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Structure and Performance of Agriculture in Central Asia

By

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Introduction

The five countries of Central Asia – Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan – became independent states in 1991-1992 with the dissolution of the Soviet Union (see **Map 1**). Immediately after assuming independence, the Central Asian countries embarked, together with the rest of the former Soviet Republics (the Commonwealth of Independent States – CIS), on a program of reforms intended to achieve a transition from a command economy to an economy more in line with market principles. The reforms in the agricultural sector aimed to eliminate the traditionally wasteful use of resources and thus improve productivity. For countries that in 1990 derived more than 30% of GDP from agriculture, improved agricultural performance was naturally expected to boost household incomes, especially in the poor rural areas. These goals were to be accomplished through the process of land reform and farm restructuring, implemented simultaneously with price and trade policy reforms. The reforms were basically expected to change the producer incentives, strengthening profit orientation and thus increasing personal involvement and motivation.

One of the striking features of transition from plan to market in CIS agriculture is the dramatic shift from the predominance of large corporate farms (kolkhozy and sovkhozy, generally referred to as agricultural enterprises) to individual or family agriculture based on a spectrum of small farms (Lerman 2008; Sedik and Lerman 2008). The individual sector, combining the traditional household plots and the new peasant farms that began to emerge after 1992, accounts for most of agricultural production and controls a large share of arable land. This is a dramatic change from the pre-1990 period, when agricultural enterprises produced over 70% of GAO and controlled over 90% of arable land.

These changes of farm structure, while consistent with the dominant mode in market agricultures, clash with the traditional Soviet philosophy of economies of scale. They also clash with the inherited ideology that views small family farms as an undesirable and even damaging deviation from the capital-intensive, highly mechanized, and commercially oriented mainstream. We therefore witness an ongoing debate, both among CIS decision makers and within the CIS academic community, as to the performance advantages of the two main organizational forms in agriculture – large corporate farms and small family farms.

This continuing debate in effect ignores the well-known theoretical considerations that reveal clearly identifiable advantages of small family farms compared with large corporate farms (Allen and Lueck 2002). There is generally no evidence of economies of scale in primary agricultural production, while individual or family farms are easier to organize and operate than corporations. Family farms are free from labor monitoring costs and are not prone to

¹ Paper prepared for the 17th World Congress of the International Economic Association (IEA), Dead Sea, Jordan, June 6-10, 2014. The analysis is largely based on data from the *Official Statistics of the CIS* database maintained by the CIS Interstate Statistical Committee in Moscow (CIS-16 in the list of references). This database provides continuous time series since 1980, which were supplemented when necessary with data from statistical yearbooks published by the national statistical agencies of the five Central Asian countries (both before and after independence).

agency problems, contrary to large corporate farms employing hired labor and run by outside managers. These factors highlight the importance of individual incentives for farm efficiency and account for the predominance of family farms in market economies, where a family farm is not necessarily a very small farm: the optimal farm size is determined in each particular case by the managerial capacity of the farmer, and it may be quite large for highly capable individuals.

In this study we assemble evidence that, in our opinion, shows that individualization of agriculture is associated with the post-transition recovery in CIS and that small family farms outperform the large enterprises, at least by measures of land productivity. The evidence is presented here for the five countries of Central Asia—Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan (**Map 1**). Previously similar results have been obtained for the Trans-Caucasian states—Armenia, Georgia, and Azerbaijan (Lerman 2006) and to a certain extent also for the European countries of the CIS (Lerman et al. 2007; Lerman and Sutton 2008; Lerman and Sedik 2013).



Map 1. Central Asian states after the dissolution of the Soviet Union (based on the U.S. Central Intelligence Agency map from the Perry-Castañeda Library Map Collection [<http://www.lib.utexas.edu/maps/asia.html>]).

The article is organized as follows. The introduction is followed by Section 1 that sets the regional context by discussing the importance of agriculture in Central Asia. Section 2 describes the three phases of agricultural development in Central Asia (and the rest of the CIS) and introduces the key concept of turnaround point, the year when agricultural production switched from decline to renewed growth. Section 3 discusses individualization of Central Asian agriculture in the process of land reform and examines the sources of renewed growth. Productivity of farms of different organizational types is analyzed in Section 4 and Section 5 establishes a link between policy reforms and agricultural performance. Conclusions present some concluding remarks.

1. Regional context: The importance of agriculture in Central Asia

Among the five countries of Central Asia, Kazakhstan is the largest by territory, whereas Uzbekistan is the largest by population (**Table 1.1**). Kazakhstan on its own, with an area of 2.7 million sq. km, is larger than the other four countries combined; it is in fact larger than any other CIS country, except Russia. Kyrgyzstan and Tajikistan are comparatively small both by territory and by population, whereas Turkmenistan has the second largest territory, but a very small population. Among the CIS countries, Turkmenistan is the fourth largest by area, after Russia, Kazakhstan, and Ukraine, while its small population of about 5 million people puts it in one group with the CIS midgets—Armenia, Georgia, Azerbaijan.

Nearly 60% of the population in Central Asia lives in rural areas, compared with less than one-third in Russia and Ukraine, but only 25% of the region's agricultural land is cultivable, compared with 60%-80% in Russia and Ukraine. Thus, despite the huge expanses of land and the relatively small number of people, the effective population density in four of the five Central Asian countries (except Kazakhstan) is very high: there is less than 0.5 hectares of arable land per rural resident compared with 2-3 hectares in Ukraine and Russia (Kazakhstan is comparable by this measure to Russia and Ukraine). Because of the semi-arid climate in the region and limited surface run-off, agriculture is highly dependent on artificial irrigation networks. In four countries (excluding Kazakhstan) more than 80% of arable land is irrigated (**Table 1.1**), compared with less than 10% in Russia and Ukraine (and also in Kazakhstan). Land and water are the two scarcest and most precious resources in the region.

Table 1.1. Selected characteristics of Central Asian countries with Russia and Ukraine for comparison*

	Country area, thousand km ²	Ag land in use, million ha	Population, million	Population density, per km ²	Population growth rate 1990-2008, % per annum
Turkmenistan	491	40.5	5.4 ^b	13.2	2.1 ^b
Uzbekistan	449	17.2	27.6	57.9	1.6
Kyrgyzstan	200	4.5	5.3	25.5	1.0
Tajikistan	143	4.0	7.4	47.6	1.8
Kazakhstan	2,725	85.5	15.8	5.5	-0.2
Russia	17,075	190.9	141.9	8.4	-0.2
Ukraine	604	36.6	46.0	78.0	-0.6

	Arable land, % of ag land	Irrigated, % of arable ^a	Rural population, %	Share of agriculture in labor, % ^b	Arable land per rural resident, ha	Share of agriculture in GDP, %
Turkmenistan	4	106	58 ^b	48	0.5 ^b	19 ^b
Uzbekistan	24	100	64 ^c	28	0.2 ^c	23 ^b
Kyrgyzstan	28	79	65	35	0.4	26
Tajikistan	21	81	74	67	0.2	22
Kazakhstan	27	7	47	31	3.1	5
Russia	60	5	27	11 ^d	3.0	4
Ukraine	84	8	32	17	2.1	7

Source: All countries except Turkmenistan and Uzbekistan from CIS-16 (2011); Turkmenistan and Uzbekistan data for population, land, and GDP from national statistical yearbooks.

*The data are for 2008, except where indicated otherwise: ^a1990; ^b2007; ^c2005; ^d2006.

The Central Asian countries are highly agrarian, as is evident from their high share of rural population, high share of agricultural labor in total labor force, and high share of agriculture in GDP (**Table 1.1**). To facilitate comparison across countries, the three dimensions of a country's agrarian profile can be aggregated into a single characteristic – an ad hoc “agrarian index” calculated as the simple arithmetic average of the three components (the agrarian index

is expressed in percent, like each of its three components). The calculations produce a ranking of the 12 CIS countries by the agrarian index, with Tajikistan the most agrarian and Russia the least agrarian (Table 1.2). Four Central Asian countries, excluding Kazakhstan, are at the top of the agrarian ranking as a group, followed by the three Trans-Caucasian states (Armenia, Georgia, Azerbaijan) and Moldova – the fourth “small” country in CIS. Kazakhstan is close to the bottom of the agrarian ranking, together with the large Slavic countries as a group, although its agrarian index is still substantially higher than that of Russia, Ukraine, and Belarus.

Table 1.2. The agrarian profile of CIS countries (2007-2008 data)

	Share of rural population (2008)	Share of agriculture in employment (2007)	Share of agriculture in GDP (2008)	Agrarian Index	GDP per capita, constant 2000 US\$ (2008)
Tajikistan	73.7	66.5	21.8	54.0	245
Kyrgyzstan	65.4	34.5	25.8	41.9	375
Turkmenistan	58.0	48.4	18.9	41.8	1705
Uzbekistan	63.9	27.9	23.2	38.3	840
Georgia	47.4	53.4	8.9	36.6	1252
Moldova	58.6	32.7	8.9	33.4	578
Armenia	36.0	46.0	15.8	32.6	1520
Azerbaijan	48.2	38.6	5.7	30.9	2132
Kazakhstan	46.8	31.0	5.2	27.7	2378
Ukraine	31.8	16.7	6.8	18.4	1156
Belarus	26.1	10.6	8.4	15.0	2483
Russia	26.9	10.6	4.1	13.9	3074

Source: CIS-16 (2011) and national statistical yearbooks for Turkmenistan, Uzbekistan, Georgia. GDP per capita from World Bank’s *World Development Indicators* online database.

