

ASA “Support to Agricultural Modernization in Uzbekistan”

Farm Restructuring in Uzbekistan: How Did It Go and What is Next?

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List of Acronyms

AGRIWANET	Database on agriculture in Central Asia prepared by IAMO
GAO	Gross agricultural output
GDP	Gross domestic product
Ha	Hectare
IAMO	Leibniz Institute of Agricultural Development in Transition Economies, Halle (Saale), Germany
LSU	Livestock unit
MAWR	Former Ministry of Agriculture and Water Resources
UzGosKomStat	State Committee of the Republic of Uzbekistan on Statistics
UZS	Uzbek Som
WB	World Bank
WDI	World Development Indicators

Executive summary

1 In January 2019, Uzbekistan started a new farm restructuring¹. It is said to seek to optimize the use of farmland by increasing the size of farms producing wheat and cotton, reallocating land to more efficient farmers and even clusters, and improving crop rotation options.

2 This is not the first time that this kind of farm restructuring in Uzbekistan takes place. The country has gone through several waves of farm restructuring and land reallocations. Both these processes were administratively managed, with little reference to market or income generation opportunities. During 1992-1997, state farms were decollectivized. During 1998-2002, farm fragmentation into small production units has started, which was completed during 2003-2008. Unsatisfied with the performance of fragmented farms, the government started farm consolidation between 2008/2009 and 2016, creating a dual system when *dekhkan* smallholders averaging 1 ha and producing livestock and horticulture products coexisted with large individual farms, averaging 40-60 ha and producing cotton and wheat under the state order system. The 2019 restructuring seeks to double the size of cotton and wheat farms to the average of 100 ha.

3 This report takes stock of the past farm restructurings and their impacts on agricultural production outcomes and productivity of farm land and labor use to predict the outcomes of the 2019 restructuring. In addition, it provides recommendations on reforms that should complement farm restructurings to make a significant impact on agricultural development.

4 The major findings from the past restructurings are the following:

- a. Past farm restructurings were an integral part of the strict policy to increase production of two strategic crops, cotton and wheat. Farmers, requested to produce these crops, have received land, intermediate inputs, capital, and market; yet, outputs were procured at prices, which could rarely cover production costs. In many cases farmers made losses, especially in the areas with poor soils and insufficient water. That is why it is difficult to decouple the effects of farm restructuring from other policies on agricultural outcomes.
- b. Agriculture grew at the relatively high rate, driving the average productivity up. Between 1996 and 2016, the average agricultural labor productivity annually grew by 1.5 percent. Yet, over time the agricultural productivity growth has slowed down despite the farm restructuring. The most important is, however, that the growth in agricultural labor productivity was a result of a large decline in the number of agricultural workers rather than a result of the large increase in agricultural value added. Share of agriculture in total labor force declined from 43 percent in 1996 to 30 percent in 2016. This growth has been called “jobless” as it has not generated jobs, neither in primary agriculture nor in food and textile industries, which depend on raw materials from the primary agriculture, where the employment declined in both absolute and relative terms.
- c. The administrative increase of size of farms producing cotton in 2008 has not helped generate economies of scale and increase its yields and quality. Production of cotton has decreased over time, because of the cotton land reallocation to other crops and flattening yields. Lower yields were a result of the cotton taxation, lack of good seeds, and introduction of wheat production quota, which replaced fodder in the cotton rotation system. Sowing wheat after cotton has reduced soil fertility (and thus cotton yield), which was regenerated in the past when cotton was followed by fodder as a part of soil management practices.
- d. Production of wheat by large farms has been rising, resulting from the increase in land allocation and yields. But in recent years, the growth in wheat production has lagged the growth in domestic wheat consumption, which is increasingly met by imports. In 2017,

¹ The Resolution of the Cabinet of Ministers No. 14 from January 11, 2019.

wheat import accounted for 43 percent of wheat production, a large increase compared to 25 percent in 2010. The evidence is piling up that larger farms are insufficient to satisfy the requirements of even local consumers in terms of quantity and quality of wheat.

- e. Production of horticulture and livestock products has almost fully shifted to small *dekhkan* farms. The government has neither intervened into production of these commodities nor provided any substantial public services. The production of these commodities increased, and *dekhkan* farms are more efficient than larger (individual) farms regarding the use of land and labor in Uzbekistan partially because they produce more profitable and less water-demanding products and partially because they take care of their limited production base. They truly 'own' their land and invest in it. Yet, very small size of these farms seems to prevent them to generate sufficient volumes of outputs to reduce transaction costs for marketing and improve quality and consistency of their outputs. Land allocation to state-mandated cotton and wheat continues to dominate the sown area, presenting a major challenge to *dekhkan* farms and production of horticulture and livestock products. *Dekhkan* farms producing high-value crops are constrained in their access to fertilizers, fuel, machinery, credit, value chains, and export channels. Solving their land issues will be only a part of the integrated solution.
- f. Frequent farm restructurings and the weak land tenure security rights have curtailed farm management and investment incentives and raised issues of "fair and just" access to farmland for rural population. Land leasing and subleasing is not permitted, so farmland cannot move freely from less efficient to more efficient producers.

Lessons for the 2019 farm restructuring

5 The past farm restructurings do not seem to provide an optimistic outlook for the 2019 restructuring. The results of the upcoming restructuring will be that large wheat and cotton farms will become even larger and some land will be shifted from farmers, who were not able to meet the state order targets for whatever reasons, to farmers, who were able to meet targets. There is no guarantee that the shifted land will be used more efficiently once 'new' land users realize that they receive low-fertile land with poor irrigation, for example. Some of the vacated land will be transferred to cotton-textile clusters, which also does not guarantee its most efficient use. But what this restructuring will surely do is to restrain farmers from making significant soil improvements and investments in innovative technologies (see paragraph 4f). Why to invest in assets, which could be expropriated by the state at any time without compensation? In addition, without making it profitable for farmers to produce cotton and wheat and without increasing public spending on agricultural programs for generating technologies, disseminating knowledge and building more human capital, reducing transaction costs, and crowding in private capital, the upcoming farm restructuring will not change the current performance of the sector.

6 Like other Central Asian governments, Uzbekistan has struggled to find a post-socialist model for its farming sector. The debates still focus on the desirable farm size where the Soviet legacy of industrialized collective farms co-existing with private household plots marked the extremes. The global experience, on the other hand, stresses the need for flexibility in farming structures. Very small plots operated by *dekhkan* farms in Uzbekistan are suboptimal, but once farm size reaches 30-40 ha for wheat and cotton, increasing it further does not bring much economic gain. There is generally no evidence of economy of scale in primary agriculture, and any gains from economy of scale are easily negated by extra monitoring costs of wage labor and farm managers. These factors highlight the importance of individual incentives for farm efficiency and account for the predominance of family farms in a market economy.

7 Optimal farm size globally is determined in each case by the managerial capacity of the farmer and many exogenous factors. Farm size is often growing in the countries where economic growth and rising off-farm wages lead to the outflow of agricultural labor. Thus, rather than

targeting at a type or size of farm organization, the global experience shows that it is better to focus on helping farmers: (i) improve their managerial capacity; (ii) react to market signals by removing agricultural distortions; (iii) lease or buy more land when profitable; and (iv) access a set of supporting agricultural services.

Recommendations

8 The future reform agenda would need to focus on: (i) removal of the production distortions; (ii) increase of the impact of agricultural public expenditures on the sector performance; and (iii) help of smallholders to reduce transaction costs. The specific actions can be the following:

Production distortions

- Phase out the cotton and wheat production quotas, inside and outside of the clusters.
- Align farm-gate prices for cotton and wheat with market prices.
- Avoid the introduction of new mandates (such as on high value crops or diversification) that impose yet other production constraints on farmers.
- Liberalize land market to allow farm restructuring to evolve responding to market signals. This does not necessarily require full privatization of farmland in the short run, but the legalization of land rentals and sub-rentals, revoking the threat of public land seizures, and formalization of labor contracts. It is important to ensure that transaction costs for moving land from less to more efficient farmers are minimized, irrespective of size or type of farms, and leasing is market oriented.

Efficiency of agricultural public expenditures

- Use public expenditures more effectively to help farmers increase returns to land and labor. It would require redirection of farm subsidies towards public good provision and empowering national and local governments to allow more effective service delivery such as land registries or advisory services.
- Major public programs, for which the public expenditures need to be increased, include, among others: applied agricultural research and development, extension, education, soil fertility, food safety, animal disease control, veterinary services, phytosanitary services, support to smallholders (cooperatives, clusters, productive partnerships), market and statistical information, water-saving technologies, market infrastructure and logistics, environment protection, policy analysis, and sector coordination.
- Ensure that an adequate amount of public expenditures is allocated to the above-mentioned programs to make a difference. Many of them were underfunded in the past.

Programs for dekhkan farms

- Introduce public programs targeting *dekhkan* farms, especially those who want to expand and grow. These programs can facilitate establishment of productive partnerships (cooperatives) among farmers, and between farm groups and agribusiness, to improve quality and safety of products and connect these farms to modern value chains. Such programs are common in many countries with small farms. The role of government would be to finance: (i) establishment of farm groups; (ii) improvement of their farming and managerial capacity; (iii) activities of anchor agribusinesses to develop vertical networks; and (iv) business arrangements to provide veterinary and advisory services to small farmers on behalf of the government.

9 How a future and still growing rural population will be employed and secure its income is one of the essential questions the government seeks to address. It would require actions beyond the farm restructuring. Farm restructuring is only a part of the puzzle to be brought together into one coherent piece, not a silver bullet as often perceived.

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I. Introduction

1 Since independence, Uzbekistan's unique agricultural reform pattern involved multiple changes in farm sizes and specialization, all mandated by the government. Public ownership of land provided the legal basis for these unique restructuring experiments. Such readjustments in farm fragmentation, re-consolidation, and optimization affected the picture of an average farm and make farmers a moving-target for policy advice.

2 The aim of this report is to describe major trends of farm restructuring in Uzbekistan since independence. Special attention is paid to the evolution of individual farms since 2006, with a focus on the changes in number and average size of cotton-grain growing farms across provinces of Uzbekistan.²

3 In the first section, the major stages of farm restructuring are presented along with the overview statistics on farm numbers and size. The second section takes stock of restructuring outcomes to date by reporting detailed figures on the current structure of individual farming by region. The third section portrays major trends in land use by crop, production outcomes and productivity measures. The final section concludes with an overall assessment of the restructuring policy and implications for the 2019 restructuring.

4 The report uses official agricultural statistical data, which were collected from the State Committee of the Republic of Uzbekistan on Statistics (UzGosKomStat) and the former Ministry of Agriculture and Water Resources (MAWR). The statistical data are complemented with expert interviews and the review of local publications and national legislation.

II. Major Stages of Farm Restructuring since Independence

Key agricultural indicators by region

5 In 2016, rural population accounted for almost half of population in Uzbekistan with the highest share in Khorezm (68 percent), Surkhadarya (64 percent), Bukhara and Samarkand (each about 62 percent) provinces. The lowest were in Tashkent (28 percent) and Namangan (35 percent) provinces (Table 1).

6 According to official statistics, in 2016 agriculture contributed about 24 percent of gross domestic product (GDP). The lowest contribution of agriculture to domestic product was in Karakalpakstan and Navoi province. Agriculture made up almost a half of GDP in Andijan and Jizzakh provinces.

7 Cotton and wheat dominate the sown area. In 2016, almost three-fourth of sown area was allocated to these crops. In Syrdarya, Bukhara, Navoi and Surkhandarya provinces, cotton and wheat occupied over 80 percent of total sown area. Cotton and wheat were less spread in Karakalpakstan and Jizzakh, Tashkent and Khorezm provinces, occupying less than two-thirds of sown land.

8 Sown area is in relative scarcity in Uzbekistan: on average there were about 0.23 ha of sown area per rural inhabitant. The provinces with the highest density of rural population are Andijan, Samarkand, Surkhadarya and Fergana, while the lowest densities are observed in Syrdarya and Jizzakh provinces.

9 After the dissolution of the Soviet Union, the farm types in Uzbekistan were changed several times (Lerman 2008 and Djanibekov *et al.* 2012).

² It should be noted that in this report the terms such as 'individual farm' with 'farm', 'dekhkan farm' with 'rural household' or 'household', and 'agricultural enterprise' with 'enterprise' are used interchangeably.

10 Table 2 summarizes the five critical stages in the farm restructuring process. Each stage differs by the speed and level of regulations accompanying the transfer of state and collective property to private hands and distinguished by policy objectives.

Table 1: Selected indicators of agriculture by provinces in 2016

Province	Total sown area, '000 ha	Total population, '000 persons	Share of rural population, %	Share of cotton & wheat in sown area, %	Share of gross agri output in GDP, %	Sown area per rural inhabitant, ha/cap
Karakalpakstan	254.9	1,818	50.8	62.3	20.5	0.28
Andijan	230.1	2,963	47.6	76.6	46.5	0.16
Bukhara	240.6	1,844	62.5	83.0	40.3	0.21
Jizzakh	401.1	1,301	53.0	61.8	47.7	0.58
Kashkadarya	495.5	3,089	57.1	78.1	25.9	0.28
Navoi	103.5	943	51.1	82.6	22.1	0.21
Namangan	225.0	2,652	35.3	75.8	39.6	0.24
Samarkand	359.0	3,652	62.4	73.0	40.5	0.16
Surkhandarya	285.0	2,462	64.4	82.3	44.6	0.18
Syrdarya	232.8	803	56.9	85.3	43.3	0.51
Tashkent	353.5	5,253	27.6	61.7	29.0	0.24
Fergana	288.9	3,565	43.3	75.7	28.4	0.19
Khorezm	236.7	1,777	67.8	65.0	41.6	0.20
Uzbekistan	3,706.5	32,121	49.4	73.1	24.0	0.23

Note: Total population in Tashkent province includes also population in Tashkent city.

Source: IAMO³ and the World Bank (WB), based on official statistical data from UzGosKomStat (2017).

³ IAMO is Leibniz Institute of Agricultural Development in Transition Economies from Halle (Saale), Germany.

Table 2: Salient characteristics of the farm restructuring stages in Uzbekistan since 1991

	First stage 1992-1997 Decollectivization of state farms	Second stage 1998-2002 Partial fragmentation	Third stage 2003-2008 Complete fragmentation	Fourth stage 2008/09-2015 Farm consolidation	Fifth stage 2016-present Production specialization
Main transformation process	Transformation of <i>sovkhozes</i> into <i>kolkhozes</i>	Transformation of <i>kolkhozes</i> into <i>shirkats</i> . Land lease to individual farms	Complete transformation of <i>shirkats</i> into individual farms	Farm reconsolidation (farm-size optimization)	Fragmentation and optimization of production
Dominant farm types	<i>Kolkhozes, sovkhozes</i>	<i>Shirkats</i> , individual farms	<i>Shirkats</i> , individual farms	Individual farms, mainly cotton-grain producers	Individual farms of different specialization
Main policy objectives	Expansion of wheat area & yields, reorganization of state farms	Specialization of newly established individual farms	Development of non-cotton/wheat producing sectors, and livestock farms	Increased and stable cotton yields, relocation of cotton fields	Relocation of cotton and wheat fields, increased area of high value crops, multi-profile farms

Source: Updated from Djanibekov (2016).

Main agricultural producers

11 As will be shown in this report, across most of food products agriculture in Uzbekistan is now structured around two main producer categories, namely individual farms and dekhkan farms. Table 3 presents their main characteristics. The third category of producers is agricultural enterprises. Over the progress of farm restructuring, this category has evolved from Soviet-type of collective and state farms, to agricultural cooperatives (*shirkats*) and further restructured to specialized enterprises of different forms including parastatal export-oriented producers or large poultry farms which are registered as an enterprise. These agricultural enterprises also include ‘agri-firms’ established since 2006 particularly in the horticultural sector (Larson *et al.* 2012). These are non-government associations and private firms with vertically-integrated organizational form as well as processing companies that also operate farm land.

Table 3: Definition individual and dekhkan farms in Uzbekistan

	Individual farm (fermer hojaligi)	Dekhkan farm (dekhkan hojaligi)
Basic definition	Individual commercial farm organized as a legal entity operating leased land	Small-scale family-based farm, based on household plot operation
Utilized labor	Family members, as well as permanent and seasonal workers	Mainly family members, with option to hire seasonal workers
Land tenure	Long-term land lease (up to 50 years). The land lease duration depends on the fulfillment of state procurement target. Farm size can vary with respect to production specialization	Lifetime inheritable possession. Sizes of allocated land: 0.35 ha for irrigated land; 0.5 for rainfed land. This includes also area for buildings
Ownership	Any adult person with sufficient agricultural qualification	Former workers of agricultural enterprises, rural families
Production specialization	Only agricultural produce indicated in land lease contract. Mainly cotton and wheat	Any agricultural produce, mainly wheat, vegetables, fruits, livestock

Source: Updated from Lerman (2008).

Decollectivization and fragmentation (1992-2007)

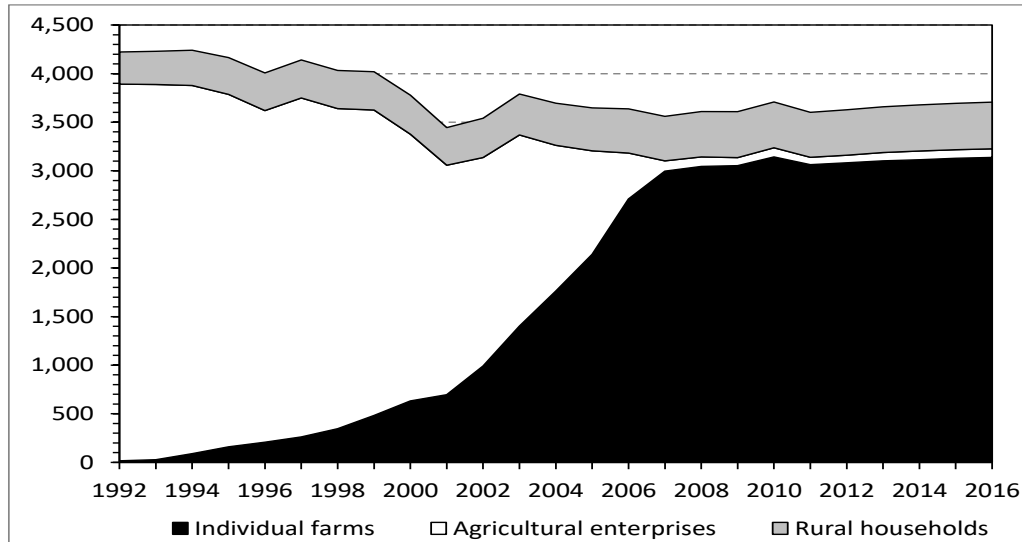
12 The first two stages (1992-2002) aimed at the development of supply and marketing infrastructure for agricultural production and organization of other types of agricultural enterprises such as corporate farms (named locally as *shirkats*), established on the basis of former state and collective farms. This included such measures as debt write-offs, tax exemptions and financial assistance to agricultural enterprises, and to agro industrial sector in general. This stage included first transfer of land of large inefficient farms for establishing of smaller individual farms through land lease and bidding on official tenders. Although production activities in large agricultural enterprises remained linked to the state production targets, one important change, however, relates to property rights over agricultural output. Production obligations for agricultural products were removed for all crops except strategic cotton and wheat (Pomfret 2000).

13 In 1998, the government announced the official definition and coexistence of three categories of producers: *dekhkan hojalik* (based on agricultural production on household plots), *shirkats* (agricultural enterprises) and *fermer hojalik* (individual farms), being distinct in land size and tenure, labor contracts and mode of production specialization. Collective farms were turned into *shirkats* through issuing and distributing the membership shares with private ownership of assets among its workers and allocating fields to their shareholders for agricultural production contracts. The definition of individual farms changed fundamentally providing them sovereignty from *shirkats* in their production decisions, both in terms of input and output allocation (Bloch 2002).

14 During the first two stages of farm restructuring (1992-2002), the speed of transfer of land from agricultural enterprises to newly-established individual farms was slow (Figure 1). In 2006, the government speeded up the fragmentation process and the re-organization of agricultural production in the form of smaller individual farms (Figure 1). The list of main policy events to the farm restructuring process in 2006-2017 is presented in the Appendix. The main result of the fragmentation was the establishment of a dual system encompassing a symbiotic relationship between individual farms and *dekhkan* farms (Djanibekov 2012). In 2014, there were about 4.7 million *dekhkan* farms that operated 20 percent of total sown land. *Dekhkan* farms were never part of the farm restructuring process and their land share increased along the population growth. Institutional transformations also affected the employment structure. Most of the rural population released from their work in agricultural enterprises became *dehkans* involved in self-sufficiency and small-scale production, while only 10 percent of households could obtain private farm land (Pugach *et al.* 2016). Observations by Swinkels *et al.* (2016) on rural income from participating in cotton

picking and Djanibekov *et al.* (2013, 2015) on labor arrangements between individual farms and households show that *dekhkan* farms in Uzbekistan are not necessarily subsistence oriented. They participate in market transactions and are integrated into rural labor market via on-farm employment.

