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The Economic Effects of Land Reform in Central Asia: The Case of Tajikistan

by

Zvi Lerman and David Sedik

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The Economic Effects of Land Reform in Central Asia: The Case of Tajikistan

Zvi Lerman and David Sedik

Tajikistan is a typical cotton-growing Central Asian country, much smaller and much more mountainous than its big (and often less than friendly) neighbor, Uzbekistan. Following up on a recent review of agricultural development in Uzbekistan (Lerman, 2008), this article describes and analyzes the economic effects of land reform on Tajikistan's agriculture and rural households. The study examines sectoral outcomes of land reform and discusses the effects of policies on farm level decision making, farm productivity, and rural incomes. It starts with an overview of Tajikistan's agriculture during transition, analyzing the changes in agricultural input use and the transition collapse after 1991. It then examines the government policy response to the fall in agricultural production, analyzes the legal framework for land reform, and describes the resulting changes in land tenure. The two core sections that follow utilize official statistics and quantitative data from field surveys to trace, on both the sectoral and the micro level, the reform-driven changes in the performance of the main types of agricultural producers in Tajikistan: household plots, family farms, and agricultural enterprises. These sections also examine the limitations of land reform and their effects on performance discussed, especially focusing on the conundrum of cotton farm debt and the "freedom to farm" issue. The article concludes that, although land reform has had significant achievements in Tajikistan, far less has been accomplished than in other CIS countries with more robust land reform policies.

As in our previous analysis of Uzbekistan (Lerman, 2008), the economic effects of land reform are examined through the prism of two substantially different datasets. The sectoral analyses rely on official statistical data from the various yearbooks published by Tajikistan's State Committee of Statistics (both before and after independence). All the statistical yearbooks used in this article are listed at the end under references. The micro-level effects on rural households are analyzed using information from four recent surveys conducted by a number of international organizations in Tajikistan between 2003 and 2008:

- **FAO 2008**: a survey of land users including 350 household plots and 135 family dehkan farms in Khatlon, Sogd and Region of Republican Subordination. The survey was carried out in the second half of 2007 and the first half of 2008 by FAO with EC financing. Results reported here for the first time.
- **ADB 2008**: a survey of 330 "small farms", i.e., family dehkan farms, in 13 cotton-growing districts in Khatlon and Sogd provinces. Organized in the first quarter of 2008 by the Agricultural Development Bank's Agricultural Sector Coordination Unit with the assistance of Legal Aid Center/Farmer Outreach projects funded by USAID, EC, DfID, and CIDA.
- **USAID/WB 2007**: a survey of 1,500 respondents (collective dehkan farms, family dehkan farms, workers in corporate farms) in 15 districts conducted by USAID and the World Bank in February 2007. Main results published as *Knowledge, Attitudes and Practices of Farm Workers and Farmers Concerning Land Use Rights and Farmland Restructuring In Tajikistan: Baseline Survey and Qualitative Study Findings*, USAID, The World Bank, and the Government of Tajikistan, March 2008.
- **TajLSMS 2003**: household-level Living Standard Monitoring Survey (LSMS) carried out in Tajikistan by the World Bank as part of its world-wide LSMS program. Includes 4,000 respondents, both urban and rural. Not all respondents have land.

AGRICULTURE AND TRANSITION IN TAJIKISTAN

Tajikistan is a highly agrarian country with a rural population of more than 70% of total and agriculture accounting for 60% of employment and around 30% of GDP As is typical of economies dependent on agriculture, Tajikistan has low income per capita. Back in the Soviet period (1990) Tajikistan was the poorest republic with a staggering 45% of its population in the lowest income "septile" (Uzbekistan, the next poorest in the Soviet ranking, had 34% of the population in the lowest income group). Today Tajikistan still has the lowest income per capita among the CIS countries: $1,750 compared with nearly $15,000 for Russia (in current PPP$ for 2007; WDI 2008).[1] The highly agrarian structure of employment in the economy implies that improvements in agricultural performance have substantial potential to improve the livelihoods of the rural population.

With its hot climate and abundantly irrigated valleys, Tajikistan is a classical cotton-growing country. During the 1980s Tajikistan was the third largest cotton producer in the USSR (after Uzbekistan and Turkmenistan), accounting for more than 10% of raw cotton production and more than 25% of fine-fiber cotton. After independence Tajikistan began to diversify its crop production into wheat, but this did not lead to a major reduction of areas sown to cotton. Cotton production, on the other hand, shrank fairly dramatically, from 900,000 tons in the 1980s to about 500,000 tons after 2000, primarily due to a drop in yields (see **Figures 10, 11**). Despite the shrinking harvest, cotton remains Tajikistan's dominant agricultural export (80%-90% of the U.S. dollar value of agricultural exports), and on a national scale it is the second largest export commodity, accounting for 16% of total exports (it is outshined only by aluminum wire, which accounts for 60% of total exports).

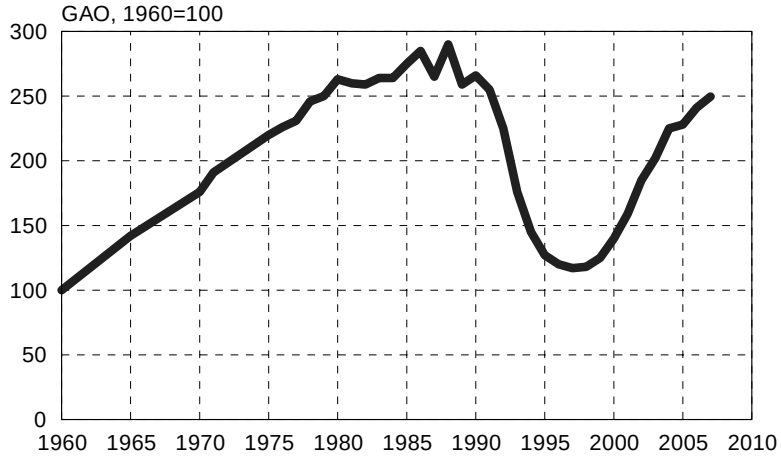

Figure 1. Growth of agricultural production in Tajikistan, 1960-2007 (GAO in percent of 1960).

Tajikistan's agricultural development as represented by changes in Gross Agricultural Output (GAO) exhibits four distinct stages (**Figure 1**) – intense Soviet growth (up to 1980), stagnation (1980-1990), transition decline (1991-1997), and finally recovery (since 1998). The transition decline began in 1990-91 and exhibited the classic features of decline observed in all post-Soviet countries: the disintegration of the traditional Soviet agricultural system, with its rigidly planned supplies of inputs to and purchases of outputs from collective and state farms at fixed prices, caused a dramatic fall in agricultural production after 1991. This

[1] According to the latest available poverty data (World Bank, 2003), Tajikistan also had the highest rate of rural poverty in the Europe and Central Asia region in 2003: 76% of the population lived below $2.15 per day (PPP) compared with 72% in Kyrgyzstan and 55% in Uzbekistan. The substantial economic and agricultural growth in Tajikistan in recent years may have contributed to poverty alleviation and reduced these numbers.

fall in production was largely due to the fall in the use of purchased inputs, including feed, machinery, and fertilizers, and the shrinkage of the livestock herd as a production resource. These results are schematically summarized in **Table 1**. By 1997 agricultural production in Tajikistan had fallen to levels not seen since the early 1960s. The perception of the transition decline in the 1990s was undoubtedly all the more negative because it was preceded by decades of steady agricultural growth during the Soviet period, as the GAO index trebled between 1960 and 1988, despite the relative slowdown during Gorbachev's rule in the 1980s.

Table 1. Schematic patterns of change in Tajik agriculture after 1990

Variable	1990-97	1997-2007	2007 relative to 1991
Agricultural output	Decline	Recovery	Back to 1991 level OK
Livestock	Decline	Recovery	Inventories 20% higher than 1991 level
Agricultural labor	Increase	Increase	60% higher than 1991
Arable land	Stable	Stable	Unchanged
Irrigation	Stable	Stable	Unchanged
Farm machinery	Collapse	Collapse	50% of 1991 for tractors; 60% for grain combines; 20% for cotton combines
Fertilizer	Apparent decline	Stable	Apparently less than 1991

The recovery of gross agricultural production in Tajikistan began in 1998. The renewal of agricultural growth has allowed production to rise by 113% since 1997, returning to 1991 levels by 2007. **Table 1** demonstrates that the impressive recovery in Tajik GAO was evidently not a result of increases in agricultural inputs such as land, irrigated land, farm machinery or fertilizer. The only two agricultural inputs that increased after 1997 were labor and livestock. Increases in agricultural labor could not have been responsible for the recent upturn, because agricultural labor had been increasing unabated since 1990, primarily due to rapid population growth. The one factor that changed its trend after 1997, livestock inventories, could not have been sufficient to trigger on its own the dramatic recovery in agricultural production.

