

Chapter 21

Dynamics of Agricultural Production and Land Use in Post-Soviet Ukraine

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Abstract

Multiple economic and institutional factors drive change in the mix of agricultural commodities produced over time in any country. We examine grain, fruit and vegetable markets in Ukraine since 2004, with a focus on the evolution of property rights and their impact on planting decisions. Institutional uncertainty about property rights impacts both the use of land in agriculture and crop mix, and leads to underinvestment in crops with a longer investment cycle and higher value added. As an alternative to land sales, a well-developed rental market has emerged. The rental market requires minimal upfront investment in land acquisition but limits incentives for long-term investments. Farm-level data from the State Statistics Committee of Ukraine on 21,000 farms between 2004 and 2012 (State Statistics of Ukraine, 2013) show that despite higher revenue per hectare, the share of fruit crops has remained virtually unchanged since 2004. In contrast, the share of oilseeds produced has doubled over the same period.

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Introduction

Multiple economic and policy factors have influenced post-liberalization changes in Ukrainian agriculture. Productivity and output adjustments vary substantially between sectors, and the national enterprise mix has evolved over time. Despite higher per-hectare revenue and relatively high profit, the share of fruit crops in the national agricultural output mix has declined since 2004, and about two-thirds of the producers have left the industry. The share of vegetables has remained unchanged despite a lower number of producers and a lack of reported profit in these markets. In contrast, grain-crop production has expanded rapidly and the sector is often mentioned as having made a successful transition to the market economy. The share of oilseeds has doubled, influenced heavily by high international prices for both primary and processed products.

The evolution of property rights and the development of support industries (i.e., transportation, handling, input supplies and financial services) have had important impacts on

changes in the national agricultural output mix beyond a simple comparison of returns between alternative crop enterprises. This chapter provides a descriptive assessment of the transition in the fruit and vegetable industries in comparison with the grain and oilseed industries, identifies land reform policies that influenced relative adjustments, and describes factors that will impact future development of the fruit and vegetable industries in Ukraine.

The Agricultural Sector

Ukraine is often characterized as the breadbasket of Europe, and has some of the richest arable land in the world. Approximately one-third of all high-quality European arable land are found in Ukraine (twice as much as in France and three times more than in Germany). However, in 2012, agriculture contributed only 9.2% of the Ukrainian gross domestic product (GDP), a figure that has declined steadily since the dissolution of the Soviet Union in 1991 (State Statistics of Ukraine, 2013). While some of the decline may be attributed to market transition and post-Soviet recovery of nonagricultural sectors, the 2012 national agricultural output was only 79% of the 1990 level (Figure 21.1).

[Insert Figure 21.1 Here]

Figure 21.1. Index of agricultural output, Ukraine, 1995–2012
Source: State Statistics of Ukraine (2013).

The agricultural sector in Ukraine includes two distinct groups of producers: commercial (corporate farms and private/smallholder farms) and subsistence (household) farms. The first group is composed of commercial producers who sell to domestic and international markets. The second group is made up of individual households who produce primarily for their own household consumption or limited supplemental income. Almost all rural households are involved with the subsistence or supplementary farming. However, for most rural households a primary source of revenue is off-farm employment, retirement pensions or remittances. Some output from households is sold in local markets and a small portion of rural household people are employed by commercial farms. About 38% of commercial farms (particularly the larger corporate farms) are successors to the former state-owned collective farms (Deininger *et al.*, 2013). A new type of commercial farm emerged following the dissolution of the Soviet Union in 1991— private/smallholder farms that rely on sales of agricultural products as their major source of income. In 2012, the commercial sector was composed of 8121 large corporate farms (average size about 2000 hectares [ha]) and 47,745 private/smallholder farms (average size about 84 ha), jointly cultivating about 21.4 million ha (State Statistics of Ukraine, 2013). Another 4.6 million ha were cultivated by approximately 9.3 million individual households (State Statistics of Ukraine, 2013). The average garden-plot size for individual households producing for their own consumption is 0.21 ha and the average garden-plot size for individual households selling some of their output is 1.1 ha. Based on the Household Budget Survey, individual households account for about 16.4 million ha of land (State Statistics of Ukraine, 2013), with over 70% of this land being rented to commercial farms or other households (State Statistics of Ukraine, 2013).

