NAUČNI ČLANCI — ARTICLES

THE STATE AND THE KOLKHOZNIK*

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ABSTRACT

Although the economic theory of labour-managed firms has often
been applied to the Soviet kolkhoz (collective farm) and even in some
aspects developed specifically for this purpose, it is evident that fun-
damental assumptions of the theory clash with kolkhoz reality, con-
cerning profit-sharing and decision-making. In the present models it
is assumed that labour on collective lands is paid at a fixed hourly
wage rate and that decisions are made by individual kolkhozniki, the
chairman and the state, but not by the collective. Rules for optimal
state policy are derived and compared briefly to Soviet kolkhoz reality.

1. THE KOLKHOZ AS A PRODUCER CO-OPERATIVE

The Soviet kolkhoz (collective farm) has often been regarded as
a fruitful application for the economic theory of the labour-managed
firms, and it has even in some cases occasioned theoretical develop-
ment (Domar, 1966; Oi and Clayton, 1968; Bradley, 1971, 1973; Came-
ron, 1973a, 1973b; Bonin, 1977). The distinguishing feature of the So-
viet kolkhoz is the combination of collective agriculture and "perso-
nal subsidiary agriculture" (lichnye podsobnye khozyastvo or LPKh)
on small private plots, and this has been incorporated into both of
the two main types of models for decision-making in the kolkhoz, con-
nected with the works of Ward (1958) and Sen (1966) respectively; in
both models the workers share income according to work, but deci-
sion-making differs:

— the Ward-model: the workers decide collectively the number
of workers with a fixed number of hours, maximizing average
income per worker. The resultant number of workers is *too
small* in the sense that a capitalist twin firm, facing fixed

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wage rates and earning a positive maximum profit would employ more workers. And in contrast to the capitalist twin, the labour-managed firm tends to respond to increases in demand and output price by lowering employment and output. Only free entry and competition can ensure a larger employment and Pareto-optimality in the economy at large (Vanek, 1970; Meade, 1972).

— the Sen-model: the fixed number of workers decide individually their number of working hours, and if each worker maximizes his utility, assuming the labour supply of the other workers to be unaffected by his own choice, then the supply of labour will be *too high*, and not Pareto-optimal for the group of workers inside the firm. This problem can be overcome by collective decision-making (Berman, 1977; Berman and Berman, 1978; Ireland and Law, 1981).

For the purpose of comparison, some fundamental results of these models are stated briefly, expressed in the same framework as the models presented below, as follows (cf. Oi and Clayton, 1968; Bonin, 1977; Aage, 1980).

1. The kolkhoz has n member kolkhozniki. In the main analysis this number is considered exogenous.

2. The kolkhoznik earns income from two sources: proceeds from his private plot, and income from the kolkhoz according to labour supplied, either as dividend (the Ward and Sen models below), or as a fixed hourly wage rate (the following sections). The kolkhoznik decides the amount of private work and also, in some parts of the analysis, the amount of collective work.

3. Two different crops are produced, crop X on private plots, and crop Y collectively on kolkhoz lands.

4. The total cultivated area, L, is fixed, and is divided into collective lands, K, and in identical private plots, H_i, for kolkhoznik no. i. If new members are admitted, they are entitled to private plots, thereby reducing collective lands.

5. All kolkhozniki are identical with regard to utility functions and production possibilities on private plots.

6. Product prices, tax rates and rents are exogenously determined policy variables.

7. Demands for both crops are assumed to be infinitely elastic at fixed prices.

The production functions and the corresponding definitional relations are as follows; first and second derivatives are indicated by one or two subscripts, respectively, i. e.

$$X_h = \partial X/\partial h_i, \quad X_{hH} = \partial X_h/\partial H_i, \quad etc.$$

$$X_i = X(h_i, H_i) \tag{1}$$

$$Y = Y(k, K) \tag{2}$$

X_h, $X_H > 0$; X_{hh}, $X_{HH} < 0$; $X_{hH} > 0$ is assumed for X, and corresponding assumptions are made for Y.

n	— number of members; $i = 1, \ldots, n$
X_i	— amount of private crop produced by member no. i.
$X = nX_i$	— total output of private crop
Y	— output of collective crop
h_i	— hours worked by member no. i on his private plot
k_i	— hours worked by member no i on collective lands
$l_i = h_i + k_i$	— total hours worked by member no. i
$h = nh_i$	— total hours worked on private plots by all members
$k = nk_i$	— total hours worked on kolkhoz lands by all members
$l = nl_i$	— total hours worked
H_i	— size of private plot for member no. i identical for all members
$H = nH_i$	— total area used as private plots
K	— size of kolkhoz lands
$L = H + K$	— total cultivated area.

