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"Agricultural Organization and Management in the Soviet Union: Change and Constancy

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SUMMARY

AGRICULTURAL ORGANIZATION AND MANAGEMENT IN THE SOVIET UNION: CHANGE AND CONSTANCY

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The main conclusions of this paper is that the relatively poor performance of Soviet agriculture is to be explained primarily by the inadequate support of agriculture from the nonagricultural sector of the economy, the inappropriateness of prices for outputs and inputs, and the unwillingness of the planners and bureaucrats to permit a reasonable degree of freedom for the farms to manage their own affairs. These conclusions run counter to two other explanations that are often given to explain why Soviet agriculture has remained an important economic problem. It is quite common to attribute the deficiencies in the performance to the forms of farm organization—the collective and state farms, the large size of the farms and the climatic factors that prevail.

It is argued that if prices and incentives were inappropriate and if both the supply of inputs and the provision of marketing services were undertaken at reasonable costs and effectiveness that the socialized forms of farm organization would not be a barrier to efficient and low cost agricultural production. Even with the very large size of farms, it would be possible to decentralize decisions within the farms to arrive at optimum size production units.

Experience clearly indicates that private agriculture will not be low cost and efficient if the price system provides inappropriate signals and inputs are not supplied at reasonable prices and in an assured manner.
The results of the paper, if valid, indicate that there is no "quick fix" available for significant improvements in the performance of Soviet agriculture. Price reforms that will correct the deficiencies of the current price relationships will be very difficult to carry out. It will not be a simple matter to improve the quality of farm machines and other inputs, to price them appropriately, to assure adequate supplies or to guarantee spare parts. If it were a simple matter, it would have been accomplished long ago.
AGRICULTURAL ORGANIZATION AND MANAGEMENT IN THE SOVIET UNION: CHANGE AND CONSTANCY

D. Gale Johnson

My task has been made immeasurably simpler by an excellent article by David M. Schoonover (1979), "Soviet Agricultural Policies" in the 1979 Joint Economic Committee volume on the Soviet Union. Schoonover provides a competent and balanced review of Soviet agricultural policies, with emphasis on the period since Stalin's death. He traces the major changes in agricultural price policies, the important organizational and administrative changes, the continuing program to increase the scale of farms, the emphasis upon specialization in agricultural production, and upon interfarm cooperation and agroindustrial enterprises. Throughout the period surveyed runs a thread of vacillation with respect to decentralization of planning and management, with little real change evident as a result of numerous reorganizations of the bureaucracy and even more numerous pronouncements by the highest officials. Similarly Schoonover traces some of the twists and turns of official policy with respect to the private plots on collective and state farms.

Overriding and dominating almost all aspects of changes in agricultural organization and management have been the following:

1. Increased size of farm enterprises;
2. Emphasis upon specialization in agricultural enterprises;
3. Abolition of the machine tractor stations;
4. Gradual reduction of the differences between state and collective farms;

5. Changes in agricultural output price and procurement policies which, however, except for the increase in the average level of output prices showed no systematic development over time;

6. Radical departure from the Stalinist exploitation of agriculture in favor of increased material incentives resulting in both higher and more secure incomes for farm people; and

7. Striking increases in the availability of nonfarm produced inputs for agriculture after 1965 and unprecedented rates of investment in buildings, capital equipment and machinery.

But with all of these changes, and others that might have been noted, much remains essentially unchanged from the 1930s. The fundamental features of Soviet agricultural organization and management have changed little during the past four decades. Equally important, as I shall argue, the fundamental nature of the interrelationships between agriculture and the rest of the economy has remained largely unchanged. True, the MTS are gone and compulsory deliveries at nominal prices have been abandoned. But farms still have too little involvement in the decisions with respect to the kinds, types and qualities of machines available to them; farm output is still procured according to purchase plans established by outside agencies. Decisions with respect to both inputs and outputs and production plans are still heavily circumscribed by decision rules that are inconsistent with each production unit maximizing its own objectives or goals.
After a relatively brief discussion of the ways in which Soviet agricultural performance might be described as disappointing, and some of the sources of those shortcomings, I present a simplified model of a collective farm and work out some of the implications of that model. The model of a collective farm is used to throw some light upon whether the collective farm structure would necessarily result in inefficient allocation of resources.

The third part of the paper considers some of the ways in which the actual collective farm structure deviates from the model and the effects of some of the policies adopted by Soviet officials to offset the sources of inefficiency and inequities in the distribution of income in the rural sector. The final part of the paper emphasizes the limited role for further changes in agricultural management and organization unless there are substantial modifications in the manner in which agriculture interacts with and is affected by the rest of the economy. Barring major improvements in pricing, marketing, input supply and bureaucratic interventions (planning) I see little scope for improving the functioning of agriculture through changes in the management and organization of agriculture.

Disappointing Performance

A full development of why the performance of Soviet agriculture since World War II can be described as disappointing is unnecessary. However, a few noteworthy points may be made in partial support of the description. A
slow rate of output growth is not the primary basis for calling the performance disappointing. Since the death of Stalin the annual growth rate of agricultural output has been approximately 3.4 percent. Compared to the agricultures of Western Europe, North America and Australia this is a very satisfactory growth rate. For the same period of time annual output growth in the United States has been less than 2 percent. However, along with the shortcomings noted immediately below, it appears that the rate of agricultural output growth was significantly lower during the 1970s than in the 1960s. The annual rate of output growth from 1961-65 to 1970-72 was 3.3 percent; from 1970-72 to 1977-79, 2.3 percent (USDA, 1980b).

The basic shortcoming with respect to output growth has been that it has not kept pace with the growth of demand at the prices to consumers, especially of meat and milk, that have been considered consistent with political stability. These consumer prices have remained essentially unchanged since 1963. In 1980 the per capita consumption of food products with relatively high income elasticities—meat and fruits—is much lower in the Soviet Union than in other countries with comparable real per capita incomes.

Three major indicators of the disappointing performance of Soviet agriculture are the very high fraction of national investment devoted to agriculture, the high cost of farm products, and the instability of output. During the Ninth and Tenth Plans, approximately 26 and 27 percent respectively, of total investment in the economy were devoted to productive activities on farms. A comparable figure for the United States for the same period would be about 5 percent of gross national investment, excluding investment in residential construction. In addition to the high rate of farm investment, very substantial investments were made in the farm input industries.
The high cost of Soviet farm output is reflected in the prices paid to the farms, especially for meat and milk. Even though consumers are using upwards of 40 percent of their income to purchase food (USDA 1980c) subsidies to farms for meat and milk purchases may have been at least 30 billion rubles in recent years.

The third shortcoming of Soviet agriculture is the wide variability in crop output, especially grain, feed and vegetable oil output, from year to year. The economic costs are substantial, whether met by investment in storage, importation of grain and other feed materials, or through accepting the consequences of significant variations in meat and milk output. The primary means of coping with the variability of output of grains and other feeding materials during the 1970s has been through grain imports, including years of imports of more than 25 million tons. The political costs, represented by dependency upon external sources for fulfillment of plans and expectations, are also high. The Soviet Union is no longer in danger of famine, even if it imported no grain or other food following a very poor crop. But the leadership has for too long raised expectations to such a level that the capacity to prevent severe shortages of calories is not enough. Thus production variability carries with it the necessity of depending on the outside world and this means, to a very large extent, the United States.

The high average prices and costs of livestock products appear to reflect abnormally large feed and labor input per unit of output. Even though there have been heavy investments in livestock building and equipment during the last decade, there is no evidence that feed use per unit of output has declined, though there has been some reduction in labor input (Johnson 1974). However, even with absolute levels of investment five to
seven times that of U.S. agriculture during the 1970s, labor input in Soviet agriculture declined at a slower rate than in the U.S. (Diamond and Davis 1979, pp. 38 and 41).