By a process of elimination, therefore, it seems that the recovery of agricultural production after 1997 was caused primarily by a radical change in factors other than agricultural inputs. We will demonstrate in the next section that this recovery was probably attributable to a radical change in incentives that occurred as reforms shifted the structure of farming in Tajikistan from collective to individual farming.

LAND REFORM LEGISLATION AND CHANGES IN LAND TENURE IN TAJIKISTAN

The record of agricultural growth in Tajikistan, with its robust upward trend during the Soviet era (**Figure 1**), suggests that the motivation for agricultural and land reform did not stem from the acknowledged failure of Soviet agriculture as a whole. There was little reason for the leadership of the country to change the Soviet system based on the pre-1980 results. The motivation for reform came only after 1990, for this is when the Soviet agricultural and political systems in Tajikistan dissolved. Initial stagnation in agricultural production that began in 1980 with the general weakening of the Soviet system changed to truly dramatic declines after 1990, when hyperinflation and general transition disruptions were followed by mounting farm losses, accumulation of farm debt, and falling real wages in agriculture. The decline in GDP and agricultural production of these years was intensified by a civil war that began in May 1992 and ended only five years later (in 1997) with a UN-brokered peace accord.

Agricultural land is at the center of the reform agenda in any transition country. In this section we discuss the land reform policy and show how the structure of land use has changed in Tajikistan since the Soviet period.

Legal framework for land reform and farm reorganization[2]

Land in Tajikistan remains in exclusive state ownership (Constitution, 1994, Article 13). Land cannot be privatized, but use rights in land can be transferred to individual or "private" use. The essence of land reform in Tajikistan is therefore reallocation of state-owned agricultural land among producers through the mechanism of land use rights. In this section we review the main land reform legislation, which is presented in chronological order in **Table 2**.

Table 2. Main legal acts relating to land reform and farm reorganization in Tajikistan

Date	Document	Title
5 Mar 1992	Law No. 594	"On Land Reform"
15 May 1992	Law No. 421	"On Dehkan (Peasant) Farm"
1 Oct 1993	Government Resolution No. 499	Organization of dehkan (peasant) farms
6 Nov 1994	Constitution of Tajikistan, Article 13	"Land … and other natural resources are in exclusive ownership of the state…"
9 Oct 1995	Presidential Decree No. 342	Allocation of 50,000 hectares to household plots
11 Oct 1995	Government Resolution No. 621	Restructuring of kolkhozes, sovkhozes, and other agricultural enterprises
25 Jun 1996	Presidential Decree No. 522	Reorganization of agricultural enterprises
13 Dec 1996	Law No. 326	Land Code
1 Dec 1997	Presidential Decree No. 874	Allocation of 25,000 hectares to household plots
22 Jun 1998	Presidential Decree No. 1021	"On Ensuring the Right to Land Use"
15 Jul 1997	Government Resolution No. 294	State control of land use and protection
4 Feb 1999	Government Resolutions Nos. 29, 30	Simplified procedure for creation and registration of land use rights; simplified procedure for determination and registration of land shares
12 May 2001	Law No. 20	"On Land Use Planning [*zemleustroistvo*]"
12 May 2001	Law No. 18	"On Valuation of Land"
23 Apr 2002	Law No. 48	"On Dehkan (Peasant) Farms"
15 Apr 2003	Presidential Decree No. 1054	"On the mechanism for settling the debts of reorganized agricultural enterprises and enterprises undergoing reorganization"
23 Dec 23 2003	Government Resolution No. 542	"On settling the debt of reorganized agricultural enterprises and enterprises undergoing reorganization"
4 Mar 2005	Approved by the President	Strategy for cotton farm debt resolution in Tajikistan
30 Jun 2006	Presidential Decree No. 1775	"Rule for reorganizing and reforming agricultural enterprises"
5 Mar 2007	Government Resolution No. 111	"Plan of measures for cotton farm debt resolution in Tajikistan for 2007-2009"
5 Jan 2008	Law No. 356	"On Land Use Planning [*zemleustroistvo*]"

Land reform efforts began in 1992, when the goals of land reform were defined in terms of creating a level playing field for farms of all organizational forms and achieving higher production levels through efficient use of land (Law of Land Reform, 1992). The reform legislation established the right of every citizen to create an independent peasant (dehkan)

[2] This section draws in part on Duncan (2000) and Aminjanov (2007).

farm outside the collectivist framework, primarily from the district's reserve land and called for the division of the traditional farm enterprises (*kolkhozes* and *sovkhozes*) into individual, inheritable land shares, to be certified by proper documentation (Law of Dekhkan Farms, 1992). It also established the right of every member of a farm enterprise to a share in non-land assets. Restructuring of farm enterprises into other organizational forms, such as dehkan farms, lease share enterprises, and agricultural cooperatives, was envisaged as essential for productivity improvement (Law of Land Reform, 1992). Dehkan farms would be allocated land from the state reserve or from the local farm enterprise in the process of its reorganization (Government Resolution, 1993).

Strengthening of the extremely active sector of small household plots has always been one of the priorities of the land reform program. Household plots were increased substantially in two stages. In the first stage (October 1995) 50,000 hectares of arable land were transferred from farm enterprises to household plots, thus increasing the area of arable land in household plots from 8% to 15% of the total (Presidential Decree, 1995). In the second stage (December 1997), an additional 25,000 hectares was allocated raising the area of arable land in household plots to 18% of the total (Presidential Decree, 1997). This additional land was allocated by force of two Presidential Decrees, and it is accordingly known as "Presidential Lands" in the vernacular.

The pace of land reform picked up toward the end of 1995, when a new government resolution initiated the phase of reorganization of traditional large-scale farms (Government Resolution, 1995). It called for the restructuring of unprofitable large farms into lease share enterprises, cooperatives, and dehkan farms. Presidential Decree (1996) established an individual's "unconditional right" to withdraw a land share from a reorganizing farm enterprise without approval from the management. The decree reiterated the earlier requirement that all farm members receive "proper documentation" for their land shares, and that a withdrawing worker has the right to an in-kind share in non-land assets (Law of Dehkan Farms, 1992).

Land Use Certificates and Land Passports were introduced in June 1998 as the documents that confirm an individual's right to land use (Presidential Decree, 1998). Both dehkan farmers and operators of household plots have the right to obtain these certificates. Importantly, this decree does not provide for certification of individual land share rights within enterprises. Two Government Resolutions adopted in February 1999 established simplified procedures for registration of land use rights and for determination and registration of land shares distributed to members of former kolkhozes and sovkhozes (Government Resolution, 1999). These simplified procedures were intended to cut through red tape in cadastral organs.

The foundations for registration and titling were laid in the Land Use Planning Law (2001), which introduced procedures for surveying, mapping, and demarcation of land plots. This law, however, also retained some very strong elements of state intervention in farm production activities in the guise of land use planning. A new version of this law was passed in January 2008 (Land Use Planning Law, 2008), but it still contains provisions that allow the government to intervene in cropping and production decisions of farms through the tools of "intra-farm" land use planning, severely restricting the property rights of the farmers and contradicting the "freedom to farm" principles.

The new Law of Dehkan Farms (2002) (replacing the 1992 law) explicitly introduced three types of dehkan farms: individual farms, family farms, and collective dehkan farms ("partnerships"). This constituted ex-post recognition of the fairly widespread phenomenon of collective (as opposed to individual and family) dehkan farms that emerged over the years in the process of government-induced reorganization of farm enterprises. Despite the new name and the new organization procedure, the collective dehkan farms did not function differently from their collective and state farm predecessors.

The inadequate reorganization failed to improve the efficiency of collective dehkan farms compared with the traditional farm enterprises. The persistent inefficiency coupled with continued government intervention led to accumulation of debt, especially in cotton growing farms. In absolute numbers, the cotton farm debt is so large that it has assumed the dimensions of a macro-economic and political crisis for the government.[3] On the micro-level, farm debt creates obstacles to much needed farm reorganization, as members of collective dehkan farms and other agricultural enterprises are hesitant to start an independent peasant farm because on leaving the collective farm they become liable for a portion of the collective debt. Tajikistan's farm sector is trapped in a vicious circle: inadequate restructuring leads to inefficiency and operating losses, which leads to accumulation of debt, which prevents restructuring due to the legal requirement of distributing collective debt to exiting farmers.

The cotton debt problem has been addressed by several government resolutions over the years.[4] The latest of these resolutions (Government Resolution, 2007) included policy measures aimed at creating a better enabling environment for cotton producers, such as a provision prohibiting district authorities from confiscating land for use "not according to purpose" and provisions guaranteeing no interference in farmers' freedom to farm. Unfortunately, the enabling measures have not been fully enacted to this date (end of 2008) and the "freedom to farm" principles seem to have been abrogated by more recent legislation, which has apparently reverted to the interventionist tradition (see, e.g., Law of Land Use Planning, 2008).