The identical utility functions of the kolkhozniki have income and total hours worked as arguments:

$$U_i = U(W_i, l_i), \quad \begin{array}{cc} U_W > 0, & U_{WW} < 0, \\ & U_{Wl} < 0 \\ U_l < 0, & U_{ll} < 0, \end{array} \tag{3}$$

$$W_i = \frac{k_i}{k}[p_y Y(k, K) - r_y K](1 - t_y) + [p_x X(h_i, H_i) - r_x H_i](1 - t_x) \tag{4}$$

U_i	— utility for member no. i
W_i	— income for member no. i
p_x, p_y	— price of private and collective crop respectively
r_x, r_y	— rent rate on private and collective lands respectively
t_x, t_y	— tax rate on private and kolkhoz income respectively.

Collective choice of h_i and k_i, given a fixed n, will be Pareto-optimal, and is obtained by:
inserting $t_x = t_y = 0$, $k = nk_i$ in (4), $l_i = k_i$ in (3), and
maximizing (3) with respect to h_i and k_i, which yields

$$\frac{U_i}{U_w} = p_x X_h = p_y Y_k \qquad (5)$$

Individual choice of h_i and k_i, given a fixed n, and assuming that each member maximizes utility while considering that other members' supply of kolkhoz labour is unaffected by his own choice, defines a Nash-equilibrium, and is obtained by: (Berman and Berman, 1978; Israelsen, 1980; Sen, 1966):

inserting $k = \bar{k} + k_i$, $dk/dk_i = 0$, $t_x = t_y = 0$, $l_i = h_i + k_i$, in (3) and (4), and

maximizing (3) with respect to h_i and k_i, which yields (Bonin, 1977:81):

$$\frac{U_i}{U_w} = p_x X_h = \frac{1}{n} p_y Y_k + \left(1 - \frac{1}{n}\right) \frac{p_y Y - r_y K}{k}$$

This allocation will be Pareto-optimal either if there is only one member ($k_i = k$), or if rent equals the marginal product of land ($pY_K K = rK$) and the production function for the collective crop is homogeneous in the first degree, so that Euler's theorem applies ($Y = Y_k k + Y_K K$). But normally (6) implies that, compared to Pareto-optimum (5), too much labour is supplied and too much of the labour is spent on kolkhoz lands.

Collective choice of n and H_i, assuming that H_i and k_i are identical for all members, as well as the production function for the collective crop to be homogeneous of the first degree, is obtained by:
inserting $t_x = t_y = 0$, $m = nk_i$, and $K = L - nH_i$ in (4) and
maximizing (3) with respect to H_i and n, which gives:

$$p_y Y_k - r_y = p_x X_H - r_x \qquad (7)$$
$$p_y Y_K - r_y = 0, \qquad (8)$$

cf. Oi and Clayton (1968:40), and in this case collective and individual choice of h_i and k_i, (5) and (6) respectively, become identical.

One of the important problems for the analysis of the Soviet kolkhoz is description of the criteria for optimal state policy, and an attempt has been made to introduce the state as a decision-maker alongside the collective and the individual kolkhoznik (Aage, 1980).

2. DECISION-MAKING IN THE KOLKHOZ

This theory is important in its own right, but it is evident that fundamental assumptions of the theory clash with kolkhoz reality. Maybe the theory of labour-managed firms is, or will be, relevant for the new, experimental brigade organizations of work in industry and *zveno* (chain) in agriculture, which are small groups (often 10—20 people), producing given work at a fixed price per unit of output, de-

ciding collectively how many people they need to be and how the bonus part of their income should be distributed internally between them (Karpukhin and Shapiro, 1981).

