



European
Commission

JRC SCIENTIFIC AND POLICY REPORTS

Farming and rural development in Ukraine: making dualisation work

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December, 2012



Report EUR 25878 EN

Joint
Research
Centre

European Commission
Joint Research Centre
Institute for Prospective Technological Studies

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JRC80164

EUR 25878 EN

ISBN 978-92-79-29052-7 (pdf)

ISSN 1831-9424 (online)

doi:10.2791/85743

Luxembourg: Publications Office of the European Union, 2013

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Printed in Spain



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Preface

This JRC Scientific and Policy Report is an account and synthesis of the ENP-Ukraine project «Prospects of the Farming Sector and Rural development in European Neighborhood Policy Countries. The case of Ukraine» under contract number 152201-2011 A08-NL issued by JRC-IPTS, Seville and awarded under a restricted call to the Centre for World Food Studies in Amsterdam (Dutch acronym: SOW-VU). The Centre for World Food Studies subcontracted the Institute for Economics and Forecasting (IEF) of the National Academy of Sciences of Ukraine as executor of the main deliverables.

The deliverables consist of the main report on the current situation of the agricultural sector in Ukraine and the transition it went through (Agricultural Report), the three policy briefs, presenting a quantitative analysis of topical issues of the transition, and the training courses on the statistical techniques used in this project. More specifically:

a. Main report (Agricultural Report) :

The Institutional and Policy Framework of Agricultural and Rural Economy in Ukraine

b. Policy briefs:

1. *The improvement of rural incomes – commercialisation of farming households*
2. *Land lease and rent rates: towards benefits of smallholders*
3. *Grain potential of Ukraine to contribute to world food security: opportunities and challenges*

c. Two training courses on statistical techniques for IEF and IPTS, respectively.

These four unpublished papers (the main report and the three policy briefs) provide the input for the present final report by SOW-VU and IEF, which also provides a synthesis of findings.

The project started in April 2011 and lasted for 18 months. The final results have been presented by the IEF-team in a workshop in Kiev on 31 May 2012.

Acknowledgements

As counterpart and representative of JRC, Dr. Sergio Gomez-y-Paloma, Action Leader SUSTAG of IPTS, had the overall coordination from JRC-side and was one of the originators of this project. He was assisted by Dr. Szvetlana Acs, who was responsible for the project's management and provided inputs for inclusion into the present report. The authors wish to thank both of them for their comments on deliverables and for their continued interest and enthusiasm in the project, and their support. The authors wish to thank also Mr. Andriy Kharchenko of JRC-IPTS for the valuable comments he provided to the draft final report.

At IEF the project was conducted under the responsibility of the Director, Acad. Valeriy Heyets. It was supervised and coordinated by Dr. Olena Borodina and Dr. Ihor Prokopa who were also lead authors of the Agricultural Report. The Agricultural Report also benefitted from contributions of Oleksandra Borodina, Sergiy Kyryzuk, Natalia Mishchenko, Olha Popova, Oksana Rykovska and Viktor Yarovyv. Their profound knowledge of the agricultural sector in Ukraine, its historical development and current structure, were a very valuable source of information, and contributed a lot to the pertinence and actuality of the project's findings.

Sergiy Kyryzuk and Oksana Rykovska were lead authors of the Policy Brief on rural incomes, Viktor Yarovyv was lead author of the Brief on land lease, and Oleksandra Borodina was lead author of the Brief on grain potentials. Their knowledge and skills in statistical analysis, as well as their eagerness to learn, are very much appreciated.

Dr. Tatiana Ermolieva (IIASA) provided comments and support to the IEF team throughout the project. Acad. Volodymyr Yurchyshyn was advisor on the Report and the Briefs. Secretaries and interpreters of IPTS, IEF and SOW were helpful in preparing and assisting the multi-language workshops, meetings and training sessions.

At SOW, Professor Michiel Keyzer was leader of the project and Dr. Max Merbis was project coordinator, maintaining day-to-day relations with IEF and JRC. Dr. Rudolf Witt assisted in communication with IEF-NASU, particularly in Russian, and jointly with Dr. Boualem Rabta delivered training courses in statistical techniques for IEF and IPTS. Both also advised and assisted the IEF team with their quantitative work.

