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# Financial Performance and Efficiency of Corporate Farms in Northwest Russia

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The corporate farms in Leningrad Oblast are classified into five solvency groups by an index of financial health based on the coverage of farm costs by sales revenue. The two highest solvency groups containing 35% of the oblast farms produce 75% of sales and generate 90% of profit. They rapidly grow by investing in machinery and equipment and can be regarded as having fully adapted to the new market conditions. Their production efficiency is significantly higher than the efficiency of less solvent farms. A regression analysis shows that 50% of the variability in the financial health of Leningrad farms is explained by management quality, while another 30% is explained by farm size (farms employing more labour and more land are characterized by higher solvency).
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## INTRODUCTION

Large corporate farms or farm enterprises – the successors of Soviet collective and state farms – have lost their former dominant role in agriculture, but still account for more than 40% of agricultural product, control nearly 80% of agricultural land, and are the recipients of virtually all bank loans and government subsidies (Uzun, 2005). During the transition the Russian

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corporate farms have been generally viewed as highly unprofitable and inefficient, with the majority reporting losses and many in a state of technical bankruptcy (Yastrebova, 2005). Surprisingly, there have been relatively few analytical studies of the financial performance of Russian corporate farms[2] and our work during the last few years has been aimed to partially fill this gap. In a previous study (Epshtein, 2001; Epstein, 2003), we have shown that the dreary averages – low profitability and high indebtedness – hide a whole spectrum of agricultural producers. At one end, there are well-run, financially healthy farms, which can be described as successful agricultural businesses that have fully adapted to the new market environment. At the other end, we find weak, unprofitable farms, many of which are totally unsustainable.

In this article, we use the 2001 financial and production data for all corporate farms in Leningrad Oblast in Northwest Russia to classify them into five solvency groups by measures of financial health and to characterise the performance differences across the five groups. Most notably, farms in the high-solvency groups achieve higher production efficiency than less solvent farms. We show that the best performers are those with the best management, which plays a more important role than asset endowments in successful farms. We also verify to what extent the previous solvency grouping based on 1999 data has persisted over time. If the best farms survived as a group between 1999 and 2001, this would indicate that agricultural reforms have created a contingent of strong and healthy corporate farms capable of profitable production. In this sense, this would provide some evidence of at least partial success of agricultural reforms in Russia.

## DATA AND METHODOLOGY

The study used the Goskomstat database of large and medium corporate farms for Leningrad Oblast supplemented with agricultural yearbooks published by oblast-level statistical organs (Goskomstat, various years). These sources included a wide range of financial and production variables covering all 195 corporate farms that regularly filed annual reports. The farms were classified into five groups based on two solvency measures (Table 1). Both measures calculate the coverage of fixed costs by value added (sales revenue less the cost of purchased and intermediate inputs), but they use two different definitions of fixed costs. K1 is calculated with the full wage cost plus full depreciation in the denominator. While the standard profitability

[2] A notable exception is the World Bank study of farm debt in five CIS countries, which includes Russia (Csaki et al., 2001).

**Table 1:** Algorithm for solvency classification of corporate farms

| Solvency groups | K1=(revenue – input costs)/(wages+depreciation)<br>K2=(revenue – input costs)/(minimum wages+farm machinery depreciation) |
|---|---|
| 1 (best) | $K1 \geqslant 1$ |
| 2 | $K1 < 1$ and $K2 \geqslant 1$ |
| 3 | $K2 < 1$ and $K2 \geqslant 0$ |
| 4 | $K1 < 0$ and $K1 \geqslant -0.3$ |
| 5 (worst) | All others |

ratio divides sales revenue by total operating costs, K1 is modified by moving the cost of purchased and intermediate inputs (essentially a variable cost component) from the denominator to the numerator. It thus provides a measure of contribution from sales to fixed costs.