Many explanations have been given for the various shortcomings of Soviet agriculture. These have included the large scale of the socialized farms, on the one hand, and the tiny scale of private agriculture that still utilizes a major fraction of the total labor input, on the other hand; the low level of incomes received by workers; inadequate transportation; poor quality of farm inputs; the quality of land and climatic limitations; ineffectiveness of the marketing and storage systems; and the socialized forms of agricultural farms. I shall first consider one of these possible sources of an inefficient agriculture—the collective farm.

Many observers of Soviet agriculture have long held that a significant part of its poor performance could be explained by the collective farm system and certain inherent features of that system. I am now not so certain of that view, and most of the remainder of this paper deals with a model or models of a collective or cooperative farm. It is possible to support the view that while one can find some reasons—actually two reasons—why a collective farm might not be as efficient as private agriculture, I conclude that adequate explanations of the poor economic performance of Soviet agriculture must be found elsewhere.

I recognize that over time the relative importance of collective farms has declined and that the changes envisaged for the future will result in an even smaller role for the collective farms. Collective farms now account for 58 percent of the employment and approximately half of the output of socialized agriculture. For the period since World War II the relative importance of the collective sector was greater, much greater during the
first half of the period. But I believe that the arguments that I make about the effect of the collective farm system upon Soviet agricultural performance applies with nearly the same force to state farms. I shall return to this point briefly at the end.

A Model of a Collective Farm

An analytical model must start with certain key assumptions. I have not found any official Soviet analytical conception of the collective farm, but this is hardly surprising since the establishment of collective farms appears to have had four primary objectives that largely outweighed any niceties of organizational forms. These objectives were the liquidation of the kulaks, the achievement of effective political control over the countryside, and the creation of large-scale production units as a means of increasing the percentage of farm output that was marketed, achieving greater output than was possible on millions of small-scale farm units. The emphasis could as easily have been given to state farms, and has been to an increasing degree in recent years. The choice of the collective form of organization may well have been dictated by considerations of peasant resistance to completely giving up the land promised them by the revolution, to the inability to fully bring the rural sector into the monetary economy, and to greater capacity of the collective rather than the state farm as a mechanism for the exploitation of the peasants.

Based on the collective farm statute and other information, one can state three assumptions that may serve as the basis for an analytical model of collective farms:

1. The collective farms should be large-scale units.

2. Land to be assigned to farms, rent free and in perpetuity, on the basis of the existing populations of the villages. Land cannot be bought or sold or transferred in any other way.
3. The farms to be organized as cooperatives, with management controlled by a meeting of the members and with all major decisions, such as work rules, membership and distribution of income, to be approved by the members.

Anyone who knows anything about Soviet collective farms will immediately say that the third assumption is largely, if not wholly, incorrect, and that it was always assumed that the state had the right to extract differential rent associated with advantages of fertility of the soil and location. But for the moment I shall accept these assumptions and determine the possibilities of achieving an efficient allocation of resources within such a system.

If there were no additional economic restraints on the behavior of the cooperative, and if there were not significant economies or diseconomies of scale over the range of farm sizes, the cooperative form of organization would not result in economic inefficiency unless in the same circumstances privately organized firms would also be inefficient. In other words, if one assumes a competitive situation, a cooperative need be neither more nor less efficient than a private firm. This will be true even with the restraints on land assumed in the analytical model. The restraint on the amount of land available to a farm could be fully offset by varying the amount of other resources. This would be true even if there were only one other input, namely labor, so long as that other input can be freely bought and sold. The return to land would be maximized by employing labor until the value of the marginal product of labor used within the cooperative equals the value of its use in the best alternative outside the cooperative. It is clearly in the interest of the members of the cooperative to employ additional labor, paying it the value of its marginal product, if
without the added labor the value of the marginal product were greater than the wage that had to be paid to the workers. Similarly, if the value of the marginal product of the labor of the members of the cooperative were less than alternative earnings outside the cooperative, it would be in the interest of the members to encourage some individuals to seek employment outside the cooperative while retaining their rights in the rent from the land and the return on other capital assets. These conclusions can be derived from several articles (Helmberger, Ward, Domar, Oi and Clayton and Meade) that have presented economic models of cooperatives.

However, if restraints are imposed upon the model to prevent the cooperatives with a relatively high value of marginal product of labor from employing hired labor, then an industry consisting of cooperative firms cannot be efficient. If the primary means that a cooperative has to bring the value of the marginal product of labor down to the value in alternative uses is to admit new members, with a claim to a share of the rent on land and capital earnings, there is no incentive to expand the labor input. In this situation, resources will not be efficiently allocated among firms.

If labor were paid on the basis of its average product and allocated on the basis of maximizing the average product, the allocation of labor and complementary inputs among farm products would not result in the maximum possible value of output. It would do so only in the unlikely circumstance that land and labor were used in the same fixed proportions for all farm products or the average product of land were the same for all farm products. The natural tendency of the collective farms to allocate their labor to products with a high average product of labor rather than to products where the marginal products of labor is high and uniform can be partially offset by imposing procurement and production plans upon the farms. This approach is used, of course, though it is not clear if the
reason given is the one used to rationalize the agricultural planning process.

A critical question is whether a system of farm cooperatives operating subject to the added restraints would move toward a more efficient allocation of resources than imposed by the original assignment of land. As long as land is an important factor of production, adding inputs other than labor does not modify the result significantly. Figure 1 depicts the situation of two different cooperatives. Each farm has, at the time of organization or some subsequent time (the labor-land ratio was changed significantly by World War II) a given amount of land and a given membership with a specified number of able-bodied workers. It is further assumed that the elasticity of supply of work from the members is zero. Cooperative "A" had a relatively favorable man-land ratio, while "B" had a less favorable one. It is assumed that there are no other factors that affect labor or land productivity; thus for the same labor-land ratio the average revenue product and the value of the marginal product of labor would be the same on the two cooperatives. Relaxing this assumption, as noted later, is not likely to improve the situation.

Cooperative "A" members would have significantly higher incomes and higher value of labor marginal product than Cooperative "B" members. Agricultural output could be increased if the members of "B" were admitted to "A" until the values of the marginal product of labor were equalized. But there is absolutely no incentive for "A" to permit this readjustment. The consequence would be a loss of income to the existing members of "A" and the loss could be substantial. This result is an empirically realistic one. Even though there are and have been substantial income differences among collective farms in the same community, there have been almost no
additions to the membership of high income collectives by transfers from other collectives. 2

In Figure 1 it was assumed that the collectives had the same production function and that members received a payment equal to the average product of their labor. Even assuming that the product curves are net of all exactions made by the state in the form of taxes or required support for various public services, the actual payments to the members are less than those indicated. Collective savings, whether forced or voluntary, must come out of the average product and is not available for distribution. But the fact that collective savings on Cooperative "A" will be significantly larger than on "B" would almost certainly lead to an increase in the income disparity over time.

If the income differences between the two cooperatives were of the magnitude indicated, it is unlikely that the similarity in the average and marginal product functions would hold for long. 3 The high income collective could make investments in its land that would increase the marginal product of land, for a given current labor input, to a much greater extent than the low income collective. This is depicted in Figure 2 by the disparate upward shifts over time in the product curves for labor on the two collectives.

Of course, if there were an efficient capital market, the low income collective could keep pace with the high income one. But it could only keep pace; the income differential that existed at the beginning could only be narrowed by reducing the number of members in the low income collective. Further, over time the high income collective probably would improve the relative quality of its labor force, both as workers and managers, and thus further increase the income disparity. The improvement in labor force quality would occur in two ways: more schooling for the younger people and higher retention rates of members with greater human capital. Soviet
Agriculture appears to lose through migration a very high percentage of its young people and, in particular, young people with marketable skills. High income cooperatives would be in a better position to retain more of those with such skills. It appears that there is no substantial basis for expecting that income differences among the cooperatives would be reduced, given the assumptions about labor mobility.