While large commercial (state-owned collective) farms supplied the majority of output before the dissolution of the Soviet Union, household production played a major role since the economic transition began in 1991. When comparing the household sector with the commercial sector (corporate farms and private/smallholder farms), only the crop output from the household

sector has notably increased since 1995. Crop and livestock output from the commercial sector has increased slightly since 2007, but growth remains modest. The output index for livestock from the commercial sector has not been higher than 50% since 1995 (1990 = 100). Likewise, output of livestock from the household sector and crops from the commercial sector remain below 100% (i.e., levels are below those of 1990).

The household sector expanded rapidly between 1991 and 2000, as many rural and some urban households depended on subsistence farming as a strategy for coping with the economic changes due to the transition reform. While the garden plots of the individual households were small, they were also numerous. Over the same period, output from commercial farms decreased, resulting in the national agriculture-output share from individual households increasing from 29.6% in 1990 to 61.6% in 2000 (Table 21.1). The household sector share remained at 49.3% in 2012, even as the commercial sector began to recover.

Table 21.1. Percent share of agricultural output from individual households, Ukraine, selected years, 1990–2012

Indicators	1990	1995	2000	2005	2010	2011	2012
	Percent (%)						
Agricultural output	29.6	45.9	61.6	59.5	51.7	48.2	49.3
All crops	18.9	36.5	50.7	51.4	46.4	43.3	45.0
Grains	2.8	8.1	18.4	24.3	24.2	22.1	21.9
Sugarbeets	0	2.6	12.2	21.5	7.9	8.5	8.7
Sunflowers	2.4	4.4	12.5	21.2	17.5	15.9	15.0
Potatoes	71.4	95.8	98.6	98.8	97.4	96.9	96.7
Vegetables	26.9	72.7	83.1	89.3	88.1	84.3	85.7
Fruits & Berries	53.6	83.6	81.8	88.2	83.6	84.2	81.6
Grapes	20.5	26.5	30.0	41.8	36.3	35.4	35.8
All livestock	40.8	58.9	79.0	73.8	61.2	59.4	58.2
Meat	28.9	51.7	73.7	63.2	44.9	43.3	42.5
Milk	24.0	45.3	71.0	81.2	80.3	79.7	77.7
Eggs	37.8	55.6	66.2	50.5	39.9	37.2	37.3
Wool	11.2	30.1	61.4	78.3	83.1	83.3	85.1

Source: Statistical Year Book of Ukraine (2012).

The contribution by individual households to total production varies significantly between commodities. In 2012, the household sector contributed only about 22% of the grains and 15% of the sunflowers produced in Ukraine. In contrast, the household sector in 2012 contributed 97%, 86%, and 82% of the potatoes, vegetables, and fruit, respectively. Market-oriented commercial farms (corporate farms and private/smallholder farms) contributed about 51% of all national agricultural output in 2012. Almost all of the commercial farms were involved in grain production. The major commercial farm crops included grains (50%), oilseeds (above 20%), animal feed (8%), and root crops (8%).

In commercial agriculture (corporate farms and private/smallholder farms) that excludes individual households, private/smallholder farms dominate the number of Ukrainian farms. In 2012, the State Statistics Committee of Ukraine recorded 55,866 commercial farms (8121 corporate and 47,745 private/smallholder farms), including approximately 15% reporting no land

in production. Over 32,000 of the private/smallholder farms reported operating less than 100 ha (Figure 21.2). These private/smallholder farms represent over two-thirds of the commercial operations but less than 5% of the land area.

[Insert Figure 21.2 Here]

Figure 21.2. Number of commercial farms and total land area, by farm size, 2012

Source: State Statistics of Ukraine (2013).