Figure 1: Changes in sown area by producer category, '000 ha



Source: IAMO and the WB based on AGRIWANET and UzGosKomStat (2017).

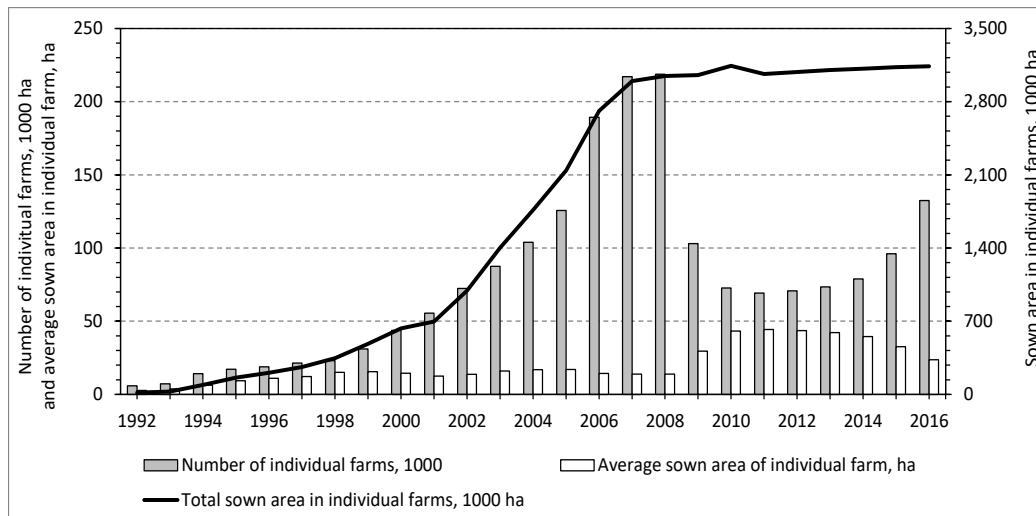
15 The average sown area in individual farms did not change much in 1998-2006 staying around 15 ha (Figure 2). In the last two years of the third stage of farm restructuring (2007-2008), the expansion of farmland in individual use slowed down because most *shirkat* land had already been redistributed. A (new) farmer could acquire additional farmland (i.e. lease new farmland) if the state allotted land that had been returned by another farmer. In 2007, the number of individual farms increased by 28,000 farms compared to 64,000 farms in 2006. By the end of the third stage (2008), the number of individual farms reached 218,600 farms with average sown area of 14 ha.

Farm consolidation (2008-2015)

16 Until 2008/2009, farm restructuring did not take into account the general idea of a farm as one production unit in the sense that farm fields are located next to each other so as to form a single territory of a farm unit. Instead, an individual farm comprised fields scattered and located often at distances from each other. The demands in inputs and services of rapidly expanding individual farms soon created a number of difficulties. Among them is a mismatch of irrigation water supply infrastructure designed for large-scale farms (Djanibekov *et al.* 2015). A redesign of the existing irrigation system in a way to suit the many smaller farms would be costly. These along with other issues triggered decisions of the state to reduce the number of farms and increase ('optimize') size of their land. With the declared aim of a 'farm-size optimization' namely farm consolidation via merging smaller farms into larger units, the fourth stage took off in late 2008/2009 and continued till 20154 (Figure 2). Officially, farm-size optimization was reasoned by low productivity of individual farms, especially in fulfilling cotton and wheat state necessities, and the consolidation of scattered farm fields into larger production units was seen as a remedy.

⁴ 2008 and 2010 Presidential Decree "On optimization of sown area and increase of food crop production".

Figure 2: Evolution of average sown area and the number of individual farms in Uzbekistan



Note: Average size of individual farm is given in average sown area per farm.

Source: IAMO and the WB based on AGRIWANET and UzGosKomStat (2017).

17 During the first wave of farm consolidation, the number of individual farms decreased from about 218,600 in 2008 to around 103,000 in 2009. In the second consolidation wave of 2010, the number of farms was reduced further (by about 30 percent), reaching about 69,100 farms in 2011. The average sown area per individual farm increased from 13.9 ha in 2008 to 29.6 ha in 2009 and over 44 ha in 2011 (Figure 2, left Y-axis). New norms for farm restructuring came into play with the third wave of farm optimization in 2012: (i) decrease of the land size or farm liquidation became possible through voluntary or local authority initiation; and (ii) prohibition of land division was lifted conditional to condition of land size not being less than the state-set minimum according to farm specialization.

Adjustment of cropping structure (since 2016)

18 The current fifth stage of farm restructuring is a five-year plan during 2016-2020 that includes a complex and province specific approach to switching optimization from farm size to production structure.⁵ New measures project a gradual reduction of the total area sown under cotton by 170,500 ha (13 percent less compared with 2015) and 50,000 ha for grains (3.4 percent less compared with 2015) on irrigated areas (Table 4). Although cotton and wheat remain strategic crops, the projected measures show attempts to expand and diversify agricultural production.

19 Land freed up from cotton and wheat is planned to be allocated for potato (increase by 36,000 ha), vegetables (increase of 91,000 ha), fodder crops (increase by 50,300 ha), intensive gardens, oilseeds, and other crops. By 2020, the plan is to increase vegetables and potato production area by 40 percent, while the area under oilseeds is projected to be doubled.

⁵ Presidential Decree No. PP-2460 "On further measures of reforms and development of agriculture for 2016-2020" (29.12.2015).

Table 4: Projected parameters of crop production in Uzbekistan in 2016-2020

Crop	Sown area, '000 ha						Difference in 2020 to 2015, %
	2015	2016	2017	2018	2019	2020	
Cotton	1,285.5	1,255.0	1,221.0	1,187.0	1,151.0	1,115.0	-13.3
Wheat	1,329.5	1,329.5	1,319.5	1,304.5	1,289.5	1,279.5	-3.8
Potato	80.3	85.3	92.5	100.5	108.8	116.3	44.8
Vegetables	192.0	204.6	222.7	243.0	264.0	283.0	47.4
Fruits & melons	261.9	264.6	268.0	272.0	276.1	279.9	6.9
Fodder	309.1	316.1	326.1	337.3	348.9	359.4	16.3
Oilseeds	14.7	16.2	19.0	22.1	25.4	28.3	92.5
Grapes	144.0	145.5	147.8	150.3	152.9	155.2	7.8
Crop	Yield, tons/ha						Difference in 2020 to 2015, %
	2015	2016	2017	2018	2019	2020	
Cotton	2.61	2.62	2.63	2.65	2.67	2.69	3.1
Wheat	5.49	6.09	6.25	6.36	6.51	6.64	20.9
Potato	21.89	22.43	22.6	22.75	22.9	23.05	5.3
Vegetables	27.71	28.61	28.85	29	29.2	29.4	6.1
Fruits & melons	12.39	12.64	12.94	13.29	13.66	14.04	13.3
Fodder	22.5	22.8	23.1	23.4	23.7	24.0	6.7
Oilseeds	1.7	1.8	1.9	2	2.1	2.2	29.4
Grapes	12.67	12.79	12.99	13.21	13.46	13.71	8.2
Crop	Total harvest, '000 tons						Difference in 2020 to 2015, %
	2015	2016	2017	2018	2019	2020	
Cotton	3,350.0	3,287.0	3,217.0	3,147.0	3,074.0	3,000.0	-10.4
Wheat	7,305.0	8,100.0	8,250.0	8,300.0	8,400.0	8,500.0	16.4
Potato	2,670.0	2,833.0	3,010.0	3,206.0	3,411.0	3,601.0	34.9
Vegetables	9,923.0	10,458.0	11,031.0	11,651.0	12,314.0	12,925.0	30.3
Fruits & melons	2,731.0	2,874.0	2,982.0	3,109.0	3,244.0	3,380.0	23.8
Fodder	18,725.0	18,976.0	19,303.0	19,662.0	20,039.0	20,386.0	8.9
Oilseeds	98.0	110.0	125.0	132.0	145.0	160.0	63.3
Grapes	1,556.0	1,601.0	1,651.0	1,707.0	1,769.0	1,830.0	17.6

Note: Harvest of potato, vegetables, fodder and oilseeds include second harvest and raid-fed production.

Source: Presidential Decree PP-2460 (29.12.2015).

20 The projected decrease in cotton and wheat area is planned to be compensated by respective increase in their yields. As such it is projected that by 2020 the increase in cotton yield should be by about 3 percent, while wheat yield should increase by 20 percent. The latter should offset the projected decrease in wheat area and bring additional 16 percent of output.

21 By 2020, the largest relative decrease in cotton area, by 22 percent, is planned in two labor-scarce regions, namely Syrdarya and Jizzakh. These provinces will also have the highest expansion of vegetable area (Table 5). Wheat area is planned to be decreased by 3-6 percent across provinces. No reduction in wheat area is foreseen in Karakalpakstan, and Navoi and Khorezm provinces.

Table 5: Projected changes in sown area by province, 2015-2020, '000 ha

Province	Cotton			Wheat			Vegetables		
	in 2015, '000 ha	Increase by 2020, '000 ha	diff., %	in 2015, '000 ha	Increase by 2020, '000 ha	diff., %	in 2015, '000 ha	Increase by 2020, '000 ha	diff., %
Karakalpakstan	95.9	-7.0	-7.3	64.4	0.0	0.0	10.5	2.2	21.0
Andijan	93.4	-11.2	-12.0	84.9	-4.0	-4.7	18.7	6.4	34.2
Bukhara	110.3	-10.0	-9.1	91.7	-5.0	-5.5	8.6	7.1	82.6
Jizzakh	101.8	-22.5	-22.1	148.1	-5.0	-3.4	8.3	11.0	132.5
Kashkadarya	164.7	-18.4	-11.2	226.3	-4.0	-1.8	16.5	9.7	58.8
Navoi	35.8	-3.4	-9.5	50.2	0.0	0.0	3.8	1.4	36.8
Namangan	82.6	-10.1	-12.2	89.7	-5.0	-5.6	14.4	6.8	47.2
Samarkand	93.0	-16.2	-17.4	172.2	-6.0	-3.5	27.9	8.3	29.7
Surkhandarya	119.6	-14.3	-12.0	117.5	-5.0	-4.3	13.3	8.7	65.4
Syrdarya	106.8	-22.7	-21.2	97.1	-5.0	-5.1	4.4	10.1	229.5
Tashkent	94.4	-13.4	-14.2	129.0	-6.0	-4.7	33.3	7.5	22.5
Fergana	100.1	-12.5	-12.5	120.7	-5.0	-4.1	19.4	7.0	36.1
Khorezm	99.7	-8.8	-8.8	54.4	0.0	0.0	14.9	4.8	32.2
Uzbekistan	1,298	-171	-13.1	1,446	-50	-3.5	194	91	46.9

Source: Presidential Decree No. PP-2460 (29.12.2015).

22 The projected parameters also target the increased number of livestock and production output, and the number of livestock farms (Table 6). The number of cattle and sheep-goats is planned to be increased annually by 5 percent, reaching 20 percent increase by 2020. By 2020, the number of poultry is projected to grow by 50 percent, while production of eggs by 75 percent.

Table 6: Projected livestock production parameters for 2016-2020

	Number, '000 heads						Difference in 2020 to 2015, %
	2015	2016	2017	2018	2019	2020	
Cattle	11,637.2	12,150	12,720	13,350	14,050	14,800	27.2
Sheep & goats	19,096.1	19,600	20,380	21,240	22,170	23,187	21.4
Poultry	61,070.5	64,600	69,500	75,500	83,000	92,000	50.6
	Production, '000 tons						Difference in 2020 to 2015, %
	2015	2016	2017	2018	2019	2020	
Meat (live weight)	2,033	2,060	2,150	2,260	2,375	2,500	23.0
Milk	9,028	9,478	10,242	11,075	11,957	13,000	44.0
Eggs (million)	5,535	6,200	6,900	7,700	8,600	9,600	73.4

Note: The numbers used for 2015 are for 01.01.2016, while PP-2460 uses the numbers as of December 2015.

Source: Presidential Decree No. PP-2460 (29.12.2015).

23 Among the provinces, Karakalpakstan and Syrdarya province are projected to have the highest increase in the number of cattle heads by 2020, 42 percent and 40 percent, respectively. In terms of poultry heads, it is planned that their number will increase by three-fourth in Karakalpakstan and Namangan province, while the smallest increase is projected for Surkhandarya and Tashkent provinces. The projected relative increase in number of sheep and goats across provinces ranges from 16 percent (Bukhara province) to 32 percent (Tashkent province).

Table 7: Projected changes in livestock numbers by province, 2015-2020, '000 heads

Province	Cattle			Sheep & goats			Poultry		
	in 2015, '000	Increase by 2020, '000	diff, %	in 2015, '000	Increase by 2020, '000	diff., %	in 2015, '000	Increase by 2020, '000	diff., %
Karakalpakstan	955.0	396.0	41.5	901.5	225.5	25.0	3,103.6	2,296.4	74.0
Andijan	980.0	191.0	19.5	1,224.0	241.0	19.7	6,400.0	3,310.0	51.7
Bukhara	1,133.2	273.8	24.2	1,936.7	318.3	16.4	3,218.9	1,481.1	46.0
Jizzakh	825.1	257.9	31.3	1,727.4	324.6	18.8	2,395.2	1,489.8	62.2
Kashkadarya	1,405.1	366.9	26.1	4,268.2	973.8	22.8	4,403.8	2,006.2	45.6
Navoi	415.0	121.0	29.2	1,859.6	315.4	17.0	1,971.2	818.8	41.5
Namangan	640.0	230.0	35.9	696.0	179.0	25.7	3,417.2	2,542.8	74.4
Samarkand	1,425.2	234.8	16.5	2,150.7	439.3	20.4	8,603.8	3,576.2	41.6
Surkhandarya	850.1	214.9	25.3	2,024.1	477.9	23.6	3,351.7	1,258.3	37.5
Syrdarya	399.8	160.2	40.1	278.0	67.0	24.1	1,738.9	1,141.1	65.6
Tashkent	815.0	235.0	28.8	828.6	266.4	32.2	13,645.0	5,260.0	38.5
Fergana	969.4	225.6	23.3	811.5	162.5	20.0	4,000.4	2,649.6	66.2
Khorezm	824.3	256.7	31.1	389.8	100.2	25.7	4,820.8	3,099.2	64.3
Uzbekistan	11,637	3,164	27.2	19,096	4,091	21.4	61,071	30,930	50.6

Note: The numbers used for 2015 are for January 2016, while PP-2460 uses the numbers as of December 2015.

Source: Presidential Decree No. PP-2460 and official data from GosKomStat (2017).

24 In addition to the PP-2460 (29.12.2015), in the beginning of 2017 the Government adopted the Strategy of Actions for the Development of Uzbekistan for 2017-2021. The Strategy of Actions outlines its political, economic, and social priorities, including measures to liberalize the economy. The National Development Strategy identifies the need for diversification out of cotton into high value-added and labor-intensive production and processing, which is expected to contribute to significant growth of rural jobs, food security and exports. Section 3.3 of the strategy on Modernization and intensive development of agriculture accents on further optimization of the sown areas, aimed at reducing the acreage of cotton and cereal crops, area expansion for potato, vegetables, forage and oilseeds, creating new intensive gardens and vineyards. In the same section the strategy sets priority of developing multi-profile farms, which could be engaged in agricultural production and processing, preparation, storage, marketing, construction and provision of services.

25 Reforms also took the direction of strengthening the value chains and giving the support for the farmers to enable their direct exports without engaging the government monopoly Uzagroeksport. Another push for facilitating agricultural exports was the reform of currency market coupled with the abolishment of the requirement that exporters surrender part of their hard-currency earnings to the state.

26 Despite these changes in farm specialization, the procurement policy in cotton and wheat directly influences the availability of inputs to high value crops. The distribution of main agricultural inputs such as fertilizers, diesel, and machinery and irrigation services are still coordinated via governmental organization. These inputs are channeled to farmers through parastatal agencies at fixed prices. Farmers are linked to certain outlets for purchasing seeds, fertilizers, fuel and machinery services and cannot access better or cheaper alternatives. The priority in input allocation is given to cotton and wheat producers.

27 The input quantities that farmer can access for each production season depends on the scientific norms of input application and planned sown area (Djanibekov *et al.* 2012). In calculations

of total fertilizer and fuel needed by a farmer for certain season only the input requirements for cotton and wheat cultivation are considered. In such prescriptions of fertilizer and diesel amounts, farmers are considered a homogenous group with only difference in production specialization, namely whether farmer cultivates cotton and wheat or not. The specific input and service needs of commercially oriented farmers, particularly of small ones and those engaged in horticulture, are neglected. Inputs can also be obtained via Birja (commodity exchange), but transaction costs can be too high for farmers. For small farms and dekhkan farms lack access to chemical fertilizers and often make use of large amounts of organic fertilizers, supplemented by smaller doze of chemical fertilizers for commercial crops.

28 Farmers responded to this by inventing an informal (black) input markets for purchasing inputs for high value crops. Farmers also divert these inputs from cotton and wheat to commercial crops or sell directly to other agricultural producers (Larson *et al.* 2012). Aware of this, to ensure the fulfilment of state procurement targets, the local administration monitors and controls land allocation and input application in farms by initiating frequent inspections by different state organizations (Hornidge and Shtaltovna 2014). As a result, cotton-grain producing farms often lack flexibility to make better decisions about their production and allocation of available inputs. The commercial farms involved in production of fruits and vegetables lack access to inputs and services. Their needs are neglected in years of drought and irrigation water scarcity when all efforts are mobilized to safe cotton and wheat harvest.

III. Restructuring Outcomes to Date

Number and structure of individual farms in 2016

29 With the increasing number of individual farms during the last five years, in 2016 there were over 132,000 registered individual farms in Uzbekistan (Table 8), with the most farms being registered in Samarkand (over 19,000 farms) and the fewest in Navoi (about 3,400 farms).

Table 8: Number and average size of individual farms by province in 2016

Provinces	Number of farms	Agricultural output per individual farm	Average area of allocated land per farm	Average sown area per farm	Sown area in total allocated farm land
		million UZS /farm	ha /farm	ha /farm	percent
Karakalpakstan	5,482	83.7	93.5	39.6	42.3
Andijan	12,293	147.7	20.1	16.0	79.6
Bukhara	7,234	172.2	109.9	27.6	25.1
Jizzakh	10,304	77.5	46.7	35.5	76.0
Kashkadarya	16,629	86.2	43.6	24.7	56.7
Navoi	3,427	168.3	62.3	23.2	37.3
Namangan	8,094	129.9	30.6	23.8	77.7
Samarkand	19,789	114.9	24.8	15.0	60.5
Surkhandarya	8,833	116.4	82.8	26.7	32.3
Syrdarya	6,116	111.3	40.3	34.5	85.6
Tashkent	14,179	144.1	33.3	20.9	63.0
Fergana	11,366	114.9	29.9	21.3	71.4
Khorezm	8,610	108.6	29.6	22.3	75.2
Uzbekistan	132,356	118.2	49.8	23.7	47.6

Source: IAMO and the WB based on UzGosKomStat (2017).

30 According to the official statistics, average agricultural output per individual farm in 2016 was about 118 million Uzbekistan Soms (UZS). The highest agricultural output per individual farm was observed in Bukhara province (over 172 million UZS per farm).

31 Average area of land allocated per individual farm in 2016 was about 50 ha, ranging from 110 ha in Bukhara province (the largest average size of farms) to 20 ha in Andijan province (the smallest average size of farms). Average sown area in individual farms was about 24 ha, implying that about a half of total farm land is sown, while another half was under perennial crops, gardens, vineyards, fishponds, pastures, grassland or constructions and unproductive land.

32 In 2016, individual farms operated 84 percent of sown area (Table 9), with the largest share observed in Jizzakh and Syrdarya provinces (over 90 percent of sown area). Rural households (*dekhkan* farms) operated 13 percent of sown area.