Two caveats are required for the statement that the cooperative form of organization could be as efficient as a private firm in a competitive situation. First, if the members of the cooperative firm cannot sell the value of their rights in the cooperative, investment will not be optimal. There will be no way that existing members can assure themselves of receiving the full benefits of an investment. This feature of cooperatives, which seems to be nearly universal, would primarily affect long-term investments. If the full fruits of an investment could be realized within a fairly brief period—say two to five years—the impact would be much smaller than if a significant part of the investment could be realized only after a decade or more. This feature of collective farms may partially explain why soil erosion is such a major problem, or why land reclamation projects such as drainage seldom achieve their goals, or why such a significant percentage of irrigated land is abandoned each year.¹

Second, a farming cooperative may quite freely choose a method of distributing its net income that leads to some inefficiency in the use of resources within the farm. The net income of a cooperative is generally distributed according to the amount of a particular input contributed by the members. In the case of an agricultural cooperative the input used to allocate income is generally labor. This means that labor will be paid on the basis of its average product. If it is true that labor is both paid
on the basis of its average product and allocated to maximize the average product of labor, the allocation of labor and complementary inputs among farm products (crops and animal products) would not result in a maximum value of output. It would do so only in the unlikely circumstance that land and labor were used in the same fixed proportions for all farm products or the average product of land (and all other inputs beside labor) were the same for all farm products. The natural tendency of the collective farms to allocate their labor to products with a high average product of labor rather than on the basis of marginal labor product can be partially offset by imposing procurement and production plans upon the farms.

Let us turn now to the question of whether a system of farm cooperatives subject to the added restraints would over time move toward a more efficient allocation of resources than imposed by the original assignment of land. The added restraints are those related to the employment of hired labor and the prohibition on the sale of membership rights. As long as land is an important factor of production, the existence of inputs (machinery, fertilizer and energy) in addition to labor does not modify the result significantly.
One of the assumptions of the model of the cooperative farm was that land was originally assigned to farms on the basis of the prevailing distribution of village populations and the supply of land farmed by the members of the villages. For a variety of historical and economic reasons there were substantial variations in the amount of land per worker, a circumstance not unique to Russian agriculture. As the previous discussion has indicated, the particular restraints that prevent cooperatives from adding new members without loss to existing members has prevented some adjustments that could reduce income inequalities among the collective farms within a region or between regions. As noted earlier, if hired labor were an acceptable practice, high income collective farms could hire workers from low income collective farms. This would not decrease the incomes of the members of the high income collective farms; in fact, it would increase their incomes while also increasing the incomes of members of the low income collectives. But this is not a solution that has been adopted to any significant degree. Much of the hiring of labor for the traditional farm tasks has been of nonfarm people who, willingly or otherwise, make themselves available during the peak labor demand periods.

The substantial differences in rural income, both within regions and between regions, induced the government to devise programs specifically designed to reduce income inequality. There are some approaches to reducing such income inequalities that could result in a more efficient use of resources. Permitting the employment of hired labor, as noted above, is one approach to reducing income inequality while improving efficiency of resource use. Two other approaches that would have desirable impacts upon both the distribution of income and resource efficiency are noted—labor mobility from agriculture to urban areas and charging rent for land.
But for a number of reasons, primary emphasis has been given to other approaches for reducing income inequalities. And as will be noted these approaches impose substantial costs in terms of inefficient use of resources.

A solution that would be consistent with the basic theory of collective agriculture (with legal or self-imposed restraints on hiring labor) and improve resource efficiency would be through differential mobility of farm people to urban communities. To the extent that regional and personal inequality of income has been reduced in agriculture in private market economies, differential mobility has been much more important than any farm policy. Differential mobility has functioned through both actual migration and by the increase in off-farm work in private market economies. In recent years, the Stalinist policy of restricting the nonagricultural employment of collective farm members has changed to one of encouraging collective farms through the development of "agrarian-industrial complexes" and by some other means. However, as my colleague, Arcadius Kahan (1976), has shown, the amount of employment, and especially off-season employment, provided to farm workers has so far been very small.

Another approach to offset some of the effects of the unequal labor-land ratios when mobility is limited is to charge or collect rent on land. Two main approaches for collecting differential rent have been considered since the abolition of the machine tractor stations. One is through the price system and the other is by a direct rental charge.

A specific rental charge on land, if a part of an appropriate set of output and input prices, would go some distance toward reducing income inequality in agriculture without adverse effects upon resource allocation. If the rental charge were related to the value of the marginal product of
land, a part of the source of the higher incomes of farms with relatively low man-land ratios would be captured by the state. However, a rental charge cannot fully offset the effects of labor immobility. Assuming that the quality of labor were everywhere the same, the amount of rent per unit of land collected on farms with a relatively high man-land ratio would be greater than on farms with a relatively low man-land ratio for land of equal productivity.\(^5\)

It is not surprising, of course, that charging rent would not remove all or even most of the income inequality when land cannot be rented in or out, and labor cannot move freely among farms. The high man-land ratio farms, even though paying higher rent per unit of land, would not be able to acquire more land by renting (or buying). Thus the Soviet economists who favor charging rent probably would be disappointed in the resulting effects upon income distribution. If the rent charged per unit of standard land were set equal to the rent on farms with the lowest man-land ratios, some improvement in income equality would be achieved. My impression is that this is what at least some Soviet economists have in mind. This practice would then leave some of the rent for distribution as labor payments on farms with high man-land ratios. However, even this may be disappointing starting from the current situation, since the marginal productivity of land on the current high income per worker farms may well be substantially higher than on the low income per worker farms due to the long-term effects of higher quality management, greater human capital and larger investments in land improvements on the higher income farms.

The approach taken since the abolition of the Machine Tractor Stations has been to capture rent through the use of differential prices. The general practice has been to differentiate prices regionally, though there are some
cases where regional prices have been differentiated according to productivity or incomes of groups of farms within a price region. I shall consider only the regional differentiation of prices. It should be added that price differentiation has been accompanied by minimum and guaranteed payments to workers per day of work. These minimum payments are relatively uniform both within and among regions, at least this is the impression that one gets from the limited amount of data that has been published.  

Once minimum wages have been established by regions, output prices must be established that cover production costs on most farms. The criterion for establishing zonal prices was to cover average production costs plus some unspecified percentage of net income or profit. Land costs are not included in production costs. It is possible that regional or zonal price differentials and the minimum wages have reduced regional income differences. However, the reduction in income inequality has certainly been at the cost of efficiency. If land and labor were the only inputs used in agriculture, the added inefficiency other than that due to labor immobility would be small. However, purchased inputs have come to play an important role in Soviet agriculture. Regions with high output prices would tend to increase their use of purchased inputs, such as fertilizer, relative to regions with low output prices. Thus the real value of marginal product of fertilizer would be significantly lower in high price than in low price regions. I am assuming, to some degree inaccurately, that the decisions on the amounts of inputs to use are made by the farms. If this is not the case, then the inefficiency from regional price differentials would be relatively small.

It is uncertain how seriously the objective of reducing regional income differentials is actually taken. Most farm products now carry substantial
premia for above procurement plan deliveries. These differentials, which are of the order of 50 percent for many products, have resulted in substantial income inequality due to inequities in establishing the delivery quotas, either regionally or among farms in the same region. The objective of the price premia is to increase output and marketings, and it is possible that this objective receives more weight than reducing income inequality.

If the price system described above is not complex enough, in some republics experiments have been made to differentiate prices within a regional price zone (Kalnyn'sh 1972). This was done by dividing farms into four groups according to their costs of production and differentiating prices so that higher prices were paid to relatively high cost farms and lower prices to relatively low cost farms. This is a witch's brew that could hardly be more effective in discouraging efforts to reduce production costs. If farms are reclassified among groups, as it appears they are, cost reductions will sooner or later be followed by price reductions. In fact, during some period of time it would be profitable to expand output through high cost means in order to obtain a higher price in the future. Gray (1979, p. 553) was informed that the extent of price differentiation by zone and "even by groups of non-contiguous farms" had increased during the 1970s.