State Statistical Data

To describe changes in crop-production patterns, we rely on detailed micro-level data collected regularly by the State Statistics Committee of Ukraine. The Committee maintains a well-developed system of state statistics linked to the registry of business entities. All agricultural producers are required by law to file several statistical forms integrated into reporting systems used for farm accounting. Electronic submission was established in 2011 to simplify the reporting process. Reporting forms, instructions, and methodology available online make the self-reporting process relatively straightforward. Local State Statistical offices track the reports. In addition to data reporting, the same statistical forms are required as support documents when obtaining credit or state subsidies. These forms are also requested by private sector in many other cases as a part of background documentation on a farm. As stipulated by law, the state statistics system maintains strict confidentiality of identifiable individual data.

The discussion in this chapter draws on data from two forms: Form 29SG *Total Yield of Agricultural Crops* and Form 50SG *Economic Results of Agricultural Producers*. While both forms are collected annually, data from Form 29SG was available only for 2008 and 2011. Data on land area and yield by crop are reported through Form 29SG for all individual production units, in contrast to the legal entity that owns the corporate farm/agricultural enterprise and can operate multiple production units or farms. There were approximately 54,000 and 51,000 production-unit-level observations from Form 29SG in 2008 and 2011, respectively (Table 21.2). The sample captures over 90% of all Ukraine commercial farms (both corporate farms and private/smallholder farms) based on data from Census results reported in the Statistical Yearbook.

Table 21.2. Number of commercial operations reported, Ukraine, 2004–2012

Year	Statistical Yearbook	Form 29SG*	Form 50SG**
2004	58,575	—	8,892
2005	57,877	—	7,961
2006	57,858	—	7,220
2007	58,387	—	8,098
2008	59,059	54,016	8,485
2009	57,152	—	8,396
2010	56,493	—	8,515
2011	56,133	50,887	8,482
2012	55,866	—	8,335

* Form 29SG reports commercial operations involved in any land cultivation.

** Form 50SG reports commercial operations larger than 200 ha.

Source: State Statistics of Ukraine (2013); State Statistics Form 29SG (2012); State Statistics Form 50SG (2012).

Annual data from 50SG were available for each year between 2004 and 2012. Form 50SG was submitted by large commercial farms that contained more than 200 ha for land holdings; had either 50 animals or at least 20 full-time employees at the place of registration which is the legal entity; and provided data that may have included multiple production locations. Crop and livestock output and sales data as well as cost of production were reported through Form 50SG. Compiled data from Form 50SG represented about 21,000 unique farm identifications (IDs) between 2004 and 2012. There were observations for an average of over 8200 commercial farms in each year. Farms in the sample operated approximately 18 million ha annually between 2004 and 2012.

Small commercial farms dominate the sector in terms of farm numbers, but not in terms of land area. Farms in the Form 50SG sample operated over 80% of the agricultural land cultivated commercially in 2012. The share of farms planting specific crops and the share of respective land area varied substantially (Table 21.3). For example, in 2012, approximately 93% of the commercial operations that filed Form 50SG produced grains, and those farms had almost 50% of their acreage planted to grains. In contrast, less than 4.5% of the same farms produced fruit, and those that did had only 0.2% of their acreage planted to fruit. While shares were relatively stable for grains over time, the share of sunflower hectares reported by the larger producers (i.e., those who complete Form 50SG) increased both in terms of the share of farms (from 52.6% in 2004 to 70.1% in 2012) and the land area used for the crop (from 9.7% in 2004 to 18.1% in 2012). During the same period, the share of farms growing fruit declined from 11% to 4.3%. Likewise, the share of farms planting vegetables decreased from 15.4% to 6.6%. Since land area planted to vegetables- and output remained steady, this suggests that large-scale commercial vegetable production has become more concentrated.

Table 21.3. Share of farms and share of area planted by sector from farms operating more than 200 ha, 2004–2012

Year	Grains		Sunflower		Fruit		Vegetables	
	Land	Farms	Land	Farms	Land	Farms	Land	Farms
	<i>percent (%)</i>							
2004	46.0	96.9	9.7	52.6	0.4	11.0	0.2	15.4
2005	47.3	97.3	10.9	53.3	0.4	10.8	0.2	11.6
2006	46.6	93.9	11.8	52.4	0.3	8.7	0.2	12.2
2007	45.2	91.5	10.8	52.3	0.3	7.1	0.1	7.8
2008	52.3	92.7	14.0	59.8	0.2	5.9	0.2	8.7
2009	51.8	92.8	14.1	59.8	0.2	5.2	0.2	6.7
2010	48.3	91.3	15.9	63.7	0.2	4.9	0.2	7.0
2011	51.3	91.6	16.5	67.4	0.2	4.7	0.2	8.7
2012	48.9	92.7	18.1	70.1	0.2	4.3	0.2	6.6

Source: State Statistics Form 50SG.

