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**WHY HASN'T THE COLLECTIVE
FARM DISAPPEARED?**

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Abstract

The collectivization of agriculture was among the more conspicuous failures of the communist economic system. Hence, it was to be expected, when the communist polity collapsed, that collective farmers would be eager to leave their farms and engage in private farming. And yet this has happened only in Albania. In Rumania, collective farms were dismantled from above while elsewhere in Eastern Europe and the former Soviet Union, they remain more or less intact. We suggest that two factors may lead the farmer to choose to remain within the collective. First, the collective farm has difficulties in monitoring the work effort of its members. In consequence, there are well-known incentives to free ride. While this leads, in equilibrium, to a reduction in output below the Pareto efficient level and, hence, to a reduction in members' utilities, individuals with sufficiently leisure preferences will prefer to trade the income forgone vis a vis private farming - where there is no moral hazard - for the greater leisure afforded by a collective existence. Second, the transition from planning to the market has been accompanied by a large increase in the uncertainty surrounding economic activity. The collective farm, by virtue of its size and links with marketing networks, offers a measure of risk sharing to its members. The greater the degree of economic uncertainty - modelled as increased variance of expected revenues - the more likely is the collective to survive.

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1. Introduction.

The communist economic system was not notable for its successes. However, even among its failures, the collectivization of agriculture must be considered exceptional. The establishment of collective farms in the Soviet Union - a movement inaugurated together with breakneck industrialization in 1929 - was accompanied by a brutal process of "de-kulakization", where a kulak was any peasant who did not want to give up his minimal property rights in agriculture to the collective.¹ In Eastern Europe, the process of collectivization also met with resistance, to the point where in Poland and Yugoslavia it was never to be successfully completed.

This inauspicious start led to a predictable outcome for collective agriculture; viz. it failed to supply the agricultural output necessary to feed the rapidly growing industrial work force. The terms of trade were set sharply against the peasant and incentives to work were sub-optimal.² Further, collective farmers were tied to the farm by administrative fiat. Meaningful reform reached agriculture only in Hungary, where collective farmers did well only relative to their counterparts elsewhere in Eastern Europe.

Under these circumstances, we would expect the collective farm to be among the first of the economic institutions to disappear with the collapse of communism. But this has happened nowhere except in Albania - where all social institutions have fallen apart - and, to some extent, in Rumania - where the communist regime met a violent end. On the other hand, collective farms in Peru and the Dominican Republic vanished relatively quickly once the parcellation option was made available to peasants.³ This, in spite of the fact that these farms were always

¹ Conquest (1971, p.46) reports that Stalin informed Churchill that 10 million kulaks had to be dealt with and that "the great bulk" had been "wiped out".

² For a comparison between work incentives in the *kolkhoz* and in the Israeli *kibbutz*, see Guttman and Schnitzer (1989).

³ Under this option, collective farms were simply divided up among the peasants. See Carter (1987).

more democratically run than those prevailing under communism and that they were never made to bear the brunt of an industrialization drive. Thus, the continued existence of collective farms in Eastern Europe and the former Soviet Union represents a major puzzle in the economics of transition. The purpose of this paper is to develop a simple model in which rational collective farm members opt *against* decollectivization.

In developing the model, we build on the contribution of Carter (1987), who showed how parcellation can be the equilibrium outcome when there is a trade off between personal risk - against which the collective self-insures - and moral hazard. However, Carter argues that more "general risk, which systematically affects agricultural production (e.g., price and macroenvironmental factors) cannot be locally insured and is ignored here." We maintain that the collective farm has a measure of market power accruing from its size and contacts with central marketing organizations which permits it to offer a measure of self-insurance with respect to the risks associated with revenue and costs.

