Cooperatives and the Breakup of Large Mechanized Farms

Theoretical Perspectives and Empirical Evidence

Klaus W. Deininger
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FOREWORD

The political changes in Eastern Europe have significant implications for the organization and structure of agricultural production. Given the importance of agriculture in many of these countries the restructuring process and the efficiency of the resulting institutional arrangements is likely to be of major importance for the economic well-being of a large part of the population and for growth of the economy in general. The World Bank is well aware of the importance of agriculture in these countries and devotes a considerable amount of resources to assisting in this process. Questions concerning the relative advantages and disadvantages of different forms of organization, and the consequences for public sector involvement, arise in many of these situations. The issues involved have been discussed at length in the theoretical literature and evidence from countries where cooperatives in agriculture have been established can provide guidance with regard to these questions.

This study was initiated to investigate the appropriateness of cooperatives as successors of large farms both from a theoretical and empirical perspective. It argues that, due to a number of crucial differences, agricultural production and service cooperatives have to be treated separately from each other. Theoretical considerations, as well as empirical evidence from seven countries where cooperative forms of production are or were of economic significance, are used to argue that agricultural production cooperatives are unlikely to be efficient and competitive. On the other hand, service cooperatives can provide significant benefits by utilizing scale economies, by increasing the competitiveness of agricultural markets, and by contributing to dissemination of technology and rural capital formation. This role of service cooperatives is of particular importance in situations where markets for inputs, output, insurance, credit, and other services are incomplete, and empirical evidence is used to illustrate how service cooperatives have successfully overcome some of the structural problems associated with cooperative forms of organization. Recognition of this fundamental difference would suggest that provision of the legal means for production cooperatives to dissolve, and for producers to organize in service cooperatives, is an important task for the public sector.

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This study benefited from discussions with and comments from Hans Binswanger, Karen Brooks, Gershon Feder, Bruce Gardner, Zvi Lerman, Carmel Nadav, Claudia Parliament, and Dina Umali.
This paper assesses the potential for cooperatives to contribute to the restructuring of large farm agriculture by comparing costs and benefits of cooperative forms of organization from a theoretical and an empirical perspective. A key distinction is made between agricultural production cooperatives (APCs), where production is undertaken jointly, and service cooperatives (SCs), which provide services in the areas of input supply, marketing, credit, or technology.

Service cooperatives (SCs) are defined as voluntary associations with a democratic internal structure in which members' voting power is based either on the 'one man-one vote' principle or on patronage i.e. use of cooperative services. Capital is not a residual claimant but receives only a fixed dividend and the main part of residual profit is distributed among members as a patronage rebate. Furthermore, ownership rights can not be traded but may be retired according to a scheme designed by the cooperative.

Agricultural production cooperatives (APCs) are, in addition to possessing some or all of the characteristics of SCs characterized by joint ownership and operation of the means of production.

Agricultural Production Cooperatives

Benefits from APCs were supposed to be associated with their ability to (i) facilitate the utilization of scale economies; (ii) to contribute to greater equity; (iii) to increase workers' motivation; (iv) to lead to faster adoption of technology; and (v) to bring forth a higher level of public good provision. Review of these arguments indicates that (i) there are no significant economies of scale which could be utilized exclusively by production cooperatives; (ii) equitable distribution of the fruits of communal production introduces severe disincentive effects which in many cases undermine the viability of cooperative production, especially since production cooperatives do not have an advantage in providing implicit insurance in an environment characterized by high risk and incomplete insurance markets; (iii) arguments concerning higher motivation, more rapid adoption of innovations, or provision of public goods through production cooperatives lack theoretical foundations and the evidence concerning these issues is ambiguous.

The potential disadvantages of APCs in the areas of incentives, employment generation, and investment have received considerable attention in the literature. These issues can be summarized in the following theses:
Incentives:
(i) An APC with a totally need-based reward system is in general not Pareto-efficient. Exceptions may be encountered in situations of high social cohesion but are inherently unstable.
(ii) If the remuneration of workers is based on effort supply and monitoring is not costless, APCs are likely to be even less efficient than large scale mechanized commercial farms.
(iii) If the land available to a production cooperative can be freely allocated between private and collective cultivation, there are no economies of scale in production, and access to services is not contingent on the maintenance of cooperative production, all of the community’s land will be used in private plots.

Employment:
(i) The typical APC will generate less employment and produce less output than its capitalist twin, leading to a Pareto inefficient allocation of resources if, in the short run, profits are positive.
(ii) If members of a successful APC have the opportunity of employing hired workers at the market wage, they will successively reduce membership until only one member is left.
(iii) APCs will attain Pareto efficiency in the long run only if there is entry of new firms.

Investment:
(i) APCs will be characterized by underinvestment and a preference for short-term over longer term investments. Such underinvestment will be particularly severe as far as intangible assets are concerned. If there are no legal restrictions explicitly preventing them from doing so, APCs are likely to consume whatever capital is available to them.
(ii) APCs will be more reliant on external funding than comparable profit maximizing firms. Internal savings generated by APCs will be lower than the internal savings generated by comparable IOFs. Debt will be used to finance consumption whenever possible.
(iii) Given equal endowments of capital, APCs’ intensity of capital per worker will be at least as high, but is likely to be higher than that of identical profit-maximizing firms.
(iv) Due to members’ low ability to diversify risk, cooperatives will normally not undertake investments with high variance of returns even if such investments are socially profitable.

These predictions are reinforced by empirical evidence showing that cooperative forms of agricultural production exceeding the size of a family farm are virtually absent in industrialized countries and that the experience with formation of production cooperatives in seven developing countries was dismal.
Collectivization of small farms was always associated with productivity losses and formation of a cooperative agricultural sector was never justified on economic grounds alone. In Ethiopia in 1974-76, China in 1959-61, and North Vietnam during the period 1958-71, collectivization of small farms significantly decreased productivity. The decollectivization experience in China and Vietnam furthermore suggests that there are more effective methods to increase rural (i.e. agricultural and non-agricultural) investment or to tax the agricultural sector than collectivization. Even the kibbutzim in Israel are not a valid example to demonstrate the economic efficiency of cooperative production in agriculture as their establishment was heavily subsidized and they now derive the majority of their income from industry rather than agriculture.

Cooperative forms of production which were established as a consequence of the breakup of large farms were not efficient. In Nicaragua, the transformation of large estates into state farms, as well as continued support of the private large farm sector, could not prevent serious declines of production in both of them. This policy was recently replaced by a more smallholder-oriented strategy. In Peru, cooperatives which had been formed out of the large estates either broke up into family farms once they were allowed to do so, or, in sugar where economies of scale exist, degenerated into state farms. Experience from Cuba indicates that even considerable support in the form of differential subsidies to cooperatively organized state farms did not to make them competitive in relation to private farmers or voluntary producer associations.

Reversal of collectivization facilitated gains in production and efficiency in a number of instances. Maximum productivity gains from such decollectivization would be expected if (i) competitive markets for inputs, outputs, and credit exist; (ii) the macroeconomic environment does not discriminate against agriculture; (iii) technology for the new units is readily available; (iv) farms are small enough to be able to rely predominantly on family labor; and (v) property rights are sufficiently secure to provide an incentive for investment. The experience of China and Vietnam illustrates that even if not all of these conditions were met initially and land endowments were very low, decollectivization, led to considerable one-time productivity gains. In both cases a mix of cooperative and private sector arrangements to facilitate marketing, the utilization of existing farm machinery, and the establishment of infrastructure, made significant contributions to this success.
Service Cooperatives

Service cooperatives, in contrast to agricultural production cooperatives, can utilize genuine economies of scale in marketing, credit provision, input supply, and technology transfer which enables them to enhance competition and productivity in the agricultural sector and to provide tangible economic benefits to their members.

- Scale economies in input supply, marketing and credit provision arise from the cost advantage of large firms in acquisition of information about market opportunities and the credit-worthiness of a borrower, or technical indivisibilities in input provision or output marketing.

- Much of the physical and human capital used in agricultural is highly specific to this sector. If markets for inputs and outputs are, e.g. due to lack of infrastructure, incomplete, traders in these markets could appropriate the ensuing rents and discourage investment in agriculture. Efficient service cooperatives can offer "fair" prices and, by functioning as a "competitive yardstick" indirectly contribute to rural capital formation. Through better access to credit markets they may also directly contribute to capital formation.

- Establishment of cooperatives to provide technical information is important where a public extension system is not well developed, significant adaptation of existing technology to local conditions is necessary, and where significant gains can be had from adoption of innovations and capital accumulation.

- Empirical evidence suggests that, in line with the above arguments, cooperatives are most advantageous in situations where infrastructure for communications and transport is lacking or markets are incomplete. With economic development cooperatives increasingly adopt mechanisms similar to those used by IOFs.

Difficulties for cooperatives arise from the non-existence of secondary markets for equity, the free-rider problem, and failure to invest. Understanding of the underlying mechanisms can assist in devising appropriate mechanisms to counteract these effects in service cooperatives.

- The lack of association between equity participation and voting power will affect members’ incentive to monitor and can make cooperatives more susceptible to political pressure. Adoption of strict standards of accounting together with public supervision are important to overcome these problems.

- Adoption of such standards, together with cost recovery mechanisms, and limitation of public subsidies to cases where clear public goods are provided, will also mitigate the free-rider problem.

- Flexible policies of equity redemption or limited transferability of ownership shares, together with continuing member-education, provide an opportunity to overcome the tendency towards underinvestment which would make service cooperatives uncompetitive in the long term.
Conclusion

Given the theoretical limitations and the empirical evidence on the failure of agricultural production cooperatives, independent family farms are likely to be the most promising candidate to succeed large scale commercial farms. The size of such farms, however, varies widely among countries, ranging from less than 0.5 hectares in China to several hundred hectares in the US. The "optimal" farm size for any given environment depends on a number of factors, primarily the available technology, nonagricultural income opportunities, and the price of capital. Neither the level nor the dynamic development of these variables can be easily predicted for economies making the transition from a centrally planned to a market economy. Wide and equitable distribution of the available assets and the provision of a maximum of organizational options appear to be the most promising means to allow market-based determination of an "optimal" farm size structure.

For small private farms to succeed, competitive markets for inputs and outputs, access to credit, and to information and technology, are necessary. Absence of any of these conditions may threaten the long-term viability of owner-operated farms. Assisting in the provision of physical and institutional infrastructure to facilitate the emergence of these conditions is a major task facing the public sector during the transition from central to decentralized planning. Formation of service cooperatives which compete with the private sector can significantly contribute to increased competitiveness of agricultural and financial markets and technology transfer and would be an important element in the restructuring of large scale agriculture. If adequate control mechanisms, as well as policies to safeguard member education and investment, can be put in place, service cooperatives, in contrast to production cooperatives, are likely to become an integral part of the newly emerging agricultural sector in Eastern Europe.
I. INTRODUCTION

This paper assesses the potential for cooperatives to contribute to the restructuring of large farm agriculture by comparing costs and benefits of cooperative forms of organization from a theoretical and an empirical perspective. A key distinction is made between agricultural production cooperatives (APCs), where production is undertaken jointly, and service cooperatives (SCs), which provide services in the areas of input supply, marketing, credit, or technology.

It emerges that benefits from formation of APCs are likely to be very small whereas problems of incentives and supervision, employment, and investment associated with cooperative agricultural production are very difficult to solve and have depressed economic efficiency of APCs all over the world. In contrast, SCs can utilize economies of scale, enhance the competitiveness of markets for inputs and outputs, provide farmers with access to credit or insurance, and adapt or disseminate technology, thus providing tangible benefits particularly in situations characterized by low levels of economic development and multiple market imperfections. While past performance of SCs has not been uniformly positive, these benefits appear to have outweighed the costs of cooperative organization in a large number of cases. Furthermore, SCs’ failure can be linked to the theoretical difficulties associated with cooperative organization, facilitating the identification of a number of areas critical to SCs’ continued viability.

The paper is structured as follows: In section two we introduce terminology and highlight the significant differences between investor owned firms, service cooperatives, and agricultural production cooperatives. Section three is devoted to a more detailed discussion of potential advantages and drawbacks of agricultural production cooperatives (APCs), as derived from economic theory, and a brief reference to the empirical evidence to support such predictions. More detailed discussion of country experiences with formation of agricultural production cooperatives is relegated to the case studies in the appendix. Section four examines advantages and disadvantages of service cooperatives in agriculture and relates them to the empirical evidence available. A number of conclusions end the paper.
II. TERMINOLOGY

This section illustrates the characteristics of production and service cooperatives by comparing them to the investor-owned firm, the most common organization of large businesses in western market economies.

*Investor owned firms (IOFs)* are firms\(^1\) owned by shareholders who are residual claimants to profit. There are two main differences between IOFs and cooperatives, both production and service: First, in contrast to service cooperatives, IOF's shares are tradeable, i.e. there exists a secondary market in equity. This solves the problem of investment disincentives since individuals who hold shares in the firm can sell them at any point in time, while cooperative members are dependent on the specific retirement policy adopted by the cooperative. Furthermore, the market price of shares also conveys information on the expected future performance of the firm and thus may reduce the cost involved in monitoring of managers. Second, in contrast to production cooperatives, IOFs base decisions on employment of workers on their marginal, rather than their average product (Bonin and Putterman 1986).

