LIQUIDITY AND PRODUCTIVITY IN RUSSIAN AGRICULTURE: FARM DATA EVIDENCE

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ABSTRACT

The Russian agricultural sector has experienced many problems since the beginning of the 1990s that resulted in a fall in farm output. Employing a production function approach and, unlike other studies, *farm-level* data on more than 20,000 Russian large-scale farms for the period 1995-2000, this study analyzes the impact of both production (land, labour, capital, materials) and financial (debts and budget transfers) determinants on the productivity. Inter-regional differences such as weather conditions and farm-specific features such as geographical location, management and soil quality are taken into account employing the fixed-effect estimation. The findings show that Russian farms operate under liquidity constraints that lower their productivity.

Keywords: productivity, liquidity, Russia, Agricultural Registry.

INTRODUCTION

When reforms of the agricultural sector in Russia began in 1992, many analysts predicted that farmers would become profit maximizers and, consequently, improve the productivity and efficiency of their operations. After an initial fall in agricultural production Russian agriculture was expected to recover significantly. However, gross agricultural output (GAO) has declined by over 40% between 1991-1998[1], and a large proportion (84,4%) of agricultural enterprises was unprofitable in 1998 (Goskomstat, 2001c). In 1997, the sector demonstrated a small economic growth of 1.7%. After the financial crisis of 1998 the sector started to recover and obtained an annual growth of 5% on average in 1999-2001 and a declining number of farms making losses (52,7% in 1999 and 50,7% in 2000)[2].

Analyzing the performance of Russian agricultural sector is important, since this sector may have a large impact on world markets for agricultural products, especially after Russia will join the World Trade Organization (WTO). Nevertheless, most empirical studies of the transition process have focused on the radical reformers among the Central and Eastern European Countries (CEEC), thus leaving the room for an investigation of the performance of more gradual reformers such as Russia (Budina *et al.*, 2000).

The Russian economy has experienced many changes since the economic reforms started in the beginning of the 90-s. The reform of the agricultural sector has resulted in privatization. Previous linkages between farms and the up- and downstream industries broke down. The whole set of problems was worsened by lack of agricultural finance and credit (Trzeciak-Duval, 1999). Government intervention via subsidies or other instruments was greatly reduced. Payments due among and within the sectors of the economy continue tightening the activities of many producers. Agricultural enterprises have also accumulated high debts.

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[1] Figure is given for all types of producers. Gross agricultural output by agricultural enterprises reduced even more dramatically: 1991-1998 by 60%.
[2] Producers tend to reduce the declared profits, thus the number of loss-making farms could be somewhat smaller (see e.g. Yastrebova, 2001). Nevertheless, the proportion of unprofitable farms is very high.

The level of debt payables in constant prices increased by 73% throughout 1995-1999; the level of outstanding debts increased by 117% in the same period. Debt receivables account for less than 20% in total debts and its level from 1995 to 1999 has declined by 10%. More extensive reviews of Russian agricultural sector development and state policies are found in Macours and Swinnen (2000), Serova (2000), Serova and Khramova (2001).

In Russia, the internal lack of finance caused by negative profitability of the farming business cannot be sufficiently compensated by external financing via bank commercial credit. This is because farms cannot offer an adequate collateral, implying that commercial credits flow out of the unprofitable agricultural sector (Yanbykh and Yastrebova, 2002). The financial concerns of Russian farms are increasing as a result of the declining volume of direct budget support (in real prices) to agriculture[3]. Higher financial support in the near future is ruled out since Russia aims at complying with WTO regulations that among others impose limits to the level of state support in agriculture.

According to the survey conducted by Goskomstat in 1998, 78% of Russian agricultural enterprises reported a lack of finance as the most significant limiting factor of agrarian development; 55% mentioned high interest rates; 48% underlined consumers' insolvency (Goskomstat, 2000). Therefore, key questions of interest to policy makers are whether Russia is able to raise its overall agricultural productivity and whether liquidity constraints restrict productivity growth. A number of studies have documented a robust relationship between farm performance and financial constraints although these studies were performed at the level of country (e.g. Macours and Swinnen, 2000), region or agricultural sector as a part of Russian economy (e.g. Arnade and Gopinath, 2000; Voigt and Uvarovsky, 2001).