It is shown that two factors may lead the farmer to choose to remain within the collective. First, the collective farm has difficulties in monitoring the work effort of its members. In consequence, there are well-known incentives to free ride. While this leads, in equilibrium, to a reduction in output below the Pareto efficient level and, hence, to a reduction in members' utilities, individuals with sufficiently leisure preferences will prefer to trade the income forgone vis a vis private farming - where there is no moral hazard - for the greater leisure afforded by a collective existence.⁴

Second, the transition from planning to the market has been accompanied by a large increase in the uncertainty surrounding economic activity. The collective farm, by virtue of its

⁴ It is interesting to note that these were, in essence, the two arguments used by the Bulgarian socialists - the former communists - in their successful election campaign in the Bulgarian countryside in the first free elections following the collapse of the communist dictatorship.

size and links with marketing networks, offers a measure of risk sharing to its members. The greater the degree of economic uncertainty - modelled as increased variance of expected revenues - the more likely is the collective to survive. Given the high degree of economic uncertainty which pervades all former communist countries and the legacy of disincentives to work in agriculture, we conclude that the collective farm, albeit with an inevitable modification in property rights, is likely to prove a resilient institutional form for the foreseeable future.

2. The Model.

The precise rules governing the post-communist transformation of the collective farm differ from country to country. Common to all, however, is the change in economic environment implied by the transition from central planning to the market. Under, these circumstances, the property rights of collective farmers have undergone a change. Whereas under central planning the state was the effective residual claimant, the peasant being left with whatever output the state either did not want or could not extract, in the new environment the collective farm has become the residual claimant. We shall assume that the collective farm is democratically run and that income is allocated - as in the past - on the basis of work done.

While farm members are now free to leave, the economic climate is such that most who left for the towns would find themselves unemployed. In the absence of large-scale capitalist farms as potential employers, exit within agriculture implies small-scale family farming. For this, however, land is necessary. We analyze two plausible privatization scenarios. First, we consider the case in which farm members who wish to leave may "take with them" a share of the collective's land in proportion to their number. This attempts to capture the essence of the hitherto failed Soviet agricultural reform introduced by the Gorbachev government.

The second case is one in which collective farm members vote on whether or not to disband, i.e., parcellate, the farm. Regardless of whether this is considered as an all-or-nothing decision or whether partial parcellation is a permitted outcome, we prove the existence of a Nash equilibrium in which the decision maintain the collective is unanimous.

A. Parcellation by attrition?

We assume identical individuals, so that if it is worthwhile for one to leave, it is so for all. In this case, there are no strategic considerations involved. The individual farm member compares his expected utility if he remains with that if he leaves. If the individual remains in the collective, his expected utility is given by:

$$E_{\theta} \left[\theta R(Q) \frac{l_i}{L}, (e_i \times l_i) \right] \quad (1)$$

where e_i is the work effort of individual i ,

l_i is the monitored labor input of the i th individual,

$(e_i \times l_i)$ is a composite product of effort and labor,

$L = \sum_{i=1}^m l_i$ is total labor supply for a collective farm with m members,

Q is total collective farm output and is a function of all members' actual labor input,

$R(Q)$ is collective farm profit

and θ is a random variable, influenced by uninsurable risks like fluctuating demand for output or climate hazards. We choose θ such that $E\theta = 1$. We assume, following Carter (1987), that $U_1 > 0, U_{11} < 0, U_{12} = 0$ and $U_{111} = 0$.

As a private farmer, the individual maximizes the following utility function:

$$E_{\theta} \left[\theta r_i(q_i), (e_i \times l_i) \right] \quad (2)$$

$$E\theta R(Q) > E \sum_{i=1}^m \theta_i q_i \quad (3)$$

Following Miyazaki (1984), we may define a private farm as a collective farm with only one member. Since the collective farm offers local insurance, for any number of members greater than one, we have that $\text{var}\theta_i > \text{var}\theta$. As the collective farm gets smaller, its capacity for self-insurance diminishes and we assume that $\lim_{m \rightarrow 1} \text{var}(\theta) = \text{var}(\theta_i)$.