*Service cooperatives (SCs)* are democratically structured institutions based on the voluntary association of individuals pursuing a common (economic) goal with the following characteristics:

- Individual members' decision-making influence (voting power) is not determined by the proportion of capital contributed but is based either on the 'one man-one vote' principle or on patronage, i.e. use of cooperative services. This has an influence on the incentive to invest since, in contrast to IOFs, an increase in share capital is not accompanied by increased voting power.
- Capital is not a residual claimant but receives only a fixed dividend. The main part of residual profit is distributed among members as a patronage rebate. Ownership rights can not be traded but may be retired according to a scheme designed by the cooperative. This implies that the main benefit from cooperative membership is through patronage and that imbalances among members' expected level of patronage may create disincentives to contribute equity,

\(^1\) A firm is here defined as a legal entity in accordance with Jensen & Meckling (1979) who define the firm as a nexus of contracts.
to invest, or to engage in monitoring of management.

- Cooperatives often enjoy a special legal status which grants certain forms of tax exemption, but also enforces limits on profits or capital gains, and restricts vertical and/or horizontal expansion, e.g., by limiting business with outsiders or by placing constraints on the number of non-members who can assume managerial responsibility.

**Agricultural production cooperatives (APCs)** are, in addition to possessing some or all of the characteristics of SCs characterized by joint ownership\(^2\) and operation of the means of production. This introduces the additional problems of determination of total employment (membership) and monitoring of worker performance. Discussion of APCs requires understanding of the general characteristics of joint production, which are discussed in the literature on the labor managed firm. It would, however, be incomplete without reference to specific characteristics of the production process in agriculture such as covariance of risks, the difficulty of monitoring effort supply by hired workers, and the issue of scale economies in agricultural production (Binswanger and Rosenzweig 1986).

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2/ Systems which provide for communal land ownership are of importance in many parts of the world, in particular in Africa, and have often been confused with collective production (Noronha 1985). The defining characteristic of communal tenure systems is, however, the existence of community-enforced restrictions on transfers of land to outsiders (Binswanger et al. 1993). The right to a plot (the location of which may change over time), as well as the exploitation of this plot, is usually on an individual basis, so, despite some parallels to APCs, communal land ownership is outside the scope of this paper.
III. AGRICULTURAL PRODUCTION COOPERATIVES

In this section we investigate the theoretical justification and empirical evidence relating to advantages and disadvantages of agricultural production cooperatives. Concerning the advantages attributed to production cooperatives, we argue that a number of the benefits which have been associated with agricultural production cooperatives such as realization of scale economies, greater equity and motivation, or faster adoption of technology, are based on weak empirical evidence. Other potential benefits from APCs, such as access to credit and insurance under conditions where credit is rationed and insurance markets are imperfect, can be provided by other organizations in a more efficient way. This will then be contrasted with the disadvantages of cooperative production in general which have been discussed in the literature on the labor managed firm. Given the extent of these disadvantages, we argue that limited benefits, together with a number of severe problems, are likely to make agricultural production cooperatives economically inviable. This hypothesis is supported by empirical evidence from a number of countries (see the appendix) where attempts to establish APCs, even if associated with large amounts of government subsidies, failed to achieve the desired goals.

1. Potential advantages of agricultural production cooperatives

Review of the arguments advanced to show advantages of production cooperatives indicates that (i) there are no significant economies of scale which could be utilized only by production cooperatives; (ii) equitable distribution of the fruits of communal production introduces disincentive effects, and production cooperatives do not have an advantage in providing implicit insurance in an environment characterized by high risk and incomplete insurance markets; (iii) the evidence to support arguments concerning higher motivation, more rapid adoption of innovations, or provision of public goods, through production cooperatives is ambiguous.

3/ Schmitt (1993) uses similar arguments, explaining the continued importance of family farms in Western countries and the failure of agricultural production cooperatives as a result of (i) the limited amount of economies of scale in agricultural production; (ii) the difficulty of monitoring effort in agriculture which results in high transaction costs for cooperative farms; (iii) motivational advantages of family farms, among others in the provision of implicit or explicit insurance; (iv) higher dynamic efficiency of family farms due to their flexibility in allocating labor between on-farm, off-farm, and household production. His reference to Potter, Oppenheimer, and Areboe, who -without elaborate theoretical justification- noted agricultural cooperatives' tendency towards "self-extinction" and lack of profitability around the turn of the century indicates that these issues have a long tradition.
**Economies of scale**

The main argument advanced to support cooperative forms of production has been related to the presumed existence of economies of scale. More detailed discussion indicates, however, that with the exception of few plantation crops, the empirical case for existence of economies of scale in agriculture is weak and, as a result, cooperatives would not be in a position to operate more efficiently than individual producers.

In principle, economies of scale in production arise from indivisibilities of inputs such as tractors, management, and fixed transaction costs in the provision of credit and insurance where intertemporal markets are imperfect. These factors lead to an initial segment of declining average costs in the production function until the lumpy input is fully utilized. Draft animals and, more so, threshers, tractors and combines can be fully utilized (i.e. reach their lowest per-unit cost of operation) only on farms of a certain minimum size. Management skills are another example of an indivisible input. The better the manager, the larger the optimal farm size. Rental markets for machine services and management can in principle substitute for the lumpiness of some but not all of these inputs.\(^4\) Since the 19th century threshers, which were too large for individual farms, have been rented out in Europe. The rental markets for combines in the US is very efficient, involving large scale movement of the machines from South to North. Similarly, rental markets for specialist services or publicly financed extension, possibly organized by farmers themselves in the form of SCs, can to some degree circumvent such economies of scale.

Economies of scale arising from indivisibility of inputs may be offset by "agency costs" (Jensen & Meckling 1976) which result from the need to manage and enforce effort on large scale operations. The unenforceability of effort and the ensuing need to engage in supervision of labor and/or offer incentive-compatible contracts has received considerable attention in the industrial organization literature (Stiglitz 1987) and is recognized to have profound implications for the organization of production, in particular the optimal size of the firm (Calvo and Wellisz, 1978). The potential losses

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\(^4\) Binswanger and Rosenzweig (1986) explain that, due to moral hazard problems, rental markets for draft animals are unlikely to be feasible. Furthermore, rental markets are more difficult to organize for time-bound operations.
from imperfect information are particularly large in agricultural production\(^5\) due to spatial dispersion of the production process and the need to constantly adjust to micro-variations of the natural environment. It has therefore long been recognized that supervisory capacity is an important determinant of the mode of operation of large tracts of land (Eswaran and Kotwal 1985). The fact that family members are residual claimants to profits and thus have higher incentives to provide "effort" than hired labor, share in the risk, and can be employed more flexibly both on and off farm without incurring hiring or search costs are among the main reasons for the superiority of family-operated over wage-operated large scale agricultural operations.\(^6\)

This lack of economies of scale in agriculture, and the resulting competitive superiority of farms operated predominantly with family labor, is confirmed by a large body of literature\(^2\) comprising both developing and developed countries. Much of the literature on the diseconomies of scale comes from regions where agricultural mechanization is incomplete and where technical change has been slow. But even in the developed world most studies suggest that increasing returns to scale do not exist beyond farm sizes which can be managed by a family.

**Equity**

Cooperative forms of production can increase equity by either distributing an existing amount of resources more equitably or by insuring members against risks. With respect to the first argument, it has been shown (Israelsen 1980) that even if agents are characterized by equal ability, a payment system based on need (e.g family size) alone as compared to one based on the effective input of "effort" leads to significant reductions in overall output. If managerial abilities differ across individuals and non-agricultural employment is available, the potential efficiency losses associated

\(^5\) Agricultural production is here defined as excluding typical plantation crops like bananas and sugarcane where, due to perishability of the raw produce, economies of scale associated with the capital-intensive processing/marketing stage might affect the optimal organization of production. For a more detailed discussion of this topic see Binswanger and Elgin (1988).

\(^6\) Binswanger and Rosenzweig (1986). With simple unmechanized technology, large landholders’ supervisory capacity would soon become binding and lead them to rent out their land to independent family farmers on a cash- or share rental basis.

\(^7\) See Barraclough and Collarte (1973) for six Latin American countries, Berry and Cline (1979) for studies incorporating Brazil, Colombia, the Philippines, Malaysia, and India, Kutcher and Scandizzo (1981) for the Northeast of Brazil, Cornia (1985) for 15 countries in Africa, Asia, and Latin America, Sen (1981) for the Indian Punjab and West Bengal, Bhalla and Roy (1988) for the whole of India disaggregated into 78 agroclimatic zones and Chavas and Aliber (1992) for mechanized farms in Wisconsin. A more comprehensive review of the literature on this subject is provided by Binswanger et al (1993).
with a need-based distribution of income increase considerably; Holstrom (1982) proves the Pareto-
inferior character of such an equilibrium. This implies that a system based on individual production
by each member of the community, combined with a lump sum tax (e.g. in the form of a flat land
rent) and a subsidy scheme to facilitate subsequent redistribution of the surplus, would leave
everybody better off.

Individuals might prefer a lower but safe and regular stream of income to a high expected income
characterized by a large variance. Carter (1987) has shown that any insurance scheme associated
with common production, while potentially preferable to a situation in which insurance is totally
absent, will not be Pareto-efficient due to the disincentive effects it creates. In the same way it can
be shown that share tenancy attains only a second-best equilibrium (Otsuka et al 1992, Binswanger
et al 1993). If the only reason for the adoption of such arrangements is that they provide insurance,
the associated efficiency losses could be understood as the "insurance premium" that individuals are
willing to pay in any given situation and the ensuing situation could still be constrained efficient
(Stiglitz 1986).

Empirical evidence suggests, however, that insurance against covariate risks is made infeasible by
a combination of moral hazard and the spatial covariance of returns from agricultural production

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8/ In particular in the presence of unemployment, risk aversion of workers can explain their willingness to take over an
unprofitable firm and organize it as a labor managed firm rather than to face the vagaries of the spot labor market
(Miyazaki 1984). The argument that share tenancy serves as an insurance mechanism (which will be discussed below)
utilizes a similar reasoning.

9/ The argument that share cropping acts predominantly as an insurance device has, however, been challenged by Otsuka
et al (1992) who argue convincingly that, empirically, share cropping often emerges as a response to government policy
constraints rather than the riskiness of the environment.

10/ In general, the potential for moral hazard arises if the existence of a principal-agent relationship (e.g. an insurance
contract) leads to a significant deviation of the marginal cost of certain actions to the agent from the marginal cost without
such a relationship. As the latter may be identical to the ex ante cost assumed by a principal in order to calculate whether
establishment of such a relationship (e.g. provision of insurance) is economically feasible, a principal-agent relationship
which may be desirable and economically feasible if based on the marginal cost in the absence of the contract may become
infeasible economically due to moral hazard. In the case of health insurance, the availability of such insurance might lead
the insured (i.e. the agent) to demand more health services (which are now available to him at lower marginal cost) than
he would have if he had to pay for them himself. In the case of credit, availability of credit may induce the agent to utilize
such finances for risky projects if he or she expects to face less than the full cost of default. Group-lending approaches can
be used to increase the marginal cost of default to the agents and thus make such projects more feasible. For crop
insurance, the potential for moral hazard arises from the fact that once such insurance is available, the agent might adopt
riskier practices or crops than in the absence of insurance and that the extent of damage to crops which is due to natural
(continued...)
(Binswanger and Rosenzweig 1986). It has been shown that there are more efficient means, such as social ties or use of informal credit markets, available to ensure against noncovariate risks, even in environments characterized by high risk and very incomplete intertemporal markets (Rosenzweig and Wolpin 1989, Rosenzweig and Stark 1985). As such insurance mechanisms do not affect production, they are more efficient than the establishment of APCs or share tenancy contracts. In summary, cooperatives do not have advantages to insure against covariate risks such as a drought, which affect production of all members equally, even if they were designed to do so,\textsuperscript{11} and the insurance they can provide against noncovariate risks is likely to be more costly than that to be gained by alternative social arrangements.

It is worth noting that cooperatives in which remuneration depends on effort supply generally introduce income risk even in a deterministic environment. The return to each member’s input of effort depends at least partly on aggregate production, i.e. the effort contribution of all other members, which is beyond the control of the individual member and the value of a “workpoint” cannot be known with certainty until total output and total input are determined. The uncertainty resulting from this alone would lead risk-averse individuals to cut down on effort provision, and allow to attain only a Pareto-inferior equilibrium (Putterman 1989).

\textit{Motivation}

A number of studies from non-agricultural industries argue that in worker-managed, as contrasted to for-profit firms, higher motivation of workers would exert a positive effect on production. At a theoretical level, democratic decision-making processes --which are not necessarily realized in all forms of cooperative production-- may entail higher costs than hierarchical management (Alchian and Demsetz 1972). Empirical evidence appears to be flawed also because the "motivation" variable used, normally an index of worker participation in decision making or the percentage of worker-

\textsuperscript{10/(...continued)}

\textsuperscript{10} disaster (rather than actions for which the insured is responsible) is difficult to ascertain \textit{ex post}. Crop insurance schemes all over the world which attempted to overcome these difficulties have generated huge losses because of the moral hazard problem. Cooperatives, especially if involuntary, have great difficulties to guard against, and may even encourage, moral hazard.