Typically, economies dependent on agriculture are relatively poor, with low GDP per capita. This relationship generally holds for the CIS countries: in Table 1.2 high values of the agrarian index are associated with lower GDP per capita (the correlation coefficient between the Agrarian Index and GDP per capita for the 12 countries is -0.746). Thus, in the six most agrarian countries (mean agrarian index 41) the mean GDP per capita in 2008 was \$832, whereas in the six least agrarian countries (mean agrarian index 23) the mean GDP per capita was \$2,124. Figure 1.1 clearly demonstrates the overall decrease of GDP per capita with increasing agrarian orientation.

GDP per capita in 2008 vs Agrarian Index

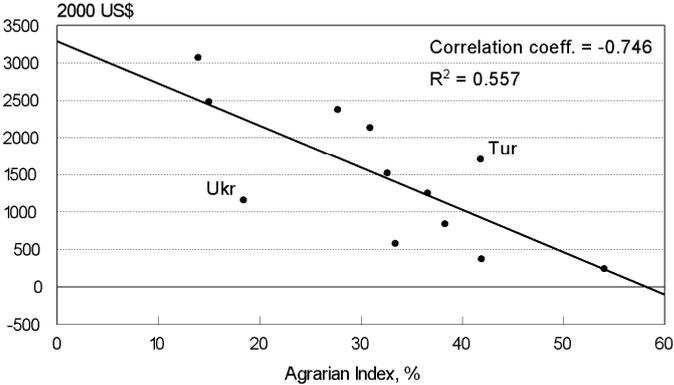


Figure 1.1. Linear regression estimates of GDP per capita (in constant 2000 US\$) as a function of the agrarian index.

Uzbekistan, Turkmenistan, and Tajikistan are the three main cotton producers in Central Asia (and actually in all of CIS). Uzbekistan contributes 64% of CIS cotton production, Turkmenistan holds the second place with a 15% share, and Tajikistan accounts for another 9% (averages for 2001-2008). In these three countries area in cotton accounts for 30%-40% of total cropped land (**Table 1.3**). Kazakhstan, on the other hand, is the primary grain producer, with 80% of cropped area under cereals. It produces nearly 60% of Central Asian grain and fully 15% of grain production in all of CIS (**Table 1.4**). Its cotton production is marginal by comparison, although it has been rising in recent years and has reached 8% of total cotton output in Central Asia (up from less than 5% in the 1980s and the 1990s). Kyrgyzstan occupies an intermediate position, with very little cotton and more than 50% of cropped area under cereals. It is noteworthy that Turkmenistan, despite its strong emphasis on cotton production, also has more than 50% of its cropped area in grain (primarily wheat), compared with 40% of cropped area in Uzbekistan and Tajikistan (**Table 1.3**). The share of land cropped to cereals has been growing since 1990 in Turkmenistan, Uzbekistan, and Tajikistan, mainly as a result of drastic reductions in area under feed crops. Still, Kyrgyzstan, Tajikistan, and Turkmenistan combined produce less than 20% of all grain in Central Asia, while Uzbekistan on its own ranks second (after Kazakhstan) with 23% of total grain production in the region.

Another noteworthy point is the share of horticultural crops in the cropping mix (**Table 1.3**). Horticultural crops are ideally suited to smallholder cultivation. Thus, the relatively high share of horticultural crops in Kyrgyzstan and Tajikistan is related to the high incidence of small individual and family farms in these countries (higher than in other countries).

Table 1.3. Cropping patterns across Central Asia (averages for 2001-2008)

Country	Grain	Cotton	Other technical crops	Horticultural crops	Feed crops	Total cropped
Turkmenistan	52.4	36.3	0.5	2.2	8.6	100.0
Uzbekistan	43.9	39.9	1.4	6.2	8.5	100.0
Tajikistan	44.8	29.4	5.4	7.9	12.5	100.0
Kyrgyzstan	56.2	--	12.6	10.7	20.5	100.0
Kazakhstan	80.0	--	4.8	1.7	13.5	100.0

Source: CIS-16 (2011)

Table 1.4. Cotton and grain production in Central Asia (% , averages for 2001-2008)

Country	Grain	Cotton
Turkmenistan	9.1	15.4
Uzbekistan	22.6	65.1
Tajikistan	3.1	9.2
Kyrgyzstan	6.3	2.1
Kazakhstan	58.9	8.2
All Central Asia	100.0	100.0
'000 tons	25,520	5,210

Source: CIS-16 (2011).

Prior to 1990, the three cotton producing countries—Uzbekistan, Turkmenistan, and Tajikistan—were characterized by a relatively high share of crop production and a correspondingly low share of livestock production in their national product mix. Livestock production for these three countries accounted for slightly over 30% of gross agricultural

product during the 1980s, whereas in the two other Central Asian Countries—Kazakhstan and Kyrgyzstan—as well as in Russia and Ukraine livestock production averaged 55-60%. After 1992, on the other hand, we observe a distinct convergence of the product mix in all countries (except Tajikistan; **Figure 1.2**): livestock production in Uzbekistan and Turkmenistan accounted for 45%-50% of agricultural output between 1992 and 2010, very close to the share of livestock in Kazakhstan, Kyrgyzstan, Russia, and Ukraine. The relative increase in the importance of livestock in Turkmenistan and Uzbekistan since 1992 is attributable to the growing role of individual farms, which emphasize livestock to a much greater extent than the large-scale collectives.

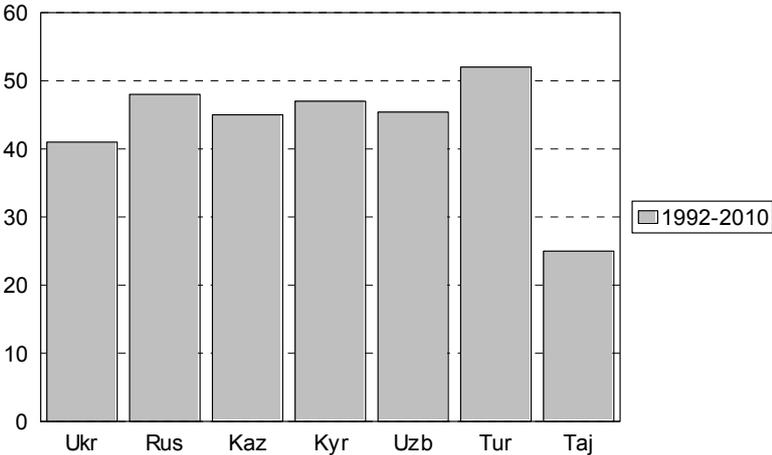


Figure 1.2. Share of livestock production in GAO in Central Asia, with Ukraine and Russia shown for comparison (averages for 1992-2010). Source: country agricultural yearbooks.

Turkmenistan is one of only two countries in CIS where the irrigated area in 2007-2008 is substantially above the 1990 level (the other is Azerbaijan in the Trans-Caucasus). The irrigation efforts in Turkmenistan persisted but for a short time in the late 1980s–early 1990s and then stopped in 1994, producing a one-time boost in irrigated area followed by stability at a new increased level. Three of the five Central Asian countries – Kazakhstan, Kyrgyzstan, and Uzbekistan – display dramatic decreases in agricultural land after 1990, presumably due to abandonment of unproductive or inaccessible pastures (**Figure 1.3**). Tajikistan, as well as the group of six other CIS countries (Armenia and Georgia in the Trans-Caucasus, Russia, Ukraine, Moldova, and Belarus in the European CIS), are characterized by overall stability of agricultural land since 1990 (actually since 1980), with a slight downward secular trend.

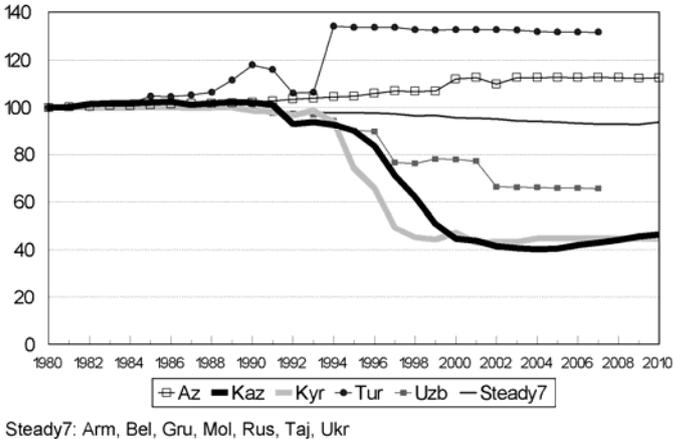


Figure 1.3. Evolution of agricultural land in CIS 1980-2010 (1980=100). Source: CIS-16 (2011).

