Productivity of private farms:
the case of Tashkent Region, Uzbekistan

Evelina Budjurova[1], Siegfried Bauer[2]

INTRODUCTION

The agrarian sector of national economy of Uzbekistan is going through difficult process of fundamental changes. The main issue of this process is transition into new model of economic development, connected with more effective use of market instruments and mechanism of their regulation. In the process of transition new economical and organizational frames for agricultural producers are formed. By the new legislative conditions since 1998, three different types of farms were established: agricultural cooperatives (shirkat), private farms and dekhkan farms (Figure 1). Counter-productive policies such as intervention on input and output markets, misapplication of the bankruptcy law, lack of land market and ineffective finance system have affected the reform process. Most agricultural cooperatives in the period 2001-2003 were pronounced bankrupt. In 2003 the government changed direction of reforms in order to restructure the agricultural cooperatives (shirkats). The agricultural land was given to rent through competition to private farms (Figure 2).
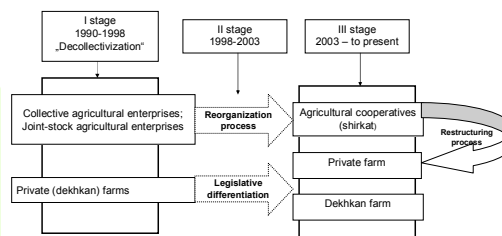

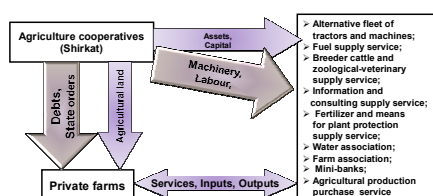Figure 1: Chronological change of reorganization agricultural enterprises.

Figure 2: Restructuring of agricultural cooperatives (shirkats) into private farms

OBJECTIVES

• Examine the changes in agricultural productivity in Tashkent Region, Uzbekistan
• Determinate factors affecting in technical efficiency change

DATA BASE

Study area: Tashkent region, Uzbekistan

Data: statistics about private farms of 15 districts in the period of 2001-2005

METHODOLOGY

For estimation of Total Factor Productivity the Malmquist Productivity Index was used. MPI was calculated through input – oriented DEA Model. The use of this index makes it possible to recognise whether or not the changes in productivity of agriculture took place and it was uniformly, there was the phase of aggravation or stabilization in situation changes.

$$M_i(q_t, x_t, q_s, x_s) = \left[\frac{D^s(q_t, x_t)}{D^s(q_s, x_s)} \times \frac{D^t(q_t, x_t)}{D^t(q_s, x_s)}\right]^{1/2}$$

$$D(x, q) = \max\{\rho : (s/\rho) \in L(q)\},$$

$$M_i(q_t, x_t, q_s, x_s) = \frac{D^t(q_t, x_t)}{D^s(q_s, x_s)} \times \left[\frac{D^s(q_t, x_t)}{D^t(q_t, x_t)} \times \frac{D^s(q_s, x_s)}{D^t(q_s, x_s)}\right]^{1/2}$$

$\underbrace{}_{EFCH^t} \quad \underbrace{}_{TECH^t}$

where

q_s, q_t – outputs in the period s and t ;

x_s, x_t – inputs in the period s and t

$L(q)$ - the quantity of all input vectors, which a certain output vector q can be produced

ρ - reciprocal value of the factor by which the total inputs could be maximally reduced without reducing output.

The second stage, Tobit regression was used to identify the factor affecting technical efficiency from the DEA results:

$$TE_i = \alpha + \beta_1 FSIZE_i + \beta_2 MLR_i + \beta_3 LIVLR_i + \beta_4 SP_i + \beta_5 INT_i + \beta_6 FLR_i + \varepsilon_i$$

where

FSIZE – average farm size in the districts, hectares;

MLR – man – land ration, man/ha ;

LIVLR - livestock – land ration, heads/ha;

SP - specialization of the private farms in the districts, crop production in %;

INT – intensity, UZ Sum/ ha

FLR – fertilizer – land ration, tonn/ha

Table 1: Variables used in productivity analysis .

