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**Turkmenistan's New Private Farmers: The Effect  
Of Human Capital on Performance**

by

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# Turkmenistan's new private farmers: the effect of human capital on performance

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## Abstract

Almost all former socialist countries are introducing private farming as part of land reform. In countries where such farming existed one or two generations ago, land might be restituted to former owners. In Turkmenistan, where there had been little private agriculture and no small landowners, land was distributed to new beneficiaries. This paper shows that the previous position of the new farm "owners" strongly affected what resources they had (land, capital, water) and how effectively they used them. The study is based on a survey conducted in 2000 on a sample of 143 farmers from Turkmenistan's all five administrative regions. The farmers were divided for analysis into five categories, according to previous positions (managers, middle-level specialists, skilled and unskilled workers, and administrative staff). On the average, all categories of farmers turned a profit. However, the most successful were the middle-level specialists (agronomists, engineers). They had the largest plots, the best land, and the best-equipped farms. Like the managers and the administrative staff, they had savings, some of which they used as startup capital. They diversified their production more than others, and were better able to obtain credit. Former unskilled workers were the least successful, lacking capital, and unable to afford risks, thus growing only wheat and cotton at the expense of other crops and of livestock. Earlier studies have shown that former position affected the share of resources received by individuals in the ex Soviet Union. In addition to confirming the finding, we have shown that former position also affected the use of those resources, and the economic performance of the users. Unfortunately, the sample size was small, and our conclusions remain thus tentative.

## Introduction

The emergence of independent peasant farmers operating outside the traditional collectivist frameworks may well have been one the few tangible outcomes of Turkmenistan's agrarian reform. Private farming was allowed in Turkmenistan in February 1993 by a Presidential decree that provided for the allocation of farmland to any Turkmen citizen. Priority in access to land in each location was given to local residents having agricultural experience and appropriate qualifications. Subsequently, the Law on Daikhan (Peasant) Farms (March 1994) stipulated that citizen applying for land must be able-bodied and above 18 and have adequate farming skills. Land was to be allocated primarily to rural people residing on the territory of former collective and state farms (which were required by law to reorganize into so-called *daikhan berleshik*, or peasant associations).

Article 1 of the Law on Daikhan (Peasant) Farms defines a peasant (daikhan) farm as a family-based unit engaged in commercial agricultural production using mostly family labor. Article 8 stipulates that the land for daikhan farming can be allocated in inheritable possession, private ownership, or lease, the exact form of tenure being at the discretion of the local authorities. A peasant farm is free to determine its organization, production, and sales. However, it is obligated to use the land strictly in accordance with the prescribed purposes, while carrying out soil improvement work and protecting the land from erosion

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and ecological deterioration. A farmer may lose his ownership rights if the land has remained fallow for two years; if it was not used for the prescribed purposes; or if irresponsible cultivation methods led to soil degradation.

These restrictions on land use in peasant farms did not deter the rural residents and many applied and actually received an allocation of land for independent private farming. Indeed, for the first three years after the decree (1993-1996) new private farms were established on 98.5 thousand hectares, which constitutes only 0.3% of agricultural land in Turkmenistan, but fully 93% of land given until now in private ownership. The growth of private farming abated after this initial burst, and in 1996-2000 the area distributed for private farming increased by only 0.7 thousand hectares (Lerman and Stanchin 2003).

This paper discusses peasant farms in Turkmenistan. It is based on a survey conducted in 2000 on a sample of 143 new private farmers from five administrative regions (*velayats*). The survey provides farm-level information about resources, assets, activities, and achievements as well as about the demographic profiles of the farmers' families. In analyzing this information, we expect the success of the farmers to be affected by their initial financial and social resources, i.e., their "capitals". Thus, the most successful ones could be those who started in the most favorable conditions: with better skills, higher social status and more money. The study addresses two specific questions: (1) how the former status of the private farmers (their "position") affected what they initially received; and (2) how connections, formal education, and special skills implied in the farmers' "positions" affected their subsequent success.

Each farmer possesses several kinds of capital: physical (material and financial resources), human (education, training, skills), and social (formal and informal ties). While physical capital is embodied in material form, human capital is less tangible, being embodied in the skills and knowledge acquired by an individual, and social capital is less tangible yet, as it is expressed in relations among persons (Coleman 2000). All three types of capital are likely to contribute to productivity, and the survey provides information on the physical and human capital of peasant farmers in Turkmenistan and to some extent on the social capital implied in the positions of the farmers.