2. The three phases of agricultural development and the turnaround point

Central Asia, as a region, has gone through three phases of agricultural development during the last 45 years (Figure 2.1). The first phase can be characterized as the Soviet growth period, which was sustained by the stable supportive environment that characterized the post-Stalin attitude toward agriculture in the USSR. The Soviet growth phase extended until 1990, when the GAO index had risen to 225% of its level in 1965. The second phase is the transition collapse triggered by the dismantling of the traditional Soviet system and the disruption of all support services in agriculture. The GAO index dropped by almost 40% between 1990 and 1998, bottoming out in 1998 at about the level of 1975. The third phase is the recovery phase characterized by renewed agricultural growth after 1998, when the cumulative effect of sustained market reforms began to be felt.

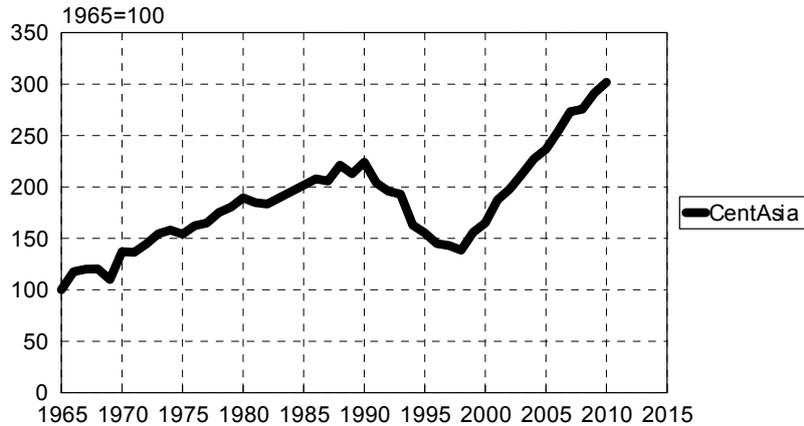


Figure 2.1. Long-term agricultural development in Central Asia: GAO index 1965-2010.

The turnaround point

Figure 2.2 superimposes the agricultural growth curves for two other regions: Trans-Caucasus and the European CIS. The three phases of long-term agricultural development – growth, collapse, and recovery – are clearly visible in each regional curve. The notable difference is the shift of the point where recovery starts: as early as 1993 in Trans-Caucasus, 1998 in Central Asia, and 1999 in the European CIS.

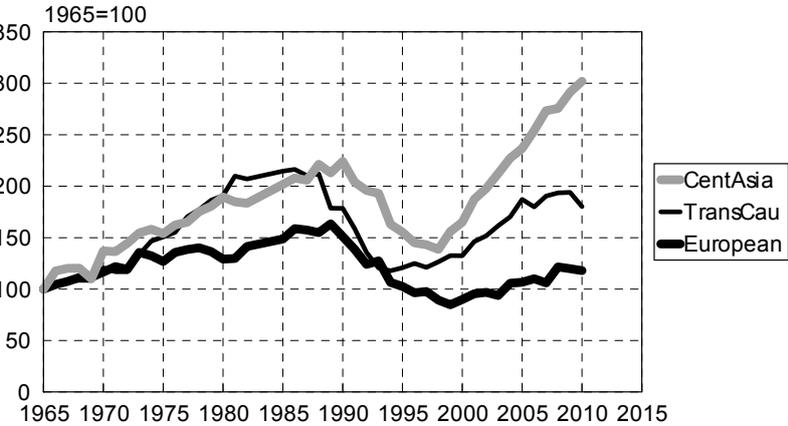
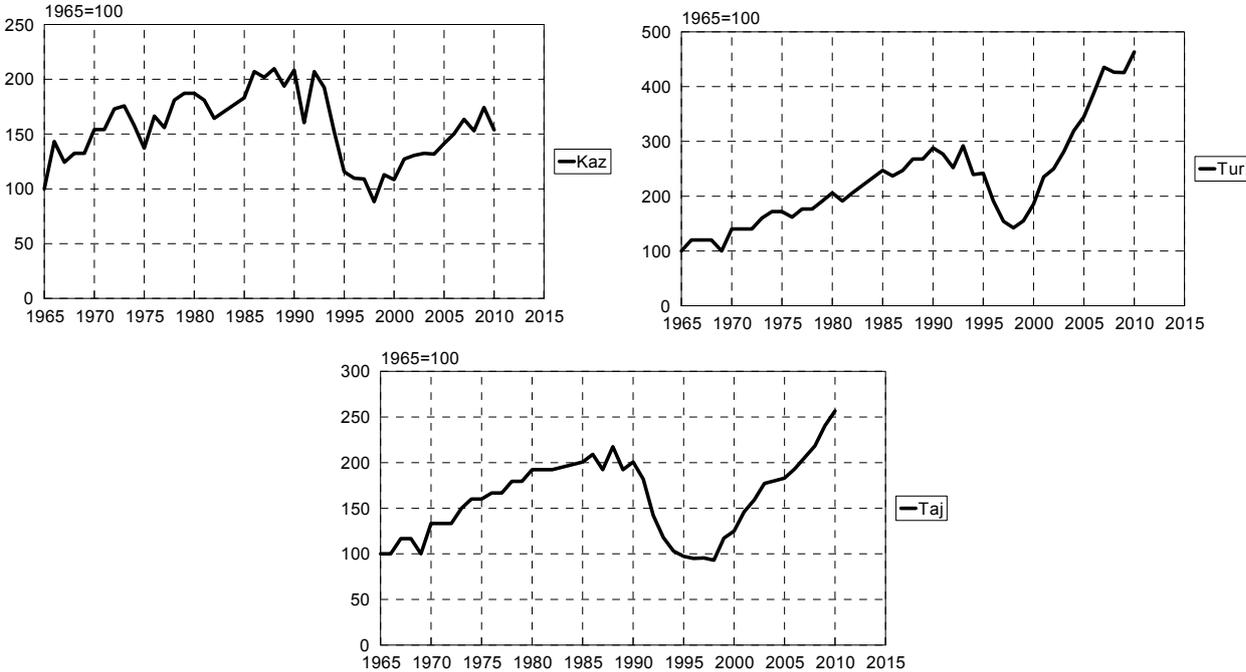


Figure 2.2. Regional GAO growth 1965-2010: averages for three regional groupings of CIS countries.

There is a traceable link between the beginning of recovery and the implementation of significant farm structure reforms. In the Trans-Caucasus recovery started in 1993, precisely when two of the three Trans-Caucasian countries – Armenia and Georgia – had made resolute efforts to dismantle collective agriculture and distribute land to individual farms at the very

beginning of transition. The rate of recovery in Trans-Caucasus subsequently accelerated after 1996, when Azerbaijan had adopted a farm individualization policy as part of Aliyev’s reforms (see Lerman and Sedik 2010): this acceleration is clearly visible in the steeper slope of the Trans-Caucasus curve in **Figure 2.2** from 1997 onward. It is sometimes argued that Azerbaijan’s agricultural success since 1996 is simply a reflection of the booming oil revenues that fuel the overall economic growth. Armenia and Georgia do not have any oil revenues, and yet the starting point for agricultural recovery in these countries is clearly linked with the implementation of land individualization reforms. In the European CIS, recovery began around 1999, as two of the four countries – Ukraine and Moldova – began moving in earnest toward distribution of land plots to holders of paper land shares. The extent of the recovery in this group is moderate, because two other countries – Russia and Belarus – have not done much by way of actual land reform.

1998 turnaround



1995-1996 turnaround

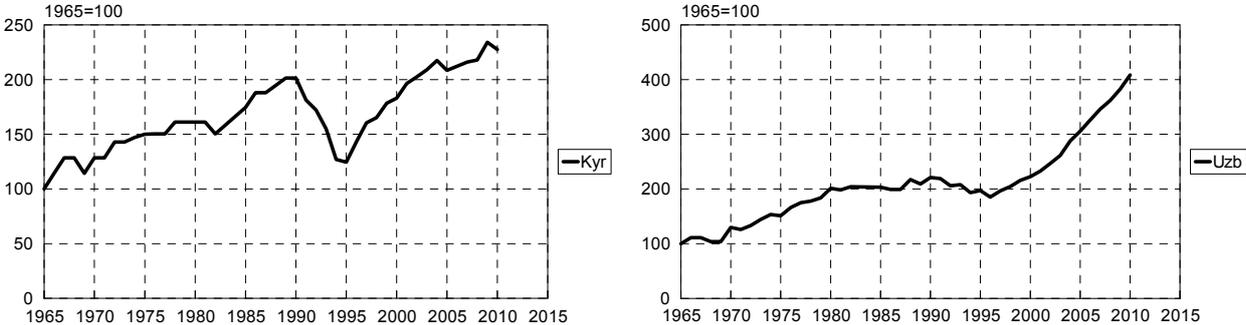


Figure 2.3. Turnaround points for Central Asian countries: Kazakhstan, Turkmenistan, Tajikistan (1998 turnaround), Kyrgyzstan (1995), and Uzbekistan (1996).

The recovery in Central Asia as a region began in 1998 (see **Figure 2.2**), by which time all five countries had moved toward implementing various reform measures in various ways. Looking at the detailed country patterns (**Figure 2.3**), we note that in three of the five cases –

Kazakhstan, Tajikistan, and Kyrgyzstan – the actual turnaround from decline to recovery indeed came in 1998. In Kyrgyzstan and Uzbekistan, on the other hand, the turnaround came earlier (1995 and 1996, respectively), but the advanced contribution of these two countries to overall recovery is masked in the average regional curve by the majority with 1998 turnaround. The different timing of the turnaround point is explicitly linked to adoption of significant land reform legislation in different countries, as demonstrated in **Table 3.2** below.

