Senauer, Sahn and Alderman, 1986).

The rising value of time, particularly of women, as economic growth

occurs and labor force opportunities improve, can help explain some of the shifts in food consumption patterns that are observed in developing countries. In particular the consumption of wheat, primarily in the form of commercially prepared bread, is increasing and that of traditional grains and root crops, whose preparation is frequently very time consuming for women, is decreasing in many countries. Senauer, Sahn and Alderman (1986) found that urban Sri Lankan households in which the wife/mother had a higher value of time consumed less rice and more bread ceteris paribus. Although rice requires far less preparation time than some traditional foods in other countries, it is far more time-intensive than commercially baked bread. In some situations, the shift from traditional foods to more processed, time-saving foods may have unfortunate nutritional consequences. The latter may not adequately replace the nutrients in the former and are likely to be more expensive.

The value of time also has implications for the design of food subsidy and nutrition intervention programs. Queuing or waiting time can be used as a rationing mechanism. The opportunity cost of poor people's time is presumably lower than others, and hence they will be willing to wait longer to receive a certain program benefit. However, this view overlooks the fact that the demands on the time of low-income individuals, especially women, may be very high if they are going to subsist. Alderman and van Braun (1984), in a study of the Egyptian food ration and subsidy scheme, found that waiting time did influence the use consumers made of the system. However, the poor were no more willing to wait in line than those with higher incomes.

Many child nutrition and health programs ignore the time costs

imposed on the mothers, and for this reason are under-utilized. If participation in a program requires several hours to travel some distance to a clinic and then wait once there to receive treatment, many mothers who might like to participate will be unable to because of the other demands on their time. Some further implications of the Becker model and the value of time as measured by wage rates, will be examined in the context of intrahousehold issues and the determinants of health and nutritional status.

Intrahousehold Issues

There are really two different, but related issues. One is the distribution of resources, including food, among family members and the other is the decision-making process within the household. An inappropriate distribution of food among household members, in some cases, can exacerbate the effects of an inadequate household food supply. In other cases, although the household has enough food to cover all its members' needs, some individuals may still suffer from malnutrition because of the pattern of intrahousehold allocation (Senauer, Garcia, and Jacinto, 1988, p. 170). Furthermore, household-level data on food consumption will not serve as a good predictor of the nutrient intake of individuals, if the pattern of intrahousehold distribution differs significantly between households.

Studies in various countries have found considerable inequality in the distribution of food among household members in relation to their nutritional needs. In particular, the intrahousehold allocation pattern contributes to the high rate of malnutrition among women and young

children in some cultures (Haaga and Mason, Piwoz and Viteri, and USDA). The distribution of food in the household frequently discriminates against women and girls in South Asia. Other studies have found an age-related pattern which favors adults. Both an age and a gender bias exist in some cases, with the male household head being the most favored person.

The allocation of food among household members can be analyzed either in the context of a bargaining model or a joint household utility function, in which an individual's food consumption affects his/her ability to work. The value of household members' time, as measured by their actual or potential wage rates, plays a key role in either model. In the bargaining model, an individual with a higher earning potential has more bargaining power in terms of household decisions, and hence may be favored in the allocation of food. In the joint utility function model, it makes sense for the household to allocate more food to its most productive members to enhance their ability to work and thus increase the total resources available to the household.

Since individuals typically care deeply about the welfare of those in their immediate family, altruism plays a role in the intrahousehold distribution of resources, particularly for children. In the case of children, expectations about future intergenerational transfer may also be a major factor, since parents frequently depend on their children, especially their sons, for old age security (Folbre, 1984, p. 308). It is in the interests of the parents to invest in the human capital of their child, including their nutrition, to enhance their future income generating potential.

Senauer, Garcia and Jacinto (1988) used data from three rural areas

in the Philippines to analyze the intrahousehold distribution of food in relation to individuals' recommended daily allowances (RDA's) for calories. They found that in households in which the wife's value of time (estimated wage) was higher, both she and her children received a relatively greater share of the available calories. When the husband's value of time (wage) rose, the intrahousehold allocation of calories to the husband and wife improved. However, the nutrition situation of the children declined. They also found that boys and children born earlier in the birth order were favored in the distribution of food within the household, in relation to its caloric content compared to the individuals' calorie RDA's.

Increasing attention is being given to the decision-making process within the household. Evidence suggests that the increased control of income by women results in an improvement in nutritional status. Women are perhaps more concerned about the nutrition and health of family members than men. When women have more decision-making power, they are likely to spend more on food and health care (Kennedy and Cogill, 1987, p. 10). Kumar (1978, p. 51) in a study in Kerala, India, found that wage income earned by mothers had a greater positive impact on child nutrition than other wage income. The generation of income and the control of its budgeting are typically, but not necessarily, correlated. In a study in Kenya, Kennedy and Cogill (1987, p. 52) discovered that the nutritional status of children, as measured by height for age and weight for age, was better in households headed by women.