The survey distinguished five categories of farmers according to the position they held prior to establishing a peasant farm: managers, middle-level specialists, administrative staff, skilled workers, and unskilled workers. These positions represent different combinations of physical, human, and social capital, and we examine their effects on farming success.

All positions imply some degree of knowledge, experience, and connections, as well as accumulation of or access to physical capital. People who held managerial positions in the past usually have extensive formal and informal links (social capital); most are well educated (human capital) though they may lack specialized agricultural skills and have no competence in specific production processes (especially those who came to private farming from industry, local government, and other non-agricultural sectors); they also are likely to have savings and assets (physical capital) by virtue of their relatively high earnings in the past.<sup>2</sup> Middle-level specialists were responsible for day-to-day management of production

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<sup>2</sup> Nikula (2001) called a leading position in the old structure *organizational capital*. It is important for successful entrepreneurship, as it provides financial resources and knowledge. He argued that top managers do not necessarily become private entrepreneurs. More likely are the lower managers with their specialized knowledge. Organizational capital as such is not a decisive factor, but personal contacts and

in former collective and state farms. Their earnings were large enough to have some startup savings (physical capital), their position was high enough for useful connections (social capital), they are well educated, and they have practical experience and technological skills (human capital). They often assisted farm managers by carrying out basic business operations, such as negotiating credit and arranging sales. These managerial skills augmented their human capital. Middle-level specialists may combine technical competence and useful connections. They know many practically oriented people at the middle level. As professionals, they are always welcome in technocratic networks, unlike the rank-and-file workers. Middle-level specialists always know who to ask what. Administrative staff includes economists, accountants, and office workers. While all have professional education (human capital), their experience is primarily in paperwork, not farming. However, they have a better chance (than rank-and-file farm workers) to acquire useful friends at a high enough level (social capital). Their earnings, while lower than those of managers, were higher than those of farm workers and comparable with those of middle-level specialists (physical capital). Skilled and unskilled workers had lower earnings and thus smaller savings (physical capital); they were less educated and did not acquire special managerial skills (human capital); they had less opportunity for developing connections (social capital). Workers may have practical experience as do others in their network, but their level may be too low to ensure effective *blat*. The difference between skilled and unskilled workers is mainly one of degree, with unskilled workers characterized by lower endowments of all three capitals.

Managers clearly have the highest “capitals”, whereas workers are at the bottom of the ranking. We hypothesize that, taken separately, formal education, special skills, managerial experience, informal connections, and savings do not guarantee the best results in a private business, such as farming. Only a proper combination of “capitals” will ensure profitable operation.

This paper is organized as follows. The introduction is followed by a section that presents the results of the survey analysis. Here we describe who the farmers are, where they live, why they have chosen to become farmers, what resources they have obtained from the powers that be, how they have deployed these resources, and what they have achieved on their new farms. This section is followed by a discussion and by conclusions.

## Survey analysis

### Who are the farmers surveyed?

The farmers surveyed came to private farming from all sectors of the economy: agriculture (57%), industry (14%), services (9%) and other sectors (13%), and from positions at different levels (table 1). Unskilled workers came mainly from agriculture, while managers and administrative staff – from all sectors. The percentage of former managers of collective and state farms equals the percentage of former agricultural workers – skilled or unskilled (14%), though the managers constituted but a small proportion of the staff of agricultural enterprises. This may imply that selection committees favored people in leading positions, with better connections and deeper pockets; that former workers did not feel confident to apply for a farm of their own; or that farms run by managers have a higher survival rate.

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capabilities are. The chances of an ordinary worker, lacking networks and skills, of setting up a profitable business are limited, or at least he would need to invest more efforts (Nikula 2001).

The average age of the farmers is 48 years, and those who had higher former positions tend to be older (table 2). Average family size is 5.6 persons with insignificant differences between groups. Education varies with position. Managers and administrative workers are the most educated: ca. 90% reported higher education (table 2), as against 59% for the sample as a whole. At the other end of the continuum, among unskilled workers 21% had less than ten years of schooling.

Most farmer families live in the village of the peasant association where the farm is located, but not on the farm itself (table 3). Former managers and administrative staff show a clear preference for actually living far from their farm – in other villages, in the *etrap* (district) center<sup>3</sup>, or in a nearby city, perhaps because in this way they are closer to their off-farm jobs (see table 8).