Transition in the Grain Sectors

The grain sector includes staple and legume crops (such as corn, wheat, barley, rye, buckwheat, pea, oat, millet, sorghum, and rice) and oilseeds (primarily sunflower; also rape and soy) largely has been judged a success story for Ukrainian agriculture (e.g., Bezlepkina *et al.*, 2013). Ukraine was the eleventh largest producer of wheat globally between 2010 and 2012, and the eighth largest exporter of wheat from 2010 to 2011 (FAOSTAT, 2012). In the same periods, Ukraine was the largest world producer and eighth largest exporter of sunflower seeds. All are annual crops and the share of grains and oil seeds in the national enterprise mix has grown steadily.

While the household sector has had an increased role in national grain production, the majority of output remains in the hands of large commercial farms. Prior to 1991, less than 3% of Ukrainian grain output came from individual households as large state-owned collective farms dominated the sector. The household share increased to about 25% in 2006 before decreasing to just under 22% in 2012 (State Statistics of Ukraine, 2013).

Commercial farms across all size categories allocated approximately 50% of their acreage to grains in 2011, with the very largest operations (over 3000 ha) accounting for 55% of the national grain output. Among oilseed crops, expansion in sunflower production has been particularly notable (Figure 21.3). A larger share of land among all size farms was planted to sunflowers in 2011 compared with 2008 (increasing from approximately 16% of the crop mix in 2008 to approximately 19% in 2011).

[Insert Figure 21.3 Here]

Figure 21.3. Percent share of cropland, by sector, farms more than 200 ha, 2004–2012
Source: State Statistics Form 50GS.

Grains have been an important, and a growing, source of foreign exchange for Ukraine since 2000, as exports from the cereals sector have trended upward sharply (Figure 21.4). The value of cereal exports in United States America dollars (USD) has exceeded USD 1 billion in every year since 2005, with the exception of 2007, when export restrictions were imposed (for a recent review of Ukrainian grain exports, see Kobuta *et al.*, 2012). In 2012, cereal exports reached a record of almost USD 7 billion.

[Insert Figure 21.4 Here]

Figure 21.4. Ukraine cereal, fruit, and vegetable exports to the world, 2000–2012
Source: World Integrated Trade Solution (2011, HS chapters 07, 08, 10 only)

Transition in the Produce Sector

Transition in the produce sectors (vegetable and fruit) is slower in developing and is far less encouraging. Potatoes are the most important vegetable crop in Ukraine. Other important vegetables include tomatoes, cabbage, and cucumbers. Household producers contribute approximately 85% of the national vegetable production and approximately 97% of the potato production in Ukraine. More than one-half of the household output is targeted toward home consumption; the rest is traded at local farmers markets. Per-capita consumption of potatoes was 139 kg/year in 2011 compared to 163 kg for all other vegetables (Bezlepkina *et al.*, 2013). Area planted to potatoes and other root crops increased across most farm sizes (an exception was

farms operating less than five ha) and the share of root crops in the crop mix increased from approximately 6.5% to 9%. As expected, vegetables are widely grown across Ukraine with pockets of commercial concentration in the Kherson, Mykolaiv, and Odessa oblasts, where irrigation canals remained in place from former Soviet systems. Commercial vegetable acreage tends to cluster around these irrigation canals.

More recently, an emerging growth trend is developing in vegetable production (Figure 21.5). Larger commercial farms are investing some profits from grain sales into irrigation upgrades and into the construction of greenhouses targeting produce supplies to supermarket chains. To help increase the area of greenhouse production, the government has instituted a policy to compensate 50% of the construction costs if energy-saving technologies are included (Bezlepina *et al.*, 2013). As a result of this policy, household producers and private/smallholder farms are incorporating greenhouse production of vegetables (primarily cucumbers and tomatoes) as a profitable and low risk line of business where financial resources from micro-credit institutions and banks are readily available.

