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Duality of Farm Structure in Transition Agriculture: The Case of Moldova

by

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DUALITY OF FARM STRUCTURE IN TRANSITION AGRICULTURE: THE CASE OF MOLDOVA

ZVI LERMAN*, DRAGOS CIMPOIES**

ABSTRACT

The duality of farm structure in Moldova is manifested by the existence of a relatively small number of large corporate farms at one extreme and a very large number of small and very small family farms at the other. "Medium-sized" family farms, the backbone of any market agriculture, virtually do not exist in Moldova. Moldovan agriculture is characterized by a much greater concentration of land in large farms than agriculture in market economies. The small individual farms on the whole are more productive and more efficient than the large corporate farms. They produce higher incomes for rural families than corporate farms. The main conclusion of the paper is that land should be allowed to flow from large corporate farms to small family farms through the medium of land markets until an equilibrium is established between the two farm sectors at a new level closer to that observed in market economies.

Keywords: farm structure, efficiency, productivity, land fragmentation, land concentration, farm size, Moldova.

1 INTRODUCTION

Privatization of agricultural land and assets followed by restructuring of collective and state farms were among the primary goals of Moldova's transition to a market-oriented economy in the post-Soviet space (LERMAN et al., 1998). During the first phase of land reform between 1992 and 1998, state-owned land was privatized through the distribution of landownership certificates to more than one million rural residents (30% of Moldova's population). The second phase of land reform began in 1998 and led to a sweeping conversion of the paper certificates to physical plots, averaging less than 1.5 hectares. The share of agricul-

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tural land in state ownership dropped from 100% in 1990 to less than one-third in 2003, much of it held in state reserve for future reallocation to individuals.

Progress with land privatization did not produce a commensurate shift to individual or family farming. Less than half the landowners who received physical plots as a result of the land reform decided to farm their land independently (DSS, 2004a). The rest (57%) leased their land to operators, including so-called "leaders" or "managers", i.e., enterprising individuals who founded new corporate farms by consolidating the dispersed small plots of passive landowners. Today there are about 1,500 corporate farms – limited liability companies, joint stock companies, agricultural production cooperatives – with an average size of 400-800 hectares. These new corporate farms are substantially smaller than the traditional collective and state farms, which averaged 2,000-3,000 hectares in 1990, and they use private land, not state-owned land.

The distribution of land to the rural population led to dramatic changes in the structure of land use by farms of various organizational forms (**Table 1**). Particularly notable is the shrinking share of former state and collective farms and a corresponding increase in land used by the individual sector. Thus, in 1990, more than 90% of the 2.5 million hectares of agricultural land in Moldova was managed by corporate farms (about 30% by state farms and 60% by collective farms). The individual sector (household plots at that time) cultivated less than 9%. As of 2003, the individual sector (which now consists of household plots and peasant farms) controls 40% of the agricultural land. Approximately the same land area is operated by large-scale corporate farms, mostly new organizational forms with private ownership of land and assets. These new corporate farms are basically corporate shareholder structures with joint cultivation of land. The traditional collective farms practically disappeared during the last decade, as many of them have been privatized or liquidated, while others registered in new legal forms. State farms still persist, but they operate in highly specialized areas that can be legitimately regarded as a public good (seed selection, livestock selection, experimental stations, agricultural education and research).

Table 1: Structure of Agricultural Land Use in 1990 and 2003*

	1990	**2003**
State sector (state farms and reserve land)	32.1	27.4
Corporate forms (private sector)	59.5	32.5
Individual sector	8.5	40.1
Total agricultural land	100.0	100.0
'000 ha	2562.2	2528.3

* End of year data, percent of agricultural land, including Transnistria.
Source: State Cadastre Agency, land balance tables; transposed to end of year.

While corporate farms average 400-800 hectares, the individual farms (household plots and peasant farms) are much smaller. Thus, the average peasant farm has 1.9 hectares and only 342 peasant farms (out of some 300,000 in total) are larger than 50 hectares (DSS, 2004b). Half the agricultural land in Moldova (excluding Transnistria) is in units smaller than 10 hectares (WORLD BANK, 2005).