Changes in farm structure and land tenure since independence

Soviet agriculture in Tajikistan, as in all other former Soviet republics, was characterized by total dominance of large collective and state farms, which controlled 99% of agricultural land and 96% of arable land in the pre-independence era. The dominance of large corporate farms began to wane when serious land reform measures began to be implemented in Tajikistan after 1995. **Figure 2** shows how the share of agricultural land in corporate farms – the successors of former collective and state farms – dropped steadily from the Soviet level of 99% to 30% in 2007. Much of this land shifted to new emergent farm structures – the so-called dehkan farms, which now control more than 60% of agricultural land, double what

[3] The farm debt to investors and non-investor creditors accumulated by January 2006 was about equal to the total amount the World Bank and the Asian Development Bank, taken together, had lent and given Tajikistan since they began operations in the country.

[4] April 15, 2003: Presidential decree No. 1054 "On the mechanism for settling the debts of reorganized agricultural enterprises and enterprises undergoing reorganization"; December 23, 2003: Government Resolution No. 542 "On settling the debt of reorganized agricultural enterprises and enterprises undergoing reorganization" (writing off $38.5 million of cotton growers debt); March 4, 2005: Strategy for cotton farm debt resolution in Tajikistan; June 30, 2006: Presidential Decree No. 1775 "Rule for reorganizing and reforming agricultural enterprises"; March 5, 2007: Government Resolution No. 111 "Plan of measures for cotton farm debt resolution in Tajikistan for 2007-2009"

remains in corporate farms (between 1998 and 2007 agricultural land in dehkan farms grew from 300,000 hectares to nearly 2.6 million hectares).

The remaining 5%-6% of agricultural land is in household plots, which have increased their share many-fold from the traditional 1% in the Soviet period. There was a doubling in the land area allotted to private household plots by Presidential Decrees in 1995 and 1997. These decrees increased land area in them from 86,400 hectares in 1993 to 130,400 hectares in 1996 and further to 170,400 hectares in 2000. This is a growth of from less than 2% percent to 4% of total agricultural land in Tajikistan (**Figure 3**). Since 2000 land in household plots has continued to grow to 230,900 hectares by the end of 2007. This further increase implies that agricultural land in plots is 5.8% of total agricultural land. As household plots have virtually no pastures, their share in arable land is much higher than in agricultural land, nearly 20% in 2007. **Figure 3** illustrates the dramatic growth in the share of land controlled by the household plots, showing the increase in their agricultural land and especially their arable land holdings since 1995.

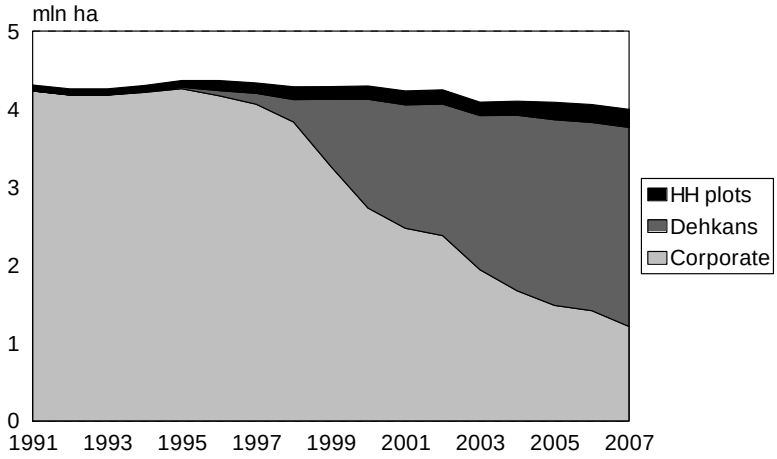

Figure 2. Agricultural land by farm type, 1991-2007 (million hectares). Dehkans include both family and collective dehkan farms.

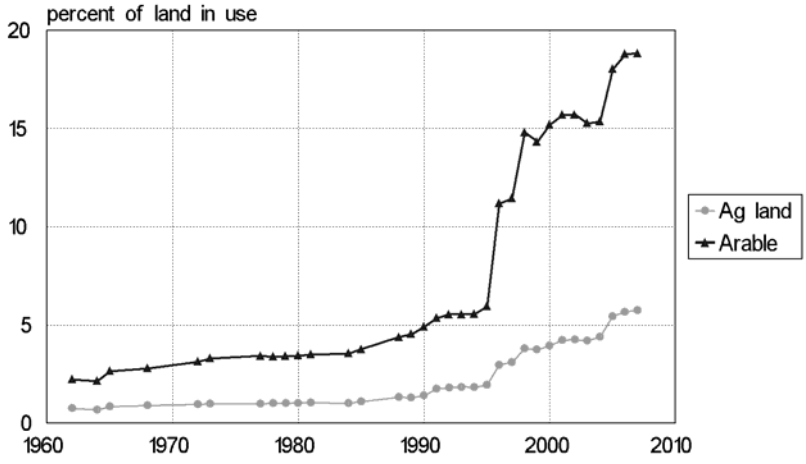

Figure 3. Share of household plots in land use, 1962-2007 (in percent).

While household plots are true individual or family farms continuing from the Soviet period, they account for only a small part of the land in the family farm sector in Tajikistan. Many dehkan farms represented by the dark-gray wedge in **Figure 2** are also individual or family farms, but unfortunately not all of them. A large part of dehkan farms are in fact *collective* dehkan farms and despite the "peasant" adjective in their name they are corporate successors of former collective or state farms. To obtain a proper estimate of the importance of the

family farm sector in Tajikistan, the dehkan farms need to be separated into *collective* dehkan farms and *family/individual* dehkan farms.[5] Unfortunately no full statistical data exist to enable us to perform this separation. Partial information obtained from Tajikistan's State Agency for Surveying, Cartography, and Land Use suggests that in 2004-2006 fully two-thirds of land in dehkan farms was actually held in family or individual dehkan farms, as opposed to collective dehkan farms. This land should be counted together with household plots as land in the individual farm sector. It would thus seem that the individual sector in Tajikistan – including household plots and family dehkan farms – controls today more than 45% of agricultural land (and an even higher share of arable land). These estimates are summarized in **Table 3**.

Table 3. Estimates of the share of individual and corporate sector in land based on data of Goskomstat and the State Agency for Surveying, Cartography, and Land Use (2006)

	Agricultural land	Arable land
Total land	4 million ha	800,000 ha
Share in "enterprises" (corporate farms), %	35	20
Share in household plots, %	6	20
Share in dehkan farms, %	59	60
Estimated share in family dehkan farms (2/3 of land in dehkan farms), %	39	40
Estimate for individual sector (household plots and family dehkan farms), %	45	60
Estimate for corporate sector (enterprises and collective dehkan farms), %	55	40

Source: Calculated from information provided by the State Agency for Surveying, Cartography, and Land Use.

Concentration of livestock in the household sector

Land reform has also resulted in the near total transfer of livestock inventories to household plots. The individual sector controlled most of the livestock even back in the Soviet era, when more than 60% of the herd (in standard head) was in household plots (**Figure 4**). In 1990, 62% of livestock was held outside of corporate farms. By 2007 the share of household plots in livestock had risen to nearly 90% (measured in standard head).

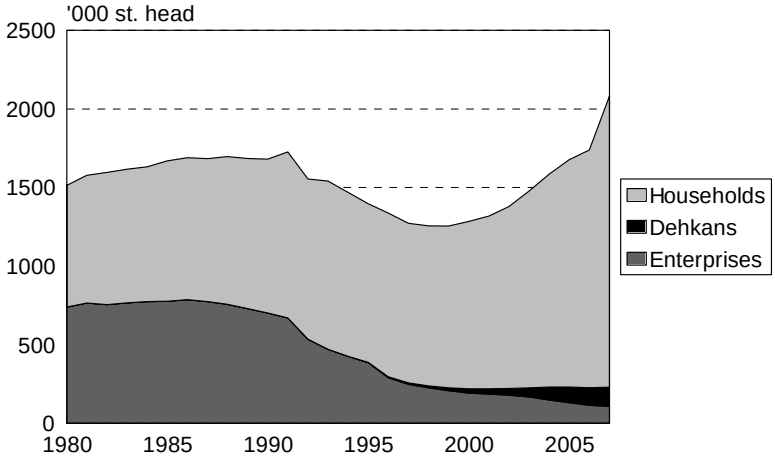

Figure 4. Livestock inventories by farm type, 1980-2007 ('000 standard head).

