THE ECONOMICS OF AGRICULTURAL DECOLLECTIVIZATION IN CENTRAL AND EASTERN EUROPE

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ABSTRACT

The break-up of large-scale agricultural production units into individually operated farms differs considerably across Central and Eastern European countries. Family farming is not well developed in countries where large-scale successor organizations to the former state and collective farms still dominate, such as Slovakia, Hungary and the Czech Republic. However, family farms are important in Albania and Latvia, where a massive break-up of the collective farms resulted in a domination of small-scale production units. Also within countries there exist wide variations in the decollectivization of different regions and agricultural subsectors. We develop an economic model of decollectivization to explain these variations and derive a series of propositions regarding factors affecting the decollectivization process. Our empirical analysis presents remarkable correlations between decollectivization and our explanatory variables. Specifically, they suggest the importance of relative productivity, factor intensity and privatization procedures in explaining differences between countries in decollectivization.

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I. Introduction

In most Central and Eastern European countries (CEECs), agricultural production was organized in large-scale collective and state farms under the Communist regime. Economic reforms since 1989 include both the privatization of agricultural production assets and the restructuring of state and collective farms. Quite remarkably, the breakup of large-scale agricultural production units into individually operated farms -- a process we define as decollectivization -- differs considerably for the various CEECs. Our calculations give an index of decollectivization (DI) -- based on the percentage of agricultural land used by individual farms but corrected for the initial situation -- that varies between 5 and 95 percent in the different countries of Central and Eastern Europe (Table 1).[1] The DI is low in countries where large-scale successor organizations to the former state and collective farms still dominate, such as Slovakia (5 percent), Hungary (13 percent), and the Czech Republic (20 percent). The DI is highest in Albania (95 percent) and Latvia (80 percent) where a massive breakup of the collective farms resulted in a domination of small-scale production units. Within the CEECs there also exists wide variation in the decollectivization of different regions and agricultural subsectors.

Are these differences random? We argue that they are not, and develop an economic model of decollectivization to explain the variations. We derive a series of propositions regarding factors affecting the decollectivization process and show that these are supported by empirically observed differences in CEEC agricultural decollectivization.

We formally model the decollectivization process as the decision of collective farm members to leave the collective production framework and start up individual farms. As in Carter (1987) and Machnes and Schnytzer (1993), this decision is made by comparing the expected utility of collective farm members with the expected utility of leaving and starting up an individual farm independent of the collective farm.

The literature identifies both advantages and disadvantages in collective production, some of which would not extend beyond the transition period. Disadvantages include high transaction costs associated with the monitoring of labour and inefficiencies due to the right of co-determination (Pollak, 1985; Lin, 1988; Schmitt, 1991, 1993).[2] Advantages of collective farms include economies of scale in risk management, the provision of information and credit, input purchasing, marketing and production (Putterman, 1985; Carter, 1987; Pryor, 1992; Machnes and Schnytzer, 1993; Deininger, 1995).

[1] We define decollectivization in a very strict sense, i.e. the breakup of state and collective farms into individual farms. A common critique is that in this way the DI measures "fragmentation" rather than decollectivization. While fragmentation and decollectivization coincide in some cases (e.g. Albania), this is not necessarily the case in general. In most of the CEECs we study many individual farms cover 100 hectares and more.

[2] Alchian and Demsetz (1972) were the first to note the high monitoring costs of metering labour quality or effort.

Other factors that affect the expected utility of moving from collective to individual farming (and thus, the decollectivization process) are farm-specific labour productivity, factor intensity, technology, and asset privatization procedures.

This paper analyzes how all the above factors influence a collective farm member's decision to start his own farm. Our model of the collective farm follows the tradition of literature on agricultural producer cooperatives and labour-managed firms.[3] The collective farm uses one variable input, labour, to maximize dividend per member, assuming elastic labour supply and labour remuneration according to work rather than need (Bradley, 1971 and Israelsen, 1980). Like Israelsen (1980), we assume constant labour effort. However, we extend the standard model by relaxing assumptions about fixed membership, a homogeneous work force with identical labour productivity, and a perfectly democratic labour-managed firm. Furthermore, we explicitly model the exit costs of leaving the collective and analyze how these exit costs are affected by exogenous factors, including privatization and government regulations.

First, our model recognizes that risk has a negative impact on decollectivization, based on the assumption that collective farms have the advantage of scale in dealing with risk. However, we argue that this advantage is to a great extent only temporary and is conditional on the transition period, which is characterized by uncertainty and missing markets. With the development of markets, differences in risk management disappear and the negative impact of risk on decollectivization is reduced. Second, we show that price increases stimulate decollectivization, independent of risk, because the marginal income effects of an output price increase are larger for an individual producer than for a collective farm member, ceteris paribus. Third, our theoretical findings indicate that the average labour productivity of the collective farm negatively affects the incentives of members to leave. Fourth, exit costs influence an individual's decision. Exit costs are influenced by factor intensity and the property rights distribution of productive assets. How and the extent to which property rights are reassigned by the privatization process are crucial for the decollectivization process. We argue that due to high transaction costs and high opportunity costs for former owners who left agriculture during Communism, restitution of land does not necessarily lead to a fragmentation of farm structures. The opposite may happen: restitution may lead to consolidation of large-scale farms as former owners prefer to lease their land to the collective farm.

Our empirical analysis, based on data from nine CEECs[4], presents remarkable correlations between decollectivization and our explanatory variables. Specifically, they suggest the importance of relative productivity, factor intensity, and privatization procedures in explaining differences between CEECs in decollectivization.
The paper is organized as follows. In Section 2, a theoretical model of decollectivization is presented. In Section 3 we derive seven propositions concerning the factors influencing decollectivization. Section 4 provides empirical evidence for the propositions stated in Section 3. Section 5 concludes the paper.

II. A model of decollectivization

[3] This literature was initiated by the seminal works of Ward (1958), Domar (1966), and Vanek (1970). We refer to Bonin and Putterman (1985) for an excellent overview.
[4] Albania, Bulgaria, the Czech Republic, Hungary, Romania, Slovakia, Estonia, Latvia, and Lithuania.

Assume that before reform, no individual farms exist and all individuals work on a single collective farm. Collective farm members allocate their time between working for the collective farm and leisure, i.e., there is no household production on private plots.[5] Assume that labour is the only variable production factor and that production is linear in labour, i.e., that there are constant returns to scale, and that the quality of labour is constant (Israelsen, 1980). The profit of the collective farm before reform is a stochastic function,

$$(1) \qquad \pi_o^C = \theta^C \, p^C \sum_j^{n_o^C} \alpha_j^C h_j^C$$

where θ^C is a random variable reflecting the states of nature; p^C is the output price received by the collective farm; n_o^C represents the initial number of collective farm members; α_j^C is the productivity of member j; and h_j^C is the labour input of member j. The following assumptions apply to θ^C and α_j^C:

- Following Stiglitz (1974), Carter (1987), and Machnes and Schnytzer (1993), we normalize θ^C such that $E[\theta^C]=1$ and $var[\theta^C]=E[(\theta^C-1)^2]$. A greater variance of θ^C implies more risk. When there is no risk, $\theta^C=1$. All uncertain factors influencing prices, labour input, and labour productivity are included in θ^C.

- We relax the generally used assumption of a homogeneous work force (Ward, 1958; Domar, 1966; Sen, 1966; Bradley, 1971; Israelsen, 1980) by assuming that on the collective farm all members have different labour productivity, with an average of $\alpha_o^C = (\sum_j^{n_o^C} \alpha_j^C)/n_o^C$ before reform.

A collective farm member receives a share of the collective farm's profit as dividend. This share is based on his labour contribution in the collective farm (h_j^C), such that his income or dividend $y_j^C = (h_j^C / \sum_j^{n_o^C} h_j^C)\pi_o^C$.[6] However, whereas most models of collective farms assume perfectly democratic decisionmaking, we relax this assumption by assuming that the collective farm managers can influence the remuneration of labour and extract some rents (Lyons et al., 1994).[7] Assume that members only receive a share δ of the collective farm's profit, with $0<\delta<1$. The farm managers are hence the residual claimants of the farm's profits earning an income equal to the sum of the dividend and the extra rents. We treat δ as an exogenous factor.

[5] There is an extensive literature on labour allocation on collective farms where a farmer chooses between leisure, working on his private plot, and working for the collective farm (see Lin (1988) for an overview). Whether or not an individual farm is an extension of the private plots an individual cultivated before, or not, is not relevant for the analysis.

[6] See Sen (1966) and Putterman (1989) for the determination of labour supply under a mixed remuneration scheme according to work and needs.

[7] δ is a formalization of Putterman's *"obstacles to internal democracy and self-determination"* (Putterman, 1985, p. 180).