The existence of a relatively small number of large corporate farms at one extreme and a very large number of small and very small family farms at the other is manifested in the duality of farm structure. "Medium-sized" family farms, the pillar of any market agriculture, almost do not exist in Moldova. Yet the relationship between organizational form and farm size is not always single-valued. Family farms are typically small, but some of them fall in the category of large farms. A similar picture is observed with corporate farms, which are typically large, but not always. Therefore, the duality of farm structure will be examined in two dimensions: the organizational form dimension and the farm size dimension.

2 THE ORGANIZATIONAL FORM DIMENSION: CORPORATE FARMS VS. INDIVIDUAL FARMS

Two conflicting scenarios were envisaged in the early 1990s for the outcome of land reform and farm restructuring in transition countries. According to one scenario, the removal of socialist state controls would result in collapse of the chronically inefficient collective and state farms and produce a complete shift to family farming. According to the second scenario, corporate farms would persist because rural families did not have the required human capital and managerial skills to start independent farming. In reality, none of these scenarios has materialized and a large variety of farm structures have emerged in the transition space, spanning the whole spectrum of individual and corporate farms (LERMAN et al., 2004; SWINNEN, 2006).

Individual or family farms include very small household plots operated virtually by every rural family and somewhat larger peasant farms established by relatively enterprising individuals. Individual farms are managed by the head of the household, relying mainly on family labor and family-owned land. They are typically small or very small, ranging in size from less than a hectare to about 5-10 hectares. In contrast, corporate farms are owned by shareholders and managed by hired professional managers. In Moldova and other transition countries, the shareholders are typically the local village residents who were formerly members of the local collective farm and received shares in its land and assets. Corporate farms typically use land leased from their shareholders and rely on hired labour.

The emergence of two well-defined categories of organizational forms as a result of the post-socialist land and farm structure reforms has triggered an ongoing debate among policy makers and economists concerning the efficiency and performance advantages of corporate farms versus individual farms in transition countries. The traditional socialist thinking believed in economies of scale and thus gave preference to large corporate farms. The Western market-oriented thinking attaches more importance to individual incentives and thus emphasizes the advantages of smaller family farms. GORTON and DAVIDOVA (2004) note that, contrary to prior expectations, there is no clear-cut empirical evidence in transition economies that family farms are more efficient than corporate farms in all farming activities. While significant differences have been found in favour of family farms against the average corporate farm, the best corporate farms still tend to perform as well as the best family farms. Yet these findings clearly support the previous conclusion (LERMAN et al., 2004) that, contrary to the economies-of-scale school of thought, large corporate farms do not have a significant performance advantage over individual farms. We use national statistics and survey data to examine the comparative performance of individual and corporate farms in Moldova.

Table 2: Land, output, and labour by farm type 1990-2003 (end of year data for selected years)

	Agricultural land used by farms			Gross Agricultural Output			Employed in agriculture		
	'000 ha	Corporate, %	Individual, %	Million lei, 2000 prices	Corporate, %	Individual, %	'000 workers	Corporate, %	Individual, %
1990	2301.8	90.7	9.3	16189	77.8	22.2	610	83.2	16.8
1995	2196.4	82.7	17.3	10293	59.9	40.1	771	69.2	30.8
2000	2146.7	56.1	43.9	7917	26.9	73.1	766	23.1	76.9
2001	2076.0	44.6	55.4	8427	28.4	71.6	764	20.7	79.3
2002	2069.2	44.1	55.9	8717	29.0	71.0	747	20.6	79.4
2003	2059.8	46.9	53.1	7535	24.7	75.3	583	23.9	76.1

Note: Land used by farms is agricultural land excluding the areas not allocated to agricultural producers (the state reserve, miscellaneous state and municipal lands).
Source: Statistical yearbooks of Moldova for various years; DSS (2004b).

The shift of agricultural land from corporate to individual farms noted in **Table 1** has led to significant changes in the production structure of Moldovan agriculture: the output of the corporate farm sector decreased, while the output of the individual sector shows a steady growth. At the beginning of agricultural reforms in the early 1990s, the individual sector was producing 20% of agricultural output on less than 10% of agricultural land; in 2003 individual farms produce three-quarters of agricultural output on half the agricultural land (**Table 2**). The discrepant shares of the two farm sectors in land and output clearly

show that the individual farms use their land more productively than the corporate farms. This phenomenon has persisted since 1990, as the share of individual output has always been greater than the share of land in individual tenure (**Table 2**).