\textsuperscript{11} Empirically the adoption of cooperative forms of production often transferred risk from the state to the farmer via the imposition of fixed time and/or output quotas. Such measures left the farmer as the residual claimant, bearing all the production and price risks of collective and/or private plots (Bonin 1977).
members,\textsuperscript{12} may in fact measure the cooperative’s ability to provide individuals with access to capital and to allow them to enter new markets with higher income opportunities in an environment where credit is rationed (Chillemi and Gui 1992). If, as argued above, insurance through common production is Pareto inferior, it would be more efficient to provide such insurance through other means, e.g. service cooperatives.

\textit{Adoption of technology}

Cooperative agricultural production, in particular if carried out under a highly hierarchical structure, is supposed to facilitate the rapid dissemination and adoption of new technologies. The net benefit of this characteristic depends on the present value of the gains from such early adoption as compared to the losses from use of techniques which are relatively unspecific, and the lack of incentives for farmers to experiment and adapt technology to local conditions as compared to independent production. Empirical evidence on the issue is scarce and mixed. Adoption of new varieties was higher in cooperatives than in private farms in China but at the same time it is observed that cooperatives were less price responsive (Lin 1992). Data on profits are not available. Government-directed investments in technologies which were not compatible with local conditions resulted in very costly failures in China (ploughs; Nolan 1988) and Cuba (sugar-cane harvesters; MacEwan 1981).

\textit{Provision of public goods}

Provision of public goods such as infrastructure, irrigation systems, health services, settler education, or defense, is sometimes considered to be one of the main advantages of production cooperatives (Ghose 1985, Griffin and Hay 1985). In most of the cases advanced to support such arguments, there were either alternative institutional structures available which performed at least as well,\textsuperscript{13} or the APCs in question were highly subsidized, and actually provided public goods in a very inefficient way. This indicates that the alleged advantage is not inherent to and should not be attributed to cooperative modes of production.

\textsuperscript{12} In the studies summarized by Chillemi and Gui (1992), an index of worker participation in decision making or profit-sharing (approximated by the percentage of workers that are members) is included in a Cobb-Douglas production function.

\textsuperscript{13} Irrigation systems were established in China and Sri Lanka in the absence of collectives. The majority of immigrants into Israel after 1948 was absorbed not by \textit{kibbutzim} but by \textit{moshavim} which are not based on joint production (Kislev and Haruvi 1982, Zusman 1988).
2. Potential disadvantages of agricultural production cooperatives

We discuss the potential disadvantages of APCs under the headings of efficiency, employment, and investment and find that (i) production cooperatives attain Pareto efficiency only under special conditions, and the associated equilibria are unstable; (ii) in the short run successful production cooperatives will be characterized by too little employment or inegalitarian treatment of hired labor, limited entry of new competitors is sufficient for the Pareto inferior character of the ensuing situation in the long run; (iii) the investment-incentives specific to cooperatives will lead to high capital intensity of production, consumption of the capital stock, underinvestment, and high indebtedness of these organizations.

Incentives and efficiency

An APC with a totally need-based reward system is in general not Pareto-efficient. Exceptions may be encountered in situations of high social cohesion but are inherently unstable.

A production cooperative will attain a Pareto-optimal equilibrium independent from the incentive structure adopted only if there is "perfect cohesion" or "complete emulation" (Chinn 1979, Ireland and Law 1981), i.e. any unilateral increase of effort by a member will be perfectly matched by others. Such an outcome, which eliminates the free-rider effect, is contingent on the successful solution of a coordination problem (Sen 1966). Such equilibria may be empirically attainable in communities characterized by small size and shared noneconomic values (e.g. the kibbutz), but are dynamically unstable. This problem is particularly severe if a totally egalitarian payment system is adopted, as this implies the absence of any link between effort supply and remuneration. Even if remuneration systems that link individual reward to the performance of the cooperative are adopted, these run into a prisoner dilemma and are likely not to attain the optimal level of production. Assuming that other members behave in a way such that the Pareto-optimal equilibrium would be attained, every member of the cooperative has an incentive to supply less effort up to the point where the loss of income (which is only the n-th fraction of total production since other members continue to work hard) equals the marginal utility of leisure. Emergence of a Pareto-inferior equilibrium of this nature is particularly likely if members' abilities are not equal or if, as in agriculture, monitoring of effort is very difficult.
If the remuneration of workers is based on effort supply and monitoring is not costless, APCs are likely to be even less efficient than large scale mechanized commercial farms.

The problem to choose the optimal level of supervision is common to large scale farms and cooperatives. However, the cooperative's ability to implement any given scheme of monitoring and differential awards (including an effective arbitraging procedure) that will not be perceived as arbitrary by its members is likely to be lower than that of an equivalent capitalist firm. On the one hand, members may perceive such a scheme to be inequitable, making it implementable only at additional cost. On the other hand, certain mechanisms, such as the firing of shirking members, may be more costly or totally unavailable in a cooperative. Given the crucial importance of the ability to get rid of shirking workers as a means to provide incentives in capitalist as well as labor-managed firms (Shapiro and Stiglitz 1984, Putterman and Skillman 1992), absence of this instrument may lead to considerable losses of productivity.

The history of collectivization in various countries contains a vast number of attempts to cope with the monitoring problem. Fully need-based wage schemes often led to disastrously low production, a result which then gave way to their replacement by sophisticated workpoint schemes. Implementation of such schemes, however, proved to be very costly and the schemes were often abandoned in favor of less information-intensive time-rate or even fixed-wage schemes. This supports the view that monitoring in agricultural production is very difficult up to the point where it becomes uneconomical and therefore a Pareto-efficient equilibrium very difficult to sustain.

If the land available to a production cooperative can be freely allocated between private and collective cultivation, there are no economies of scale in production, and access to services is not contingent on the maintenance of cooperative production, all of the community's land will be used in private plots.

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14/ Anecdotal and quantitative evidence for excessive idling of ex-plantation workers in collectivized agricultural enterprises where they could no longer be fired is not hard to come by (e.g. MacEwan 1981, Colburn 1986).
15/ The most significant examples are China and Cuba in the early 1960s.
16/ Less sophisticated "time rate systems" were introduced in China, Vietnam, and Cuba after workpoint systems proved to be infeasible. In the Soviet Union, a workday payment system was in 1966 replaced with a minimum collective farm wage which was to be supplemented by any available profits.
The monitoring costs and other efficiency losses associated with cooperative production would be incurred voluntarily only if such a mode of production facilitates real gains, in the form of economies of scale or improved access to credit markets. If such gains do not exist, it is always more efficient to cultivate the land individually implying the breakup of the cooperative as far as production is concerned. The marginal product of work on the collective plot may be further decreased by low incentives of fellow workers or depressed official prices, which led governments to introduce --with varying degrees of success-- a number of additional measures such as mandatory work requirements, output quotas, and reductions in prices for private output to increase the amount of effort devoted to collective plots.

**Employment**

*The APC will generate less employment and produce less output than its capitalist twin, leading to a Pareto inefficient allocation of resources if, in the short run, profits are positive.*

Ward (1958) has shown that, in the short run, for the single-output, single-input case, the APC or labor managed firm will hire fewer workers and produce a smaller amount of output if APC workers can earn rents above opportunity wages. As such rents can result from government subsidies in favor of the cooperative sector, this is empirically of relevance. This result emerges because the maximum net revenue per worker, which is the relevant criterion to be maximized by the APC, occurs where net income per worker equals labor’s value of marginal product, which, in equilibrium, is above the market wage. As a corollary, a rise in output price will induce the APC to decrease employment and thus output, whereas a decrease in output price or an equivalent increase in fixed rents would increase employment and output. Ireland and Law (1981) have shown that the same result holds.

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17/ diGiorgio and Putterman (1985) show that economies of scale are a necessary condition for an "interior solution" to the choice problem between collective and private plots. Putterman (1986) and Bonin and Putterman (1987) extend this result to the choice of labor requirements and penalties for the collectives plot as well as the optimal level of monitoring. Oi and Clayton (1968) analyze a different problem, namely the optimal membership with fixed private plot size and no substitutability between output from private and collective plots based on an exogenously given output price ratio. Even in China, aggregation at the village level in elementary cooperatives in 1954/55 served only to pool resources and left cultivation at the discretion of individual producers (Nolan 1988).

18/ This perverse reaction of APCs, and the conditions under which it would or would not hold, has given rise to intense discussion concerning the rationality of "Stalinist" policies, i.e. the possibility to increase output by imposing higher rents and thus squeezing the peasants. Bonin (1977) provides a summary of this literature and shows that, once risk is incorporated, the result will no longer hold. Empirically it appears that "the Soviet Union achieved growth and development not because the peasantry was exploited and agriculture neglected, but despite it" (Millar 1970:93).
if the APC can vary labor hours or work effort. This short term response of the APC will lead to permanent departures from a Pareto optimum (assuming it had been attained originally) if output and employment reductions by existing firms are not counteracted by the entry of new competitors.

*If members of a successful APC have the opportunity of employing hired workers at the market wage, they will successively reduce membership until only one member is left.*

A successful APC's ability to hire laborers from outside at a wage that is lower than their marginal product in cooperative production, although inegalitarian, as workers performing the same task receive different remuneration, will increase efficiency and, in the limit, lead the APC to produce the same output as would the profit-maximizing twin (Domar 1966, Bonin 1981). If the positive quasi-rents to labor are not competed away, it would be rational for the cooperative to dismiss members and replace them by hired workers until it is completely transformed into a capitalist firm with only one remaining "member" (Ben-Ner 1984). Periods in which profits are nonpositive can delay, but not reverse this process, so that production cooperatives are generally a very unstable form of organization. Criticisms which have been voiced against this result appear to be of little empirical relevance and are not pursued here.

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19/ In the short run, i.e. taking the production structure with elements such as the cropping pattern, the capital-land ratio, technology, prices, and institutional conditions (e.g. taxes and forced savings regulations) as given, such "exploitative" employment of hired labor would facilitate the attainment of some form of "Pareto efficiency" (Caballero 1985). Of course, if the production structure itself is endogenous, this would not be a first best solution.

20/ The only exception is the case of pure "member productivity", i.e. group solidarity which makes members in a given environment more productive even if they do not receive higher wages than offered by the outside environment. In this case, the empirical importance of which can be debated (many *Kibbutzim* are characterized by considerable employment of hired labor, Don 1985), the production cooperative would continue to exist but consist of members only (Ben Ner 1982). In this context it is of particular interest that the ability to fire workers, one of the preconditions for achievement of optimal incentives (as discussed under 2.1.2), will also lead to the degeneration of the collective form of production.

21/ This hypothesis has given rise to predictions on the "life-cycle" of production cooperatives: Ben Ner (1984), based on an argument similar to Miyazaki (1984) notes that with risk averse workers, production cooperatives tend to be formed in periods of economic recession since cooperation would leave these workers with higher expected utility than they could obtain by hiring themselves out on the spot labor market. With profitability of the cooperative, successive reduction of the membership would set in.

22/ Meade (1972) argues that "solidarity rules" requiring that (a) no members may be dismissed involuntarily or (if debt is concerned) leave the cooperative without the other members' consent and that (b) additions require the present memberships' consent, would prevent membership reduction. This does not change the fundamental Ward-result that increased profitability will not result in the hiring of new members but rather in reduction of output, clearly involving "underemployment" in comparison with the profit-maximizing firm.

Steinherr and Thisse (1979) argue that, if dismissals are randomly distributed, there may be constellations in which risk (continued...)
The tendency of cooperatives to collapse as a result of their failure to pay a scarcity-reflecting remuneration for the use of collectively owned capital is confirmed by a number of empirical studies. Jones and Backus (1977) show that cooperatives in the British footwear industry were unstable, characterized by small size as compared to profit maximizing firms, and always produced in the region of increasing returns to scale. McGregor (1979) demonstrates that in American plywood cooperatives existing members tended, via membership reduction and large scale employment of non-member workers, to appropriate any surplus and jeopardize the long run survival of the cooperative.

The potential to reduce the disadvantages associated with cooperative production in industry through strictly voluntary membership, together with equity redemption and membership-fees, is confirmed by a number of empirical studies. Berman and Berman (1989) investigate a sample of Pacific plywood cooperatives where membership was strictly voluntary and tradeable. They show that, although still characterized by relatively inelastic supply, these cooperatives were not significantly less productive than their for-profit counterparts. Successive membership reduction and social conflicts arising from the inequitable treatment of members, as compared to hired labor, was one of the main reasons behind the failure of Peruvian agricultural reform cooperatives (Horton 1979, Kay 1983, McClintock 1981); large scale employment of hired labor and appropriation of rents by members is observed in some Israeli kibbutzim as well (Satt and Ginzburg 1992).

23/(...continued)

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averse members would prefer secure but lower income to higher expected income associated with a nonzero probability of dismissal. This would not prevent the cooperative from replacing departing members with hired workers and would be inapplicable if certain groups within the firm were able to form coalitions and fire only non-coalition members. Specification of a competitive market for worker-partnership deeds (Sertel 1982) in which membership rights are traded based on the discounted present value of their expected future returns, and workers make capital gains or losses when they trade in membership rights, a notion formalized by Dow (1986), could in theory be used to re-establish equivalence in the number of employees between the APC and the profit maximizing firm. Apart from the moral hazard problems and empirical difficulties arising from such a scheme, this would give up the essential characteristic of the labor managed firm. It still does not solve the problem of entry which will be discussed below.
APCs will attain Pareto efficiency in the long run only if there is entry of new firms.