3. Individualization of Central Asian agriculture

During the Soviet era, the farming structure in all the former republics of the USSR was dominated by large agricultural enterprises—collective and state farms, which coexisted with small household plots cultivated by the rural population—the traditional “private” sector of Soviet agriculture (Lerman et al. 2004). The large enterprises produced most of the commercially traded output, while the household plots were largely subsistence oriented and sold only their surplus output that remained after satisfying the family’s needs for food.

Two changes began to be implemented in this dual farming structure already in the early 1990s: the household plots were substantially enlarged by additional land allocations from the state and a totally new organizational form—the “peasant farm”—emerged after 1992. While household plots were typically managed on a part time basis by workers of agricultural enterprises, rural administrative employees, or pensioners and had many symbiotic links with the local agricultural enterprise, peasant farms were created as independent entities outside the existing collectivist framework. They were substantially larger than the household plots (although much smaller than the agricultural enterprises) and, unlike household plots, they had a clear commercial orientation. As a result, the dual farming structure that prevailed during the Soviet period evolved into a three-component structure: a “private” or individual sector that now consisted of both household plots and peasant farms and the corporate enterprise sector inherited from the Soviet era. We refer to this process involving enlargement of household plots and creation of new peasant farms as “conventional” land individualization.

It is important to note that individualization of land tenure is different from privatization of legal ownership of land. First, land can be privatized only in countries that legally recognize private ownership of agricultural land, i.e., Kazakhstan and Kyrgyzstan. In Tajikistan and Uzbekistan all land remains state owned and it is transferred to farmers in use rights. Turkmenistan formally recognizes private land ownership (with severe transferability restrictions), but virtually all land in the country is owned by the state and is given to farmers in use rights, as in Tajikistan and Uzbekistan where no private land ownership is recognized. Second, new landowners may decide not to farm their privatized land individually and instead transfer it to others for farming through various lease or rental arrangements. This is the experience in many Central and Eastern European countries, where land privatization often created absentee landowners with more lucrative jobs in the city, or alternatively, in countries such as Moldova or Romania, where the new landowners, while residing in rural areas and relying mainly on income from agriculture, felt unprepared to assume the risks of individual farming and therefore entrusted their land under contract to others, both individuals and corporations (Lerman et al. 2004). Private land owners and individual farmers are therefore two different groups of people with only partial overlap.

Since land resources in each country are inherently limited, the enlargement of household plots and the creation of new peasant farms have necessarily come at the expense of the

agricultural enterprises, which lost much of their land to the individual sector. **Figure 3.1** illustrates the shift of arable land from corporate farms (enterprises) to the individual sector (household plots and peasant farms) in four of the five Central Asian states, which adhered to the process of reform as described above. In all four countries we witness substantial expansion of the individual sector and the corporate farms have clearly lost their exclusively dominant position. Kazakhstan is somewhat of an outlier in three respects: first, this is the only country that suffered from significant shrinkage of arable land inventories through abandonment; second, the household sector in Kazakhstan controls a much smaller proportion of land than in the other countries; and third, the corporate sector continues to retain a much greater share of arable land than in the other countries. Still, the share of corporate farms in arable land in Kazakhstan went down from virtually 100% in 1990-91 to about 60% in 2007.

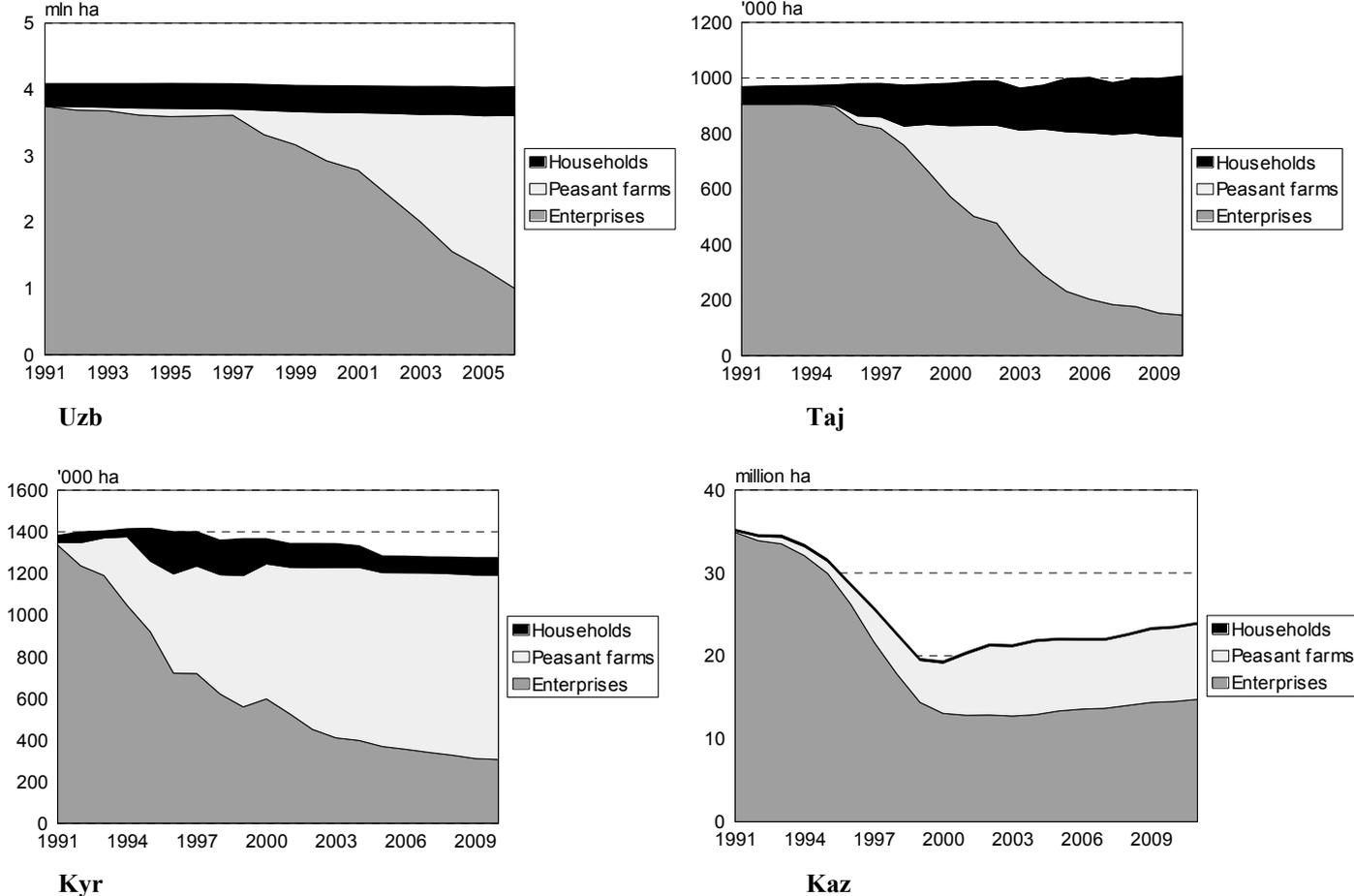


Figure 3.1. Shift of arable land from agricultural enterprises to individual farms since 1991 (countries with “conventional” individualization: Uzbekistan, Tajikistan, Kyrgyzstan, Kazakhstan).

Alongside with conventional individualization of land tenure in the four countries, Turkmenistan also achieved remarkable changes of farm structure despite its image as a “slow” reformer. In fact, Turkmenistan allowed farm structure to shift in 1998 from collective form of organization to family leaseholding (Lerman and Brooks 2001; EBRD/FAO 2012). Leaseholding is basically a form of individual farming (with many restrictions), although land in family leasehold is still recorded as part of the inventory of the former collective farm, which actually awards the leaseholds to its members: this land is not counted as individual tenure in official statistics and is not reflected as an advance in land reform in the formal land

reform indexes published by international organizations. Turkmenistan is the only country in the region where individual agriculture is mainly leasehold-based and the bulk of land in individual land tenure is not reported in official statistics. In **Figure 3.2**, the left-hand panel reflects the official land statistics, which show very little individualization since 1990. The right-hand panel uses indirect land-use data to separate out the component of arable land cultivated in family leaseholds: with this adjustment most of the arable land is seen to be in individual use since 1998.