Labour is another basic factor affecting the performance of agriculture. The agricultural labour in corporate farms decreased sharply over time, while that in individual farms increased. In farms of both types the changes in labour use are strongly correlated with the changes in land use (the coefficient of correlation is greater than 0.95 for 1990-2003). The increase in labour in individual farms, especially after 1998, is thus linked with the land distribution efforts during the second-phase reforms, which focused on conversion of land share certificates into physical plots. The opposite employment trends in corporate and individual farms have resulted in a sharp increase of the share of agricultural labour in the individual sector – from about 25% in the early 1990s to more than 75% in 2000-2004 (**Table 2**).

The full time series underlying **Table 2** were used to calculate the partial productivity of land and labour in absolute terms. The partial productivities of land and labour decreased over time in both corporate and individual farms, and the results are summarized in **Table 3** as averages for the entire period 1990-2003 and for two subperiods. Despite the declining trend, the land productivity of individual farms was higher than that of corporate farms (the differences are statistically significant for the entire period and for both subperiods). The difference in labour productivity, on the other hand, is not statistically significant for the entire period 1990-2003 and for the latter subperiod 1997-2003. Moreover, the direction of the difference in labour productivity does not always match the findings in other transition countries, where labour productivity, unlike land productivity, is observed to be lower for individual than for corporate farms (a manifestation of the "labour sink" effect of individual farms). Thus, the two partial productivity measures for land and labour do not give a consistent picture: while land productivity is definitely higher for individual farms, the results for labour productivity are ambiguous.

Table 3: Land and labour productivity for corporate and individual farms 1990-2003 (averages for selected subperiods)

Years	Productivity of land, '000 lei/ha		Productivity of labour, '000 lei/worker	
	Corporate	Individual	Corporate	Individual
1990-2003	3.4*	10.1*	14.7	17.4
1990-1996	4.3*	13.8*	16.2*	22.6*
1997-2003	2.4*	6.3*	13.1	12.2

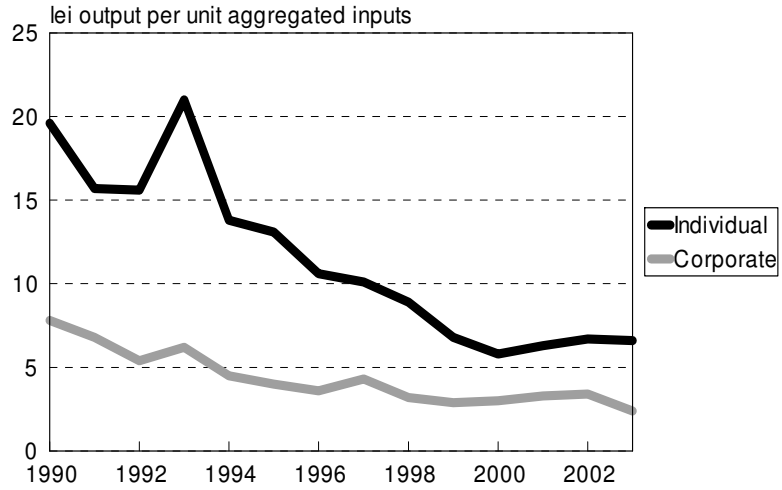
* The differences between corporate and individual farms are significant at $p < 0.1$ by both parametric and non-parametric tests.

Source: Calculated from full time series underlying **Table 2**.

To resolve the ambiguity, we have to switch from one-factor partial productivities to Total Factor Productivity (TFP), which is calculated as the ratio of the value of output to the aggregated cost of all inputs used. In the absence of market prices for valuing the cost of inputs (such as the price of land), TFP is usually determined by estimating a production function and then using the estimated input coefficients as the weights to calculate the value of the bundle of inputs. From considerations of data reliability we have decided to calculate production functions using two inputs only: land and labor.

A qualitative picture of TFP changes over time was obtained from national statistics by assuming a conventional Cobb-Douglas production function with stylized factor shares of 0.7 for land and 0.3 for labour (these are the factor shares that we consistently obtained in production functions estimated using various farm surveys in Moldova). **Figure 1** presents the TFP results calculated with these land and labour weights using the full time series underlying **Table 2**. The TFP for individual farms is higher than for corporate farms over the entire period 1990-2003. The respective means for 1990-2003 are 11.5 for individual farms and 4.4 for corporate farms (the difference is statistically significant).

