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The paper concentrates on the supply side of labor markets. Chapter II restates the "classical" and the "neoclassical" assumptions in terms of the income-leisure framework. Chapter III criticises the underlying behavioral assumptions in sociological terms. Chapter IV presents a model of economic behavior in the peasant family-farm-plus-household. Finally, Chapter V extends and applies the model to account for purchased inputs in both farm and household production, social conditions of work, and for family labor leaving the agricultural sector.

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An Alternative Approach to the Theory of Labor Supply in LDCs

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An Alternative Approach to the Theory
of Labor Supply in LDCs

Egbert Gerken*

I

This paper follows a tradition in which the transformation from agriculture to industry is seen as the central part of economic development (FEI and RANIS, JORGENSON, ZAREMKA).[1/] The market most explicitly tying sectors together is the labor market. In view of the key role assumptions on the behavior of working people play in development theory and policy relatively little attention has been given to labor markets as compared to other factor markets and to product markets. The older academic discussion almost deadlocked over the zero marginal product of agricultural labor controversy (LEWIS, VINER, SCHULTZ). The present wave of studies on the "employment problem" touches on a wide set of related problems — open urban unemployment, low productivity labor and seasonal unemployment in agriculture, rural-urban wage differentials, intrasectoral income disparities — but mostly fails to spell out the basic assumptions on the working behavior of economic agents in a way enabling them to be tested with observed data .

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1/ The agriculture - industry dichotomy is merely a convenient conceptual simplification. Neither does it preclude an analysis of agriculture

The paper will concentrate on the supply side of labor markets. Chapter II restates the "classical" and the "neoclassical" assumptions in terms of the income-leisure framework. Chapter III criticizes the underlying behavioral assumptions in sociological terms. Chapter IV presents a model of economic behavior in the peasant family-farm-plus-household. Finally, Chapter V extends and applies the model to account for purchased inputs in both farm and household production, social conditions of work, and for family labor leaving the agricultural sector.

II

The LEWIS, FEI-RANIS "classical" tradition believes that in densely populated LDCs labor can be transferred from the agricultural to the industrial sector at no costs in terms of falling agricultural output or additional capital investments into agriculture to make good for departing labor. This is believed to be true as long as the agricultural sector has not reached the "commercialization point" at which it will enter the neoclassical world of factor prices equalling marginal product values.

For someone trained in Marshallian micro-economics this is hard to believe as it, presumably, implies zero agricultural wage. SCHULTZ referred to anthropological data (HOPPER, TAX) to prove that even in an extremely labor intensive, land scarce situation an additional work effort will still produce something more than zero. JORGENSON developed an alternative "neoclassical" model in which the withdrawal of labor from the agricultural sector in fact lowers

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turning a high productivity sector nor are all non-agricultural sectors regarded as highly productive. The following argument makes a further simplifying distinction between urban and rural sectors which leaves us with an industrial, urban nonindustrial, agricultural, rural nonagricultural sector.

the sectoral output and in which the MP of the remaining workers rises, thus leading to an upward sloping supply curve of labor to the industrial sector.

The classical school did nothing to prevent such interpretation but accepted the MPL equals zero assertion by introducing an alternative mechanism of wage determination: the constant institutional wage. This clearly puts it on the defensive. The c.i.w. assumptions — a) in long historical periods of high labor-land ratios agricultural wages have been fixed near the average product per worker, b) in cases of rising agricultural productivity or a decreasing labor force (both resulting in an increasing average product per worker) the wage will stay constant in the short run while landowners decide on the use of the differential surplus — do not match historical evidence easily. Almost all densely populated LDCs have a history of colonial dominance and/or indigenous centralized political systems in which taxes, tributes, and other extractions were levied from the agricultural sector. While these may be treated as constant fractions deducted from total output, one cannot interpret away findings which clearly show that agricultural wages in an area increase or fall as labor productivity is rising or falling[1/].

The c.i.w. argument can be viewed as a piece of sociology misreceived by economists prompting pure neoclassical economists to speak of "sociological

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1/ see recent crossregional data on Green-Revolution and Non-Green-Revolution states in India (EVENSON).

software" and "muddled thinking". The correct conception that in a traditional agricultural sector individual and collective behavior is ruled more precisely and more rigidly by communicative, "social" norms and expectations than in a pure capitalistic sector governed by the more technical than social market rules should not lead one to the conclusion that in a traditional sector social norms place factor prices more out of touch with marginal product values than the market imperfections of a modern, capitalistic sector. There is good reason to expect the opposite. In an agricultural sector which for generations has only seen slow or no technical progress social norms determining factor prices are more likely to have adjusted to a shadow market price than in a quickly changing modern sector.

However, there is one point to the institutional argument which is mostly overlooked by neoclassical critics: if there is rapid change in both sectors the sector governed by communicative norms will, in the short run, show a more distinctive difference between actual and shadow factor prices than the one following technical market rules. But in no way do these "institutional rigidities" lead to a constant wage. On the contrary, a rise in total productivity will increase the income accruing to each factor proportionally.

The institutional argument thus leads to a prediction which is different from both the classical and the neoclassical prediction in that wages are not expected to be constant and

the fractional change in factor income is in no way assured to be equal to the change in marginal product values.

The validity of the central hypothesis of the classical school -- the transfer of labor from the agricultural to the industrial sector at no costs -- is, however, not necessarily dependent on the MPC = 0 and the c.i.w. assumptions. As SEN, ZAREMBKA and others rightly pointed out one should carefully distinguish between MP per man and MP per man-hour. The neoclassical school attacked on the MPpmh = 0 basis only, where it has the facts on its side. However, with a positive MPpmh the MPpm can still be zero, which is what counts for the transformation at no cost argument. If the transfer of labor leads the remaining workers to work more hours such that the total amount of man-hours remains constant, the classical hypothesis would still go through.[1/] A test of this hypothesis, therefore, rests on the intrasectoral supply behavior of agricultural workers.