It is possible that zonal price differentials and minimum wages were adopted for a primary reason other than reducing income differentials within agriculture. The highest zonal prices are in regions that have many disadvantages for farming. Without the minimum wages and higher prices, agriculture might well have disappeared in some areas. With the current emphasis on expanded food production, policy makers may well have
felt that they simply could not accept a decline in food output in any part of the Soviet Union.

Private Plots

I have so far ignored the existence of private plots farmed by collective farm workers. In a competitive situation with market prices equating supply and demand for both outputs and inputs, private plots would present no problem in the organization of a collective or cooperative agriculture. Private plots present difficulties only because prices paid to the collectives are below market levels or because of significant inefficiencies in the functioning of the cooperative enterprises.

If the output of both the private plots and collective farms were priced at equilibrium market levels (at both producer and consumer levels) there would not be a significant encouragement to withhold labor from the cooperative enterprise during critical periods—if the labor on the cooperative received the value of its marginal product.

The continued importance of private plots in marketable output and in the incomes of collective farm members in the Soviet Union is a clear indication that the cooperative sector is inefficient in the use of resources. Data for 1970 indicate that on collective farms only 47 percent of income was derived from the collective; the remainder came from private plots and other receipts. In the source the importance of private plots alone was given only for the Georgian Republic. In this republic "more than 50 percent of the family budget" came from private plots, and only 22 percent from the collective farm (Teriaeva, p. 51).8

But the inefficiency of the cooperative sector is due primarily to the policy setting within which it must function. Inappropriate prices, as well as other policy defects, limit the efficiency of the cooperative
sector. The fact that the private plots provide higher returns for most resources—certainly for labor and land—than the cooperative sector is not proof that the private plots are efficiently operated and the cooperative sector is inefficiently operated. While the private plots operate under severe restraints with respect to size and the availability of many resources, the plot operators have the very real advantage of significantly higher output prices and of being able to allocate whatever resources they may have without the benefit of Moscow planners.

As noted earlier, one limitation of the cooperative form of organization in Soviet agriculture is that investment may be inhibited by the inability of a member of the cooperative realizing any return from his investment if he should leave the farm. This problem is not unique to the Soviet collective farm but is true of cooperatives generally. Since cooperatives appear to operate with reasonable efficiency in a number of economies without well defined ownership of their assets, it seems reasonable to conclude that the ownership structure of Soviet collective farms is not a significant source of inefficiency. This is not to say that the inability of a member of a collective to realize any benefit from past contributions to the assets of the collective or from the land owned by the collective has no effect on efficiency of resource use. One effect, in addition to the effects on long term investments, is that farm labor may be retained in agriculture that would leave if the individuals would not lose the income from the assets that he "owns" as a member of the cooperative or collective. 9

As might be inferred from the above, I do not believe that socialized ownership of agricultural land is, by itself, a significant source of inefficiency. As long as the system defines with some clarity who has the
rights to the income from land, the land will be used with a reasonable degree of efficiency. The model of the cooperative farm as I have described it provides for such clarity. There is nothing in the collective farm charter that is inconsistent with the members of a collective farm feeling secure in their control of the land assigned to the farm. Unfortunately for the members of collective farms, actual practice of agricultural officials has resulted in numerous violation of the "inviolability" of the rights of the collective farms to the land that was assigned to them. These violations have included the amalgamation of collective farms or the transfer of collective farms to the state farm sector by merging a state farm with one or more collective farms.

Scale of Collective Farms

Up to this point I have argued that the cooperative form of enterprise need not introduce significant inefficiencies. The only important negative factor is the area of long-term investment. In arriving at this conclusion, I have implicitly assumed that workers receive the value of their though I recognize that such is not the case in Soviet agriculture. marginal product as payment for their labor. I shall now comment briefly on the possible inefficiencies that may have resulted from the Soviet penchant for large units.

The average size of a collective farm in the late 1970s was a sown area of approximately 3,000 hectares, something over 400 households and approximately 540 workers. These are large farms, but are they so large that with appropriate forms of internal management they should be inefficient?

If there were the willingness to delegate responsibilities within the farms, whatever handicaps scale may bring to agriculture could be largely offset. To a greater extent than many manufacturing activities,
farming offers the opportunity to separate production activities into discrete functions or spaces with little or no interference with the rest of the functions and processes. Grain production can be largely separated from livestock production, if desired, and in the United States this has occurred to a considerable degree. Even within grain or other crop production, decentralization and separation of activities can be readily accomplished.

Given the nature of farming there are very real problems of relating reward to performance when the units are large and decentralization has not been permitted. The magnitude of this problem is undoubtedly exaggerated by the assumption that where there are "n" workers, each worker views the reward from added effort in terms of 1/n share of the results of that added effort. But there is almost certainly some validity to this definition of the effort or work problem that seems to plague collective farms in the Soviet Union.

One can easily imagine, at least if one is not a Soviet ideologue, a number of approaches to decentralizing activities within a collective farm that would be consistent with the concept of a collective farm, and that would bring a much closer correspondence between reward and effort than now exists. The collective farm could remain as the primary unit for marketing output and purchasing inputs and for making a variety of decisions where externalities and economies of scale exist. Examples of such externalities and scale economies are irrigation, drainage, erosion control, roads, electricity, processing of certain products, maintenance of spare parts inventory, repair services and provision of credit. If the collective farm were permitted to charge rent to each of the smaller divisions or units, there would be adequate resources for the provision
of a wide range of social services and for technical assistance to each of the operating units.

State Farms

Over the past two decades there has been a major emphasis on the expansion of the state farm sector. During the 1950s the importance of state farms grew due to their importance in the New Lands Program. But since 1960 the increased importance of the state farm sector has occurred at the expense of the collective farm sector--by collective farms being amalgamated with existing state farms. One might call the transforming of thousands of collective farms into state farms and the enlargement of the remaining collective farms through amalgamation the most significant administrative and organizational changes in agriculture during the past two decades. Yet, as with a myriad of other changes, there seems to have been no readily identifiable positive effect upon farm output or reductions in the costs of producing that output as a result of the transfer of such a large percentage of the collective farms to the state farm sector. In 1950 state farms accounted for 11 percent of the total crop area and three decades later for approximately half.

It may also be noted that over time the differences between collective and state farms have been reduced. The periodic payments to collective farm members for their labor at an established minimum level has made them almost, if not quite, wage workers similar to those on the state farms. Collective farms have grown in scale and while still smaller than state farms, the collective farms of today are larger than state farms were a decade or so ago. Now, as in the past, state farms have been favored in terms of material resources and investment, but this is the result of a
policy decision and has nothing to do with the form of organization.

The reader may well wonder why I have given almost all of the emphasis to the cooperative or collective form of farm organization even though this form is now no more important than the state farm sector. My reasons are mainly historical. I excuse my emphasis by noting that the state and collective farms suffer or benefit from approximately the same features and principles. The state farm sector has an important advantage over the collective—it can adjust its labor force more directly than can the collective. But other than this much of what I have said, or will say, applies to approximately the same degree to both collective and state farms.

Collective Farms and the Soviet Economy

While I believe that there could be improvements in the performance of Soviet collective farms if the farms were smaller or if the internal organization were changed along the lines suggested above, I am not convinced that the poor performance of Soviet agriculture is primarily due either to its being a socialized agriculture or the large scale of the units within that structure.

On the basis of the simple model developed earlier, and accepting the objective of Soviet planners to reduce income inequalities in agriculture, I put forward the following considerations that I believe largely explain the poor performance of Soviet agriculture:

(a) The output price system provides farms with inappropriate signals and incentives for an efficient use of agricultural resources.