Figure 1: Total factor productivity for individual and corporate farms 1990-2003



Notes: Inputs from national statistics (see **Table 2**) aggregated using hypothetical factor shares of 0.7 to land and 0.3 to labour.

The TFP results in **Figure 1** are derived by production-function methodology using national statistics and they reflect Total Factor Productivity in a sectoral perspective. A different methodology can be used to estimate the efficiency of specific farms from survey data (at a point in time). The efficiency of input use for a particular farm is measured in relation to the production frontier, which is the locus of "best attainable" points, i.e., points where the maximum output is achieved for every given bundle of inputs. Once the production frontier has been constructed, we can calculate the technical efficiency of each farm by

measuring its relative distance from the frontier. Points on the frontier are technically efficient; their distance from the frontier is 0, and their technical efficiency (TE) score is 1. As the distance of a particular point from the frontier increases, its TE score decreases. Each TE score is the fraction of the "best performer" output that a given farm achieves with the same bundle of inputs.

Table 4 presents the mean TE scores obtained for farms of different types in two samples from 2003 surveys in Moldova.[1] While all farms surveyed are relatively inefficient (compared to the efficiency benchmark of TE = 1), individual farms achieve higher TE scores than corporate farms (the difference is statistically significant in both samples). This indicates that the individual farms on average utilize the two inputs (land and labour) more efficiently than the corporate farms: for any given bundle of inputs they produce on average more than the corporate farms. These results are consistent with the TFP results: individual farms are more productive and more efficient than corporate farms.

Table 4: TE scores obtained by Stochastic Frontier Analysis (SFA)

	WB 2003 survey (n = 198)	WB 2003 survey pooled with PFAP 2003 corporate farm survey (n = 719)
Corporate	0.46[a] (n = 22)	0.67[b] (n = 543)
Individual	0.64[a] (n = 176)	0.70[b] (n = 176)

Notes: [a] Difference statistically significant at $p = 0.10$ by parametric and nonparametric tests.
[b] Difference statistically significant at $p = 0.10$ by nonparametric test only.
Source: Authors' calculations based on DUDWICK et al. (2005) for WB 2003 survey; MURAVSCHI and BUCATA (2005) for PFAP 2003 survey.

3 THE FARM SIZE DIMENSION: LARGE FARMS VS. SMALL FARMS

The second dimension of farm-structure duality involves farm sizes – large versus small. The optimum farm size is difficult to define because opinions about the farmers' objective function differ and because the same determinants can affect farm size in different ways across different farms or countries (KOESTER, 2003). The optimality of farm size for a given country is largely an empirical question (SWINNEN, 2006). In general, the optimal farm size is a relative notion that depends on the local conditions, such as the share of rural population and the land endowment.

In the absence of a universal optimum, average farm sizes can be meaningfully compared only for countries with similar natural conditions. It makes no sense to compare the farm sizes in densely populated Moldova to those in Russia or

[1] The TE scores were derived by Stochastic Frontier Analysis (SFA), an econometric production frontier technique that is conceptually close to production function estimation. For details see COELLI et al. (1998).

Ukraine (both sparsely populated, land-rich countries). While farm sizes in Russia and Ukraine may be compared to the United States and Canada, an appropriate benchmark for Moldova is provided by the relatively densely populated and land-poor European countries, such as Portugal, Greece, and Italy. These three countries actually have the smallest family farms among the EU-15 – 5-10 hectares, compared with an average farm size of around 20 hectares for EU-15 as a group (Eurostat data from EUROPEAN COMMISSION (2005)). The family farms in Portugal, Greece, and Italy are thus not dramatically larger than the average peasant farm in Moldova (2 hectares national average, 4-5 hectares in various surveys – see **Table 5**), but they are certainly much smaller than the average corporate farm in Moldova (400-800 hectares as mentioned in the Introduction).

Table 5 presents the size characteristics and the partial productivity measures for small and large farms in four recent surveys in Moldova. While the large farms as a group are substantially larger than the small farms by all measures – output, land, and labour, the partial productivities show a mixed picture:

- The partial productivity of land (output per hectare) is higher for small farms.
- The partial productivity of labour (output per worker) is lower for small farms.
- The number of workers per hectare is much higher in small individual farms than in large corporate farms (the "labour sink" effect of individual farms).