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Executive summary

Rural economy

- 1.** Following the decollectivisation of agriculture in Ukraine, the dualisation between very large commercial farms and small individual farms has become a prevalent trend in the rural areas of Ukraine.
- 2.** Rural farm households would need larger plots. They could benefit from mechanization.
- 3.** Yet, as their crop yields are low and lie close to those of large farms that use far more chemical inputs and machinery, the area expansion could be kept modest.
- 4.** Distribution of land ownership rights and cadastral registration need to be supplemented by introduction and registration of other formal titles such as the right of passage and the user rights in commons.
- 5.** Shareholders of a large farm do not need to know the precise location of their property within the farm. Explicit cadastral registration of parcels into units smaller than the individual field is wasteful.
- 6.** Land users should be made to pay due rent to landowners, private (e.g. pensioners), and public (e.g. municipalities), and no longer predominantly in kind. This could improve social safety nets, stimulate activities in rural villages, and improve the fiscal revenue of local governments.
- 7.** Corporate farms should pay corporate taxes.
- 8.** Since growth in employment has been stagnating in urban areas, rural areas have to provide for it, partly in horticulture, animal husbandry and agricultural processing, and partly in expanded household farms, possibly as small multi-household enterprises or cooperatives, on land returned from commercial farms.

Foreign trade

- 9.** Access to exports should be made available to all who deliver goods of adequate quality, and not only to specific trading companies who can get access to export licenses.
- 10.** Product labeling on exports, could with adequate inspections, with labels requiring satisfaction of social as well as environmental standards, provide effective means to complement and support local governance.
- 11.** Ukraine has considerable scope to step up its exports of grain and oilseeds, which might significantly contribute to world food security. Yet, to effectuate this expansion without amplifying prevailing price volatility, Ukraine will have to enhance its management of irrigation, storage and plant protection, to limit its support to biofuels and to abstain from imposition of export bans in response to shortfalls.

Nutrient management

- 12.** Large exports amount to large outflow of plant nutrients, and turn recycling and imports of nutrients into a necessity in preventing soil fertility loss and land degradation. Expansion of livestock activities with proper manure management also helps to compensate for this loss.

Statistics and governance

- 13.** There is domestic and foreign demand for independent and reliable information on prevailing social and environmental conditions, and trade regimes in Ukraine. A data platform that makes use of the available surveys, and avails of some capacity to conduct new ones could help meeting this need.

1. Introduction

By concluding bilateral treaties and agreements in various domains, the EU has been seeking enhanced cooperation with its neighbors. Fields of cooperation include visa policy and trade access but also capacity building, in most cases to enhance governance and assist the democratization process. The cooperation aims to maintain friendly relations, to help securing the EU's borders, and to promote development in the EU's border regions. It may also serve as stepping stone to closer association, and even to membership.

One particular aspect of capacity building is to provide assistance in setting up analytical capacity in these neighboring countries that may provide credible and timely economic analysis. This is important for effective democratic debate and governance based on trust in the countries concerned but also to inform potential foreign investors and to conduct a fruitful dialog with the EU itself.

Rural areas are of particular importance in this respect, because of their export potential to the EU but also because they largely fall beyond the range of observation of the international press, harbor a significant fraction of the poor, and are the often silent witnesses of environmental pressure.

Ukraine is more than an interesting case in this regard. Of the EU's neighboring countries it is by far the one with the largest agricultural potential that has in recent years achieved a significant rise in cereals exports, also to the EU. Yet, the country has also been struggling with the aftermath of decollectivization and has so far not been able to avoid poverty, lack of social amenities, and environmental degradation in its rural areas.

Concerning the available statistical information in rural areas, Ukraine maintained and even extended the practice from the Soviet period of conducting relatively large surveys, particularly in rural areas, among households and farm enterprises. Yet, the data collected are commonly used only for computing selected aggregates at regional and national level, with very limited cross tabulation across characteristics and even less analysis at household and enterprise level. Furthermore, for most of the data collecting and processing agencies, simultaneous use of such data is still largely uncharted territory, and few of these agencies are currently equipped with the statistical tools and expertise to exploit their data in this way when addressing upcoming questions by decision makers.