The main objective of this research is to analyse the impact of liquidity on farm productivity. A priori, it is expected that Russian farms operate under liquidity constraints. The hypothesis is that extra finance may improve farms' productivity. The distinctive feature of this study is that it deals with individual *farm data*, whereas previous studies were based on regional or country level data. The use of aggregated data may lead to aggregation bias. Availability of farm level data allows for adjusting for heterogeneity in the sample of farms, resulting from differences in farm management, location, quality of soil, and other farm-specific characteristics. In this research, the focus is on large-scale agricultural farms since these farms are still the major producers of agricultural products and use approximately 82% of total agricultural land area in Russia. In 1995-2000 the large scale farms produced about 44.8% of Gross Agricultural Output, although the share declined from 50.2% in 1995 to 43.1% in 2000 (Goskomstat, 2001a). The data source used in this study is rather unique, so details are given to shed some light on its content and peculiarities.

The main conclusion of this study is that farms in Russia face liquidity constraints that lower their production performance. The results show a positive relation between budget transfers and productivity, short-term debts and productivity. It is concluded that debts are used as a source of operating capital. The remainder of this paper is organized as follows. The next section discusses the theoretical model used in this study. Sections 3 and 4 describe the data and empirical modeling. Section 5 presents the research findings and conclusions are found in Section 6.

THEORETICAL BACKGROUND

Nickell *et al*. (1997) suggest a so-called productivity model, which is a standard production function extended with a residual productivity term, reflecting factors that affect the productivity of regular inputs. Following Nickell *et al*. (1997), several studies have successfully applied this concept. Examples are studies on the impact of ownership, competition and privatization on industrial firms' productivity in Russia (Brown and Earle, 2000, 2001) and in Ukraine (Schnytzer and Andreyeva, 2002) and studies on the impacts of various factors on the agricultural sectors of transition countries (Macours and Swinnen, 2000).

Following this approach, the relation between outputs, inputs and other factors is given by:

[3] In transition economies, direct subsidies are not the only source of governmental support. Other sources of more indirect support are reduction of taxes, subsidized credit rates, etc. (Legeida, 2001).

$$Q = F(\mathbf{X}, A) \quad (1)$$

where F is production function; **X** is a vector of inputs; A indexes total factor productivity (disembodied) with A=f(**A**, u). In this paper, the vector **A** consists of a set of variables that reflect the financial environment the enterprise faces and u is a disturbance residual factor affecting productivity.

Nickell *et al.* (1997), argue that financial effects approached through the level of debts influence productivity in the U.K. industry. The authors provide evidence that high debts have a positive impact on managerial effort and hence the level of productivity via the discipline of debt. Following similar reasoning, one could assume that availability of financial sources affects productivity on Russian farms.

When it is not directly observable whether farms are liquidity constrained, a lack of financial sources can be reflected by different variables. The impact of subsidies on resource allocation and performance may be positive and negative. At the micro level, subsidies can create impediments to competition through biased conditions for factor allocation. Furthermore, they can lead to ineffective distribution of resources, give wrong market signals and perpetuate loss-making enterprises (Legeida, 2001). On the other hand, serving as extra source of finance for the farms that operate under severe lack of liquidity, subsidies may positively influence performance. High debt payables may lead to deteriorating farm performance and to bankruptcy. In Russia bankruptcy is not a big threat because the law on bankruptcy has not been heavily applied and thus only a small percentage of highly indebted enterprises went through this procedure (Osborne and Trueblood, 2002a). Thus, short-term debts may keep farms in business when debts are used as a source of working capital (see also Yastrebova, 2001) under given conditions that neither the state nor suppliers harden the budget constraints.

DATA

The agricultural firm data in this study are taken from data of the Goskomstat (State Committee for Statistics) agricultural registries. This data source contains annual records on all Russian medium and large agricultural enterprises based on the reports, which are submitted to local statistical offices annually (and some of them quarterly). These reports correspond with other forms submitted to tax offices and thus are the only official sources of farm accounting system available.

The data from Agricultural Registry are supplemented with regional statistical price indices from Goskomstat (2001b, c) and the collected data on projected and actually granted level of federal subsidies differentiated by regions (available from the authors upon the request).

To the best of the authors' knowledge, such a source of statistical data on agriculture as the Agricultural Registry has not yet been discussed in the international literature. Therefore, some further details about its contents and the actual meaning of variables are given here. The Agricultural Registry mostly contains variables that are collected from the annual agricultural reports (forms 5APK-16APK)[4]. The registry has a rather broad range of technological variables (land area by varieties of crops, heads of animals, crop and livestock output by types in physical and Rouble values, inputs by categories in Rouble value, etc.). The data set includes detailed data on input and output subsidies. It also contains information on farm location, ownership, and type of organizational structure. Only few variables are available on farm financial aspects. By linking the annual data on enterprises over the period 1995-2000 the total number of observations is 163,077, representing more than 27,000 agricultural organizations in 77 oblasts of the Russian Federation annually.