Table 9: Share of different agricultural producer categories in sown area in 2016

Province	Total sown area, '000 ha	from this (percent)		
		Farms	Households	Enterprises
Karakalpakstan	254.9	85.1	12.5	2.4
Andijan	230.1	85.4	12.4	2.2
Bukhara	240.6	82.9	16.2	0.8
Jizzakh	401.1	91.2	6.1	2.7
Kashkadarya	495.5	83.0	14.1	2.9
Navoi	103.5	77.0	17.0	6.0
Namangan	225.0	85.5	13.6	1.0
Samarkand	359.0	82.9	16.0	1.1
Surkhandarya	285.0	82.9	15.6	1.5
Syrdarya	232.8	90.6	6.4	3.0
Tashkent	353.5	84.0	11.6	4.4
Fergana	288.9	83.9	14.2	1.9
Khorezm	236.7	81.0	16.7	2.3
Uzbekistan	3,706.5	84.7	13.0	2.4

Source: IAMO and the WB based on UzGosKomStat (2017).

33 There is a positive relationship between sown area per rural inhabitant (Table 1) and sown area per farm (Table 8) at the province level in 2016. This implies that individual farms on average had smaller sown area in provinces with higher density of rural population (Figure 3). On average, the sown area was 0.23 ha per a rural inhabitant with the smallest land-man ratio in Samarkand and Andijan (each about 0.16 ha), Surkhandarya (0.18 ha), and Fergana (0.19 ha) provinces.

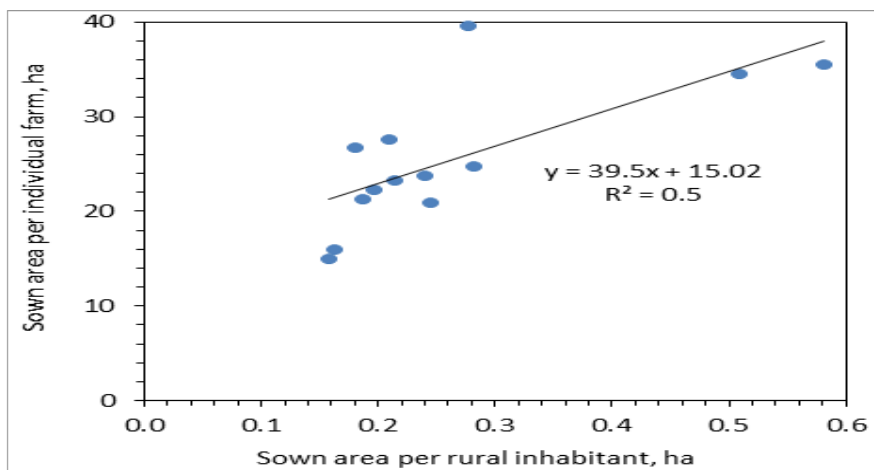
Production specialization of individual farms

34 Two main characteristics of existing farm categories marked the path of farm restructuring process since 2006, namely farm size and their specialization. Based on their production specialization, the Uzbek legislation defined four groups of individual farms. The largest and dominant farm type, cotton and grain producing farms, consisted of at least 10 ha of land, designated by the government for production of two strategic crops (Djanibekov 2012).

35 The second and third farm types, horticultural and garden farms, specialized in vegetables, melons, as well as gardening and grape production on plots of at least 1 ha in size. These farms were not part of the system of production targets. Additionally, horticultural and garden/vineyard farms could produce crops such as potato, melons and fodder crops.

36 The size of the fourth farm type, livestock farms, including poultry farms, was directly related to farm’s animal stock through a ratio of 0.33 ha per cattle equivalent (i.e. there should be at least 30 heads of cattle equivalents corresponding to 10 ha of land). Livestock farms are granted more decision-making freedom to produce cash crops than crop-growing farms.

Figure 3: Relationship between sown area per individual farm and sown area per rural inhabitant

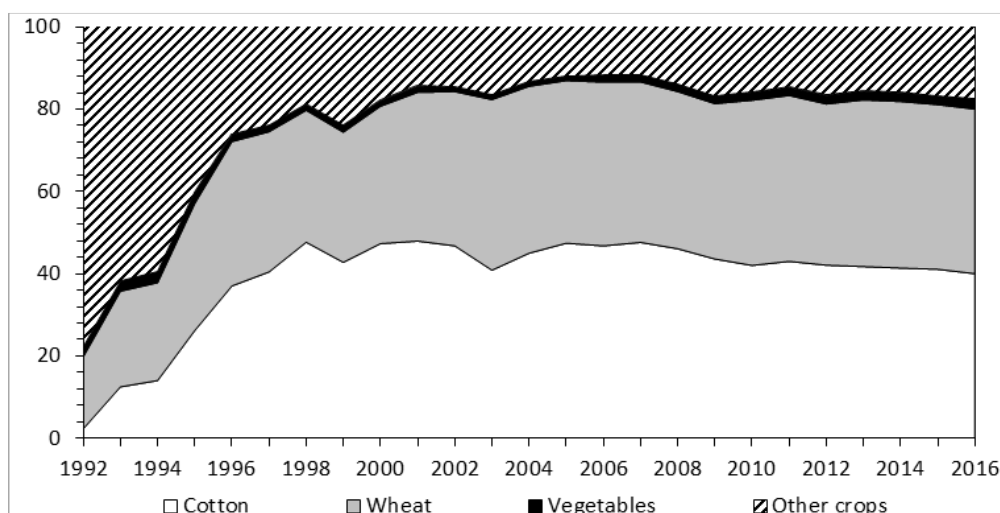


Source: IAMO and the World Bank based on UzGosKomStat (2017).

37 Despite that the horticulture, garden and livestock farms have better decision-making freedom compared to the cotton-grain producing farms, according to Petrick and Djanibekov (2016) cotton-grain producers have better access to machinery supplied from parastatal machinery-tractor stations, as well as better access to diesel fuel and fertilizers (Larson *et al.* 2012). As these farms produce strategic cotton and wheat, along with access privileges to fertilizer and fuel, the state prioritizes their timely and sufficient access to irrigation water (Djanibekov *et al.* 2012).

38 During the farm optimization process, the minimum size of cotton and wheat farms, and gardening and horticulture farms, were redefined.⁶ The minimum size of cotton and wheat farms was increased from 10 ha to 30 ha, and for horticultural and gardening farms from 1 ha to 5 ha.

Figure 4: Share of sown area under cotton and wheat in individual farms, percent



Source: IAMO and the WB based on AGRIWANET and the UzGosKomStat (2017).

⁶ Law “On introduction of changes and additions to legislative acts of the Republic of Uzbekistan in connection to deepening of economic reforms in agriculture and water sector” (2009).

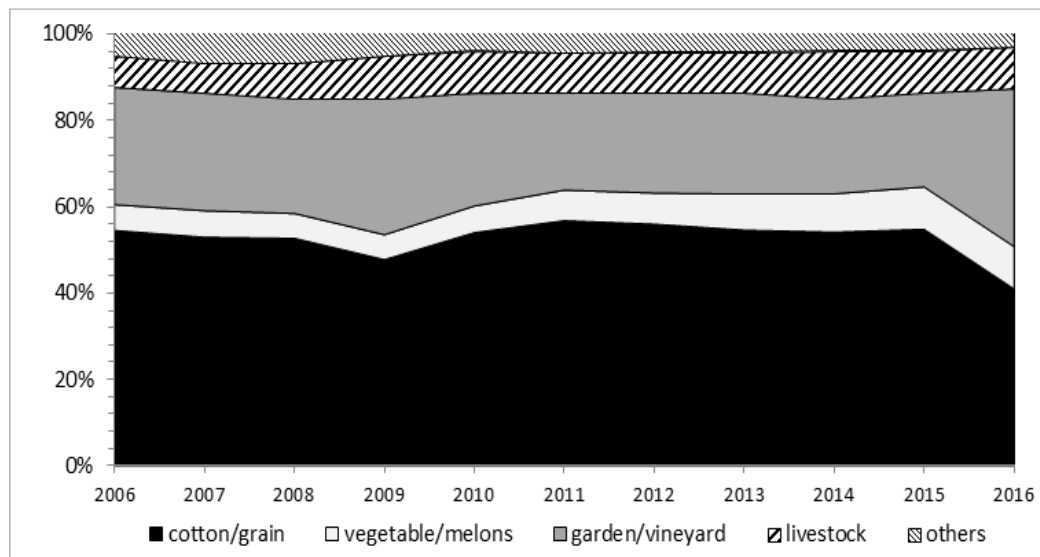
39 Figure 4 shows that with the progress of farm restructuring, production of cotton and wheat was transferred from former collective farms to individual farms. Despite the announced diversification of production activities in individual farms, cotton and wheat continue to dominate in their land use. Almost 80 percent of sown area in individual farm was under cotton and wheat production.

40 Law on Individual farms stipulated that leased land must be cultivated with due diligence to yield a certain minimum harvest of cotton and wheat. Yet, 2012 can be marked with two important recommendations provided by the state to individual farms: development of farms towards diversification apart from the main activity⁷; and along with strategic crops, secondary crops (such as mung beans, annual fodder crops such as maize and others) were recommended to be grown after wheat harvest (Platonov *et al.* 2014).

41 Between 2006 and 2015, covering the complete fragmentation and farm consolidation, the government took measures to convert cotton-grain producing farms into horticulture and garden farms in selected districts. Such examples in 2011 and 2012 cover the districts of Jamboy in Samarkand province, Asaka in Andijan, and Yangiyul in Tashkent. However, this did not lead to drastic changes in the production specialization structure of individual farms.

42 More visible change in farm structure can be observed with the start of the fifth stage in 2016. As Figure 5 shows the number of farms specializing in cotton-grain production declined, while the number of farms specializing in horticulture and gardens/vineyards increased. As a result of this change, 41 percent of all registered individual farms in 2016 were specializing in cotton-grain production, while those specializing in gardens and vineyards accounted for 33 percent of all farms. Only 10 percent of all individual farms specialized in horticulture, while another 10 percent were livestock farms.

Figure 5: Structure of individual farms according to specialization, percent of all individual farms



Source: IAMO and the WB based on UzGosKomStat (2017b) and MAWR (2017b).

43 In total land allocated to individual farms, cotton-grain farms operated 71 percent of total 5.56 million ha of land allocated to individual farms (Figure 6). With the progress of land consolidation, the share of cotton-grain producing farms increased up to 87 percent of total farm land in 2011. Further with the progress of production optimization in 2012-2015, their share in total

⁷ Presidential Decree UP-4478 “On measures of further improving the organization of activities and development of farming in Uzbekistan” (22.10.2012)

farm land shrank. The farms specializing in gardens and vineyards operated 16 percent of all individual farm land in 2016.

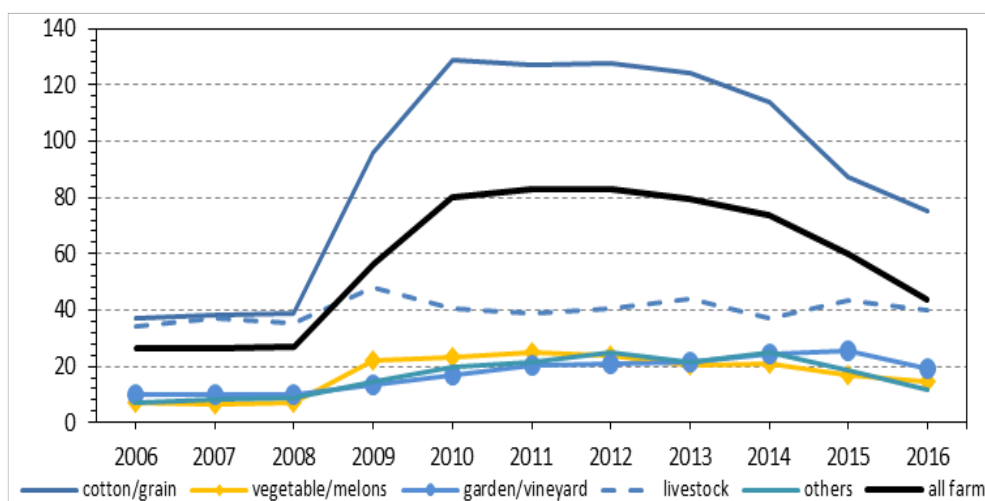
Figure 6: Land allocated to individual farms according to production specialization, '000 ha



Source: IAMO and the WB based on UzGosKomStat (2017b) and MAWR (2017b).

44 In 2016, livestock farms that require larger areas for fodder production and livestock grazing operated about 9 percent of all land allocated to individual farms.

Figure 7: Average size of individual farms according to production specialization, ha



Note: Average size of individual farms is given in total allocated land per farm. This land includes not only sown (or arable) area but also perennial crops, gardens, fallow, and unproductive land.

Source: IAMO and the WB based on UzGosKomStat (2017) and MAWR (2017b).

45 During the farm optimization process in 2009-2012, the average area of allocated land to individual farms (farm size) was increased in all production specializations, although at a different scale (Figure 7). On the other hand, average size of individual farms gradually declined. The effect of farm optimization process in 2009-2012 is most visible for cotton-grain farms. During the first farm optimization wave, their average size increased from 40 ha to 96 ha. The farm consolidation continued with the second wave reaching 130 ha in 2010. The new state of optimization reduced average size of cotton-grain producers to 75 ha in 2016.

46 The first two waves of farm optimization had also affected average sizes of farm of other production specialization. The biggest increase could be observed for vegetable-melon producing farms. During the first wave of farm optimization in 2009, their average size almost three times, from 7 ha to 22 ha.

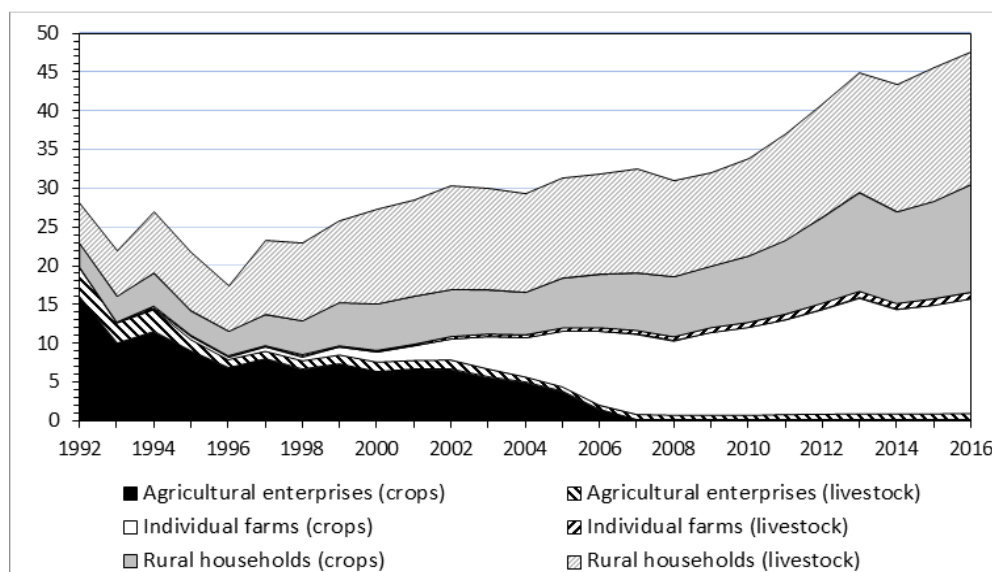
IV. Evolution of Agricultural Output

47 This section presents the evolution and trends in gross output of agriculture and in the most important agricultural commodities such as cotton, wheat, vegetables, fodder crops, meat, milk and eggs across main producer categories. It is necessary to note that due to the level of aggregation, the province-level data does not show contrasting differences between districts where cotton production was phased out. Petrick and Djanibekov (2016) show that individual farms in districts released from cotton production targets have more diversified crop production portfolio, including a substantial share of fruits, melons and vegetables, than cotton-producing farms.

48 When measured in constant 2016 Uzbek UZS, there were two distinct trends in the path of the gross agricultural output (GAO). First, during the initial steps of reforms in 1992-1996, the agricultural sector experienced stagnation: GAO was mainly generated by agricultural enterprises (Figure 8). With the progress of farm restructuring the contribution of agricultural enterprises to GAO shrank from 70 percent in 1992 to 3 percent in 2007. The performance of agricultural sector recovered with the progress of farm restructuring.

49 Following the complete fragmentation of agricultural enterprises into individual farms, the GAO comprised contributions by three sectors: livestock output in *dekhkan* farms and crop production in individual farms and *dekhkan* farms (Figure 8).

Figure 8: Evolution of GAO by producer category and sector, trillion constant 2016 UZS



Note: Inflation, GDP deflator (annual percent) from the 2017 World Development Indicators (WDI) was used to convert GAO from current prices to constant 2016 UZS.

Source: IAMO and the WB based on AGRIWANET and UzGosKomStat (2017).

50 One needs to consider that to convert GAO from current prices to constant 2016 UZS the GDP deflator from the WDI (2017) was used, which refers to the official statistics of Uzbekistan. The quality of the latter is often claimed to be unreliable due to the low level of transparency (see for instance, MacDonald 2012). To inform about possible issues with the use of official figures of agricultural output to derive constant values, Figure A in Appendix compares GDP deflator with annual percentage changes of unofficial (black market) exchange rates of UZS to US dollar in Figure

A. It suggests that the GDP deflator understates actual price inflation after 2014, so that deflated figures below are overstated for this period. The same applies for the 1990s, whereas the opposite seems to be the case during the early 2000s.

51 In 1992, rural households produced about 30 percent of GAO, while the remaining output originated in agricultural enterprises. In the following years, the share of households in GAO has been increasing reaching two-third in 2000-2001. In 2016, dekhkan farms contributed about 65 percent of GAO.

52 The contribution of individual farms in GAO has been increasing with the progress of the farm restructuring: it reached 31 percent in 2006 and then stabilized around 32-35 percent in the following years. The contribution of individual farms into GAO came almost entirely from the expansion of crop output. In 2016, the contribution of individual farms to GAO ranged from 25 percent in Navoi and Surkhandarya districts to 37 percent in Syrdarya and Kashkadarya (Table 10).

Table 10: GAO by producer category and province in 2016, billion UZS

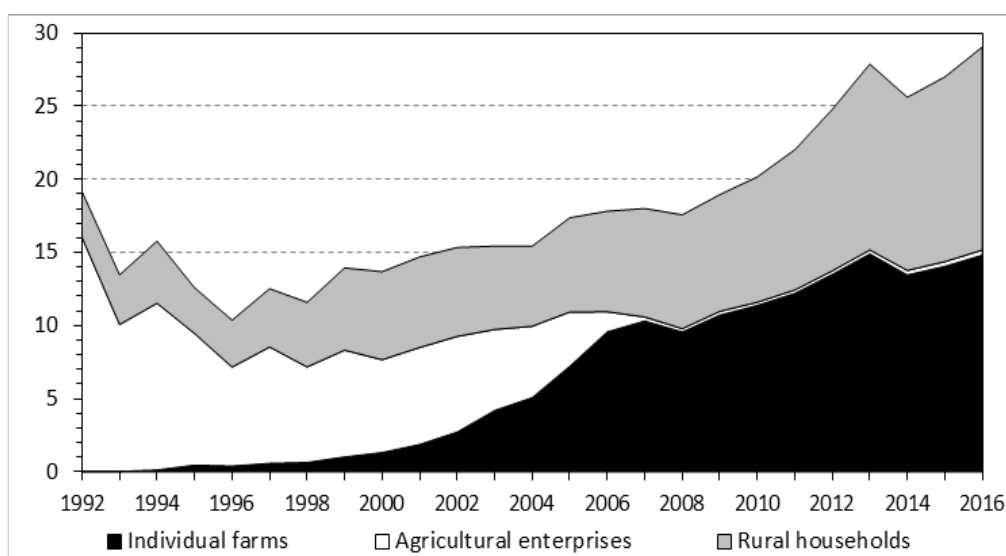
Province	GAO, billion UZS				from which (percent)		
	Farms	House-holds	Enter-prises	Total	Farms	House-holds	Enter-prises
Karakalpakstan	458.7	847.5	31.1	1,337.3	34.3	63.4	2.3
Andijan	1,815.6	3,387.3	37.9	5,240.8	34.6	64.6	0.7
Bukhara	1,245.7	3,114.6	39.3	4,399.7	28.3	70.8	0.9
Jizzakh	798.6	1,519.9	21.5	2,340.0	34.1	65.0	0.9
Kashkadarya	1,433.7	2,381.2	46.7	3,861.7	37.1	61.7	1.2
Navoi	576.7	1,676.0	77.5	2,330.2	24.7	71.9	3.3
Namangan	1,051.1	2,426.0	35.0	3,512.1	29.9	69.1	1.0
Samarkand	2,273.9	3,272.6	153.9	5,700.5	39.9	57.4	2.7
Surkhandarya	1,027.7	3,019.2	42.3	4,089.3	25.1	73.8	1.0
Syrdarya	680.5	1,088.3	44.4	1,813.3	37.5	60.0	2.5
Tashkent	2,043.3	3,609.2	304.6	5,957.1	34.3	60.6	5.1
Fergana	1,305.5	2,578.5	69.7	3,953.7	33.0	65.2	1.8
Khorezm	935.0	1,983.2	32.2	2,950.4	31.7	67.2	1.1
Uzbekistan	15,646.1	30,903.7	936.3	47,486.1	32.9	65.1	2.0

Source: IAMO and the WB based on UzGosKomStat (2017).