One of the specific concerns about the commercialization of smallholder agriculture is the loss of decision-making power and income

control by women that results in many cases. Women, particularly in Africa, have had a major role in traditioanl agriculture. They have typically had substantial control over both the food produced for their own household's consumption and any cash generated by sales. In most cases, the men exercise increased control over the new commercial crop(s) and the income it generates, even when the women continue to supply considerable agricultural labor (Von Braun, 1989 and Jones, 1983).

Nutritional Status (Health) Production Functions

A considerable body of research now exists which analyzes the determinants of individuals' nutritional status. Nutritional status is typically measured by various anthropometric measurements. Weight and height compared to standards of a reference group are widely used measures. Some economists prefer to use the more general term "health status", rather than "nutritional status", in relation to such anthropometric measures (Behrman and Deolalikar, 1988).

An individual's health (nutritional status) may be viewed as a household produced commodity. The inputs into the production of a person's health include: the nutrient intake of the individual; the consumption of other goods and services which affect health, such as medical care and potable water; the time inputs of the individual and other family members in activities which affect health, such as cooking and, in the case of young children, the child care time of parents and older siblings; characteristics of the individual, such as age and education; characteristics of other family members and of the household, such as family size and the physical structure of the housing; and more

general community, institutional and environmental factors related to health, such as sanitation conditions and health care availability (Behrman and Deolalikar, 1988, pp. 640-644 and Senauer and Garcia, 1989).

In moving to a relationship which can be empirically estimated, there are two important considerations concerning this health production function which affect the reliability of the results. The first is that several of the determinants listed above are household choice variables which are simultaneously determined and may themselves be influenced by the individual's health status. For example, an individual's physical size and state of health will influence his/her food consumption needs. More generally, several of the determining factors represent choice variables, which cannot be treated as exogenous givens, but are determined endogenously by household behavior. For this reason, much of the recent work has concentrated on estimating reduced-form equations for health (nutritional status), which contain only exogenous variables as explanatory factors.

The second consideration is that some of the key health determinants can typically not be observed. The most important unobserved factor is the individual's genetic endowment, but in any given data set there may be many other factors related to the individual, household, or community which were not observed and might affect health and nutrition. Longitudinal data, which contain multiple observations over time for the same individuals and households, has allowed researchers to factor out the possible impact of unobserved fixed effects, which do not change over time, such as genetic endowment.

Much attention has focused on the health status of preschool

children, a group at high risk of malnutrition. The most widely applied health (nutritional) status indicators used are weight for age, height for age, and weight for height. Several conclusions can perhaps be drawn from the various studies for preschoolers. Boys are typically favored over girls in the intrahousehold allocation of calories. However, that does not necessarily mean that their anthropometric measurements reflect less malnutrition (Senauer and Garcia, 1989, p. 13). Earlier-born (lower birth order) children fare better in terms of their nutrition and health status (Horton, 1988; Behrman, 1988; and Senauer and Garcia, 1989). In some studies, parents' ages and education have been found to affect the child's nutritional status, with older and better educated parents, particularly the mother, having a positive effect (Horton, 1986; Wolfe and Behrman, 1982; and Senauer and Garcia, 1989).

The expected effect of the parents' wages, or potential wages if not employed in the labor force, is negative if they only represent the opportunity cost of time. As the market wage rate increases, less time would be allocated to child care and other household activities, ceteris paribus. However, the impact of wages on child nutritional status has been found to be positive in some cases, which suggests a possible effect on income and/or the intrahousehold allocation of food and other resources (Behrman and Deolalikar, 1988, p. 661 and Senauer and Garcia, 1989, p. 15). Wages may also be correlated with other factors such as the village's general environment.

The prices of the major staples would, of course, be presumed to have a negative impact on food consumption, nutrient intake and nutritional status. However, studies have found an unexpected positive impact,

because of strong substitution effects. When the price of the preferred staple rises, say for example rice, poor households substitute more of the inferior staples in their diets, which are a cheaper source of calories, such as maize and cassava. The calorie content of the diet may rise and short-run measures of nutritional status improve, such as weight for height. However, the overall nutrient quality of the diet may suffer and long-run measures of nutritional status, such as height for age, decline (Behrman and Deolalikar, 1988, p. 664 and Senauer and Garcia, 1989).

The notion of a health (nutritional) status production function provides a conceptual perspective which has important policy implications. Nutrient intake is only one factor determining an individual's health status. The most crucial factor limiting health may be something else. In some situations, for example, well-fed children may still be malnourished because of an unsanitary environment. More likely, factors such as an impure water supply and the resulting disease will aggravate the impact of an inadequate diet. The policy message is that alleviating malnutrition is typically not just a matter of increasing the available food.