It should be noted that the list of balance sheet variables in the registry does not distinguish the beginning or end values. Having available the balance sheets of farms in the Moscow Region, the corresponding variables from the balance sheets and the registry were compared. It can be stated that financial variables such as short- and long-term debts, overdue debts, credits are given in the end-year values.

[4] The complete overview with detailed description of forms, the correspondence of variables among the forms can be found in Minselkhoz (2000).

The beginning year value of debts is preferred in the analysis as it indicates the initial financial condition of the enterprise. Lagging financial variables by one year, the time period is reduced by one year to 1996-2000.

This research is focused on large-scale agricultural farms, the successors of kolkhozes and sovkhozes. The agricultural firms that are classified as public, religious, charitable, political, professional union organisations, foundations, representative offices, consortiums, scientific stations and trial fields are omitted from the analysis. Observations from Chukotian autonomous district are dropped since they represent farms operating on 0.7-4.1 million hectares and employing 40-105 workers, which are considered as outliers. Observations from Ingushetiya, Magadan oblast, Jewish Autonomous Oblast are excluded because there is no data on price index in these regions. These dropped observations together correspond with less than 1.5% of total number of observations in the database. In the final sample there are 73 Regions. With respect to all agricultural enterprises, on average in 1996-2000 this sample covers 75% of total number of agricultural enterprises, 66.8% of employment, 76.6% of agricultural land, and 49.7% of Gross Agricultural Output as reported by Goskomstat (2001c).

Next, the measurement of variables of interest is discussed. All variables are measured in Rouble value, unless stated otherwise. Farm output is measured as gross revenue. It should be noted that the analysis is confined to the agricultural part of the enterprise. Non-agricultural production, in particular social facilities, is excluded from the investigation. The agricultural registry does not provide the information on social activities of the enterprise. Capital is measured as annual average replacement value of fixed assets including livestock. This is the only variable that stands for the value of fixed capital in the registry[5]. Labor is measured as the number of farm employees. Land is measured as agricultural area in hectares. Both labour and land are not corrected for quality, due to a lack of data on quality. The fourth production input in the model is materials measured as the costs of materials (seeds, fodder, mineral fertilizers, oil products, energy, fuel, spare parts, and other).

Two financial factors are distinguished, i.e. budget transfers and short-term debts. Budget transfers are measured as the sum of subsidies and compensations for different outputs and inputs. The variable short-term debt is constructed as the sum of short-term credit and total debt payables at the beginning of a year. Continuing the discussion over actual meaning of variables in the registry, one should be aware that the short- and long-term credits actually represent the amount of credit to be repaid at the end of a year. Thus, indeed it gives the information about the financial state of the enterprise but does not correspond with the value of actually granted credit. Short-term debts on credit (to banks) and total short-term debts (to suppliers, budget, employees, etc.), being considered of the same nature are thus aggregated in one variable.

All monetary variables are normalized by the base year prices (1996). Regional price indices for aggregated agricultural output and materials were used to deflate revenue and cost of materials. Subsidies and debts are deflated by the regional Consumer Price Index. A problem of devaluating the value of capital, reported in other studies (Lissitsa and Odening, 2001; Voigt and Uvarovsky, 2001), was encountered here. Not available on regional basis, the national index of fixed assets in agriculture, computed as the ratio of costs of fixed capital in agriculture in constant prices to its cost in current prices (see Goskomstat, 2001a), was used in this study.

EMPIRICAL MODEL

The production function framework has been widely applied in agricultural studies focusing on the impact of various factors on productivity. Important model specification issues are the choice of the functional form and methods of dealing with potential data problem such as e.g. endogeneity. In order to answer the research questions in this study, farm production is assumed to be a function of productive inputs (e.g. capital, labor, land and materials) and financial factors that are expected to have an impact on productivity of farms (subsidies and short-term debts). Assuming a Translog specification, farm-specific production is given by:

[5] Depreciation costs are available for a smaller number of observations.