Assume that individuals maximize utility, which is defined as an increasing, continuous and twice differentiable concave function of income y_j (i.e., $U_y>0$ and $U_{yy}<0$) and leisure L_j (i.e., $U_L>0$ and $U_{LL}<0$). The assumption that utility is concave in income implies that farmers are generally risk averse (Binswanger and Rosenzweig, 1986). To simplify the calculations, we assume that $U_{yyy}=0$.[8] Define leisure as the time not spent on labour and assume that each individual disposes over one unit of time, such that $L_j=1-h_j$. Since we assume that there is risk, member j chooses his labour input, h_j^C, to maximize expected utility:

$$(2) \qquad \max_{h_j^c} \; EU_\theta[\, y_j^C(h_j^C), 1-h_j^C\,] = EU_\theta[\theta^C \delta p^C \alpha_o^C\, h_j^C, 1-h_j^C\,].$$

Using Maclaurin expansion and our earlier assumptions about θ and $U[y_j,1-h_j]$, we can rewrite (2) as

$$(3) \qquad \max_{h_j^c} \; U[\delta p^C \alpha_o^C\, h_j^C, 1-h_j^C\,] + U_{yy}[\delta p^C \alpha_o^C\, h_j^C, 1-h_j^C\,]\mathrm{var}[\theta^C]/2.$$

The optimal labour input, h_o^C, is determined by the first-order condition

$$(4) \qquad \eta_o^C = \frac{U_L^C}{U_y^C} = \delta p^C \alpha_o^C .$$

which equates the marginal rate of substitution between income and leisure, η_o^C, to the marginal product of labour. Since the marginal product of labour is the same for all collective farm members, all members supply the same amount of labour and earn the same income

$$(5) \qquad y_j^C = y_o^C = \delta p^C \alpha_o^C\, h_o^C .$$

This immediately implies that more productive collective farm members have an incentive to leave, while less productive members have an incentive to keep the more productive members from leaving.

Assume now that at the beginning of the reform the collective farm is transformed into a successor organization, e.g., into a producer cooperative. We assume that the only <u>effective</u> change resulting from this initial transformation is that each member is given the right to leave the collective farm and start up an individual farm. Hence, the successor organization is still a collective farm, where farm production is carried out jointly, but each member is free to leave. *We define decollectivization as the process of individuals' leaving the collective farm to start up individual farms.* More specifically, we define the "degree of decollectivization," ρ, as the ratio of farmers who leave the collective farm over the total number of farmers.

After reform, the collective farm's profit is determined by the productivity of the labour remaining in the collective:

[8] See also Carter (1987) and Machnes and Schnytzer (1993).

$$(6) \qquad \pi_R^C = \theta^C p^C \sum_j^{n_R^C} \alpha_j^C h_j^C$$

where n_R^C is the number of members who remain in the collective farm. Let α_R^C denote the average productivity in the reformed collective farm. A collective farm member earns $y_R^C = \delta p^C \alpha_R^C h_j^C$. Assuming that δ does not change after the reform, and analogous to maximization problem (3), the optimal labour input of a member is determined by the optimization problem

$$(7) \qquad \max_{h_j^C} U[\delta p^C \alpha_R^C h_j^C, 1 - h_j^C] + U_{yy}[\delta p^C \alpha_R^C h_j^C, 1 - h_j^C] var[\theta^C]/2.$$

and more specifically by the first-order condition equating the marginal rate of substitution between income and leisure in the reformed collective, η_R^C, to the marginal product of labour:

$$(8) \qquad \eta_R^C = \frac{U_L^C}{U_y^C} = \delta p^C \alpha_R^C,$$

where $U_L^C > 0$ now denotes the marginal utility of leisure and $U_y^C > 0$ denotes the marginal utility of income in the reformed collective farm.

If individual k decides to leave the collective farm, the output of his individual farm will be $\alpha_k^I h_k^I$, where α_k^I is individual k's productivity in an individual farm and h_k^I his labour input on an individual farm. We assume that individual productivity follows a continuous distribution $G[\alpha]$. Individual k's farm profit, which equals his income, y_k^I, is also defined as a stochastic function

$$(9) \qquad y_k^I = \theta^I (p^I \alpha_k^I h_k^I - C),$$

where θ^I is a random variable reflecting the states of nature; p^I is the output price received by the individual farm; and C equals "exit costs", i.e., the costs involved in leaving the collective farm. These exit costs include all real costs and transaction costs a member faces when he wants to leave.[9] Again we normalize θ^I in such a way that $E[\theta^I]=1$ and $var[\theta^I]=E[(\theta^I-1)^2]$. Individual k will compare his profit with the income he can earn in the collective farm. Analogous to (3) and (7), the optimal labour input for the individual is determined by the following maximization problem

$$(10) \qquad \max_{h_k^I} U[p^I \alpha_k^I h_k^I - C, 1 - h_k^I] + U_{yy}[p^I \alpha_k^I h_k^I, 1 - h_k^I] var[\theta^I]/2.$$

[9] Some parts of the exit costs (C) are influenced by risk, but other parts of C are not affected by risk (see further). For mathematical convenience the specification of y_k^I as in (9) assumes that all parts of C are affected by θ^I. An alternative specification does not change the basic results, but substantially complicates the derivations.

The optimal value for k's labour input, h_k^I, can be found via the first-order condition, such that the marginal rate of substitution between income and leisure on the individual farm, η^k, is equal to the marginal product of labour

$$(11) \qquad \eta^k = \frac{U_L^k}{U_y^k} = p^I \alpha_k^I,$$

where $U_L^k > 0$ denotes the marginal utility of leisure and $U_y^k > 0$ the marginal utility of income in k's individual farm.

Individual k will leave the collective farm if the expected utility from leaving is larger than the expected utility from staying in the collective farm, i.e. when $EU_\theta[\, y_k^I(h_k^I), 1-h_k^I\,] > EU_\theta[\, y_R^C(h_R^C), 1-h_R^C\,]$. After substitution of y_k^I and y_R^C, this condition becomes

$$(12) \qquad EU_\theta[\theta^I(p^I \alpha_k^I h_k^I - C), 1-h_k^I\,] > EU_\theta[\delta \theta^C p^C \alpha_R^C h_R^C, 1-h_R^C\,].$$

We can rewrite condition (12) as follows

$$(13) \qquad U[p^I \alpha_k^I h_k^I - C, 1-h_k^I\,] + U_{yy}[p^I \alpha_k^I h_k^I - C, 1-h_k^I\,] var[\theta^I]/2 > U[\delta p^C \alpha_R^C h_R^C, 1-h_R^C\,] + U_{yy}[\delta p^C \alpha_R^C h_R^C, 1-h_R^C\,] var[\theta^C]/2.$$

This implies that individual k will leave the collective farm if

$$(14) \qquad U[p^I \alpha_k^I h_k^I - C, 1-h_k^I\,] - U[\delta p^C \alpha_R^C h_R^C, 1-h_R^C\,] > -U_{yy}[.](var[\theta^I] - var[\theta^C])/2,$$

where we use the assumption that the second derivative of the utility function is constant. Condition (14) indicates that the decision to leave the collective farm is influenced by the following factors: (1) the difference between the prices received by the collective and the individual farm, p^C and p^I; (2) the difference in how the collective farm and individual producers deal with risk, $var[\theta^I] - var[\theta^C]$; (3) the difference in labour supply between the collective and the individual farm, h_R^C and h_k^I; (4) the ability of managers to extract rents, δ; (5) the distribution of individual productivity, $G[\alpha]$; and (6) the exit costs, C.

A straightforward implication of this comparison is that members with high individual farm productivity will want to leave, because they reach a higher utility level by farming on an individual farm than by staying in the collective farm. Inversely, the other members will want to stay in the collective farm, because for them the utility of staying exceeds the utility of leaving. We can derive the "threshold productivity," α^T, at which a member is indifferent between leaving and staying in the collective farm. Using condition (14), α^T is determined by condition

$$(15) \qquad Z = U[p^I \alpha^T h_T^I - C, 1-h_T^I\,] - U[\delta p^C \alpha_R^C h_R^C, 1-h_R^C\,] + U_{yy}[.](var[\theta^I] - var[\theta^C])/2 = 0.$$

We can now express the degree of decollectivization, ρ, as a function of the threshold productivity level above which a member will leave, α^T:

$$(16) \qquad \rho = \frac{1}{n_o^C} \int_{\alpha^T}^{\alpha^{max}} G[\alpha] d\alpha \,,$$

which we can rewrite as

$$(17) \qquad \rho = \frac{1}{n_o^C} (F[\alpha^{max}] - F[\alpha^T])$$

where F[.] is the integral function of G[.]. In the next section we use these results to derive the impact of several factors on the degree of decollectivization.

III. Factors influencing decollectivization

Impact of the economic environment (terms of trade and risk)

The terms of trade that farms face affect their relative profitability and thus the incentive for individuals to leave the collective farm. We limit our formal derivation to the impact of changes in output prices, but similar results can be derived for the impact of input price changes.