If the short term reaction of the APC to product price increases is to reduce output and employment, long run optimality can only be re-established by the entry of new firms.\textsuperscript{24} The mechanisms by which such entry is to come about are insufficiently specified in the existing literature.\textsuperscript{25} In general, the "horizon problem", i.e., the fact that residual claims cannot be concentrated, would dilute potential entrepreneurs' incentives and one would intuitively expect the extent of such entry to be less than optimal. Government restrictions limiting entry into cooperative sectors, especially in agriculture, are widely observed\textsuperscript{26} and, may be critical in order to avoid the spontaneous breakup of the agricultural production cooperative especially if (as hypothesized in 2.1.3) private cultivation would be more efficient. Such restrictions would lead to Pareto inefficiencies not only in the short term but also in the long run. They would result in cooperative members living as "rentiers", i.e., either hiring outside workers or adopting high degrees of mechanization.

Investment

APCs will be characterized by underinvestment and a preference for short-term over longer term investments. Such underinvestment will be particularly severe as far as intangible assets are concerned. If there are no legal restrictions explicitly preventing them from doing so, APCs are likely to consume whatever capital is available to them.

In a cooperative which does not redeem equity continuously, a "horizon problem" arises from the fact that the claim on benefits from any investment ends with termination of patronage. Any given member will approve an investment with a duration longer than his expected tenure only if, in addition to receiving the opportunity cost of the funds needed, he or she can fully recoup the

\textsuperscript{24} Ward (1958), followed by a large number of scholars maintains that with costless entry and exit, prefect competition and mobility of factors, and constant returns to scale the long run equilibrium of the APC is Pareto optimal. Meade (1972) emphasizes the importance of free entry and the costs and institutional problems associated with the formation of new enterprises in an environment dominated by cooperatives.

\textsuperscript{25} The issue is discussed only by Vanek (1979) who appears to assume that the government founds new firms but is not very clear about how as to identification of promising opportunities or the eventual transfer of such firms to workers.

\textsuperscript{26} A frequent restriction is the prohibition of land sales or rental (often by nationalizing land) following the government's allocation of land rights which endows the cooperative sector with a permanent monopoly on a crucial input to agricultural production.
principal during his remaining tenure. This implies that the return from such a project needs to be higher than the interest rate IOF-owners would require and leads to a firm-specific "hurdle rate" which will be applied to any investment by the cooperative. This hurdle rate is monotonically decreasing in the expected remaining tenure of the representative member, implying that, especially if membership is gradually restricted (as indicated in 2.2.2), investment would finally cease. Even with constant membership, the cooperative will always be characterized by lower investment than its capitalist twin (Bonin 1985).

It can be shown (Bonin 1985) that in this situation, members may value liquidity higher than profitability of investments, i.e. prefer investments with low IRR but short payback period over projects with high IRR, if the majority of returns for the latter does not accrue during the representative members' tenure. Such behavior would ultimately result in the consumption of all available capital. In order to prevent this from happening, legal constraints (the so-called social "capital maintenance rule" in the prototypical labor-managed firm) are often imposed. While such a rule may maintain the nominal value of the capital stock, it would not be effective as far as maintenance and allocative efficiency are concerned.

APCs will be more reliant on external funding than comparable profit maximizing firms. Internal savings generated by APCs will be lower than the internal savings generated by comparable IOFs. Debt will be used to finance consumption whenever possible.

Due to unwillingness of members to finance projects the life of which extends beyond their expected tenure, the cooperative will, in the absence of equity redemption, prefer to finance investments which are associated with a benefit stream longer than the expected tenure of the representative member

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27/ The "hurdle rate", comparable to the internal rate of return, can be characterized as "the constant share per period accruing to the representative worker of normalized per dollar incremental value-added minus any membership dilution costs and any costs related to a change in hours worked per member" (Bonin 1985:59). Investment will be undertaken only if the return is higher than the hurdle rate. "Dilution effects" (Furubotn 1976) arise if investment would require the admission of additional members. In this case, existing members would require additional benefits to compensate for the expected losses.
by drawing on external funds (Bonin 1985).\textsuperscript{28} With imperfect financial intermediation, a cost of capital schedule for such an APC can be derived.\textsuperscript{29} This schedule depends on the age/tenure structure of cooperative members as well as the cost of external financing. APCs tend to incur more debt the lower the remaining tenure of the representative member, and the better the lending conditions (i.e. long maturity\textsuperscript{30} and low costs). The problem will be particularly severe if, as in many empirical cases, members do not bear full responsibility for the debts incurred or if, due to government subsidies, interest rates are very low, a fact which empirically has often led to the accumulation of unsustainably high amounts of debt by cooperatives.

\textit{Given equal endowments of capital, the capital intensity of APCs will be at least as high, but is likely to be higher than that of identical profit-maximizing firms.}

Governments in a large number of countries have subsidized capital to increase capital formation by production cooperatives. Even if this policy succeeds to increase the capital stock, cooperatives' tendency towards underemployment (see 2.2.1) will lead to significant static and dynamic differences in the capital-labor ratio between production cooperatives and IOFs. In pure cooperatives, which do not have the possibility of hiring in wage labor, the need to pay dividends rather than market wages to member-workers implies an implicit cost of labor which is higher than in capitalist firms. As a result, the technology chosen by such an APC will be more capital intensive than the profit maximizing one if dividends are higher than wages, i.e. there are positive profits in the equivalent profit maximizing firm (Bonin and Putterman 1986).\textsuperscript{31} Thus price increases (e.g. favorable government price policies) will induce substitution towards the less-expensive input (capital), further decreasing the employment potential of APCs. It is often argued (Binswanger et al 1993) that, due to subsidization of capital, large scale mechanized farms generate less employment than would be

\textsuperscript{28} Under perfect financial intermediation (i.e. the interest rate on lending equaling the deposit rate), all investments with an expected lifespan longer than the representative agent's tenure in the APC would be financed by debt rather than equity (Furubotn 1970 and Pejovich 1969).

\textsuperscript{29} This schedule indicates that, depending on the maturity of the investments, external financing will be used first, followed by the use of internal savings and, if there are still profitable investments, the use of short term loans (Bonin 1985).

\textsuperscript{30} Long maturity would imply that only a small amount of the principal has to be repaid in every period, decreasing the total financing costs. Bonin (1985) shows that theoretically (with perfect financial intermediation), the amount of investment chosen in a production cooperative could still be Pareto optimal if a capital maintenance requirement were in place and no payments of principal had ever to be made.

\textsuperscript{31} The same result applies if there exists a labor market but costs of hiring labor is higher than in the capitalist firm, e.g. due to problems in monitoring mentioned in 1.2.
socially optimal. Based on the above result, one would expect large farms operated as cooperatives to be characterized by even higher mechanization and lower employment than such private farms.\textsuperscript{32}

*Due to members' low ability to diversify risk in secondary markets, cooperatives will normally not undertake investments with high variance of returns even if they are socially profitable.*

If shares in cooperative equity are not marketable or the market for such shares is thin, individual members of APCs will not be able to diversify their portfolios and insure against firm-specific risks. In the absence of such possibilities, risk averse individuals would have to be compensated for such risk-taking by higher than usual returns. This may lead to serious reductions in Pareto optimality since projects which have high variance of returns but little social risk (i.e. low covariance with other investments in the economy) will not be undertaken by cooperatives even if their expected returns are above the opportunity cost of capital.\textsuperscript{32} As a consequence, one would not expect cooperatives to make large R&D-investments even if they were socially profitable, or to diversify into areas that are characterized by high risk and rapid, capital intensive, technical change (Staatz 1987).

\textsuperscript{32} This argument implicitly assumes identical capital stocks. If, due to underinvestment in the past, cooperatives' capital stock is lower, the result becomes more ambiguous.

\textsuperscript{33} One can, of course, imagine situations in which moral hazard by cooperative managers may lead to the adoption of such projects.
3. Empirical evidence

The above arguments would imply limited efficiency and thus competitiveness of agricultural production cooperatives as compared to privately owned farms. Indeed, APCs which are significantly larger than comparable family-farms are virtually nonexistent in all industrialized countries. Where they exist outside the western market economies, formation of APCs was often non-voluntary and continued existence of production cooperatives was often contingent on government subsidies or state monopolies in factor or output markets. The case studies summarized in the appendix allow to draw three main conclusions:

- Collectivization of small farms was always associated with productivity losses and formation of a cooperative agricultural sector was never justified on economic grounds alone. In Ethiopia in 1974-76, China in 1959-61, and North Vietnam during the period 1958-71, collectivization of small farms significantly decreased productivity (Mengisteab 1990, Pingali and Xuan 1992, Lin 1990). The decollectivization experience in China and Vietnam furthermore suggests that there are more effective methods to increase rural (i.e. agricultural and non-agricultural) investment or to tax the agricultural sector than collectivization (Chen et al 1992). Even the kibbutzim in Israel are not a valid example to demonstrate the economic efficiency of cooperative production in agriculture as their establishment was heavily subsidized, they were allocated quotas for inputs and outputs and thus had never to compete with a domestic small scale agriculture, and now derive the majority of their income from

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34/ In France in 1983, 28 500 GAECs (groups of management in common) cultivated a total of about 2 Mn ha (out of a total of 28 Mn ha). However, the vast majority of such farms (about 20 000) is run by father and son, or (about 6000) by brothers. An average GAEC size of 74 hectares and the fact that salaried workers are employed only by 15% of GAECs suggest that these are in fact "family cooperatives", often to facilitate intergenerational transfer and therefore not subject to the problems characteristics to APCs as discussed here (Rambaude 1985). Agricultural production groups in Spain, despite the fact that they are favored by government subsidies and "many groups received the benefits but did not exist in reality" (Egido 1905) amounted to about 2.3% of total acreage and ranged from 90 to 250 hectares in size. Cooperative production in Norway is limited to about 100 partnerships (of two farmers) for milk production (Almas 1985). In Japan, about 3 700 cooperative farms holding about 40 000 hectares (less than 1% of agricultural area and households) exist, almost two thirds of which are family cooperations (Ishii 1985). Even in the US, in 1987, only 3.2% of all farms (holding 11.8% of the land) were organized as corporations, mainly family corporations (Schmitt 1993).

35/ Mandatory crop delivery quotas and central decisions on the balance between consumption and accumulation were imposed in a number of countries and in some instances even backed up by restrictions on the mobility of peasants, indicating that cooperative forms of production were rarely forthcoming on a voluntary basis. Jensen & Meckling (1979) point out that failure of such organizations to emerge in an otherwise unconstrained economic environment would imply that the costs of setting up such institutions exceed the potential benefits. They emphasize that the multitude of regulations concerning mandatory savings is a good empirical indicator for the presence of a serious problem in this area.

- Cooperative forms of production which were established as a consequence of the breakup of large farms were not efficient. In Nicaragua, the transformation of large estates into state farms, as well as continued support of the private large farm sector, could not prevent serious declines of production in both of them (Utting 1992). This policy was recently replaced by a more smallholder-oriented strategy. In Peru, cooperatives which had been formed out of the large estates either broke up into family farms once they were allowed to do so, or, in sugar where economies of scale exist, degenerated into state farms (McClintock 1981, Kay 1983). Experience from Cuba indicates that even considerable support in the form of differential subsidies to cooperatively organized state farms did not make them competitive in relation to private farmers or voluntary producer associations (Ghai et al 1988).

- Reversal of collectivization facilitated gains in production and efficiency in a number of instances. Maximum productivity gains from such decollectivization would be expected if (i) competitive markets for inputs, outputs, and credit exist; (ii) the macroeconomic environment does not discriminate against agriculture; (iii) technology for the new units is readily available; (iv) farms are small enough to be able to rely predominantly on family labor; and (v) property rights are sufficiently secure to provide an incentive for investment (Binswanger et al. 1993). The experience of China and Vietnam illustrates that even if not all of these conditions were met and land endowments were very low, decollectivization, i.e. the redistribution of land from large cooperative farms to family farms, led to considerable one-time productivity gains (Lin 1992, Pingali and Xuan 1992) and that a mix of cooperative and private sector arrangements to facilitate marketing, the utilization of existing farm machinery, and the establishment of infrastructure, contributed to this success. Family farms matched or exceeded the production performance of former cooperatives in other countries such as Peru, Ethiopia, and Cuba as well, but lack of public goods and policies rooted in a belief in the economic superiority of large scale farming have constrained the performance of smallholder agriculture in each of these cases (Melmed-Sanjak and Carter 1991, Hoben and Bruce 1992, Ghai et al 1988).
IV. SERVICE COOPERATIVES

A number of factors can contribute to greater economic success of service cooperatives as compared to APCs. These are (i) the existence of genuine economies of scale in marketing, credit provision, and input supply which enables SCs to provide tangible economic benefits to their members and compete with the private sector; (ii) the distinction between members (owners) and workers which enables the cooperative to hire workers in the same way as a profit-oriented firm, and (iii) SCs' ability to rely on members' observable delivery of physical goods rather than provision of unobservable "effort" to distribute any the great reduction of monitoring costs coming with this ability. Furthermore, SCs can develop measures to counteract some of the problems, such as the horizon problem, which are specific to cooperatives. We first discuss potential benefits of SCs and, in elaborating on the problems associated with these organizations, highlight how these problems have been dealt with empirically.

1. Potential advantages of service cooperatives

Due to the existence of true economies of scale in marketing, credit, and information provision, cooperatives can, in particular in situations where markets are incomplete and farmers' technical knowledge is deficient, enhance competitiveness and facilitate the dissemination and adoption of relevant innovations. This would enhance farmers' economic well-being and facilitate successful competition of cooperatives with the private sector.