Crop production

53 The path of gross crop output can be divided into four stages (Figure 9). First stage comprises the 1990s with crop production concentrated in large agricultural enterprises and rural households. The second stage, during 2000-2006, can be characterized by increasing share of individual farms in crop output. During the third stage, in 2003-2004, before the intensified fragmentation took off, each of three producer categories contributed almost equal share to the gross crop output. Finally, the last fourth stage started with individual farms taking over the share of agricultural enterprises, turning again into the dual producer system. Despite that the new dual system was established, the previous one was dominated by large and industrialized enterprises, while the new one is based on almost equal contributions by individual farms specializing in cotton-wheat production, and rural (subsistence) households.

Figure 9: Evolution of gross crop output by producer category, trillion constant 2016 UZS



Note: Inflation, GDP deflator (annual percent) from WDI was used to convert GAO from current prices to constant 2016 UZS.

Source: IAMO and the WB based on AGRIWANET and UzGosKomStat (2017).

54 In 2016, individual farms, which cultivated about 85 percent of sown area, produced only one-third of crop output (Table 11). Contribution of individual farms to crop output in Surkhandarya province was the lowest among other provinces. Individual farms in Jizzakh and Kashkadarya provinces accounted for over two-thirds of the crop output.

Table 11: Crop output by producer category and province in 2016, billion UZS

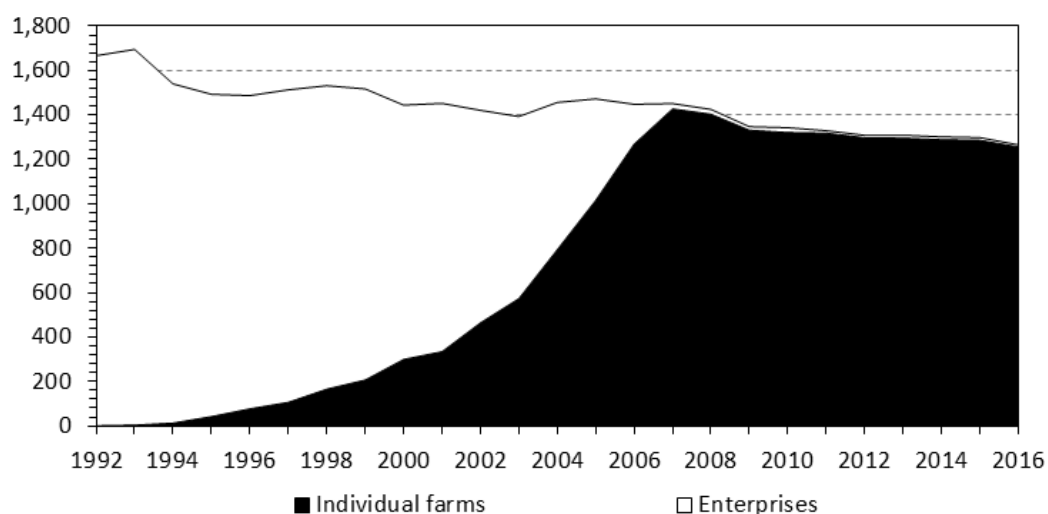
Province	Gross crop product, billion UZS				from which (percent)		
	Farms	Households	Enterprises	Total	Farms	Households	Enterprises
Karakalpakstan	436.4	229.6	25.9	691.9	63.1	33.2	3.7
Andijan	1,751.6	2,188.8	21.2	3,961.5	44.2	55.3	0.5
Bukhara	1,165.4	1,407.7	9.1	2,582.2	45.1	54.5	0.4
Jizzakh	777.6	352.2	9.6	1,139.4	68.2	30.9	0.8
Kashkadarya	1,380.3	663.2	18.3	2,061.8	66.9	32.2	0.9
Navoi	537.0	623.9	25.8	1,186.7	45.3	52.6	2.2
Namangan	981.9	1,336.5	17.2	2,335.5	42.0	57.2	0.7
Samarkand	2,155.7	1,522.7	33.5	3,711.9	58.1	41.0	0.9
Surkhandarya	948.9	1,428.3	21.3	2,398.5	39.6	59.5	0.9
Syrdarya	651.9	447.8	31.4	1,131.1	57.6	39.6	2.8
Tashkent	1,931.0	1,691.9	98.0	3,720.9	51.9	45.5	2.6
Fergana	1,231.4	1,316.1	30.1	2,577.6	47.8	51.1	1.2
Khorezm	869.4	662.4	11.5	1,543.3	56.3	42.9	0.7
Uzbekistan	14,818.5	13,871.0	352.9	29,042.4	51.0	47.8	1.2

Source: IAMO and the WB based on UzGosKomStat (2017).

55 At the national level, two patterns can be assigned for evolution of cotton area in 1992-2016. First, its area has been decreasing gradually since 1991 due to decline in productive area and targeted expansion of food crops, mainly wheat and vegetables. In 2016, cotton area was 1.27 million ha or almost 25 percent lower of its 1992 level (Figure 10). The second pattern is that with

the progress of farm restructuring cotton production was shifted from agricultural enterprises to individual farms. With the completion of farm fragmentation, individual farms cultivate almost 99percent of cotton fields.

Figure 10: Cotton sown area by producer category, '000 ha



Source: IAMO and the WB based on AGRIWANET and UzGosKomStat (2017).

56 Table 12 illustrates cotton area across different provinces in 1992 and 2012-2016. In 2016, cotton sown area across all provinces was larger than 80,000 ha (Navoi province with 35,000 ha of cotton area is the only exception). The largest cotton area was in Kashkadarya (160,500 ha) and Surkhandarya (117,100 ha) provinces. Since 1992, cotton area in Karakalpakstan was reduced by 36percent and in Syrdarya province by 33 percent, while in Bukhara, Khorezm and Surkhandarya provinces it stayed rather stable.

Table 12: Total sown area of cotton by province, '000 ha

Province	1992	2012	2013	2014	2015	2016	Difference between 2016 and 1992, %
Karakalpakstan	147.8	94.7	94.7	94.7	95.9	94.4	-36.1
Andijan	130.1	93.4	93.4	93.4	93.4	91.4	-29.7
Bukhara	115.1	110.1	112.3	111.3	110.3	108.0	-6.1
Jizzakh	141.2	101.5	101.8	101.7	101.8	99.7	-29.4
Kashkadarya	204.5	162.7	164.8	164.9	164.7	160.5	-21.5
Navoi	47.2	36.1	35.9	35.8	35.8	35.2	-25.4
Namangan	109.5	83.1	83.0	82.6	82.6	80.9	-26.1
Samarkand	117.5	93.7	94.8	94.7	93.0	89.8	-23.6
Surkhandarya	130.9	119.0	119.6	119.6	119.6	117.1	-10.5
Syrdarya	152.2	106.9	106.4	107.5	106.8	101.4	-33.4
Tashkent	121.9	100.4	98.2	95.6	94.4	89.1	-26.9
Fergana	141.8	100.1	100.1	100.1	100.1	98.0	-30.9
Khorezm	107.0	106.6	103.8	99.4	99.7	99.5	-7.0
Uzbekistan	1,666.7	1,308.3	1,308.8	1,301.5	1,298.1	1,265.1	-24.1

Source: IAMO and the WB based on UzGosKomStat (2017).

57 Despite the gradual decrease in sown area, cotton remains the dominant crop, occupying over one-third of total sown area in 2016 or 40 percent of sown area in individual farms (Table 13). Individual farms in Bukhara and Khorezm provinces allocated over a half of their land to cotton.

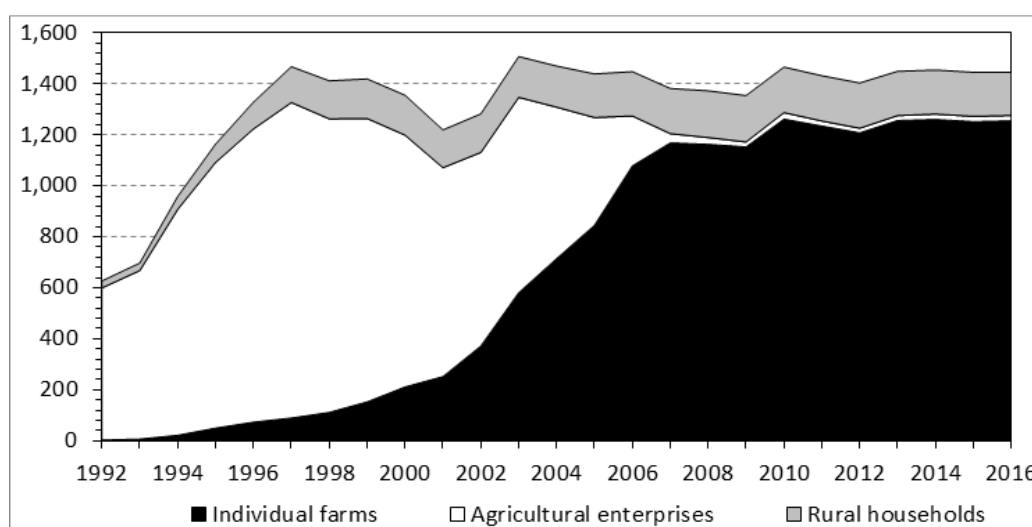
Table 13: Cotton area and its share in sown area by producer categories and province in 2016

Province	Cotton sown area, '000 ha			Share of cotton in sown area, percent		
	Farms	Enterprises	Total	Farms	Enterprises	Total
Karakalpakstan	94.0	0.3	94.4	43.3	5.6	37.0
Andijan	90.9	0.5	91.4	46.3	9.0	39.7
Bukhara	107.8	0.3	108.0	54.0	14.0	44.9
Jizzakh	99.4	0.3	99.7	27.2	2.7	24.9
Kashkadarya	159.1	1.4	160.5	38.7	9.7	32.4
Navoi	34.8	0.4	35.2	43.7	6.1	34.0
Namangan	80.3	0.6	80.9	41.8	29.1	36.0
Samarkand	89.4	0.3	89.8	30.1	8.6	25.0
Surkhandarya	116.1	1.0	117.1	49.1	23.5	41.1
Syrdarya	99.1	2.2	101.4	47.0	32.5	43.6
Tashkent	88.7	0.5	89.1	29.9	3.0	25.2
Fergana	97.5	0.5	98.0	40.2	8.9	33.9
Khorezm	98.3	1.2	99.5	51.3	21.9	42.0
Uzbekistan	1,255.6	9.5	1,265.1	40.0	10.8	34.1

Source: IAMO and the WB based on AGRIWANET and UzGosKomStat (2017).

58 Compared to cotton production, wheat production experienced significant growth both in sown area and yields. Among the core pillars of these changes was the national food self-sufficiency policy, which initiated the expansion of wheat production and its strategic importance. In 1992-1997, wheat sown area in Uzbekistan more than doubled (Figure 11). In the following years, the area allocated to wheat stabilized. Further increase in wheat production can be attributed to yield improvement: from 2.1 tons/ha in 1997 to 4.8 tons/ha in 2016.

Figure 11: Wheat sown area by producer category, '000 ha



Source: IAMO and the WB based on AGRIWANET and UzGosKomStat (2017).

59 Like cotton, individual farms dominate in wheat production and cultivate about 84 percent of total wheat area. Dekhkan farms cultivate the remaining 16 percent of wheat area. Households' wheat area increased from 27,400 ha in 1992 to 170,000 ha in 2016. While the wheat cultivation in individual farms is under production target system, the expansion of wheat cultivation in households was due to the availability of new wheat varieties, machinery, and rural flour mills. Despite this, household remain net buyers of wheat. For instance, in Khorezm province households' own

production of wheat can cover only one-third of their annual consumption requirements (Djanibekov 2008).

60 In 1992, wheat sown area was 627,000 ha, and mainly located in Kashkadarya, Samarkand and Jizzakh provinces (Table 14). Further expansion of wheat area was based on the introduction of winter wheat varieties that ensured high yields in irrigated lowlands. Particularly in areas that were under continuous cotton monoculture, winter wheat was preferred by farmers as it offered space for follow-up cultivation of high-value crops such as maize, rice, vegetables, and potatoes after the wheat harvest in early summer (Akramov 2011). Among the provinces, the biggest expansion of wheat sown area was in dryland area such as Karakalpakstan and Khorezm.

Table 14: Total sown area of wheat by province, '000 ha

Province	1992	2012	2013	2014	2015	2016	Difference between 2016 and 1992, %
Karakalpakstan	9.0	64.2	68.5	64.4	64.3	64.4	615.4
Andijan	19.0	87.7	87.2	86.4	86.4	84.9	346.8
Bukhara	16.4	91.6	91.5	91.5	91.6	91.7	459.2
Jizzakh	92.3	156.6	141.9	143.6	139.7	148.1	60.5
Kashkadarya	183.7	203.2	217.7	223.3	226.4	226.3	23.2
Navoi	19.6	48.3	48.8	48.8	50.1	50.2	156.3
Namangan	17.4	87.5	88.9	90.1	90.0	89.7	415.3
Samarkand	121.5	150.4	180.5	180.5	174.8	172.2	41.7
Surkhandarya	56.6	114.4	117.7	118.5	118.5	117.5	107.5
Syrdarya	28.0	92.3	95.5	95.9	94.5	97.1	246.7
Tashkent	35.7	131.5	134.3	134.4	133.5	129.0	261.3
Fergana	21.5	128.3	126.0	125.1	123.8	120.7	461.4
Khorezm	6.3	48.0	51.1	52.3	52.3	54.4	762.8
Uzbekistan	627.0	1,404.0	1,449.6	1,454.8	1,445.9	1,446.1	130.6

Source: IAMO and the WB based on AGRIWANET and UzGosKomStat (2017).

61 Table 15 illustrates the distribution of wheat area different producer categories and provinces. In 2016, wheat was the second dominant crop after cotton and occupied 39 percent of total sown area. Individual farms allocated 40 percent of their sown area to wheat cultivation. Wheat occupies almost a half of sown area in individual farms in Navoi and Samarkand provinces.

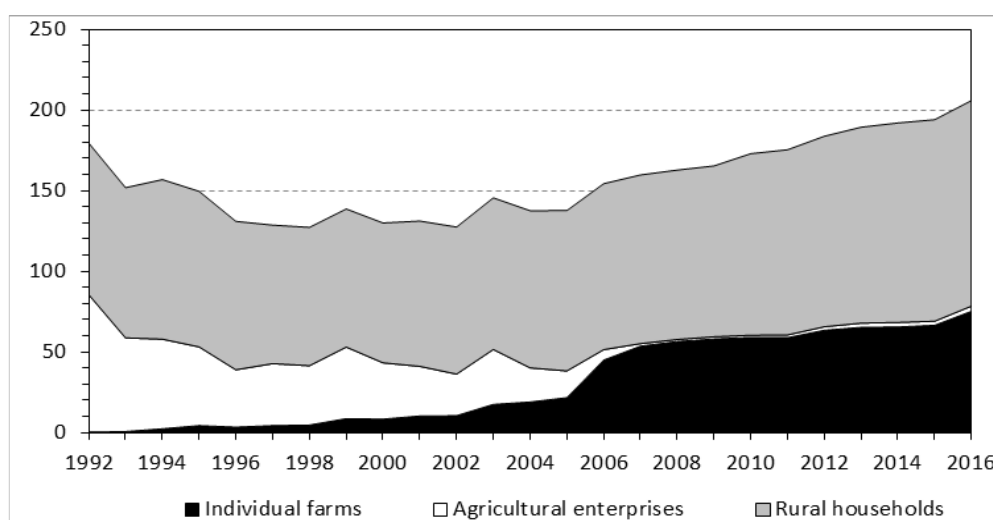
Table 15: Wheat area and its share in total sown area by producer category and province in 2016

Province	Wheat sown area, '000 ha				Share of wheat in sown area, percent			
	Farms	Households	Enterprises	Total	Farms	Households	Enterprises	Total
Karakalpakstan	52.8	10.9	0.6	64.4	24.3	34.4	9.7	25.3
Andijan	79.5	4.5	0.9	84.9	40.4	15.8	17.9	36.9
Bukhara	65.3	25.9	0.5	91.7	32.7	66.4	25.4	38.1
Jizzakh	140.6	4.3	3.2	148.1	38.4	17.8	29.2	36.9
Kashkadarya	190.3	32.8	3.2	226.3	46.3	46.9	22.4	45.7
Navoi	40.2	8.4	1.6	50.2	50.5	47.6	26.0	48.5
Namangan	79.0	9.9	0.8	89.7	41.1	32.5	35.6	39.9
Samarkand	146.2	23.6	2.3	172.2	49.2	41.0	58.9	48.0
Surkhandarya	99.5	16.6	1.4	117.5	42.1	37.3	32.1	41.2
Syrdarya	91.2	4.3	1.6	97.1	43.3	28.5	22.6	41.7
Tashkent	125.2	0.6	3.1	129.0	42.2	1.6	20.1	36.5
Fergana	108.5	10.8	1.4	120.7	44.8	26.3	26.2	41.8
Khorezm	36.9	16.9	0.6	54.4	19.2	42.7	10.5	23.0
Uzbekistan	1,255.3	169.6	21.3	1,446.1	40.0	35.3	24.0	39.0

Source: IAMO and the WB based on UzGosKomStat (2017).

62 *Dekhkan* farms allocated over 35 percent of their land to wheat production. There are large differences in the share of wheat in households' sown area across provinces: in Bukhara province households allocated two-thirds of their sown area to wheat production, while in Tashkent province – only 1.6 percent. Compared to wheat and cotton, vegetable production in Uzbekistan experienced different changes in sown area and structure of producers (Figure 12).

Figure 12: Vegetable sown area by producer category, '000 ha



Source: IAMO and the WB based on AGRIWANET and UzGosKomStat (2017).

63 During the onset of independence, almost a half of total area under vegetable production was in agricultural enterprises, and another half in rural households. During the first stage of farm restructuring in 1992-1998, organizational changes going in the state and collective farms and the underdevelopment of marketing channels led to the stagnation of vegetable area.

64 The recovery of vegetable production can be associated with the completion of farm restructuring in 2007. In fact, the expansion of vegetable area in individual farms made the biggest contribution to the recovery and further increase in vegetable sown area after 2006.

65 Table 16 illustrates vegetables area across provinces in 1992 and 2012-2016. Vegetable sown area recovered in almost all provinces, except for Bukhara, Jizzakh and Syrdarya provinces. The largest relative increase in vegetable area compared to 1992 can be observed in Karakalpakstan, Khorezm, Namangan and Samarkand provinces.

Table 16: Total sown area of vegetables by province, '000 ha

Province	1992	2012	2013	2014	2015	2016	Difference between 2016 and 1992, %
Karakalpakstan	8.0	8.5	9.8	10.5	10.5	10.9	36.1
Andijan	18.6	17.3	18.1	18.6	18.7	19.4	4.2
Bukhara	10.2	7.8	8.2	8.3	8.6	9.5	-6.4
Jizzakh	10.2	8.9	8.1	8.1	8.3	8.8	-13.4
Kashkadarya	13.7	15.6	15.8	16.1	16.5	17.2	25.3
Navoi	3.8	3.5	3.7	3.9	3.8	4.1	7.9
Namangan	10.1	13.9	14.0	14.3	14.4	15.1	49.2
Samarkand	21.8	24.9	26.8	26.9	27.9	29.9	37.1
Surkhandarya	12.1	13.5	13.2	13.3	13.3	15.1	24.7
Syrdarya	6.8	4.0	4.1	4.3	4.4	4.5	-33.6
Tashkent	36.3	33.8	34.2	33.7	33.3	36.8	1.4
Fergana	18.6	17.8	18.8	19.3	19.4	19.5	4.9
Khorezm	9.3	14.3	14.6	14.7	14.9	15.2	63.0
Uzbekistan	179.5	183.8	189.4	192.0	194.0	206.0	14.7

Source: IAMO and the WB based on AGRIWANET and UzGosKomStat (2017).