Proposition 1. *An increase in the output price positively affects decollectivization.*

To analyze the impact of output price on decollectivization, we first assume that the individual farms and the collective receive the same output price: $p^I=p^C=p$. Using (15) and (17) we can derive that

$$(18) \qquad \frac{\partial \rho}{\partial p} = \frac{F_\alpha}{n_o^C} \frac{Z_p}{Z_\alpha} > 0 \,,$$

where $F_\alpha>0$ is the derivative of the integral function of G[.] with respect to threshold productivity, α^T, and

$$(19) \qquad Z_\alpha = U_y^T (\partial y_T^I / \partial \alpha^T) - U_L^T (\partial h_T^I / \partial \alpha^T) - (U_y^C (\partial y_R^C / \partial \alpha^T) - U_L^C (\partial h_R^C / \partial \alpha^T)) \,,$$

$$(20) \qquad Z_p = U_y^T (\partial y_T^I / \partial p) - U_L^T (\partial h_T^I / \partial p) - (U_y^C (\partial y_R^C / \partial p) - U_L^C (\partial h_R^C / \partial p)) \,.$$

Using the chain rule it can be shown that $Z_p>0$ if $Z_\alpha>0$ (and vice versa), which implies that $\partial \rho / \partial p > 0$ always.[10]

[10] After rearranging (19) we can derive the following condition for $Z_\alpha>0$:

$$(19b) \qquad \frac{U_y^C}{U_y^T} + \frac{U_L^T (\partial h_T^I / \partial \alpha^T) - U_L^C (\partial h_R^C / \partial \alpha^T)}{U_y^T (\partial y_R^C / \partial \alpha^T)} < \frac{\partial y_T^I / \partial \alpha^T}{\partial y_R^C / \partial \alpha^T} \,.$$

This condition reflects an upper concavity bound on the utility function for our analysis. With a linear utility function, condition (19b) reduces to $U_y^C / U_y^T < (\partial y_T^I / \partial \alpha^T) / (\partial y_R^C / \partial \alpha^T)$, which always holds. With utility

Decollectivization increases with output price, because an increase in output price will increase the income of individual farmers more than the income of collective farm workers, because the individual farmers have higher productivity and higher labour supply. Proposition 1 implies that a decrease in output price, and hence of overall profitability in agriculture, negatively affects decollectivization. Notice that this effect arises independently of the effect of risk on decollectivization. An important policy implication of this result is that government interventions to increase farm output prices, e.g., through general price support policies, would stimulate decollectivization.

In many CEECs the prices collective farms and individual farms face receive not identical during transition and this affects decollectivization. More specifically:

Proposition 2. *An increase in output prices received by the collective farm relative to output prices received by an individual farm negatively affects decollectivization.*

We now analyze the impact of differences in prices received by the farms, i.e., $p^I \neq p^C$. More specifically, using (15) and (17) we can derive that

$$(21) \qquad \frac{\partial \rho}{\partial p^I} = \frac{F_\alpha}{n_o^C Z_\alpha}[U_y^T(\alpha_T^I h_T^I + p^I \alpha_T^I (\partial h_T^I / \partial p^I)) - U_L^T (\partial h_T^I / \partial p^I)] > 0,$$

which can be written as

$$(22) \qquad \frac{\partial \rho}{\partial p^I} = \frac{F_\alpha \alpha_T^I h_T^I}{n_o^C Z_\alpha}[U_y^T(1+\varepsilon_p^I) - (U_L^T / p^I \alpha_T^I)\varepsilon_p^I] > 0$$

where $\varepsilon_p^I > 0$ denotes the elasticity of labour supply with respect to output price in individual farming. Expression (24) is positive, which can be seen after substituting the marginal rate of substitution from (11). The intuition is straightforward: with increased profitability of individual farming relative to collective farming, it becomes more attractive for a member to leave the collective farm. Moreover, an increase in p^I increases the opportunity cost of leisure and thus increases the labour supply on an individual farm.

Similarly, we can derive that an increase in p^C, holding p^I constant, decreases decollectivization, or

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strictly concave, an increase in α^T increases income from individual farming more than income from collective farming, or $\partial y_T^I / \partial \alpha^T > \partial y_R^C / \partial \alpha^T$. However, as a result of the concavity of the utility function, an increase in α^T increases utility from collective farming more than utility from individual farming. The extent to which the two effects offset each other depends on the concavity of the utility function, which is characterized by the marginal rate of substitution between individual and collective farming with respect to income, U_y^C / U_y^T. There is an additional utility effect due to the decreased "consumption" of leisure, which is reflected in the second term of the left-hand side of condition (21b). This term is positive since $U_L^T(\partial h_T^I / \partial \alpha^T) > U_L^C(\partial h_R^C / \partial \alpha^T)$, i.e., $U_L^T > U_L^C$ and $\partial h_T^I / \partial \alpha^T > \partial h_R^C / \partial \alpha^T$. For the rest of the analysis we assume that $Z_\alpha > 0$, i.e., that the total "utility effect" is less than the "income effect".

$$(23) \qquad \frac{\partial \rho}{\partial p^C} = \frac{F_\alpha}{n_o^C Z_\alpha}(-U_y^C \delta(\alpha_R^C h_R^C + p^C \alpha_R^C (\partial h_R^C / \partial p^C)) + U_L^C (\partial h_R^C / \partial p^C)) < 0,$$

which can be rewritten as

$$(24) \qquad \frac{\partial \rho}{\partial p^C} = \frac{F_\alpha \delta \alpha_R^C h_R^C}{n_o^C Z_\alpha}[-U_y^C (1 + \varepsilon_p^C) + (U_L^C / \delta p^C \alpha_R^C)\varepsilon_p^C] > 0$$

where $\varepsilon_p^C > 0$ denotes the elasticity of labour supply with respect to output price in collective farming. Expression (24) is negative, which can be seen after substitution of the marginal rate of substitution from (8). Again the intuition is straightforward: an increase in the profitability of collective farming relative to individual farms makes leaving the collective less attractive. Also, labour supply on the collective farm increases as the opportunity cost of leisure on the collective farm increases. These results imply that when collective farms receive higher prices than individual farms ($p^C > p^I$), this has a negative impact on decollectivization. There are several reasons collective farms might receive higher prices than individual farms, at least in the beginning of transition.

First, there are economies of scale in marketing, input purchasing, credit, and information provision (Deininger, 1995). Large-scale farms can bargain for higher output prices (through their market power) and lower input prices (through bulk purchasing) and have higher creditworthiness because they can pool non-covariate risk. Hence, they have better access to credit. Particularly when monopolies persist, large-scale farms enjoy benefits in bargaining (Brooks and Meurs, 1994). Individual farmers can also make use of these scale economies by establishing new forms of cooperation, e.g., a marketing or service cooperative. In this way the advantages of the collective farm will gradually disappear.

Second, collective farm management has closer contacts with up- and downstream industries that provide them with better access to market information, particularly when these sectors are still monopolized. Collective farm management possesses certain organizational and networking skills required for successful farming (Lyons et al., 1994), for example, because it knows the appropriate channels and has close contacts with the administration, it is in a better position to acquire government subsidies. As up- and downstream industries are privatized, and to a certain extent demonopolized, this advantage to collective farms will gradually disappear.

Third, some markets are still immature or even missing, e.g., markets for credit, land, and certain inputs. This situation provides the collective farm with a temporary advantage over the individual farms. The development of these markets is therefore crucial for the emergence of individual farming. For example, the collective farms still own most machinery, which cannot be used by individual farmers. Brooks and Meurs (1994) report, based on the 1991 World Bank survey on Romanian farm restructuring, that the unavailability of appropriate machinery is one of the main factors to prevent individuals from leaving the collective production arrangements. One should expect this advantage to be temporary as machinery rental services (sometimes organized by the collective farm itself), custom work, and informal markets for land and credit develop.

Proposition 3. *(a) Risk has no effect on decollectivization when collective and individual farms deal with risk in the same way.*
(b) Positive scale economies in risk management negatively affect decollectivization.

First, consider the impact of risk when the collective farm and individual farms deal with risk in the same way, i.e., they face the same risk factor θ such that the variability of their income is the same, $var[\theta^I]=var[\theta^C]=var[\theta]$ or $\theta^C=\theta^I=\theta$. It follows from (15) and (17) that $\partial\rho/\partial\theta = 0$, i.e., a change in risk does not affect decollectivization. Since there is no difference in income variability, an increase in risk does not affect the decision of a member to stay or leave. This proposition further implies that external causes of risk (such as a drought or policy changes) have no effect on decollectivization, provided that all types of farms are affected by or deal with risk in the same way.