(b) The unwillingness of Soviet officials and planners to permit the
collective farms reasonable scope of decision-making clearly inhibits efficient resource use.

(c) The production, marketing and transportation systems for agricultural inputs do not provide appropriate farm inputs in adequate quantities and qualities and in a timely manner to the farms.

(d) Rules and practices that prevent or inhibit labor migration within agriculture reduce significantly the efficient use of resources, and have resulted in inappropriate measures being taken to eliminate income disparities within agriculture.

(e) The pattern of time preference evidenced by a variety of decisions implies an exceedingly high rate of discount of the future. The very great emphasis on a high level of output and marketing in the current year results in decisions that increase output variability through reducing summer fallow to a wholly inadequate level, and apparently minimizes carryovers of grain and feed, thus making livestock production a vulnerable sector.

While none of these points are new, some documentation or comment is in order on each.

Output Prices

Prior to Stalin's death the price system was not a major element in the decision process either for planning officials or the farms, except for the producers of the technical crops. However, after Stalin the Soviet planners have used output prices to encourage output expansion, if not to significantly influence the allocation of resources among farm products. But
policies have vacillated. Khrushchev significantly increased the level of output prices, but retained a two price system for most farm products until 1958 when the Machine Tractor Stations with their required delivery of part of the output were abolished. At that time a single price system was introduced with great fanfare as the most appropriate approach (Nimitz 1959, pp. 267-76). But under Brezhnev the multiple price system was reintroduced, with premia of 50 to 100 percent for above plan deliveries of crops. In 1970 a complicated set of prices were introduced for livestock products, calling for premia for above plan deliveries and additional premia for achieving certain weights for cattle when sold for slaughter. Alongside these complex price systems were the regional price differentials, which were designed to reflect differences in costs of production. In effect, the regional price differentials appear to be a not very well disguised means of collecting land rent from the areas with good land, such as the Northern Caucasus and the Ukraine.

The radical revisions of procurement prices made by Khrushchev were designed to cover average production costs and to permit accumulation (Nimitz 1959, p. 268). Average cost calculations, as is well known, exclude any return to land and capital. Thus if there are to be funds left over for net accumulation or savings by enterprises, procurement prices must exceed the average production costs. But to provide incentives for expanding production of particular products it would not be enough to maintain the same differential of prices over production costs. Land and capital inputs vary among farm products; thus if the price system is to have an important role in influencing production decisions output prices must reflect the contributions of land and capital in the production of various commodities. Generally speaking, the profitability levels are
higher for crop than for livestock products. This reflects, at least to some degree, the greater importance of the land input in the production of crops than in the production of milk, pork, poultry and eggs. The negative profitability of milk, mutton, wool and potatoes lead officials to increase procurement prices substantially in 1979 (Grushetskii 1979).

But rising levels of costs, which presumably should not occur in an economy with a stable price level, may have already largely offset the 1979 price increase of 15 percent for milk. Assuming that the 1979 price increases were based on 1977 production costs, cost increases for 1978 through 1980 approach the magnitude of the milk price increase.

Except for the price increases made during 1979, average procurement prices did not increase significantly during the 1970s. Average annual production costs increased in the collective and state farm sector by 1 to 4 percent; perhaps the rough average was 2 percent or about 22 percent for the decade. Profitability of production clearly declined during the decade.

As viewed by state farm workers or collective farm members the increase in average production costs were not all bad. A significant part of the increase in production costs reflected increased payments to workers. From 1966 through the late 1970s man-day earnings on collective farms increased by 4.6 percent per year; on state farms by 5.2 percent (Schoonover 1979, p. 96). Gross labor productivity increased at a slower rate—about 3.5 percent annually (Diamond and Davis 1979, p. 38). Net labor productivity, after one accounts for the increase in capital stock and purchased inputs per man-day of labor, increased significantly less than gross labor productivity.11

Soviet planners have no easy answer to the need to offset rising
production costs to maintain profitability and incentives to expand production, especially for meat and milk. The planners are caught between their unwillingness or inability to increase consumer prices and the resulting impact of rising procurement prices upon the magnitude of the subsidy required to make up the difference between purchase and selling prices for meat and milk. In announcing the 1979 price increases, the Soviet government simultaneously stated that retail prices would not be increased even though the price increases would cost the budget 3.2 billion rubles.

Premia for above plan deliveries are supposed to encourage output expansion by providing a much higher marginal price than would be possible with a single output price. But there are two very real problems with such premia. One is to determine the size of the required or plan deliveries; there is no magic formula for an equitable or efficient distribution of such plans among farms. As one Soviet author, V. Iur'ev (1979, p. 83), states: "A considerable percentage of the markups is received by enterprises that strive for nonintensive plans they can easily surpass." It is not stated how a farm "strives for non-intensive plans" but some of the ways are not too difficult to imagine, if one puts one's mind to it.

The other difficulty is that in an agricultural economy that is subject to substantial year-to-year production variability, the payment of the premia increases income instability. This is not a new problem. Nancy Nimintz (1959, pp. 264-65) notes the income effects of the premia for above plan deliveries, where the above plan deliveries were paid for at a rate of three times the rate for the compulsory deliveries, and resulted in average with a good crop than in one price in a region with a poor crop. She also presents data on three groups of farms in Stalingrad Oblast, where the required deliveries were the same
per hectare for every farm regardless of yield. A rather small difference in yield—apparently not more than a fifth—resulted in a realized price difference of more than 100 percent in 1956.

Current studies show the same consequence of the premia—if a farm has a very good crop yield, its income increases both because of the higher output but also because of a higher price. And when the crop yield is low, income declines for the same two reasons. Iur'ev (1979, p. 86) presents data for a group of collective farms in Rostov Oblast. In 1973 when the value of gross agricultural output (in constant prices) was 672 million rubles, receipts for above plan deliveries was 55.6 million rubles. In 1972 when gross agricultural output was only 287 million, income from above plan deliveries was only 0.5 million rubles. The contribution of the premia to income instability is substantial.

Planning from the Center

What more can be said about the problems created by efforts to closely control from Moscow the agriculture of such an enormous range of soil and climatic conditions as exists in the Soviet Union? In spite of several reorganizations designed to reduce the scope of central planning, it is not obvious that anything has been accomplished in the past three decades. How little such efforts have accomplished was indicated, in a rather small matter, by a change for 1976-80 that farms would no longer be given two procurement plans—one for the base or plan deliveries and one for above plan deliveries (Schoonover 1979, p. 109). During the 10th Plan, farms would be given only the base procurement plan. However, the procurement agencies would be given both plans and it does not take a very great stretch of the imagination to conclude that the directors of collective and state farms will not see much difference in their relationships with the procurement agencies.
The Soviet planners do face difficult problems. Given the inappropriateness of both output and input prices, the output that would be called forth by the current price system operating without procurement and other forms of planned intervention would differ significantly from the desired output distribution. Without incentives for the management for plan fulfillment on collective and state farms, it is doubtful if livestock output could have achieved the level of recent years since such output was unprofitable for most farms. Some of the incentives have been positive, such as bonuses; others have clearly been negative such as the pressure of the procurement agencies and local planning and party officials who have much to gain if all or most components of the plan are fulfilled.

But it is the planners who are involved in establishing the prices. One might argue that in a communist system that prices are inappropriate so that planners and political officials will have a reason for maintaining their authority over the most minuscule detail of economic activity! But the problem may have even more sinister roots. Planners and officials apparently neither understand nor trust farm people. I have no reason to modify what I wrote almost a decade ago after a brief visit to the Soviet Union (Johnson 1971, pp. 263-64):

Despite frequent references to the role of incentives in economic activity, including agriculture, the real operating principle that seems to guide agricultural planners and officials is that farms cannot be trusted to make appropriate decisions. While there is a great deal of objective evidence to support this conclusion, the basic idea was well put in a speech at Minsk by A. M. Rumyantsev:

"Every collective farm cannot take into account society's real needs in agricultural products. This can be done only
by socialist society as a whole. The latter makes the necessary information available to all collective farms in a centralized way, by drawing up its firm plan of purchasing farm products, by placing orders with these farms and thus ensuring the stability of their production."