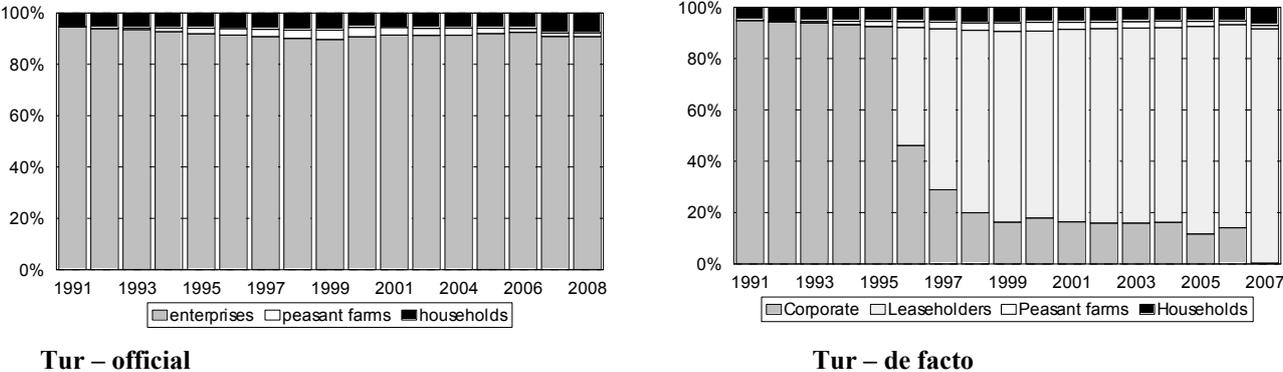


Figure 3.2. Individualization through leaseholding in Turkmenistan. Left panel: farm structure based on official statistics; right panel: estimated by extracting from corporate farms the component of land in leaseholding.

The shift of the main productive resource—arable land—from enterprises to the individual sector has resulted in a significant increase in the share of individual farms in agricultural production. At the end of the Soviet era individual farms (the traditional household plots at that time) contributed one-third of Gross Agricultural Output (GAO) in Central Asia and agricultural enterprises produced the remaining two-thirds; in 2010, individual farms (household plots and peasant farms combined) contributed 89% of GAO and the share of the enterprises had shrunk to 11%. **Table 3.1** summarizes the data on the dramatic shift of land and production to the individual sector between 1990 and 2010 in the Central Asian states. For comparison it shows Azerbaijan as a representative of the Trans-Caucasus region, where individualization has been comparable to that in Central Asia, and also Russia and Ukraine, where individualization lags far behind both Central Asia and Trans-Caucasus.

Table 3.1. Changing role of individual farms 1991-2010

	Share of arable land in individual use, %		Share of GAO from individual farms, %	
	1991	2010	1991	2010
Kaz	1	39	32	71
Kyr	3	76	44	98
Taj	7	86	36	91
Tur*	5	93		
Uzb*	8	75	33	94
<i>Average Central Asia</i>	5	73	33	89
Azerbaijan	4	84	35	95
Russia	2	31	24	56
Ukraine	7	49	27	60

*Latest available data for 2006; includes leaseholding.

There are certain differences in the composition of individual sector GAO across countries (**Figure 3.3**). Kyrgyzstan stands out as the country where peasant farms contribute the largest share of GAO. In Tajikistan, Uzbekistan, and Kazakhstan the role of the household plots in production is much more prominent. The share of agricultural enterprises in GAO has collapsed across the entire region, but in Kazakhstan they retain a relatively large share of

production (although also much smaller than the share of the individual sector). The relatively large share of production contributed by corporate farms in Kazakhstan is consistent with their relatively large share in arable land (see **Figure 3.1**).

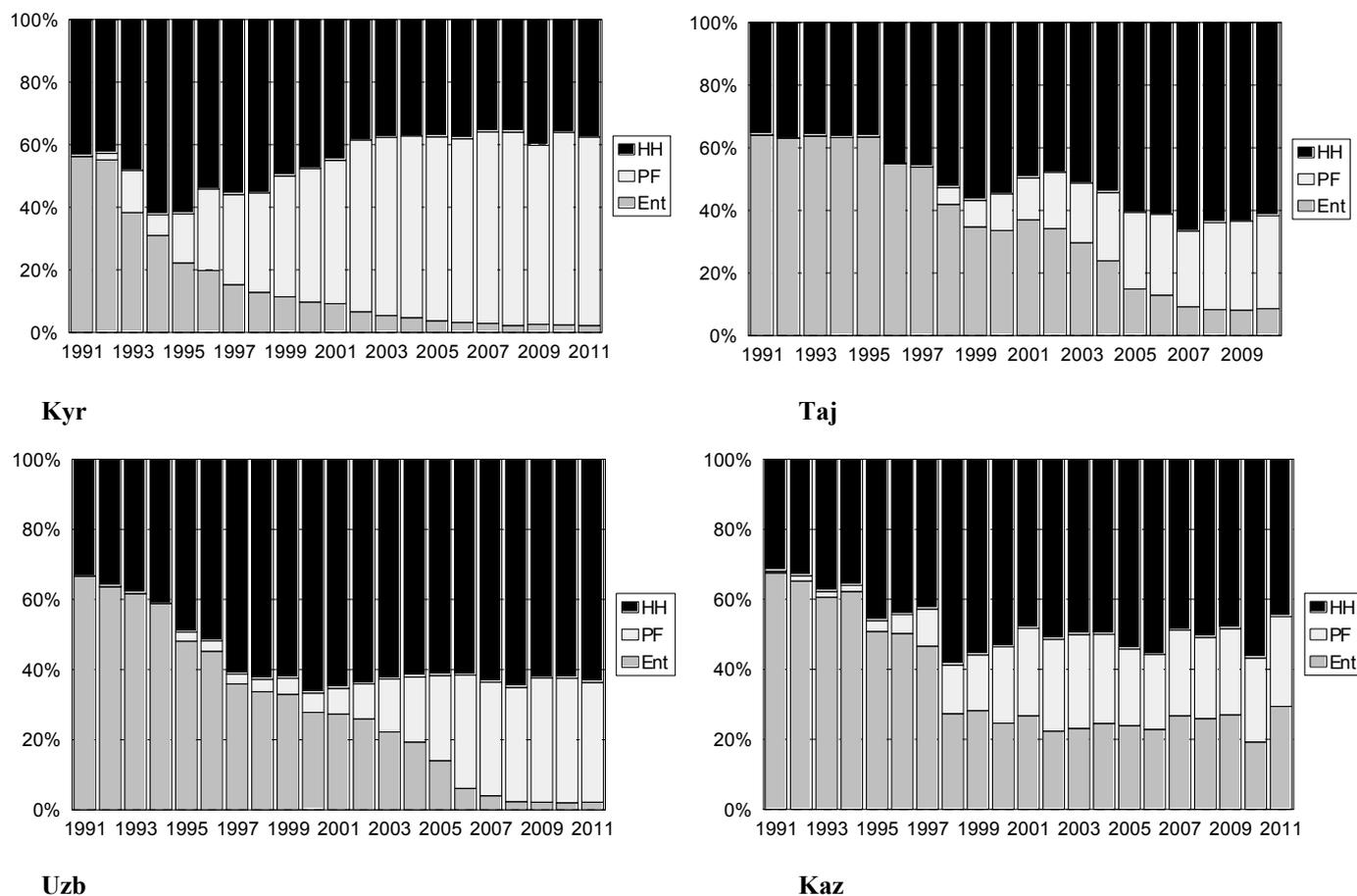


Figure 3.3. Changes in structure of GAO by farm type since 1991.
Legend: HH – households, PF – peasant farms, Ent – agricultural enterprises.

The turnaround point and individualization

The turnaround point in all Central Asian countries is characterized by a significant jump of the share of arable land in individual cultivation (**Table 3.2**). This share increased abruptly by a factor of between 1.6 and 2.0 in just two years: the year before the turnaround point (t-1) and the year after the turnaround point (t+1).² These abrupt increases in the share of individual land tenure were triggered by identifiable pieces of legislation adopted near the turnaround point (**Table 3.3**).

Table 3.2. Change in the share of arable land in individual use before and after the turnaround point

	Turnaround year, t	Arable land in individual use, %		Jump (t+1)/(t-1)
		Year t-1	Year t+1	
Kaz	1998	16	27	1.69
Kyr	1995	26	49	1.88
Taj	1998	16	32	2.00
Uzb	1996	12	19	1.58
Tur (incl. leaseholds)	1998	54	84	1.56

² In Azerbaijan the shift of arable land resources on two sides of the turnaround point (1997) was even more dramatic: the share of arable land in individual use went up from 6% in 1996 to 82% in 1998, a 14-fold increase.

Table 3.3. Significant land-reform legislation passed near the turnaround point

	Turnaround year	Date of significant land reform legislation	Name of legislation
Kaz	1998	8.1997 3.1998	Land shares Peasant farms law
Taj	1998	6.1996 6.1998	Enterprise reorganization Right to land use
Tur	1998	12.1996 1.1997	Land allocation to individuals Improving farm incentives
Kyr	1995	2.1994 8.1994	Measures for deepening land and agrarian reform Procedures for implementation of land reform; reorganization of ag enterprises; land share determination
Uzb	1996	8.1994	Measures for economic encouragement of the development of agriculture

The significant change of individual land tenure at the turnaround point and the existence of identifiable legal acts associated with the turnaround year provide strong evidence of a link between individualization of agriculture and agricultural recovery. Further evidence is provided by the comparison of individualization in Central Asia, on the one hand, and Russia and Ukraine, on the other (**Table 3.1**). Two facts are apparent for Russia and Ukraine. First, agriculture in Russia and Ukraine is much less individualized than in Central Asia (**Table 3.1**). Second, agricultural recovery in Russia and Ukraine after the turnaround point in 1999 was much more sluggish than in Central Asia or Trans-Caucasus (**Figure 2.2**). In our view, the sluggish recovery in Russia and Ukraine is the result of indecisive and half-hearted individualization attempts: these two large countries continue to maintain policies that give preference to large corporate farms rather than small family farms. By contrast, the robust recovery in both Trans-Caucasus and Central Asia is associated with decisive land individualization policies in these regions.