Second, consider the case where there is a difference in how collective and individual farms manage risk. Assume that the collective farm can pool risk such that it has a scale advantage in risk management over individual farms (as argued in Carter, 1987, and Machnes and Schnytzer, 1993), such that the variability of income is lower in the collective farm, $var[\theta^C]<var[\theta^I]$. To analyze the impact of this factor on the degree of decollectivization, we define μ as the difference in variation in θ between individual and collective farms, i.e., $\mu=var[\theta^I]-var[\theta^C]$. Therefore, μ is a measure for the scale advantage of the collective farm in dealing with risk: μ increases with increasing scale economies in risk management. Its impact on decollectivization is

$$(25) \qquad \frac{\partial\rho}{\partial\mu} = (F_\alpha / 2n_o^C Z_\alpha) U_{yy} < 0,$$

since $U_{yy}<0$. This implies that positive scale economies in risk management reduce the incentive for collective farm members to leave the collective and therefore reduce decollectivization. Furthermore, this effect depends on the risk aversion of the members. To show this, we can rewrite (25) as

$$(26) \qquad \begin{aligned} \frac{\partial\rho}{\partial\mu} &= -\frac{F_\alpha}{2n_o^C Z_\alpha} R_R^C U_y^C \\ &= -\frac{F_\alpha}{2n_o^C Z_\alpha} R_T^I U_y^T \end{aligned}$$

where $R_R^C = -[\partial^2 U/\partial(y_R^C)^2]/[\partial U/\partial y_R^C]$ denotes the coefficient of absolute risk aversion of the collective farm member farmer and $R_T^I = -[\partial^2 U/\partial(y_T^I)^2]/[\partial U/\partial y_T^I]$ the coefficient of absolute risk aversion of the individual farmer with threshold productivity. Expression (26) implies that an increase in μ has a negative effect on decollectivization. Further, the effect increases with the coefficient of absolute risk aversion, which implies that more risk-averse members will have more incentive to stay in the collective than less risk-averse members.

Given these results, does risk affect decollectivization? To answer this question, we need to understand whether there really is a difference in how collective and individual farms deal with

risk. Three sources of risk should be distinguished: covariate risk affecting prices, covariate risk affecting production, and non-covariate or individual specific risk affecting production.

Covariate price-related risk is caused not only by the erratic movement of prices on the market, but also by government policy, for example, uncertainty about policy changes (problems of credibility) or uncertainty about the enforcement of contracts, legislation and property rights (Stiglitz, 1993). Any form of price stabilization (e.g., buffer stocks or guaranteed floor prices) is usually not a good cure, since it does not imply income stabilization. Hedging is impossible because the appropriate markets are missing in CEECs. The only way to deal with this price related risk is self-insurance or self-protection.

Similar insurance problems arise in the presence of covariate production related risk. In this case the variability of weather and nature is the main source of risk. Yield risk arises from weather variability and/or insect infestation and disease. Timing uncertainties depend on farm-specific weather variations. Only when risks are specific and locally limited (e.g. hail, typhoon) insurance is easy to provide. According to Binswanger and Rosenzweig (1986) crop insurance is not feasible because of (1) asymmetric information, leading to problems of moral hazard, (2) incentive problems leading to efficiency losses and (3) the high covariance of risks.[11] Hence, insurance substitutes are used rather than insurance contracts, such as holding reserves, diversifying prospects, use of conservative or excessive input levels, investing in creditworthiness and developing social ties.

Other sources of covariate risk, however, exist. Stiglitz (1993) adds three distinct sets of risk to the traditional risk problems discussed up to now: inadequate infrastructure, lack of government commitment and other transition risks associated with the ongoing institutional changes and immature markets. Ensuring clear property rights is a necessary condition to be able to decollectivize. When farmers are uncertain about which plot they will own or when they are uncertain whether there is uncertainty of tenure, they will not invest. Farmers will leave a collective farm only if property rights are certain and enforceable.

Machnes and Schnytzer (1993) contend that a collective farm's market power and its contacts with former central marketing organizations, provide it with the opportunity to self-insure. However, they do not provide empirical evidence for this statement. Both Carter (1987) and Deininger (1995) state that collective farms cannot deal with systemic risk better than individual producers in an environment characterized by high risk and incomplete insurance markets.

Non-covariate production related risk is a form of individual specific or personal risk. It has been called 'breakdown and life cycle risks' by Binswanger and Rosenzweig (1986). It applies to durable factors of production that may fail resulting in repair costs and/or reinvestment, or to individuals who can be temporarily or permanently absent from work because of illness, accidents or other life cycle risks. Carter (1987) argues that collective farms can self-insure against these risks as a collective is always self-insuring around its own mean. Deininger (1995) states that this insurance is likely to be more costly than that to be gained by alternative social arrangements. Cooperative risk pooling can, however, be important in a transitional stage where markets are ill developed and the necessary infrastructure is not yet available.

[11] For a detailed treatment of crop insurance and empirical evidence see Hazell et al. (1986).

In conclusion, there are arguments both in favour and against the statement that collective farms have positive scale economies in risk management. The argument that collective farms can deal better with risk than individual farms holds especially in an environment characterized by much uncertainty and missing markets. However, as this uncertainty is more characteristic for the beginning of economic transition in CEECs, the relative advantage of the collective farms, if any, is likely to be only temporary and will gradually disappear when markets develop and macroeconomic instability reduces.

Impact of labour productivity

From our previous discussion we know that members are more likely to start up their own farm if their labour productivity on their individual farm is relatively high. However, decollectivization is not only affected by the distribution of members' productivity on individual farms, but also by the pre-reform average productivity of the collective farm. More specifically:

Proposition 4. *Collective farms with high average productivity will tend to decollectivize less than collective farms with low average productivity.*

To show this, we introduce three simplifications to the original model: (1) utility is linear in income, $U=\gamma y$ with $\gamma>0$, implying that individuals are risk neutral and there is no risk ($\theta^I=\theta^C=1$); (2) labour supply is constant, i.e., $h_R^C = h_T^I = h_k^I = h$; and (3) productivity follows an equal distribution with frequency g, such that the average productivity in the pre-reform collective farm (α_o^C) is equal to the mean of the minimum (α^{min}) and the maximum productivity (α^{max}) in the collective farm. This implies that after reform, the average productivity of the collective farm, α_R^C, is equal to the average of the post-reform minimum productivity, which has remained the same, α^{min}, and the post-reform maximum productivity, which equals the threshold productivity, α^T, or $\alpha_R^C = \frac{\alpha^{min} + \alpha^T}{2}$. We can now write the threshold productivity α^T as

$$(27) \qquad \alpha^T = (\delta p^C \alpha_R^C h + C)/p^I h.$$

After substituting α_R^C with $(\alpha^{min}+\alpha^T)/2$, the formula for the degree of decollectivization simplifies to $\rho = (\alpha^{max}-\alpha^T)/n_o^C$ or by substituting α^T

$$(28) \qquad \rho = \frac{1}{n_o^C}\left(\alpha^{max} - \frac{\delta p^C \alpha^{min}}{2p^I - \delta p^C} - \frac{2C}{(2p^I - \delta p^C)h}\right).$$

Consider an alternative distribution, $G^{\#}[\alpha]$, with $G^{\#}[\alpha]=G[\alpha]+\varepsilon$ where ε is a constant. If $\varepsilon>0$, average productivity is higher under $G^{\#}[\alpha]$. The degree of decollectivization under distribution $G^{\#}[\alpha]$ equals

$$(29) \qquad \rho^{\#} = \frac{1}{n_o^C}(\alpha^{max} + \varepsilon - \frac{\delta p^C(\alpha^{min} + \varepsilon)}{2p^I - \delta p^C} - \frac{2C}{(2p^I - \delta p^C)h})$$
$$= \rho - \frac{2\varepsilon}{n_o^C}\frac{\delta p^C - p^I}{2p^I - \delta p^C}.$$

With the last term $\frac{2\varepsilon}{n_o^C}\frac{\delta p^C - p^I}{2p^I - \delta p^C} > 0$, it follows that $\rho > \rho^{\#}$ if $1 < \delta p^C/p^I < 2$.[12]

In conclusion, decollectivization is affected both by a member's productivity in the collective farm, α_k^C, and a member's productivity in an individual farm, α_k^I. In general, members are more likely to leave the collective farm when α_k^I/α_k^C is high, i.e., when their productivity on individual farms is high and/or collective farm productivity is low. The relation between productivity on the collective farm and productivity on an individual farm is not straightforward. It depends on the skills and human capital of collective farm workers, but also on the technology and the degree of labour specialization in the collective farm before reform. Consider two collective farms, one in which the members are highly specialized in performing a specific task and another in which every member performs the same tasks. As a result of specialization, productivity in the first collective farm will be higher than in the second farm. However, members in the first collective farm might be too specialized to start up a private farm: they might have a low productivity outside the collective, and the ratio α_k^I/α_k^C might be low. Members on the second collective farm have a lower productivity in the collective farm, but might have a higher productivity when they start up their own farm: α_k^I/α_k^C might be high.

The impact of factor intensity and privatization

Our model of the decollectivization process is based on labour as the only production factor. Land and capital assets affect decollectivization through their impact on the exit costs of farm members wanting to leave the collective farm. In general, exit costs reduce incentives for members to leave the collective farm:

Proposition 5. *Higher exit costs reduce decollectivization.*

Using (15) and (17), we can derive that

$$(30) \qquad \frac{\partial \rho}{\partial C} = \frac{F_\alpha}{n_o^C Z_\alpha}(U_y^T(-1 + p^I\alpha_T^I(\partial h_T^I/\partial C)) - U_L^T(\partial h_T^I/\partial C)),$$

[12] Given our assumptions on risk, etc., $\delta p^C/p^I$ summarizes the "non-productivity differences" between collective and individual farms. When $\delta p^C/p^I<1$, all individuals will leave the collective farm, and, hence, average productivity has no impact on decollectivization. When $\delta p^C/p^I>2$, nobody will leave, since the scale advantages of the collective farm are too large to be overcome, given that labour supply is constant and that $G[\alpha]$ follows an equal distribution.

which can be rewritten as

$$(31) \qquad \frac{\partial \rho}{\partial C} = \frac{F_\alpha p^I \alpha_T^I h_T^I}{n_o^C Z_\alpha C}\left(U_y^T\left(-\frac{C}{p^I \alpha_T^I h_T^I} + \varepsilon_C^I\right) - U_L^T \varepsilon_C^I\right) < 0,$$

where $\varepsilon_C^I > 0$ denotes the elasticity of labour supply with respect to exit costs. After substitution of the marginal rate of substitution from (11), it can be shown that (33) is negative. The intuition that decollectivization is negatively affected by exit costs is straightforward: an increase in the exit costs lowers the potential profitability of an individual farm relative to the collective farm. Furthermore, increasing C decreases the opportunity cost of leisure on an individual farm and hence decreases labour supply on an individual farm.