*Utilization of economies of scale*

In contrast to agricultural production, supporting activities, such as input supply, marketing and credit provision, are characterized by the existence of economies of scale. These arise from the cost advantage of large firms in acquisition of information about market opportunities and the credit-worthiness of a borrower, the costs of the mortgage instruments for credit, or technical indivisibilities in input provision or output marketing. With constant transactions costs, it is more profitable for banks and marketing firms to transact in large quantities and large loans than in many small ones,

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26/ Non-production cooperatives often failed to realize their potential due to political interference, direct and indirect subsidization, and the ensuing inefficiencies and lack of responsiveness to members' needs. Structural characteristics of cooperatives, in particular the cost of control, the free-rider problem, and lack of adequate investment incentives due to the horizon problem, can provide an explanation for such failure and help to identify indicators for cooperative performance and areas where support of such cooperatives may be beneficial.
and a formal credit market for very small farmers often does not even exist. It has long been recognized that these economies of scale can be utilized by well designed marketing, service, and credit cooperatives,\(^{37}\) and by careful group lending approaches. The potential of cooperatives to increase availability of credit to smallholders is well documented in the literature (von Pischke 1991, von Pischke et al 1983). Cooperative risk pooling in the form of joint liability for defaults reduces the lender’s transaction costs in assessing the credit-worthiness of individual borrowers and, especially if coupled with the threat of interruption of credit flows to the whole group in the case of default, improves repayment (Huppi and Feder 1990).\(^{38}\)

**Enhancement of competitiveness**

Technical characteristics of agricultural production processes, the spatial dispersion of production, and other imperfections in factor markets, make many agricultural assets, such as human capital or machinery, highly specific, i.e. characterized by a large divergence between acquisition and resale or salvage value. This may, in the presence of imperfect output or input markets, give rise to rents\(^{39}\) which can be appropriated in those markets.\(^{40}\) As a result, individuals may be unwilling to start independent family farming altogether or to invest in certain capital intensive businesses out of fear of being "exploited" in uncompetitive markets.\(^{41}\) Cooperatives, either in the form of bargaining associations, or by engaging in marketing themselves, can counteract such exploitation and guarantee

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37/ Indeed the use of service cooperatives, but not production collectives, in the Soviet Union was proposed by Chayanov (1991) already in the 1920s.

38/ Administrative costs of loans to groups of small farmers compare favorably with the costs of loans to large scale commercial farmers. Joint group liability led to loan recovery rates which (in Zimbabwe) are 40% higher than those on individual loans and generally above 90% (Huppi and Feder 1990).

39/ The existence of such rents can be illustrated by a simple example (Staatz 1987): Suppose a farmer has the opportunity to establish a fruit orchard by investing an amount equivalent (over the expected lifespan of the orchard) to an annual rental value of $300,000 but that, once established, the (annualized) resale value of this object is only $100,000. Assuming annual variable costs of $100,000, he could enter a contract (e.g. with a processor) to deliver his total annual production for a price of $500,000 and expect to make a profit of $100,000 each year. Once the investment is made, however, the processor would have an incentive to offer only $200,001, imposing a net loss of $199,999 on the farmer which would still make him strictly better off than if he were to sell the orchard. These problems are discussed in the economic literature under the headings of "time inconsistency" of contracts and "opportunistic action", i.e. the existence of incentives by at least one of the contracting parties to renege on an existing contract.

40/ The hypothesis that the importance of cooperatives decreases with economic development as input and output markets become more competitive and financial markets become more complete is supported by Guttman and Haruvi (1988) who found that the degree of use of cooperative facilities in Israeli moshavim varied inversely with "development".

41/ In fact, preliminary results from Eastern European farm surveys indicate the empirical validity of this argument (see Csaki and Lerman 1993, and Brooks and Lerman 1993).
demand for agricultural output at "fair" prices (normally composed of a base price and a patronage refund). Participation of cooperatives in input and output markets will not only enhance the competitiveness of such markets but can also lead to rural investment in productive and/or processing equipment, a feature which can be assisted by cooperatives' superior access to credit markets. Performance of a "competitive yardstick" function through cooperatives in this way does not normally require government subsidies. To the contrary, in comparison to the private sector, cooperatives may benefit from better access to credit markets in an environment with market imperfections, their ability to specify and enforce technical product characteristics, and from lower transaction cost in price negotiations, since returns are, irrespectively of prices, returned to members in the form of patronage refunds. These advantages are often advanced to argue that cooperatives can be at least as efficient as private firms (Staatz 1987).

Empirical evidence suggests that the main advantages, such as provision of access to credit and increasing competition, associated with cooperatives vanish as, with economic development and the associated higher density of infrastructure for communications and transport, markets become more integrated and complete. While this implies that there is an important role for cooperatives in stages where such infrastructure is not yet available, it would also suggest that with economic development, and in order to survive, cooperatives increasingly adopt mechanisms similar to those used by IOFs.

An important role of agricultural marketing cooperatives in enhancing competitiveness is supported by empirical evidence. Historically the market share of such cooperatives has been high in commodities such as milk and fruits which are characterized by perishability, importance of product quality, geographically concentrated production, homogenous and highly specialized producers, and large investments in specific assets. The ability to counteract local or temporal monopoly or

42/ This argument is supported by the fact that, with increasing economic development the share of output or input marketed through cooperative channels generally decreases (Kislev and Haruvi 1982). Similarly, Lerman and Parliament (1993) find that while Israeli cooperatives, in line with theoretical predictions, are more indebted than comparable IOFs, there are no difference in indebtedness between American cooperatives and IOFs, which, in the American context, in general achieve similar levels of performance.

43/ In 1985, 26% of inputs for US agriculture and 28% of US agricultural output were handled by cooperatives (Cobia 1988) with the highest shares in dairy (78%), grain soybean and cotton (33%), but lower shares in livestock, wool and (continued...).
monopsony power can also provide an explanation for the diversification of successful marketing cooperatives into input supply (Heflebower 1980). A particularly illustrative example is the importance of cooperatives in milk processing and marketing. Cooperative marketing arrangements for this commodity had their origins in product characteristics such as weight, perishability, difficulty of quality-determination, and asset-specificity. Continued importance of milk marketing cooperatives, however, indicates the potential for continued competitiveness of cooperative marketing arrangements. In order to remain competitive and keep up with technical change, utilize increasing economies of scale in processing, and gain access to the funds necessary to implement such technologies, the original primary cooperatives joined second-level cooperatives and, in particular during the post World-War II period, underwent significant concentration processes (Empson 1984). The market-dominating role of cooperatives in flowers in the Netherlands (Kamann and Strijker 1992) and pigmeat in Denmark (Sargent 1991) similarly illustrates that, if they adopt appropriate management practices and investment strategies, cooperatives can successfully develop and expand in a competitive environment without dependence on specific government subsidies.

_Innovation_

Member education has, from the very beginning, been one of the main principles of cooperative movements. Members' intimate knowledge of the production process, and farmers' motivation to increase the profitability of their business put cooperatives in an advantaged position regarding the acquisition and transmission of information useful to members' business activities. Marketing cooperatives can not only identify innovation possibilities but also, e.g., by adopting quality-dependent payment-systems, provide an economic incentive to their members to provide higher product qualities (Toogood 1985). Cooperative provision of technical information is of particularly high value in situations where (potential) farmers' knowledge-base is deficient, government funds are limited, and the economic potential to be realized by adopting agricultural innovations is high.

43/(...continued)
poultry (8%). While cooperatives' share in fruits and vegetables (17%) is modest, it is extraordinarily high in some fruits such as cranberries, pears, oranges, walnuts, almonds, processed citrus fruits and juices, and prunes (Heflebower 1980). For data on the worldwide importance of cooperatives see Sargent (1988).

44/ In 1980, the market share of cooperatives was in excess of 75% in 16 of the 20 countries surveyed by Empson (1984).

45/ Note that continuing high shares of cooperatives in milk marketing may also be due to government regulations in this area which, for instance through quota-allocation, essentially provided monopolies to existing milk processors.
Case studies indicate that cooperatives can have an important role in the transmission of information and agricultural innovation. There are numerous examples of cooperatives which started out in marketing or input supply and expanded into the provision of specialized technical information since other sources of information were either not available or not sufficiently responsive to market opportunities or farmers' needs (Tendler 1983, van Empel 1991, Narayanan 1991). Members' willingness to pay for the technical and economic advice provided by cooperatives in developed countries (see, e.g., Thirkell 1984 and OECD 1989) illustrates not only the usefulness of such information but also the fact that cooperatives may maintain a continuing advantage over alternative sources (such as government extension or private input-supply companies) in the supply of production and market information. Even when such an advantage did not exist, cooperative producer-organizations have historically often played an important role by establishing the infrastructure and an institutional framework which, once available, allowed the private sector to enter the market (e.g. in artificial insemination), or by introducing new products (e.g. formula-fertilizer), which were then taken up and supplied by the private sector (Heflebower 1980).

2. Potential disadvantages of service cooperatives

The above arguments imply that, in theory, service cooperatives have the potential of providing significant economic benefits. In this section we discuss how general characteristics of SCs such as the non-existence of secondary markets for equity, the lack of association between equity participation and voting power, and (legal) constraints or excessive government intervention, may affect the performance of these organizations and have in the past often led to the failure of "cooperative" approaches even in areas where production was on an individual basis. This will allow to derive a number of organizational features in the areas of investment, control, and recurrent finance which appear to be conducive to the economic success of non production cooperatives.

Cost of control

Due to the inability to concentrate residual claims, and thus reap the returns from costly information-collection, members' incentives to control management are often not in line with the economic returns to be had from such activity. This can reduce the amount of independent information available to judge cooperatives' economic performance and thus make monitoring of management costlier than in comparable for-profit firms. In organizations, the shares of which are marketable,
(potential) shareholders have an incentive to monitor firm performance as information on the flow of future profits or losses by the firm will enable them to gain by either buying or selling stocks. Empirically, this is associated with individual agents’ specialization in the generation and sale of such information for IOFs. The fact that, in contrast to owners of an IOF who are residual claimants, cooperative members will have less incentives to engage in effective monitoring activity is well known as the "control problem" (Jensen and Meckling 1979). Existence of this problem would generally result in a lower than optimal amount of control in SCs and costs of control for such cooperatives that increase disproportionately with size. Absence of independent indicators such as a stock-market valuation of corporate equity, and lack of incentives for members to control management may prevent members of cooperatives from acquiring the management and marketing skills necessary to undertake the more complex tasks, a constraint which is particularly serious in rapidly changing economic environments, if members’ initial level of education is low or if there are legal restrictions on non-members’ participation in cooperative management.

The structural characteristics mentioned above would imply that day-to-day management as well as overall growth of cooperatives are likely to be more susceptible to political pressures; that -- unless they adopt practices, including tradeability of equity shares, similar to those used by IOFs -- cooperatives are most efficient at relatively modest sizes; and that vertical integration and innovative activities, the benefits of which are not immediately obvious to the existing membership, would generally not be undertaken unless associated with very large benefits.

These hypotheses are consistent with the empirical observation that cooperatives often diversify

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46/ As a certain upfront-investment is required and the amount of capital available may be limited, such trade in stocks may, in particular in the initial stages of a transition from central planning, not be feasible or quite costly. Explicitly or implicitly providing for transferability of shares in cooperatives may facilitate utilization of the advantages of cooperatives (rapid initial capital formation) with relatively little losses in efficiency.

47/ As the markets’ judgement on the quality of management will immediately be reflected in the share price, which in turn can be linked to the remuneration of management by writing appropriate contracts, this also provides a relatively cheap mechanism to control management.

48/ Any improvement in management performance resulting from such monitoring has public good characteristics, benefiting all members of the cooperative in relation to their patronage. Since they receive only small part of the benefit, individuals will have insufficient incentives to supply the socially optimal amount of monitoring effort (Alchian and Demsetz 1972), leading to a free-rider problem.
around a fixed base of customers rather than the most profitable businesses\textsuperscript{49} and the wide incidence of government intervention in cooperatives which is often associated with disappointing economic performance.\textsuperscript{50} Furthermore, failure to realize the benefits from organization of second-level cooperatives, and the adoption of management techniques to facilitate such investment, is reported as a main reason behind cooperatives' failure to remain economically efficient (Langdon 1984, Hussi et al 1993). Against this background, continuing member-education, the adoption of transparent accounting and management procedures, and possibly imposition of stringent reporting requirements and public control, appear to be crucial in order to safeguard the long-term viability of cooperatives.

**Free-rider problem**

Individual members share in the cooperative's returns in the form of patronage refunds that depend on the volume of business rather than the amount of equity held. Services performed by cooperatives are thus formally equivalent to club goods (Cornes and Sandler 1987). It would be economically rational for individual members to maximize their share in the benefits from thus goods but leave the cost of providing them to other members or to the public at large. This could be achieved through lobbying for public subsidies or by accumulating unsustainable amounts of debt. At a theoretical level, this problem can be solved as cooperatives providing any combination of pure public and club goods can adopt a set of prices, taxes, and usage restrictions which will lead to attainment of a Pareto efficient equilibrium.\textsuperscript{51}

Empirically, cooperatives' provision of public goods has often been used as a justification for undifferentiated provision of public subsidies which, rather than enhancing their economic performance, have provoked inefficient investment, mismanagement and corruption (Kislev, Lerman, 50/ Such intervention is widespread not only in developing countries but has led to crises in more developed countries, such as the financial crisis of the Israeli cooperative system, the savings and loans debacle in the US, and bankruptcy of large union-owned real estate cooperatives in Germany, as well.