If K1 is greater than 1, the farm generates some surplus after paying its workers and covering its depreciation expense, and can continue to grow. If K1 equals 1, the farm at least can maintain the labour and the fixed assets at a stable level, without attrition. If, however, K1 is less than 1, the value added does not cover the fixed costs and the farm needs to raise external capital (i.e., borrow) in order to grow or just stay in place. If no borrowing is possible, the farm will be forced to reduce its labour or its asset base (or both). Yet even farms with $K1 < 1$ can continue to survive if their gross earnings are sufficient to cover the minimum (reservation) wages and the depreciation of farm machinery and equipment (excluding farm buildings). This less restrictive solvency measure is captured by the ratio K2, which is calculated with the minimum wage cost plus machinery depreciation in the denominator.[3] If K2 is greater than or equal to 1, the farm can manage to keep its workforce and main production assets even without making a profit. If, however, K2 is less than one, the operating earnings are not sufficient to cover even these minimum requirements.

The algorithm used to classify the farms into five solvency groups is shown in Table 1. The best and the worst performers (groups 1 and 4, 5, respectively) are identified using only the ratio K1. The identification of the intermediate performers (groups 2 and 3) requires also the ratio K2.

## FARM CHARACTERISTICS ACROSS SOLVENCY GROUPS

The distribution of the main financial and physical characteristics of Leningrad Oblast farms in 2001 by solvency groups is presented in Table 2.

[3] In our analysis, we set the minimum wage at 50% of the average wage for each district.

**Table 2:** Distribution of corporate farms by solvency groups 2001

| | Farms | Revenue | Profit | Overdue debt | Number of employed | Agricultural land | Fixed assets |
|---|---|---|---|---|---|---|---|
| 1 (best) | 14 | 48 | 59 | 7 | 27 | 10 | 21 |
| 2 | 20 | 27 | 29 | 17 | 28 | 22 | 24 |
| 3 | 30 | 16 | 10 | 24 | 23 | 29 | 27 |
| 4 | 14 | 5 | 2 | 15 | 11 | 15 | 13 |
| 5 (worst) | 21 | 4 | 0 | 36 | 11 | 24 | 15 |
| Total | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

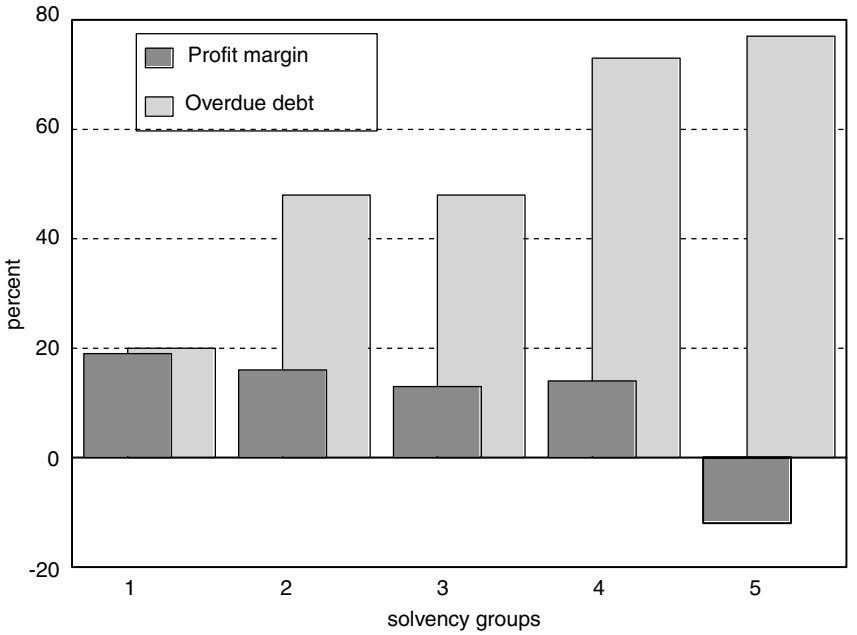


**Figure 1:** Profit margin and level of overdue debt in Leningrad Oblast, 2001.

The number of farms is distributed fairly uniformly, with about one-third of the farms in the best two groups and the same number in the worst two groups. There is no sharp bunching of farms at the extreme ends of the solvency ranking. Despite this uniform distribution of the number of farms, financial and physical measures show strong polarization. Thus, the best farms account for most of the sales revenue and most of the profit: about 35% of farms contribute 75% of total revenues and almost 90% of total profit. On