The above has led to the formulation of the current study which aims to serve as a pilot for providing an assessment of the key bottlenecks in agricultural development in Ukraine, tapping on available data by means of state-of-the-art statistical tools, with a focus on trade, social and environmental aspects of agricultural transition. Extensive use of primary survey data is one of the distinctive features of this study. In the current framework the access to the major surveys at primary level was available; those data were processed (see Annex 1 and 2 for details) and trainings on data processing were provided by the institutions involved in this study.

Based on the above aim the current paper is structured as follows. Section 2 provides background on the Ukrainian economy, Section 3 describes the emergence of the dual agriculture; Sections 4 to 8 the trade, social and environmental aspects and Section 9 the concluding remarks and policy challenges.

2. Some background on Ukraine's economy

Ukraine is the European country with the largest surface (besides Russia), 603 700 sq km of which 324 780 is arable land. With 45 million inhabitants, its population numbers are low given its size, by comparison to, say, France (549 000 sq km, of which 183 450 arable, 63.5 million people), Germany (357 000 sq km, of which 119 450 arable, 82.0 million people) or Poland (312 700 sq km, of which 125 390 arable, 38.3 million people), and hence has more arable land than any two of these countries together, see Figure 1.

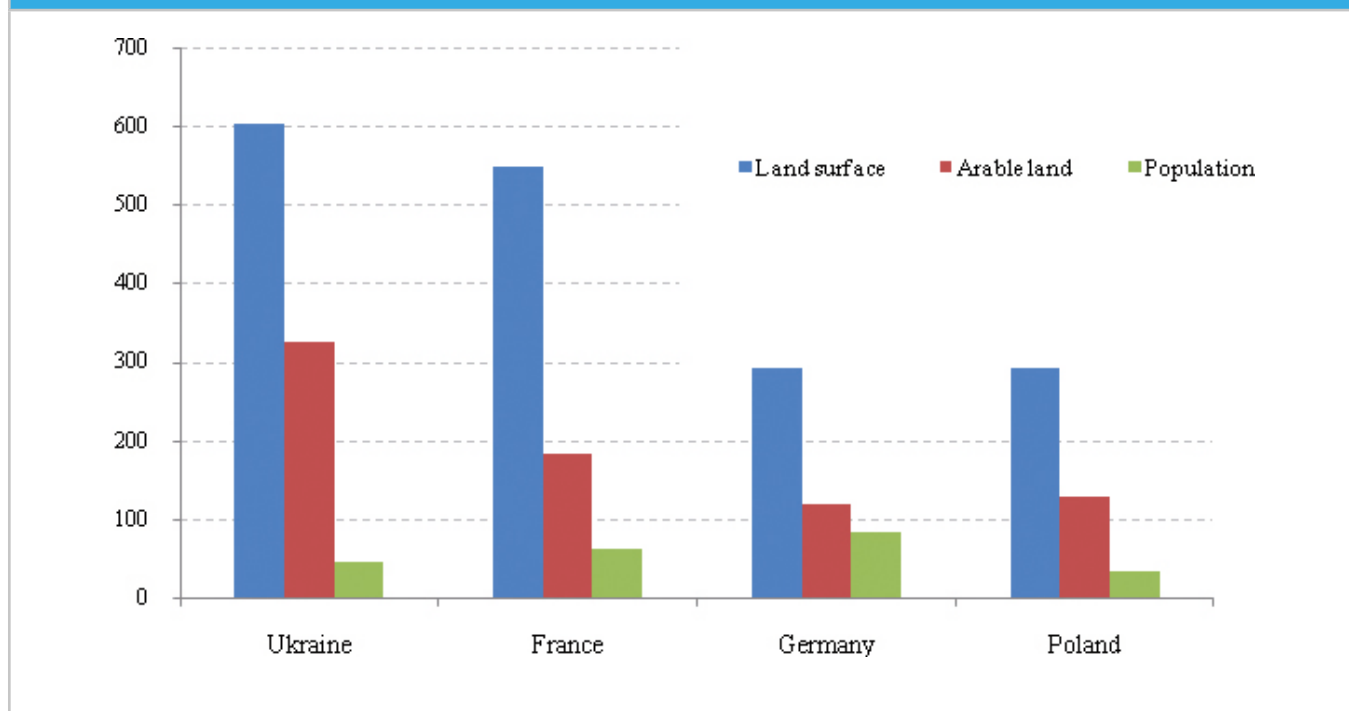
Ukraine's relatively open and unprotected borders (Figure 2), with only the Dnieper river and its embankments as major, internal demarcation line, made it throughout the ages the theater of frequent conflicts between East and West, North and South, as its fertile lands were always highly prized by neighboring powers.