$$\log Q_{nt} = \alpha_n + \sum_{i=1}^{4} \alpha_i \log X_{\text{int}} + \frac{1}{2} \sum_{i=1}^{4} \sum_{j=1}^{4} \beta_{ij} \log X_{\text{int}} \log X_{jnt} + \sum_{k=1}^{2} \gamma_k \log A_{knt} + \sum_{k=1}^{2} \delta_k \left(\log A_{knt}\right)^2 + \frac{1}{2} \sum_{i=1}^{4} \sum_{k=1}^{2} \gamma_{ik} \log X_{\text{int}} \log A_{knt} + e_{nt} \quad (2)$$

where Q_{nt} is output of farm n in year t; X_{int} are productive inputs for farm n at time t with i=1 (labor), 2 (land), 3 (capital) and 4 (materials); A_{knt} is vector of financial determinants with k=1 (budget transfers) and 2 (short-term debts); e_{nt} is an error term accounting for random events. The condition All α's, β's, γ's and δ's are parameters to be estimated and α_n is a farm-specific effect representing unobserved variables such as management, quality of soil, location and climate. In this paper, financial factors are modeled as production function shifters and are represented in the translog by single, squared and interaction terms (see also Celikkol and Stefanou, 1999; Oude Lansink *et al*., 2000).

The reverse causality problem between liquidity and productivity or in other words the problem that subsidies may more likely go to worse farms or that high debts may be generated by low performing firms, is handled in this study by applying an instrumental variable technique. Several groups of instruments are constructed. Following Brown and Earle (2000), the first group consists of instruments computed as the average value over all the other farms in the region. The second group of instrumental variables for financial factors consists of their lagged values. The third instrument for subsidies is the share of actually paid gross subsidies to its projected level in the federal budget. The third instrument for debts is the ratio of debts at the end of a year to the gross regional product of that year, lagged[6]. The dummy for farm specialization constructed upon the farm specialization code *OKONCh* (Dspec=1 for livestock activities and Dspec=0 for crop activities) is also used as an instrument.

RESULTS

Estimation results of the Translog production function (2) are presented for the sample of 104428 observations (24415 farms) over the period 1996-2000. Panel data estimation techniques are employed here (fixed-effect and random-effect) to account for unobserved differences in soil quality, management, location, etc. across the farms in the sample. The statistical package Stata 7.0 is used for the regression analysis.

The Hausman test rejects the random-effect specification[7] in favour of the fixed-effects specification, which is employed in the remainder of this paper. The implication of this test result is that the regressors are not independent of the farm-specific effect, a result that is frequently found in the estimation of production functions in the agricultural economics literature. It is important to note that the fixed-effects specification captures farm-specific characteristics, including regional differences in terms of climatic conditions.

The full Translog specification given by (2) with additional year dummies produced very poor estimates. Two tests on the validity of instruments and model specification, i.e. the Davidson-MacKinnon test for endogeneity and the test on overidentifying restrictions (see Greene, 1997) rejected this specification. After excluding several regressors and trying the different sets of instruments, a specification is obtained[8] that is not rejected by both tests.

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[6] Gross regional product for year 2000 is not available from the latest statistical data, therefore the instrument is a lagged variable. Since no data are available for debts in agricultural sector at the regional level, its level for the whole regional economy is taken: debt payables of enterprises and individuals at the end of a year. This instrument indicates the general financial performance of the regions.

[7] The statistical software with the built in Hausman test procedure reported a negative Chi-square statistics due to non-inversion of the covariance matrix. This outcome is cautiously interpreted in favor of selecting the fixed-effect model over the random-effect model.

[8] The final list of instruments includes the endogenous variables of the model, the average value of subsidies on other farms in the region (iv1s), the ratio of actually paid subsidies to the projected level (iv3gs), the share of regional debts in regional product (shd) and the dummy for farm specialization (DSpec). All the lagged values appeared to be inappropriate instruments indicating a high correlation with the dependent variable Q and leading to the failure of the test for overidentifying restrictions.

This final specification does not include interaction terms of financial variables and inputs and squared terms of financial factors. The non-rejected specification implies that financial factors act as slope-neutral production shifters. According to the tests on instruments, instrumental variable estimation is required (the null hypothesis is not rejected at the 1% critical level) and the instrumental variables explain the endogenous variables well (P-value for the test on overidentifying restrictions is 0.466). The year dummies are found to be statistically significant (at 1% level). Finally, using an F-test it is found that the Cobb-Douglas production function is not an adequate representation of the data. The results of the final fixed-effect regression model are presented in Table 1.

Table 1. Fixed-effect estimation results for overall sample, 1996-2000.