Table 5: Size characteristics and productivity measures for small and large farms in Moldova: survey data

	WB 2003 survey		PFAP 2003 surveys		WB 2000 baseline survey	
	Small farms	Large farms	Small farms	Large farms	Small farms	Large farms
Number of observations	176	22	1,166	521	170	180
Ag land (ha)	4.48	971	4.02	918	5.7	533
Workers	4.51	332	6.27	150	1.6	43.7
Ag output ('000 lei)	25.8	3,230	25.3	2,038	75.4	1,642
Output/ha (lei)	6,765	2,745	9,535	2,085	6,414	3,145
Output/worker (lei)	6,857	17,135	5,145	17,824	55,304	54,393
Workers/ha	1.42	0.26	3.25	0.19		

Note: All differences between small and large farms are statistically significant at $p = 0.1$ (except the differences in productivity of labour – output/worker – in the WB 2000 survey).

Source: DUDWICK et al. (2005) for WB 2003 survey; MURAVSCHI and BUCATA (2005) for PFAP 2003 surveys; LERMAN (2001) for WB 2000 survey.

The ambiguity in partial productivity measures is resolved by calculating total factor productivity (TFP) in the production function paradigm. First, the sum of the coefficients in a Cobb-Douglas production function sheds light on the behaviour of the returns to scale: the returns are constant to scale if the coefficients sum to 1; the returns are increasing to scale (i.e., larger is more productive) when the sum of the coefficients is greater than 1; and finally the returns are decreasing to scale (i.e., smaller is more productive) when the sum of the coefficients is less than 1. Second, differences in TFP between categories of farms can be captured by estimating appropriate production functions with a dummy variable for different farm types. If the dummy coefficient for type A farms is found to be greater than for type B farms, this implies that type A farms produce a greater value of output at any given bundle of inputs and essentially means that type A farms have higher TFP than type B farms. This procedure enables us to assess *differences* in TFP without actually calculating the TFP in *absolute values*.

Simple two-input Cobb-Douglas production functions relating the aggregated value of output to land and labour were estimated for the 2003 WB survey with 198 farms classified into large and small. The two-input production function was first estimated without dummy variables (Model 1 in **Table 6**). In this model, the coefficients of the two factors of production (land and labour) summed to less than 1, and the difference from 1 was statistically significant at $p = 0.10$. The production function thus shows *decreasing* returns to scale: large farms produce less per unit of inputs in the margin than small farms.

Table 6: Estimation of Cobb-Douglas production function for large and small farms

Dependent variable: value of output (lei)	**Model 1 coefficients**	**Model 2 coefficients**
Explanatory variables:		
Land (ha)	0.60	0.69
Labour (workers)	0.30	0.31
Farm type (dummy): large farms relative to small farms	--	–0.58
Sum of input coefficients	0.90	n.a.
R^2	0.770	0.773

Source: Authors' estimations based on 2003 WB survey from DUDWICK et al. (2005).

This conclusion is strengthened and quantified by estimating the same two-input production function with a dummy variable for large and small farms (Model 2 in **Table 6**). The intercept for large farms (relative to small farms) is negative, which means that at each level of inputs (land and labor) large corporate farms attain lower output than small individual farms (the negative coefficient was statistically significant at $p = 0.10$). The mathematics of the Cobb-

Douglas production function translates the negative dummy variable coefficient of −0.58 into a difference of 45% in output between corporate and individual farms for each bundle of inputs.

4 DISENTANGLING THE EFFECTS OF ORGANIZATIONAL FORM AND FARM SIZE

We have shown that in Moldova individual farms are more productive than corporate farms and that small farms are more productive than large farms. Typically, individual farms are small while corporate farms are large, and there is a fairly sharp size gap between the farms of two organizational forms (WORLD BANK, 2005). It could therefore be argued that the farm size effect observed in our analysis is simply a result of the organizational form effect, or vice versa. To try and disentangle the two effects, we have looked at two homogeneous samples: a sample of corporate farms (without any individual farms) and a sample of peasant farms (without any corporate farms).