Since the private farmer has no difficulties monitoring his own labor input, it is reasonable to suppose that, upon departure from the collective, he will increase his work effort, e_i . It may be, however, that he cannot thereby increase his utility. Consider, first, the simple case with no uncertainty, so that $\theta = \theta_i = 1$. The members of the collective farm will individually opt to remain members if:

$$U[r_i(q_i), (e_i^p \times l_i^p)] \leq U[R(Q)_L^k, (e_i^k \times l_i^k)] \quad (4)$$

where the superscripts p and k represent respectively, equilibrium outcomes under private and collective farming.⁵ Owing to production and marketing economies, the same labor input leads to less individual income under private farming than collective farming. The idea behind parcellation is that farmers will, thereby, increase their labor inputs. But this depends on leisure preference, as is readily shown diagrammatically. In Figure 1, we contrast the behavior of Latin American collective farm members with those of Eastern Europe when both groups faced the parcellation option. U_1 and U_2 are indifference curves showing, respectively, the leisure-income preferences of East European and Latin American peasants and representing individual utility under collectivization. For ease of exposition, it is assumed that the income possibilities frontier under private farming, AA' , is identical for both regions. Owing to moral

⁵ The equilibrium determination of labor supply in collective farms is considered by Carter (1987) for Latin America and Guttman and Schnytzer (1989) for the Soviet Union and Eastern Europe.

hazard, the Latin American collective farm members begin at point D on U2. If the individual leaves the collective and does not change his labor input, he moves to point G on AA', where he is worse off. An increase in labor input, however, moves him to point F, hence the decision to leave. The East European peasant, facing an even worse incentive system on the collective farm, starts at point B on U1.⁴ In this case, private farming with equal labor input would leave him worse off at point C on AA'. But then in this case, no amount of extra work will make him better off than he was at B. Consequently, he opts to stay on the collective farm.

We now consider the general scenario of voluntary departure from the collective farm under uncertainty. In this case, the individual collective farm member will opt to remain a member if:

$$EU[\theta_i r_i(q_i), (e_i^p \times l_i^p)] \leq EU[\theta R(Q) \frac{l_i}{L}, (e_i^k \times l_i^k)] \quad (5)$$

To determine the conditions under which inequality (5) may hold, we write the Taylor Series expansions around both sides of the inequality at the point $E\theta = E\theta_i = 1$, which, after simplification, come down to:

$$EU[\theta_i r_i(q_i), (e_i^p \times l_i^p)] = U[r_i(q_i), (e_i^p \times l_i^p)] + \frac{E(\theta_i - 1)^2}{2} r_i(q_i) U_{11}^p [\dots] \quad (6)$$

$$\text{and } EU[\theta R(Q) \frac{l_i}{L}, (e_i^k \times l_i^k)] = U[R(Q) \frac{l_i}{L}, (e_i^k \times l_i^k)] + \frac{E(\theta - 1)^2}{2} R(Q) \frac{l_i}{L} U_{11}^k [\dots] \quad (7)$$

The first terms in equations (6) and (7) represent the income-labor trade off in the absence of uncertainty. The impact of uncertainty is given by the two second terms. To show how uncertainty may convince individual farmers that it is best to remain in with collective, let

⁴ This assumption seems reasonable, however our results do not hinge upon its validity.

us suppose that $U[r_i(q_i), (e_i^p \times l_i^p)] > U[R(Q)_L^l, (e_i^k \times l_i^k)]$. That is, suppose the individual's indifference curve is given by U2 in Figure 1. Thus, in the absence of uncertainty, the optimal decision would be to leave the collective farm. But note that:

$$\frac{E(\theta-1)^2}{2} r_i(q_i) U_{11}^p[.] < \frac{E(\theta-1)^2}{2} R(Q)_L^l U_{11}^k[.] < 0 \quad (8)$$

and if the first term in inequality (8) is sufficiently less than the second, this uncertainty effect will outweigh the gains from extra labor under private farming. The effect of uncertainty is shown in Figure 1. The private farming income possibilities frontier is now shown as the band, JAH, instead of the curve AA'. Now, from point D on U2, the labor input yielding utility at F under private farming with no uncertainty, brings only the expected utility at X.⁷ We have thus shown that either a sufficiently great leisure preference or privately uninsurable income risk may explain the continued existence of the once despised collective farms of Eastern Europe and the former Soviet Union.