**Table 3:** Partial productivities and physical endowments of corporate farms in 2001

| | Gross profit per worker | Gross profit per 1 ha sown area | Gross profit per 1 ruble fixed assets | Number of workers per farm | Agricultural land per farm (ha) |
|---|---|---|---|---|---|
| 1 (best) | 163 | 343 | 206 | 463 | 1,829 |
| 2 | 114 | 127 | 141 | 364 | 2,797 |
| 3 | 57 | 48 | 47 | 193 | 2,439 |
| 4 | 56 | 47 | 47 | 196 | 2,590 |
| 5 (worst) | 35 | 18 | 29 | 133 | 2,897 |
| Oblast average | 100 | 100 | 100 | 255 | 2,544 |

the other hand, most of the overdue debt is concentrated in 'bad' farms: 35% of farms in groups 4 and 5 account for 51% of overdue debt while roughly the same percent of farms in groups 1 and 2 account for 24% of overdue debt.

A self-explanatory pattern is observed for the distribution of profit margin and overdue debt across the five solvency groups (Figure 1). The ratio of gross profit to sales (the profit margin) decreases from 'best' to 'worst' farms, dropping to strongly negative values in group 5. The share of overdue debt (in percent of all farm debt) increases steeply from group 1 (20% overdue) to group 5, where more than three-quarters of debt is overdue. Higher profit margins are apparently the key to the general success of 'the best' farms.

There are also pronounced differences in physical endowments and physical performance of farms across the five solvency groups. The share of group 1 farms in labour, land, and capital is substantially lower than their share in revenue and profit. The share of group 4 and 5 farms in labour, land, and capital is conversely much higher than their share in revenue and profit. This immediately points to the existence of substantial differences in the productivity of resource use between 'best' and 'worst' farms.

Table 3 shows the partial productivities of labour, land, and capital (fixed assets) expressed in percent of the oblast averages (ie, oblast average = 100). Group 1 farms are two to three times more productive than the average, whereas group 5 farms hardly reach 30% of the average productivity. The question of farm size across solvency groups appears to be somewhat ambiguous (see the last two columns in Table 3). If farm size is measured by the number of workers (or sales revenue), then there is a clear downward gradient from group 1 to 5. If, however, we measure farm size in the more conventional way, by the amount of agricultural land used, then we do not observe significant differences for farms in groups 2–5, and only farms in group 1 use much less land than the average (while employing much more labor than the average). Group 1 farms use relatively little land because they

include a relatively high proportion of poultry factories and greenhouses, which technologically rely more on labour and capital assets than on land.

## INVESTMENT AND FINANCIAL SOURCES

Despite the dismal financial performance of more than one-third of corporate farms in the province, Leningrad farms continued to invest in 2001 (Table 4). Investment in fixed assets by corporate farms amounted to 7% of the total value of fixed assets at the beginning of the year. There are, of course, significant differences across the solvency groups: 'good' farms invest much more than 'bad' farms, but it is remarkable that net investment is observed for all farms in the oblast. Another remarkable feature is that all farms attract some external capital to finance their new investments. Most farms finance about 10% of their investments with external capital. However, insolvent farms (group 5) borrow 40% of their investment needs from outside sources. This is understandable in view of the low profitability of group 5 farms, but it is very difficult to understand how these practically bankrupt farms manage to borrow more.

A more detailed analysis of all financial sources available to corporate farms is presented in Table 5. The 'best' farms use more internally generated funds (primarily sales revenue) in their financing mix, while the 'worst' farms rely more heavily on external funds. Direct transfers from the budget (both federal and regional) are a marginal factor for all Leningrad farms, and external financing sources are mainly commercial credit from banks and suppliers. Borrowing from banks and other institutions contributes roughly the same share of sources for 'best' and 'worst' farms and the main difference is in the use of supplier credit: the 'best' farms keep their accounts payable in check, while the 'worst' farms increase their payment arrears to such an extent that new supplier credit virtually matches bank borrowing.