Soils in Ukraine

The soils in Ukraine, from Northwest to Southeast can be divided into three major types: a zone of soils of sandy nature (podzolic), a central belt consisting of the fertile black earth (chernozem), and a zone of relatively salinized soils (chestnut) near the Black Sea. These soils belong to different climatic zones of Ukraine (Figure 3). From an agricultural point of view the most important ones are: Polissya, Forest-Steppes and Steppes zones.

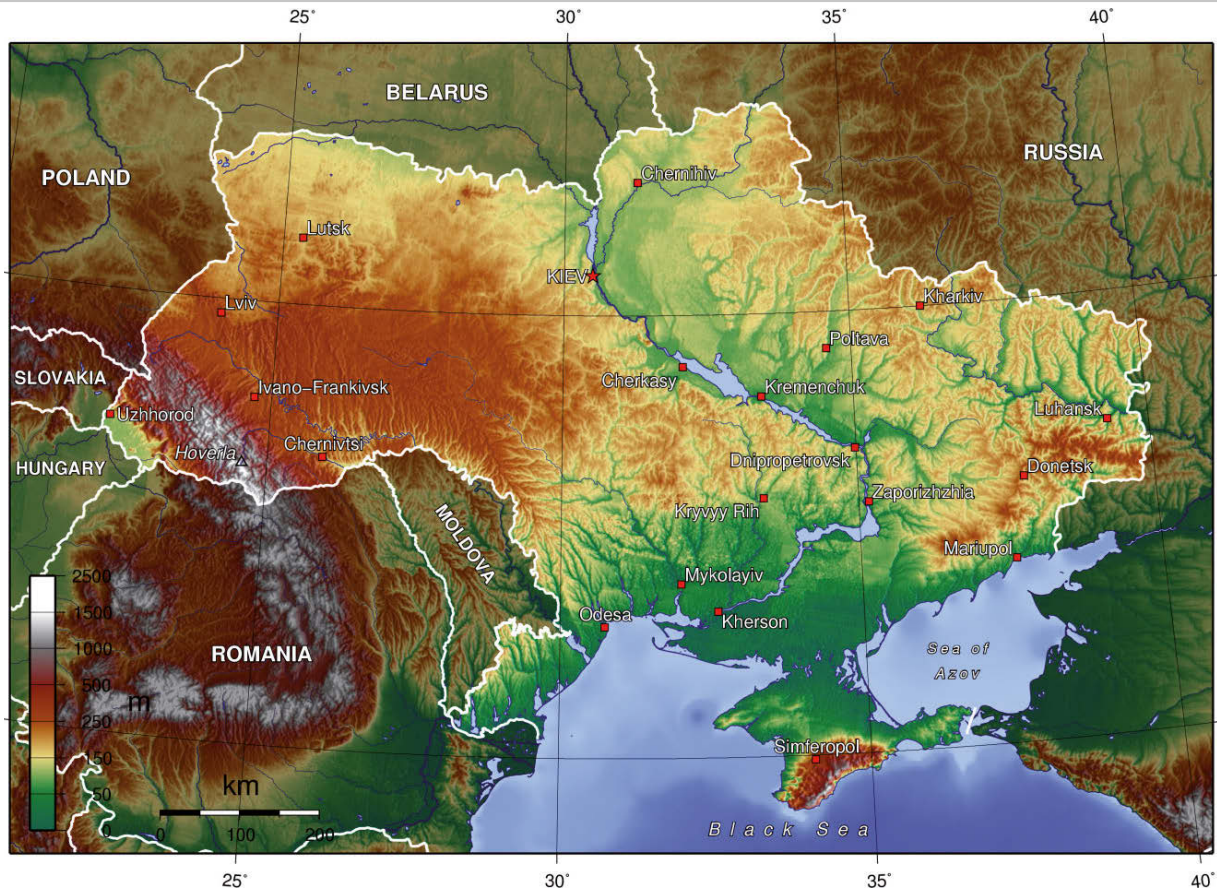
The *Polissya (marshy woodlands)* zone in the North and Northwest covers about 11 mln ha of lowlands. The soils are characterized by low humus content, high acidity, low natural fertility and a relatively short growing season. Water holding capacity is low due to sandiness, resulting in inefficient use of both rainfall and plant nutrients. This area is characterized