To derive the labor supply curve microeconomic textbooks commonly use a Hicksian indifference curve device (FERGUSON). Income per worker is plotted on the vertical and hours of leisure on the horizontal axes. A bundle of indifference curves is drawn in the plain representing income-leisure combinations of equal utility. Their convex shape indicates limited substitutability. A line connecting both axes gives the income-leisure "production possibilities" as total available time is

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1/ The problem of food transfer from the agricultural to the industrial sector will not be treated here. See, however, MELLOR and LELE.

divided between leisure and work, its slope gives the wage rate or income per time unit of work. If the individual's behavior has no influence on the wage, the possibility curve will be a straight line (the case of the industrial worker); otherwise the law of diminishing returns to factor gives it a concave shape (the case of the family worker on a peasant farm). Equilibrium occurs whenever the slope of the possibility curve equals the slope of an indifference curve touching it as this is the curve with the highest obtainable utility at given production possibilities. If the production possibilities increase, due to, say, the opening of new land or the decrease in input prices, the curve will expand along the income axis and a higher indifference curve will be touched. It then depends on the shape of the indifference curves if this results in a bigger or smaller supply of labor. Keeping total income constant, a rise in wages or income per time unit leads to a substitution of income against leisure time (a movement along the indifference curve), thus increasing labor supply while, with income per time unit kept constant, the rise in income leads to a higher indifference curve and -- mostly -- to a decrease in labor supply as leisure becomes more valuable at higher income levels. Whatever the balance of both the substitution and the income effect the total effect will be partially offset by the curvature effect arising from the diminishing returns to factor.

This device seemed to explain the early colonial backward bending supply curve as well as it explained the more common forward bending curve

(FISK and SHAND).[1/] An increase in the productivity of working time or a wage increase would lead to an increase in the supply of labor as long as the substitution effect dominated the income effect and the curve would turn backward as soon as the income effect swamped the substitution effect as -- in the long run -- it always was expected to do. Intercultural differences in reaction to wage increases or productivity increases could then be explained by factors determining the wage level at which the income effect would turn decisive. A small and poor variety of consumption goods obtainable would mean a rapidly diminishing marginal utility of income (a sharper bend in the convex indifference curve) and thus weaken the substitution effect prematurely, resulting in the backward bending supply curve troubling early colonial administrators, whereas the introduction of new consumption goods would lead to a more slowly diminishing marginal utility of income and thus offset the income effect until a later stage in economic development.

Before voicing some doubts on the assumptions made in this model let us, first, represent the classical and the neoclassical position in these terms. To find the classical point of the individual supply of man-hours changing in a way as to exactly offset the departing men, we can make use of a slightly modified device developed by ZAREMBKA. Let us imagine a family-owner-operated farm with five working men, one of

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1/ Recent work on the effect of unemployment on labor force participation in the U.S. also analyses different supply curves of white and non-white, poor and non-poor in terms of substitution and income effect ("discouraged" and "additional worker hypothesis" MINCER, MOONEY, CAIN and MINCER).

whom is leaving without affecting the size of the farm. In this case, the individual possibility curve of each of the four remaining workers (assumed to be equal to each other) shifts out along the income per worker axis. If, before the departure, each man has been working 4 hours per day, now each remaining worker must work 5 hours to meet the classical assumptions. As the total amount of work on the farm does not change and other complementary factors remain constant, the marginal product per man-hour remains equal, i.e. the MP of the new fifth hour approximates the MP of the old fourth hour. Diagrammatically, this point is easy to find as we only have to prolong the line between the intersection of the possibility curve and leisure axis and the old point of equilibrium to its intersection with the new production possibility curve. The slopes of the production possibility curves equal each other at the new and the old point of equilibrium.

Such a rather special situation would occur if there is either perfect substitutability between income and leisure or zero factor substitutability between labor and complementary factors, say, land (SEN, BERRY and SOLICO, ZAREMKA). Geometrically, perfect substitutability means a bundle of straight indifference curves (Diagram 1). Let us first assume a nearly straight production possibility curve and a point of equilibrium between the extremes. A rise in a worker's production possibilities must lead to a total substitution of income against leisure (moving along the indifference curve from M_0 to M_1). The income effect will move the point only from M_1 to M_2, that is, it will not change the amount of labor supplied. Only by reintroducing a concave shape of the

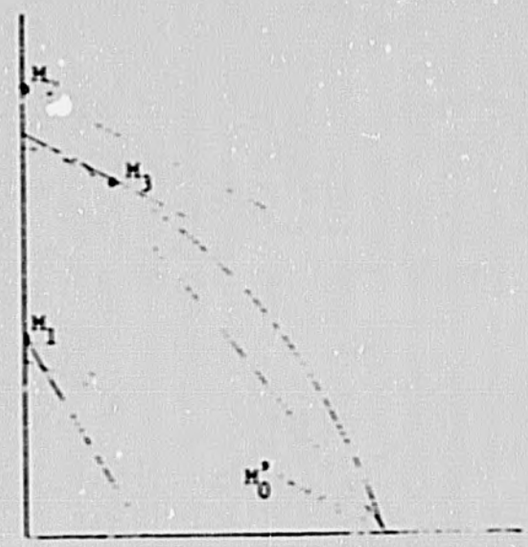

Diagram 1

possibility curve do we reach a new point of equilibrium between the extremes, M_3. The condition of parallel indifference curves assures the MPpmh to be equal at both the new and the old point, i.e., the total amount of labor has not changed. The second situation relates to a case of fixed factor proportions where the production possibility curve would be a straight line with a kink. While fixed factor proportions can be dismissed as rather unreal for the agricultural sector, the first situation is not inconceivable if we allow for a certain mix of inferior and superior consumption goods (see Chapter V). However, this is clearly a matter of empirical research and should not be assumed right away.