**Table 1.** Distribution of farmers by previous occupation (% of all respondents)

Former position	Agriculture	Industry	Social institutions	Local government	Other	Total
Manager	14.0	6.3	4.9	3.5	2.1	<b>30.8</b>
Middle-level specialist	24.5	6.3	2.1		2.8	<b>35.7</b>
Administrative staff	3.5	0.7	2.1	3.5	4.2	<b>14.0</b>
Skilled worker	7.0	0.7			2.1	<b>9.8</b>
Unskilled worker	7.7				2.1	<b>9.8</b>
<b>Total</b>	<b>56.6</b>	<b>14.0</b>	<b>9.1</b>	<b>7.0</b>	<b>13.3</b>	<b>100.0</b>

**Table 2.** The average age, family size and education of farmers

Former position	Average age, years	Family size, persons	Education (% of respondents in each category)			
			Higher complete, incomplete	Technical/special secondary	General secondary	Incomplete secondary
Manager	51	5.4	88.6	11.4		
Middle-level specialist	47	5.4	47.1	35.3	13.7	3.9
Administrative staff	50	5.9	90.0	5.0		5.0
Skilled worker	45	5.2	14.3	28.6	50.0	7.1
Unskilled worker	41	4.9	7.1		71.4	21.5
<b>Total</b>	<b>48</b>	<b>5.6</b>	<b>58.7</b>	<b>19.6</b>	<b>16.8</b>	<b>4.9</b>

**Table 3.** Where the farmer's family lives (% of families within each category).

Former position	On the farm	In the village, where the farm is located	In another village	In district center	Other
Manager	11.4	43.2	6.8	34.1	4.5
Middle-level specialist	11.8	58.8	9.8	15.7	3.9
Administrative staff		60.0	10.0	30.0	
Skilled worker	14.3	71.4		14.3	
Unskilled worker	21.4	78.6			
<b>Total</b>	<b>11.2</b>	<b>57.3</b>	<b>7.0</b>	<b>21.7</b>	<b>2.8</b>

<sup>3</sup> Administratively, Turkmenistan is divided into five *velayats* (provinces, former Soviet *oblasts*), which are in turn subdivided into *etrap*s (regions, former Soviet *raions*).

There are some [non significant] differences between categories in reasons for becoming a farmer. Thus, for skilled categories the main reasons were to secure their children's future, followed by the hope to earn more. Unskilled workers complained the most about insufficient income in collective farms. Besides desiring to earn more, they were eager to work without superiors (71% as against 56% in average). This is understandable after years of obedience coupled with the lowest pay level. Managers were more than others motivated by family prestige.

### What do they have?

#### *Land*

In their application forms future farmers indicated the desired size, location of the plot and planned agricultural activity. Then, the authorities decided whether to grant the request, or not. Land could be received in private ownership or leased. A private farmer can lease additional land from the local authorities. The proportion of farmers receiving land in private ownership and long-term lease varies by position. Among unskilled workers, the percent of owned plots is the smallest, perhaps because the authorities do not believe in such farmers or because unskilled applicants are more cautious and less ambitious than the others (table 5). Total plot size was determined by the *etrap* level State committee on land reform. It depended on the availability of land and water and on the labor capacity of the applicant's family. Payment was collected as annual land tax, determined by land quality, location and availability of water for the plot. Farm size ranges from 1 to 370 hectares, averaging 19 ha for owned farms and 39 ha for leased farms. 88% of the plots do not exceed 50 hectares, the legal limit. There is no significant difference in plot size among farmer categories, but table 6 shows that middle-level specialists received the largest plots, twice the average for skilled workers. This may be because the former were assumed to have skills and experience in farm management.

**Table 4.** Plot size (ha), land quality (% of land of each quality group in the plot), land property, and perceived security of tenure (% of respondents within each group).

Former position	Plot size, ha	Land quality*			Land property		Perceived security of tenure		
		1	2	3	owned	leased	yes	no	don't know
Manager	34.8	19.0	14.5	66.5	52.3	47.7	77.3	4.5	18.2
Middle-level specialist	36.3	41.2	28.6	30.2	37.3	62.7	76.5		23.5
Administrative staff	21.8	16.1	10.6	73.4	40.0	60.0	95.0		5.0
Skilled worker	17.8	38.2	6.8	55.0	57.1	42.9	92.9		7.1
Unskilled worker	25.9	9.1	32.2	58.7	14.3	85.7	64.3	7.1	28.6
<b>Total</b>	<b>31.0</b>	<b>22.0</b>	<b>20.2</b>	<b>57.8</b>	<b>42.0</b>	<b>58.0</b>	<b>79.7</b>	<b>2.1</b>	<b>18.2</b>

\*Land quality classification:

- 1 – irrigated land prepared for cultivation;
- 2 – land prepared for irrigation, but requiring improvement;
- 3 – virgin land.