66 At the national level, vegetables occupied 5.6 percent of sown area in 2016 (Table 17): the largest share was Tashkent province. Vegetables were mostly produced in dekhkan farms (households) which cultivated almost two-thirds of total vegetable area in 2016. Individual farms cultivated the remaining one-third of vegetable area. On average households allocated a slightly above 25 percent of their sown area to vegetables: over 40 percent of sown area was allocated to vegetables by households in Tashkent, Andijan, and Fergana provinces. Despite the increasing share of individual farms in vegetable production, they still allocate only 2.4 percent of their sown land to vegetables: this ranges from less than 1 percent of farms' sown area in Syrdarya, Fergana, Surkhandarya, and Jizzakh provinces to as high as 5 percent in Samarkand and Tashkent provinces.

Table 17: Vegetable area and its share in sown area by producer category and province in 2016

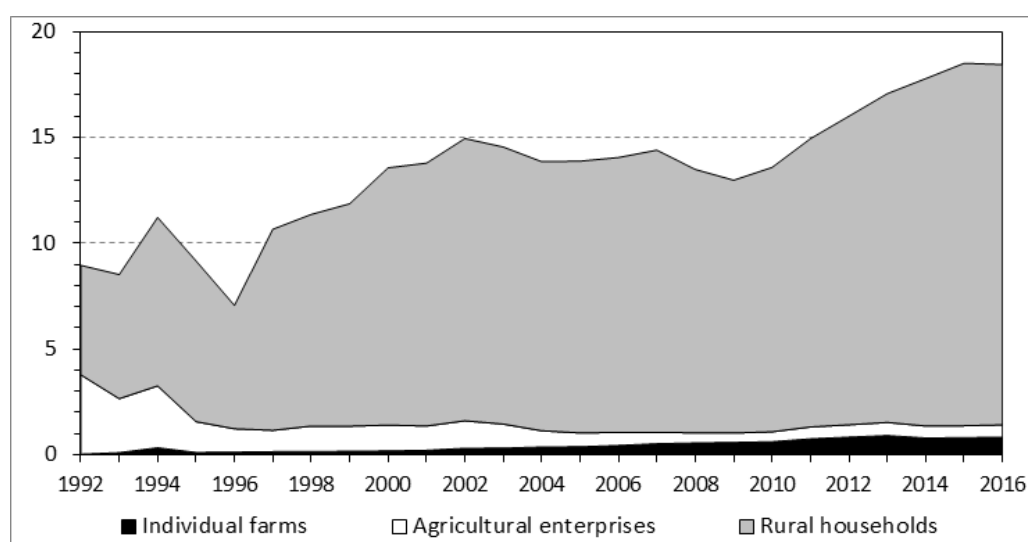
Province	Vegetable sown area, '000 ha				Share of vegetables in sown area, percent			
	Farms	Households	Enterprises	Total	Farms	Households	Enterprises	Total
Karakalpakstan	4.0	6.5	0.4	10.9	1.8	20.4	7.0	4.3
Andijan	6.7	12.2	0.4	19.4	3.4	43.0	8.1	8.4
Bukhara	3.4	6.0	0.1	9.5	1.7	15.4	4.5	4.0
Jizzakh	3.5	5.3	0.1	8.8	0.9	21.8	0.8	2.2
Kashkadarya	7.2	9.7	0.2	17.2	1.8	13.9	1.3	3.5
Navoi	1.1	3.0	0.1	4.1	1.3	16.8	1.2	4.0
Namangan	4.9	10.0	0.2	15.1	2.5	32.9	8.3	6.7
Samarkand	17.6	12.2	0.2	29.9	5.9	21.1	4.7	8.3
Surkhandarya	2.1	12.5	0.5	15.1	0.9	28.1	12.3	5.3
Syrdarya	0.9	3.5	0.1	4.5	0.4	23.4	1.5	1.9
Tashkent	16.5	19.4	0.8	36.8	5.6	47.6	5.3	10.4
Fergana	2.0	17.5	0.1	19.5	0.8	42.6	0.9	6.8
Khorezm	5.5	9.6	0.1	15.2	2.9	24.2	1.3	6.4
Uzbekistan	75.3	127.4	3.2	206.0	2.4	26.5	3.7	5.6

Source: IAMO and the WB based on AGRIWANET and UzGosKomStat (2017).

Livestock production

67 Compared to crop production, livestock output is almost entirely produced by *dekhkan* farms: in 2016, 4.7 million households possessed 12 million cattle heads, from which 4 million were cows. The farm restructuring did not result in significant improvement in livestock production in individual farms (Figure 13). In 2016, individual farms operated 84 percent of sown area contributing about a half of total crop output but produced only 5 percent of livestock output.

Figure 13: Evolution of livestock output by producer category, '000 billion constant 2016 UZS



Note: Inflation, GDP deflator (annual percent) from WDI was used to convert GAO from current prices to constant 2016 UZS.

Source: IAMO and the WB based on AGRIWANET and UzGosKomStat (2017).

68 In fact, the farm restructuring led to the concentration of livestock output in hands of *dekhkan* farms. In 1992, agricultural enterprises produced about 42 percent of livestock output. Yet, already by 1997 livestock production in these farms was reduced more than three-fold, and their contribution to livestock output made up less than 10 percent. In 2016, agricultural enterprises produced 3 percent of livestock output.

69 It has also led to delinking crop from livestock production. Cotton areas were left without organic manure from cattle, while wheat replaced fodder crops after harvesting cotton, leading to soil depletion and thereby cotton yield reduction and a loss of feed for cattle (AFD 2018).

70 Across the provinces, Jizzakh is characterized by almost complete concentration of livestock output in *dekhkan* farms; individual farms generate less than 2 percent of livestock output (Table 18). The highest contribution to the livestock output by non-household sector was in Tashkent province where agricultural enterprises, including poultry and dairy processing enterprises produced a bit less than 10 percent of livestock output.

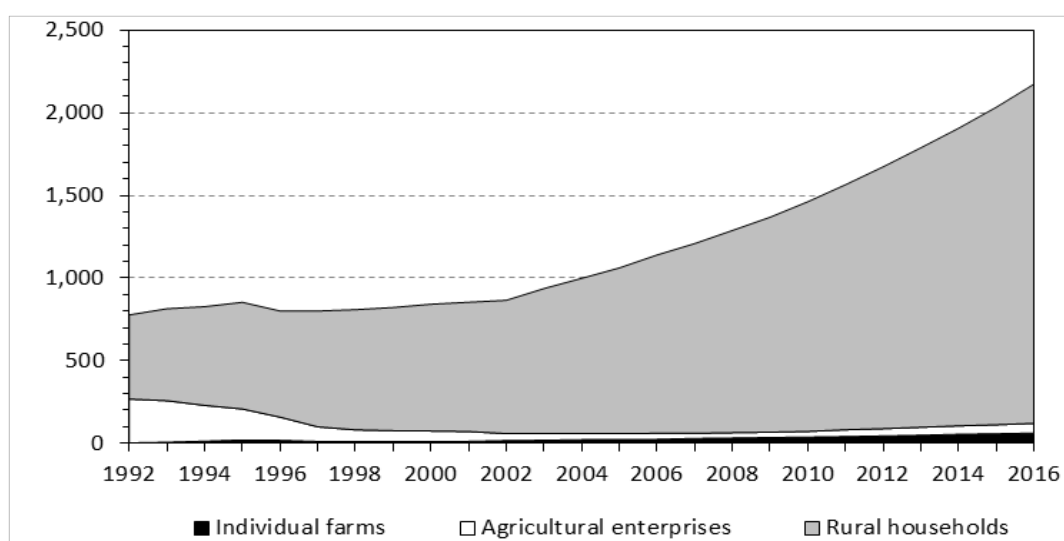
Table 18: Livestock output by producer category and province in 2016, billion UZS

Province	Gross livestock product, bln UZS				from which (percent)		
	Farms	House-holds	Enter-prises	Total	Farms	House-holds	Enter-prises
Karakalpakstan	22.2	618.0	5.2	645.4	3.4	95.7	0.8
Andijan	64.1	1,198.5	16.7	1,279.3	5.0	93.7	1.3
Bukhara	80.3	1,706.9	30.2	1,817.5	4.4	93.9	1.7
Jizzakh	21.0	1,167.7	11.9	1,200.6	1.8	97.3	1.0
Kashkadarya	53.4	1,718.0	28.5	1,799.9	3.0	95.4	1.6
Navoi	39.6	1,052.1	51.7	1,143.5	3.5	92.0	4.5
Namangan	69.2	1,089.5	17.8	1,176.6	5.9	92.6	1.5
Samarkand	118.2	1,749.9	120.4	1,988.6	5.9	88.0	6.1
Surkhandarya	78.9	1,591.0	20.9	1,690.8	4.7	94.1	1.2
Syrdarya	28.7	640.5	13.0	682.2	4.2	93.9	1.9
Tashkent	112.3	1,917.2	206.7	2,236.2	5.0	85.7	9.2
Fergana	74.1	1,262.5	39.5	1,376.1	5.4	91.7	2.9
Khorezm	65.6	1,320.8	20.7	1,407.1	4.7	93.9	1.5
Uzbekistan	827.6	17,032.7	583.4	18,443.7	4.5	92.3	3.2

Source: IAMO and the WB based on UzGosKomStat (2017).

71 Meat production increased almost three times, from 777,000 tons in 1992 to 2,200,000 tons in 2016 (Figure 14). The farm restructuring did not consider transfer of livestock from former collective and state farms to newly-established individual farms. As a result, meat and milk production is constantly increasing, mainly due to expansion of livestock numbers in *dekhkan* farms.

Figure 14: Meat production (in light weight) by producer category, '000 tons



Source: IAMO and the WB based on AGRIWANET and UzGosKomStat (2017).

72 In 2016, almost 95 percent of meat in Uzbekistan is produced in household plots of *dekhkan* farms, ranging from 90 percent in Tashkent and Navoi provinces to 97 percent in Kashkadarya province (Table 19). Contribution of Individual farms into meat production ranged from 0.7 percent in Jizzakh province to 4.4 percent in Surkhandarya and Tashkent provinces. At national level, individual farms produce less than 3.0 percent of meat.

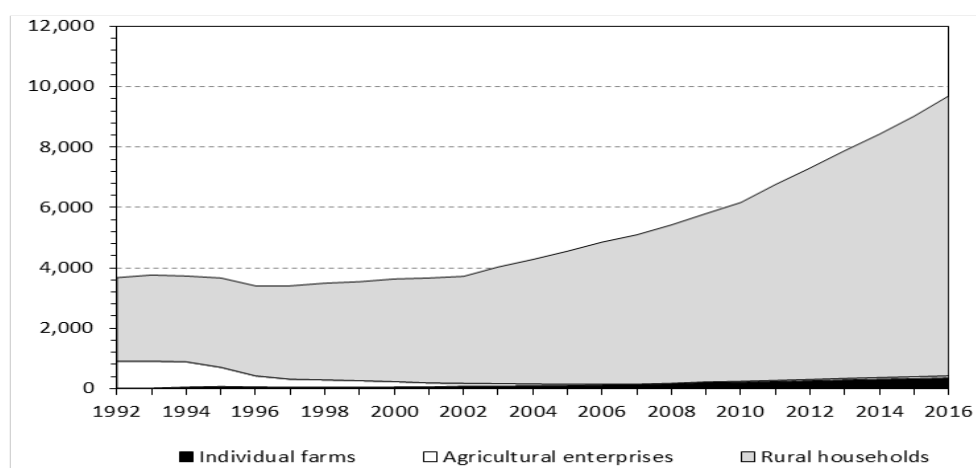
Table 19: Meat production by producer category and province in 2016

Province	Meat production, 1000 t				Share of producer category in meat production, percent		
	Farms	Households	Enterprises	Total	Farms	Households	Enterprises
Karakalpakstan	2.0	92.1	1.0	95.2	2.1	96.8	1.1
Andijan	4.3	127.9	1.8	134.0	3.2	95.4	1.4
Bukhara	5.7	201.6	2.0	209.3	2.7	96.3	1.0
Jizzakh	1.3	187.8	1.0	190.2	0.7	98.8	0.5
Kashkadarya	4.1	258.2	4.0	266.3	1.5	97.0	1.5
Navoi	3.2	127.1	11.8	142.0	2.2	89.5	8.3
Namangan	3.4	120.8	0.9	125.0	2.7	96.6	0.7
Samarkand	8.6	237.2	12.1	258.0	3.3	92.0	4.7
Surkhandarya	7.5	159.5	1.6	168.5	4.4	94.6	0.9
Syrdarya	1.6	58.4	0.4	60.4	2.6	96.8	0.6
Tashkent	10.6	212.5	15.9	238.9	4.4	88.9	6.6
Fergana	5.8	136.5	5.7	148.0	3.9	92.2	3.9
Khorezm	4.3	131.8	0.8	136.9	3.1	96.3	0.6
Uzbekistan	62.2	2,051.3	59.1	2,172.5	2.9	94.4	2.7

Source: IAMO and the WB based on UzGosKomStat (2017).

73 Similar trend can be observed in milk production (Figure 15), where the dominance of *dekhkan* farms is even stronger: about 97 percent of milk in Uzbekistan is produced by smallholders. At the onset of 1990s, agricultural enterprises accounted for a quarter of all milk production. With the progress of farm restructuring by 1992, the production of milk in agricultural enterprises was almost entirely terminated.

Figure 15: Milk production by producer category, '000 tons



Source: IAMO and the WB based on AGRIWANET and UzGosKomStat (2017).

74 The concentration of milk in rural households continues to hinder the development of milk supply chains and the improvement of milk yields (UNDP 2010).

75 In 2016, Samarkand province accounts for the largest amount of milk production, almost 13percent of national milk originates in this province (Table 20). Syrdarya and Navoi provinces and Karakalpakstan had the least milk production levels. Compared to meat, contribution of individual farms and agricultural enterprises to milk production is relatively small in all provinces.

Table 20: Milk production by producer category and province in 2016

Province	Milk production, '000 tons				Share of producer category in milk production, percent		
	Farms	House-holds	Enter-prises	Total	Farms	House-holds	Enter-prises
Karakalpakstan	14.4	328.3	4.2	347.0	4.2	94.6	1.2
Andijan	31.2	856.2	5.1	892.6	3.5	95.9	0.6
Bukhara	35.6	815.0	2.3	852.9	4.2	95.6	0.3
Jizzakh	13.2	521.9	1.5	536.7	2.5	97.3	0.3
Kashkadarya	19.8	997.3	6.0	1,023.1	1.9	97.5	0.6
Navoi	15.4	396.4	3.3	415.1	3.7	95.5	0.8
Namangan	16.3	618.8	2.3	637.4	2.6	97.1	0.4
Samarkand	54.7	1,171.7	1.8	1,228.3	4.5	95.4	0.2
Surkhandarya	17.1	760.8	3.7	781.5	2.2	97.3	0.5
Syrdarya	14.5	297.2	7.2	318.9	4.5	93.2	2.2
Tashkent	40.4	773.9	24.0	838.3	4.8	92.3	2.9
Fergana	40.2	861.1	8.2	909.6	4.4	94.7	0.9
Khorezm	39.9	880.1	2.3	922.3	4.3	95.4	0.2
Uzbekistan	352.7	9,278.8	71.9	9,703.4	3.6	95.6	0.7

Source: IAMO and the WB based on UzGosKomStat (2017).

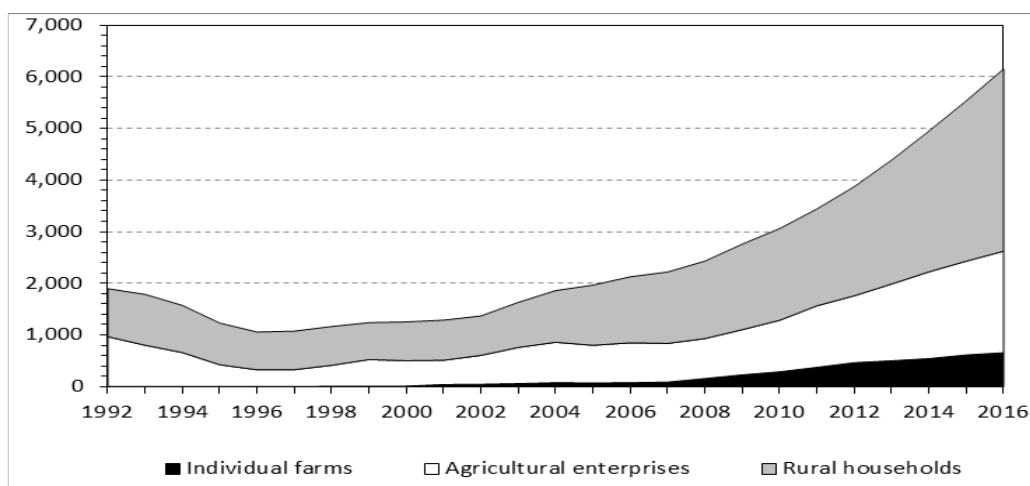
76 In contrast to meat and milk, which predominantly produced in household plots, egg production in agricultural enterprises and individual farms has been developing rapidly (Figure 16). At the onset of reforms, egg production in agricultural enterprises shrank rapidly, leading to the increase in the share of *dekhkan* farms in egg production from 50 percent in 1992 to 70 percent in 1997. The progress of farm restructuring since 2001 and, particularly, the development of poultry-specialized enterprises and individual farms led to the recovery of egg production outside of

household plots. In 2016, *dekhkan* farms produced about 57 percent of all eggs, while individual farms contributed about a one third of production volumes. Since 2007, the contribution of individual farms in egg production increased from 4 percent to 11 percent.

77 There are big variations in egg production volumes across regions (Table 21). The biggest production is concentrated in the provinces around the two biggest cities, Tashkent and Samarkand. Two provinces surrounding these two cities accounted for about 40 percent of egg production.

78 The contributions of different producer categories also varied across provinces. For instance, poultry farms produced one-third of eggs in Namangan and 20 percent in Samarkand province. In fact, these two provinces accounted for 60 percent of all eggs produced in individual farms. In Bukhara and Kashkadarya contribution of individual farms in egg production was less than 2 percent.

Figure 16: Egg production by producer category, million eggs



Source: IAMO and the WB based on AGRIWANET and UzGosKomStat (2017).

Table 21: Egg production by producer category and province in 2016

Province	Egg production, million eggs				Share of producer category in egg production, percent		
	Farms	Households	Enterprises	Total	Farms	Households	Enterprises
Karakalpakstan	12.4	218.1	5.5	236.0	5.3	92.4	2.3
Andijan	50.2	436.5	45.6	532.3	9.4	82.0	8.6
Bukhara	5.9	213.5	128.3	347.7	1.7	61.4	36.9
Jizzakh	15.0	156.1	61.6	232.6	6.5	67.1	26.5
Kashkadarya	8.9	315.0	134.0	457.9	1.9	68.8	29.3
Navoi	34.7	177.1	50.5	262.3	13.2	67.5	19.3
Namangan	138.6	185.2	99.5	423.3	32.8	43.7	23.5
Samarkand	234.5	525.6	406.9	1,167.0	20.1	45.0	34.9
Surkhandarya	13.7	212.3	85.8	311.8	4.4	68.1	27.5
Syrdarya	13.2	98.9	33.9	146.0	9.0	67.8	23.2
Tashkent	57.9	501.3	740.4	1,299.6	4.5	38.6	57.0
Fergana	48.4	253.3	48.2	349.9	13.8	72.4	13.8
Khorezm	23.3	235.5	127.4	386.1	6.0	61.0	33.0
Uzbekistan	656.7	3,528.2	1,967.5	6,152.5	10.7	57.3	32.0

Source: IAMO and the WB based on UzGosKomStat (2017).