The neoclassical solution as presented by JORGENSON implicitly assumes that the remaining workers do not change their work habits at all. Our 4 men still work 4 hours a day; the total amount of work goes down while the MPpmh and the income of the remaining workers increase. In Hicksian terms: the income effect exactly balances the substitution effect. ZAREMBKA proves this to apply only when the elasticity of indifferent substitution equals the elasticity of factor substitution, f.ex., if both are unity. Although such a situation is perfectly conceivable, we know of no mechanism working toward equality. Completing the rather rough sketch of established theory I would argue that no criterion has been established on which to choose between either of the two or three assumptions. However, there arises a strong case for

empirical research on the factors determining actual working behavior.[1/]

III

A main stumbling block on the road to empirical generalizations about labor supply behavior is the concept of leisure with its underlying assumptions on the character of work and the relationship between person and work-role. Economists treat leisure as a (superior) good reluctantly given up to allow for working time in order to earn the income necessary to obtain other, competing goods, which again are to be consumed in leisure-time. The satisfaction of a person's needs as well as the realization of his social values, in short: "Real Life," is enacted outside the work sphere, in leisure. Applying a sociological frame of reference we might characterize the implied assumptions under an objective and a subjective aspect:

1. On the objective side, the work offered to an individual does not itself satisfy any of the needs a person has, only the resulting monetary or nonmonetary income in terms of consumable products does. This, probably, applies to a colonial plantation as well as to most repetitive, low-skill demanding work positions in the industrial sector, but not to positions of, say, a nomadic herdsman, an independent peasant

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1/ One might question the relevance of our discussion in a situation of rapid population growth in which the absorption of additional labor into the agricultural sector is a more pressing problem than the substitution for departing labor. However, the analysis is essentially the same for both cases: the classical assumption would mean constant MPpmh, decreasing work hours per man and constant work hours per family. The neoclassical assumption would mean constant work hours per man, increasing work hours per family and decreasing MPpmh. The classical result would be underemployment (measured as difference between the actual and some normative working time), the neoclassical result decreasing income at full employment (in terms of working hours) which would become disguised unemployment in case the MPpmh is higher in the nonagricultural than in the agricultural sector.

farmer or a modern professional. It is at least open to debate for most industrial and administrative positions in which successful role performance requires some skills and engagement. Varying with the rigidity of work demands and the type of sanctions used, a person is able to satisfy in his work needs for i.a., security, self-expression, recognition by role partners as well as to realize some "meaningful" goal in his work object.

2. The subjective side of the leisure concept can best be characterized in three dimensions defining the person-role relationship: role-taking, integration of role into self, role-distance.

a) The income-leisure model expects the worker to react to changes in wages or productivity per time unit. The reaction mostly is not seen in a variation of work-hours offered by a single worker as they are often fixed by social or technical rules, but rather by an additional person of his prime social collectively, the family, entering or leaving the labor force. With this, a conscious process of role-taking and role-leaving is assumed. A person is not "born" into a role by, f.ex., personal identification with his father (thus acquiring also his work role) or by collective identification with an age plus sex role as symbolized by the "rites des passage." Instead, he is assumed to be able to decide on whether or not to take a certain work role provided the social structure objectively leaves such a choice. Probably, this is true for most positions in both capitalistic and socialistic industrial societies as well as in the urban-industrial and the administrative sector of LDCs. It will also apply to most migrant labor, but not to

slave labor and other forms of forced labor. It is open to debate for peasant family labor. I would hypothesize that contents of schooling, the degree of market integration and the availability of work role alternatives are causally relevant variables for an explantion of observed role-taking (GERKEN).

b) If the work role itself does not fulfill any of the needs a person has, one would expect it not to become a part of that person's self but merely an instrument to other roles like father, husband, friend, neighbor, member of a village council or the PTA which are integrated into the self.[1/] But this is likely to be as extreme a case as the opposite one, which usually is assumed in integrationist social system theory. Here, a basic congruency between work role demands, a person's needs and his motivation to take a role is assumed (HABERMAS, DREITZEL). Role conflict refers to conflicting demands inside or between roles and role-sets, not to conflicts between demands and needs (MERTON). Reality and modern role theory is more complex. F.ex., ideology as well as social domination might well enforce a person's "negative" identification with a role not fulfilling his needs, in psychological terms: "the identification with an aggressor" (BRONFENBRENNER, HOFFMAN) (the case of the colonial servant). Alternatively, the person might try to compartmentalize into separate selves, being someone else "at home" or "at work"

1/ Thus, in a study in Uganda it could be shown that workers in agricultural processing industries as well as in modern urban industries took their roles only as instruments for the more important kinship roles (to acquire a wife, to pay school-fees for a son) or the one "real" work-role, farmer (to buy land or cattle), and discarded it as either the goal was reached or a conflict with the main roles developed (GERKEN).

but nevertheless identifying with roles in both spheres (the case of the bureaucrat trying to separate kinship and office sphere) or to split the role itself into identifiable and nonidentifiable aspects (like the split of the unskilled worker's role into the role of companion to fellow workers and the role of performer of some meaningless tasks on the assembly-line).

c) The income-leisure model has the worker only reacting to changes, not actively influencing the content of work demands. Such behavior might be a consequence of rigidly enforced demands or of an unreflected distance between person and role. The person can or wants to do nothing to change the role definition via, say, the organization of resistance or the participation in a labor union but accepts the situation and keeps himself distant from the role (COSER, GOFFMAN). This, as well, excludes engagement in a work role, as it bars the possibility to analyze the causes of a certain role definition not allowing for the satisfaction of a person's or a collectivities' needs; in short: it excludes social change.[1/] The economist's model takes the "alienated" "disillusioned," "unreflective" Taylorian worker as the reference person on which to base

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1/ In the concept of "labor commitment" the integrationist social system theory deals with only one side of the dialectical relation of role distance. The uncritical translation of the system-survival problem leads to a management bias when labor commitment is seen as a precondition of high role performance and system success while the relation between role demands and personal needs remains untouched (FELDMANN and MOORE).

behavioral assumptions.[1/]

So far, we have only been speaking of individual, not collective work behavior. The wide variations in individual working behavior make simple averages of individual behavior empirically meaningless. Instead, one has to ask for criteria on which to group individuals into classes of persons which can be expected to show basic similarities in work behavior; that is, which face a similar objective character of work and are conditioned to similar person-workrole relationships.