Supply of Inputs

An important reason for the differences in the resource costs of agricultural products in the Soviet Union and the United States is to be found in input and knowledge sectors that serve agriculture in the two countries. Also of significance is the very different functioning of the marketing and transportation sectors that process, move and deliver the output of agriculture to the final consumer.

The mechanization of Soviet agriculture has long been plagued by machines of relatively poor quality and short working lives. To some degree a short machine life may be due to poor maintenance, but poor quality and lack of an adequate supply of spare parts must have an important role (Johnson 1979, p. 9). The mania for large machines has also taken its toll; it has only been in recent years that relatively small wheeled tractors have been available in reasonable numbers. The emphasis upon the large track laying tractors has meant an enormous investment in a machine with known high maintenance costs. It is not only that the original cost of the track laying tractors is higher than for rubber tired wheel tractors of equivalent power, but maintenance costs are much higher as well. And for the vast majority of farm operations, the track laying tractors have no advantage over the wheeled tractor. In a system that has great difficulty in providing both spare parts and
adequate repair services, the track laying tractor represents an enormous inefficiency.

In the 1950s a cotton picker that would not pick cotton satisfactorily continued to be produced even though thousands of them were left idle on the collective farms. In a market economy production would have been stopped because of lack of sales, but in the Soviet Union the planning system resulted in the continuing production and delivery of a useless product for several years. I do not intend to imply that there are no mistakes in a private market economy in the design of machines, but such mistakes are relatively quickly detected and a correction occurs, either through foresight or the absence of sales.

Modern agriculture is dependent upon purchased inputs--fuel, fertilizer, insecticides, herbicides, machinery, spare parts, seeds, electricity and tools. It is also dependent upon a number of services, such as machinery repair, maintenance of electric transmission lines and telephones. In many cases, what appear to be minor delays in receiving a product or a service can result in very substantial economic losses. The seasons dictate the most appropriate times to apply fertilizer, insecticides and herbicides; if these products are not available at the appropriate times their values are substantially diminished. A delay in planting or seeding of a week can reduce output by a few percent. Note that in the Soviet Union each 1 percent loss of grain output is approximately three million tons. If a combine is waiting for repair at the beginning of the harvest and if a month is required to complete the repair, in most cases the investment in the combine has been wasted for the entire year.

**Labor Immobility**

Undue emphasis should not be given to labor mobility within agriculture
as a possible corrective for inequality of the income distribution and for improving resource allocation in agriculture. Based on experiences in high income countries, labor mobility reduces regional and personal income inequalities in agriculture through the transfer of labor from agriculture to the rest of the economy. Through differential regional rates of migration, migration reduces income differences both within and among rural areas and between rural and urban areas.

The reduction of income inequalities through mobility is a process that requires a considerable amount of time. In the United States net outmigration from farms started about 1880; the size of the farm population continued to increase absolutely until about 1915, and by 1950 the farm population had declined by 30 percent. The changes in the farm population in this period of more than a third of a century were not sufficient to significantly reduce the regional income differentials within U.S. agriculture. But the next twenty years witnessed remarkable changes—by 1960 the farm population had declined 52 percent from its peak level and by 1970 the decline had reached 70 percent.

It was not only that the U.S. farm population declined by more in terms of both percentage and absolute amount from 1950 to 1970 than between 1915 and 1950, but the population that continued to reside upon farms earned an increasing percentage of its income from nonfarm sources. In 1950, about 30 percent of the income of the farm population came from nonfarm sources; by 1970 the percentage had increased to 53 (USDA 1979). During this twenty-year period there was a remarkable reduction in the income inequality among farm families that was formerly associated with region and farm size or the amount of farm resources owned.

The increase in the importance of nonfarm income and the sharp
reduction in the farm population since 1950 can be attributed primarily to improved communication, a sharp reduction in the cost of personal transportation, increased education levels, and the growth of real incomes in the United States.

The long run solution to the regional income inequalities (as well as many of the intraregional ones) in the Soviet Union is either to encourage migration away from the farms or to bring a wide range of nonfarm jobs within easy reach of farm people. Immeasurable harm was done to rural people by the Stalinist policy of preventing collective farms from establishing nonfarm employment opportunities and by the destruction of the handicraft and other cottage industries that were so important to Russian rural people. The reversal of these policies during the past two decades will work to reduce income differentials, but it will take years before the effects of the Stalinist policies are overcome.

A further inhibition to a significant reduction in income inequalities by labor mobility is the high cost of personal transportation in rural areas. This high cost is due to the abysmal state of the rural road network and the limited availability of personal vehicles. In addition, the limited development of the rural trade network and small scale industrial enterprises means that there are relatively few nonfarm jobs available in most rural communities.

Regional or zonal price differentials have apparently become a permanent feature of Soviet agricultural price policy. As noted above, regional price differences that do not reflect differences in transportation and marketing costs are a source of inefficiency in the use of resources. It is not obvious how important such inefficiency may be since resource allocation in the Soviet Union respond to many variables other
than the prices of inputs and outputs. In fact, one of the important reasons for procurement contracts and for the direct allocation of certain inputs is to induce farms to behave in a way other than that which would be the most profitable given the prices that they face.

**Time Preference**

Soviet agriculture is continually being pressed by the central authorities to maximize output now. With few exceptions, output plans are too ambitious and can be achieved only with good luck and good weather. Given the incentive structure that exists throughout the system, such plans put enormous pressure on all parts of the agricultural system to achieve a high level of output now--this year--even if the impact on future output is substantial. The discount rate is very high, apparently far higher than that used by farmers in market economies.

Let me give one illustration. Agronomists and other agricultural scientists have long recognized that the crop rotations used in most of the low rainfall areas of the Soviet Union result in highly unstable yields and rather modest increases in output over a period of years (Johnson 1977, pp. 15-19). The amount of grain sown on summer fallow is far smaller than in similar areas of North America, where as much as 50 percent of the crop rotation consists of summer fallow. While the long run impact of increasing summer fallow to the amount that would minimize the cost of producing the grain would result in a rather modest reduction in grain output, there would be a larger short run loss of output during the transition period. A much greater use of summer fallow would significantly reduce production variability, which would have favorable cost effects upon marketing, storage, and livestock production.
There is little doubt that given the existing variability of grain production that stocks of grain are too small in the Soviet Union. One reason for the small size of stocks is that the price system provides no incentive for farms to hold stocks from one season to another. There are no seasonal price differentials and procurement prices are set for the indefinite future and are independent of annual output variations. In fact, the premia for exceeding planned procurement deliveries provide a negative incentive for holding stocks. If a farm has a good crop and can deliver more than the procurement plan, its marginal return for such deliveries is 50 percent above the regular procurement price. If it stored the grain instead of delivering it, it would run the substantial risk that in some subsequent year it would have to deliver the grain at the regular procurement price. Thus its "reward" for the storage costs and waiting might well be a negative return of half of the regular procurement price. Further, the farm manager may assume that he can acquire grain from the mixed feed industry at a stable price during the years of low grain yield. If this is possible, it is an added reason for not storing at the farm level.

Equally important the price and reward system provides insufficient incentives to procurement agencies to hold stocks in adequate amounts. Given the internal stability of prices, holding grain from one year to the next adds only costs and no income to the procurement agency. And it appears that the costs of unusual imports, since such imports involve foreign exchange, are not reflected in the accounts of the procurement agencies.