**Table 4:** Investment in fixed assets by corporate farms in 2001

| | All farms | Solvency groups | | | | |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 |
| Total investment per farm, '000 rubles | 4,456 | 11,703 | 4,721 | 2,819 | 1,256 | 960 |
| Percent financed from external sources | 10 | 8 | 17 | 5 | 7 | 40 |
| Investment in % of total fixed assets at beginning of year | 7.1 | 13.3 | 8.7 | 4.6 | 3.3 | 3.4 |

**Table 5:** Structure of sources of funds of corporate farms in 2001

| Solvency group | 1 | 2 | 3 | 4 | 5 | All farms |
|---|---|---|---|---|---|---|
| Internal sources | 70 | 76 | 75 | 67 | 59 | 71 |
| External sources | 30 | 24 | 25 | 33 | 41 | 29 |
| From government | 1 | 3 | 2 | 3 | 3 | 2 |
| Loans | 15 | 14 | 8 | 17 | 18 | 14 |
| Payables | −1 | 2 | 8 | 5 | 16 | 2 |
| Other | 15 | 5 | 8 | 8 | 4 | 11 |
| All sources | 100 | 100 | 100 | 100 | 100 | 100 |

*Source*: Annual reports of corporate farms in Leningrad oblast for 2001

**Table 6:** Distribution and level of subsidies received by corporate farms 2001

| Solvency group | 1 | 2 | 3 | 4 | 5 | All farms |
|---|---|---|---|---|---|---|
| Subsidies, % of sales | 1.4 | 2.8 | 3.4 | 4.7 | 4.6 | 2.4 |
| Net profit as reported, % of sales | 13.1 | 11.1 | 8.6 | 2.8 | −29.2 | 8.2 |
| Net profit without subsides, % of sales | 11.7 | 8.2 | 5.2 | −2.0 | −33.9 | 5.8 |
| Share of total subsidies, % | 23 | 31 | 24 | 11 | 12 | 100 |
| Subsidies per workers, rubles | 4,050 | 4,960 | 4,050 | 4,150 | 3,340 | 4,230 |

The ‘bad’ farms are thus able to continue borrowing and buying inputs on credit despite their low profitability and apparent lack of repayment capacity. It is not clear why and how this is allowed to go on. In a market economy, it is inconceivable that commercial banks would continue lending to insolvent farms and suppliers would continue selling them on credit. Perhaps the regional authorities intercede with the banks and the suppliers on behalf of the unprofitable farms in the belief that they play an important role in maintaining rural employment and social infrastructure. Perhaps the suppliers and other creditors are still bound by some bureaucratic ties that force them to pursue ‘higher objectives’. Whatever the explanation, we are clearly witnessing a continuation of the practice of soft budget constraints that proved so destructive in Soviet times.

The small contribution of budgetary transfers to the financial sources of corporate farms is a sign of the relatively low importance of various government subsidies for farm finances. Indeed, subsidies average 2% of sales, and this is the extent of their impact on net profits: had all subsidies been eliminated, the net profit reported by corporate farms would have dropped from 8% to 6% of sales (Table 6). There are, of course, differences across the five solvency groups. Subsidies are much more important for the

'worst' farms (groups 4 and 5), where they reach nearly 5% of sales. Elimination of subsidies would have increased the losses of group 5 farms from 29% to 34% of sales and would have shifted group 4 farms from net profit to net loss (from +3% to −2% of sales).

Despite the higher importance of subsidies for the 'worst' farms, we cannot really say that subsidies are spent to keep non-viable farms afloat. Nearly 55% of total subsidies go to 'good' farms (groups 1 and 2), while the 'bad' farms (groups 4 and 5) receive less than 25% of the subsidies. The data in Table 6 seem to suggest that subsidies are allocated mainly from considerations of social equity, and not economic performance: the level of subsidies per worker is roughly constant across the five solvency groups. As so often happens in studies of agricultural transition, the empirical findings refute the conventional wisdom, which in this case claims that government pours good money after bad by subsidising totally inefficient agriculture.