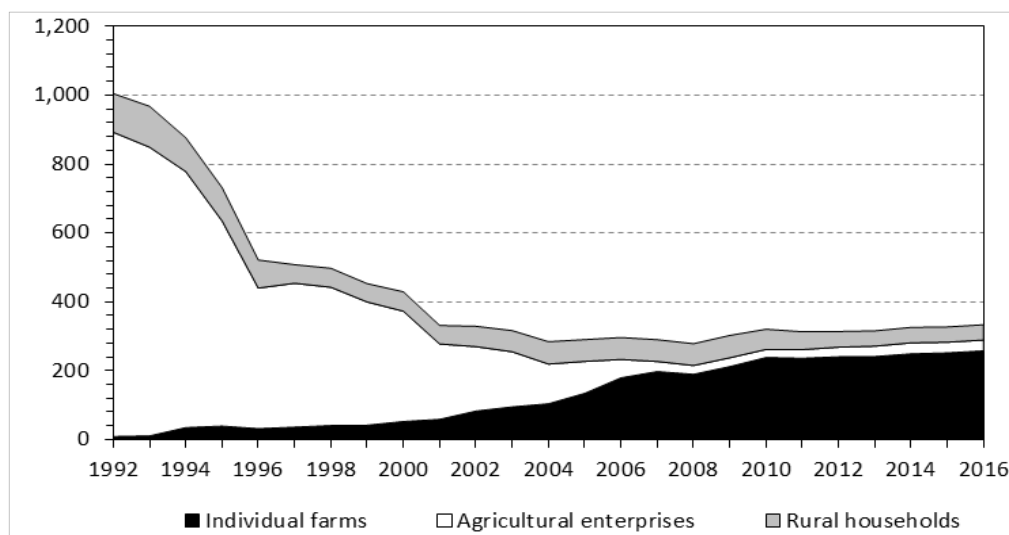
79 Except for Karakalpakstan, Andijan and Fergana provinces, agricultural enterprises contributed over a quarter of eggs production at the province level. Due to the development of poultry farms, most eggs in Tashkent province were produced in agricultural enterprises.

Fodder production

80 The expansion of wheat area that largely occurred in irrigated lands was at the expense of area under fodder crops, particularly of perennials such as alfalfa which were part of cotton rotation scheme in agricultural enterprises (Figure 17). In 1992, sown area under fodder crops was 1 million ha or 24 percent of total sown area. Fodder crops were mainly produced in agricultural enterprises. In 2016, only 333,000 ha were allocated under fodder crops, despite slight increase since 2008. With the fragmentation of large-farms, individual farms took over the largest share of fodder production for a crop rotation after winter wheat or as fodder in livestock farms.

81 Despite the decline in absolute numbers, in 2016 agricultural enterprises allocated the largest share of their sown area to fodder crops (Table 22), over one-third at the national level, ranging from over 60 percent in Bukhara province to just 10 percent in Samarkand province. Individual farms allocated slightly over 8 percent of their sown area to fodder crops. Despite this, over three-fourths of fodder crops area is operated by individual farms. Households which possess almost the entire cattle operate only 13 percent of fodder area, and thus rely on crop byproducts and fodder purchases for feeding their livestock.

Figure 17: Sown area of fodder crops by producer category, '000 ha



Source: IAMO and the WB based on AGRIWANET and UzGosKomStat (2017).

82 Despite the growth in cattle herd, the sown area under fodder crops continued to decline. As a result, the trend in fodder production did not follow the growth in cattle herd: since 1992 fodder area per a head of livestock unit (LSU) has declined almost three times: from 0.15 ha/LSU in 1992 to 0.05 ha/LSU in 2016 (Figure 18).

83 The situation is even worse in *dekhkan* farms which possess over 90 percent of all cattle. The ratio between fodder area and LSU in these small-scale subsistence farms continues to decline. In 2016, compared to individual farms that had about 0.3 ha of fodder area per a LSU, the ratio of fodder area to LSU in *dekhkan* farms was only 32 m² per LSU.

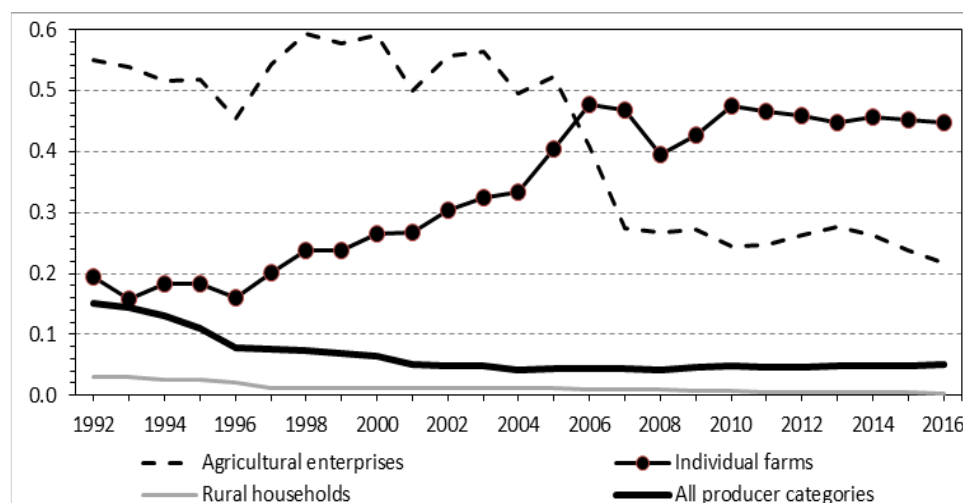
Table 22: Fodder area and its share in sown area by producer category and province in 2016

Province	Fodder sown area, 1000 ha				Share of fodder in sown area, percent			
	Farms	House-holds	Enter-prises	Total	Farms	House-holds	Enter-prises	Total
Karakalpakstan	17.4	3.3	1.6	22.3	8.0	10.4	26.3	8.7
Andijan	10.9	1.1	2.3	14.3	5.5	3.9	45.2	6.2
Bukhara	21.0	1.9	1.2	24.1	10.5	4.9	60.8	10.0
Jizzakh	33.3	7.7	3.0	44.0	9.1	31.7	27.5	11.0
Kashkadarya	26.4	6.9	4.6	37.9	6.4	9.9	32.0	7.6
Navoi	2.0	2.4	1.6	6.0	2.5	13.6	25.6	5.8
Namangan	18.5	0.8	0.3	19.6	9.6	2.6	13.8	8.7
Samarkand	16.9	7.9	0.4	25.2	5.7	13.7	10.1	7.0
Surkhandarya	15.1	2.1	1.2	18.4	6.4	4.7	27.4	6.5
Syrdarya	8.2	1.3	1.6	11.1	3.9	8.7	23.2	4.8
Tashkent	34.2	6.1	8.5	48.8	11.5	14.9	54.3	13.8
Fergana	29.7	0.5	2.9	33.1	12.3	1.2	52.7	11.5
Khorezm	24.1	2.3	2.3	28.7	12.6	5.8	43.1	12.1
Uzbekistan	257.7	44.3	31.5	333.5	8.2	9.2	35.6	9.0

Source: IAMO and the WB based on UzGosKomStat (2017).

84 According to the official statistics, the general trend of shrinking area under fodder crops has not affected milk yields: 1.7 tons/cow in 1992 and 2.3 tons/cow in 2016, which is almost 40 percent increase. This can be explained by the fact that most cattle are held in household plots of *dekhkan* farms which rely in feeding their livestock by open grazing after harvesting and crop byproducts (UNDP 2010).

Figure 18: Average sown area of fodder crops per LSU by producer category, ha / LSU



Source: IAMO and the WB based on AGRIWANET and UzGosKomStat (2017).

85 In 2016, an average ratio of fodder area to livestock units was about 0.022 ha/LSU, ranging from 0.043 ha in Tashkent province to just 0.009 ha in Navoi province (Table 23). Individual farms, which possess about 4 percent of all LSU, had on average 0.3 ha of fodder area per a head of LSU. This ratio of fodder-to-livestock is the highest in Tashkent and Jizzakh provinces and the smallest in Navoi province.

Table 23: Fodder area per LSU by producer category and province in 2016, ha/LSU

Province	Fodder sown area per livestock, ha/LSU			
	Farms	Households	Enterprises	Total
Karakalpakstan	0.470	0.003	0.066	0.019
Andijan	0.201	0.001	0.125	0.011
Bukhara	0.248	0.001	0.028	0.017
Jizzakh	0.808	0.008	0.116	0.041
Kashkadarya	0.323	0.004	0.058	0.019
Navoi	0.045	0.005	0.019	0.009
Namangan	0.401	0.001	0.025	0.024
Samarkand	0.168	0.005	0.006	0.014
Surkhandarya	0.182	0.002	0.031	0.016
Syrdarya	0.223	0.003	0.162	0.024
Tashkent	0.382	0.006	0.074	0.043
Fergana	0.516	0.000	0.104	0.028
Khorezm	0.302	0.003	0.121	0.029
Uzbekistan	0.308	0.003	0.056	0.022

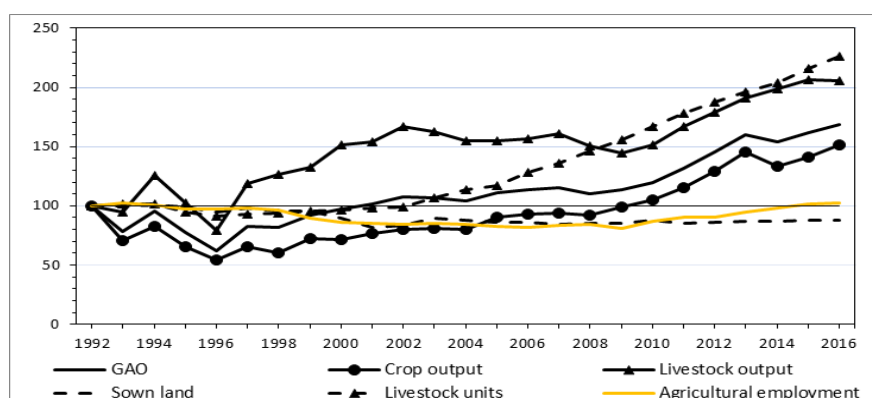
Source: IAMO and the WB based on UzGosKomStat (2017).

Productivity measures

86 Five indicators were used to calculate the average agricultural productivity in this report. It included: (i) labor productivity calculated as a ratio of GAO in constant prices divided by number of agricultural workers; (ii) land productivity calculated as a ratio of GAO in constant prices divided by agricultural land area; (iii) livestock productivity calculated as a ratio of livestock GAO in constant prices divided number of LSU; (iv) cotton yields; and (v) wheat yields.

87 Figure 19 shows the trends of selected productivity indicators. The GAO and crop and livestock outputs in constant 2016 UZS were recovering since 1996. The output growth in livestock sector, measured in meat, milk, eggs, and wool production, outperformed the growth of crop sector. While the gross output of crop sector increased by more than 50 percent, the area of sown land was declining. In contrast, the number of livestock units and the gross livestock output increased after their initial stagnation in 1992-1998 (Figure 20).

Figure 19: Agricultural output, sown area and employment in 1992-2016, 1992=100

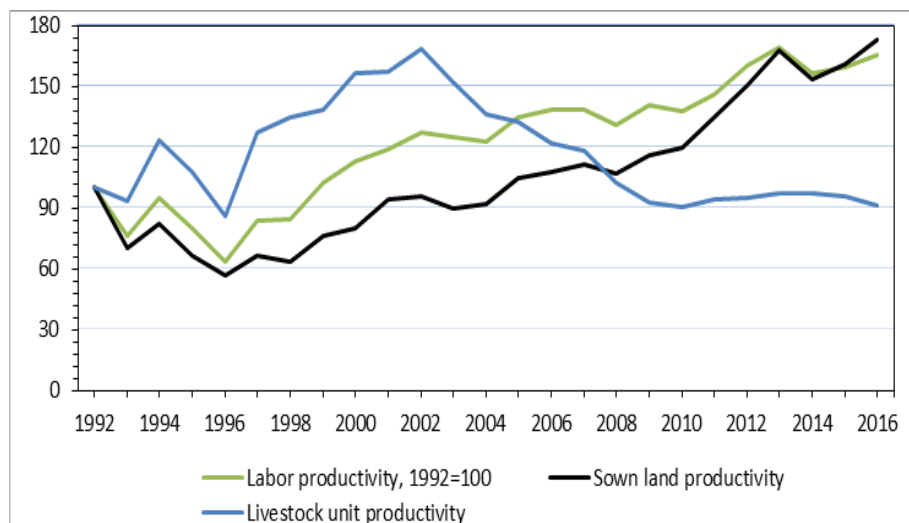


Note: Inflation, GDP deflator (annual percent) from WDI was used to convert GAO, gross crop and livestock output from current prices to constant 2016 UZS.

Source: IAMO and the WB based on AGRIWANET and UzGosKomStat (2017).

88 The restructuring of collective and state farms and the land transfer to individual farms resulted in the decline of agricultural employment up to 80 percent by 2008 compared to the 1992-level.⁸ Yet, following the optimization program in 2008/2009, employment in agriculture has been gradually increasing.

Figure 20: Agricultural output per labor, land and livestock unit, 1992=100



Source: IAMO and the WB based on AGRIWANET and UzGosKomStat (2017).

89 Agricultural labor productivity grew relatively fast. On average, it grew by 1.53 percent annually, between 1996 and 2016, which was faster than in manufacturing, construction, and trade and catering (Table 24). Yet, it has slowed down over time, declining from 2.16 percent in 1996-2000 to 0.90 percent in 2012-2016.

Table 24: Changes in labor productivity in selected sectors, Uzbekistan, 1996-2016

	1996-2000	2001-2008	2009-2011	2012-2016	1996-2016
Change in total productivity, inc. in:	2.85	4.44	5.63	6.16	4.55
Agriculture	2.16	1.84	1.68	0.90	1.53
Manufacturing	0.27	1.29	0.20	0.83	0.92
Construction	-0.10	0.22	0.16	1.11	0.41
Trade and catering	0.57	0.48	1.53	1.28	0.77

Source: World Bank (2018).

90 The growth in average agricultural productivity has not translated into better quality jobs. In primary agriculture, most jobs were in cotton and wheat sectors. They were largely seasonal/temporary and with low rates of return, and low labor intensity. While the absolute number of agricultural labor increased from 3.5 million in 1996 to 3.7 million in 2016, their share in total labor force declined from 43 percent to 30 percent, respectively (World Bank 2018). The small land area allocated for horticulture and livestock/fodder has limited job creation in the sector, although labor intensity of horticulture and livestock production *per se* is much higher than that of cotton and grains (World Bank 2012). On the other hand, light industry and food processing industry, which depend on the primary agriculture for supply of raw materials, have shed the labor in big numbers (Table 25). Among the reasons were the lack of volumes and quality of raw materials for processing and the poor access to foreign markets to sell Uzbek products. This labor shedding has reduced the average productivity of the economy, as labor productivity in food and light industries is pretty high. Most labor, who left agriculture and these industrial jobs, moved to much less

⁸ Official figures for agricultural employment also include self-employed members of *dekhkan* farms.

productive construction and trade & catering jobs or out-migrated. In other words, agriculture has not served the food systems well in terms of job creation.

Table 25: Changes in employment and labor productivity of subsectors of Uzbekistan’s economy, 1996-2016

	Employment, million			Labor productivity (output per worker), '000 Som		
	1996	2016	Change, %	1996	2016	Change, %
Agriculture	3.51	3.69	5.1	738	2,275	208.2
Food industry	0.82	0.71	-13.1	1,698	10,650	527.4
Light industry	0.21	0.14	-33.9	1,812	6,031	233.0
Construction	0.54	1.26	134.4	957	2,730	185.2
Trade and catering	0.71	1.52	112.6	1,068	3,751	251.1
TOTAL	8.21	12.28	49.6	1,158	2,811	142.6

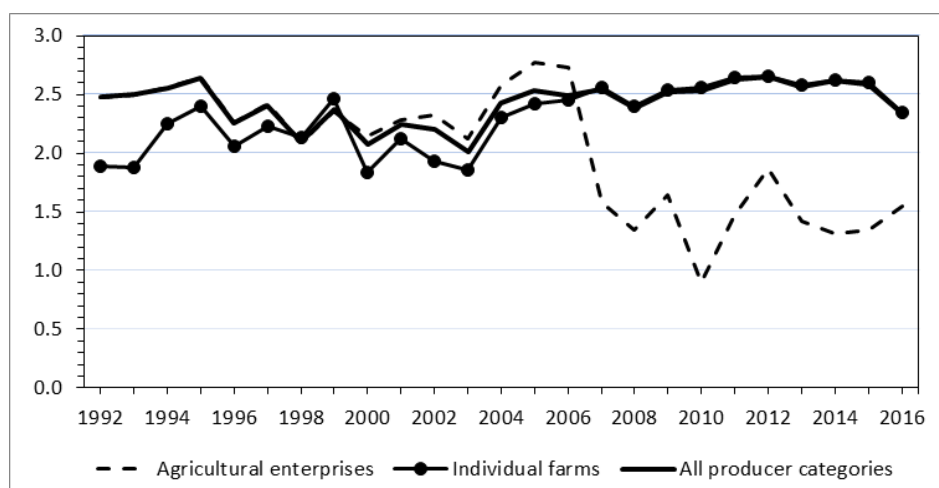
Source: World Bank (2018).

91 The livestock productivity trend differs from those of sown land and labor productivity. The livestock productivity was improving in 1997-2002 recovering after the initial stagnation. In 2003-2009 it experienced a decline as the growth of livestock numbers outperformed the growth in their output. Since 2009 the livestock productivity has been around 93-97 percent of its 1992-level.

92 During the early stages of farm restructuring (1992-2008) cotton yields at the national level were declining and had higher yearly fluctuations (Figure 21). Following the program of farm size and location optimization, the cotton yields on individual farms first increased and fluctuated less but then flattened and stopped growing. One of the reasons for this weak growth in cotton yields is a decoupling of livestock from cotton production. In the past, cattle provided manure on cotton fields, and cotton production was followed by fodder production, which also helped restore soil nutrients. With the introduction of production quota for wheat, it replaced fodder, putting pressure on soil fertility on which cotton is produced (AFD 2018).

93 Wheat yields have been going up since 1994 (Figure 22). The highest increase in wheat yields was observed during the first two stages of farm restructuring. The optimization program initiated in 2008/2009 contributed to the further increase: wheat yield reached the average of 4.8 tons/ha.

Figure 21: National average yields of cotton by producer category, tons/ha

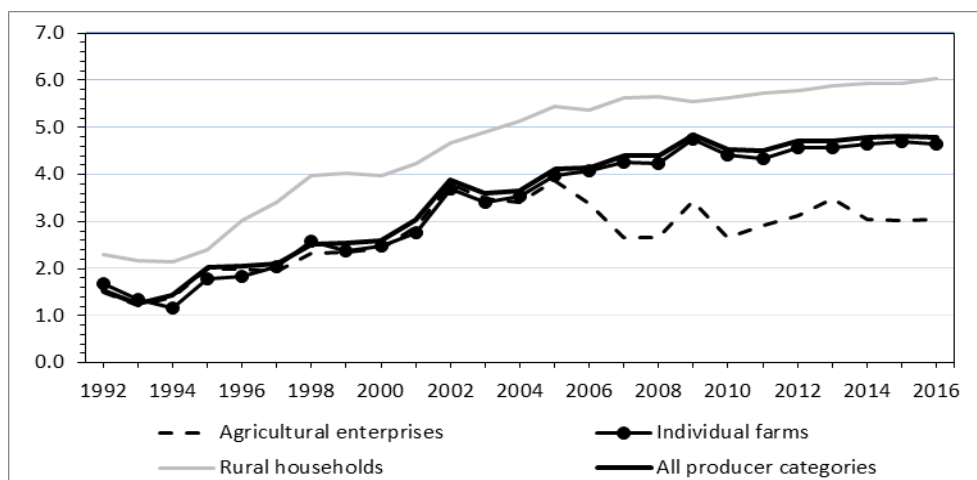


Source: IAMO and the WB based on AGRIWANET and UzGosKomStat (2017).

94 *Dekhkan* farms always achieved higher yields than other two producers, reaching unprecedented 6 tons/ha in 2016. This can be attributed to the governmental program to adopt higher yield varieties, expansion to productive irrigated land, improved mechanisms of seed distribution owing to the public maintenance of agricultural research facilities, import of modern

grain combines as well as continuous increase in application rates of mineral fertilizers (Pomfret 2008, Lerman *et al.* 2016, Bobojonov *et al.* 2017). This indicates that small farms can be highly productive if enabling environment is conducive for their development.