Dependent variable: Q	Estimate	Standard error	t-statistic	P-value
Debt	0.819	0.211	3.75	0
Budget transfer	0.009	0.004	2.20	0.03
Workers	1.303	0.182	7.07	0
Land	0.099	0.110	0.90	0.37
Materials	0.287	0.077	3.73	0
Capital	0.139	0.045	3.10	0.00
Workers^2	0.022	0.014	1.59	0.11
Land^2	0.005	0.007	0.79	0.43
Materials^2	0.011	0.005	2.13	0.03
Capital^2	-0.006	0.002	-3.30	0.00
Workers*Capital	-0.025	0.012	-2.17	0.03
Workers*Land	-0.069	0.017	-4.02	0
Workers*materials	-0.043	0.013	-3.23	0.00
Capital*Land	0.007	0.007	1.03	0.30
Capital*Materials	0.003	0.006	0.60	0.55
Land*Materials	0.006	0.009	0.71	0.48
Dummy year 1997	-0.502	0.152	-3.30	0
Dummy year 1998	-0.586	0.142	-4.13	0
Dummy year 1999	-0.553	0.145	-3.83	0
Dummy year 2000	-0.588	0.156	-3.77	0
constant	-5.490	1.503	-3.65	0

The main interest of this research is to analyze the impact of financial factors on farm production. A priori, it is expected that Russian farms are suffering from liquidity constraints and the coefficients of corresponding financial variables (budget transfers, short-term debt payables) are positive. As can be seen from the results, the estimates of financial variables are highly significant and positive. A positive relation between the short-term debt and productivity suggests the presence of liquidity constraints, because farms may accumulate large debts due to inability to repay them. Instead, they spend available cash for input purchase. This is in line with the observation presented in Yastrebova (2001) that short-term debt payables in Russian agriculture are used to finance working capital. Subsidies have a positive impact on production, although its coefficient and consequently its marginal impact are very small. In addition, the level of subsidies is likely to be reduced due to budget limits and requirements of the WTO; thus this resource of finance should not be overvalued in the future. However, both findings provide evidence for the presence of liquidity constraints.

To assess the impact of production factors on the level of farm output, the output elasticity with respect to production factors was computed. The computed values are based on average values in 1996-2000. These values vary only slightly among the years (see Table 2). The computed t-ratios demonstrate that the elasticities are significant at 5% level[9].

[9] T-statistics were calculated using the following formula for variance: $\sigma^2 = \mathbf{f}' \, \mathbf{\Omega} \, \mathbf{f}$, where **f** is a vector of partial derivatives of the variance function with respect to the parameters of the estimated profit function. **Ω** is a covariance matrix of the estimated parameters (see Rao, 1973).

Table 2. Annual average output elasticity with respect to inputs (t-ratios in parentheses).

	1996	1997	1998	1999	2000	1996-2000
Labor	0.251	0.242	0.251	0.264	0.270	0.256 (2.53)
Capital	-0.302	-0.312	-0.302	-0.290	-0.283	-0.298 (-2.91)
Land	-0.436	-0.447	-0.436	-0.423	-0.413	-0.431 (-3.07)
Materials	0.251	0.250	0.251	0.251	0.252	0.251 (6.34)

The negative output elasticity for land corresponds with the observation that farms in Russia use too much land. Possibly, this result is driven by the measure used for land: agricultural land area. It is also rather likely that sown area would better indicate the land usage, as sown area requires other inputs, whereas some hectares of agricultural land may not be used at all. Also, some caution is required in the interpretation of the negative elasticity of capital. It would be mistaken to conclude straightforward that capital is overused. It is more likely that the value of fixed assets on the farm is overstated due to a year-to-year revaluation resulting in extremely high values of capital relatively to its market price. On the other hand, the finding is in line with the conclusions from Osborne and Trueblood (2002b) who used physical measures of capital (i.e. number of tractors) and concluded that farms tend to use machinery-intensive technologies inherited from the Soviet time. An overall conclusion from Table 1 is that the poor quality of fixed assets lowers their productivity. In line with *a priori* expectations, the elasticity with respect to material costs is positive. This is because variable inputs may be considered as one of the limiting factors in farm production. Purchasing these inputs (fuel, electricity, fertilizers, seeds, concentrates, etc.) requires cash expenses, which are not sufficiently available in Russian agriculture. Therefore, the large elasticity of variable inputs compared to those of other inputs provides weak evidence for the presence of liquidity constraints on Russian farms. The relatively large elasticity for labor might contradict with results of other studies (see e.g. Liefert and Swinnen, 2002; Osborne and Trueblood, 2002a) suggesting that labor is an excessive input. Overall, it may be concluded that the lack of finance is not the only disturbing component in production. Poorly maintained and absent fixed assets are additional factors in explaining poor production performance in Russian agriculture.