## MANAGEMENT QUALITY AS A DETERMINANT OF SOLVENCY

Corporate farms in different solvency groups have been observed to differ by a variety of financial and physical measures (Tables 3–6). We tested the observed differences for statistical significance by estimating a standard Cobb–Douglas production function with a dummy variable for the solvency group. Sales revenue was used as the dependent variable; the independent variables comprised a standard basket of inputs – labour, cost of purchased and intermediate inputs, value of fixed assets, and agricultural land. The dummy-variable coefficients in this setting reflect differences in production efficiency (output produced by a given basket of inputs) for different levels of financial health as represented by the five solvency groups. Based on economic logic, we expect the high-solvency groups to be more efficient (in production function terms) than the insolvent groups.

The coefficients of the solvency groups in the estimated production function are all positive and significantly different from zero (Table 7). This implies that group 5 (the least solvent group used as the base in dummy-variable regression) is the least efficient group among Leningrad corporate farms. Additional tests showed that the group coefficients are also significantly different from one another and that they are ranked in the expected order from group 1 (highest) to group 4 (lowest, but still significantly greater than zero) and then group 5 (zero). This ranking is clear from an examination of the 95% confidence intervals of the estimated group coefficients in Table 7.

**Table 7:** Estimated Cobb–Douglas function with solvency group dummies[a]

| | Coefficients | Significance level | Left confidence limit (95%) | Right confidence limit (95%) |
|---|---|---|---|---|
| Labour | 0.202 | 0.000 | | |
| Input costs | 0.851 | 0.000 | | |
| Fixed assets | 0.005 | 0.799 | | |
| Agricultural land | 0.005 | 0.703 | | |
| Group 1 | 1.029 | 0.000 | 0.88 | 1.15 |
| Group 2 | 0.774 | 0.000 | 0.65 | 0.89 |
| Group 3 | 0.588 | 0.000 | 0.48 | 0.69 |
| Group 4 | 0.410 | 0.000 | 0.28 | 0.53 |
| Group 5 (base) | 0 | – | – | – |
| Constant | −0.172 | 0.411 | | |

[a] Dependent variable: sales revenue; all variables logged; $R^2$=0.971; 2001 data from Goskomstat database of corporate farms.

In a sense, the group dummies in Table 7 proxy for a missing management variable, as management quality is responsible (at least to some extent) for differences in financial health across solvency groups. We have conducted a separate analysis to verify the relationship between financial health and management quality. Financial health was expressed by the solvency measure K1, a continuous variable which (together with K2) defines the five solvency groups used previously. Following Heady and Dillon (1972), we calculated the management quality variable as the ratio $\text{Mng} = Y_a/Y_e$, where $Y_a$ is the actual output (sales revenue) for a farm in the database and $Y_e$ is the estimated output for that farm from a Cobb–Douglas production function fitted using the same database (not reported here).[4] Farms with $\text{Mng} > 1$ outperform the norm predicted by the production function, presumably due to the superior quality of their management. Farms with $\text{Mng} < 1$ perform less well than the predicted norm, presumably due to the inferior quality of their management. Table 8 illustrates how the management quality variable decreases from the 'best' to the 'worst' farms. The same table also shows the mean values of the continuous solvency variable K1. There is obviously a very strong positive correlation between the management quality variable and the solvency measure (the coefficient of correlation between Mng and K1 is 0.62).

[4] The Cobb–Douglas function was estimated by regressing sales revenue in 2001 on standard input variables (labour, land, fixed assets, input costs) as well as a set of additional attributes characterising natural conditions, distance from St. Petersburg and from the district centre, farm specialisation (mixed crop/livestock, feedlot, poultry, greenhouse, fur animals), level of regional and federal subsidies. In this regression with 195 observations $R^2 = 0.94$ and $F = 181.8$.