Figure 22: Wheat yields by producer category, tons/ha

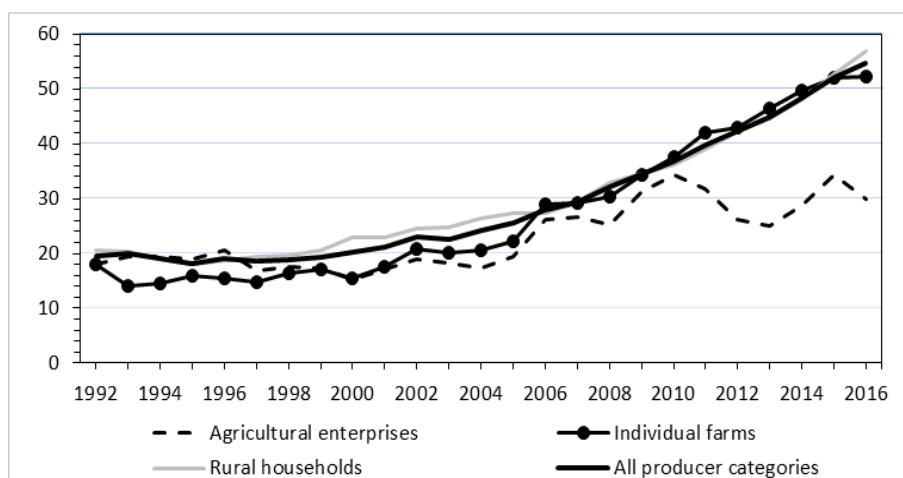


Source: IAMO and the WB based on AGRIWANET and UzGosKomStat (2017).

95 Vegetable yields, derived by dividing vegetable production to vegetable sown area, have been continuously increasing after the government initiated the farm fragmentation in 1998 (Figure 23): an increase from 19 tons/ha in 1998 to 55 tons/ha in 2016. During the first two stages of farm restructuring, vegetable yields in individual farms were about 20-25 percent lower than those in dekhkan farms. The completion of farm restructuring in 2006 narrowed the yields gap between these two producers.

96 The increase in vegetable yields in individual farms can be associated with the fact that these crops are exempted from the state production targets, and thus provide direct economic incentives to producers. Despite its economic attractiveness and increasing yields, the underdevelopment of marketing and export channels, as well as the state priority in input distribution to cotton-wheat production (Lerman *et al.* 2016) hinders the development of vegetable production in individual farms. In 2016, only 2.4 percent of sown area in individual farms was under vegetables (Table 17).

Figure 23: Vegetable yields by producer category, tons/ha

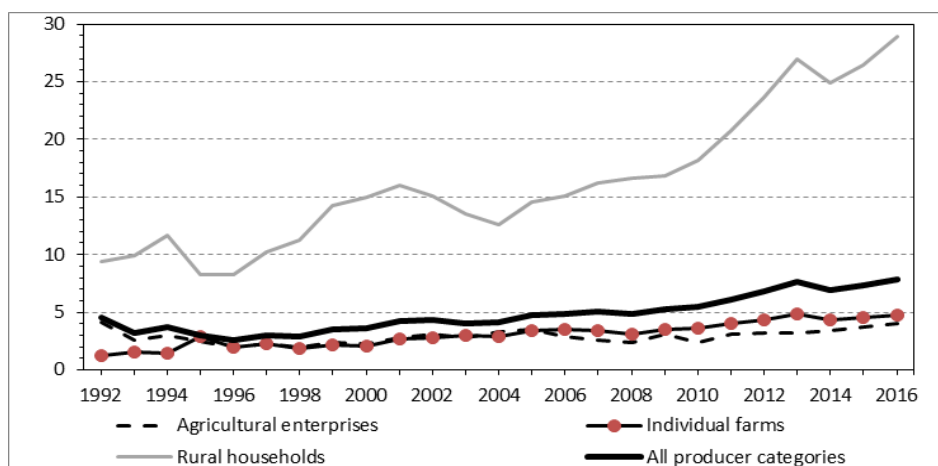


Source: IAMO and the WB based on AGRIWANET and UzGosKomStat (2017).

97 Productivity of sown land, measured in constant 2016 UZS, has been increasing since 2005/06 (Figure 24). This can be attributed to the rapid decline of the number of loss-making

agricultural enterprises and completion of land transfer from of agricultural enterprises to individual farms. *Dekhkan* farms had much higher productivity of a hectare of sown land than individual farms and agricultural enterprises. In 2016, the total crop output per a hectare of sown area in Uzbekistan was 7.8 million UZS, ranging from 4.5 million UZS in agricultural enterprises and individual farms to almost 29 million UZS in *dekhkan* farm plots. The average national value of land productivity was closer to the value in individual farms, which operate about 84 percent of sown area.

Figure 24: Sown land productivity by producer category, million constant 2016 UZS/ha



Note: Inflation, GDP deflator (annual percent) from WDI was used to convert GAO from current prices to constant 2016 UZS.

Source: IAMO and the WB based on AGRIWANET and UzGosKomStat (2017).

98 Before the completion of farm restructuring in 2016, the sown land productivity of individual farms and agricultural enterprises was almost the same. The completion of farm restructuring widened the gap between these two producer categories.

99 The comparison of sown land productivity across producer categories and provinces in 2016 shows that sown land productivity in individual and *dekhkan* farms in Karakalpakstan and in Jizzakh and Kashkadarya provinces was below the national level (Table 26). In all provinces, small-scale *dekhkan* farms were more productive than individual farms. Individual farms and households in Andijan province had the highest sown land productivity. In 2016, in Karakalpakstan as well as Namangan, Samarkand, Surkhandarya, Syrdarya and Fergana provinces, sown land productivity in agricultural enterprises was higher than in individual farms.

100 Livestock unit productivity in constant 2016 UZS values experienced a recovery in 1996-2002 (Figure 25) mainly due to the improvement of livestock output in *dekhkan* farms. Yet, with the decline of area under fodder crops, the growth of gross livestock output did not follow the speed of cattle herd growth in *dekhkan* farms. This can be tracked by the average meat production (in live weight) per cattle head which was increasing gradually since 1997 from 154 kg/cattle to 162 kg/cattle in 2011 (Figure 27).

101 Another reason for the stagnating livestock productivity in *dekhkan* farms is the scarcity of pastures and fodder sources, and dependence of households in grazing their cattle in fields after harvesting. The transfer of land to individual farms reduced opportunity for such grazing practices for *dekhkan* farms (UNDP 2010; ADF 2018).

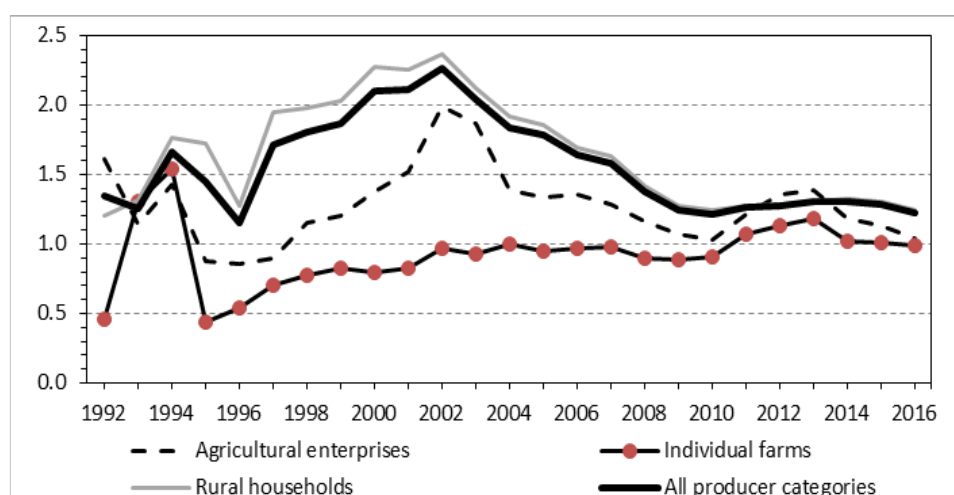
Table 26: Sown land productivity by producer category and province in 2016, million UZS/ha

Province	All producers	Farms	Households	Enterprises
Karakalpakstan	2.7	2.0	7.2	4.3
Andijan	17.2	8.9	76.9	4.2
Bukhara	10.7	5.8	36.0	4.6
Jizzakh	2.8	2.1	14.5	0.9
Kashkadarya	4.2	3.4	9.5	1.3
Navoi	11.5	6.7	35.4	4.1
Namangan	10.4	5.1	43.7	7.9
Samarkand	10.3	7.2	26.4	8.5
Surkhandarya	8.4	4.0	32.2	4.9
Syrdarya	4.9	3.1	29.9	4.6
Tashkent	10.5	6.5	41.4	6.3
Fergana	8.9	5.1	32.1	5.5
Khorezm	6.5	4.5	16.7	2.2
Uzbekistan	7.8	4.7	28.9	4.0

Source: IAMO and the WB based on UzGosKomStat (2017).

102 The comparison of values of livestock unit productivity across producer categories shows that in 1995-2003 smallholders had the highest productivity. In the following years, productivity of livestock units in households and individual farms converged. In 2016, the livestock output per livestock unit was 1.22 million UZS, ranging from around 1 million UZS in agricultural enterprises and individual farms to 1.24 million in *dekhkan* farms. Since the latter possess over 90 percent of all LSUs, the national value of livestock unit productivity is closer to the productivity of *dekhkan* farms.

Figure 25: Livestock output per LSU by producer category, million constant 2016 UZS/LSU

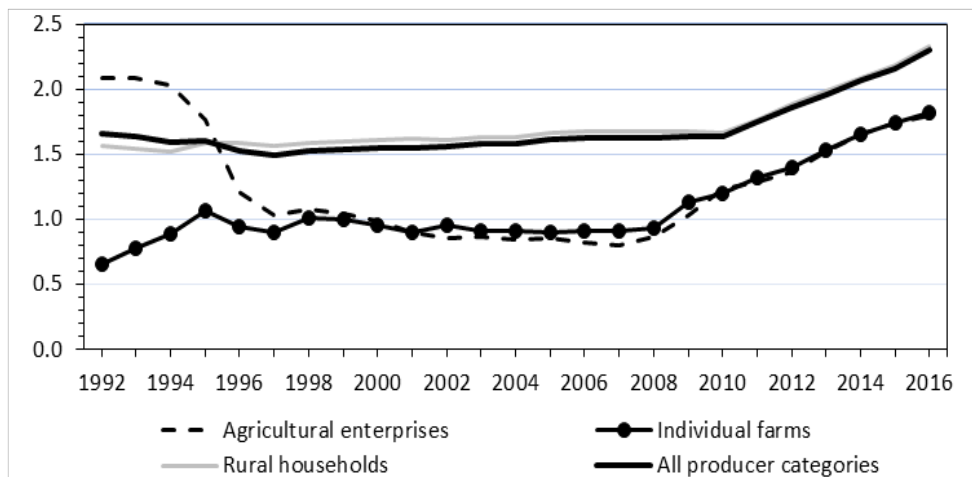


Note: Inflation, GDP deflator (annual percent) from WDI was used to convert GAO from current prices to constant 2016 UZS.

Source: IAMO and the WB based on AGRIWANET and UzGosKomStat (2017).

103 Since 2010, the *dekhkan* farms were increasing milk yields (from 1.6 tons/cow in 2010 to 2.3 tons/cow in 2016), which stabilized the livestock unit productivity (Figure 26). Milk yields in agricultural enterprises declined rapidly during the first stage of restructuring (1992-1997) but stabilized after 1998. With the completion of farm fragmentation and after the first wave of optimization program, agricultural enterprises and individual farms experienced similar, almost parallel, increase in milk yield: milk yield per cow in individual farms doubled in 2008-2016.

Figure 26: National average milk yields by producer category, tons/cow

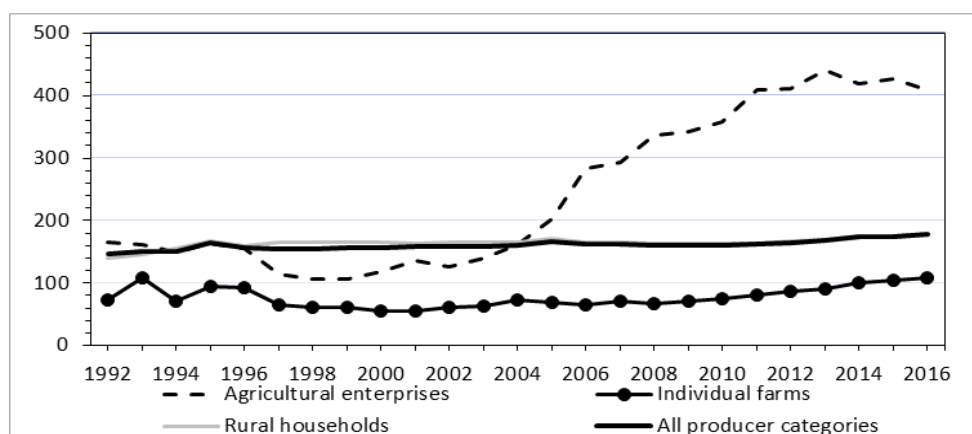


Source: IAMO and the WB based on AGRIWANET and UzGosKomStat (2017).

104 While it is difficult to associate the increasing milk yields in *dekhkan* farms with the expanded fodder area and improved quality of pastures, the increase can be due to the government programs to improve availability of cotton byproducts to livestock producers, import of better cow breeds, improvement of accessibility and quality of veterinary services, and better feeding practices. Understanding of the reasons of increasing milk yields requires further investigation.

105 The farm restructuring affected meat production in agricultural enterprises (Figure 27). Producing about 2 percent of total meat in Uzbekistan, agricultural enterprises had recovered meat production per a cattle head from 126 kg (in live weight) in 2002 to 409 kg in 2016. Similar recovering trend in meat production can be observed in individual farms, yet at a lower speed than in agricultural enterprises: in 2002-2016 meat production per cattle in agricultural enterprises gained additional 224 percent, in individual farms it was 77 percent.

Figure 27: National average meat production (in live weight) by producer category, kg/cattle



Source: IAMO and the WB based on AGRIWANET and UzGosKomStat (2017).

106 In 2002-2016, meat production per cattle in *dekhkan* farms was much lower than in agricultural enterprises, but higher than in individual farms. Since *dekhkan* farms possess most of the livestock, the general increase in meat productivity was not as rapid as in case of milk yield. The average meat production (in live weight) per cattle head increased slowly from 154 kg/cattle which in 1997 to 162 kg/cattle in 2011, or only 5.3 percent increase over 15 years. The meat production per cattle increased from 165 kg in 2002 to 178 kg in 2016.

107 As in the case of productivity of sown land, individual farms and dekhkan farms in Karakalpakstan had the lowest productivity of livestock units (0.6 million UZS/LSU), almost two times lower than the national average (Table 27). The highest livestock productivity can be observed in Tashkent and Navoi provinces. In most provinces households outperform individual farms and agricultural enterprises in terms of livestock productivity, except for Andijan, Namangan, Samarkand, and Fergana provinces.

Table 27: Livestock output per LSU by producer category and province in 2016, million UZS/LSU

Province	All producers	Farms	Households	Enterprises
Karakalpakstan	0.56	0.60	0.57	0.22
Andijan	1.02	1.18	1.02	0.91
Bukhara	1.26	0.95	1.30	0.71
Jizzakh	1.11	0.51	1.15	0.46
Kashkadarya	0.90	0.65	0.94	0.36
Navoi	1.74	0.89	2.00	0.61
Namangan	1.46	1.50	1.46	1.51
Samarkand	1.10	1.18	1.07	1.94
Surkhandarya	1.46	0.95	1.54	0.53
Syrdarya	1.45	0.78	1.52	1.32
Tashkent	1.95	1.26	2.04	1.81
Fergana	1.18	1.29	1.16	1.42
Khorezm	1.45	0.82	1.51	1.09
Uzbekistan	1.22	0.99	1.24	1.04

Source: IAMO and the WB based on UzGosKomStat (2017).

V. Conclusions and Recommendations

Farm restructuring outcomes

108 Since national independence, government-led farm restructuring in Uzbekistan has followed a non-linear path:

- During the 1990s up to 2007, the former collective farms were hesitantly dismantled and split into smaller individual farms. However, land ownership remained public and farms continued to be subjected to cotton and wheat delivery quotas that persist up to date. Inputs like seed, fertilizer, and machinery have been mostly provided by government agencies, also focusing on cotton and wheat production. Farmers obtained the right to produce and sell crops other than cotton or wheat on private terms. The main policy goals were to maintain a persistent supply of raw cotton to secure government's export revenues and of wheat to secure essential food supply.
- Unsatisfied with the productivity of individual farms that resulted from the decollectivization process and aware of a mismatch between water supply infrastructure and farm sizes, the government implemented a farm consolidation policy after 2008. By government decree, smaller farms, particularly of cotton-grain production specialization, were merged into bigger ones.
- After 2015, the official policy turned to the diversification of crop rotations away from cotton and wheat. In addition to productivity increases among traditional crops, the government now also aims to increase the output of fruits, vegetables and other high-value crops. Some land is being shifted from cotton and wheat to other crops, although the magnitude of this shift remains relatively small. Farmers are supposed to be integrated into multi-profile farms, which could be engaged in agricultural production and processing, preparation, storage, marketing, and provision of other services. Reforms also aim to strengthen the value chains and permit direct export without going through the government monopoly Uzagroeksport and mandatory submission of part of export revenue in foreign currency.

109 Against these declared policy goals, the major trends of farm restructuring were as follows:

- The decollectivization process was formally successful and after a long delay farms were fundamentally restructured.
- Cotton production was taken over completely by individual farms. The areas sown to cotton were gradually reduced. Yields stabilized but in the last ten years it stopped to grow, leading to the decline in the national cotton production.
- Wheat self-sufficiency has progressed through expanding the wheat sown area and rising yields, to which farm restructuring has partially contributed. Yet, wheat import, mainly from Kazakhstan, has grown recently, accounting for 43 percent of wheat production in 2017 compared to 25 percent in 2010 (USDA 2018). Thus, the increase in demand for wheat from Uzbekistan's consumers, which grew from 7.7 million tons in 2010 to 9.7 million tons in 2017, was largely met by imports, not domestic production, due to the mismatch in wheat quality between locally-produced wheat and higher quality import demanded by consumers.
- Sown area and yields under higher-value food crops such as fruits and vegetables in individual farms have risen. The structure of individual farms according to their production specialization is currently being gradually diversified from cotton/wheat to horticulture farms, but their productivity significantly lags the productivity of *dehkan* farms.

- Livestock on large farms mostly collapsed and shifted to *dekhkan* farms.

110 The official statistics aggregated at the province level does not provide full the picture to understand the changes induced through the optimization program. Such drastic changes can be observed at district level, e.g. known examples of individual farms in districts in Samarkand that were released from cotton cultivation and diversified to fruit and vegetable production.

Remaining areas for improvements

111 According to the analysis in this report and the references quoted, the following problem areas persist and need to be addressed:

- Over two and a half decades after independence, the government has maintained strict control of the entire production chain, with only few exceptions in horticulture and livestock products. In addition, producers of non-strategic crops greatly depend on state-mandated land and input allocations.
- Strategic crops continue to dominate the sown area of individual farms and the land allocations to these crops are not driven by market signals.
- *Dekhkan* farms are disconnected from food value chains and agribusinesses. Larger farms do not work as nuclear or anchor farms for small *dekhkan* farms.
- Farm restructuring by decrees and weak property rights in land use curtail management and investment incentives and raise issues of the just access to farmland for the rural population.
- A limited fodder base constrains livestock expansion, the sub-sector with a large potential for inclusive growth and job creation, and keeps it concentrated in *dekhkan* farms. Crop and livestock production are decoupled. As a result, cotton, for example, does not benefit from organic manure while livestock producers lost access to fodder, which was previously produced after harvesting cotton. Fodder in individual farms was replaced by wheat grown under production quota and procurement systems.
- Individual farms producing high-value crop are constrained in their access to fertilizers, fuel, machinery, credit, value chains, and export channels.
- Problems pertaining to the stability and distribution of irrigation water supply have not been resolved in a satisfactory manner.

Recommendations on the future of farming in Uzbekistan

112 Like other Central Asian governments, Uzbekistan has struggled to find a post-socialist model for its farming sector. The debates still focus on the desirable farm size where the Soviet legacy of industrialized collective farms co-existing with private household plots marked the extremes. The global experience, on the other hand, stresses the need for flexibility in farming structures (Otsuka et al. 2016). Very small plots operated by *dekhkan* farms in Uzbekistan are suboptimal, but once farm size reaches 30-40 ha for wheat and cotton, increasing it further does not bring much economic gain. There is generally no evidence of economy of scale in primary agriculture, and any gains from economy of scale are easily negated by extra monitoring costs of wage labor and farm managers. These factors highlight the importance of individual incentives for farm efficiency and account for the predominance of family farms in a market economy (Lerman and Childress 2013).