The significant estimates of year dummies show that productivity was declining from the first year in the data set (1996) up to year 1998. In 1999, the sector experienced a productivity growth of 3.3%, followed by a decline by the same percentage in 2000.

As can be seen from the descriptive statistics (see table I.1 in Appendix I), some observations represent a relatively low number of employees and acreage of agricultural land (compared to the average). To assess the sensitivity of the results to the presence of very small and very large farms, the same model (Table 1) was estimated for a sample of farms excluding small (land <500, workers<50) and large farms (land>50000, workers>1500). The estimation results for this reduced sample of 89320 observations (86% of initial sample) do not show large deviations compared with the results of Table 1 and leave the conclusions based on the whole sample unchanged.

CONCLUSIONS AND DISCUSSION

In this paper a production function approach is utilized to analyze the impact of financial factors such as subsidies and accumulated debts on productivity of large-scale Russian farms. The model is estimated on unbalanced panel over more than 20,000 farms over the period 1996-2000. This research moves beyond empirical studies based on aggregated oblast data on Russian agriculture by applying *farm* level data. Moreover, it presents elasticities of output with respect to different inputs.
This paper addresses the methodological problem of endogeneity of financial factors by applying an instrumental variable technique. The tests on instruments are crucial in selecting the final model specification. The specification that assumes absence of interactions between financial factors and inputs is not rejected. Furthermore, it is found that the fixed-effects specification is preferred over the random-effects specification due to correlation between regressors and the farm-specific effect. Also, the more restrictive Cobb-Douglas specification is rejected by the data.

The results demonstrate the positive impact of subsidies on productivity (see also Epstein, 2001) and suggest that short-term debts are used as a source of working capital (see also Yastrebova, 2001). The overall conclusion is that liquidity constraints have a negative impact on productivity of Russian agriculture.

Output elasticities indicate that land and capital are excessive factors. The large and positive elasticity of output with respect to materials provides additional evidence for the presence of liquidity constraints on Russian farms. A sensitivity analysis was performed by estimating the model on a reduced sample of farms, excluding very large and very small farms. The sensitivity analysis suggests that results are robust to this modification.

This paper gives a detailed description of the enormous data set that was obtained from the Agricultural Registry of Russian farms. It should be stressed that a careful interpretation of the variables in the database is required. Financial values are given at the end of a year and should not be confused with the average annual level. Furthermore, the database does not include data on labor and land quality and lacks physical measures of fixed assets, that might be more reliable than the value of fixed assets that was used in this paper.

In light of the current conclusions, the next research question to address would be the relative importance of factors causing the liquidity constraints. Future research could also focus on the choice of alternative measures of productive inputs to assess the sensitivity of the results. A natural extension of this study could be an attempt to compute the efficiency scores for enterprises employing the stochastic frontier approach. This approach requires the estimation of the production frontier, which is similar with estimation of the production function done in this research.

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Appendix I

Table I.1. Descriptive statistics of the main variables, 104428 observations.

Variable	symbol	Units of measurement	Mean	Std Dev	Minimum	Maximum
Output	Y	1000 Roubles of 1996	2624.3	5622.5	0.045	407196.1
Subsidy	A_1	1000 Roubles of 1996	267.4	680.9	0.009	49419.0
Debts	A_2	1000 Roubles of 1996	1539.7	5271.0	0.001	1099135.3
Labor	X_1	Number of workers	176.9	143.7	2.000	4757.0
Land	X_2	Hectares	5700.4	6066.6	2.500	444280.0
Capital	X_3	1000 Roubles of 1996	35276.4	64113.4	0.569	15597691.9
Materials	X_4	1000 Roubles of 1996	2626.8	3836.7	0.201	212618.2
Dummy year 1997	Yr97	=1 for year 1997, 0 otherwise	0.204	0.403	0	1
Dummy year 1998	Yr98	=1 for year 1998, 0 otherwise	0.200	0.400	0	1
Dummy year 1999	Yr99	=1 for year 1999, 0 otherwise	0.199	0.399	0	1
Dummy year 2000	Yr00	=1 for year 2000, 0 otherwise	0.195	0.396	0	1