Development in the fruit sector differs notably from the vegetable and grain sectors. A majority of fruit crops are perennials with long production and investment cycles. Modern orchard systems require substantial investment and there are multiyear lags before trees come into marketable production.

Similar to production of vegetables, the share of individual households in total output remains high. Households produced 54% of the fruit and berries in 1990 and 82% in 2012. Most of this fruit was sold to the processed fruit market through traders or brokers acting as the aggregators in supplying fruits and berries to local processors (e.g., juice concentrate, frozen) and food retailers. Again, like vegetables, the increase in food standardization in both domestic and international markets is putting pressure on traders, processors, and retailers to link with large-volume suppliers. High transaction costs of consolidation and variable quality limit household sector participation in the nascent commercial supply chains. So while both the share of total fruit output from the commercial sector and fruit production as a share of the commercial crop mix are small, the majority of fruit targeted to emerging modern supply chains is concentrated among the commercial farms.

The 2011 share of fruit in the on-farm crop mix ranged from 4.3% of area for the smallest farms to 0.2% of area for farms of more than 3000 ha (Table 21.4). However, in terms of total area, farms operating between 1000 and 2000 ha continue to have the greatest amount of land planted in orchards (Table 21.5). In 2011, farms in this size category produced about 30% of the fruit output from commercial farms, with 95% of fruit output produced on commercial farms operating more than 50 ha. Average yields were highest for commercial farms between 15 ha and 50 ha, and fruit production area expanded over 50% on these farms between 2008 and 2011. The largest farms (more than 3000 ha) had the smallest growth rate in orchard area. Between 2008 and 2011, the area planted to orchards decreased on the smallest commercial farms of less than five ha and on operations of 500 ha or more. At the same time, output increased for the larger commercial farms as production was becoming more intensive. Between 2008 and 2011, the area of newly planted orchards increased by 6.5%. Annual data for farms operating over 200 ha confirmed these trends with a steady increase in fruit output per hectare from 1865 kg in 2004 to almost 4230 kg in 2012 (a 127% increase) while area fell by an average of 10% annually over the same time period.

Table 21.4. Average on-farm enterprise shares for commercial farms, Ukraine, 2011

Hectares (ha)	Grains	Sunflower	Non-root Vegetables	Fruit	Root Crops
Percent (%)					
< 5	52.2	6.0	2.4	4.3	3.7
5–15	49.9	14.9	1.4	2.6	1.9
15–50	43.9	23.1	0.7	1.4	0.8
50–200	48.7	21.4	0.8	1.7	1.0
200–500	49.3	21.2	0.6	1.5	0.9
500–1000	51.5	20.9	0.3	1.0	1.1
1000–2000	52.0	20.6	0.1	1.0	1.2
2000–3000	49.8	20.9	0.2	0.6	1.4
> 3000	51.5	19.2	0.1	0.2	2.3
Total	48.2	19.4	0.9	1.8	1.4

Source: State Statistics Form 29SG (2012).

Table 21.5. Crop mix and land use for commercial farms, Ukraine, 2011

Farm size	Total area per crop		Output (mt)		Yield (mt/ha)		Change in crop output 2008–2011	
	Non-root Vegetable	Fruit	Non-root Vegetable	Fruit	Non-root Vegetable	Fruit	Non-root Vegetable	Fruit
Hectares	Hectares		Metric tonnes		mt/ha		Percent	
<5	256	532	2,961	1,484	10.34	2.32	–41	19
5–15	754	1,522	11,561	6,017	13.75	3.92	–6	344
15–50	3,223	5,670	60,505	20,986	15.2	4.57	25	183
50–200	6,409	13,809	161,723	60,735	16.8	3.25	26	107
200–500	8,480	20,036	235,501	95,798	17.9	3.55	81	80
500–1,000	5,485	18,508	150,900	95,419	19.26	3.42	–10	7
1,000–2,000	3,948	33,876	118,981	192,032	16.83	2.59	–21	7
2,000–3,000	5,768	17,748	179,428	118,852	14.63	2.29	27	41
>3,000	10,167	15,288	358,900	70,590	16.58	2.13	92	2
Total	44,489	126,990	1,280,459	661,912	15.25	3.25	–40.86	19

Source: State Statistics Form 29SG (2012).