113 Optimal farm size globally is determined in each case by the managerial capacity of the farmer and many exogenous factors. Farm size is often growing in the countries where economic growth and rising off-farm wages lead to the outflow of agricultural labor. Thus, rather than

targeting at a type or size of farm organization, it is better to help farmers: (i) improve their managerial capacity; (ii) react to market signals by removing agricultural distortions; (iii) lease or buy more land when profitable; and (iv) access a set of supporting agricultural services.

114 The future reform agenda would need to focus on: (i) removal of the production distortions; (ii) increase of the impact of agricultural public expenditures on the sector performance; and (iii) help of smallholders to reduce transaction costs. The specific actions can be the following:

Production distortions

- Phase out the cotton and wheat production quotas, inside and outside of the clusters.
- Align farm-gate prices for cotton and wheat with market prices.
- Avoid the introduction of new mandates (such as on high value crops or diversification) that impose yet other production constraints on farmers.
- Liberalize land market to allow farm restructuring to evolve responding to market signals. This does not necessarily require full privatization of farmland in the short run, but the legalization of land rentals and sub-rentals, revoking the threat of public land seizures, and formalization of labor contracts. It is important to ensure that transaction costs for moving land from less to more efficient farmers are minimized, irrespective of size or type of farms.

Efficiency of agricultural public expenditures

- Use public expenditures more effectively to help farmers increase returns to land and labor. It would require redirection of farm subsidies towards public good provision and empowering national and local governments to allow more effective service delivery such as land registries or advisory services.
- Increase the capacity of applied agricultural research and extension/advisory services to produce new location-specific technologies and make them available to farmers.
- Ensure that an adequate amount of public expenditures is allocated to the above-mentioned programs to make a difference. Many of them were underfunded in the past.

Programs for dekhkan farms

- Introduce public programs targeting *dekhkan* farms, especially those who want to expand and grow. These programs can facilitate establishment of productive partnerships (cooperatives) among farmers, and between farm groups and agribusiness, to improve quality and safety of products and connect these farms to modern value chains. Such programs are common in many countries with small farms. The role of government would be to finance: (i) establishment of farm groups; (ii) improvement of their farming and managerial capacity; and (iii) activities of anchor agribusinesses to develop vertical networks and business arrangements and provide veterinary and advisory services to small farmers on behalf of the government.

115 How a future and still growing rural population will be employed and secure its income is one of the essential questions the government seeks to address. It would require actions beyond the farm restructuring. Farm restructuring is only a part of the puzzle to be brought together into one coherent piece, not a silver bullet as often perceived.

References

- ADF (2018): Uzbek agrarian systems: Lessons learned from 3 diagnostics done in Kachkadarya, Dzizzak and Namangan Provinces (March-December 2017). French Development Agency, Unpublished Power Point Presentation.
- AGRIWANET project (2017): Database on agriculture in Central Asia across producer categories and provinces. Halle (Saale), Germany. www.iamo.de/en/agriwanet
- Akramov, K. (2011): International food prices, agricultural transformation, and food security in Central Asia. *Development in Practice* 21 (4-5), 741-754.
- Bobojonov, I., Djanibekov, N., and P. Voigt (2017): Future perspectives on regional and international food security: Emerging players in the region: Uzbekistan. In: Gomez y Paloma, S., Mary, S., Langrell, S., Ciaian, P. (Eds.) *The Eurasian Wheat Belt and Food Security: Global and Regional Aspects*. Springer Cham, pp. 195-213.
- Djanibekov, N. (2008): A Micro-economic analysis of farm restructuring in the Khorezm Region, Uzbekistan, PhD dissertation, ZEF/Bonn University.
- Djanibekov, N., Van Assche, K., Bobojonov, I. and J.P.A. Lamers (2012): Farm restructuring and land consolidation in Uzbekistan: New farms with old barriers. *Europe-Asia Studies* 64 (6), 1101-1126.
- Djanibekov, N., Bobojonov, I., Van Assche, K., Rudenko, I., Nurmetov, K., and J. P.A. Lamers (2015): Farm restructuring in Uzbekistan through fragmentation to consolidation. In: Lamers, J.P.A., Khamzina, A., Rudenko, I., Vlek, P.L.G. (Eds.) *Restructuring Land Allocation, Water Use and Agricultural Value Chains: Technologies, Policies and Practices for the Lower Amurdarya Region*. V&R unipress, Bonn University Press, Goettingen, pp. 33-44.
- Djanibekov, U., Van Assche, K., Boezeman, D. and N. Djanibekov (2013): Understanding contracts in evolving agro-economies: Farmers, dekhkans and networks in Khorezm, Uzbekistan. *Journal of Rural Studies* 32, 137-147.
- Djanibekov, U., Van Assche, K., Boezeman, D., Villamor, G.B. and N. Djanibekov (2015): Revealing the role of agricultural contracts in rural livelihoods in Uzbekistan. In: Kimhi, A., Lerman, Z. (Eds.), *Agricultural Transition in Post-Soviet Europe and Central Asia after 20 Years. Studies on Agricultural and Food Sector in Transition Economies*, IAMO, Halle (Saale).
- Larson, D.L., Khidirov, D. and I. Ramniceanu (2012): Uzbekistan: Strengthening the horticulture value chain. World Bank, Washington DC.
- Lerman, Z. (2008): Agricultural development in Central Asia: A survey of Uzbekistan, 2007–2008. *Eurasian Geography and Economics* 49 (4), 481-505.
- Lerman, Z. and M. Childress (2013): The Evolution of Central Asia's farming sectors: Structure, Performance, and Policy. The World Bank report. Unpublished.
- Lerman, Z., Sedik, D., Yusupov, Y., Stanchin, I. and I. Kazakevich (2016): Wheat production and regional food security in CIS: The case of Belarus, Turkmenistan, and Uzbekistan. *FAO Policy Studies on Rural Transition* No. 2016-1.
- MacDonald, S. (2012): Economic policy and cotton in Uzbekistan. Report from Economic Research Service CWS-12 h-01. USDA.
- MAWR (2017a): Official figures on number of machinery in agriculture across provinces. Tashkent.
- MAWR (2017b): Official figures on structure of individual farms by production specialization across provinces. Tashkent.
- Otsuka, K., Liu, Y. and F. Yamauchi (2016): The future of small farms in Asia. *Development Policy Review* 34, 441–461.
- Petrick, M. and N. Djanibekov (2016): Obstacles to crop diversification and cotton harvest mechanization: Farm survey evidence from two contrasting districts in Uzbekistan. IAMO Discussion Paper No. 153, Halle (Saale). <http://purl.umh.edu/234226>

- Platonov, A., Wegerich, K., Kazbekov, J. and F. Kabilov (2014): Beyond the state order? Second crop production in the Ferghana Valley, Uzbekistan. *International Journal of Water Governance* 2, 83-104.
- Pomfret, R. (2000): The Uzbek model of economic development, 1991-99. *Economics of Transition* 8 (3), pp. 733-748.
- Pomfret, R. (2008): Tajikistan, Turkmenistan, and Uzbekistan. In: Anderson K, Swinnen J (eds) *Distortions to Agricultural Incentives in Europe's Transition Economies*. Washington, DC: World Bank, pp. 297-338.
- Pugach, I., Yusupov, Y. and Z. Berdinazarov (2016): Agricultural policy in wheat production and crop diversification in Uzbekistan. *IAMO Discussion Paper No. 157*, Halle (Saale), IAMO.
- Shtaltovna, A. and A.-K. Hornidge (2014) A comparative study on cotton production in Kazakhstan and Uzbekistan. ZEF, University of Bonn.
- Swinkels, R., Romanova, E. and E. Kochkin (2016): Assessing the social impact of cotton harvest mechanization in Uzbekistan. World Bank, Washington DC.
- UNDP (2010): *Livestock production in Uzbekistan: Current state, challenges and prospects*. Nasaf, Tashkent.
- USDA (2018): United States Department of Agriculture. Online database with agricultural commodity balances. Washington, DC.
- UzGosKomStat (2017): *Agriculture of Uzbekistan, and official figures on structure of individual farms by production specialization across provinces*. The State Committee of Statistics of Uzbekistan. Tashkent.
- World Bank (2017): GDP deflator (annual percent) for Uzbekistan 1992-2016, *World Development Indicators*.
- World Bank (2018): *Growth Diagnostic for Uzbekistan*. Washington, DC.

Appendix: Policies events related to restructuring of individual farms in 2006-2017

Date	Policy event	Highlight of the policy event	Effect of the policy event
January 9, 2006	<p>Presidential decree UP-3709 “On measures of deepening economic reforms in horticulture and viniculture”.</p> <p>The decree was implemented through the Presidential resolution PP-255 “On organizational measures of reforming horticulture and viniculture” (January 11, 2006). This included also the Cabinet Ministers resolution №42 “On the approval of the regulation of the establishment and organization of activities of horticultural and vinicultural agro-firms” (March 10, 2006).</p>	<p>UP-3709 addressed the need to transform agricultural cooperatives (<i>shirkats</i>) specialized in vegetable, melons, fruit and grape production into individual farms. Transferred land should be maintained for the use of gardens and wine production. The decree regulates the formation of agro- firms by individual farms based on the use of flexible, modern mini-technologies for the processing of agricultural products.</p> <p>PP-255 provided concrete organizational measures to transform horticultural and vinicultural <i>shirkats</i> into individual farms, including the list of <i>shirkats</i> to be reorganized, indication of infrastructure facilities to be established on territory of transformed <i>shirkats</i>, and investment projects of processing enterprises.</p> <p>The Cabinet Ministers resolution №42 determined the procedure for creating and organizing the activities of horticultural and vinicultural agri-firms by individual farms.</p>	<p>The law initiated the transfer of vegetable and fruit production from <i>shirkats</i> to individual farms. The number of individual farms specialized in the production of vegetables and melons in 2007 increased from 11,300 to 13,300 (17.9 percent increase). Accordingly, in 2007 the number of individual farms specializing in horticulture and grape production increased from 51, 300 to 59,100 (increased of 15 percent). Sown area of vegetables from 2006 to 2007 in individual farms increased from 45,000 to 53,600 ha; vegetable production in individual farms increased from 1,305,400 tons to 1,567,800 tons. Meanwhile, sown area of vegetables in <i>shirkats</i> dropped from 6,700 to 1,500 ha; vegetable production decreased from 170,400 tons to 42,700 tons.</p>
March 23, 2006	<p>Presidential resolution PP-308 “On support measures designed to increase the number of cattle or cows in households, <i>dekhkan</i> and individual farms.”</p>	<p>The decree aimed at enabling legal and economic conditions for increasing the number of <i>dekhkan</i> and individual farms engaged in livestock production, especially cattle, and at solving unemployment issues. In particular, the procedure for allocation of preferential targeted loans by commercial banks to citizens for purchasing cattle in households, <i>dekhkan</i> and individual farms under guarantee of local (<i>mahalla</i>) committees was simplified.</p>	<p>From 2006 to 2007, the number individual farms specializing in raising livestock production increased from 13,700 to 16,000; in 2007 number of cattle in individual farms increased on 223,000 heads (35 percent increase), in 2008 – on 135,000 heads (16 percent increase). Other years, annual increase was on average about 69,000 cattle heads.</p>
November 15, 2006	<p>Cabinet of Ministers resolution №238 “On the forecast parameters of production and use of fruits and vegetables, potatoes, melons and grapes in 2007.”</p>	<p>The document highlighted the priority of producing fruits, vegetables, potatoes, and grapes in specialized individual farms, paying special attention to allocation of necessary land in individual farms in accordance with forecast production parameters.</p>	<p>State-directed promotion of vegetable, potato, fruit production in individual farms along the complete fragmentation of <i>shirkats</i> into individual farms.</p>

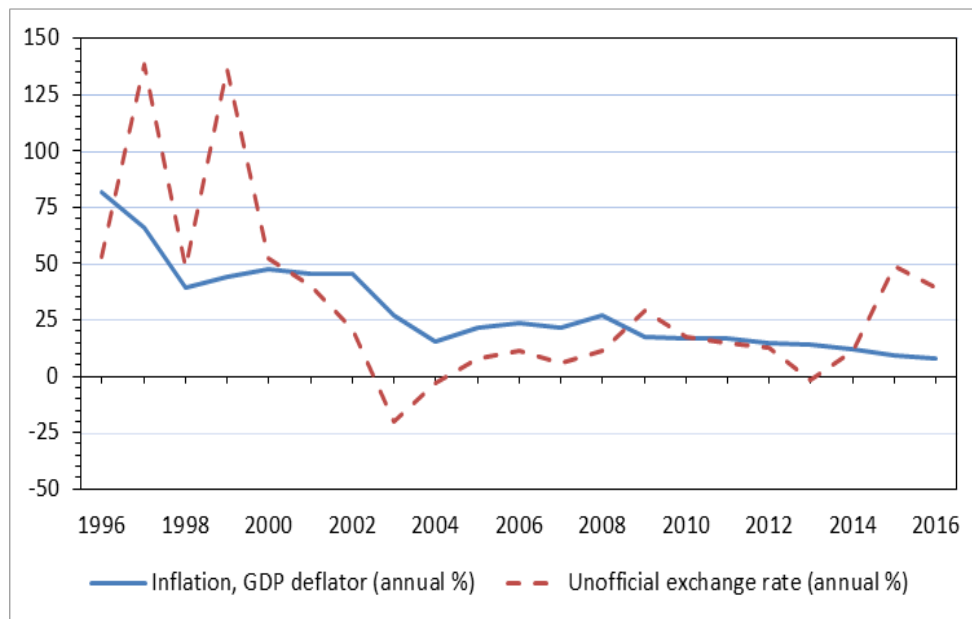
	Similar resolutions were in 2007-2014.		
November 21, 2006	Presidential resolution PP-514 "On measures of transforming enterprises into individual farms in 2007."	The resolution provided a list of agricultural enterprises to be reorganized in 2007 into individual farms and rural production and market infrastructure.	This regulation facilitated fragmentation of shirkats into individual farms. The number of individual farms increased from 189,200 to 217,100. This regulation finalized the fragmentation of agricultural enterprises and formation of individual farms with average size of 26 ha.
October 10, 2008	<p>Presidential order №3077 "On formation of a Special Commission for the elaboration of proposals on measures of optimization of sizes of land plots under the authority of individual farms."</p> <p>Presidential order №3287 "On measures of further optimization of sizes of land plots under the authority of individual farms" (October 22, 2009).</p>	<p>The order initiated the preparations for the farm size optimization (consolidation) program. After a careful analysis of the sizes of land plots in districts of regions, the commission will determine optimal sizes of land plots of individual farms for each regionalized zone</p> <p>Presidential order №3287 specified the need for further farm optimization by January 1, 2010</p>	<p>As part of farm consolidation program, the number of individual farms decreased from 218,600 (2008) to 103,000 (2009). By the end of 2010, the average area of allocated land to individual farm increased from 27 ha to 59 ha. The number of cotton and grain farms decreased from 115,200 (of an average size of 39 ha) to 49,200 (an average size of 96 ha). The number of livestock farms decreased also from 16,900 to 9,900. Yet, their share in total number of farms increased from 8 percent to almost 10 percent.</p> <p>The number of individual farms specializing in vegetables and melons decreased from 12,600 to 6,000, as their average size almost doubled (an increase from 4.5 ha to 9.7 ha).</p>
October 20, 2008	Presidential decree UP-4041 "On measures of optimization of sown areas and increase of food crops production."	The decree aimed at increasing grain area in 2009 by reducing area under cotton. The document highlighted the need for production of vegetable and other food crops in areas and farms with suitable growing conditions and available of skills and experience.	From 2008 to 2009, sown area of cotton decreased from 1.40 million ha to 1.33 million ha. At the same time, sown areas for grain crops increased from 1.25 million ha to 1.30 million ha. Grain production in individual farms increased from 5.1 million tons to 5.7 million tons.
March 16, 2010	Cabinet of Ministers resolution №47 "On the results of optimization of sizes of land plots	The resolution provided inventory of farm optimization process, rationality of their use, as well as the reasonableness, objectivity, and transparency in the provision of land to individual farms, as well	In 2010, the number of farms decreased from 103,000 to 71,000 (or 31 percent). Their average size increased from 57 ha to 80 ha.

	under the authority of individual farms.”	as financial condition of individual farms, availability and efficient use of material, labor, technical resources and capital.	
April 18, 2011	Presidential decree UP-4301 “On measures of compliance with legality in reorganization and optimization of sizes of the land plots of individual farms.”	The decree stipulates that all issues related to the reorganization and optimization of the sizes of the land plots of individual farms are decided through courts on based on claims from local authorities or other authorized bodies strictly in accordance with the procedure established by law. The conditions were listed as violation of land rental contract, farm specialization, cultivation of crops not included into contracting arrangements, systematic (three years) crop yields below norms of cadastral valuation and failure of procurement contracts etc.	In 2011, the number of farms decreased to the minimum of 70,700 farms, and average size was 83.1 ha, while of cotton-grain growing farms 127 ha. The decrease in number of farms was mainly through decreased number of horticulture, viticulture and livestock farms.
October 22, 2012	Presidential decree UP-4478 “On measures of further improving the organization of activities and development of farming in Uzbekistan.”	The decree aimed at the enhancement of the role and importance of individual farms in sustainable development of agrarian sector and improving rural welfare.	According to the decree, a "Program of measures on the further improvement of the regulatory and legal framework for the development of farming aimed at strengthening the financial and economic independence of individual farms" was elaborated.
January 31, 2013	Cabinet of Ministers resolution №22 “On the approval of the regulation on the procedure of optimization of land plot sizes of individual farm and its liquidation.”	The resolution determined procedures of optimizing and liquidating individual farms. The resolution determined that optimization is not consolidation but a change of farm size aiming at more rational use of land and water resources and ensuring financial sustainability of individual farm. Farm can be optimized and liquidated on voluntary basis, but also initiated by an authority.	From 2013 to 2014 throughout the country, the average size of individual farm decreased from 83 ha to 79.5 ha. The number of individual farms increased from 70,800 to 73,400, i.e. the farm consolidation program was ceased.
December 15, 2015	Cabinet of Ministers resolution 362 “On measures to optimize the size of land plots provided for individual farming.”	The resolution provides inventory indicators of farm optimization program within the main types of production specializations for each administrative territory. Based on the results of farm optimization, the number of individual farms and their average sizes was provided. The decree introduced new changes on procedures of optimization and liquidation of individual farms (with additional functions provided to local deputy councils), as well as indicated on the establishment of a central database on economic indicators of individual farms.	The indicated inventory shows that between October and December 2015 the numbers of farms increased by 21 percent. In 2015-2016 the number of individual farms increased from 96,000 to 132,300, while their size declined from 60 ha to 43 ha.
December 29, 2015	Presidential resolution PP-2460 “On measures for further reforming and development of	The resolution aimed at optimization of sown area under cotton and grains on irrigated land in 2016-2020. This implied that production of two strategic crops on less productive land should be released	In 2016, the number of vegetable and livestock farms increased by 37 percent, while the number of horticulture farms increased by 130

	agriculture in 2016-2020.	stepwise to cultivation of potato, vegetables, and fodder crops should be increased. The resolution provided targeted parameters of such optimized use of land resources, as well as increased numbers of cattle and poultry.	percent. The sown area of cotton in 2016 declined by 33,000 ha.
October 9, 2017	Presidential decree UP-5199 “On measures of radical improvement of the system of protection of rights and legal interests of individual farms, dekhkan farmers, and owners of household plots with the purpose of efficient use of agricultural arable land.”	The decree lists a number of problems and shortcomings in the effective protection of the rights and interests of individual farms, <i>dekhkan</i> farms and owners of household plots. In particular, the decree indicates measures for converting individual farms into multi-profile farms (which includes also such activities as processing storage, service provision). The decree also indicates provision of <i>dekhkan</i> farms with infrastructure, inputs and extension services. In return, the state representatives (local deputy councils) will regularly discuss the performance of land users and decide on their land tenure. From 1 January 2022, land lease contracts will be continued only with multi- profile farms.	
October 10, 2017	Presidential resolution PP-3318 “On organizational measures of further development of individual farms, dekhkan farmers and owners of household plots.”	The resolution highlights the main tasks and activities of Council of individual farms, <i>dekhkan</i> farms and owners of household plots.	

Note: Presidential decree – указ президента; Presidential resolution – постановление президента; Presidential order – распоряжение президента.
All policy events are of national coverage.

Figure A: Annual changes in GDP deflation and unofficial exchange rate of UZS to USD, percent



Note: Unofficial exchange rate (annual change in percent): for 1994-2012 from MacDonald (2012), for 2012=2016 from <https://uzdollar.com/>

Source: GDP deflator (annual percent) from WDI (2017).