One possible way of grouping is provided by the theory of social classes. Members of the entrepreneurial class obviously have definite similarities in objective work character and person-role relationship which are distinct from those between members of the industrial worker's class in a capitalist system. The concept of social class, however, has limited regional and historical applicability when strictly defined by the ownership of means of production. In the agricultural sector of many African and Asian LDCs wage labor or dependent labor (i.e., labor without rights of ownership to land, tools, cattle and other means of production) is either nonexistent or only a peripheral phenomenon.

1/ The similarity to the Marxian description of the alienated worker, indeed, is striking. In Oekonomisch-philosophische Manuskripte (1844) MARX writes, "... dass die Arbeit dem Arbeiter aeusserlich ist, d. h. nicht zu seinem Wesen gehoert, dass er sich daher in seiner Arbeit nicht bejaht, sondern verneint, nicht wohl, sondern ungluecklich fuehlt, keine freie physische und geistige Energie entwickelt, sondern seine Physis abkasteit und seinen Geist ruiniert. Der Arbeiter fuehlt sich daher erst ausser der Arbeit bei sich und in der Arbeit ausser sich... (Seine Arbeit) ist nicht die Befriedigung eines Bedueerfnisses, sondern sie ist nur ein Mittel, um Bedueerfnisse ausser ihr zu befriedigen."

Other differences effectively separate social collectivities with regard to work behavior: religious and ethnic groups, f. ex., are often found to have developed distinct differences in work behavior although they have a similar amount and mode of control over means of production. Certainly, the concept of social class could be widened to cover also these differences but only at the price of precision in meaning.

I would rather propose to make use of a conceptual differentiation which has been developed in modern role theory, namely, between situation-roles, position-roles, and status-roles (BERGER and LUCKMANN, GERHARDT). Situations, sociologically, refer to short-term, positions to persistent complexes of expectations and norms. Positions, unlike situations, are elements of social institutions (kinship, authority, economics) and their concrete organizations (families, political parties, firms). Position-roles, then, are dependent on positions (thus, a work role is always dependent on a position of farmer, machine operator, civil servant, etc.) while situation-roles, like friend in need or pedestrian in traffic, arise in certain situations only. Status-roles, finally, are those nature or society ascribes to a person and which, if at all, can be changed only in the very long run: sex, age, race, family-status, membership in a social stratum, religion. Status roles function as a selective criterion for allocating position roles, especially work roles, to individuals (the role of civil servant in a [illegible] in society might be open only for Protestant, white men over 25 years of age, of a family resident for at least three generations and not belonging to the lower half of social strata). Status roles can thus be expected to cluster together

work-roles of similar objective work character for individuals whose personality building process followed certain distinct patterns in family socialization, schooling, and youth experiences. Members of such a collectivity are likely to show similarities in the ways of role-taking, integrating roles into themselves and keeping role distance.

Little, if any work has been done to extend the conceptual framework of modern role theory to nonindustrial societies transgressing the boundaries implicit in social system theory. The development of a typology comprising empirical generalizations on changing work character and person-role relationships in the agriculture-industry transformation process is a necessary prerequisite to a labor supply theory which is at the same time more general and more realistic than the one based on the income-leisure model.

While, at present, sociological critique can only promise to come up with the necessary generalizations, there remains an immediate consequence: a labor supply theory should restrict the income-leisure-work terminology to the description of an historically specific case and, instead, use the more general terminology of allocation of time between different activities. BECKER did so for the modern industrial economy while HYMER and RESNICK developed a similar model to explain the "marketable surplus behavior" in traditional agrarian economies. Furthermore, in aggregating data on individual behavior one should form empirically meaningful classes of workers.

Chapter IV presents what is basically a generalization of the HYMER-RESNICK model.

IV

Our point of departure is the peasant family-farm-plus-household without wage labor. The family controls the time lived by all family members in a culturally defined age bracket (say, 10 to 59 years). In the short run total available time, T, is constant while, in the long run, it varies with norms of procreative behavior and seniority. The time constraint

$$(1)\ T = Tg + Tz + Tc + Te$$

says that total available time is distributed exclusively between either G-, Z-, C-, or E-activities. G activities comprise all those leading to the production of actually marketed cash crops or other agricultural goods which, in the course of development, will eventually be marketed (food crops). Z-activities produce goods and services which can only be consumed by the family household or used as inputs on the family farm: pottery, furniture, clothing, shelter, the processed component of processed food teaching children their future roles. Once the family regularly sells these goods on a market we shall speak of E-goods or, if it purchases them, of M-goods. Te comprises all family time offered directly (as wage labor) or indirectly (as E-goods) to nonagricultural sectors (rural nonagricultural as well as industrial and urban-nonindustrial sectors). We shall, first, assume Te to be zero. The distinction between marketed G- and nonmarketed Z-goods is, in a way, arbitrary and justified only by our interest in the different role they are playing in the agriculture-industry transformation process: Z-goods can (and will) eventually be replaced by goods produced outside the household in nonagricultural sectors while the production of G-goods will remain in the agricultural sector regardless of changes in the technology and mode of production. G-goods are those "basic commodities"

of consumption which enter the utility function directly (Becker): sleeping is "produced" by time, a bed, a house, sometimes pills; eating is produced by combining time with processed food, dishes, a room, etc. While both Z- and C-goods are produced in the household, only Z-goods can be replaced physically by goods produced outside the household.[1]

The production functions are

$$(2) \quad G = G\,(Tg, \bar{A})$$

$$(3) \quad Z = Z\,(Tz, \bar{B})$$

$$(4) \quad C = C\,(G^*, Z, M, Tc).$$

Both G- and P-production depend on the time allocated to them and on other factors like land and shelter which shall be treated as constant. For the time being we shall assume that no productive services are purchased for either G- or Z-production. Finally, C-production depends on those marketable goods consumed in the family G^*, household goods Z, purchased consumer goods M and time Tc.