In 2011, the fruit-crop farming area was widespread geographically. Fruit crops were particularly heavy in western and southern Ukraine and throughout the central and eastern oblasts. In contrast to increasing exports in the grain sector, exports in the fruit and vegetable sectors have been relatively flat since 2000. The total value of exports was only USD 141 million in 2005, reaching a high of USD 350 million in 2011 (World Integrated Trade Solution, 2011). Over the same period, imports of fruit to Ukraine have expanded dramatically, particularly since 2008. Fruit imports were greater than USD 1 billion in 2012 (Figure 21.5).

[Insert Figure 21.5 Here]

Figure 21.5. Ukraine cereal, fruit, and vegetable imports from the world, 2000–2012

Source: World Integrated Trade Solution (2011, HS chapters 07, 08, 10 only).

Despite decreasing acreage and increasing imports, , the average annual rate of revenue growth has been greater for fruit and vegetables than it has been for grains and slightly less than it has been for sunflower. Once costs are considered, increasing profitability for sunflowers, particularly since 2008, is even more evident. This higher profitability is consistent with the observed shift of farming activity moving into the oil seed sector (Figure 21.6). Profitability in the fruit sector is higher consistently than that of grains and much less variable than that of vegetables (Figure 21.6). Profit, output, and firm industry entrance and exit are not independent from each other. The general trends are illustrative of the patterns in the development of agricultural sectors without attempting to assign causality, which suggests that lack of profitability has not been the driving factor behind the lack of development in the fruit sector.

[Insert Figure 21.6 Here]

Figure 21.6. Profit by crop sector, 2004–2012

Source: State Statistics of Ukraine (2013).

Land Reform

Expected returns that impact the enterprise mix selected by producers include consideration of risks and risk preference in addition to cost and revenue. In addition to price and yield uncertainty, producers in transition economies recognize greater uncertainty over changes in the institutional protection of property rights. Given a higher investment and a multi-year time horizon to recoup costs, long-term property rights are a critical source of uncertainty that may have hampered development in the fruit sector. The level of protection and definition of property rights themselves continued to change throughout the transition period.

In 1990, all land belonged to the state and was operated by collective enterprises (Article 11, Constitution of the Ukrainian Soviet Social Republic, 1978). With parliamentary resolution *On Land Reform* (15 March 1991) and the Law *On Forms of Land Tenure* (30 January 1992), farms and other industrial and trade entities were given a right to manage their business and to finance activities independently from the state, and non-state ownership of land was formally established. Former members of Soviet state-owned and collective farms were granted joint ownership rights to the land and other farm assets. By 1995, about 40% of the agricultural land had been transferred to corporate farming enterprises (Figure 21.7). Citizens who were not members of the collective farms were given the right to lifelong possession and inheritance of parcels of housing, garden, and recreational land that were eventually privatized. As a result, every citizen of Ukraine became entitled to a share of land; however, specific parcels of agricultural land were not identified and other property rights (use and disposal) were not realized at that point in time.

[Insert Figure 21.7 Here]

Figure 21.7. Changes in landownership structure, selected years, 1990–2007
 Source: State Agency for Land Resources of Ukraine (2014).

Several changes in direction for the establishment of individual property rights for agricultural land were implemented between 1991 and 2000. Initially, even though the land of state-owned collective farms was parceled among former members, the managers of these former state farms exercised power over land distribution and management. The land market moved closer to its current shape in 1999, when the Presidential Decree *On Urgent Measures to Accelerate Reform in Agriculture* gave owners of land parcels the right to leave a collective enterprise without the consent of a general assembly and gave owners the right to keep their land parcel (Parliament of Ukraine, 1999). This allowed for the transformation of collective enterprises into other forms of ownership (e.g., private enterprises, limited liability companies), but a lack of support and clear procedures limited the number of applications. The 1999 decree has been characterized as the beginning of establishing a second round of reforms, in contrast to the more *ad hoc* policies of 1990 (Lerman *et al*, 2007).