On the other hand a more detailed description of kolkhoz reality may also be of some general interest as it is a distinctive type of economic organization, and this is the purpose of the following model, which takes two specific features of the kolkhoz into account:

a) *Fixed hourly wage rate on collective lands.* Since 1 July 1966 a guaranteed minimum wage has been the first charge on farm income, and there is also a possible bonus (Schoonover, 1979:100):

> "... it seems fairly clear that what is guaranteed for an indivi-
> dual kolkhoznik is not a definite amount per month, but a defi-
> nite amount for the work that he does, and the fact that he will
> be paid monthly what he has earned.
>
> "... the fact that the kolkhozniki now know how much they will
> get for their work when they do it, and that they will get paid
> fairly soon for it, is a very big improvement on the old *trudoden'*
> system, under which the ultimate money value of the units being
> earned was unknown, and more work might simply result in less
> money per unit."

(Clarke, 1968:162; quoted by Schoonover, 1979:100).

If this change of the payment system is taken into account in the theoretical description, it implies a big step away from the conception of the kolkhoz as a producer co-operative with a lag of some 15 years behind Soviet reality.

b) *Individual production of collective output* based on contracts between the kolkhoz and the individual kolkhoznik was introduced in the *Postanovlenie* (decree) of 17. 1. 81:

> "State farms and other agricultural enterprises have been autho-
> rized to conclude (and it is recommended that collective farms
> conclude) on a strictly voluntary basis, contracts with collective
> farmers, workers, office employees and other citizens who live
> on the territories of these enterprises and conscientiously partici-
> pate in communal production, as well as with pensioners, for the
> raising and purchases of livestock and poultry and for purchases
> of surplus milk«. *(Postanovlenie, 17. 1. 81 p 15).*

In principle, the chairman of the kolkhoz can choose between fulfilling the output plan of the kolkhoz by means of collective production or individual contract production, e. g. of livestock, which is fed by the individual kolkhoznik and delivered to the kolkhoz at a fixed price. These "contract livestock" are not owned by the kolkhoznik, their number may exceed the norms for the number of livestock that can be kept as personal property, and the kolkhoznik has to be provided with young livestock and poultry, fodder, pasture areas and services on terms stipulated in the contract. The proper, private "personal subsidiary agriculture" (LPKh), which has been stimulated increasingly since 1977—78, is also encouraged, the aim being to en-

gage as great a part of the population as possible in agricultural production (Rumer, 1981; Nové, 1982; Lisichkin, 1981). For example, state farms *(sovkhozy)* and other enterprises are authorized

> "...to use money from economic incentive funds to pay back up to 50% of the credit granted for acquiring cows and calves to workers and office employees who have been working conscientiously, as well as to teachers and physicians who work and live on the territories of these enterprises and to pensioners who worked for them for a long time«. *(Postanovlenie, 17. 1. 81 p 16).*

It seems necessary, therefore, to introduce a fourth decision-maker, namely the chairman of the kolkhoz, besides the kolkhoznik, the collective, and the state. The decision-making power, the aims and means, of these four agents are assumed to be as follows:

1) the kolkhoznik: maximizes utility, given a fixed hourly wage rate for collective work, choosing the amount of private labour and in some models also the amount of collective labour.

2) the collective: has no decision-making power.

3) the chairman: is introduced in the model in section 4 below, and is assumed to choose between collective and individual contract production, in order to minimize total cost of fulfilling the procurement plan.

4) the state: fixes the hourly wage rate for collective work, the size of the private plots and other general conditions of agricultural production, with the aim of maximizing total agricultural output or surplus, subject to side conditions with respect to the composition of output and total agricultural income.

Two types of models are analyzed. In section 3 models with two decision-makers are considered, the kolkhoznik versus the chairman acting in unison with the state. In section 4 an independent part is assigned to the chairman. In both models, there is a hierarchy of decision-making, and the decision-makers on higher levels need to pay attention to the optimizing behaviour of lower level decision-makers in order to decide optimally.

3. INDIVIDUAL LABOUR ALLOCATION AT A FIXED COLLECTIVE WAGE RATE

The kolkhoznik maximizes utility, U_i, with respect to the amount of collective work, k_i, and private work, h_i, at a fixed hourly wage rate for collective work, ω, cf. equations (3) — (6).

$$U_i = U\,(W_i, l_i), \text{ where} \tag{9}$$

$$W_i = \omega k_i + p_x\,X\,(h_i, H_i) \tag{10}$$

$$l_i = k_i + h_i \tag{11}$$

Maximizing U with respect to k_i and h_i yields:

$$\frac{U_l}{U_W} = p_x X_h = \omega \tag{12}$$

This choice is similar to the choice between work in the market at a fixed wage, home production, and leisure, which has been analysed graphically and compared to empirical evidence for the U.S.A. and Israel by Gronau (1977).