In our model, exit costs include costs involved in the withdrawal of other means of production: land and capital assets. Key elements affecting the costs of withdrawing assets from the collective farm are: (1) the factor intensity and production technology in the collective farm, (2) the withdrawal procedure, and (3) the ownership of assets, which itself is determined by the asset privatization process.

Proposition 6. *Higher labour intensity of collective farms induces more decollectivization.*

Factor intensity and technology of collective farm activities determine the quantity and quality of the assets needed to start up a competitive individual farm, and thus the exit costs. The argument is related to the level of technology used. It is easier for a member to withdraw from a more labour-intensive collective farm than from a collective farm that makes use of more capital. The total amount of transaction or exit costs a member faces depends on the size of the assets he wants to withdraw. It is difficult to start up farms when a high degree of mechanization is used in the collective farm and is presumably needed in the individual farm.[13] This can be due to the indivisibility of assets, as in the case of a combine-harvester. Where Machine-Tractor Stations were used, such as in Romania, the machinery was not owned by the collective farms, and decollectivization has been easier. The use of custom work can also circumvent these problems.

Proposition 7. *Decollectivization is more likely when agricultural assets are privatized through allocation to collective farm members than through restitution to outsiders.*

Privatization of farm assets in CEECs occurs through a variety of procedures (Swinnen, 1996a). In general, land is restituted to former owners and/or distributed among farm workers. Non-land assets are distributed among farm workers and former contributors of land and capital to the former collectives. The privatization procedure affects the allocation of production factors and the farm restructuring in the presence of transaction costs. Especially in the beginning of transition in the CEECs, many feared that restitution would reduce efficiency. One of the assumptions at the base of this fear is that land ownership coincides with land use in the presence of imperfect markets (Brooks and Meurs, 1994). Restitution to former owners therefore implies a breakup of the large-scale collective farms and the fragmentation of land use. However, we argue that the opposite may happen. We argue that

[13] Pryor (1992) stated "*that collectivized agriculture is more likely to be irreversible in three situations: where the level of agricultural technology in the country is relatively high, where collectivized agriculture has been the dominant form of production for many decades, and where state farms predominate*" (p. 267).

restitution of farm assets to outsiders (non-collective farm workers) will reduce decollectivization.

Consider two extreme (hypothetical) scenarios: (a) restitution to former owners, none of whom are currently involved in farming, and (b) distribution of assets to collective farm members. The standard argument that restitution to former owners will breakup the collective farms is based on the assumption of a strong link between asset ownership and asset use. One cause of such a link could be high transaction costs in the asset exchange markets. However, this argument ignores (a) the existence of important transaction costs in the privatization process, (b) differences in transaction costs between insiders and outsiders, and (c) differences in relative incentives for starting up an individual farm. Taking these factors into account leads to a different conclusion.

First, the existence of transaction costs in privatization implies that property rights for outsiders are incomplete at best. This reduces their incentives to use the assets themselves for production. Moreover, because they lack farming skills, former owners have low labour productivity in individual farming, further reducing incentives to take the land out of the collective farm structure. Hence, many former owners show little enthusiasm to invest in strong property rights and decide instead to leave their land in the collective farm.

Second, restitution to outsiders increases the transaction costs for members wanting to use the assets for setting up their individual farm. These members in any case face transaction costs. They need to monitor and control the privatization and asset distribution process when assets are distributed to themselves. Transaction costs are lower for insiders than for outsiders. If assets are restituted to former owners, however, the collective farm members face higher transaction costs as they need to control both the privatization process and the restitution process. Moreover, while in the first scenario they might develop an informal contract with the collective farm, this is more difficult in the second scenario because former owners have less insight regarding the location or condition of the assets.

In addition, when the individual member competes with the collective farm management in renting land from the former owner, he might be at a disadvantage in contracting with the former owner. The collective farm management, which typically plays an important role in privatization implementation, has an advantage in access to information and possibly also in resources available for dealing with transaction costs.

All these factors combined lead to the conclusion that in the case where former owners are no longer active in agriculture, restitution of assets to former owners induces a conservation of the collective farm structure, in contrast to a privatization procedure that allocates assets to the collective farm members.

Finally, as increased exit costs reduce the income of a member who withdraws from the collective farm, and therefore decrease decollectivization, transaction costs linked to the withdrawal of assets are important. The withdrawal procedure is partly stipulated by law, but is partly determined by the reform implementation at the collective farm level. The reform implementation is complicated by the incentive problems of the agents responsible for the implementation in the presence of imperfect information and transaction costs. The problems can be described as a double principal-agent problem. On the one hand, a member who wants to leave has to see to it that he receives the appropriate amount of land of acceptable quality

and adequate infrastructure to which he is entitled. He therefore faces the costs of supervising the managers and the members who control the allocation and implementation process. On the other hand, members with low productivity want to prevent highly productive members from leaving to avoid a decrease in the average productivity, and hence the average profitability and income, of the collective farm. Managers also want to prevent the more productive members from leaving, because their income (dividend+rent) depends on the average productivity of the collective farm. Therefore, less productive members and management might increase exit costs (a) by influencing the regulations for privatization of property rights and factor allocation at the government decision-making level and (b) by slowing down and limiting the implementation of the registration at the farm level.[14]

Examples of (a) include cases in which governments, under political pressure from a collective coalition, have introduced amendments to the land law making it more difficult for individuals to withdraw their land. One such example is the introduction of co-ownership of land between private individuals and state farms in Slovenia (Bojnec and Swinnen, 1996). In Bulgaria, amendments to the original land law include the institution of an extended administrative procedure, the possibility or reviewing the restitution process, and several restrictions to sales of land (Swinnen, 1996b). Another example is Hungary, where members can still leave their cooperative after its transformation, but they cannot withdraw their land or non-land assets. They receive a compensation which is only a fraction of the real value of the assets (Mathijs, 1996). In Slovakia, cooperatives can issue vouchers instead of restituting assets to former owners, but these vouchers cannot be traded for seven years (Kabat and Hagedorn, 1996).

Governments in favour of decollectivization want to reduce exit costs and also reduce the ability of collective farm members and managers to influence these costs. A notable example is Bulgaria. The 1991 Land Law passed by the ex-Communist government did not include detailed specifications about how to implement the law. Much leeway was given to local government and collective farm management to increase exit costs. After the 1991 elections, the law was amended by the new reformist government. Liquidation councils were installed to oversee the liquidation of the collectives and keep managers from raising exit costs (Swinnen, 1996b).

IV. Empirical evidence

The quality and quantity of the available data and the nature of the transition do not allow a sophisticated empirical analysis at this moment. Therefore, the empirical evidence should be interpreted as indicative, rather than as conclusive.

1. There are no consistent data to calculate the impact of prices and risk on decollectivization. We do observe that the negative development in agricultural terms of trade in 1989-1991 throughout CEECs has stabilized and that the situation has improved substantially for some commodities since 1991. We can also conclude that price variation has reduced substantially since 1992, and that agricultural producers generally have a better

[14] Collective farm management might use another instrument to dissuade productive members from leaving. By firing less productive members, management could cause the average productivity of the collective farm to increase and hence decrease decollectivization (see Proposition 4). This is easier in state farms, where farmers are employees, than in collective farms organized as producer cooperatives. However, in the latter members can be laid off as workers, even though they remain shareholders of the cooperative.

understanding of the emerging market economy by agricultural producers (Jackson and Swinnen, 1995). Both factors can be expected to reduce overall production risk, especially "transition-related" risk. The proposition that risk and negative terms of trade have a negative impact on individual incentives to leave the collective farm is consistent with the increase in the share of individual farms over the 1990-1994 period.

2. To analyze the impact of average collective farm productivity, we analyzed the relationship between the decollectivization index (DI) and value added per farm worker (as a proxy for average collective farm productivity). Figure 1 shows a clearly negative relationship for nine CEECs.[15] As Proposition 4 predicts, countries with low productivity on collective farms, such as Albania, have a significantly higher degree of decollectivization than those where collective farm productivity was higher, such as Hungary.