A functional sales market for land did not exist until 2002, when a new Land Code came into effect that entitled legal entities, territorial units, and the state to hold land-property rights (Parliament of Ukraine, 2002). A procedure was established to identify the size and borders of land parcels, and individuals were released from the need for third-party consent of the collective enterprises. Together with adoption of the new Land Code, a moratorium on land sales was established in 2002. It was meant as a temporary measure due to the absence of a clear land inventory and absence of clear legal procedures for exchange, sales, purchase, or gifting of land. The general population strongly opposed establishment of free markets for trading agricultural land in fear of the potential for large-scale land grabbing. The moratorium was initially set to expire on 1 January 2005, but has been extended multiple times and currently is set to expire 1 January 2016.

As an alternative, a well-developed rental market for land has emerged (in 2014, it was the only legal way to exchange rights for land cultivation). By 2011, more than 92% of the land cultivated by commercial farms was rented from private landowners and from local governments. The average size of an individually owned land plot rented to commercial farms or to other households was about 5.7 ha (State Statistics of Ukraine, 2013). The share of land rented by commercial farms varies with respect to farm size. Farms below five ha operate primarily on their own land, while more than 90% of land is rented by farms that operate on more than 200 ha (Table 21.6).

Table 21.6. Percent share of owned land by farm size, Ukraine, 2011

Farm size	Total land area	Total area owned by farms	Share of owned land
Hectares	1,000 ha	1,000 ha	Percent
< 5	86.9	49.5	57.0
5–15	70.2	52.8	75.2
15–50	509.2	397.9	78.1
50–200	662.3	167.9	25.4
200–500	1,260.5	101.7	8.1
500–1000	1,804.1	79.6	4.4
1000–2000	3,589.2	134.1	3.7
2000–3000	3,075.9	158.1	5.1
> 3000	10,301.8	520.5	5.1
Total	21,360.0	1,662.3	7.8

Data: State Statistics of Ukraine (2013).

Despite the large number of rental transactions, there is a lot of diversity among the geographic regions of Ukraine. Of the 490 rural rayons (standardized administrative land units) in Ukraine, there were 21 rayons where less than 5% of farm operators own acreage in 2011, and 38 rayons where more than 40% of the farm operators own acreage (Figure 21.8). The average across all areas was 24.5% of operators who owned some acreage in 2011.

[Insert Figure 21.8 Here]

Figure 21.8. Share of operators who own some farmland, Ukraine, 2011

Source: State Statistics Form 50SG ; State Statistics Form 29SG.

The rental market for agricultural land has important benefits and a number of limitations that continue to impact the development of the agriculture and crop mix in Ukraine. An important benefit is that a rental market reduces entry and exit costs and enhances overall productivity growth in the sector (Deininger *et al.*, 2013). Farms that exit tend to be underperforming and are replaced by new farms with higher productivity. The rental market requires minimal upfront investment in land acquisition.

A critical limitation is that rental land cannot be collateralized which limits access to financial resources (Ciaian *et al.*, 2012). This constraint is often more binding on medium-size farmers that have higher percent shares of fruit and vegetable crops. Individual household producers that have movable assets or some real estate can be served by the informal credit market or by the micro-finance institutions with housing or future crops used as collateral. The largest farms have greater access to financing through formal domestic and international markets. A 2005 FAO survey of Ukraine's farms found that 63% of corporate farm managers reported borrowing funds compared to only 34% of medium-size farmers who borrowed funds (Lerman *et al.*, 2007). Modern commercial fruit and vegetable production is very resource-intensive during startup with requirements for irrigation, climate control, cost of trees, and site preparation. Thus restrictions on access to capital may have a greater negative impact on growth in the fruit and vegetable sectors among mid-sized operations.