Variable	Definition	Determination
Y1	Crop production	Market private farms products in Uz SUM
Y2	Livestock production	Market private farm products in Uz SUM
X1	Land	Agricultural land in hectares
X2	Labor	Number of farm workers in crop and livestock production
X3	Capital	Amortization in Uz SUM
X4	Variable inputs	Seed, animal feeds, fertilizers, fuel, electrical energy and other inputs in Uz SUM
X5	Machinery	Number of wheel and crawler tractors
X6	Livestock	Number of heads
X7	Fertilizer	Metric tons

RESULTS

Table 2: **Total factor productivity change in agriculture in the study area**

Year	Malmquist Productivity Index (MPI)	Technical change (TC)	Technical efficiency change (TE)	Pure technical efficiency change (PE)	Scale efficiency change (SE)
2001	0.886	0.912	0.983	0.969	0.958
2002	0.577	0.577	1.000	1.000	1.000
2003	1.570	1.733	0.906	0.981	0.923
2004	1.099	1.131	0.971	0.943	1.030
2005	1.030	1.020	1.010	1.006	1.004
Average	1.006	1.036	0.971	0.982	0.989

Table 3: **Malmquist Productivity Index change between the districts**

N	Districts	MPI	TC	TE	PE	SE
1	Oqqurgan	0.991	0.991	1.000	1.000	1.000
2	Okhangaron	0.767	1.010	0.759	0.845	0.898
3	Bekabad	0.975	1.013	0.963	0.963	0.963
4	Bustonliq	1.307	1.307	1.000	1.000	1.000
5	Buka	0.991	1.011	0.980	1.000	0.980
6	Zangiata	1.017	1.017	1.000	1.000	1.000
7	Qibray	1.298	1.298	1.000	1.000	1.000
8	Quyi Chirchik	1.013	1.013	1.000	1.000	1.000
9	Parkent	1.389	1.389	1.000	1.000	1.000
10	Piskent	0.892	0.892	1.000	1.000	1.000
11	Tashkent	1.194	1.194	1.000	1.000	1.000
12	Orta Chirchik	0.811	0.846	0.958	0.960	0.998
13	Chinaz	0.906	0.916	0.990	0.990	1.000
14	Yugori Chirchik	0.769	0.813	0.946	0.949	0.997
15	Yangiyol	1.025	1.025	1.000	1.000	1.000
	Mean	1.006	1.036	0.971	0.982	0.989

Table 4: **Regression model explaining technical efficiency in 2003[1]**

Independent variables	Coefficient	Std. err.	T-ratio	P-value
Constant	18,5648	278,3839	0,067	0,9468
Farm size (FSIZE)	2,3007	3,6518	0,63	0,5287
Man – Land Ration (MLR)	0,9935	12,052	0,082	0,9343
Livestock – Land Ration (LIVLR)	-26,3251	21,436	-1,276	0,202
Specialization (SP)	4,0458	3,6207	1,118	0,2634
Intensity (INT)	2,929	2,5877	1,132	0,2577
Fertilizer – Land Ration	-6,1487	2,584**	- 2,379	0,0174
Log-L	-274,5763			

Note: *,** and *** denote significance at 1%, 5% and 10% level, respectively

1 TE scores in 2003 have the lowest level among the analyzing years.

CONCLUSIONS

The empirical results of the analysis lead to the following conclusions: the decline of agricultural production in the period of 2001 to 2003 is accompanied by a reduction in total factor productivity of 42 percent. The primary cause of productivity decline was a reduction in technical change. However, it is not clear of deep change due to mechanical, biological or organisational factors. The productivity change among the districts shows that 4 districts had a high increases of TFP and it was in favour of livestock production. It is interesting to notice that these districts are located closer to the capital, Tashkent. A technical efficiency change shows that the technical use of production factors during all the period exhibits on an increase differences between farms. In other words, the privat farms are very successful at the start of the trasformation process. Although it cannot be assumed the low technical efficiency lead directly to farms' economical instability. In conclusion, implemented trasformation policy shows positive impact on total factor productivity change in the region.

Corresponding Author:
1. Evelina.Budjurova@agrar.uni-giessen.de
2. Siegfried.Bauer@agrar.uni-giessen.de