Land was classified into three categories: good quality irrigated land ready for cultivation; land with irrigation, but requiring improvement; and unprepared virgin land. Middle-level specialists and skilled workers received the best land, probably because they

were good judges of land quality. Managers and administrative staff, however, ended up with the worst land (table 4). In spite of an optimistic attitude to land quality (about 80% of respondents were satisfied with the land received), only half the respondents cultivated their entire holding. In general, private farmers are confident of keeping their land (table 4). The most pessimistic are the unskilled workers, while the administrative staff is the most confident of the permanence of their tenure.

The Law on Daikhan (Peasant) Farms promises that the state will protect the rights of private farmers and state investment. It also promises that the state will help them develop new land and improve irrigation<sup>4</sup>. However, only 32% of the farmers received a budget for land improvement, averaging 4.2 million manats<sup>5</sup> per farm, which is \$830 at the official rate and about \$200 at the black market rate. Again, former unskilled workers were forgotten (none received any attention from the state). Meanwhile more than half the administrative staff (55%) received state assistance for their land improvement, while middle-level specialists received the largest state help.

#### *Water*

According to the Law on Daikhan (Peasant) Farms, the state supports private farms, providing them with water for irrigation, for production needs and household consumption. All private farms have access to an external irrigation network, wells, rivers, or at least to local water sources such as highly mineralized ground water and contaminated drainage lakes. However, only 20% report receiving it on time and even then much less than required. The distribution of water sources between farms differs by former positions of their owners (table 5). Thus, managers, middle-level specialists, and administrative staff have good access to the man-made irrigation network, while former unskilled workers are forced to rely on natural water sources (e.g., rivers, lakes, and wells). The difference in water sources may mean different water quality and eventually may affect yields.

**Table 5.** State land improvement plan, water sources, and financial ability (% of respondents in each group).

Former position	State land improvement plan		Water sources			Financial ability
	% of respondents	mIn manats	natural sources	man-made network	other sources	
Manager	38.6	3.55	29.5	63.6	6.8	31.8
Middle-level specialist	27.5	7.31	29.4	64.7	5.9	17.6
Administrative staff	55.0	1.89		90.0	10.0	15.0
Skilled worker	28.6	1.75	35.7	50.0	14.3	7.1
Unskilled worker			64.3	21.4	14.3	0.0
<b>Total</b>	<b>32.2</b>	<b>4.24</b>	<b>29.4</b>	<b>62.2</b>	<b>8.4</b>	<b>19.0</b>

<sup>4</sup> Waiting for help was naïve. By 1999 the share of agriculture in state investments had been cut to 2% (Pomfret 2001).

<sup>5</sup> The national currency, the manat, was introduced in November 1993 with the initial rate \$0.5 for 1 manat. The currency depreciated rapidly. In April 1998, the currency was pegged at 5200 manat per dollar, close to the then prevailing market rate. Since then the government has maintained the official rate despite strong excess demand for foreign currency. The parallel (free market) exchange rate fell precipitously to over three times the official rate by mid 1999 and to four times the official rate by late 2000.

### *Other resources*

Allocation of land is a prerequisite for starting a peasant farm. In addition to land, farmers may receive other production assets from the peasant association, such as livestock or machinery, based on their seniority and cumulative salary. Among the farmers surveyed, only managers and middle-level specialists report receiving any additional assets on leaving the association. Thus, 2% of the managers and 6% of the middle-level specialists left the peasant association with some livestock; 2% of the managers received some machinery on exit. None of the respondents in other categories received anything other than land.

The last column in table 5 shows farmers' statements about their ability to buy additional resources. Unsurprisingly managers could save – almost one third reported being able to buy inputs. Half that proportion of middle-level specialists and administrative staff could purchase necessary farm inputs, while none of the unskilled workers could. This appears congruent with the former salary hierarchy between farmers.

### *Credit*

Banking for agriculture in general and private farmers in particular is the monopoly of the state-controlled Daikhan Bank. Private farmers are allowed to hold individual accounts and conduct financial transactions with the Daikhan Bank only. Credit to farmers is provided exclusively through special government programs administered by the Daikhan Bank<sup>6</sup>. 85% of the farmers surveyed have a bank account. However, active borrowing is extremely limited among private farmers, partly because Turkmenistan is a “cash economy” and many are unfamiliar with the banking system. Even when given an opportunity to obtain highly subsidized credit, many do not know how to apply, the rest lack collateral, and some may be unsure of being able to pay back, despite negative real interest rates.