Another limitation of rental markets is related to specifics of the institutional setting in Ukraine and of unfinished land reforms. The ban on land sales was established as a temporary measure; uncertainty will remain over property rights and parameters of the land market until the ban is lifted which is slated for 2016. Several scenarios for regulating the land market have been proposed by the government that stipulate alternative limitations to maximum land purchase and holding size, a different set of pre-emptive rights for buying land (e.g., state versus neighbors versus tenants), and limitations on the rights of legal entities and foreign citizens to buy land. This institutional uncertainty increases the risk of land taking at some future point when an operating land-sales market may be established. Both owners and tenants rely on strategies that reduce risk and, as a consequence, limit investment for land improvements. In anticipation of further market adjustments, landowners have been reluctant to lock themselves into long-term rental agreements. Over time, as the ban on land sales has continued and the rental market has grown, the average contract length has slowly increased. The share of shorter contracts decreased since 2005 because other regulations changed so that by 2013 about 44% of all rental agreements in Ukraine were for five years or less.

When considering investment decisions in a hectare of land that is leased for approximately five years, such lease is well below the time needed to recover investments in orchards, irrigation, or many other land-improvement projects. While the average length of land rental contract has increased, it remains a limitation. Between 2005 and 2013, the share of contracts for longer than ten years increased from 2.7% to 13.9%. Without a long lease, tenants prefer crops where returns can be captured easily. In the commercial farms, grains dominate vegetable and fruit crops that require irrigation or greenhouses for large-scale production. As a result, Ukraine's agriculture is facing underinvestment in high value-added crops and in land improvements.

Potential Future Developments

If better access to financial resources and expected improvements in the protection of property rights were to develop, fruit production could become a more attractive industry for investment. Besides changes related to functioning land markets, other shifts in the institutional environment have influenced the crop mix with the Ukraine agriculture. Ukraine productivity in many agricultural sectors remains below levels of other European countries, and a large share of agricultural land has not yet been converted to commercial production (World Bank, 2013). Continued transition will provide an opportunity for productivity and output growth in many crops. Like other developing economies, improved off-farm employment opportunities will eventually reduce available labor inputs and perhaps will raise the wage rate. Individual household and other small landowners will have additional incentives to transfer some of their land plots to larger operations.

Liberalization of the banking, insurance, and financial services sectors, and the telecommunication and business services sectors took place between 2001 and 2008 as a precondition for accession of Ukraine to the World Trade Organization (WTO). During this period, there was significant productivity growth in the manufacturing sector as transaction costs were reduced (Shepotylo and Vakhitov, 2012). In the agricultural sector, this liberalization was associated with the entrance of international operators and investors who rented land. This entry brought new technologies and access to international commodity and financial markets for larger operations, allowing them to increase investments in modern production systems for all crops.

Another factor that impacted the crop mix in 2011 was the regulation of grain exports. Over time, most of the large producers and trading companies made investments in grain storage and in logistics infrastructure that increased the benefit of vertical integration, decreased dependence on local monopolies for these services, and added to sunk costs that limited incentives for exiting the industry. At the same time, the government made several attempts to restrict exports of grain. This intervention introduced additional risk to grain production and provided incentives for diversification of crop mix.

Further opening of the European markets to Ukrainian products and to the expansion of supermarket retail chains in Ukraine will continue to push quality management and control as a priority for fruit and vegetable growers who would like to access these relatively lucrative markets. Introduction of hazard analysis and critical control points (HACCP), GlobalGAP, or similar standards are a precondition for entry into the European markets, and some quality requirements must be introduced by the government as part of free-trade-agreement with the European Union. A potential effect of introducing higher standards could be additional pressure on small commercial producers unless they can access resources needed for investment or unless they can consolidate their operations via cooperatives or unions.

Finally, recent conflict with Russian Federation, including annexation of Crimea and war in Donetsk and Lugansk regions, have added another source of uncertainty that will restructure import and export flows as well as access to some seaports and international markets. A significant portion of Russian grain exports have been shipped via Ukrainian ports, so conflict may impact opportunity or price for Russia to access international agricultural commodity markets and will, in turn, affect prices and changes in crop mix for entire KRU region.

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