Interrelationships

There are interrelationships among these sources of inefficiency and high cost in Soviet agriculture. All of the sources, I assert, start with
the inappropriateness of the price system for agricultural outputs and inputs. By inappropriateness of prices I mean that the prices do not reflect the underlying supply (or cost) and demand conditions. The prices of some farm products require that numerous farms produce such products at less than the cost of current inputs while the prices of other farm products are such as to provide not only for recovery of current input expenditures but also a substantial return for capital and land. Under these circumstances criteria other than profitability, as viewed by the farms, must be used to influence output decisions. Similar comments apply to the prices for farm inputs; these prices fail to equate supply and demand in most cases and thus various forms of rationing and allocation must be imposed.

Consequently efforts to change agricultural management and organization to provide for greater initiative and decision making authority at the farm or even the rayon or regional level cannot be carried through given the current price structure. Or at least to do so would carry the substantial risk that output of some important crop, such as potatoes, would drastically decline or that most of the fertilizer would be used very near where it was produced in order to minimize transport costs.

It seems clear that no one managerial or organizational change or a group of such changes will significantly improve the efficiency of Soviet agriculture until there is a radical reform of the Soviet price system and a major improvement in the performance and responsiveness of the farm input supply and marketing sectors of the Soviet economy. Soviet agriculture has undergone major administrative and organizational changes during the past quarter century.

Among the very important changes was the abolition of the Machine
Tractor Stations (MTS). Partial analysis clearly supported the decision taken by the Soviet planners. With the MTS there existed a division of authority over the production of agricultural crops—the management of the farms, on the one hand, and the director of the MTS. Appropriate incentives did not exist, in many cases, for the MTS workers to do work of high quality. In addition, with the complicated interrelationships between the MTS and the farms they served, it was difficult if not impossible to devise any form of accounting system that could reflect the underlying cost conditions. Yet actual experience following the abolition of the MTS indicated that nothing really changed. I am confident that if we had access to the required data we would find that there were many instances in which the MTS were well managed and there were good relations between the MTS and the collective farms, farm output declined and costs increased after the abolition of the MTS. This is not to say that the MTS should have been continued, but only to indicate that where there are numerous sources of inefficiency removing one of the sources may not improve anything since the new approach to performing the same tasks may be no more effective than what it replaced.

I know of no better way of illustrating what I have just written than a quite lengthy quotation from an article entitled "Improving the Management of Agriculture" by I. Buzdalov (1980). This quotation follows a discussion of higher output prices and increased enterprise costs of production of all major farm products between 1970 and 1977. After noting that procurement price increases "cannot go on indefinitely" because such increases affect "basic questions of socioeconomic development, including problems of retail prices, the national economic profitability of agriculture, etc." Buzdalov (pp. 26-27) wrote:
In this regard the question arises as to how to curb these trends and to turn them around. Practically speaking, the problem is to develop and apply economic and organizational forms of relationships that ensure a close link between physical indicators of the plan and indicators of effectiveness, the quality or work, and material incentives.

The existing system of material incentives is expressed in a set of primarily quantitative indicators that frequently duplicate one another and therefore does not sufficiently promote the development of true cost accounting and the creative initiative of enterprise collectives and personnel in the rational distribution and utilization of resources and in increasing effectiveness. Economists have recently proposed using physical and conditional planning indicators (norm-days, norm-rubles, etc.). In so doing they usually advance a single argument: value indicators, especially profitability, are incomparable since prices are imperfect, and hence the fulfillment of the plan's volume indicators may be attained to the detriment of the necessary product mix, at the expense of costly types of products, by-products, etc. However, the proposed arbitrary indicators are divorced from the real forms of social accounting of the expenditures and results of labor, from the actual economic principles of the planned management mechanism and especially on the improvement of pricing. No manner of accounting price or other arbitrary indicator can provide the enterprise with normal conditions of economic activity if the actual price for a given type of product does not ensure the necessary profitability. Nor does the non-cost accounting redistribution of net income between profitable and unprofitable production
facilities produce the proper effect. Of course, arbitrary calculated normative criteria on evaluations in planned management are admissible, but only if they play an auxiliary role and do not supplant the actual conditions and proportions of reproduction.

To support his position, Buzdalov calls to the reader's attention a statement made by L. I. Brezhnev at the March (1965) Plenum of the Central Committee (p. 28): "The level of profitability is what must form the basis of evaluation of the economic activity of collective and state farms." He also, following common practice, noted that V. Lenin viewed self-recoupment as a "very important principle in the organization and evaluation of all economic planning work under cost-accounting conditions" (p. 29). And finally he noted that two CMEA countries—German Democratic Republic and Hungary—have made effective use of economic levers and incentives in the planned agricultural management mechanism and that doing so was "producing positive results" (p. 28). After noting a number of the features of the economic levers and incentives provided in these countries he noted that these measures "directly influence the improvement of production proportions and provide economic motivation for the rational use of internal reserves. The strengthening of the economic basis of planning on an objective basis, without excessive guardianship, compels producers to improve final quantitative and qualitative indicators" (p. 28).

I have not quoted Buzdalov at such length on the grounds that I expect his article (and probably others like it) to lead to a reform of the price system in the years ahead. I have called attention to this forthright expression of views for the quite obvious reason that it so fully supports what I have argued for a long time.

Two final conclusions can be stated. One is that while Soviet
agriculture may well increase its output at a reasonable rate in the future, it will continue to be a high cost agriculture and thus a source of difficulty to Soviet planners. Nevertheless, I do not anticipate that the required overhaul of the price and incentive systems will be made in the reasonably near future. The second is that I am now quite fully convinced that the socialized nature of agriculture is not the primary or even an important source of the inefficiency and high cost so prevalent in the Soviet Union.

The Tenth Plan and Implications for the Future

My paper presents a rather gloomy picture of the future of Soviet agriculture. My conclusion is that the important deficiencies of Soviet agriculture—high cost, output instability, the large demands on investment resources, and the slower growth of output than of demand for commodities with high income elasticities—are such that managerial and administrative changes will be insufficient to contribute significantly to their solution. Nothing short of a major overhaul of prices, greatly increased responsiveness of input suppliers and marketing agencies, and significant relaxation of central control can provide solutions for high costs and low returns on investment and make some contribution toward reducing production instability. As long as livestock production remains significantly less profitable than other major farm products, output growth will lag behind demand. The commitment to fixed retail prices for meat and milk is imposing major costs on the economy, operating as this commitment does through the budget to restrain policy makers from providing appropriate incentives for meat producers.

In terms of the agricultural sector, performance during the Tenth
Plan can only be described as a significant disappointment (USDA 1980a). Output has generally lagged behind what were quite reasonable goals; only the cotton and egg goals seem likely to be met. There will be significant shortfalls for sunflower seeds (output will be lower during the Tenth than the Ninth Plan) and the same will be true for potatoes. Both meat and milk will fall short of the lower end of the very modest minimum goal of 7 percent increase for the plan period.

It appears that grain used for feed will increase by about 23 percent during the Tenth Plan while meat and milk output will increase approximately 6 percent (USDA 1980a, pp. 22 and 28). This may well be the most disconcerting aspect of the agricultural performance during the Tenth Plan for the top Soviet officials. An increase in grain use of more than 20 million tons produced less than a million tons of meat and 5 million tons of milk. In addition, there were 0.5 million tons more eggs.

A rough calculation indicates that the annual increase in meat, milk and egg output between the two plans had a total value less than the increase in grain used as feed. The estimates of the value of output were generous—eggs at the current U.S. retail value, milk at the high U.S. price for manufactured milk and meat at $1,500 per ton, carcass weight. In recent months imported boneless beef was priced at the U.S. border at about $1,300 per ton. It was assumed that the grain at the Russian border had a value of $180 per ton—a price at U.S. Gulf Ports of $140 per ton plus transport and associated costs of $40 per ton. The increased value of meat, milk and egg output was estimated to be $3.05 billion annually; the value of the grain was estimated at $3.6 billion. The cost of all feed, not just the grain, should not be more than 60 or 70 percent of the value of meat, milk and eggs produced.
The large specialized livestock enterprises were supposed to be the answer to high feed requirements. These enterprises are said to be more productive in the use of feed than the ordinary collective and state farms, though at enormously high investment per animal. But it remains to be the case that as the importance of these specialized feeding operations has increased, feed requirements per unit of output for agriculture as a whole appear to have increased.