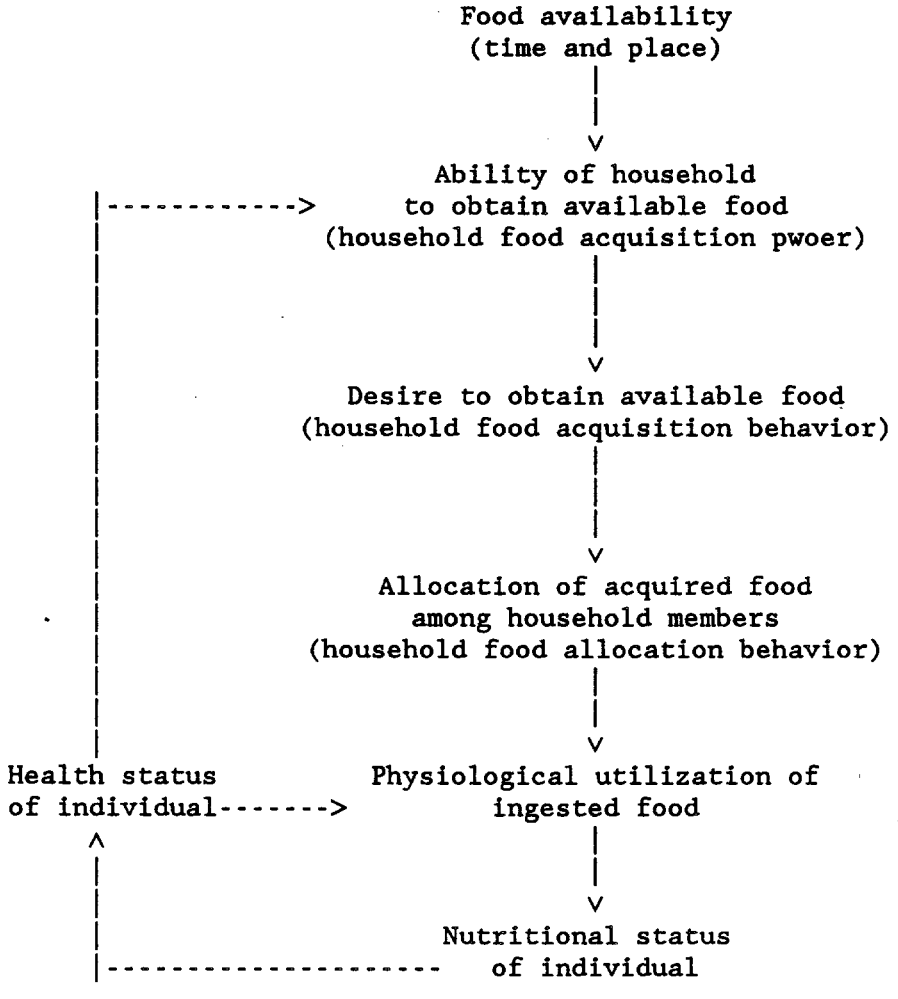
Some Concluding Remarks

Food security has been proclaimed as a major policy goal in many developing countries. The World Bank (1986, p. 1) defines food security "as access by all people at all times to enough food for an active, healthy life". The achievement of this goal will be facilitated by a better understanding of how households respond to economic changes, particularly price and income changes, and government policies and

programs. The food consumption and nutritional status of the population is ultimately determined by the decisions made by households given their available resources.

The advancement of knowledge in this area has relied primarily on the analysis of household survey data collected in developing countries. Research based on such data is the source of the new insights into household behavior discussed in this paper. In recent years, our understanding of household behavior as it affects food consumption and nutrition has been greatly extended. This new evidence can serve as an improved guide to policy decisions and program choices.

Figure 1 -- Schematic Overview of the Principal Food-Related Factors Affecting the Nutritional Status



Source: Pinstrup-Andersen, 1981.

Table 1. Income Elasticities of Energy Demand and Expenditures on Food, Low-Income Households

	Urban		Rural	
	Energy	Expenditure	Energy	Expenditure
Sri Lanka	0.41	0.72	0.60	0.86
Thailand	0.26	0.62	0.29	0.65
Egypt	0.20	0.71	0.34	0.68
Sudan	0.30	0.74	0.33	0.84
Indondesia	0.55	0.88	0.61	0.98
Brazil	0.10	0.83	0.23	0.83
Bangladesh	0.40	1.06	0.40	1.06

Source: Alderman, 1986, pp. 37-38.

Table 2. Price Elasticity of Demand for Rice among Low- and High-Income Population Groups in Selected Countries

Country	Low Income		High Income	
	Percentile	Price Elasticity	Percentile	Price Elasticity
Colombia (Cali)	1	-0.43	93	-0.19
Indonesia	8	-1.92	55	-0.72
Bangladesh (rural)	10	-1.30	90	-0.83
Thailand	12	-0.74	87	-0.46
Philippines	12	-0.73	87	-0.40
Brazil	15	-4.31	90	-1.15
Sierra Leone (rural)	16	-2.16	84	-0.45
India (rural)	3	-1.39	96	-0.39
India (urban)	1	-1.23	92	-0.21

Source: Pinstrup-Andersen, 1985b.

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