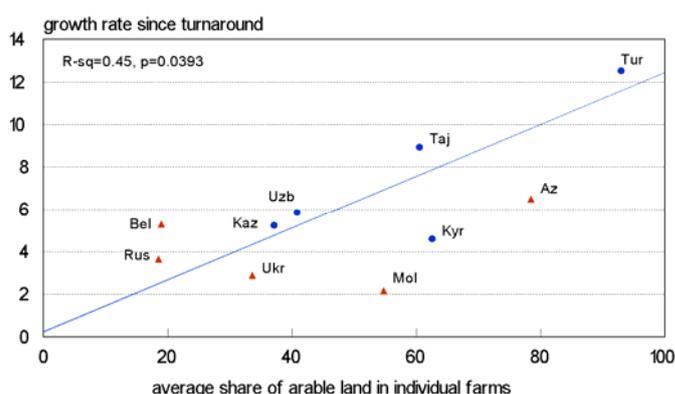


Figure 3.4. GAO growth rate since turnaround increases with the increase of the average share of arable land in individual farms: Central Asia and other CIS countries.

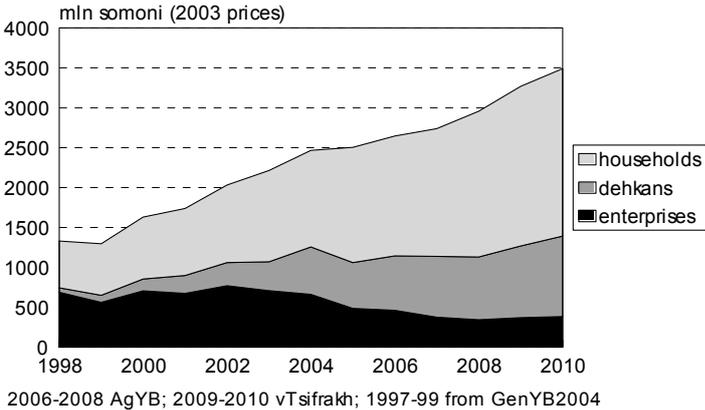
Finally, a simple analysis for Central Asia and other CIS countries shows that the annual growth rate achieved after the turnaround year is positively associated with the share of arable land in individual farms (**Figure 3.4**; $R^2=0.45$, the regression coefficient is significant at 5%). In other words, post-turnaround growth is faster in countries that have more land in individual

use. It is interesting to note that a similar result is obtained in a cross-sectional regression of some 80 administrative regions in Russia: here also agricultural growth is faster in regions with a higher share of land in individual tenure (household plots and peasant farms combined).

Sources of growth

Another view of the contribution of individual farms to growth is provided by **Figures 3.5 and 3.6**, which show the growth of GAO in absolute values for Tajikistan, Kyrgyzstan, and Kazakhstan (no data for Uzbekistan and Turkmenistan). The data are presented in constant prices, decomposed by farm type. The total GAO produced by all farm types corresponds to the line that delimits the graph area from above. The bottom (black) layer represents the GAO produced by farm enterprises, and the layers above it represent the absolute contribution of the individual sector. In Tajikistan and Kyrgyzstan the contribution of farm enterprises to GAO shrinks markedly over time, while the total GAO continues growing. This clearly proves that agricultural growth is driven by the individual sector.

Tajikistan GAO by farm type 1998-2010



Kyrgyzstan: GAO by farm type 1990-2010

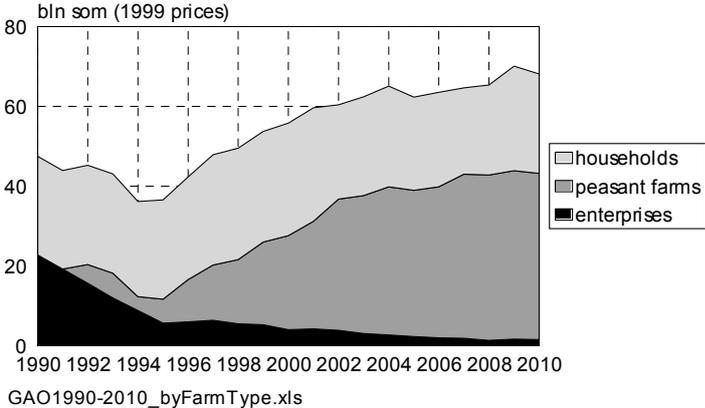


Figure 3.5. Individual sector as engine of growth in Tajikistan (top panel) and Kyrgyzstan (bottom): total GAO in constant prices (top curve) increases despite continued decrease in the enterprise sector (bottom black layer).

In Kazakhstan the overall growth since turnaround (in 1998) was more moderate than in the two other countries (**Figure 3.6**; see also **Figure 2.3**), but the contribution of farm enterprises was increasing (contrary to Tajikistan and Kyrgyzstan). Still, the total GAO (in 2000 agricultural prices) increased by about 400 billion tenge, rising from 400 billion tenge in 1998

to 800 billion tenge in 2011, while the farm enterprises contributed just 100 billion tenge to this growth, with their production rising from about 100 billion tenge to slightly over 200 billion tenge. Thus, also in Kazakhstan, the overall growth in GAO was driven primarily by the individual sector, whose absolute contribution increased from 300 billion tenge in 1998 to 600 billion tenge in 2011, contributing 75% of the total growth over this period.

Kazakhstan: GAO by farm type 1998-2010

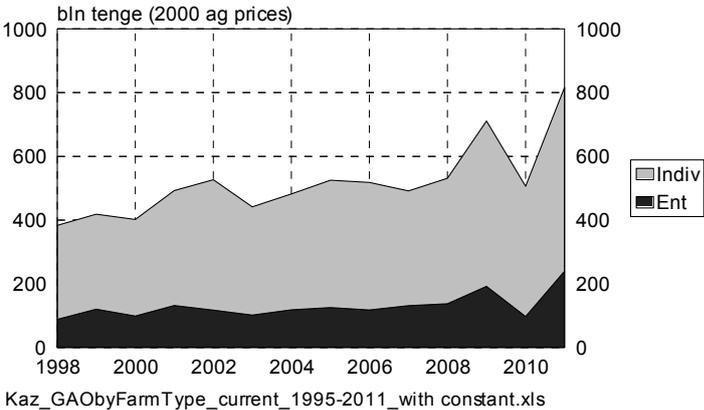


Figure 3.6. Individual sector as engine of growth in Kazakhstan: total GAO in constant prices (top curve) increases more than the increase in the enterprise sector (bottom black layer). GAO in constant prices estimated by using the index of agricultural prices to deflate reported GAO in current prices.

4. Productivity of individual farms

Central Asia enjoys robust agricultural growth despite the steady decline of corporate farms (enterprises) and their shrinking share of both land and production. This implies that recovery in agriculture is driven entirely by growth in the individual sector of household plots and peasant farms, while the formerly dominant sector of agricultural enterprises continues its decline. In fact, individual farms are the engine of recovery because they achieve higher productivity than enterprises. The renewal of growth in Central Asia is attributable to a combination of two factors: the increasing share of the individual sector (household plots and peasant farms) in agriculture and its higher productivity

A rough and easy way to assess the productivity of farms of different types is by comparing their share in production to their share in arable land. In Central Asia, the individual sector—household plots and peasant farms combined—contributes 88% of GAO (the value of gross agricultural output) on just 71% of arable land (see **Table 3.1**). This disparity between the share of individual farms in output and land is a persistent phenomenon that was observed also in the Soviet period, when household plots—the only type of family farm in existence at that time—produced 45% of GAO on just 2% of land. The disparity between shares of production and land provides a measure of relative productivity: the entire agricultural sector produces 100% of GAO on 100% of land with relative productivity of 1; relative productivities higher than 1 (when the share of output is greater than the share of land) are indicative of land being used more efficiently than the average for the entire sector, while relative productivities less than 1 (when the share of output is less than the share of land) suggest that land is being used less efficiently than the sectoral average.

Estimates of relative efficiency of land utilization for farms of the three main types—agricultural enterprises, peasant farms, and household plots—present a clear ranking for the Central Asian countries (**Figure 4.1**): the efficiency of land utilization rises sharply from enterprises (the lowest) to household plots (the highest). Peasant farms generally fall in the

middle between enterprises and household plots (except in Tajikistan, where many so-called “peasant farms” are simply renamed enterprises). The low relative productivity of agricultural enterprises suggests that they are very inefficient in the utilization of the large land resources that they continue to control: more efficient farming could generate substantially greater output from the available arable land and thus contribute more to rural incomes and poverty alleviation.