The homogeneous sample of 521 corporate farms from the 2003 PFAP survey (MURAVSCHI and BUCATCA, 2005) was grouped into three size categories (**Table 7**). The productivity of land clearly increases with farm size, whereas the productivity of labour does not. Most importantly for our purposes, total factor productivity calculated by aggregating land and labour with appropriate weights from the production function shows a definite increase with farm size in the homogeneous sample of corporate farms.

Table 7: TFP of corporate farms by land size categories: PFAP 2003 survey

	<500 ha (1)	**500-2000 ha (2)**	**>2000 ha (3)**
Number of farms	238	225	58
Land productivity (output/ha, lei)	1,927	2,162	2,430
Labour productivity (output/worker, lei)	18,660	16,580	19,219
TFP (lei per unit of aggregated inputs)	3,162	3,603	4,167

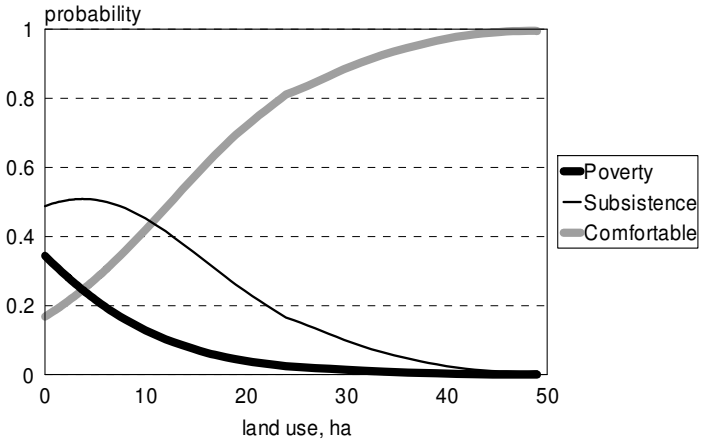
Source: Authors' calculations from MURAVSCHI and BUCATCA (2005).

In a homogeneous sample of peasant farms from the 2005 WB survey (WORLD BANK, 2005), the standard of living of rural families was observed to increase with farm size. Here, a qualitative variable characterizing different levels of family well-being ("comfortable", "subsistence", "poverty") was used as a proxy for farm performance in the absence of TFP estimates for this sample. Among peasant farms, a comfortable standard of living is associated with much larger family farms than lower standards of living. Peasant farmers reporting a comfortable standard of living had 11 hectares on average, compared with less than 5 hectares for farms in the two lower categories – poverty, when family

income is not sufficient to buy food, and subsistence, when family income is sufficient to buy food and daily necessities (the difference between farm sizes is statistically significant at $p < 0.01$). The standard of living of peasant farmers is thus an increasing function of farm size, as is commonly observed in farm surveys in CIS and other transition countries.

A different view of the relationship between standard of living and farm size for peasant farmers is presented in **Figure 2**, which plots the probability of being in one of the three standard-of-living levels as a function of farm size. The probability of being in the highest standard of living (gray curve) increases with farm size, while the probability of being on the lowest "poverty" level (thick black curve), sharply decreases with farm size.[2] These results provide support for increasing the average size of the individual farms through land market development and land consolidation policies.

Figure 2: Probability of achieving a given standard of living as a function of farm size for peasant farmers.



Note: Definition of standard of living levels: "poverty" – family income not sufficient to buy food; "subsistence" – family income just sufficient to buy food and daily necessities; "comfortable" – family income sufficient to buy food, daily necessities, and durables.

Source : Authors' calculations based on WB 2005 survey (WORLD BANK, 2005).

These results demonstrate that farm performance actually improves with increasing farm size for farms of the same organizational form. The inverse productivity–farm size relationship is observed for mixed samples that include farms of different organizational forms (both individual and corporate). This suggests that the decrease of productivity with farm size is primarily an organ-

[2] The probabilities of achieving a given standard of living were obtained in a multinomial logistic regression with the three-level standard of living as the discrete dependent variable and farm size as the continuous covariate.

izational form effect, and not a farm size effect: individual farms are more productive than corporate farms, and the size effect observed in our analysis appears to be simply a proxy for the organizational form effect.