The goods constraint is given by

$$(5) \quad M \leq Pg\,(G\,(Tg) - G^*)$$

where Pg gives the price of agricultural goods in terms of purchased consumer goods. For simplicity, let us assume that all marketable goods actually are marketed and that the family has no other source of money

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1/ The relation between C-, Z- and M-goods might be clarified with an example: The education of a family member is a C-good depending on the irreplaceable activity of the member who combines time Tc with other inputs. One other input is teaching which might be provided by member of the family, a Z-activity. It might, however, be replaced by formal schooling, an M-good provided outside the agricultural sector.

income.[1/] [2/] So far the model covers both the BECKER and the HYMER and RESNICK (H & R) approach. Writing the utility function, however, BECKER keeps Tz constant yielding

$$(6a)\ U = U\ (C\ (M,\ Tc))$$

where C, M, Tc should be read as vectors to allow for several C-goods. H & R, instead, leave Tc constant, which gives

$$(6b)\ U = U\ (C\ (M,\ Z\ (Tz)))$$

as a utility function.

Both functions suit the explanatory interests of their authors. H & R want to describe the peasant agricultural sector of LDCs where the home production of goods accounts for a sizeable part of economic activity. The relation between Z-goods produced in the household and M-goods produced in a rural nonagricultural sector and/or an industrial sector is an important feature in the course of economic development.

Writing for the highly developed industrial economy where, to a large extent, M-goods have replaced Z-goods BECKER neglected their existence.[3/] His overriding concern is with the secular increase in "nonworking time" in industrial societies and the role of the "earnings foregone" by devoting time to C-production instead of money earning.

1/ For an application to the marketed surplus problem see HYMER and RESNICK.

2/ BECKER determines income as the sum of nonworking money income and the product of working time and wage.

3/ The upbringing of small children and processing of food, however, remain important Z-activities also in high income societies and in the upper class of low income societies. Working on the allocation of the housewife's time in high income societies GRONAU reintroduced household goods into the BECKER model (GRONAU).

As foregone earnings are a substantial part of the costs of education, they should no longer be treated as "leisure." For the most part, this paper, follows the H & R approach. Since we keep Tc constant and do not analyse different C-goods (6b) can be simplified to

$$(6c)\ U = U\ (M,\ Z\ (Tz))$$

In the logic of the H & R approach the production functions and the time constraint give a production possibility curve between Z- and G-goods, as total available time is allocated between Tg and Tz. When treated as binding the goods constraint gives an exchange function which can be used to transform the production possibility into a consumption possibility curve. It is then possible to apply indifference curve analysis to derive supply curves of labor.

Writing the Lagrangean

$$(7)\ U\ (M,\ Z\ (Tz)\ ) - \lambda\ (M - PgG(Tg)\ )$$

and differentiating with respect to the choice variables, yields the first order conditions for maximum

$$(8)\ U_M - \lambda = 0$$

$$(9)\ + U_Z Z_{Tz} - \lambda\ PgG_{Tg} = 0$$

$$(10)\ - M + PgG(Tg) = 0$$

where subscripts denote partial derivatives. In equilibrium the family devotes Tz to Z-production up to the point where MP of Tz times MU of Z equals the product of MU of M-good and VMP of Tg. Note that there is no market price for Z-goods but only a shadow price given by G-income foregone by allocating unit time to Z-instead of G-production. Totally differentiating (8) - (10) and transforming into matrix notation gives

$$
(11)\quad \begin{bmatrix} U_{MM} & U_{MZ}\, Z_{Tz} & -1 \\ U_{ZM} & \left(\begin{array}{l} U_Z\ (Z_{Tz})^2 \\ + U_Z Z_{TzTz} \\ + \lambda\, PgG_{TgTg} \end{array} \right) & -Pg\, G_{Tg} \\ -1 & -\, PgG_{Tg} & 0 \end{bmatrix} \begin{bmatrix} dM \\ dTz \\ d\lambda \end{bmatrix} = \begin{bmatrix} 0 \\ \lambda\, PgG_{Tg}\, dPg \\ -\, GdPg \end{bmatrix}
$$

The second-order conditions for maximum are proved by evaluating the determinant as positive. Solving (11) for dTz/dPg gives the comparative-static results of a change in the price ratio of G- and M-goods for the allocation of time between household-and marketable-goods production. Solution

$$
(12)\qquad Tz_{Pg} = \frac{U_M PgG_{Tg}}{D} - \frac{G(U_{MM} PgG_{Tg} - U_{ZM}\, Z_{Tz})}{D} + \frac{U_M PgG_{TgTg} + U_Z Z_{TzTz}}{D} \cdot \frac{dTz}{dPg}
$$

shows a substitution, an income, and a "curvature" effect. The first term on the right side gives the substitution of M- for Z-goods as income is held constant. The second term gives an income effect which normally tends to offset the substitution effect as the MU of M-goods diminishes and the MU of Z-goods increases with increasing use of M-goods. If, however, Z is regarded an inferior good and provided M and Z are substitutes in consumption the income effect will turn around and augment the substitution effect.[1/] The third term gives the impact of the diminishing marginal returns to time in G- and Z- production or of the "curvature" of the consumption possibility curve. Switching sign with

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1/ Goods are inferior, normal, or superior according to whether their income elasticity is <0, $0 \leq 1$, or >1.

the balance of substitution and income effect the term always tends to diminish the overall result without changing its direction. This allows us the convenience of assuming constant marginal returns to time.

The income effect is weighted by the amount of marketable goods produced, that is it will be the more important the more the family specializes in market production. The overall result thus heavily depends on the empirical status of Z-goods. H & R hypothesize that in any stage of development an increase in income will lead to the replacement of inferior Z-goods by normal or superior M-goods. At a later stage, however, normal or superior Z-goods will turn the income effect back into a more "normal" direction. The first part of the hypothesis matches well with empirical evidence as it predicts a forward bending supply curve of labor for low-income societies or for low-income classes of societies in a later stage of development. The only exception — the early colonial backward bending supply curve — could be explained by a poor variety of M-goods which did not function as substitutes for Z-goods. The hypothesis would not disclaim the existence of normal or even superior Z-goods like symbolic goods (family-style clothing, ritual instruments), processed food and the upbringing of children. However, it would state clearly that (a) Z- and M-goods are substitutes, (b) at low levels of income a wide range of household goods are produced in the household among which the inferior subrange takes relatively more time than the normal and superior subrange.