Another indicator of the impact of productivity differences on decollectivization is found in Table 2, which shows Hungarian regional differences until 1994. These data suggest that decollectivization of collective farms -- induced either by transformation decisions (so-called "liquidation") or through bankruptcy procedures[16] -- is negatively related with average productivity: decollectivization is lowest in Transdanubia (21 percent), a region with the most productive farms, and highest in Northern Hungary (42 percent), a mostly mountainous region with the lowest overall productivity (the national average is 29 percent). Probably these productivity differences correlate to some extent with differences in factor intensity and technology, but we have no data to analyze the separate impacts.

Furthermore, figure 2 shows a positive relationship between the decollectivization index and the share of food in total consumer expenditures. This figure suggests that especially in those countries where productivity on collective farms is too low to provide for the basic needs of members, they will leave. The issue of relative productivity is thus related to consumption risk, or more generally, food security, reflected in the share of the budget spent on food. In countries characterized by a large share of the budget spent on food, food security is more critical. This factor appears to have been a key factor for countries such as Albania and Romania, where extremely low productivity of collective farms, in combination with government policy favouring state farms and taxing collective farms, caused very low incomes on the collective farms. In the case of Albania, the situation was so extreme that food shortages and hunger resulted, causing a massive breakup of the collective farms after 1991 (Cungu and Swinnen, 1996).

The remainder of the discussion analyzes the relationship between decollectivization and exit costs. As discussed before, exit costs are influenced by technology, the ratio of outsiders to insiders, and land reform and transformation regulations.

[15] Figure 1 is based on 1993 GAP/worker data. A better indicator would have been pre-reform GAP/collective farm worker data. However, necessary data for calculating this indicator were unavailable for several CEECs. A sensitivity analysis based on those CEECs for which necessary data were available suggests that there is no fundamental change in the relationship if pre-reform estimates of average productivity are used.

[16] All cooperative farms had to be transformed before the end of 1992. The general assembly of each cooperative could decide the nature of the successor organization(s): a cooperative or a company. The members could also decide to break up, i.e., liquidate, the cooperative and divide all the assets among themselves. The bankruptcy of a cooperative also led to the breakup of the cooperative. In both cases, there is no successor organization.

3. To analyze the relationship between decollectivization and technology, labour intensity, measured by the man/land ratio, is used as an indicator of technology: a high man/land ratio implies labour intensive agriculture, which is characterized by a low degree of mechanization and therefore easier to decollectivize. Figure 3 displays the relationship between decollectivization and labour intensity. It shows a positive non-linear relationship between decollectivization and the man/land ratio, consistent with our expectations that decollectivization is more likely to occur where labour intensity is higher (Proposition 6). However, the curve in Figure 3 depends strongly on the Albanian and, to a lesser extent, Romanian observations. Both countries have a much higher man/land ratio than the other CEECs. In fact, excluding Romania and Albania would indicate that the variation in decollectivization index is not correlated with the man/land ratio.

Notice though that the three Baltic countries are all in the upper left corner of the figure. Latvia especially stands out, with a relatively low man/land ratio and 80 percent decollectivization. The high decollectivization of Latvian agriculture can be partially explained (a) by the egalitarian pre-1945 land distribution which implies that restitution of land returns land mostly to insiders (see next paragraph), and (b) by the active restitution and decollectivization policy of the Latvian government. Latvia's active policy was inspired by nationalistic motivations, with land going to native Latvians in a country with a very high share (46 percent) of ethnic non-Latvians in the population.[17] Further, the Latvian reform regulations specify that individual farms are given the highest priority in land allocation. The lowest priority is given to reforming collective farms (quite unlike many other CEECs, where collective farms receive a preferential treatment). One can therefore conclude that the data are consistent with our proposition that high labour intensity, reflected in the man/land ratio, has a positive impact on decollectivization. The data suggest that other factors also affect the observed relationship in the Baltics and especially in Latvia.

Regional differences in decollectivization in Romania also support the relationship between decollectivization and technology. More specifically, significant negative correlation is found between the percentage of plains in the total area of a county ("judet") and the share of individual farms in total agricultural land: the Pearson's correlation coefficient is r^2=-0.71 for observations on 37 Romanian counties.

4. Figure 4 shows the relationship between decollectivization and the share of agriculture in total employment.[18] Two factors can be the cause of this relationship. First, the share of agriculture in total employment is typically negatively correlated with the level of development and the use of technology in agriculture. A country with a high share of agriculture in employment is typically less developed and uses inferior technology compared to a country with a low share of agriculture where there was a substitution of labour by capital as a result of the technological progress. Second, the share of agriculture in employment also captures the number of outsiders versus insiders. A high share of agriculture in total employment is an indication that relatively few people have left agriculture and thus that the ratio outsiders to insiders is relatively low. Consequently, a low share of agriculture in total employment means

[17] See Rabinowicz (1996) for extensive discussion and Swinnen (1996b) for an analysis of ethnic impacts on CEEC privatization choice.

[18] Official data show a substantial decline in agriculture's share in employment in CEECs, but an important part of the changes are statistical effects. Many non-production activities, including services, rural education, etc., were recorded under "agriculture" in the statistics, but are no longer (Jackson and Swinnen, 1995). We use 1993 employment data which are corrected for these statistical biases.

that relatively many farmers left agriculture resulting in a high ratio of outsiders to insiders. Recent World Bank surveys suggest that the overwhelming majority of individual farmers are former cooperative members or employees of state farms (Csaki and Lerman, 1995). Since in general outsiders lack the appropriate skills to start up a private farm, the number of farm workers, i.e., insiders, is a good reflection of the number of people actually interested in individual farming.

Figure 4 shows a positive correlation between the 1993 share of agriculture in the economy and the decollectivization index. CEECs with more than 15 percent of active people employed in agriculture (Albania, Bulgaria, Latvia, Lithuania, and Romania) show a higher degree of decollectivization compared with countries where agricultural employment is less than 10 percent of the work force (Czech and Slovak Republics, Hungary). Again the figure indicates some additional regional biases: the Baltic countries all lie above the curve, while the southern CEECs lie on or below the curve. As in Figure 3, this observation suggests that additional factors have stimulated decollectivization in the Baltic countries and especially in Latvia (see above).

These additional factors have apparently stimulated especially the start-up of larger individual farms. This can be derived from comparing Figures 4 and 5. Figure 5 shows an almost perfect linear correlation (regression R^2=0.92) between the decollectivization index and the share of farms smaller than five hectares in total agricultural land. The comparison with Figure 4 suggests that especially farms larger than five hectares have emerged more strongly in Latvia than in other CEECs with a similar agricultural share in employment. Possible explanatory factors are the pre-1945 land distribution and the active Latvian restitution and decollectivization policies.

5. Data on the impact of land reform and transformation regulations are presented in Figure 6 and Table 3. Figure 6 displays the relationship between decollectivization and land reform policies, which are characterized by the ratio of land distributed to total land to be privatized, the "land distribution index". The figure shows a positive relationship: decollectivization is lowest in countries that have allocated land to outsiders and highest where land was distributed to insiders. For example, Albania and Romania have used land reform policies that allocate land to insiders, i.e., collective farm members or state farm employees. Albania distributed most of the land to farm workers, and Romania used a combination of restitution and distribution. Jackson (1996) indicates that as a result of the close ties of Romanian collective farm workers to the land -- unlike Bulgarian collective farm workers who were more like wage earners by the 1980s -- a property settlement without a gesture towards the peasants' needs for more land was unimaginable. In contrast, decollectivization is very low in countries such as the Czech and Slovak Republics, where land was restituted to former owners many of whom were no longer active in agriculture. The DI for Slovakia and Hungary ise even lower than expected from the relationship between land reform policies and the DI, reflected by the curve in Figure 6. One reason is that both countries implemented legislation that increased the costs for leaving the collective farm considerably more than in other CEECs (see Table 3).

More generally, data presented in Table 3 suggest that decollectivization is more important where (1) more of the land was distributed to farm workers, (2) the share of agriculture in employment is high, and (3) exit costs are low. It is remarkable to see how the two countries at the extremes of the spectrum are exactly opposite in these three factors. Albania, where decollectivization is highest, distributed land, has a high share of agriculture in employment and

low exit costs. Slovakia, where decollectivization is lowest, restituted land, has a low share of agriculture in employment and high exit costs.

Another factor which affects the relationship between land reform policies and decollectivization is the pre-collectivization land ownership distribution. A more fragmented pre-collectivization land distribution implies more transaction costs for potential farmers to set up a farm of a certain size.[19] This factor may also explain partially the difference in decollectivization between Slovakia and the Czech Republic. Inheritance rules were different in both countries. In Slovakia, land inheritance was based on the Napoleontic code, that stipulates that all sons receive an equal piece of land upon their father's dead. This resulted in a stronger fragmentation of land ownership than in the Czech Republic where the eldest son inherited all the land. Former owners received thus smaller plots in Slovakia than in the Czech Republic and faced more transaction costs to take out their land from the collective farm.

V. Conclusion

Important differences in decollectivization can be observed both between CEECs and between sectors and regions within these countries. This paper presents a formal model of the decollectivization process. We identify several factors that affect decollectivization. These include general economic factors, such as prices and risk, and internal factors that result in differences between collective and individual farms, such as differences in output prices, risk management, and labour supply. We further show that productivity and the exit costs a member faces when he wishes to withdraw assets from the collective farm are important factors influencing the decision of collective farm members to stay or to leave and start up an individual farm.