The chairman of the kolkhoz, acting on behalf of the state, fixes the hourly wage rate and undertakes the obligation of employing the amount of labour supply that this wage rate elicits. In addition it may be possible to vary the number of kolkhozniki, n, and the size of private plots, H_i. If the purpose of state policy is to maximize collective output, as has often been suggested (Zemanian, 1981:292), then ω should be increased, until maximum labour is supplied and all of it to collective production. Instead two other possible, but perhaps not very realistic, purposes of state policy are considered, namely to maximize either

$$S = p_y Y - n\omega k_i \quad \text{collective, agricultural surplus, or} \tag{13}$$

$$Q = p_y Y + np_x X_i \quad \text{total agricultural output.} \tag{14}$$

Maximum surplus S, with respect to k_i, H_i and n, for fixed l_i.

When the total labour supply of the kolkhoznik is given, he only chooses the allocation of $\overline{l}_i$ on private and collective work, so that only the second of the equalities (12) is relevant. From (13) it is clear that in order to maximize collective surplus, S, the size of the private plot, H_i, should be equal to zero. The number of peasants is retained as a decision parameter as in the problem (7) — (8) above, and contrary to the individual decision models for collectives. However, the number is not decided by the collective in order to maximize income per member, but by the state in order to maximize agricultural surplus. The Lagrangian

$$L = p_y Y (nk_i, L - nH_i) - n\omega k_i + \lambda [p_x X_h (\overline{l_i} - k_i, H_i) - \omega] \tag{15}$$

is maximized with respect to ω, k_i, λ, n and H_i:

$$\frac{\partial L}{\partial \omega} = nk_i - \lambda = 0 \tag{16}$$

$$\frac{\partial L}{\partial k_i} = np_y Y_k - n\omega - \lambda p_x X_{hH} = 0 \tag{17}$$

$$\frac{\partial L}{\partial \lambda} = p_x X_h - \omega = 0 \tag{18}$$

$$\frac{\partial L}{\partial n} = k_i p_y Y_k - p_y Y_K H_i - \omega k_i = 0 \tag{19}$$

The outcome depends on which instruments it is possible to vary:

a) If only ω can be used, while n and H_i are fixed, (16) — (18) imply:

$$p_y Y_k + k_i p_x X_{hh} = p_x X_h = \omega. \tag{20}$$

In this case less labour will be spent on collective lands ($X_{hh} < 0$) than in the case with maximum total output, cf. (29) below.

b) If ω and n can be used, while H_i is fixed, (16) — (18) and (20) imply:

$$H_i p_y Y_K + k^2{}_i p_x X_{hh} = 0 \tag{21}$$

which should be fulfilled together with (20).

c) If ω, n and H_i can be adjusted simultaneously, the result becomes:

$$H_i = \omega = p_y Y_k = 0 \tag{22}$$

assuming that $X_i = X_h X_{hh} = 0$ for $H = 0$. In this case ω should be zero, because the full amount of labour $\bar{l}_i$ for each kolkhoznik will always be spent in collective production, and n should be increased until the marginal productivity of labour equals zero.

Maximum production Q, with respect to k_i, H_i and n, for fixed $\bar{l}_i$.

The Lagrangian becomes (cf. (12) and (14)):

$$L = p_y Y (nk_i, L - nH_i) + np_x X (l_i - k_i H_i) +$$
$$+ \lambda [p_x X_h (\bar{l}_i - k_i H_i) - \omega] \tag{23}$$

is maximized with respect to ω, k_i, λ, n and H_i:

$$\frac{\partial L}{\partial \omega} = -\lambda = 0 \tag{24}$$

$$\frac{\partial L}{\partial k_i} = np_y Y_k - np_x X_h - \lambda p_x X_{hh} = 0 \tag{25}$$

$$\frac{\partial L}{\partial \lambda} = p_x X_h - \omega = 0 \tag{26}$$

$$\frac{\partial L}{\partial n} = k_i p_y Y_k - H_i p_y Y_K + p_x X_i = 0 \tag{27}$$

$$\frac{\partial L}{\partial H_i} = - p_y Y_K + p_x X_H = 0, \tag{28}$$

and the conditions become:

$$p_x X_h = p_y Y_k = \omega$$

$$p_x X_H = p_y Y_k \tag{29}$$

$$k_i p_y Y_k + p_x X_i = H_i p_y Y_K$$

The last condition says that the number of kolkhozniki should be increased, until the increase in output due to the increases in labour and private lands (left side) equals the loss due to the decrease of collective lands (right side).