The second part of the H & R hypothesis is less evident. The dominance of a superior set of Z-goods is likely to occur only when inferior Z-goods have been replaced by M-goods to a substantial degree. This would occur either after a long stretch of "economic development" or with individual

mobility into high income classes within a society. In both cases it is fairly safe to assume that utility functions have changed: the comparative-static model would no longer apply.[1/]

In the following we shall restrict our argument to low-income classes in LDCs. We further make the convenient assumption that it is empirically possible to hold Tc constant.[2/]

V

The basic model allows for a host of extensions which widen the possibilities to explain observed labor supply curves. Three possible extensions shall be discussed here: purchased inputs in market and household production, social conditions of work in market production, and family labor offered to nonagricultural sectors (migration).

1/ It seems doubtful that the H & R version of Z-goods models is still very meaningful at high-income levels. By the time Z-goods have been replaced with M-goods (with only food processing and childrearing remaining) it seems more relevant to think in terms of a change in Tc, in time needed to produce the final consumption good. Although goods like eating and sleeping cannot be substituted, there is a varying degree of substitutability between time and M-goods in their production. Solving a BECKER-type model for a change in the Tc/M ratio of C-goods allows for the derivation of meaningful labor supply curves at high income levels (BECKER, BURENSTAM LINDER, GROSSAU).

2/ The assumption is not a very safe one. It does, however, save us the laborious "full income" approach BECKER uses. F. ex., assume that there are two ranges of C-goods produced by either Tc and Z-goods (C1) or by Tc and M-goods (C2). Further assume that a price Pz has been estabished for household goods which will not change during the current period. Full income can then be written as

$$(13) \quad I = PzZ\,(Tz\,(C1)) + PgG\,(Tg\,(C2)) + L\,(C1, C2)$$

where L (C1, C2) gives the income foregone by allocating less than optimum time to household and "field-work" respectively. Tz and Tg now depend on the demand for the two ranges of C-goods. Full income is achieved by maximizing G- plus Z-income subject to the goods and time constraints. Optimum working time Tz plus Tg would always be less than total available time as [illegible] used in reproduction affects the efficiency of both Tg and Tz. In a second step the family then maximizes utility subject to the full income constraint only. Solving for the C1/C2 ratio gives the result for the allocation of time between Tz and Tg.

1. Purchased inputs in market and household production

One of the more obvious extensions relates to purchased inputs in G-production. The production function reads

$$(2a) \quad G = G\,(Tg,\ I)$$

where I denotes purchased inputs (either one-use goods or productive services).

Following conventional production theory (CARLSON) the family decides at the beginning of the period on how much it will spend for productive services. The goods constraint then reads

$$(5a) \quad M + K = \leq PgG\,(Tg,\ I)$$

where K is the fund set aside for purchased inputs. A second constraint

$$(5b) \quad PiI \leq K$$

where Pi gives the price of inputs in terms of M-goods, says that the family will not spend more or purchased inputs than originally planned but might spend less. If the first constraint is binding and the second nonbinding, the first-order conditions state that in equilibrium the VMP of purchased inputs should equal their price. Extending system (2) accordingly and solving for dTz/dPi gives the comparative-static results for the allocation of time between Z- and G-production. The results can again be interpreted in terms of a substitution and an income effect with the overall result depending heavily on the status of Z-goods.

A less conventional although quite obvious extension accounts for the fact that purchased inputs can be utilized in household production. In function

$$(3a) \quad Z = Z\,(Tz,\ J)$$

one might think of J as the service of corrugated iron sheets used by African farmers in building their houses or of needles and sewing machines used for the household production of clothes. This opens a much neglected aspect of labor supply theory: an observed labor supply curve can be the result of a change in the productivity of household time as much as of a change in the productivity of time in market production.

Applying the same assumptions as for inputs in market production the model yields the necessary condition that the ratio of the marginal utilities $U_Z Z_J/U_M$ should equal Pj, the price of inputs in terms of M-goods. The first term in equation

$$(14) \qquad Tz_{Pj} = \frac{J\ Pj\ U_Z Z_{TzJ}}{D'} + \frac{J\ Pj\ (U_{ZZ} Z_J Z_{Tz} - U_{MZ} Z_J Pg G_{Tg})}{D'}$$

where D' denotes a negative determinant gives a substitution effect saying that a drop in J-prices will increase the MP of household time causing M-goods to be replaced by Z-goods. The second effect, however, would raise the demand for M-goods unless they are regarded as inferior. According to the H & R hypothesis Z-goods are regarded inferior which, in this case, would strengthen the demand for M-goods even further making it more likely that the substitution effect will be swamped. Decreasing real prices for inputs in household production are thus expected to increase the allocation of time to Tg.

2. Social conditions of work

The model has been kept in the neoclassical world so far by assuming that work itself does not satisfy any needs of the worker. Utility

functions (6a) and (6b) refer to a society in which G-activity is nothing more than a necessity to obtain the means for realizing the demands of other roles in the kinship, neighborhood, political or religious sphere. Besides the unskilled Taylorian worker the function might also approximate the landless agricultural laborer in some LDC societies. It certainly does not represent the utility function of a peasant family worker in the same society very well for whom being an independent self-sufficient farmer probably is an important part of himself. The difference is less obvious in societies with no or only peripheral agricultural wage labor. Here, work is sometimes an undistinguishable part of the kinship role. Even when the work role is clearly differentiated, it is often only instrumental to the dominating kinship roles. However, with increasing occupational differentiation and/or social heterogeneity the role of "farmer" or "farm manager" is likely to become an integral part of the self. This would result in a positive utility of either the object, the process, or the instruments of work.[1/]

On the peasant family farm in LDCs our model has in mind work instruments mostly are poorly developed and hardly an object of identification. Furthermore, if we have (2) as a production function it makes

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1/ Artisans, preindustrial craftsmen, writers attach strong feelings to their work object. The "Meisterwerk" of the urban guilds of medieval Europe is probably the purest example of such "identification with the work object." The skilled industrial worker, however, has no control over the final product of his work but has often internalized the demands of a strong work ethic. He will rather work than receive welfare of an equivalent amount. "Modern" or "progressive" farmers are often believed to derive utility from the ownership of a shiny tractor or a new storage house. For a more formal treatment see BAYANT and BAWDEN.