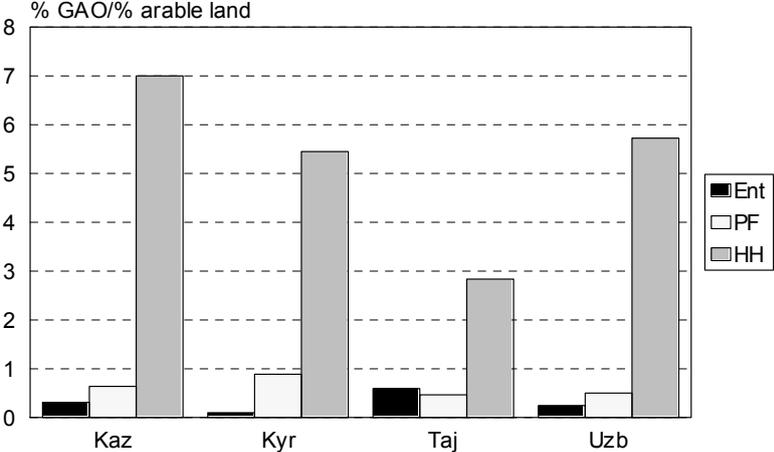


Figure 4.1. Relative productivity of land by farm type in Central Asia, 2010 data for Kaz, Kyr, Taj; 2006 for Uzb; compressed vertical scale for Kazakhstan (actual value HH=61).

Alongside relative productivities of land utilization, we can also calculate the absolute land productivity for different farm types as the value of crop production per hectare of sown land. Such calculations have been carried out for four countries: Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan. Calculations for Turkmenistan run into difficulties due to data problems stemming from the unclear definition of what constitutes the individual farm sector in this country.

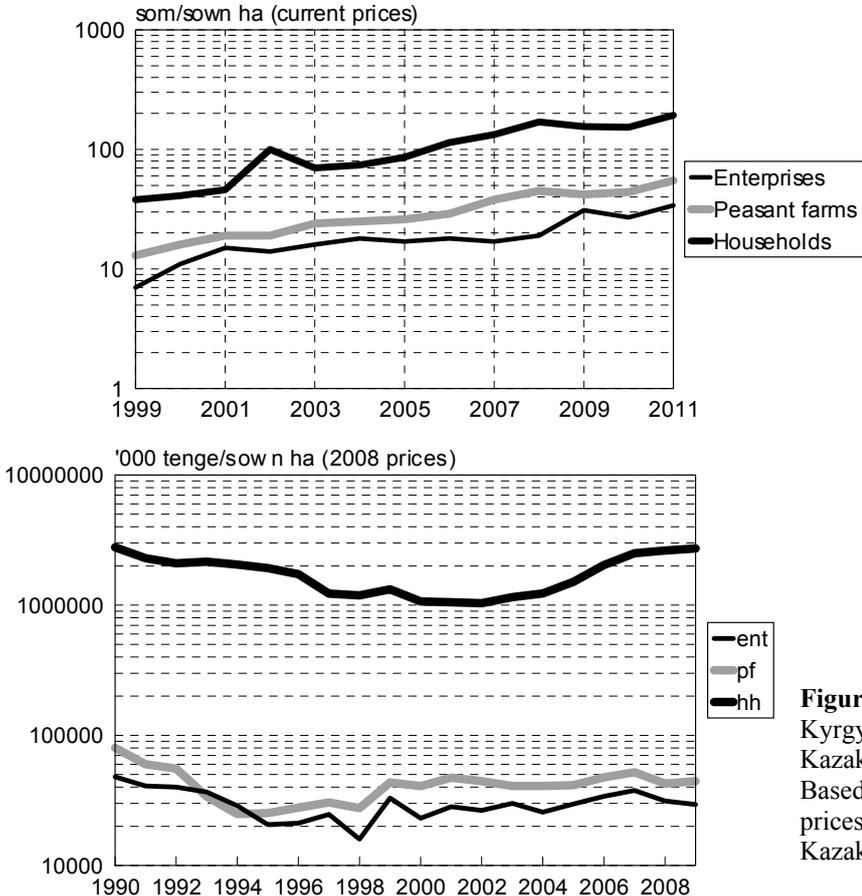


Figure 4.2. Land productivity by farm type in Kyrgyzstan (1999-2011, top panel) and Kazakhstan (1990-2009, bottom panel). Based on value of crop production in current prices for Kyrgyzstan and constant prices for Kazakhstan.

The pattern for Kyrgyzstan and Kazakhstan is the closest to our theoretical expectations: in both countries individual farms—household plots and peasant farms—achieve consistently higher levels of land productivity than agricultural enterprises (Figure 4.2). Among the two components of the individual sector, the traditional small household plots outperform the newly emergent peasant farms. The time series of productivity calculations in absolute values reveal the same ranking for Kyrgyzstan and Kazakhstan as relative productivity (see Figure 4.1): efficiency of land use rises from enterprises to peasant farms and finally to household plots. This efficiency ranking provides strong evidence in support of land reform, which has been responsible for the strengthening of the relatively more productive individual farms.

The diagrams for Tajikistan and Uzbekistan (Figure 4.3) also demonstrate the case for land reform and its potential yield improving effects. Figure 4.3 shows the huge differences in productivity of land between household plots on one side and enterprises and peasant farms on the other. Household plots—the undisputed individual farms in all 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. The productivity results for peasant farms are puzzling in our theoretical framework: there are no statistically significant performance advantages to family-run peasant farms compared with manager-run enterprises in Tajikistan and Uzbekistan.

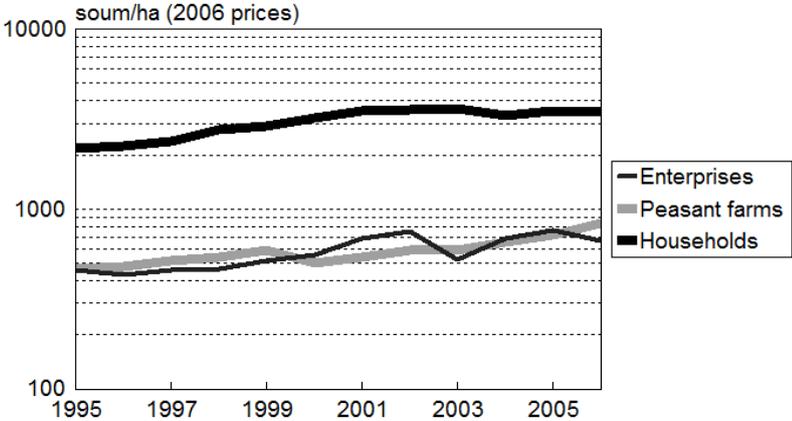
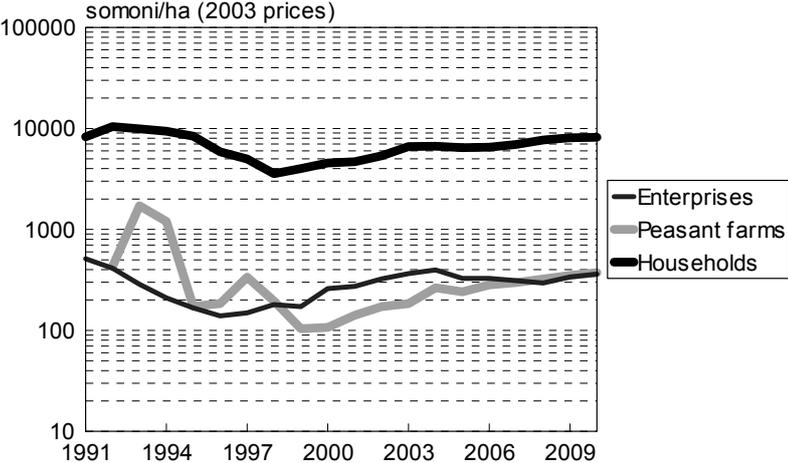


Figure 4.3. Land productivity by farm type in Tajikistan (1991-2010, top panel) and Uzbekistan (1995-2006, bottom panel). Based on value of crop production in constant prices.

In Tajikistan, this puzzling result may stem from the fact that until recently at least one-third of the peasant farms in this country were not really individual farms at all: they were

collective dehkan farms (partnerships) created in the process of reorganization of traditional farm enterprises and their incentives were closer to those of corporate farms than individual farms. Many of these collective dehkan farms had been only cosmetically reorganized and the management structures remained unchanged. Under these circumstances we should not be surprised that the productivity of peasant farms in Tajikistan, taken as a heterogeneous group, was not different from that of the farm enterprises they had succeeded. More recently, the World Bank's Land Registration and Cadastral System Project (LRCSP), jointly with the government of Tajikistan, initiated a program reallocating land from collective dehkan farms to family and individual farms. As a result, the number of collective dehkan farms shrank rapidly and most dehkan farms today are individual and family farms. This may have actually been one of the reasons for the increase in land productivity of peasant farms, which since 2007 has surpassed the productivity of collective enterprises (**Figure 4.3**, top panel).

Another reason may be related to government policies, which often impose constraints on farmers' freedom of operating choices. This is particularly so in Tajikistan and Uzbekistan (as well as Turkmenistan), where governments continued to maintain the traditional system of state orders for many years after the dissolution of the Soviet Union. Under this system peasant farmers were obligated to sow fixed proportions of their land in cotton and wheat and sell their output at prices fixed by the state. Household plots, on the other hand, were never subject to state orders. The lack of "freedom to farm" may have depressed the productivity of peasant farms, and recent relaxation of these constraints in Tajikistan may have contributed to the increase in their productivity since 2007.