While available data do not allow a sophisticated statistical test of our propositions, the data are largely consistent with our propositions. A relative improvement in terms of trade since the beginning of transition and gradual reduction of price variability and transition-related risk have induced an increase in decollectivization throughout CEECs. Furthermore, we calculated an index of decollectivization, and our analysis shows that this index is positively related with proxies for several of our explanatory variables. More specifically, the empirical analysis supports the conclusions (a) that the average productivity of collective farms has a negative impact on decollectivization; (b) that with extremely low collective farm productivity, food security concerns induce individuals to start up small individual farms; (c) that decollectivization is less in capital- and land-intensive production activities; and (d) that privatization policies affect decollectivization. More specifically, restitution of production factors to outsiders (former owners) leads to less decollectivization than does asset distribution among farm workers and members.

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[19] Swinnen (1996a) argues that the pre-collectivization land distribution also affects the *choice* of land reform policies. For example, pre-collectivization land distribution was very concentrated in Albania inducing strong resistance against restitution to former owners, but it was very fragmented in Slovakia, where former owners are restituted their land.

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TABLE 1

DECOLLECTIVIZATION INDEX (DI), 1994*

COUNTRY	DECOLLECTIVIZATION INDEX (%)
Albania	95
Latvia	80
Lithuania	60
Romania	47
Estonia	38
Bulgaria	36
Czech Republic	20
Hungary	13
East Germany	11
Slovak Republic	5

* The DI is calculated by dividing the difference between the share of individual farms in total agricultural land in 1994 (IND94) and in 1989 (IND89) by 100 minus the share of individual farms in total agricultural land in 1989: DI=(IND94-IND89)/(100-IND89). Data on land use are derived from a series of studies in the EU-COST-network "Agricultural Privatization, Land Reform and Farm Restructuring in Central and Eastern Europe", reported in Swinnen, Buckewell and Mathijs (1996).

TABLE 2

COOPERATIVES THAT HAVE BEEN FULLY DECOLLECTIVIZED (OR LIQUIDATED) AS A RESULT OF TRANSFORMATION OR BANKRUPTCY IN HUNGARY, 1989-1994

	PERCENTAGE OF DECOLLECTIVIZED COOPERATIVES		
REGION	As a result of the transformation decision	As a result of bankruptcy proceedings	Total
Transdanubia	11	10	21
Great Plain	11	21	32
Northern Hungary	25	17	42
Hungary	13	16	29

Source: Tóth and Varga (1995), National Federation of Agricultural Cooperators and Producers (MOSZ).

TABLE 3

VARIOUS INDICATORS OF LAND REFORM AND TRANSFORMATION REGULATIONS

	Decollecti-vization index 1994	Share in total agricultural land (in %)				Share of agriculture in total employment 1993	Exit costs due to government regulations (*)
		Individual farms 1989	Privatized land by restitution	distribution	State-owned land 1994		
Albania	95	4	-	93	3	53	1
Latvia	80	4	64	30	2	17	1
Lithuania	60	9	69	21	1	23	2
Romania	47	14	43-58	15-30	13	36	2
Estonia	38	4	74	22	-	8	2
Bulgaria	36	13	81	-	7	22	2
Czech Republic	20	-	79	-	13	5	2
Hungary	13	14	62	19	5	9	3
East Germany	11	10	82	-	8	na	2
Slovakia	5	-	74	-	20	7	3

(*) Own estimate of exit costs induced by farm transformation regulations (1=Low, 2=Medium, 3=High), based on case studies in Swinnen (1996a) and Swinnen, Buckwell and Mathijs (1996).

Source: Own calculations based on European Commission (1995), OECD (1996) and Swinnen, Buckwell and Mathijs (1996)

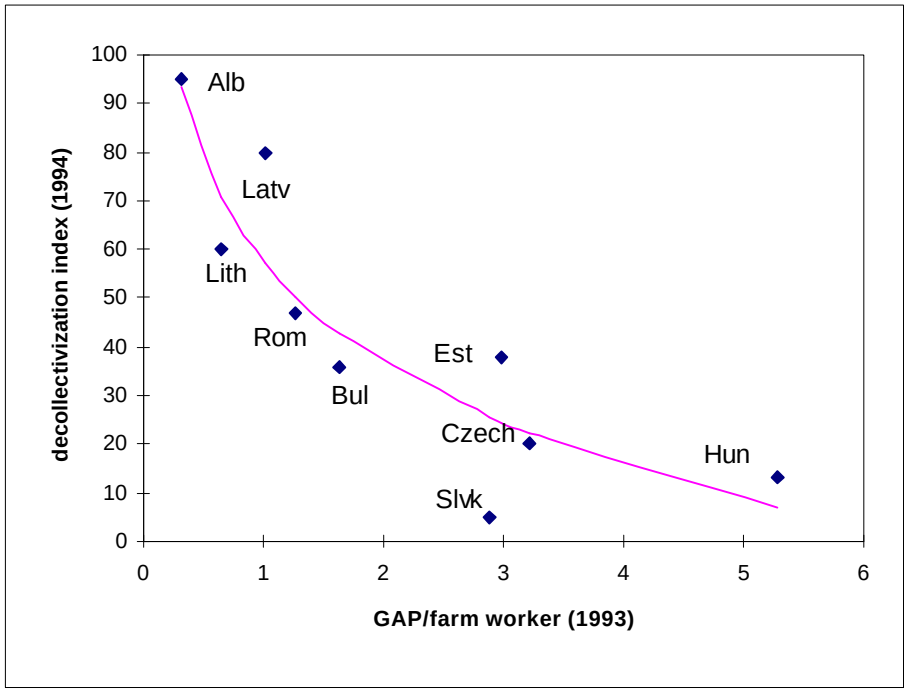

FIG. 1 - Relationship between decollectivization in 1994 and Gross Agricultural Product (GAP) in ECU per farm worker in 1993. The curve on the graph is based on a least squares regression after a logarithmic transformation of GAP/farm worker. Productivity and employment data are from European Commission, *Agricultural Situation and Prospects in the Central and Eastern European Countries* (Brussels: Directorate-General for Agriculture, 1995).

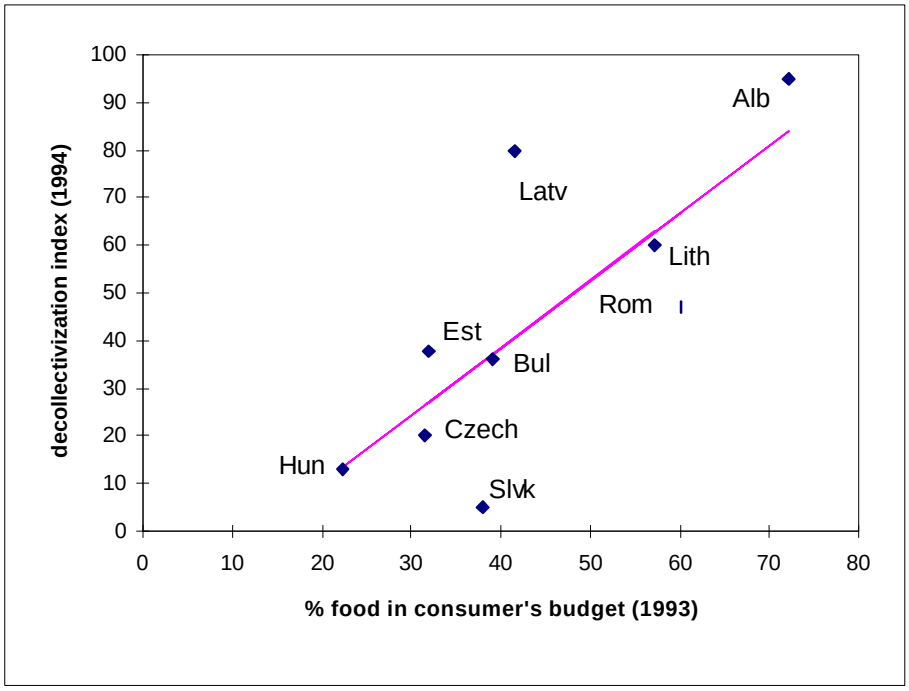

FIG. 2 - Relationship between *decollectivization* in 1994 and *the share of food in consumer's expenditure* in 1994. The curve on the graph is based on a least squares regression.). Data on the share of food in consumer's budget are from OECD, *Agricultural policies, markets and trade in transition economies: Monitoring and evaluation 1996* (Paris: OECD, 1996).