Figure 4 clearly demonstrates that the increase in livestock head count since 1995 is entirely attributable to the increase in individual sector (household plots and dehkan farms combined), which has more than offset the shrinkage of livestock in corporate farms (enterprises). It is the household component of the individual sector that continues to dominate livestock production, while dehkan farms remain but a minor player in livestock production. This

[5] By 1 January 2006 dehkan farms numbered 27,040 of which 18,300 were individual or family based and 8,740 were collective dehkan farms.

situation is not unique to Tajikistan: a similarly extreme concentration of livestock production in household plots is also observed in Uzbekistan (Lerman, 2008).

Livestock production plays a secondary role in Tajikistan's agriculture, accounting for 25% of GAO since 2000. In the long term, the share of livestock production in Tajikistan's GAO is substantially lower than in other Central Asian countries (not to mention the European CIS countries). Thus, agricultural production in Kazakhstan and Kyrgyzstan is generally biased toward livestock, and crops on average have accounted for less than 50% of GAO since 1980. Even Uzbekistan, with its agriculture heavily dependent on cotton like that in Tajikistan, maintains livestock production levels in excess of 40%-45% of GAO. Tajikistan appears to be an outlier because of its low livestock production.

THE EFFECTS OF LAND REFORM ON FARM PRODUCTION AND PRODUCTIVITY

The ultimate goal of land reform in all transition countries is to increase the incomes and the standard of living of their large rural populations, which rely on agriculture for a substantial part of the family budget. In every CIS transition country this has been done through encouraging growth in the agricultural sector and, whenever possible, improving farm productivity. We accordingly begin our examination of the effects of land reform in this section with an examination of agricultural growth and productivity improvements.

Recovery of agricultural production in Tajikistan

The impressive growth in agricultural production, which rose by 113% between 1997 and 2007 (see **Figure 1**), has been driven exclusively by the individual sector, i.e., household plots and dehkan farms (the by the two top layers in **Figure 5**). The corporate sector continued its general decline (the bottom black layer in the diagram).

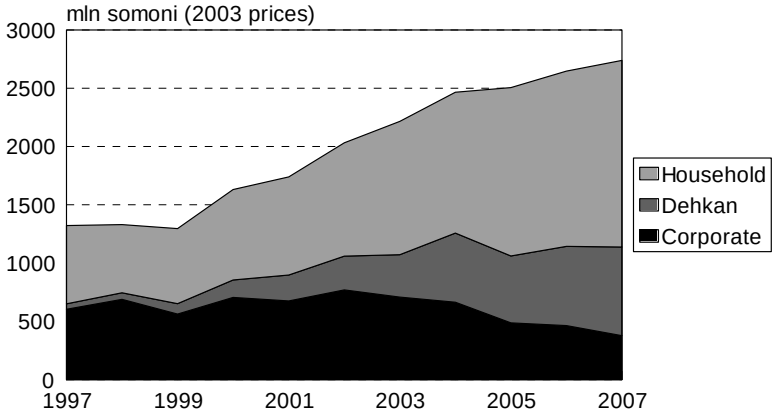

Figure 5. Agricultural production by farm type, 1997-2007 (million somoni in constant 2003 prices).

Figure 6 breaks down the GAO growth into the two main components of Tajik agriculture: individual farms (household plots and dehkan farms) and corporate farms (the successors of formers kolkhozes and sovkhozes).[6] The output of corporate farms at best stabilized in 1999, and so far it has not shown any positive growth or recovery (gray curve in **Figure 6**). The output of individual farms, on the other hand did not decline even in the early years of

[6] Some of the dehkan farms in Tajikistan are so-called "collective dehkan farms", and they appear to be closer to corporate farms than to individual farms. Unfortunately, there is no breakdown of statistical data between the two types of dehkan farms and they are all reported here as part of the individual farm sector.

transition (1991-1997) and it trebled between 1998 and 2007 (thick black curve in **Figure 6**). It is this dramatic increase of production in the individual sector that obviously drove up the aggregate agricultural output in Tajikistan (thin black curve in **Figure 6**).

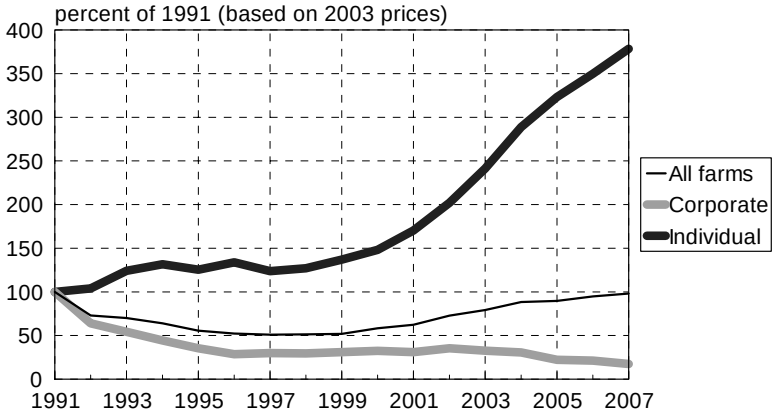

Figure 6. Growth of agricultural production by farm type 1991-2007 (GAO in percent of 1991, based on constant 2000 prices).

Productivity as a source of production growth

Growth in agricultural output can originate from increases in the resources utilized (so-called extensive growth) or from increases in the efficiency with which resources are employed (intensive growth). For example, the value of crop production can increase as a result of increases in sown area, increases in the productivity with which farms utilize land, or a combination of these two factors. Likewise, growth in the value of livestock production can derive from increases in livestock inventories, increases in the productivity with which farms make use of livestock (e.g., milk yields achieved by dairy farmers), or a combination of the two. The rationale behind agrarian reform has always been the potential productivity gains due to the transfer of land and other assets from collective and state farms to individual farms. Therefore, an important indicator of the success of reforms is the presence or absence of productivity increases as a source of recovery.

Productivity can be calculated in physical units, as the number of kilograms produced per hectare (for crops) or per cow (for milk). More generally, agricultural productivity is calculated in aggregated value terms as partial productivity of land (aggregated value of agricultural output per hectare of agricultural land) and partial productivity of labor (aggregated value of agricultural output per agricultural worker, including self-employed dehkans).[7] **Figure 7** shows the three curves that constitute the basis for value-based productivity calculations: agricultural production (gray curve), agricultural land in use (thin black curve), and agricultural labor (thick black curve). The curves span the period 1980-2007 and they are all normalized to index numbers with 1980=100, thus eliminating problems due to differences in units of measurement.

Agricultural output (GAO) has increased dramatically since 1997, while agricultural land has remained generally constant (and even declined slightly). This essentially means that the partial productivity of land increased, more than doubling (in constant prices) between 1997 and 2007 (**Figure 8**). Agricultural labor, unlike agricultural land, increased steadily over

[7] More sophisticated measures rely on total factor productivity (TFP), which aggregates the partial measures into one index that allows for the entire basket of resources and inputs used in agriculture. TFP is technically difficult to calculate, however, as it requires estimation of the production function to obtain the weights for the aggregation of inputs.

time, but its increase lagged behind the growth in agricultural output after 1997 and as a result the productivity of agricultural labor also increased between 1997 and 2007, although more moderately than the productivity of land.

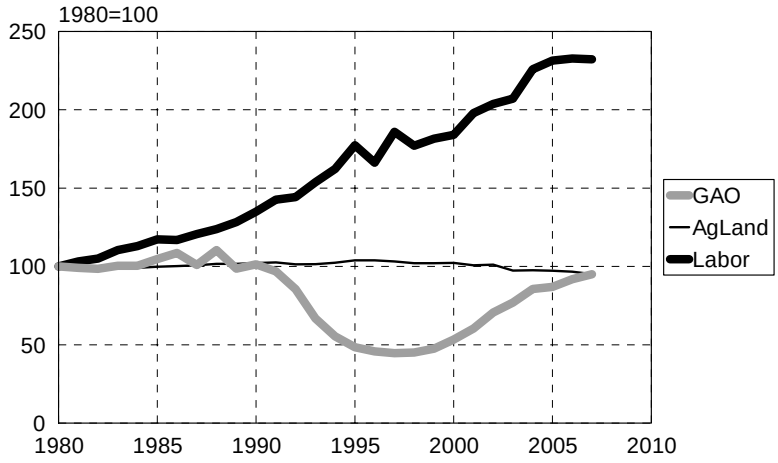

Figure 7. Basic data for productivity calculations 1980-2007 (index numbers in percent of 1980).