**Table 8:** Management quality and solvency measure for the five solvency groups in 2001

| Solvency group | 1 | 2 | 3 | 4 | 5 | Oblast average |
|---|---|---|---|---|---|---|
| Management quality (ratio of actual sales to predicted sales from Cobb–Douglas production function) | 1.40 | 1.21 | 1.08 | 0.94 | 0.72 | 1.06 |
| Solvency measure K1 | 1.48 | 0.72 | 0.24 | −0.12 | −0.71 | 0.27 |

To identify the determinants of financial health, we regressed the solvency measure K1 on the main variables from the Cobb–Douglas production function (labour, land, natural conditions, and farm specialisation) adding the management quality variable to the model. The conventional production model without Mng had a low explanatory power, $R^2 = 0.242$. The inclusion of Mng improved the explanatory power dramatically, raising it to $R^2 = 0.720$ in the full model with Mng. In the truncated model with Mng as the only explanatory variable we had $R^2 = 0.350$, which means that management quality alone accounts for almost 50% of the explained variability in the solvency measure K1 in the full model. Labour accounts for 28% of the explained variance in the full model and land for another 13%. All other variables combined account for less than 10% of the explained variability in solvency.

This analysis leads to a conclusion with interesting policy implications. Management quality is more important than physical endowments (labour and land) for success. Natural conditions and product choice play but a marginal role, while subsidies – perhaps the most popular policy mechanism in Russia – do not contribute at all to financial health (subsidies drop out of the estimated model as statistically not significant). Government policies should therefore emphasise management quality through far-reaching training programmes in finance, marketing, production management, and personnel management. A survey of corporate farms in Leningrad Oblast conducted by the author in the spring of 2002 has shown widespread neglect of budgeting and cost control. The main managerial emphasis, as in the Soviet period, remains on production rather than on economic and financial performance.

## CONCLUSION

Is there a hard core of good farms in Leningrad Oblast whose existence would provide evidence of success of the long-drawn agricultural reforms? Table 9 presents the distribution of corporate farms by solvency groups for Leningrad

**Table 9:** Distribution of corporate farms by solvency groups and transition probabilities between 'good' and 'bad' groups[a]

| Solvency groups | 2001, percent of farms | 1999, percent of farms | Group in 1999 | Probability to be in 'good' groups 1 and 2 in 2001 | Probability to be in 'bad' groups 3–5 or drop out in 2001 | Total |
|---|---|---|---|---|---|---|
| 1 (best) | 14 | 21 | 1 (best) | 73.2 | 26.8 | 100 |
| 2 | 20 | 21 | 2 | 51.2 | 48.8 | 100 |
| 3 | 30 | 25 | 3 | 16.0 | 84.0 | 100 |
| 4 | 14 | 14 | 4 | 3.6 | 96.4 | 100 |
| 5 (worst) | 21 | 19 | 5 (worst) | 2.6 | 97.4 | 100 |

[a] Transition probabilities estimated as the actual changes in the composition of the five groups between 1999 and 2001.

Oblast in 1999 and 2001 and estimates transition probabilities between 'good' and 'bad' groups. On the whole, in Leningrad Oblast, insolvent farms (groups 4 and 5) appear to be stuck in their insolvency: for farms in groups 4 and 5 the probability is over 95% that they will remain in the 'bad' groups. What is more important, however, is that 'good' farms also tend to stay 'good', although less resolutely: farms in group 1 (the best financial performers) have a nearly 30% probability of moving down to the 'bad' groups, whereas farms on the next rung of the financial scale (group 2) have a nearly 50% probability of moving to the 'bad' groups.

So the evidence is inconclusive, but this may be due to a deterioration of the general situation in 2001 and further research is needed before firm conclusions can be reached. It is clear, however, that in both years some 30%–40% of farms literally carried Leningrad agriculture on their backs. They accounted for the bulk of sales, the bulk of profits, and actually also the bulk of employment. They achieved much higher productivity by all partial measures and managed to maintain reasonable financial discipline.

Government policies probably should be targeted to encourage and support these farms, instead of spreading the subsidies uniformly and equally among the good and the bad performers. Budget funds directed to the weak farms simply prolong the agony of their unsustainable existence. It makes more sense to reassign the support to the best performers, where it can produce the maximum impact in terms of output and profits.

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