B. A unanimous decision to stay?

Suppose now, that parcellation is either an all-or-nothing process requiring a unanimous vote of the members or that parcellation takes place in a measure determined by the proportion of votes in its favor. Further, suppose that it is not individually rational to leave the collective farm; i.e., condition (5) holds. Then we may prove the following:

Theorem. If it is individually rational to remain a collective farm member, then unanimous rejection of both complete and partial parcellation is a unique Nash equilibrium.

Proof. The voting game in the case of a unanimity requirement is a simple 2×2 matrix game in which one collective farm member plays against all of the others. The unanimity requirement

⁷ The influence of uncertainty on production has been analyzed by Parush and Kahana (1980).

allows us to consider all members other than i as acting symmetrically.⁶ The individual payoffs are shown in the following payoff matrix:

	The others leave	The others don't leave
Individual i leaves	V, V	V, W^{m-1}
Individual i doesn't leave	V, V	W, W

$$\text{where } V = E U_{\theta} \left[\theta R_i(q_i), (e_i^p \times l_i^p) \right]$$

$$W = E U_{\theta} \left[\theta R(Q) \frac{l_i}{L}, (e_i^t \times l_i^t) \right]$$

$$\text{and } W^{m-1} = E U_{\theta} \left[\theta R(Q(\Sigma_j^{m-1} l_j)) \frac{l_j}{\Sigma_j^{m-1} l_j}, (e_j^t \times l_j^t) \right].$$

Note that regardless of what strategy individual i adopts, not leaving the collective farm is a dominating strategy for the others since W and W^{m-1} are both greater than V . If the others don't leave, then leaving is not optimal for the i th individual since a deviation to staying improves his payoff from V to W . Thus, a unanimous decision to stay is the unique symmetric Nash equilibrium in the game.

The game which results when partial parcellation is permitted is a little more complicated. Each individual remains with the same two strategies, but he must now take into account that others may vote non-symmetrically. To complete the proof of the theorem, it is sufficient to show that there exist no non-symmetric equilibria in the game. Consider an

⁶ Since all members are assumed identical it might be thought that we need to consider only symmetric equilibria, although it should be noted that there may exist non-symmetric equilibria. For an example of such a seemingly perverse outcome, see Nitzan and Schnytzer (1987).

outcome whereby k members vote to leave and the remaining $m-k$ vote to stay. An individual who voted to leave may increase his utility by changing his vote if no other individuals change their votes because, by assumption, the expected utility of private farming is less than the expected utility of being a collective farm member. Hence this outcome is not a Nash equilibrium and thus there exist no non-symmetric equilibria in the game. QED

It follows immediately from the theorem that a majority vote to disband the collective farm can never be obtained in equilibrium. Further, it should be noted that the theorem holds for non-identical individuals, provided that staying on the collective farm is individually rational for them all. If this is not the case, then provided there is at least one member who stands to lose from parcellation, a unanimous vote in its favor can never be an equilibrium outcome. On the other hand, depending on the number of members who stand to gain by leaving the collective, votes on partial parcellation may yield a number of different equilibrium outcomes.

3. *Conclusions.*

In this paper we confronted the seeming paradox that, in spite of its tragic history, the collective farm has thus far displayed considerable endurance in Eastern Europe and the former Soviet Union. We have shown that either sufficiently high leisure preference or the greatly increased uncertainty now faced by these economies may convince collective farm members that they are better off staying where they are than they would be were they to embrace small-scale capitalist farming.

4. References.

Carter, M., "Risk Sharing and Incentives in the Decollectivization of Agriculture." *Oxford Economic Papers* 39: 577-595, 1987.

Conquest, R., *The Great Terror*. Penguin, 1972.

Guttman, J.M. and A. Schnytzer, "Strategic Work Interactions and the Kibbutz-Kolkhoz Paradox." *The Economic Journal* 99: 686-699, 1989.

Miyazaki, H., "On the Success and Dissolution of the Labor Managed Firm in Capitalist Economy." *Journal of Political Economy* 22: 909-931, 1984.

Nitzan S. and A. Schnytzer, "Diligence and Laziness in the Chinese Countryside Revisited," *Journal of Development Economics* 22: 407-418, 1987.

Parush J. and N. Kahana, "Uncertainty and the Cooperative Firm," *American Economic Review* 70: 212-216, 1980.

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