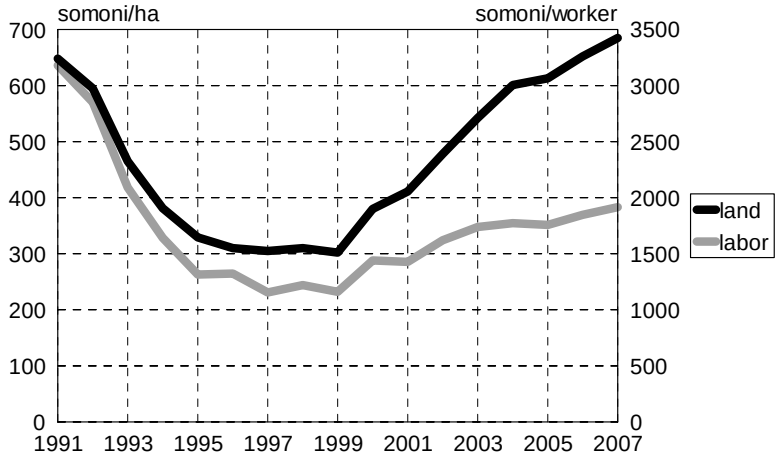

Figure 8. Productivity of land and labor, 1991-2007 (GAO per hectare of agricultural land and per agricultural worker, all farms, somoni per ha in constant 2003 prices).

The case for land reform and the potential yield improving effects can be seen in **Figure 9** which shows the huge differences in productivity of land between household plots on one side and corporate and dehkan farms on the other. Household plots – the undisputed individual farms in Tajikistan (and other CIS countries) – consistently achieve much higher levels of land productivity: agricultural land in household plots is utilized 20 to 50 times more productively than in farms of other types. Further redistribution of land to household plots could substantially increase average productivity in agriculture, thus leading to a large increase in agricultural production.

Figure 9 also illustrates that farms of all three types achieved increases in land productivity since 1999. While growth in agricultural production was driven entirely by the individual sector (see **Figure 6**), the growth in land productivity appears to be driven by farms of all organizational forms. At the same time it is noteworthy that dehkan farms are not doing better than farm enterprises on average. This puzzling result may stem from the fact that at least one-third of the dehkan farms are not individual farms at all (see **Table 3**): they are collective farms (partnerships) created in the process of reorganization of traditional farm enterprises and their incentives are closer to those of corporate farms than individual farms. Many of these collective dehkan farms were only cosmetically reorganized and the management

structures have remained unchanged (FAO 2004). Under these circumstances we should not be surprised that the productivity of dehkan farms taken as a heterogeneous group is not different from that of the farm enterprises they succeeded. Future analytical efforts should attempt to separate the performance of individual dehkan farms from collective dehkan farms.

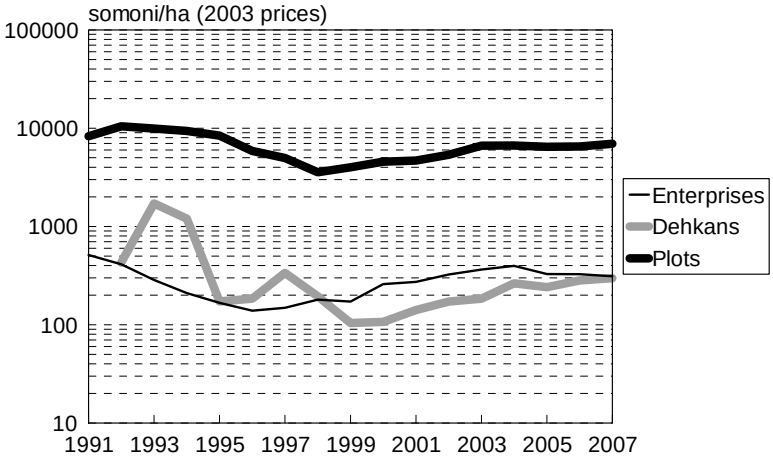

Figure 9. Productivity of land by farm type, 1991-2007 (GAO per hectare of agricultural land, by type of farm, somoni per ha in constant 2003 prices, log scale).

To assess the sources of growth since 1997, we applied the standard Solow growth accounting methodology, which separates growth in output into two components: growth in the resource base (extensive) and growth in productivity (intensive). **Table 4** shows the change in the value of crop production (in constant prices) between 1997-2006 and the corresponding change in the resource base (represented by the sown area).[8] The growth in production not accounted for by the change in the resource component is by definition the contribution from increases in productivity. The decomposition in **Table 4** shows that 55% of growth in crop production in Tajikistan is attributable to increases in land area, while the remaining 45% can be attributed to increases in productivity. The numbers for livestock production are essentially the same (57% due to change in herd size, 43% due to changes in productivity).

Table 4. Changes in output and resources in crop production for farms of different types, 1997-2006 (2006/1997, times)

	Tajikistan	Corporate farms	Dehkan farms	Household plots
Aggregate value of crop production	2.0	0.6	17.2	2.3
Sown area	1.1	0.4	16.7	1.1
Implied productivity change	1.8	1.3	1.0	2.1
Contribution of change in resources to change in production (%)	55	78	97	48
Percent of aggregate crop production in 2006 (%)	100	14	36	50

There are large differences in the contribution of productivity growth by farm type. Production growth in dehkan farms was due nearly exclusively to increases in area, extensive growth *par excellence*. For corporate farms 80% of changes in production was due to changes in sown area, and only 20% was due to productivity changes. While sown area in corporate farms fell by 60% in this period, crop production fell by only 40%, implying that land

[8] Crop production made up three-quarters of total GAO in 2006, while livestock made up only one-quarter. Thus, the importance of crop production performance is three times as important for total GAO growth as that of livestock production. For this reason we do not show the full results for livestock production in **Table 4.2**.

productivity in corporate farms actually increased by 30%. The performance of household plots stands apart from the two other farm types for its preeminent reliance on productivity change for growth of crop production. Over one half (52%) of growth in crop production in household plots can be attributed to productivity increases.[9]

Table 4 confirms that the majority of productivity change contributing to GAO growth has come from household plots rather than from the other two farm types. On the whole, household plots have outperformed both enterprises and dehkan farms. The recovery of agricultural production in Tajikistan has been driven largely by productivity increases (intensive growth), less by changes in resources (extensive growth).

Changes in cropping patterns

The restructuring or dissolution of collective and state farms and the establishment of individual farms necessarily entails the loss of a degree of control by the government over crop production and the mix of crops. This loss is best exemplified in changes in cropping structure. The main changes in Tajikistan as a result of land reform have been an increase in the area devoted to grains, decreases in the area of cotton and feed and an increase in the area devoted to horticultural crops.

Table 5. Cropping structure 1980-2007

	Total sown, '000 ha	Grains, %	Cotton, %	Horticultural crops, %	Feed crops, %
1980	763.6	25.5	40.4	4.3	28.5
1985	802.8	26.1	38.8	4.7	29.2
1990	824.2	27.9	36.8	5.9	28.0
1995	758.0	35.0	35.4	6.1	21.3
1998	827.6	49.2	29.4	6.7	10.8
2000	864.3	48.8	27.6	7.7	11.5
2003	886.9	45.6	32.1	7.6	10.8
2006	900.2	44.6	29.2	8.1	14.6
2007	891.1	44.5	28.6	9.0	14.6

Sown area in Tajikistan is heavily weighted toward cotton and wheat production (**Table 5**). Together, these two crops occupy 73% of sown land in Tajikistan (2007). Cotton alone occupies 30% of sown land. Like other countries in Central Asia and Azerbaijan, Tajikistan has seen a partial switch from cotton to grain production since the late 1980s. Between 1986 and 2007 the portion of sown area in cotton in Tajikistan declined from 40% to 30%.

During the war (1993-1997) the area in cotton, and especially the area in feed crops, was reduced to boost food production – grains (primarily wheat) and horticulture (potatoes, vegetables, and melons). Between 2000 and 2004 we again witnessed expansion of cotton area, while grain areas remained unchanged (**Figure 10**): this was made possible by an overall increase in cultivated area (see **Table 5**). The expansion of cotton apparently ended in 2005, when sown area in cotton resumed its fall.

[9] The contributions of dekhkan farms and enterprises to growth in livestock production is negligible, because together they account for only 6 percent of the total.

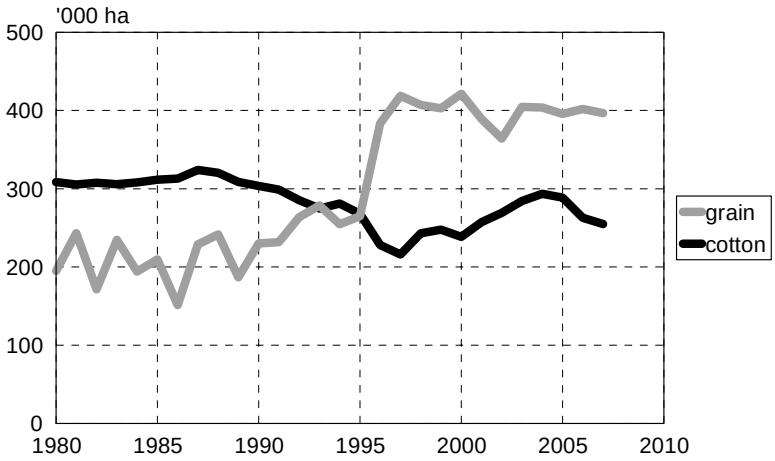

Figure 10. Areas sown to cotton (black curve) and cereals (gray curve), 1980-2007 (‘000 hectares).