5 LAND CONCENTRATION

The pronounced difference in average sizes between individual and corporate farms in Moldova is reflected in a strong concentration of land in a small number of very large farms – a feature inherited from the sharply dual farm structure of the Soviet period. The Lorenz curve provides a standard tool for visualizing inequality of land distribution between large and small farms. Plotting the cumulative percent of the number of farms (from smallest to largest) on the horizontal axis and the cumulative percent of agricultural land used by farms on the vertical axis, we obtain a curve whose downward bulge below the diagonal provides a measure of inequality or concentration. In the absence of a country-wide size distribution for all farms in Moldova, we produced a "sample" Lorenz curve ordering by size the 1885 farms included in three 2003 surveys (DUDWICK et al., 2005; MURAVSCHI and BUCATCA, 2005).

The Lorenz curve for Moldova (**Figure 3a**, black curve) shows that about 70% of farms (mostly small individual farms) account for just 1% of agricultural land while the remaining 30% of large farms (basically corporate farms) account for 99% of land holdings. At the top end of the distribution, just 5% of the largest farms control 53% of land.

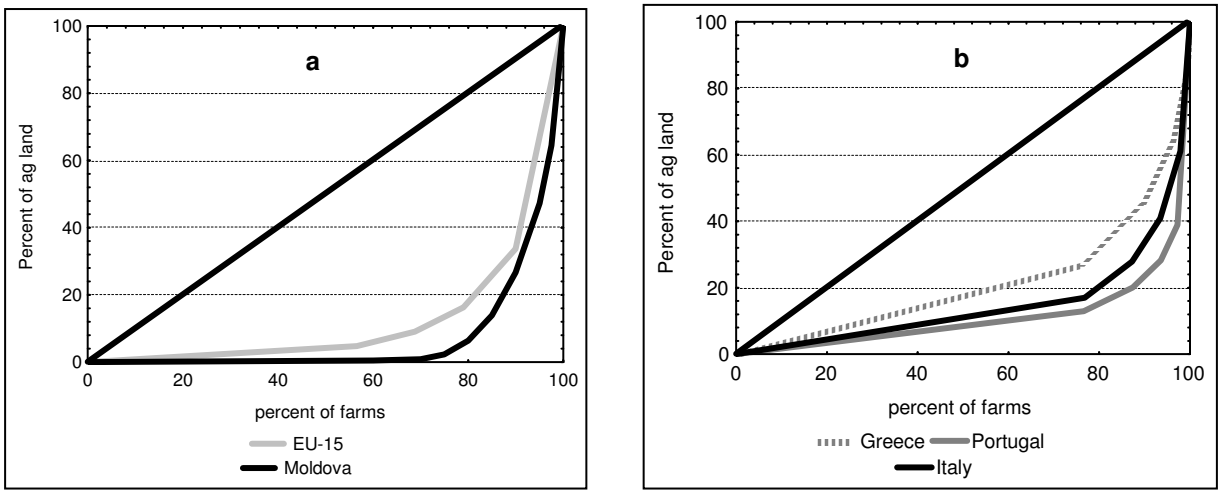
Although it is not entirely appropriate to compare the somewhat ad hoc sample results for Moldova with the systematic Eurostat data for the EU countries, we have nevertheless superimposed the aggregated land concentration curve for EU-15 on **Figure 3a** (grey curve). In the 15 countries of the EU combined, 10% of the largest farms control 64% of agricultural land compared with as much as 73% in Moldova (**Table 8**). On the other hand, the small-farm tail in EU-15 is much thicker than in Moldova, with 80% of the smallest farms controlling 16.5% of agricultural land compared with only 6.4% in Moldova.[3]

Figure 3b presents the corresponding graphs for Italy, Greece, and Portugal – the three EU-15 countries that in our view are the most appropriate for comparison with Moldova. In Greece 11% of the largest farms control 54% of land, in Italy 7% of the largest farms control 59% of land, and in Portugal 6% of farms control more than 70% of agricultural land. Portugal is the country with the highest land concentration in EU-15, but even here 80% of the smaller farms

[3] Land concentration in the EU-15 is increasing over time. In **Table 8** both the number and the area decreased between 1995-2003 for small and medium-sized farms and increased for large farms.

control 14% of agricultural land, compared to less than 7% for the same percentage of small farms in Moldova. As a result, 20% of the largest farms control 93% of land in Moldova and 86% of land in Portugal.