**Table 6.** Credit and loans obtained (% of respondents, average sum, term and interest rate)

Former position	% of farmers	Average loan amount, thou. manat	Term, years	Interest rate, %
Manager	11.4	55040	0-5	0-15
Middle-level specialist	11.8	26883	1	0-36
Administrative staff				
Skilled workers	14.3	6000	5	0-20
Unskilled workers				
<b>Total</b>	<b>9.1</b>	<b>34500</b>	<b>0-5</b>	<b>0-36</b>

Nearly two-thirds of the respondents indicated that they were unable to get any credit. As main reasons they mentioned the technical complexity of the loan-application system and their inability to provide satisfactory collateral. The few farmers who report actual

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<sup>6</sup> Funding for investment and working capital is provided to private farmers through government programs characterized by deeply negative real interest rates and high levels of credit targeting. Those accepting state orders for wheat and cotton receive credit against the future harvest at 1% interest rate (while inflation averaged 21% in 1998-99, after subsidizing from more than 1000% annually in 1993-1995). These credits are added to the 50% input subsidy covering 35% of wheat production costs and 25% of cotton production costs (Lerman and Stanchin 2003). Private farmers and other producers operating without state orders are also entitled to subsidized credit, but have to pay 8-10% nominal interest rates (Presidential decree No. 3626, March 4, 1998), which are still deeply negative in real terms.

borrowing in 1999 (9.1% of all respondents) received loans from both formal and informal sources (table 6). The average loan from banks (44 million manat) is twice as large as the average value of sales in 1999 (21 million manat). Credits and loans were only reported by managers, middle-level specialists and skilled workers (table 6). Despite the high percentage of unskilled workers having a bank account, none received credit.

### *Amenities*

Infrastructures are underdeveloped in rural Turkmenistan. This is true for roads which are both amenities and production facilities, and also true for electricity and even gas, despite its abundance in the country. More than two thirds of the private farms lack them (table 7). Agronomists, engineers and other specialists reported much better equipped farms. Running water is a privilege of middle-level specialists and managers. Former administrative staff had no gas on their farms and 90% had no electricity either. However, facilities and infrastructure may not be so important to them as only 30% work full-time on the farm and none live on it.

**Table 7.** “Amenities” (% of farms within each category).

Former position	No water, no electricity, no gas	Running water	Gas	Electricity	Access roads
Manager	70.5	4.6	9.1	29.5	50.0
Middle-level specialist	54.9	7.9	21.6	43.1	49.0
Administrative staff	90.0			10.0	35.0
Skilled worker	71.4		7.1	28.6	50.0
Unskilled worker	78.6		7.1	21.4	50.0
<b>Total</b>	<b>68.5</b>	<b>4.2</b>	<b>11.9</b>	<b>30.8</b>	<b>47.6</b>

### What do they do?

#### *Labor*

Private farms mostly employ personal or family labor. Others can be hired, on a contract basis. Farmer contribution to farm labor is measured in terms of the number of persons providing full-time or part-time work. While 72% of the farmers work off farm, 58% of the respondents with off-farm jobs identified themselves as full-time farmers (table 8).

**Table 8.** Work on the farm and off-farm job, % of respondents

Former position	Farmers with off-farm job	Full time – farm only	Full time farm work plus outside job	Part-time farm work
Manager	86.4	13.6	27.3	59.1
Middle-level specialist	62.7	37.3	29.4	33.3
Administrative staff	70.0	30.0	5.0	65.0
Skilled worker	78.6	21.4	50.0	28.6
Unskilled worker	57.1	42.9	50.0	7.1
<b>Total</b>	<b>72.0</b>	<b>28.0</b>	<b>29.4</b>	<b>42.7</b>

Farm income is thus only one component of the family budget. Administrative staff members were the least willing to farm themselves (only one third reported full-time work on the farm): maybe because none live on the farm and they are unfamiliar with agriculture, or because physical work is hard for them. The smallest share of farmers combining farm and off-farm work, and thus the largest share of those devoting their full time to farming, is among middle-level specialists and unskilled workers. The former may have trusted their skills and experience, while the latter may have felt that they had little to lose by leaving their low-paid jobs. Indeed both categories were the most eager to earn more (as a motive for becoming a private farmer).