The loss of 12% in cotton area from 1991 to 2007 was partly responsible for the fall in cotton production of nearly half in this period. However, the more fundamental reason behind this fall has been a drop in cotton yields of 39%. **Figure 11** presents a long-term view of the cotton and grain yields since 1980. We clearly see how cotton yields tumbled from about 3 ton/ha in the 1980s to less than 2 ton/ha in recent years. There were signs of recovery in cotton yields after 1999, when they rose from 1.5 ton/ha to nearly 2 ton/ha, but the performance in 2005-2007 was again extremely disappointing and it now remains to see if in the future cotton yields will rise to the relatively high level of 2 ton/ha or will stick at the low level of 1.5 ton/ha. Grain yields, on the other hand, recovered robustly after 1995 and today, at 2 ton/ha, they are significantly higher than during the Soviet period.

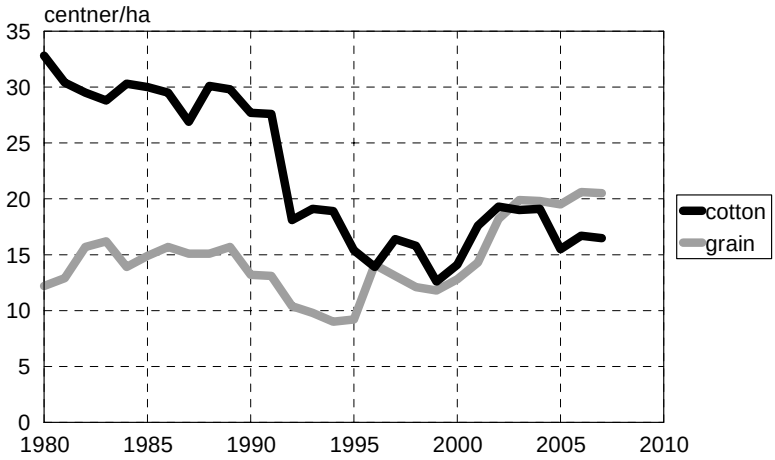

Figure 11. Cotton and grain yields, 1980-2007 (center/ha).

Horticultural crops (potatoes, vegetables, and melons) are typically grown in household plots – for both family consumption and sales – and their total area is quite small (this is true for all CIS countries). Nevertheless, the cotton–grain area tradeoff in Tajikistan has been accompanied by a definite increase in the area sown to horticultural crops, which boosted its share from 4%-5% of sown area in the 1980s to 8% in the 2000s. In absolute numbers the increase was even more impressive, as the area under horticultural crops expanded from 33,000 hectares in 1980 to 80,000 hectares in 2007. A careful focus on this change shows that it is probably a result of an increase in the area in household plots (**Figure 12**). The high positive correlation between area in horticultural crops and agricultural land in household plots (correlation coefficient 0.9 during 1980-2007) is explained by the fact that the small household plots usually specialize in production of high value added horticultural crops and livestock products, forgoing scale crops (cotton and wheat).

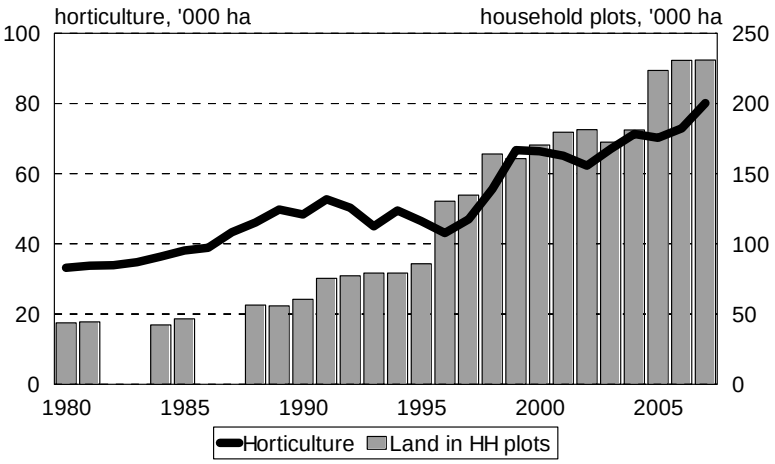

Figure 12. Area in horticultural crops and agricultural land in household plots 1980-2007 ('000 hectares).

The importance of horticultural crops for rural households is clearly seen from **Table 6**, which presents the cropping structure for farms of each type separately (averages for 2001-2007). Thus, horticultural crops account for 3% in farm enterprises, 5% in dehkan farms, and fully 23% of sown area in household plots. Households also devote more than two-thirds of their small area to cereals, mainly for feeding livestock: this efficiently compensates for their inability to grow enough feed crops on the tiny area of land in their disposal. On the other hand, household plots grow no cotton and very little other technical crops (flax, tobacco, etc.).

Table 6. Cropping structure for farms of different types in Tajikistan (averages for 2001-2007)

	Total sown, '000 ha	Grains, %	Technical crops, %	Horticultural crops, %	Feed crops, %
All farms	880	44.8	34.8	7.9	12.5
Enterprises	363	34.0	46.4	3.0	16.6
Dehkan farms	324	42.7	40.0	5.1	12.2
Household plots	193	68.4	4.0	22.6	5.0

Table 7. Horticultural crops as percent of total sown area in selected countries

	Azerbaijan	Kyrgyzstan	Tajikistan	Uzbekistan
1980	5.4	3.4	4.3	4.5
1985	5.0	3.4	4.7	4.6
1990	5.0	4.1	5.9	6.2
1995	4.0	6.7	6.1	5.8
1998	8.3	8.7	6.7	5.7
2000	13.0	9.9	7.6	5.8
2003	13.5	11.3	7.5	6.2
2005	13.5	10.8	7.8	6.1

Source: CIS Statistical Committee (2006).

Tajikistan has a great deal of potential as a producer of horticultural crops. **Table 7** shows that other countries undergoing vigorous individualization of agriculture, such as Azerbaijan and Kyrgyzstan, have expanded the area under horticultural crops quite rapidly with land reform. In Tajikistan the expansion of horticulture as a reliable source of food was triggered by the war years, and the trend has continued after hostilities ceased. It is relevant to consider which types of horticultural crops are suitable for cultivation in the traditional cotton-growing areas of Tajikistan (Ferghana Valley in Sogd, Gissar Valley around Dushanbe and further

east, Kofarnihon, Vakhsh, and Yakhsu–Panj valleys in Khatlon), and what policy changes could enable an increase in area cultivated for horticultural crops.

LAND REFORM AND FAMILY STANDARD OF LIVING: EVIDENCE FROM HOUSEHOLD AND FARM SURVEYS

Land has been shown in other CIS transition countries to be an important correlate of higher rural family incomes. In Tajikistan survey data also show a positive correlation between land and family income (or standard or living). Thus, it is reasonable to assume that increases in land holdings in individual farms as a result of land reform in Tajikistan have led to an increase in family incomes. In this section we first examine the impact of land holdings on family income and standard of living, and then proceed to analyze the role of the land market as represented by leasing transactions.

Land holdings and standard of living

The correlation between land and rural living standards can be measured by quantitative indicators or through subjective perceptions. Absolute income in monetary terms (including the value of consumption of own products) and various physical endowments, such as land, livestock, and household possessions, are quantitative measures of family living standards. On the quantitative scale, both income and income per capita are observed to increase with land holdings (**Figure 13**, based on TajLSMS 2003).

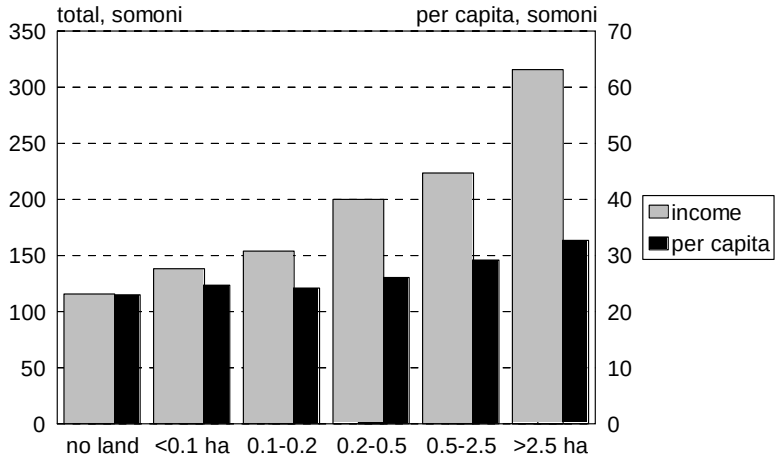

Figure 13. Family income and per capita income vs. land holdings (somoni). Source: TajLSMS 2003 (2,588 rural respondents).