From a slightly different perspective we can conjecture that the newly emergent peasant farms are still in the learning stage, trying to adapt to the market environment and to optimize their operations. The infrastructure and support services in all CIS countries are grossly inadequate in general and are ill-adapted to serving mid-sized family farms in particular. Inadequate marketing and supply channels, as well as almost total lack of extension and advice services, constitute a serious obstacle to efficient operation of new peasant farms and prevent them from realizing the inherent advantages of their individual form of organization. It is conjectured that the performance of peasant farms will rise in line with theoretical expectations when the market and policy environment improves.

5. Policy reforms and farm performance

Throughout this article we have emphasized individualization of land use as a measure of success of agricultural reforms. Individualization is a direct outcome of land reform and farm restructuring, but this in itself is only one dimension of the process of reform. The so-called ECA Land Reform Index, developed at the World Bank in 1998, essentially measures how far land tenure and farm structure have advanced from the socialist model of predominantly large-scale collective agriculture to the market model with predominance of relatively small family-operated units. The broader ECA Agricultural Policy Index, in addition to the evaluation of land reform, includes four other dimensions relevant for the transition in agriculture: liberalization of agricultural markets, privatization and demonopolization of agricultural services (both upstream and downstream), establishment of an institutional framework for market agriculture, and development of rural finance. The ECA reform indexes are constructed on a scale from 1 to 10, where 1 corresponds to a command economy and 10 to an economy with completed market reforms. Both indexes are presented for the Central Asian countries in **Table 5.1** where Kyrgyzstan and Tajikistan are characterized as "advanced" reformers (ECA Land Reform Index 6 or higher), whereas Kazakhstan,

Uzbekistan and Turkmenistan are “slow” reformers (ECA Land Reform Index below 6). Already this small example in **Table 5.1** is sufficient to demonstrate the effect of the additional dimensions beyond land reform: when these dimensions are taken into account, Kazakhstan moves to an “advanced” reformer status (ECA Agricultural Policy Index greater than 6) and Tajikistan is demoted to a “slow” reformer status (ECA Agricultural Policy Index less than 6), at least in part due to the state’s pervasive interference in farmers’ cropping and production decisions (restricted “freedom to farm”). The two indexes do not always produce the same ranking, because they aggregate different dimensions of reform. Another reform index, the EBRD transition score for the agribusiness sector (EBRD Transition Report, 2012), appears to be conceptually closest to the ECA Agricultural Policy index and in fact it produces the same ranking: Kyrgyzstan and Kazakhstan are characterized as having a medium transition gap relative to advanced industrial economies, whereas Tajikistan, Turkmenistan, and Uzbekistan still have to bridge over a large gap between the administrative-command tradition and market agriculture.

A different set of evaluation measures completely unrelated to agriculture is published by the Freedom House in their annual publication *Nations in Transit*. The so-called Democracy Score is an average of seven ratings that reflect progress with various aspects of democratic civil society (Electoral Process, Civil Society, Independent Media, National Democratic Governance, Local Democratic Governance, Judicial Framework and Independence, Corruption). The ratings are based on a scale of 1 to 7, with 1 representing the highest level of democratic progress and 7 the lowest. The Democracy Scores shown in **Table 5.1** are averages for 2003-2012. Kyrgyzstan and Tajikistan have the best scores (closest to 1), while Turkmenistan, and Uzbekistan have achieved the least democratic progress (their scores are very close to 7). Kazakhstan is in the middle between these two extremes, with Democracy Score of 6.4. Despite the numerical difference in scores, all the five countries are described by Freedom house as “Consolidated Authoritarian Regimes”, similarly to Russia, Belarus, and Azerbaijan. Although unrelated to agriculture, the ranking by Democracy Score matches perfectly the ranking by the ECA Land Reform Index (compare to first column in **Table 5.1**).

Table 5.1. Policy reform indices and growth rate since turnaround point in Central Asian countries

Country	ECA Land Reform Index (2004)	ECA Agricultural Policy Index (2004)	Transition Gap (2012)	Democracy Score (ave. 2003-2012)	Share of arable land in individual use, % (2010)	Annual growth rate from turnaround to 2010, %
Kyrgyzstan	8	7.4	Medium	5.86	76	4.1
Tajikistan	6	5.2	Large	5.97	86	8.8
Kazakhstan	5	6.2	Medium	6.36	39	4.7
Uzbekistan	5	4	Large	6.75	75*	5.8*
Turkmenistan	2	1.8	Large	6.92	93*	13.2*

*Latest available data for 2006; includes arable land in leaseholding.

Sources: World Bank ECA indexes from latest available update (Csaki and Kray 2005); Transition Gap from EBRD (2012), Table A.1.1.2; Democracy Score from Freedom House (2012), averages for 2003-2012.

Are the various policy indexes related with standard performance measures, such as agricultural growth? The numbers in **Table 5.1** do not show a clear pattern, with Kyrgyzstan and Turkmenistan extreme outliers. Kyrgyzstan achieved the lowest growth rate despite its very high Democracy Score and high ECA reform indexes; Turkmenistan achieved the highest growth rate despite its dismal Democracy Score and low ECA reform indexes (which are based on the official land reform numbers that ignore the contribution of leaseholders to individual agriculture). Of course it is very difficult to look for meaningful correlations in a

sample of just five countries. In this respect we should preferably turn to **Figure 3.4**, which reveals a strong positive correlation between individual land tenure (a proxy for the ECA Land Reform Index) and annual growth rate since turnaround, thus supporting our contention that greater policy reforms, as reflected in individual land tenure, are conducive to agricultural growth.

6. Conclusion

The five countries of former Soviet Central Asian – Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan – have made huge strides in their efforts to reform tenure rights in agricultural land and change the traditional Soviet-style farming structure to a model closer to market principles. Two of the five countries – Kazakhstan and Kyrgyzstan – now recognize private ownership of agricultural land and allow land market transactions; Tajikistan retains state ownership of land but nevertheless allows land market transactions in the guise of transferable land use rights; only Uzbekistan and Turkmenistan retain the Soviet model of state-controlled rigidly non-transferable land, but even in these two countries land use and agricultural production have massively shifted from large collective farms to small leaseholders. The individualization of Central Asian agriculture has largely driven the impressive recovery in agricultural production that we are witnessing since about 1998 across the region.

The empirical evidence presented in this study supports the theoretical view that the differences in the incentive structure between corporate and family farms should lead to higher productivity in family farms (i.e., peasant farms and household plots in the present context) than in corporate farms (large-scale enterprises). The productivity difference is due, in particular, to the positive effects of personal accountability and absence of agency costs in family farms. These theoretical considerations provide the rationale for land reform and farm restructuring in transition countries, which generally leads to individualization of agriculture, i.e., a shift from predominance of Soviet-style corporate farms to family farms.

Recovery of agricultural growth is associated with individualization of farming. Because of the higher productivity of family farms, and especially household plots, the individualization of agriculture has led to significant recovery of agricultural production in Central Asia. The steep decline in GAO that characterized the early years of transition (1990-1994) changed to robust growth in the second half of the 1990s. Following the shift to more productive individual agriculture GAO had recovered to the 1990 Soviet-era peak by 2004-2005 and has continued growing.

Small family farms have become the backbone of the post-transition farming structure, replacing the agricultural enterprises that dominated during the Soviet era. Yet policy makers in all CIS countries, including Central Asia, continue to show very strong bias in favor of large farms, ignoring the empirical fact that there are generally no economies of scale in primary agricultural production. Investments and support measures are primarily designed for large corporate farms, although this sector makes a small and steadily decreasing contribution to agricultural output. The small family farms, on the other hand, are treated with disdain as “non-commercial” and “subsistence oriented”, completely disregarding their dominant contribution to agricultural production. This attitude is clearly evident in the latest “farm size optimization” campaign in Uzbekistan, which involves forced enlargement of some peasant farms at the expense of other farms, whose owners are forced out of agriculture. The campaign characterized as it is by blatant government intervention clearly contradicts the

basic principles of freedom of choice in agriculture and can only be described as re-collectivization.

Instead of meddling in farmers' choices, governments should concentrate on implementing policies that enable small farms to operate profitably and efficiently. The new farming structure that has emerged during the transition requires a new market infrastructure for farm services, including channels for sale of products and delivery of farm inputs, as well as provision of extension, training, and advice services for the small private farmers. Government policies should be designed to take these new factors into consideration.

While much remains to be done in the area of land reform and farm restructuring until Central Asia closes the gap between the administrative-command tradition and market agriculture (see **Table 5.1**), the focus of attention has begun to shift to post-restructuring measures intended to ensure viability and profitability of the smallholder farms by counteracting the negative effects of smallness. This is reflected, in particular, in the emerging recognition of the need for agricultural service cooperatives as an institution to support market access for smallholders. The development of agricultural service cooperatives is now an official priority in the latest agricultural strategies of both Kyrgyzstan and Tajikistan.

The empirical results of this study have important implications for the ongoing policy debate between the supporters of large corporate farms, who continue to advocate economies of scale, and the supporters of smaller family farms, who emphasize the advantages of individual incentives. This debate is not limited to Central Asia, and it is relevant also for the rest of the CIS. The results will hopefully inform this ongoing debate and incrementally add to the growing body of evidence that highlights the performance advantages of family farms in transition countries.

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