If resource productivity in the livestock sector continues to decline in the years ahead, as it has during the 1970s, Soviet officials will be faced with some very painful issues. Among them are the rapid growth in the subsidies for meat and milk or the even more painful possibilities of substantially higher consumer meat and milk prices. Another of the painful issues would be the continuing growth of grain imports. With annual grain imports during the Tenth Plan at approximately 20 million tons (USDA 1980a, p. 22), one could speculate that even modest goals for meat and milk during the Eleventh Plan could call for grain imports averaging 35 to 40 million tons. I am not projecting such a level of grain imports but only trying to indicate some of the difficulties confronting Soviet officials.

Will these and other problems result in a dramatic reappraisal of agricultural policy in the Soviet Union? I believe the type of policy changes that would make a difference to agricultural productivity and output are not likely to occur during the 1980s. The Soviet Union now has high enough per capita income that it can, like Western Europe, sustain a very high cost agriculture for an indefinite period. In a real sense the planners' problems would be simplified if the primary sources of high cost and low productivity were the socialized nature of its agriculture, or the
large scale of the farms or even the regional price differentials. Changing some of these aspects of policy would be painful, but one could imagine that such changes could be carried out. One might even imagine that farms could be given greater autonomy to make their decisions. But if my analysis is at all near the mark, these policy changes would have very modest effects upon the performance of agriculture. What is required is much more fundamental and, important, much more difficult to achieve.

Given the recent experience the Soviet Union has had with efforts to restrict access to grain supplies, it is possible that an upper limit will be placed on the magnitude of grain imports. The fear that access to grain supplies may be re-

stricted should put added pressure upon Soviet officials to consider a wider range of alternatives for improving agricultural productivity than it has been their want to do so. Yet even in this setting and the difficulties that it presents, I do not see significant changes in Soviet agricultural policy during the Eleventh Plan Period. True, there may be minor changes such as higher prices for livestock products, and requiring procurement agencies to handle all output offered to them, and another re-organization of the Ministry of Agriculture. These changes, and others like them, will not be enough to permit a significant growth of livestock and poultry output without much greater dependence upon imported grains and other feeds.
Some Concluding Remarks

I hope it is clear to the reader that the socialized farm system as I have described it is a far cry from the actual Soviet socialized farm system. I have engaged in imagining what a reasonably efficient socialized agricultural system might look like in order to shed light on the reasons for some of the important shortcomings of Soviet agriculture. I happen to believe that the elimination of some of the shortcomings of Soviet agriculture, especially its instability of output and its increasing demands upon the world grain markets, would be of potential benefit to the rest of mankind. However, there is little likelihood that the Soviet Union would freely abandon the collective and state farm system. I am convinced that if the present agricultural system is retained without modification, Soviet agriculture will continue to exhibit major and increasing shortcomings. Thus it seemed reasonable to ask if there were a socialized and cooperative agriculture that would function with a high degree of efficiency capable of producing in competition with the agricultures of North America or Australia. I believe it is possible to devise such a system within the framework of Soviet law and the Model Collective Farm Statute. There is no feature of a collective or cooperative farm that I have suggested that could not be instituted in the framework of a socialized agriculture.

But I do not project or predict that the Soviet agricultural system will change in the direction outlined in this paper. While I argue that a socialized agriculture can be efficient, making that system efficient requires a reasonable approximation to a functioning price system. A price system that provides appropriate price signals for decisions made by farms, by the input supply sectors and the marketing agencies requires major changes in the role and nature of central planning.
As noted above, per capita incomes in the Soviet Union are high enough so the economy can afford an inefficient, high cost agriculture. The institution of an effective price system for agriculture and food is likely to occur for reasons that are largely external to agriculture.
Prepared for the Conference on The Soviet Economy to the Year 2000, Airlie House, October 23-25. The paper is based, in part, on research support provided by the National Council for Soviet and East European Research. The views expressed are my own and should not be attributed to the National Council or the University of Chicago. Anything I write about Soviet agriculture owes a great debt to my years as a colleague of Arcadius Kahan. The present paper is no exception.

1It may also help to explain why such a large share of investments made on collective farms comes from the state rather than directly from the resources of the collectives.

2In recent years some high income collective farms have "voluntarily" combined with low income farms.

3The underlying production functions could still be the same on the two cooperatives. Investments made in the land, such as drainage, clearing, leveling or irrigation, can be viewed as increasing the amount of land. But land in the two figures is measured by area and not productivity; differences in productivity that emerge over time are reflected in the shifting of the labor productivity curves. Changes in the quality of labor are also likely to occur over time as noted later in the text.

4Diamond and Krueger (1973, p. 330) estimated that in 1966 about 2 percent of total labor payments by collective farms went to hired workers.
This assumes that products with the same labor intensity were produced when man-land ratios differ. Such is not likely to be the case. However, it is highly unlikely that shifting toward labor intensive products on the farms with high man-land ratios could give rent per unit of land and marginal products of labor equal to those of the low man-land ratio farms if the farms are in the same climatic and soil area.

Some authors (Ward, Domar and Oi and Clayton) have argued that if rent were set at high enough level, the reduction in income on a cooperative would be sufficient to induce the cooperative to increase the number of members. However, the assumptions under which such an effect would occur are very different than those I have made and are assumptions that do not reflect the alternatives facing collective farms in the Soviet Union or Eastern Europe.

The minimum wages on collective farms were to be established equal to wages on state farms in the same region. Variations in state farm wages, based on republic averages, ranged from 81 to 128 percent of the union average in 1970 (Teriaeva 1972, pp. 52-53).

In the late 1970s the percentage of the output that could be sold as "above plan" for bonus payments was smaller than during the early 1970s. In 1976 the base prices were increased for several important farm products. These two related changes contributed to a reduction in farm income inequality.

Shmelev (1979, p. 87) indicated that 26 percent of the income of collective farm members came from private plots in 1976 in the USSR. For the entire Soviet Union in 1970 private subsidiary activity provided 38 percent of all earned income (McAuley 19, p. 132). Earnings, presumably from
wages in the socialist sector, accounted for 10 percent of earned income. Transfer payments accounted for 10 percent of money income; thus earned income was 90 percent of money income.

But this may not be a real problem with respect to outmigration. The organization to which a farm worker goes may also own assets from which he will benefit. While owning a house on a collective represents a considerable private investment, the migrant from a collective or state farm eventually obtains housing space in cities at significantly less than its cost.

In 1974 the 360,000 largest farms in the United States had an average of 192 hectares of cropland; the annual average employment on these farms would have been approximately six workers including the operator and family members.

Diamond and Davis (1979, p. 51) give data that permits estimates of capital stock per unit of labor. In 1965 the capital stock per man-day of labor was 4.7 rubles; in 1977, 16.8 rubles or an increase of 2.5 times. They also estimate that current purchases per man-day (in 1976 prices) was 0.55 rubles in 1965 and 1.32 rubles in 1977.

Summer fallow is the practice of leaving land idle for a year while cultivating it in a way that controls weeds and conserves moisture. The serious weed problem confronting much of Soviet agriculture could be reduced by increasing the amount of summer fallow.

This review of livestock output during the Tenth Plan and the estimates of grain used for feed raise the disquieting prospect that grain output
data may have an increasing degree of exaggeration over time. The other possibility is that meat and milk output data were overestimated in the past and some part of the overestimation is now being corrected. If the grain and livestock data are reasonably comparable over time, the high cost nature of the Soviet livestock sector is quite fully revealed.
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