Optimal value of ω with specific production functions. For the purpose of illustration consider the choice of ω, for fixed n and H_i, when the production function are the following:

$$p_x X_i = a_1 (\bar{l}_i - k_i) - b_1 (\bar{l}_i - k_i)^2$$
$$p_y Y = a_2 nk_i - b_2 (nk_i)^2 \qquad , a_1, a_2, b_1, b_2 > 0. \tag{30}$$

Then (20) and the first condition of (29) are reduced to (31) and (32) respectively:

$$a_1 - 2b_1 (\bar{l}_i - k_i) = a_2 n - 2b_2 n^2 k_i - 2b_1 k_i = \omega \tag{31}$$

$$a_1 - 2b_1 (\bar{l}_i - k_i) = a_2 n - 2b_2 n^2 k_i \qquad \omega \tag{32}$$

The values maximizing surplus $(\hat{k}_i, \hat{\omega})$, and production $(\tilde{k}_i, \tilde{\omega})$, respectively, become:

$$\left.\begin{array}{l} \bar{k}_i = \dfrac{2b_1 \bar{l}_i - a_1 + a_2 n}{2b_1 + 2(b_1 + b_2 n^2)} \\[4mm] \hat{\omega} = {}_1 - 2b_1 \bar{l}_i + 2b_1 \hat{k}_i \end{array}\right\} \qquad \text{max surplus (S)} \tag{33}$$

$$\left.\begin{array}{l} \overline{k_i} = \dfrac{2b_1\,\overline{l_i} - a_1 + a_2 n}{2\,(b_1 + b_2\,n^2)} \\[2em] \widetilde{\omega} = a_1 - 2b_1\,\overline{l_i} + 2b\,\widetilde{k_i} \end{array}\right\} \quad \text{max output (Q)} \tag{34}$$

Fig. 1. Optimal values of ω and k_i for specific production functions; illustrations of the cases $b_2 = 0$, and $b_1 = b_2$, $a_1 = a_2 = 0$
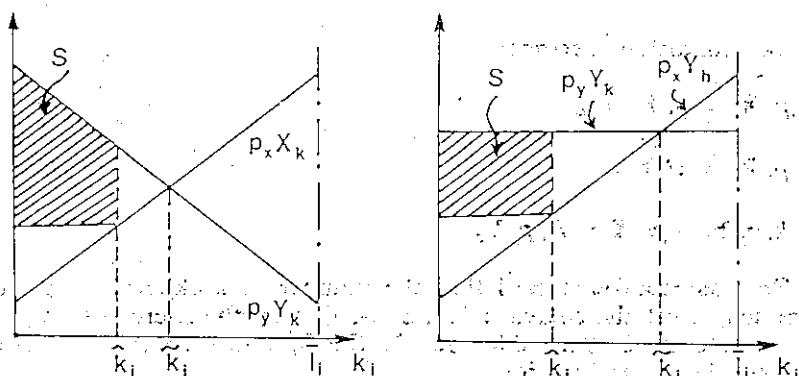
$$\hat{k_i} = \frac{1}{3}\,l_i \text{ for } n = 1, \qquad\qquad \hat{k_i} = \frac{1}{2}\,\widetilde{k_i} \text{ for } b_2 = 0. \tag{35}$$

$$\tag{37}$$

$$b_1 = b_2,\ a_1 = a_2 = 0.$$

In the case that $b_2 = 0$, the amount $\hat{k_i}$ of collective labour that maximizes the surplus, S, will be half the size of $\widetilde{k_i}$, that maximizes production, Q, as illustrated in fig. 1.

$$\hat{k_i} = \frac{1}{2}\,\widetilde{k_i} \quad \text{for } b_2 = 0 \tag{35}$$

In the general case it is verified that

$$\frac{1}{\hat{k_i}} = \frac{1}{\widetilde{k_i}} + \frac{2b_1}{2b_1\,\overline{l_i} - a_1 + a_2 n} \tag{36}$$

It is also verified that if $b_1 = b_2$ and $a_1 = a_2 = 0$, then the optimal values become:

$$\tilde{k}_i = \frac{1}{2 + n^2}\, \bar{l}_i = \frac{1}{3}\, l_i \quad for \ n = 1$$

$$\tilde{k}_i = \frac{1}{1 + n^2}\, \bar{l}_i = \frac{1}{2}\, l_i \quad for \ n = 1$$

(37)

which is also illustrated in fig. 1. The optimal amount of collective labour decreases, when the number of kolkhozniki increases.