Subjective perceptions have been derived in the surveys by asking respondents to assess their living standard on a three-point scale (low, medium, or comfortable, as in FAO 2008) or to provide a qualitative assessment of the family income relative to the average income in the village (as in USAID/WB 2007). Land and perceived standard of living are also positively associated. For household plots, more land implies a higher standard of living (**Table 8**, based on FAO 2008). There is a similar general relationship between land and standard of living for family dehkan farms, but it is not statistically significant due to the smallness of the sample. There is no relationship between the size of the livestock herd and the perception of wellbeing. If anything, households and dehkan farms with more cattle seem to be characterized by a lower standard of living.

Table 9 demonstrates a clear relationship between the subjective perception of family income and the cultivated area in a pooled sample of both family and collective dehkan farms (USAID/WB 2007). The main conclusion is that among families that cultivate land (in farms

of both types combined) 20% feel that their income is below the village average, compared with only 6% among families with cultivated land. Correspondingly, 40% of families cultivating land feel that their income is higher than the village average, compared with only 23% for families without cultivated land.

Table 8. Land and standard of living*

Standard of living	Household plots (n=352)	Family dehkan farms (n=117)
Low	0.52 ha	8.2
Medium	1.00 ha	9.9
Comfortable	2.32 ha	9.8
	Signif. by Anova and Wilcoxon tests	No signif. differences

*Effective number of observations reduced by data cleaning.
Source: FAO 2008.

Table 9. Land and relative family income: pooled sample of family and collective dehkan farms

	Income higher than average	Income equal to average	Income below average
Cultivate land*			
Yes	39	55	6
No	23	57	20
Mean cultivated area, ha**	12	10	9
Mean number of animals, st. head^	3.3	2.5	1.6

*Differences between "yes" and "no" statistically significant by chi-square test.
**Differences in land area across income categories statistically significant by nonparametric Wilcoxon test.
^Differences in number of animals across income categories statistically significant by t-test.
Source: USAID/WB 2007.

Linking the subjective perception of relative income to land holdings, we observed that families with income above the village average cultivate more land than families with income below the average. There is also a positive association between the number of livestock and the perception of family income: families with income higher than the average have more livestock than families with income lower than the average (**Table 9**).

Regression analysis (based on TajLSMS 2003) shows that land reform has probably had a positive impact on family income through making more land available to rural households. The results of a multivariate regression analysis modeling family consumption expenditure (as a standard proxy for family income) on a list of human capitals and physical capitals shows that family expenditure (in somoni) increases with the increase of land holdings and family size (**Table 10**). This implies that, for a given family size, more land leads to more income. Land leasing also has a positive effect on income in this regression model: families leasing land have higher incomes than the rest (controlling for the other variables). Additional human capital variables indicate that consumption expenditure increases with years of schooling and age of the household head: education and experience have a positive impact on family income. A new physical capital variable – households without any machinery – shows that access to farm machines has a positive impact on consumption expenditure. These effects are statistically significant at the 0.1 level; no significant differences are observed in total expenditure between rural and urban households in the survey.

We have seen earlier that land reform is largely responsible for the recovery of agricultural production and that the main driving force behind the recovery is productivity growth in household plots and dehkan farms. The cumulative evidence from the various cross-section surveys cited in this section indicates that land holding is positively correlated with various measures of family and/or per capita well-being. The more land held by families, the higher

is the measure of welfare. This survey level evidence suggests that distributive land reform directly contributes to increasing incomes or well-being in rural families.

Table 10. Determinants of household consumption expenditure (logged continuous variables, rural families only)

Dependent variable: Total consumption expenditure

Explanatory variables	Coefficient	t-value
Human capital:		
Family size	0.4832	19.35
Age of household head	0.2386	6.02
Years of schooling of household head	0.2212	6.75
Physical capital:		
Plot size, sotki	0.0469	3.61
Household does not lease in land (relative to households leasing land)	-0.0789	-2.17
Household without any machinery (relative to households with machinery)	-0.1706	-3.61
Intercept	3.6776	17.96
Number of observations	2146	
R-square	0.346	

Source: TajLSMS 2003.

Land leasing, farm size, and family income

Given the positive effect of farm size on family income or standard of living, it is important to look at mechanisms that allow adjustment of farm sizes. Normally farmers increase their land holdings through market mechanisms, which in all countries include not only buying and selling of land, but also land leasing. While buying and selling of land is prohibited in Tajikistan, where all land is state owned, there are no legal restrictions on land leasing.

Table 11. Effect of leasing on farm size

	HH plots		Family dehkan farms	
	N	Mean farm size, ha	N	Mean farm size, ha
All farms	356	1.67	134	22.3
Leasing based on sources of land:				
Without leasing	299	0.65*	130	18.5
With leasing	57	7.00*	4	144.1
Leasing based on lease payments:				
Without leasing	216	0.65**	103	20.5
With leasing	140	3.23**	31	28.4

*Differences significant by both parametric and non-parametric tests (t-test and Wilcoxon).
**Differences significant only by the parametric t-test.
Source: FAO 2008.

According to survey evidence (TajLSMS 2003, FAO 2008), farms that lease land command on average a larger area than farms that do not lease land. To demonstrate the direct impact of land leasing on farm size in Tajikistan, we dichotomized the farms into those with leased land and those without leased land (FAO 2008). The analysis was carried out separately for household plots and for family dehkan farms using two indicators of leasing for classification: one indicator explicitly took into consideration the responses on area leased from various sources (the state, the local farm enterprise, and private individuals); the other indicator relied on the presence of lease payments. Although the two classifications widely differed in the number of responses in lease/no lease categories (see **Table 11**), the mean areas are consistent. In all cases farms that lease land command on average a larger area than farms that do not lease land. The differences are statistically significant for household plots, but not for family dehkan farms (where the sample is much smaller). Even the apparently

huge difference between 18.5 ha for dehkan farms without leased land and 144.1 ha for dehkan farms with leased land (based on land sources) is not statistically significant, because the category of farms with leased land includes only 4 respondents. Still, the results for household plots show with sufficient confidence that leasing is indeed used as a mechanism for farm size adjustment (similarly to the situation in other CIS countries).

These results are consistent with the estimates from an earlier survey (TajLSMS 2003), where fully 18% of respondents (434 out of 2380) report leasing land. Here also land leasing increases the average plot size in rural households from 0.20 hectares to nearly 1 hectare (**Table 12**).

Table 12. Average land holdings for rural households with and without leased land*

	All sample	Ha	No leasing	Ha	With leasing	Ha
"Own" land	2323	0.19	1946	0.20	377	0.16
Leased land	434	0.13	0	0	434	0.74
Total used	2380	0.32	1946	0.20	434	0.90

*Excluding respondents with zero land (10% of the rural sample).
Source: TajLSMS 2003.

Since leasing markedly increases the land holdings, we hypothesize on the basis of the previous results that households that lease in land should report higher income than households that do not lease land. This hypothesis is confirmed by the regression results in **Table 10**, where households that do not lease land have a statistically significant *negative* coefficient (i.e., family expenditure lower than for families that lease land, controlling for all other variables). An easily visualized confirmation of this hypothesis is provided by the survey data in **Table 13**: both total income and income per capita are higher in households with leased land than in households without leased land (but only the difference in total income is statistically significant).[10]

Table 13. Income for rural households with and without leased land (somoni)

	All sample	No leasing (n=2202)	With leasing (n=436)
Total income	168	159	212
Income per capita	25	25	27

Note: The difference in total income between the two categories of households is statistically significant at p=0.01. The increase in per capita income from 23 somoni to 33 somoni across the six land size categories is not statistically significant.
Source: TajLSMS 2003.

The results of the two previous sections cumulatively point to a positive impact of land reform on household incomes. The impact is associated with two facets of land reform: increase of family holdings through distribution or allocation of land to rural households and emergence of options for land market transactions as reflected in the incidence of land leasing among rural respondents. Both factors – more land and options for land leasing – are seen to raise family incomes (and to a certain extent also per capita incomes).

"Freedom to farm" and the effect of administrative interference on family income

The government of Tajikistan persists in setting targets for cotton production (so-called "state orders") and thus locks Tajik farmers into a rigid cropping pattern, depriving them of freedom of choice in product mix decisions on their farms. In line with the traditions of the

[10] The data for **Tables 10** and **13** are from TajLSMS 2003, as this is the only survey with consistent income and expenditure information, but unfortunately it covers only household plots, not dehkan farms.