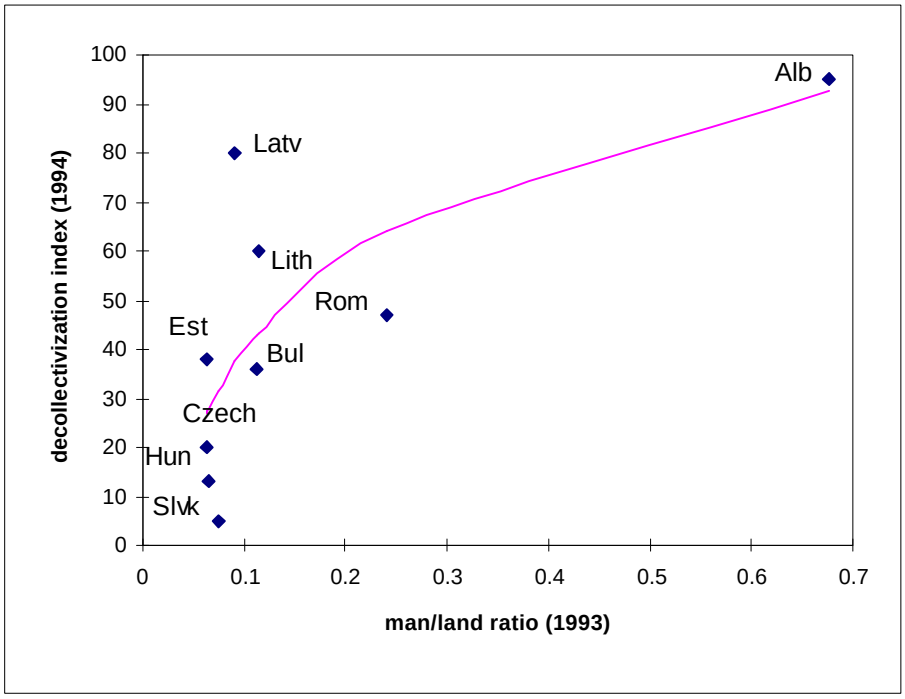

FIG. 3 - Relationship between *decollectivization* in 1994 and *the mand/land ratio* in 1993. The curve on the graph is based on a least squares regression after a logarithmic transformation of the mand/land ratio. Man/land ratios are calcuated based on data from European Commission, *Agricultural Situation and Prospects in the Central and Eastern European Countries* (Brussels: Directorate-General for Agriculture, 1995).

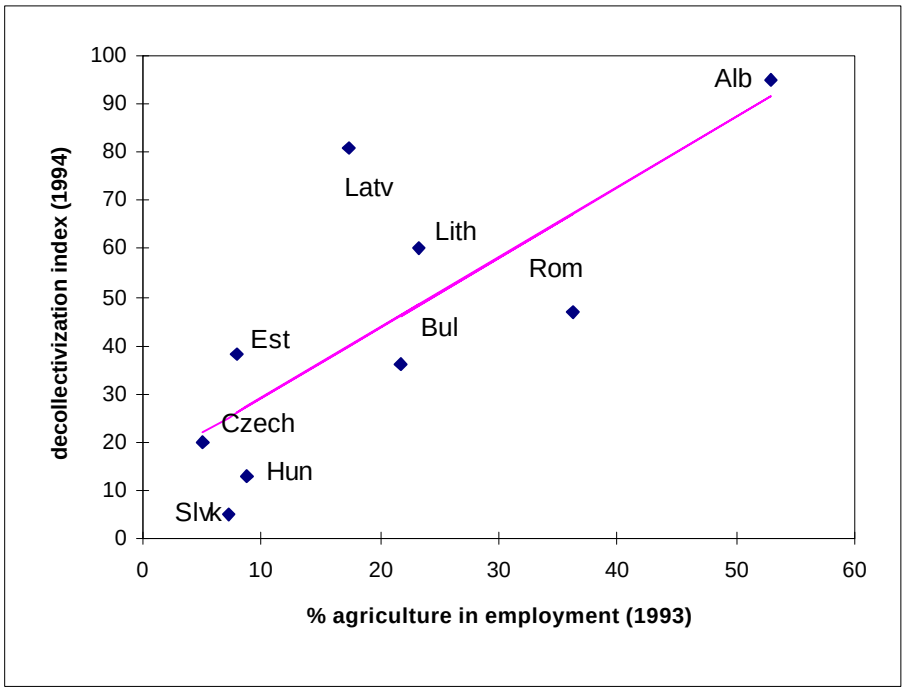

FIG. 4 - Relationship between *decollectivization* in 1994 and *the share of agriculture in total employment* in 1993. The curve on the graph is based on a least squares regression. Data on the share of agriculture in total employment are from OECD, *Agricultural policies, markets and trade in transition economies: Monitoring and evaluation 1996* (Paris: OECD, 1996).

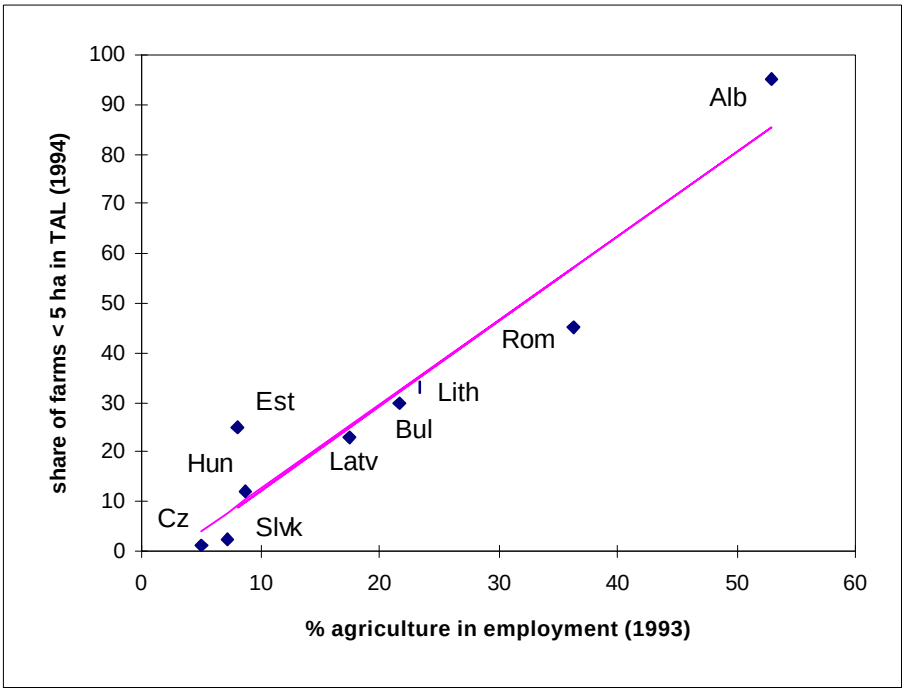

FIG. 5 - Relationship between *the share of farms smaller than 5 hectares in total agricultural land (TAL)* in 1994 and *the share of agriculture in total employment* in 1993. The curve on the graph is based on a least squares regression. Data on the share of agriculture in total employment and on farms smaller than 5 hectares are from OECD, *Agricultural policies, markets and trade in transition economies: Monitoring and evaluation 1996* (Paris: OECD, 1996).

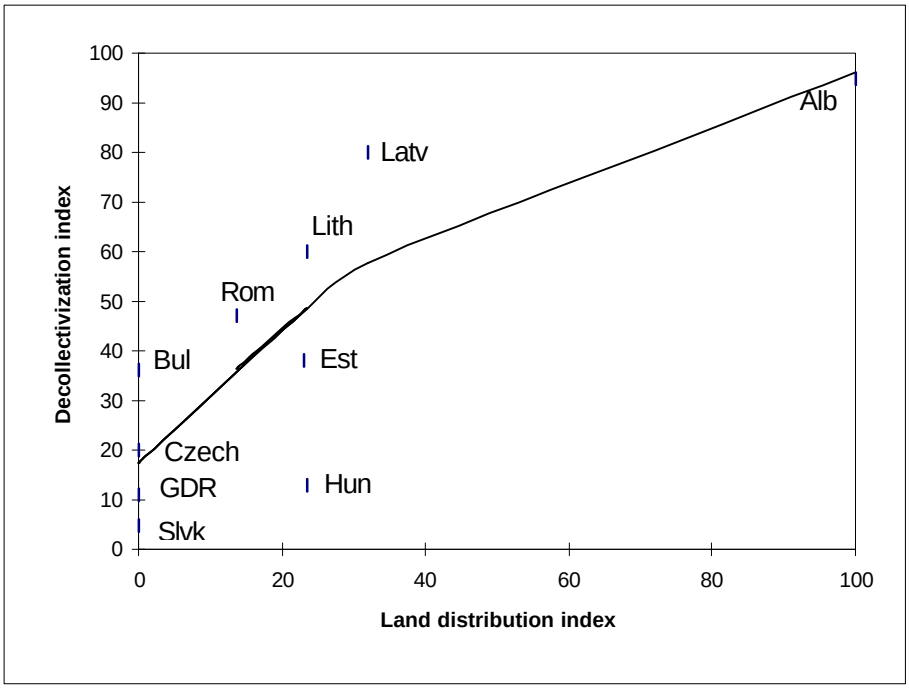

FIG. 6 - Relationship between *decollectivization* in 1994 and *the share of distributed land in total land to be privatized (land distribution index)*. The curve on the graph is based on a least squares regression using a quadratic function. Data for the land distribution index are from Swinnen, Buckwell and Mathijs (1996).