4. THE KOLKHOZ AS A STATE ENTERPRISE

The individual decision models, including the models in section 3, leave it to the individual kolkhoznik to decide his collective as well as his private supply of labour. However, it seems rather clear that the kolkhoznik is more or less forced to work the number of hours required by the chairman, especially as this is a precondition for obtaining fodder for private livestock. There are formal requirements for the minimum number of hours, and there might also be an upper limit to labour supply during off-peak periods. As a further step towards reality it is therefore assumed in this section that the kolkhoznik has no influence on the amount of collective labour, this being decided upon by the chairman. The third decision maker in the following model is the state:

1) The kolkhoznik: maximizes utility, U_i, by choosing the amount of labour on the private plot, h_i, given the size of the plot, H_i, the price of private output, p_x, labour on collective land k_i, and the wage rate for collective labour, ω. Part of the private output is individual production for the kolkhoz based on contracts, but as the contracts are supposed to be "strictly voluntary" *(Postanovlenie,* 17. 1. 81 p 15), these two forms of production are considered equivalent. One possible difference might be, however, that there is less uncertainty connected with individual contract production with regard to output price, availability of fodder and sales possibilities. A utility is maximized with respect to private labour, h_i, only the left equality of (12) is relevant, and for convenience $-U_l/U_w$ is designated as μ:

$$-\frac{U_l}{U_w} = \mu = p_x X_h$$

(38)

2) The chairman: has the task of fulfilling the plan, π, for the state procurements of the sum of both crops or types of production taken together. According to the new principles *(Postanovlenie,* 17. 1. 81, cf. section 2 above) the chairman can choose between collective production and individual production based on contracts. It is assumed that the chairman can buy as much collective labour, k_i, as he wants, at a fixed rate, ω, and as much private output, as he wants at the fixed

price, p_x, and that his choice is determined by an obligation to mini-
mize total costs, P, of fulfilling the plan, π:

$$P = nk_i \omega + p_x (\pi - Y (nk_i, L - nH_i)) \tag{39}$$

is minimized with respect to k_i, which yields:

$$p_x Y_k = \omega. \tag{40}$$

The chairman uses collective labour until the output value per
hour of collective labour in terms of the output price, p_x, becomes lower
than the wage rate, ω, and covers the deficit by individual produc-
tion contracts at the fixed price, p_x. Equation (38) and (40) differ mar-
kedly from equations (29), which obtain, when the kolkhoznik chooses
his collective labour time himself and the chairman has to accept this
supply passively.

3) The state: has the policy of maximizing total agricultural out-
put, Q, subject to the condition that total income in agriculture does
not exceed a predetermined level, γ. A further possible condition
might be that the proportion between private and collective output
should be equal to a certain constant, due either to consideration of
the relative needs for the two products of the population or to a poli-
tical evaluation of the proper size of this proportion. But this condi-
tion is not taken into account.

In order to determine optimal state policy, it is further neces-
sary to take into consideration the optimizing behaviour of the kolk-
hozniki and the chairman, cf. (38) and (40). The state has at its disp-
osal several instruments: the wage rate, ω, the size of the private plot,
H_i, the number of kolkhozniki, n, the output plan, π, whereas the
price of private output, p_x, is an exogenous parameter, reflecting the
demand for agricultural products. The total output,

$$Q = Y + nX, \tag{41}$$

should be maximized with respect to ω, H_i, π. To solve this problem,
the Lagrangian L is maximized with respect to ω, H_i, n, π, λ_1, λ_2, λ_3,
and with respect to k_i and h_i:

$$L = Y (nk_i, nH_i) + nX (h_i, H_i) \tag{42}$$

$$+ \lambda_1 [\omega nk_i + p_x nX (h_i, H_i) - \gamma]$$

$$+ \lambda_2 [\mu (\omega k_i + p_x X (h_i, H_i), h_i + k_i) - p_x X_h (h_i, H_i)]$$

$$+ \lambda_3 [\omega - p_x Y_k (nk_i, L - nH_i)]$$

This determines optimal state policy, although in a complicated
way. The size of the procurement plan, π, has no effect upon total
output, as long as condition (40) is effective and not replaced by bor-
der solutions, as is generally assumed here.