Figure 3: Land concentration curves



Sources: European countries based on Eurostat harmonized national data and EC surveys of the structure of agricultural holdings for 2003 (EUROPEAN COMMISSION, 2005); Moldova from WORLD BANK (2005).

Contrary to the established market economies of EU-15, Bulgaria and Romania, two East European transition countries that are now candidates for EU accession, are close to Moldova by their levels of land concentration: 5% of the largest farms control more than 80% of agricultural land in Bulgaria and about 60% of land in Romania (EUROPEAN COMMISSION, 2005). In these two countries, as in Moldova, the post-Soviet land reform led extreme fragmentation of land ownership, which on the one hand produced large numbers of very small farms, while on the other hand encouraged many small landowners to entrust their land to large corporate farms.

Table 8: Agricultural land distribution by farm size in EU-15

Farm size class (ha UAA)	Holdings, %				Used agricultural land (UAA), %			
	1995	1997	2000	2003	1995	1997	2000	2003
0-5	56.9	55.8	57.6	56.6	5.7	5.4	5.2	4.8
5-10	13.0	13.3	12.3	12.2	5.2	5.1	4.6	4.3
10-20	10.6	10.8	10.2	10.2	8.6	8.3	7.7	7.2
20-50	11.5	11.5	10.9	11.0	20.9	19.8	18.6	17.4
Over 50	8.0	8.6	8.9	9.9	59.6	61.4	63.8	66.3

Sources: Eurostat harmonized national data and EC surveys of the structure of agricultural holdings for 2003 (EUROPEAN COMMISSION, 2005).

The observed results for Moldova fall somewhere between the market model and the former Soviet model: the land concentration is not as extreme as in Russia and Ukraine, which are still very close to the former Soviet model character-

ized by sharply dual farm structure, but it is substantially more pronounced than in the EU (and also in the US and Canada). To move closer to the market pattern, Moldova has to undergo further farm size adjustment.

6 CONCLUSIONS AND RECOMMENDATIONS

Analysis based on national statistics and survey data shows that individual farms are more efficient than corporate farms. This conclusion does not necessarily mean that corporate farms should be eliminated and replaced with family farms. Corporate farms do exist in market economies, which proves that they are able to compete with individual farms. The small number of corporate farms that do exist in market economies appear to be even more efficient than individual farms as a group: in the United States, corporate farms control 2% of agricultural land and generate 20% of output (in Moldova, the relationship is reversed: corporate farms control 50% of land and generate less than 30% of output). The market economies have achieved an equilibrium farm structure, which includes a mix of individual farms (the dominant majority) and corporate farms (a small minority) determined by resource availability, managerial capacity, and personal preferences of farmers and investors. A similar process can unfold in Moldova, but the development of corporate farms must be left to market forces, free from government intervention and programming.

Analyzing the dichotomy between small and large farms, we conclude based on several surveys that small farms are more productive and more efficient than large farms. This result is based on a mixed sample of both individual and corporate farms, which overall show decreasing returns to scale. On the other hand, a homogeneous sample comprising only corporate farms shows increasing returns to scale, i.e., among farms of the same type size has a beneficial effect on performance. Similarly, in a homogeneous sample comprising only individual farms, family well-being increases with farm size. Based on these findings we tend to believe that the different behaviour is determined primarily by organizational form: small farms do better than large farm not because of a size effect, but because individual farms (which happen to be small) outperform corporate farms (which happen to be large). In this context, the Government of Moldova should abandon its preference for large-scale corporate farms and concentrate on improving the operating conditions for small individual farms.

The farm structure in Moldova reveals a much greater concentration of land in large farms compared to established market economies. In EU countries closest to Moldova, such as Italy, Greece, and Portugal, and even in EU-candidate countries such as Bulgaria and Romania, large farms control a substantially smaller proportion of land. Therefore, to move closer to the farm-structure pattern typical of market economies, Moldova should allow land to flow from large corporate farms to small individual farms. This can be accomplished by empha-

sizing the development of land market mechanism, which will simultaneously act to increase the average size and to reduce the number of small individual farms (284,000 farms is too much for a small country with a population of less than 4 million). These processes will reduce the concentration of land in large farms, while alleviating land fragmentation and thus bringing Moldova in closer conformity with the farm-structure patterns observed in market economies

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