no difference if utility is obtained from the work-product or the work-time. Here, we shall assume that the family worker obtains utility directly from "working in the field" but is indifferent to household work. Let us also assume that M and Z are combined with a constant $\overline{T}c$ to produce the commodity C. The utility function reads

$$(6c) \quad U = U\,(C\,(M, Z(Tz), \overline{T}c), Tg)$$

with

$$U_C,\ U_{Tg} > 0;\ U_{CC},\ U_{TgTg} < 0;\ U_{CTg} > 0$$

Solving it subject to the goods and time constraints yields the necessary condition

$$(15) \quad U_C C_M P_g G_{Tg} = U_C C_Z Z_{Tz} - U_{Tg}$$

In equilibrium the family equates the "indirect" MU obtained from devoting time to G-production with the "indirect" MU obtained from Tz less the direct MU of working in the field. It will thus allocate more time to field work, obtain a higher money income and a smaller Tz/M ratio than a family which derives utility from C-goods only.

Social conditions of work affect the utility and the productivity of work. If we treat conditions, s, as disembodied and time-augmenting the functions read

$$(2b) \quad G = G\,(a(s)Tg\,)$$

and

$$(6d) \quad U = U\,(C\,(M, Z(Tz), \overline{T}c), b(s)Tg\,)$$

with $a_s > 0$ and $b_s \gtrless 0$.

Here, a and b denote positive coefficients of augmentation and a(s)Tg and b(s)Tg can read as efficiency units in production and consumption respectively. Operationalizing a "rise" in social conditions of work as an increase in the rigidity of work demands and/or in the strength of sanctions used to enforce compliance, we assume the augmentation coefficient of work to rise in the same direction. The sign of $\partial b/\partial s$, in the short run, depends on the socialization process. Following our earlier hypothesis on status-and position-roles we expect the goals and techniques of socialization to be similar inside status-groups and their cluster of work-roles but to vary between them. The augmentation coefficient b will decrease if "independence" has been internalized as a positive value in a status-group holding the position-role. In homogenous peasant and nomadic societies this is usually the case. For a farmer or a herdsman to accept "orders" in his work decisions endangers his social status. Feudal and also modern class societies often succeed in establishing the "service for a personal master" or the "adherence to impersonal authority" as values to be internalized by lower status-groups. For the "dependent" or the "authoritarian personality" an increase in the rigidity of work demands might well mean an increase in emotional security and might thus increase the augmentation coefficient.[1/]

1/ The "autonomous personality" of recent sociological theory would react to an increase in the rigidity of work demands with a reflection on the relation between personal needs and role demands (HABERMAS, DREITZEL, BERGER and LUCKMAN). This might result in the acceptance of a decrease in work-time utility; however, it might also lead to active resistance or a demand for a redefinition of the work role. In the latter case utility and production functions would change and, in effect, limit the applicability of the comparative-static model. (Continued on page 29)

In this paper we shall proceed with the first case which is the most likely for the peasant family-farm-plus-household. As social conditions of work are determined exogenously the first-order conditions of (15) hold. Extending system (11) and solving for dTz/ds gives the comparative-static result of a change in social conditions of work for the allocation of time. In diagrammatical terms, we now have a production possibility curve between M- and Z-goods and a consumption possibility curve between C-goods and Tg. A rise in s will shift the production possibility curve outward along the M-axis but will also shift the consumption possibility curve inward along the Tg-axis. Equation

$$(16)\quad Tz_s = -\frac{U_C C_M PgG_{Tgs}}{D} - \frac{PgG_s\,(U_C C_{MM} PgG_{Tg} - U_C C_{ZM} Z_{Tz})}{D} - \frac{U_{Tgs}}{D} + \frac{PgG_{Tg}\,(U_{Cs} C_M - U_{CTg} C_M)}{D}$$

combines the effect of both changes. Since the composite function rule leaves us with some lengthy terms the equation shows only where one should differentiate with respect to s without writing out the solution. The first two terms give the familiar substitution and production effect between Z and M in C-production. With income held constant the rise in the VMP of

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1/ continued from page 28

In the long run peasant movements and other agents of change do not depend on the autonomous personality which has become a widespread socialization goal only in the middle and upper status-groups of modern industrial societies. A basic incongruence between personal and collective needs and role demands can become conscious through, i.a., the spread of revolutionary ideas and the failure of old socialization techniques. The model presented here cannot account for such basic changes.

of Tg leads to a substitution of M for Z while the outward shift in the possibility curve means an increase in Z-demand unless Z is an inferior factor.

The remaining two terms relate to the shift in the consumption possibility curve. The third term is positive, saying that the demand for Z-increases with the decreasing MU of Tg, while the fourth term gives the income effect (inward shifting possibility curve) tending to decrease the demand for Z (and Tz). The overall effect of a change in the rigidity of work demands can only be determined empirically.[1/]

If we read "work discipline" or "work rationality" instead of rigidity of work, demands our discussion relates to one of the most celebrated sociological propositions on the effect of industrialization in LDCs (MOORE). The "rationalization" of work will increase or decrease the supply of working-time depending on the person-workrole relationship and on the values internalized during the process of socialization.

3. Nonagricultural work

Let us now return to the problem of chapter II: how will agricultural workers react to the departure of labor or, in our terms,

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1/ Other sources of change fit less harmoniously into the positive world of development: the colonial and neocolonial introduction and enforcement of labor laws ranging from forced labor to the "freeing" of labor from traditional (feudal) allegiances as a condition for capitalist development is a case in point as is the introduction of alternative modes of production in a plantation-type, export-oriented agricultural sector. Also, the direct influence on "work ethic" via missionization, movements of political mobilization and the ideology of a national elite trained on European and North-American academic institutions should be mentioned (GERKEN 1972).

how will family members reallocate time between Tg and Tz if Te is increasing. Family time may be offered to nonagricultural sectors in the form of wage labor only and the real wage Pe -- price per time unit in terms of M-goods -- may not depend on the amount of family time offered.[1/] The allocation of time then varies with the unit of decision making and with the type of economic relations persisting between departing and remaining family members.