### *Farm specialization*

Practically all peasant farmers engage in crop production (table 9). According to the law, private farms have the right to decide what to grow. However, cotton cannot be grown without irrigation, whereas many private farms established on virgin land suffer from water shortage. About 80% of the farmers grow wheat (table 10), though it is much less profitable than cotton. The most diversified production is on the farms of former managers, while unskilled workers grow only wheat, cotton or both at the expense of other crops and of livestock. Cotton requires the larger number of workers per hectare, which may be, along with insufficient irrigation, a barrier to adopting cotton in family-based private farms. Choice of wheat can be explained by two strategies: (1) for better-off farmers with a well-paid outside job wheat might be a convenient crop, not requiring much time, water and other care; (2) for poor farmers with insecure status growing wheat may help to avoid risk due to lower production costs and less variability of wheat yields compared to cotton.

Livestock is reported by less than 30% of respondents. The farmers' reasons for avoiding its production are complaints about lack of everything – funds, stables, fodder, and experience. On the average, the herd is largest on the farms of middle-level agricultural specialists (68 heads including 22 cows) and smallest on the farms of skilled workers from non-agricultural enterprises (5 heads including 2 cows).

**Table 9.** Specialization profile of peasant farmers (% of respondents within each category)

Former position	Plant growing	Livestock	Livestock and crops
Manager	60.5	9.3	30.2
Middle-level specialist	72.5	2.0	25.5
Administrative staff	80.0	5.0	15.0
Skilled worker	71.4		28.6
Unskilled worker	100.0		
<b>Total</b>	<b>72.6</b>	<b>4.2</b>	<b>23.2</b>

**Table 10.** Crop specialization (% of farmers of each group growing the crop)

Former position	Wheat	Cotton	Other cereals	Vegetables, melon, potatoes	Fodder	Fruits
Manager	84.1	15.9	11.4	20.5	25.0	4.5
Middle-level specialist	82.4	37.3	17.7	17.6	27.5	2.0
Administrative staff	70.0	30.0	10.0	30.0	15.0	
Skilled worker	57.1	42.9	14.3	7.1	21.4	7.1
Unskilled worker	92.9	57.1				
<b>Total</b>	<b>79.0</b>	<b>32.2</b>	<b>12.6</b>	<b>17.5</b>	<b>21.0</b>	<b>2.8</b>

## What do they achieve?

Farm performance could be assessed using data on profits from the survey. Private farms are profitable. In 1999, the average farm had a gross profit of \$2,110 at the official exchange rate (\$610 at the free-market rate), about 52% of sales. The profitability of private farms is remarkable in view of government controls that keep producer prices below world market prices<sup>7</sup>. While only 37% of middle-level specialists reported using their entire land holding, their total revenue from farm sales is the largest, twice that of the unskilled workers (however, inter-group differences are not significant). Administrative staff members make the highest profit per hectare (table 11), though they were in the worst situation with respect to water supply (only 5% receive it on time).

Farm specialization considerably affects economic performance of the farm (table 12). Mixed farms (producing both crops and livestock) appear to be the most profitable (by total profit) and the most productive (by profit per hectare).

**Table 11.** Financial performance of the farms, thousand manats.

Former position	Total revenue	Total cost	Profit	Cost to revenue ratio	Profit per 1 ha
Manager	18939	10023	8916	0.62	441
Middle-level specialist	24546	11169	13377	0.58	707
Administrative staff	22051	9403	12647	0.48	1244
Skilled worker	21661	10817	10844	0.81	653
Unskilled worker	12912	5932	6980	0.50	580
<b>Total</b>	<b>21010</b>	<b>10002</b>	<b>11008</b>	<b>0.59</b>	<b>684</b>

**Table 12.** Financial performance of farms with different specialization, thousand manats.

Farm specialization	Total revenue	Total cost	Profit	Cost to revenue ratio	Profit per 1 ha
Plant growing	16042	7605	8438	0.58	613
Livestock	31742	15060	16682	0.45	627
Mixed (crops + livestock)	33338	15966	17372	0.64	884
<b>Total</b>	<b>21010</b>	<b>10002</b>	<b>11008</b>	<b>0.59</b>	<b>684</b>

## Profit as a function of human and physical capital

Contrary to expectations, the profit performance in Table 11 does not increase with capital endowment. We accordingly examined in some detail the relation of profit to human and physical capital. *Human capital* variables in the survey include years of schooling (as reported by the respondents) and agricultural

**Table 13.** The aggregate capital scores

Former position	Human capital	Physical capital
Manager	17.0	3.1
Middle-level specialist	16.5	3.4
Administrative staff	15.7	1.3
Skilled worker	14.9	1.3
Unskilled worker	13.9	1.3
<b>Total</b>	<b>16.1</b>	<b>2.6</b>