51/ Such an equilibrium is not necessarily dynamically stable, i.e. exogenous shocks might lead to a permanent deviation from the equilibrium (Feinerman and Falkowitz 1990).
and Zusman 1991, Hussi et al 1993). In order to minimize the incentives for individuals to free-ride, levels of equity participation which are in line with the expected volume of business, transparent accounting procedures, and cost recovery through user-charges appear to be important (Hussi et al 1993).

**Investment**

The absence of a secondary market in equity and the ensuing "horizon problem", which has already been discussed for APCs, may cause "underinvestment" in service cooperatives as well. The problem would be particularly severe with respect to intangible assets such as long-term contractual relationships, brand loyalty, and goodwill that are not backed up by an equity-share and that have value only as long as a member maintains a business-relationship with the cooperative. The problem can, especially for SCs be at least partially circumvented by adopting flexible policies of equity retirement\(^{52}\) or making cooperative membership transferable together with other productive assets such as the members’ farms (Staatz 1987). If equity is retired and, as would be expected at low levels of economic development, there are few profitable investment alternatives, SCs can, in contrast to general theoretical predictions, even face a comparatively low cost of capital (Caves and Petersen 1983) or other inputs such as members’ time and materials. Up to a critical amount, determined by the endowments of potential members, and during the establishment period when no equity needs to be retired, cooperatives can therefore actually contribute to relatively rapid rural capital formation.\(^{53}\)

With increasing levels of economic development and competition by the private sector, cooperatives’ economic viability hinges on their ability to generate the investment necessary to attain profit maximizing firm sizes and efficient equipment. Indeed, technical inefficiencies resulting from insufficient investment are argued to be at the heart of cooperatives’ lack of efficiency as compared to IOFs (Ferrier and Porter 1991, Porter and Scully 1987). Although the evidence on relative productivity of (nonproduction) cooperatives remains ambiguous (Sexton and Iskov 1993), the fact

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\(^{52}\) Bonin (1985) proves that the disincentive to investment can be eliminated in a hypothetical world with capital maintenance requirement but tradable shares.

\(^{53}\) While opportunity costs of capital may be low, empirical evidence demonstrates that in general cooperative members invest only in projects with positive economic returns. Note also that the level of investment may still be less than optimal.
that insufficient investment, leading to an increasingly obsolete capital stock, is repeatedly quoted as the main reason for relative inefficiency of cooperatives (e.g. Langdon 1984), illustrates that for cooperatives that provide tangible benefits to their members at any point in time, the ability to generate sufficient investment is a crucial determinant of long-term economic success. The importance of the investment problem is supported by the fact that cooperatives are rarely observed in sectors, such as farm machinery or grain trading, that are characterized by a need for large amounts of liquidity, organizational complexity, and substantial scale economies. In contrast, cooperative arrangements are widespread outside the agricultural sector in areas such as law, medicine, and the arts which are, among other factors, characterized by low capital-labor ratios and therefore less affected by the investment disincentives inherent to cooperatives. Continuing investment and innovation are thus key determinants of long-term cooperative success. The fact that, at least in certain areas, SCs continue to thrive within a competitive environment suggest that there are benefits from cooperative organization which outweigh the costs and that the investment disincentives common to cooperatives can be overcome.

54/ It is noted that large grain trading companies' success is due to physical scale economies in storage and shipping and economies in pooling risk which can not be hedged in futures markets. This requires a continuous trading presence, the ability to buy and sell at a wide variety of locations, and the long-range analysis of prospects in the market in order to plan investments. Cooperatives with a fixed membership base are at a disadvantage in all of these aspects and therefore limit their activities mainly to mere buying and selling of grain.

55/ Partnerships would be expected to emerge in cases where:
(1) The capital/labor ratio is small, thus reducing potential underinvestment arising from the horizon problem.
(2) There are significant economies of scale to production in relatively small teams, e.g. doctors, lawyers or accountants who have specialized in different areas of their field can provide more comprehensive services by forming a partnership.
(3) Due to "specialized knowledge", external monitoring costs are high, the monitoring of the productivity of team members is more cheaply performed internally, and the "brand name" guarantees to the customer that he receives appropriate service.
(4) Returns to the human capital of individual team members are not perfectly correlated, thus risk diversification is possible.
(5) A disproportionately large fraction of the wealth of an individual is represented by his human capital but this human capital is difficult to use as a collateral because of moral hazard.

It is of interest that existing partnerships are very selective in their admission procedures and breakups of partnerships in the initial stages are not uncommon, thus even if the environment is more suited to this type of organization than agricultural production, cooperatives are far from universal.
V. CONCLUSION

Given the theoretical limitations and the empirical evidence on the failure of agricultural production cooperatives, independent family farms are likely to be the most promising candidate to succeed large scale commercial farms. The size of such farms, however, varies widely among countries, ranging from less than 0.5 hectares in China to several hundred hectares in the US. The "optimal" farm size for any given environment depends on a number of factors, primarily the available technology, nonagricultural income opportunities, and the price of capital. Neither the level nor the dynamic development of these variables can be easily predicted for economies making the transition from a centrally planned to a market economy. Wide and equitable distribution of the available assets and the provision of a maximum of organizational options appear to be the most promising means to allow market-based determination of an "optimal" farm size structure.

For small private farms to succeed, competitive markets for inputs and outputs, access to credit, and to information and technology, are necessary. Absence of any of these conditions may threaten the long-term viability of owner-operated farms. Assisting in the provision of physical and institutional infrastructure to facilitate the emergence of these conditions is a major task facing the public sector during the transition from central to decentralized planning. Formation of service cooperatives in competition with the private sector would be an important element in the restructuring of large scale agriculture as it can contribute to increased competitiveness of agricultural and financial markets and better technology transfer. If adequate control mechanisms as well as policies to safeguard member education and investment can be put in place, service cooperatives, in contrast to production cooperatives, are likely to become an integral part of the newly emerging agricultural sector in Eastern Europe.
APPENDIX: CASE STUDIES OF AGRICULTURAL PRODUCTION COOPERATIVES

In this appendix we draw on the experience with cooperative production in Israel, Ethiopia, Nicaragua, Cuba, Peru, China, and Vietnam to illustrate the theoretical arguments made above. It is shown that establishment of cooperatives was never justified on economic grounds alone, that the transformation of large farms into production cooperatives did not lead to efficiency gains, and that the gains which have been realized through decollectivization provide an indication for the magnitude of efficiency losses in cooperative production.

1. Israel

Israeli kibbutzim are often quoted as a proof for the potential of cooperative settlement. While demonstrating that under special circumstances cooperative production is feasible, this example also illustrates that high startup subsidies and substantial ideological commitment were necessary to establish this sector; that only a low percentage of the population is likely to prefer such a type of settlement; that collective agricultural operations are unlikely to be highly efficient; and that the ability to switch out of agriculture into industry is one of the major reasons for continued success of kibbutzim. Furthermore, some of the problems which, as a result from our discussion above, would be expected to prevail in APCs can in fact be observed empirically in the kibbutz.

The percentage of the population living in kibbutzim has been stagnant or slightly declining since 1951. While in the pre-1948 formation of kibbutzim was based on ideological rather than economic motivations and assisted by heavy subsidies, no major new foundations of kibbutzim have occurred in the meantime (Morawetz 1983). Access to critical inputs such as water and land as well as to monopolistic marketing associations is highly regulated, thus there is essentially no private agricultural sector to which the productive performance of kibbutzim could be compared.

In addition to benefits transferred by monopoly marketing organizations and quotas in virtually all commodities (Aharoni 1991); highly subsidized prices for water;\(^{56}\) and cheap government credits, their contribution to the goal of population dispersion and defense entitles agricultural settlements in border regions to special benefits in the form of land grants, provision of infrastructure and means of production, as well as privileged tax treatment (Barkai 1977). Pan-territorial pricing of inputs is a further implicit

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\(^{56}\) Water prices are less than one third of production costs and water is allocated according to historical quotas rather than competitive markets (Aharoni 1991).
subsidy benefiting those settlements.

It is suggested that the most important reason for the success of kibbutzim may be their ability to diversify out of the agricultural sector. This includes the adoption of industrial activities which are associated with a greater degree of economies of scale and which now account for about 60% of kibbutz output (Aharoni 1991) as well as the possibility for members to obtain work outside the kibbutz and remit their earnings.\textsuperscript{57}

The problems encountered in many kibbutzim correspond to the theoretical predictions stated above: Employment of hired (non-member) workers has been a much-discussed issue virtually since the inception of the movement.\textsuperscript{58} Despite their tendency to substitute capital for labor which leads to a capital intensity per worker which is almost double the national average, kibbutzim are often unable to obtain the full scale economies inherent in industrial activity (Don 1985).

All this suggests that in situations where either the ideological commitment, the subsidies for establishment, or the ability to diversify into non-agricultural activities are not available, the potential for such forms cooperative production and total equality in consumption may be rather limited (Morawetz 1983).

\textsuperscript{57} Remittances accounted for about 15% of total kibbutz income in 1965 (Barkai 1977).
\textsuperscript{58} From 1951 to 1965 the number of hired workers in kibbutzim grew sevenfold as compared to total employment growth of 50% (Barkai 1977). In 1990, the top 12 kibbutz industrial plants hired on average 70% of the blue collar and 19% of the white collar workers. Both theoretical considerations and case studies from individual kibbutzim indicate that once the hiring of outside labor for specific tasks is admitted, these tasks will soon be dominated by hired workers (Satt and Ginzburg 1992).
2. Ethiopia

The case of Ethiopia clearly illustrates that at a relatively low level of technology the absence of economies of scale and the difficulties in monitoring and administration make cooperatives and state farms a very inefficient and highly unprofitable alternative to independent smallholder cultivation. The attempt to employ such institutions to extract surplus is limited by the revenue-generating capacity of the agricultural sector which, in the absence of investment in technology generation and/or infrastructure, will be very limited.

The 1973 Ethiopian land reform which eliminated the landlord class and provided tenants with ownership rights to their plots was followed by the formation of state farms and producers' associations. Apart from ideological considerations, main reasons were the desire to increase marketed production, to extract more resources from the smallholder sector, and to modernize agriculture on a broad scale. Producers' associations (Pas) were organized very rapidly (20 000 Pas with 5 Mn members had been established in 1974/6) as basic units of production. Each PA administered about 800 hectares under pseudo-communal tenure. Cooperatives, which were to emerge out of these organizations received modern inputs and credit at subsided rates, paid less head-taxes than independent farmers, were favored recipients of state extension services and could impose labor (corvee) requirements on surrounding peasant communities. Despite these advantages, their productive performance remained dismal: Yields for the five main cereals were consistently lower than yields obtained by smallholders (Mengisteab 1990) and the expected advantages in provision of infrastructure services never materialized (Ghose 1985, Griffin and Hay 1985). Once the governments' difficulties forced it to loosen its grip on the cooperative sector in 1990, virtually all production cooperatives were rapidly disbanded (Hoben and Bruce 1992).

State farms were even more favored in terms of resource allocation. Although comprising only 4% of total area, they received 76.5% of chemical fertilizers, 95% of improved seeds, and 80% of the available credit (Ghose 1985, Rahmato 1988). In contrast to an average farm size of 0.7 ha in the family farm

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59/ The leadership of the PA was supposed to distribute the land to all peasants in the area. While this provided the landless with access to land, smallholder cultivators often ended up with less land (and considerably reduced tenure security) than they had before. Even where the initial distribution was satisfactorily accomplished, redistributions to accommodate an increasing population were often highly arbitrary and greatly reduced tenure security and incentives to invest in land improvement (Rahmato 1985).

60/ In practice such registration was a lengthy and administratively cumbersome process.

61/ It is reported that such biases in favor of cooperatives went as far as to exclusively supply cooperatives only with work oxen and to exert pressure on local chiefs to shift land from independent peasant cultivation to collectives (Rahmato 1988).
sector, the average area per worker in the state farm sector was 15 ha, with some wheat farms reaching 40-80 ha per worker (Griffin and Hay 1985). The list of problems encountered by such farms is long, including slow centralized decision-making and high overhead costs, technical inefficiencies, use of inappropriate technologies due to lack of applied and adaptive research, and severe motivational difficulties, attributed mainly to inappropriate bonus payment schemes and the inability of managers to dismiss workers (Kirsch et al 1989). Average annual losses incurred by the state farm sector in the 1978-85 period amounted to $40 Mn (Mengisteab 1990) and it is agreed with the new government that abandonment, breakup, and liquidation of the remaining assets are the only economically feasible options.

The smallholder sector’s deprivation of extension, technical services, and infrastructure implied by the above policies was exacerbated by imposition of extremely low price ceilings and mandatory delivery quotas on agricultural produce. Deprived of incentives, peasants increased own consumption and reverted to subsistence cultivation. The fact that smallholders are still the dominant sector in Ethiopian agriculture suggests that APCs are certainly not sufficient, and unlikely to be necessary, for the generation of rural development.