Two extreme cases can be distinguished: a) the departing member takes the decision to leave the farm without regard to the overall interests of the family and cuts off all economic relations after he has left the farm, b) the decision is taken by the family as a whole and the migrating worker remains a member of the family household. The first case is usually taken for granted in economic models of labor migration (ZAREMBKA). However, empirical evidence strongly suggests that relevant economic relations do, in fact, persist between migrating and nonmigrating family members over wide geographical distances and long stretches of time (UNESCO). F.ex., in societies enforcing Islamic inheritance rules the departing member remains with a legal claim to a share of the family's property. Social institutions often do not allow him to dispose freely of his share which makes it likely that he will

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1/ The wage should not be understood as a minimum or average industrial wage but rather as an average wage in the urban nonindustrial or the rural nonagricultural sector. The migrant is most likely to find employment in either of the two sectors. Alternatively, one might define the relevant wage in the TODARO tradition as the product of an industrial wage and the probability of obtaining an industrial job (TODARO).

continue to participate in the family decisions. At the other extreme it is difficult to imagine an "interregional migrant" effectively participating in all day to day decisions. However, "rural intersectoral migrants" like the rural teacher, policeman, carpenter, petty trader often stay in the family household or participate closely in family affairs (GERKEN 1973).

In the first case the departure of a member is not different from any exogenously determined change in the amount of total available time, like the death of a member or children entering the labor force. The immediate effect is a change in the ratio of constant factors to workers, f.ex., more land per worker in G-production and more shelter per worker in Z-production. Rather than rewriting the production functions in per worker terms it is more convenient to think of the family receiving an augmentation of constant factors in proportion to the equal share of the departing member with available time remaining constant, thus

$$(2c)\quad G = G\,(Tg,\ a) \qquad \text{where} \qquad a = A\frac{T}{T-Te}$$

and

$$(3b)\quad Z = Z\,(Tz,\ b) \qquad \text{where} \qquad b = B\frac{T}{T-Te}$$

and the usual assumptions of

$$G_{Tg},\ G_a,\ Z_{Tz},\ Z_b > 0;\quad G_{TgTg},\ G_{aa},\ Z_{TzTz},\ Z_{bb} < 0;\quad G_{Tga},\ Z_{Tzb} > 0$$

hold. Going through the steps of the model and solving for dTz/dTe gives the comparative-static results of a change in the amount of nonagricultural work for the allocation of time between market and household production. Again, in order to avoid a rather messy expression in equation

$$(18) \quad Tz_{Te} = \frac{U_Z Z_{TzTe}}{D} - \frac{U_M P_g G_{TgTe}}{D} + \frac{Z_{Te}\,(U_{ZZ} Z_{Tz} - U_{MZ} P_g G_{Tg})}{D}$$

$$- \frac{P_g G_{Te}\,(U_{MM} P_g G_{Tg} - U_{ZM} Z_{Tz})}{D}$$

the differentiation with respect to Te is only indicated, not written in full. Note that differentiating a positive term with respect to Te gives a positive term, also remember that we disregard the "curvature effect" as it only modifies the total result without changing its direction. The first and second terms in (18) give the substitution effects arising from an increase in the MP of time in market and in household production due to the increase in the constant factor per worker ratio. An increase in nonagricultural work will thus

| decrease
increase
leave unaffected | the allocation of time to Tz or | increase
decrease
leave unaffected | the allocation

of time to Tg according to whether the rise in the MP of Tg is | greater than
smaller than
equal to | the

rise in the MP of Tz. The third and fourth terms give the income effects of higher Z- and G-production, respectively. With normal/inferior Z-goods both tend to offset/augment the corresponding substitution effects. Without additional information on observed production and demand functions it is not possible to determine whether terms 1 and 3 will outweigh terms 2 and 4 or vice versus.

In the case of the family taking the decision on migration and the migrant remaining a member of the family household the income obtained from nonagricultural work as well as the costs of migration (transport,

housing, job search costs) accrue to the family as a whole. The goods constraint then reads

$$(5c) \quad M \leq PgG\,(Tg,\ a) + (Pe - Pd)\ Te$$

where Pd gives the unit costs of migration in terms of M-goods. If the family decides on migration, Te becomes a choice variable. However, the model cannot be solved simultaneously. Instead we shall assume that the family decides at the beginning of a period on how much time it will offer to nonagricultural sectors during the current period. To reach this decision it would maximize an earnings function in which a price has been attached to Z-goods. In equilibrium the wage rate minus unit migration costs would equal the VMP of Tg and Tz. For the current period Te must be regarded as exogenously determined. Applying the model (with a binding goods constraint) and solving for dTz/dTe yields a solution which is identical with solution (18) except for the G-income effect which now reads

$$(18a) \ldots\ldots \quad - \frac{(PgG_{Te} + Pe - Pd)\ (U_{MM}PgG_{Tg} - U_{ZM}Z_{Tz})}{D}$$

Thus only the weight of the G-income effect has increased by the balance of wage rate and unit migration costs. The result is intuitively plausible and needs no comment. One can easily see that the basic solution (18) can be adjusted to account for different institutional arrangements in the migration process by rewriting the goods constraint and the production functions. It is also obvious how extensions with respect to social conditions of work and to a variation in purchased inputs in both household and market production can be included. Numerous other possible

extensions like the use of Z-goods as capital goods in G-production and the family consumption of G-goods have not been touched here but can easily be included (BAUTISTA).

The simple comparative-static Z-goods model proves to be a very flexible instrument. Applied to the context of labor supply in LDCs it provides us with a promising alternative to both the classical and the neoclassical school of labor surplus theory.

The JORGENSON and the FEI-RANIS assumptions can be represented in terms of the model. They can both occur for combinations of different reasons. The main advantage of the model is that it captures the relationships between the main factors. To open the solutions offered by the model two further steps are required: utility functions have to be translated into demand functions applying the theory of indirect utility functions (DIEWERT) and the solutions must be represented in elasticity terms. Empirical research on these lines, hopefully, leads to much needed generalizations on labor supply.

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