Soviet command economy, insistence on production targets naturally led to government-designed mechanisms for working-capital financing. The system that has been in place in Tajikistan since September 1998 (Van Atta, 2008) charges private investors active in the cotton trade with the responsibility of providing inputs in kind to farmers under forward contracts that ensure payment in the form of harvested cotton (this forward contracting explains the name "futurists" commonly attached to these cotton traders in Tajikistan). Lack of transparency in the system and the strong information asymmetry between the farmers and the "futurists" has inevitably led to increasing indebtedness of the cotton-growing farmers. The debt of cotton farms to private investors increased from less than $50 million in 1999 to $400 million in 2007, creating the so-called cotton farm debt problem (Van Atta, 2008).

The growing farm debt problem stimulated the government of Tajikistan to design policy measures aimed at creating a better enabling environment for cotton producers, including elimination of "futurist" monopoly on working-capital financing[11] and provisions guaranteeing no interference in farmers' freedom to farm (Government Resolution, 2007).[12]

The "freedom to farm" issue was addressed in the recent surveys. **Table 14** (based on USAID/WB 2007) indicates that dehkan farmers as a whole overwhelmingly claim that they have freedom to farm, and only a small minority (10%) think otherwise:[13] this minority disagree entirely with the "freedom to farm" statement. This matches the 10% of respondents who claim that the local authorities dictate the cropping program (see the last two columns in the table). On the other hand, 50% of respondents in both categories say that they make the cropping decisions (absolute "freedom to farm") and another 40% say that the farm manager makes the decision (relative "freedom to farm"). This roughly matches the 70% of respondents who agree in varying degree with the "freedom to farm" statement.[14]

Table 14. "Freedom to farm" perceptions among dehkan farmers (DF)

Do you agree with the "freedom to farm" statement?	Collective DF	Family DF	Who makes the cropping decisions?	Collective DF	Family DF
Agree entirely	29	33	Myself and my family	50	45
Agree somewhat	47	37	Farm manager	37	41
Disagree somewhat	12	14	**Local authorities**	**10**	**13**
Disagree entirely	**7**	**10**	Others	0	0
No answer	5	5	No answer	3	1

Source: USAID/WB 2007.

[11] For lack of alternatives, farmers predominantly rely on financing from investors ("futurists"), who financed (sometimes in combination with other sources) about 70% of the production costs for the 2007 cotton harvest (ADB 2008). Most farmers (72% of the respondents) use a single source of financing, which in more than half the cases is the investor.

[12] While these two policy measures are believed to have the potential for halting the accumulation of further cotton debt, international donors are concerned that enabling measures have not been fully enacted to this date (end of 2008) and farmers' access to commercial banks is still limited.

[13] Two questions in USAID/WB 2007 covering both collective and family dehkan farms had a bearing on this issue: (1) Do you AGREE or DISAGREE (in four gradations) to the following statement: "In most cases, dehkans in our raion are free to decide how they use their land". (2) Who makes the decision about what you grow on most of the land where you work? The results for these two questions are presented separately in **Table 14**.

[14] A full cross-tabs analysis of the two "freedom to farm" questions (for farms of both types) shows that among the dehkans reporting that they themselves make the cropping decisions (48% of the combined sample) fully 90% agree in varying degree with the "freedom to farm" statement. It thus seems that the responses to the two questions are in fact consistent.

However, this overall picture masks significant differences in decision making patterns between cotton growers and other dehkans. Cotton growers have much less freedom of decision than other dehkan farms, regardless of the specific organizational form. The intervention of the local authorities (hukumat) is quite pervasive for cotton growers and virtually nonexistent for other farms. Among cotton-growing dehkan farms, only 14% have freedom of decision, whereas in 56% of the farms the decision is made by the manager and in a staggering 28% of the cotton-growing farms the local authorities (the hukumat) directly intervene in planting decisions (**Table 15**). This is in a striking contrast with the decision making process in other dehkan farms, where 60% make the decisions themselves and the hukumat intervenes in only 5% of the cases.[15] A different survey that looked primarily at small cotton-growing farms (ADB 2008) found that hukumat intervened in cropping decisions in 72% of the cases.

Table 15. "Freedom to farm" perceptions for cotton-growers and other dehkans

Who makes the cropping decisions?	All dehkan farms		Collective DF		Family DF	
	Cotton growers (26%)	Other dehkans (74%)	Cotton growers (20%)	Other dehkans (80%)	Cotton growers (34%)	Other dehkans (66%)
Myself and my family	14	60	3	63	25	55
Farm manager	56	32	69	28	43	39
Local authorities	**28**	**5**	**25**	**6**	**30**	**4**
Others	0	0	1	0	0	0
No answer	2	3	2	3	2	1

Source: USAID/WB 2007.

One consequence of constrained sowing decisions for farmers is that their farming incomes should also be constrained as a result. In fact, survey evidence supports this conclusion (USAID/WB 2007): cotton cultivation tends to reduce the probability of reaching a higher income in a sample of dehkan farmers. This conclusion holds when the survey data are analyzed by multivariate regression analysis. Multivariate analysis modeling family income levels as a function of various endowments produces a statistically significant *negative* coefficient for area cropped to cotton: adding 1 hectare to area in cotton reduces the probability of reaching high income ("better than village average") by 1.8%. Other endowments – cultivated land area, herd size, and number of possessions – have statistically significant *positive* coefficients. The likelihood of achieving incomes better than the village average *increases* with the increase in the main endowments (cultivated land area, herd size, number of possessions) and *decreases* as the area cropped to cotton becomes larger. In a sense, this is econometric evidence of the negative effect of cotton growing on family income, but unfortunately it relies on fairly weak data.[16]

[15] The pattern is basically the same when the dehkan farms are split into collective and family farms. The only difference is the relatively high proportion of family farms reporting that the decision is made by the "farm manager". If we recall, however, that in family farms the "farm manager" is in most cases the head of the family, we should combine the first two "family" categories into one: among family farms we get "family" decisions in 68% of cotton growers and in fully 94% of other farms.

[16] This interesting result emerges only in multivariate regression analysis, where family income is combined with other determinants of family income. It is not discernible a simple univariate analysis of family income levels versus cotton growing when no attempt is made to control for other factors.

CONCLUSIONS

Land reform has had significant achievements in Tajikistan. The main achievement of land reform in Tajikistan has been the rapid recovery of agricultural production since 1997, which has brought Tajikistan's agriculture back to pre-transition levels by 2007. The recovery has been driven entirely by the individual farms operating at the leading edge of the reform frontier. Land reform was to a great degree responsible for this agricultural growth by expanding the stock of land at the disposal of household plots and dehkan farms.

Perhaps even more impressive has been the predominant role of productivity growth in the recovery of agricultural production in Tajikistan, primarily in household plots. Land reform has also most likely led to an improvement of rural family incomes through increases in land holdings in family farms.

Another distinct effect of land reform involves important changes in cropping patterns. Distribution of additional land to household plots and the restructuring of agricultural enterprises have necessarily resulted in a loss of control by the government over the mix of crops produced. As a result, the area sown to cotton has fallen and the area in grain and horticultural crops has increased. In addition, land reform has resulted in the near total transfer of livestock inventories to household plots.

Despite these undeniable achievements, Tajik agriculture has achieved far less than other CIS countries with more robust land reforms for three reasons. First, the recovery of agriculture is built on a relatively small base in terms of land resources. Unreformed farms (agricultural enterprises and collective dehkan farms) still control over half of sown land in Tajikistan. If dehkan farms and agricultural enterprises had achieved the same level of productivity as household plots, agricultural production in 2006 would have been 114% higher. If they had achieved only half the productivity level of household plots agricultural production in Tajikistan would have been 37% higher.

A second reason that land reform has not lived up to its potential in Tajikistan is that the government has retained a large role for administrative intervention in farm decision making. Administrative controls on cotton sown area, as well as the monopsonistic position of "futurist" financers cause farm returns to growing cotton to be less than they could be. Limited returns are an important factor in the continued fall in cotton yields and production. Other crops without heavy administrative intervention, including wheat, have shown increasing yields in the past few years. Amongst the major crops, only cotton yields have fallen so dramatically. Unless the debt overhang of cotton growers is resolved expeditious and cotton farms are allowed to reach profitability through proper reorganization, the area under cotton will probably continue to decrease, adversely affecting Tajikistan's export revenues.

The third reason why the land reform in Tajikistan has not lived up to its potential is that the failure to follow through on land reform has prevented the government from attending to the longer term needs of agriculture, rural development and natural resource management. Land reform is a basic first step toward the construction of a viable, sustainable agriculture that can be an adequate source of rural livelihoods in Tajikistan, though there are many further steps that will be necessary. The failure to take the first and most basic step preserves an underperforming agriculture, keeping the rural population on the brink of food insecurity and

hindering serious consideration of further steps. Ultimately, this is the important role of land reform that remains unfulfilled in Tajikistan.

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