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62/ Highly capital intensive methods of farming were adopted in the state farm sector despite the fact that state farm wages were considerably below even the minimum wage rate (Rahmato 1988).
63/ Yields for all of the major crops cultivated by state farms were significantly less than half of the potential (Kirsch et al 1989:149).
64/ Ghose (1985) shows that for a number of commodities, the implicit return on peasant labor (after deduction of purchased inputs) was below the minimum wage.
3. Nicaragua

The case of Nicaragua shows that performance of the (private as well as public) large farm sector with respect to generation of productive employment as well as output was disappointing; that in the absence of a dynamic smallholder sector attempts to improve urban workers' access to adequate nutrition are very costly; and that attempts to substitute cooperatively organized government monopolies in the areas of marketing, output- and credit supply for "exploitative" private traders are likely to be costly and ineffective.

When the revolutionary regime took over in 1979, it was able to confiscate the Somoza properties, comprising about 25% of total agricultural capacity, without any resistance, a major difference to other countries. Given the dependence on the export crop sector, the desire to control these resources, and the fear of "repeasantization" through subdivision of land into small individual plots, the estates were transformed into state farms. The government's goals were to (i) demonstrate advantages of large scale state production and centralized planning; (ii) improve workers living conditions and increase worker participation; (iii) create sources of accumulation; and to (iv) resolve the productive backwardness of peasants through technical assistance, credit, and commercialization (Colburn 1990, 50 quoting the Ministry of Agriculture).

The expected advantages of large scale production did not materialize. Despite the state farm sector's virtual monopoly on modern inputs (Fitzgerald 1985), production as well as economic performance of the private large scale farming sector, as well as the state farms, was dismal. Indexes of production for different crops in the state farm and the large scale sector (Utting 1992:208 and 223) indicate that large scale private production fell significantly in all crop sectors excluding sorghum, the growth of which was direct consequence of the threat to have "unutilized" land expropriated. Productive performance of the state farm sector in export crops was bad as well.65 In economic terms, state farms were a disaster: Out of 102 state farms, only 4 did, despite heavy infusions of subsidized credit, not make losses (Colburn 1990:25). Political pressure led to a considerable increase of employment and a large decline in labor productivity in the state farm sector (Utting 1992:198). On the other hand, inflexible minimum wage

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65/ Production declined sharply in cotton and coffee, the two main export earners and the main justification for the establishment of state farms. Increases in maize production were largely due to forced cultivation in order to increase domestic food supply and are thus indicative more of the failure of government policy to bring forth significant increases in peasants' supply rather than the efficiency or responsiveness of the state farms.
legislation associated with declines in real wages, and the unavailability of the traditional coercive means to obtain labor supply, resulted in serious labor shortages during harvest and other peak seasons (Enriquez 1992).

Government attempts to improve workers’ living conditions were very costly. Considerable improvements in the provision of health and education were made but not contingent on cooperative production. Imposition of ceilings on consumer prices for basic staples and establishment of a government-operated collection and distribution network were associated with high costs. Direct subsidization of these products, in order to provide a fair return to producers, constituted a drag on government resources. Since supply was not sufficiently elastic, this policy required not only to divert state farm land from export crops to foodstuffs but led also to a significant increase in food imports. The concentration of resources on urban areas, together with the absence of profitable rural investment opportunities, provided a disincentive for peasant producers, attracted migrants to urban centers, and thus further increased the budgetary outlays on social programs and subsidies to urban centers.

While large amounts of government investment were available, the surplus to be appropriated from the state farm sector shrank considerably, indicating low profitability of such investment. Government-sponsored investment increased but was concentrated on large scale projects and, in the absence of secure land titles, large increases in credit supply to smallholders in the early 1980s were used mainly for consumption, thus not increasing the productive capacity of the sector (Utting 1992).

Attempts to reduce “exploitation” of peasants by middlemen were unsuccessful and could not compensate for the absence of appropriate technology and access to land. A new marketing network (ENABAS) which was set up to provide minimum prices to peasants was hampered by administrative difficulties and remained unable to match the performance of the old "exploitative" marketing relationships it was supposed to replace (Enriquez 1992). Continuing land invasions by peasants, and decreasing support for the Revolution indicated the central role of access to land and the lack of effectiveness of the government’s policies which aimed to increase peasants’ access to land mainly by means of rent ceilings

66/ Subsides on basic grains, milk and sugar amounted to 6.3% of total government expenditure or 3.7% of GDP in 1985 (Utting 1992).
67/ Food items accounted for 15.6% of total imports in 1981 (Utting 1992).
68/ Government investment increased from 16% of GDP in 1970-78 to about 20% in 1981-85.
and mandatory rental of all uncultivated land by large landowners. In order to maintain peasant support, land distribution to small farmers has been increased since 1984. It is now recognized that "medium sized" producers from one of the most important sectors of the agrarian structure, that land acquisition (with compensation) and its redistribution to individual producers could provide considerable gains in output, and that government marketing agencies should compete with the private sector in input and output as well as in credit markets (Utting 1992).

69/ As could be expected, these policies were not enforceable and resulted in large-scale tenant eviction and resumption of self-cultivation (Enriquez 1992).
4. Cuba

A first land reform in 1959 transformed large estates directly into public cooperatives and redistributed a significant share of land to the smallholder sector.\(^{20}\) The second land reform, in Oct 1963, imposed a lower ceiling and transferred most of the land thus acquired to the state farm sector, increasing its share of total land to 76%.\(^{21}\) From the beginning, economic performance in the state farm sector was disappointing. Major problems with idling of labor due to lack of incentives, misdirected investment, and technical inefficiency led to the adoption of a number of reforms which, from 1970, promoted decentralization in the state farm sector, and, from 1977, emphasized the organization of the remaining farmers in the private sector into cooperatives. In the early 1980s, further measures such as changes in the organization of work brigades and performance-related wage increases were introduced to improve incentives in the state sector while production of the private sector was to be increased by the establishment of a free peasant’s market for above-quota production. Despite discrimination against the smallholder sector in the allocation of credit and inputs, the co-existence of the three sectors offers the ability to compare economic performance of cooperatives, state farms, and (tentatively) the private farm sector. Such a comparison indicates that cooperatives are more efficient than state farms but that independent smallholder farming remains a "competitive threat" to cooperatives and state farms.

Formation of a state farm sector\(^{22}\) led to a jump in absenteeism and lack of discipline by existing workers\(^{23}\) which precipitated huge labor shortages. Further incentive problems were introduced by the 1967 abolition of piece-rate and bonus payment systems which de-facto eliminated wage differentials. To compensate, large mobilization campaigns\(^{24}\) were required.

\(^{70}\) This more than tripled the number of smallholders (which are defined as farms below 67 ha) from about 40 000 to 150 000.

\(^{71}\) Following this second land reform, the government guaranteed private property and was willing to buy any land offered to it from the private sector (e.g. due to a farmers’ lack of successors), a policy which until 1988 increased the amount of land in the state farm sector to about 86%.

\(^{72}\) The "cooperatives" which had been established initially operated on the basis of a wage system, were headed by INRA-appointed officials and never redistributed any revenues. In mid-1961 they were officially abandoned in favor of state farms (MacEwan 1981:50). Official support for these organizational forms was justified by the argument that workers on the highly mechanized plantations were not interested in independent cultivation, the high land-labor ratio of such existing farms which would have required resettlement of additional beneficiaries if the emergence of a new "landlord class" was to be avoided, and the need to have control over food supplies.

\(^{73}\) Rates of absenteeism were at about 40% and reports indicate that workers used to work only half of the expected time-load due to new-found job security and the inability of managers to fire them (MacEwan 1981).

\(^{74}\) In the 1970 mobilization, about 1.2 Mn persons participated.
Exceptionally high rates of investment\textsuperscript{75} and preferred treatment of agriculture in such investment\textsuperscript{76} did not facilitate the attainment of the agricultural development targets (MacEwan 1981). Large part of the investment-funds went into mechanization.\textsuperscript{77} Low efficiency in utilization of such machinery and the adoption of unsuitable machines led to low technical efficiency of production\textsuperscript{78} and, in the pre-1970 period, production in the agricultural sector grew only at 1.5\%, below the population growth rate of 2.3\% (Ghai et al 1988:26). This led to a number of reforms, namely (i) introduction of production cost as the yardstick for performance measurement; (ii) formation of permanent production brigades; (iii) introduction of performance-payment schemes. As a result, the state farm sector\textsuperscript{79} has stabilized and, with continued subsidization, keeps its share of total output.

In order to increase production on the 12.6\% of total land which had remained outside the state farm sector, cooperatives\textsuperscript{80} were promoted. Their characteristics are (i) relatively autonomous self-government\textsuperscript{81} which is restricted only with respect to the hiring of outsiders, the distribution of profit between consumption and capital formation, and the prohibition of cooperative members to raise animals on their own account; (ii) land contributed by members is redeemed over a period of 7 years; (iii) highly advantaged access to credit and mechanization.\textsuperscript{82}

Small private farms constitute a residual category, concentrated in inaccessible regions. They depend on the state for credit and inputs for which they have to pay prices which are considerably higher than those offered to cooperatives (Ghai 1988:106) and have to deliver procurement quotas like all other agricultural

\textsuperscript{75} Total investment increased from 16.4\% of GMP in 1962 to 31\% in 1968.
\textsuperscript{76} The share of agriculture increased from an average of 27\% in 1962/63 to 40\% in 1965/66.
\textsuperscript{77} The number of tractors increased fivefold between 1960 and 1970 (MacEwan 1981).
\textsuperscript{78} In 1969-73, the recovery rate of sugar (which provides a good summary indicator) was 15\% below the 1951-56 average achieved under private production (12.85\%) (MacEwan 1981:193), indicating continued difficulties in organization of the work process beyond the initial problems.
\textsuperscript{79} In 1988, state farms accounted for 83\% of the land, 80\% of the workforce, and 77.5\% of total production. Average area cultivated amounted to 14 000 ha with an average workforce of 1390.
\textsuperscript{80} The average size of cooperatives in 1984 was 766 ha and 51 member families.
\textsuperscript{81} Work norms are set by an internal norm commission and adjusted every year. Cooperatives as well as private farmers are subject to quota deliveries to the state.
\textsuperscript{82} Even temporary hires must be approved by ANAP, the national peasant organization.
\textsuperscript{83} Net profit was distributed among payments to members (40 to 50\%), payment for members contributing land and capital (25 to 30\%), investment (10-15\%), culture, sport, recreation and social services (20\%) and possibly some establishment of a current account to reduce reliance on commercial credit for working capital.
\textsuperscript{84} Subsidized farm machinery sales (Ghai et al 1988:73) led to high degrees of mechanization but figures to indicate the magnitude of such implicit subsidies are unavailable.
sectors. After the establishment of a total state monopoly on retail operations in 1967 had eliminated all channels for independent marketing, only the peasants' market, established in 1980, allowed independent farmers to sell above-quota production to the public at free prices rather than at fixed prices to the state. The resulting higher potential for profit by independent farmers provided a serious threat to cooperatives which led, after repeated temporary closures, to the final abolition of these markets in 1986.

While there are no data on profits, wages paid (or incomes) can provide a basis to compare productivity. On average in 1979-81, cooperative members earned 23% more than state farm employees. Inter-regional differences are more pronounced in private farming, but only a limited number of private farmers in extremely disadvantaged regions earned less than the average state farm member (Ghai et al 1988). Out of 761 CPAs in 1982, 88.6% reported a profit, achieving an average cost of production of 0.67 which, mainly due to the need to repay members who had contributed land, increased to 0.77 in 1984 (Ghai et al 1988). This compares to a target cost of production (actual figures are not available) of 0.85 for the state farm sector. Higher profitability of the private farmers can be inferred from the continuous lobbying by cooperative leaders, in particular in 1982-86, to close down on the independent peasant's market in order to prevent cooperatives' membership from declining.

85/ If, for example due to the absence of explicit capital maintenance requirements, investment in state farms is lower than in coops, the difference may be even more pronounced.
5. Peru

The Peruvian reform illustrates the potential for conflicts between a privileged class of cooperative members and the hired workers employed by them, a conflict which required increasingly severe government intervention in the management of cooperatives. This was necessary to prevent decapitalization, to ensure appropriate long-term management, and to limit open exploitation of outside workers. Despite such intervention, cooperative enterprises in all corps which were not characterized by economies of scale, disintegrated rapidly. A special form of "service cooperative" (SAIS) which was adopted in the highland in order to provide land reform benefits to rural communities without granting them access to land, i.e. equal membership rights, failed as well.

The reform of 1969, which was adopted to counter low productivity growth in the agricultural sector, expropriated land above a certain size irrespective of its use. CAPs (Agrarian production cooperatives) which comprised the former workers of the estate were formed predominantly in the coastal regions. Despite considerable amounts of credit made available to the agricultural sector, agricultural production increased on privately operated lands but declined in cooperative enterprises and growth of aggregate output was only slightly higher than during the 1960s, far below the growth of population. Cooperatives, instead of generating employment, led to the escalation of existing inter- and intra-regional inequalities and were characterized by "self-destructive properties." The employment of casual labor in coastal reform enterprises illustrates the tendency of these cooperatives to degenerate into capitalist firms in which a few members retain managerial and other well-paid tasks and appropriate the surplus generated by contract workers. Employment of casual labor was very high.