As a simplification, consider the case, where total working hours of the kolkhozniki are fixed at $\overline{l}_i$, i. e. that the kolkhozniki have decided $\overline{l}_i$ independently of ω, p_x, H_i etc; then $\lambda_2 = 0$ and $h_i = \overline{l}_i - k_i$ is inserted into (42) to give:

$$L = Y\,(nk_i;\, L - nH_i) + nX\,(\overline{l}_i - k_i,\, H_i) \tag{43}$$

$$+ \lambda_l[\omega nk_i + p_x\, nX\,(\overline{l}_i - k_i,\, H_i) - \gamma]$$

$$+ \lambda_3\,[\omega - p_x\, Y_k\,(nk_i;\, L - nH_i)],$$

which is maximized with respect to ω, H_i, k_i, n, λ_l, λ_2, and this gives the following equations:

$$X_H - Y_K = \lambda_l\,[p_x\, nk_i\, Y_{kK} - p_x\, X_H], \tag{44}$$

$$X_k - Y_k = \lambda_l\,[\omega - p_x\, X_h + p_x\, nk_i\, X_{kk}] \tag{45}$$

$$k_i Y_k - H_i Y_K + X = \lambda_l[- \omega k_i - p_x\, X - nk^2_i\, p_x\, Y_{kk} + p_x\, nk_i\, H_i\, Y_{kK}] \tag{46}$$

$$\lambda_3 = - \lambda_l\, nk_i \tag{47}$$

$$\omega nk_i + p_x\, nX = \gamma \tag{48}$$

$$\omega = p_x\, Y_k \tag{49}$$

Equations (44) — (46) would be analogous to the optimum conditions (29), if the right hand side of the equations were equal to zero; this would be obtained, if p_x could be used as an instrument as well (maximizing (43) with respect to p_x implies that $\lambda_1 = \lambda_3 = 0$). However, the determination of the price of private output, p_x, by exogenous market forces prevents attainment of this optimum. The model can be used to determine the effects of exogenous changes in p_x and other parameters upon state policy, labour supply of kolkhozniki, and output.

5. MODELS AND REALITY

The model presented in section 4 above is realistic with respect to the limited decision power assumed for individual kolkhozniki. In the Soviet press more independence is often suggest for the kolkhozy, that is for the specialists in the kolkhozy *vis-à vis* the planning authorities, e. g. by Chernetskij (1982), who does not even mention the kolkhoznik or the collective. Also the obligation to work the number of hours stipulated by the chairman is in accordance with reality.

On the other hand the model does not include the possibility of overfulfilling the plan at a higher output price. The obligatory quota with a lower price could be regarded as a rent. Recently a uniform price has been suggested (Nove, 1982:119) and for *sovkhozy* there is a 50% premium for production in excess of the 1976—80 average (Postanovlenie, 14. 11. 80). Also, the higher productivity of individual production should be incorporated explicitly, the use of fodder being in some cases only 33% of the use in collective production (Lisichkin, 1981). Further, the maximum size of the private plot may not be an important limit to private production, the average size of private plots being well below this maximum (Nove, 1982:121; Rumer, 1981:570). The wish for leisure is apparently more important.

A further clarification of these questions is needed in order to answer the question, whether the state agricultural policy has some degree of economic rationality, or whether it is motivated purely by political traditions.

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DRŽAVA I KOLHOZNIK

Hans AAGE

Rezime

Mada je ekonomska teorija radničkih preduzeća često primenji-
vana na sovjetski kolhoz (zemljoradnička zadruga) i čak se u nekim
vidovima i specijalno razvijala radi kolhoza, očigledno je da se osnov-
ne pretpostavke ove teorije ne slažu sa stvarnim stanjem kolhoza, što
se tiče podele dobiti i odlučivanja. U modelima iz ovog članka pret-
postavlja se: da se rad u zemljoradničkim zadrugama plaća na sat po
utvrđenoj nadnici, da odluke donose kolhoznici, predsedavajući i dr-
žava, ali ne i zadruga. Pravila za optimalnu državnu politiku se for-
mulišu u članku i ukratko porede sa stvarnim stanjem u sovjetskom
kolhozu.