<sup>7</sup> The producer price for wheat in March 1999 was \$25 per ton at the curb exchange rate. The cotton price was about \$95 per ton, which corresponds to \$285 fiber equivalent. The export price for cotton fiber f.o.b. at the Turkmen border is approximately \$1,550 per ton (Lerman and Brooks 2003).

experience (arbitrarily set at 5 years for respondents who previously worked in agriculture). Managerial ability is also an important component of human capital, but is not reported in the questionnaire and thus cannot be included in our analysis. The two reported components of human capital were summed to produce an aggregate human capital score (table 13). *Physical capital* variables in the survey include plots size adjusted for quality (hectares multiplied by land quality score on a scale of 1 (bad) to 3 (good); see Table 4), financial ability to buy additional resources (0 or 2), and farm machinery (in units owned). These variables were summed to produce an aggregate physical capital score (table 13).

It should be noted that we consider farmers' human and physical capital and farm performance at different moments of time. We look at human capital and positions at the moment of becoming a farmer, and measure physical capital and profit 2-8 years later, at the moment of the survey. Besides, by running the farm, the farmer accumulates practical farm management experience under the new conditions, and thus a form of human capital which may have considerable practical value, in contrast with soviet type agricultural experience, with its extreme specialization, which may have become obsolete.

Two regression models were run (table 14). The first regressed farm profit on the detailed capital variables and farm labor. In the second model, the five capital variables were regressed on the two aggregated scores for human and physical capital, keeping labor as the third independent variable. In Model 1, the estimated coefficients of labor, land adjusted for quality, and financial resources are statistically significant, while schooling and agricultural past and number of units of own machinery are not. Model 2 produces similar results: labor and the aggregated physical capital index are statistically significant, while the aggregated human capital index is not.

**Table 14.** Regression models: The impact of human and physical capital on profit.

Model 1			Model 2		
Variable	Coefficient	Significance	Variable	Coefficient	Significance
(Constant)	-5123.5	0.575	(Constant)	-1799.7	0.826
Years of schooling	212.2	0.732	Human capital	100.9	0.835
Agricultural past	988.3	0.726	Physical capital	1736.8	0.000
Land	79.2	0.000	Labor	1553.1	0.001
Financial ability	7603.3	0.031			
Units of machinery	538.6	0.361			
Labor	1502.8	0.002			
Adjusted R <sup>2</sup>		0.317	Adjusted R <sup>2</sup>		0.274

Since education is the main part in our estimate of human capital, and we cannot know the profile of education farmers got, we can say that just level of education does not improve the farm performance. This is consistent with the results of Rosenzweig and Binswanger (1993) indicating that even in relatively developed LDCs (India) schooling does not affect farm profit. The second part of our estimate of human capital is work at the agricultural enterprises. It appears that most of the farmers who worked in agriculture in Soviet days do worse than those from other sectors, although the difference is insignificant.

## Discussion

The study showed dissimilarities in both the initial endowment of the farms established by persons with different occupational pasts and the achievements of those farms. We expected managers and middle-level specialists to be the most successful. We also expected administrative personnel lacking any practical agricultural experience to be unsuccessful. And we did not expect skilled and especially unskilled workers to do very well.

Managers “disappointed” us. Having better initial conditions for running private farms and possessing more physical, human and social capital than other categories of farmers, they nevertheless showed the worst performance (18% of farms are unprofitable, and the rest – far from outstanding). There can be several explanations. (1) For many managers a farm is not a necessity, but rather a matter of prestige. Indeed more managers than members of other categories reported prestige as motive for becoming farmers. Besides, 86% of them still have a paid (or even well paid) off-farm job, which might be their main source of income. Therefore, they are less concerned with farm profitability. (2) Influential household heads may use their positions to promote younger members of the family, get land for them and leave them to deal with the practicalities. (3) If farm managers are not only official owners, but also participate in production, they may lack practical experience, special skills and for some – agricultural knowledge. Thus, while their farms have better equipment, more credit and more diversification than others, their operation is less profitable.

In contrast, administrative personnel having similar office character of job and level of education worked wonders. Only a quarter of them came from agriculture, in comparison to half the managers with agricultural past; they got the worst land, only 5% received water on time, only one third worked on their farms full time and none of their families lived there, no farms were provided with running water and gas. Nevertheless, they could avoid losses on their farms and showed the highest profit per hectare, lowest cost/revenue ratio. Besides, they could manage the best irrigation in the sample (90% of farms had irrigation network compared with 21-65% in other farmers’ categories) and more than half received governmental help through the “complex land arrangement plan”. Whether this was accomplished through their superior bureaucratic skills or because of their connections with bureaucrats in other offices is anybody’s guess.