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86/ Total output increased at 1.8% in 1970-76, as compared to 1.1% during the 1960s. As a consequence, food imports increased from 15% of total exports in 1972 to 25% in 1974 (Kay 1988).
87/ Employment increased at less than 1% annually and gross income inequalities both between regions as well as between members and hired workers have amplified, in part due to the skewed pattern of public investment: Capital value per beneficiary family was 135 000 soles ($3100) in the coast and 23 000 ($528) in the highlands. In the aggregate, beneficiaries (30% of the population) were still privileged and have access to almost 50% of national crop area (Kay 1988).
88/ "The tendency towards self-destruction expresses itself in the reduction of the working day, the decrease of labor intensity, the inability to take quick and efficient commercial and production decisions, the use of coop's resources for the private benefit of members, outright corruption, and, in a considerable number of cases a pressure in favor of parceling out the land" (Caballero 1985:171).
89/ In large (>700 ha) cooperatives in the Ica valley, 40% (as compared to an average of 23% in all cooperatives surveyed) of the work force were composed of hired labor (Caballero 1985). Given that hired labor was required to do double the workload of regular members (and still received lower wages), this clearly indicates the high reliance of existing cooperatives on hired labor as well as the low density of beneficiaries if the cooperatives were to be redistributed to existing members only.
and associated with considerable wage differentials. To prevent degeneration of cooperatives into capitalist enterprises, repeated and increasingly harsh government intervention was necessary: in 1972, CAPS were forced to incorporate some casual laborers (eventuales) as members; in 1975 they were forced to reintroduce piece-rate payment schemes (by tarea) for members; from 1976, the Ministry’s approval was necessary for any increases in wages or changes in members’ workloads. In the sugar cooperatives, elected representatives were replaced by government officials, and, to break strikes by beneficiaries, some of the sugar complexes were occupied by the military, completing the de-facto transformation of the cooperatives into state farms.

A special form of service cooperatives (SAIS; Agrarian society of social interest) was formed in the highlands. This organizational form was adopted to utilize the presumed economies of scale in production and to incorporate a wider range of beneficiaries. In addition to the (often few) former hacienda workers, neighboring peasant communities were included into the service cooperatives. Although they did not obtain land, they were to receive collectively part of the profits from the cooperative business to facilitate infrastructure investment.

In commodities where no economies of scale existed, cooperatives were subject to "breakup from within". Such internal encroachment, while being widely observed in coastal CAPs as well, was particularly severe in the highlands where any profits generated by the SAIS would have to be shared with the associated members (highland communities) of the SAIS. Socios approved for themselves large wage increases (thus decreasing profits), diverted inputs and water to their own plots, used hired labor to fulfill their work quotas, cut back investment and wherever possible decreased the extent of cooperative plots. This led to rapid output increases on private plots while productivity of cooperative agriculture stagnated. The government, rather than permitting dissolution of the CAPs where tenancy had in fact

90/ Average money income received by members of the eight larger sugar cooperatives in 1972 was four times that received by casual workers (Caballero 1985:174) and in general the wage received by members was about 50% higher than that received by casual laborers. This was complemented by indirect income such as access to facilities, social and medial and educational benefits, credit access and retirement benefits as well as job stability.
91/ This regulation was widely evaded and led to the creation of a new form of member (rentado) who did not fully share in the profits of the cooperative (McClintock 1981).
92/ Average area adjudicated per family was 23 ha in the CAPs, and 46 ha in the SAISs (Kay 1988:214).
93/ The extent of such disintegration can be gauged form examples in which tenant members had increased their share of total rice production from 13.5% in 1972 to 64.4% in 1975 (Kay 1983).
94/ Income from private plots was at least half but often equal or higher than the income obtained from cooperative production. Land allocated to private plots in 1975/76 accounted for 67% of the total in the southern highlands (Kay 1983).
undermined joint production, eliminated the possibility to rent plots from the cooperative in 1977, so that farmers had to choose between either giving up their rented plot and remaining socios or continuing to farm on their own account and loosing all benefits of cooperative membership such as input supply and marketing (Kay 1983). As a result, "virtually no CAP remained profitable and decapitalization through lack of investment was common" (Kay 1983:227), often in the hope of accelerating the breakdown of the cooperative enterprise.

Members of the highland communities did -except possibly from some wage employment on coastal CAPs- not receive any benefit from the hybrid organizations and staged land invasions in order to emphasize their demand for ownership of land rather than an entitlement to profits which would never materialize. In areas were such land invasions were pronounced, SAIS agreed to rent out some marginal land to comuneros and deducted rental fees from future profit shares. The hope that cooperatives would be very flexible in their use of a fixed labor force, provide a big stimulus to work, and mobilize members' labor surplus in slack periods to operate long maturing labor-intensive projects without additional labor costs, did not materialize either: Comuneros refused to perform unpaid work for infrastructure improvement and the SAISs used individual wage payments under the guise of a food quota to induce such work. Following increasing intensity of land invasions in 1977, the failure of the model (i.e. both of its components) was acknowledged and a significant policy of redimensonamiento, i.e. redistribution of land, took place.

Comparison of parcellized holdings to the productive performance of their parent cooperatives (Melmed-Sanjak and Carter 1991) suggests that CAPS had not been able to utilize their productive potential, and that decollectivized production was characterized by higher cost-efficiency and significantly increased intensity of land use. Private farmers introduced short season cropping, made much higher use of family labor, and increased their use of fertilizer. Despite using less machinery and seeds than the previous cooperatives, decollectivized plots had generally higher yields than their predecessors.

95/ "Beneficiaries themselves are not over-concerned about the financial collapse of the central enterprise as they hope this might accelerate its disintegration and result in the private adjudication of land" (Kay 1983:228).
96/ Even the largest CAP (Tupac Amaru II) which was established in 1971 as a government-showpiece (with 26 peasant communities affiliated) was, after successive land invasions and redimensonamientos from 1976 onwards completely redistributed to peasants in 1979.
6. China

The process of collectivization

Collectivization in China started with the formation of mutual aid teams (before 1955) which involved the pooling of labor, farm tools, and draft animals for peak season demands by 4 or 5 neighboring households on a temporary or permanent basis. Encouraged by the success of such collectivization, elementary cooperatives (comprising 20-30 households) were introduced in 1955. In these units, farmers did no longer operate on their own account but, in addition to payment for work performed, received dividend payments for means of production (animals, land, tools) they contributed to the cooperative. This was followed by the formation of "advanced cooperatives", in which all means of production were owned jointly and remuneration was strictly on the basis of work points. While these steps were mainly voluntary and initially successful, the formation of large communes which comprised an average of 5000 households and 10000 acres (Lin 1990) and which were characterized by a totally need-based distribution was a disaster: Grain output in 1962 was at 79% of its 1957 level and output of cotton, edible oils and meat declined by more than 50% (Nolan 1988). Starvation was widespread and the population fell by 10 Mn in 1959-60.

In reaction to the disastrous performance in the early 1960s, work incentives were reintroduced and production teams, comprising about 25 households, were formed as the basic unit of production. To improve incentives, a highly complex workpoint system was established. Inability to effectively implement such a system led to the development of the simpler "time-rate" system under which the amount of workpoints earned depended on a (periodically reassessed) rating of workers in terms of a "workpoint grade" which was then multiplied by the hours worked. Production on private plots (amounting to about 5% of total arable land) was also allowed.

Investment, though involuntary, was very high and the recruitment of labor led large increases in irrigated area (from 20 Mn ha in 1952 to 27 Mn hectares in 1957 and 43 Mn hectares in 1975; Nolan 1988). It is, however, argued that the need for such high investment was in part caused by the low efficiency of

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97/ Agricultural output increased by 27% in 1952-57 (Lin 1990).
98/ Nolan (1988) argues that most of the disasters in 1960 and 1961 were in fact the consequence of an ill-conceived and poorly planned expansion of irrigation facilities during the Great Leap forward and thus at least man-induced.
99/ This workpoint system distinguished over 200 tasks, each of which had to be classified according to the degree of diligence with which it was performed. Supervision of the quality of such tasks alone created immense costs and provided a basis for corruption and personal favoritism (Nolan 1988).
collective resource use and that the ceiling on income ensuing from the investment of any surplus considerably dampened collective work incentives (Nolan 1988).

Productive performance was hampered by further constraints such as state procurement and taxation which were introduced in 1953 and which accounted for 92-95% of total farm sector sales to the non-farm sector in 1952-83. Lack of regional diversification, in part as a result of quota requirements which had to be delivered in grain, and strict limitations on peasant’s interregional mobility may have contributed to such efficiency losses. According to 5 independent estimates, total factor productivity in Chinese agriculture decreased considerably and was below the 1957 level throughout the 1959-78 period (Lin 1990).

Decollectivization

Contract systems, under which households were, in return for inputs, obligated to deliver a certain amount of grain to the state but could dispose of any surplus as they wished, were widely and rapidly adopted from 1978 and a full scale return to family farming had been achieved by 1983/83. Individual households received allotments of land under 15 year transferable and inheritable leases. The collective means of production were either directly sold off to peasants, as with small scale machinery, or contracted out to individuals or partnerships, often by auctioning off rental contracts. Technical assistance was still provided by the state but extension and other services had been shifted to a system under which the remuneration of extension agents and agricultural specialists depended on the performance of the farmers under his supervision (Nolan 1988). Rural water conservation and irrigation and drainage continued to be of high concern and to be managed centrally but work was contracted out to specialized teams with higher skills. Insurance, education, and health continued to be provided on a centralized basis.

Agricultural output in 1975/77-1983/85 increased by 8.4% annually (Nolan 1988:115), despite an average farm size of only 0.5 ha which was often highly fragmented (Wenfang and Makeham 1992, Ling 1991). Productivity increased sharply by 42% between 1978 and 1984 and it is estimated that the change in the

\[ \text{100/ The extension of such leases to 50 years has been discussed (Nolan 1988).} \]
institutional structure alone facilitated a productivity gain of 16.4% (Lin 1992). Improvement in farm incomes resulted from the more efficient use of resources and increased non-farm employment which greatly improved the efficient use of labor resources. Contrary to expectations, decollectivization did not lead to a collapse of rural capital formation: Sales of agricultural means of production almost doubled between 1978 and 1986. Total rural assets increased by more than 27% per year in the period 1978-1985 (Chen et al 1992), an extremely rapid rate of rural capital formation.

101/ Fan and Pardey (1992) argue that the one-time impact of such an institutional change will lead to long term dynamic gains only if backed up by appropriate investment in research. They estimate that research-induced technical change accounts for about 20% of the growth in aggregate agricultural output since 1965.

102/ Non-farm employment accounted for between 20 and 30% of total income in the sample of Ling (1991).

103/ It is of particular interest to consider the components of this growth: While the area mechanically ploughed decreased (from 40 to 34 Mn has), the stocks of trucks for agricultural use increased almost fivefold, and small-sized and walking tractors almost tripled (Nolan 1988). While there was no new construction of irrigation works, there are indications that the existing structures were being used more efficiently.
7. Vietnam

Following redistribution of land to individual smallholder farmers in the land reform in 1953-57, North Vietnam successively collectivized agriculture via formation of work exchange teams (1955-57), low rank cooperatives (1958-60), and high rank cooperatives (widely adopted by 1971), similar to the Chinese model. Constant difficulties in monitoring of work led to the degeneration of the originally envisaged workpoint systems into fixed point systems and finally into fixed wages, i.e. the de-facto operation of the cooperatives as state farms. Rice yields during the 1956-65 period remained static. As a reaction and an attempt to increase management incentives, the "New Management System" was introduced in the 1970s (Fforde 1989). The limited success of this measure is evident from the fact that growth of rice production in 1966-75 remained with 1.5% below the population growth rate of 2% (Pingali and Xuan 1992).

Before unification in 1975, agricultural production in the South was performed essentially on an individual basis. Rice production and yields increased considerably (by 5% and 3.5% per annum respectively over the 1956-75 period) during this period, leading to expectations that the South would assume the role of the granary for the North. However, the abandonment of individual ownership of means of production and attempts at collectivization led to significant decreases in rice yields (Beresford 1989, Pingali and Xuan 1992).

In response to the production crisis of the 1970s, the product contract system was adopted in 1981/2. Under this system, collectively owned land was allocated to individual peasants (for 3-year periods) to perform labor-intensive tasks such as transplanting, harvesting, and cultivation which required high level of diligence and were difficult to monitor. Cooperatives continued to be responsible for ploughing, irrigation, and application of fertilizer and pesticides and were to be remunerated at prices fixed by the government. Households were allowed to appropriate any surplus remaining after fulfillment of the state quotas and could dispose of it as they wished (Beresford 1989). While this system led to gains in output, it did not bring about long-term land improvements by individual farmers and the quality of the services performed by the cooperative was often low. To eliminate this problem (and to counteract stagnation of output which became a problem in the mid-1980s), land leases to individuals were extended to a period of 15 years (50 years for perennials) and input markets were liberalized: Cooperatives were to retain only the minimum amount of machinery which was necessary to ensure subsistence and sell off the rest. Farmers, in turn can contract services from the cooperative or from private entrepreneurs and exchange or hire seasonal labor at freely negotiated prices.
The first set of decollectivization measures led to increases in rice yields by 32 and 24% for North and South. Analysis of the productivity impact of the reforms indicates that in the North, due to disincentives and the uncertainties associated with centralized income supply, cooperative farmers' productivity was 52% lower than that of non-cooperative farms. The effect of decollectivization alone is estimated to have amounted to 11.8% in the North and 16.25% in the South, figures which are broadly comparable with Lin's estimate of a productivity gain of 16.4% due to decollectivization in China.
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