Middle-level agricultural specialists (agronomist, engineer, etc) represent most of those who have managerial skills and education. Along with a good level of schooling (mostly higher, vocational, and technical), two thirds have agricultural background. This probably allowed them to get the best land in the sample, and good irrigation conditions. They diversify farm activities showing the highest profit per farm.

Skilled workers are in a moderate position – in terms of both what they received and what they achieved. Unskilled workers showed the most modest achievements, lacking capital and consequently evincing risk aversion. They cannot afford to buy inputs, to breed expensive livestock, to get loans. The state gave them bad land mostly in lease and “forgot” them while designing the complex land improvement plan. 80% of their farms have no access to the irrigation network. Unskilled workers only grow cash crops on the farm – wheat and cotton and presumably devote the household plot to subsistence. It may also be that livestock production, though more profitable than plant growing, requires larger investments, which former unskilled workers cannot afford. Not having livestock allows them to reduce production costs and do without credits and loans. These farmers devote

more than the others family labor to the farm, instead of hiring people or keeping low-paid off farm job. Profit per hectare on their farms is small, but costs are also small.

Explaining the difference in farm performance by differences in previous positions may be insufficient. For example, what makes the performance of managers and administrative staff so different? It cannot be explained by human capital theory, which often assumes that a person's socioeconomic status is only limited by his or her formal education: that people with more schooling are always more productive than those having less of it. A fuller picture would encompass differences in family size, earner-dependent ratios, and the role of the private household plot. Moreover, previous position may not reflect present social status. In the time elapsed since the respondents became private farmers, things could have changed, especially among people with leading positions. Besides, the household head is not necessarily the one running the farm. He might give the farm to grown up children to manage production.

In our analysis we use socio-economic characteristics of the official owner, because the statuses of children tend to be strongly correlated to those of their parents. Thus, children of highly educated parents tend to have more years of schooling than children of less highly-educated parents (Becker 1993). Similarly, children tend to inherit their parents' capital assets, or even receive wealth transfers while the parents are still alive. Parents also invest in social networks and pass them on to their children (Dasgupta 2002).

## **Conclusions**

The farmers came from all sectors of economy, although more than half had previously worked in agriculture. Those deciding to become private farmers are motivated first and foremost by hopes for their children's future, prospects of higher earnings, and the opportunity to work independently.

The study correlated the performance of private farms to operator social status, defined as previous occupational position. The survey showed that middle-level specialists were the "most appropriate" candidates for private farming. They have the largest plots with the best land quality, and the best equipped farms. Their agricultural experience told them which land was best, and allowed them to ask for it, and diversify production – i.e. add livestock to plant growing. Some managerial skills helped them perform farm business operations, including obtaining credit, purchasing inputs and arranging sales. They also brought some startup capital saved on previous jobs and were successful financially.

We have shown that socio-economic characteristics of the farmer are affecting farm productivity only indirectly, through physical capital. Land and financial ability (components of variable 'physical capital') matter to successful farming, while farmer's formal education, agricultural experience, positions (social status) and useful connections serve mainly as means towards acquiring them – "good" education helps get a "good" position, which in turn helps get "good" friends and earn more money, which can serve as start up capital. In addition, labor quality seems immaterial and only quantity counts.

Human capital, or at least what we have been able to measure of it, appears unimportant for successful farming for three reasons: (1) education acquired may have become obsolete or irrelevant to the new situation; (2) as it has been shown that in developing countries where agriculture is simple, only the first years of schooling actually do matter; (3) our results are tentative. Unfortunately, the questionnaire provides no details about field of education – thus, people with knowledge in soil sciences, agronomy, and

veterinary science might be more successful in farming than experts in nineteenth century Russian poetry.

As far as social capital is concerned – the questionnaire was not designed to study it, and indeed as shown in the case of the administrator’s better ability to receive government assistance, we can hardly isolate its effects. Further research is needed to assess the exact contribution of different forms of capital to farm performance.

Curiously, the socialist past affects not only the resources the new farmers receive but also how they use them. This may be due to the limited amount of structural change that Turkmenistan has undergone since independence. Thus it would be interesting to find out whether our findings would hold in countries where reforms have been more sweeping.

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