Figure 1. Land surface, arable land, and population in Ukraine, compared to large-sized countries in Europe



Note: Surface in 1 000 sq km, population (in 2012) in mln people.
Source: FAOSTAT

Figure 2. Ukraine topography, main cities and neighbors



by cereal and industrial crop (mainly oilseed) cultivation, and animal husbandry as main farming activities. Considerable application of fertilizer and lime is needed to reach adequate yields on these soils.

The *Forest-steppes* zone is located in the central part of Ukraine and covers about 20 mln ha of mostly flat land with insignificant area of woodlands. Here the famous black soils can be found, which are fine grained and easy to cultivate. The northern belt consists of typical deep chernozem soils. It is the most fertile part, rich in humus and more than a meter thick. Yet, because of the continental climate with warmer summers, colder winters and lower precipitation in this region, there is a risk of frost and snow mold (“winterkill”) causing crop failure.

The *Steppes zone* extends further towards the South and the East, where the humus layers are not as thick. This area covers about 24 mln ha and is ideally suited for crop cultivation, mostly of winter wheat, other grains, sugar beet and sunflower, and also hosts some animal husbandry. The southern regions are warmest overall, and well suited for growing fruits, vegetables and wines, but have a risk of drought.

Along the coastlines of the Black Sea and the Sea of Azov, a rather narrow strip of chestnut soils is found, which tend

Figure 3. Climatic zones of Ukraine

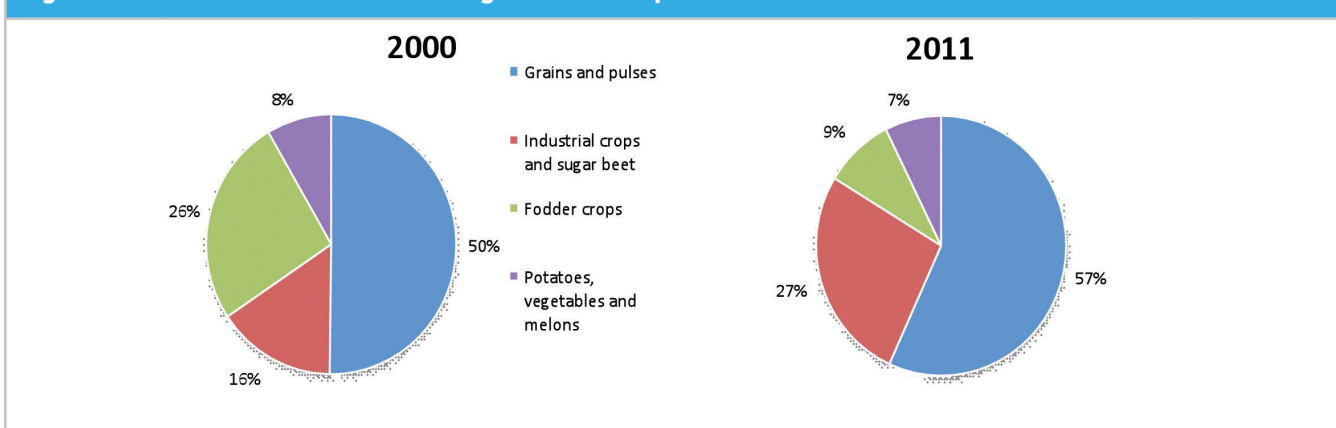


to be increasingly salinized to the south as they approach the Black Sea. Chestnut soils are not as fertile as the black soil, but they are also well structured and easy to cultivate. Productivity is mainly limited by the lack of rainfall.

Agriculture in Ukraine

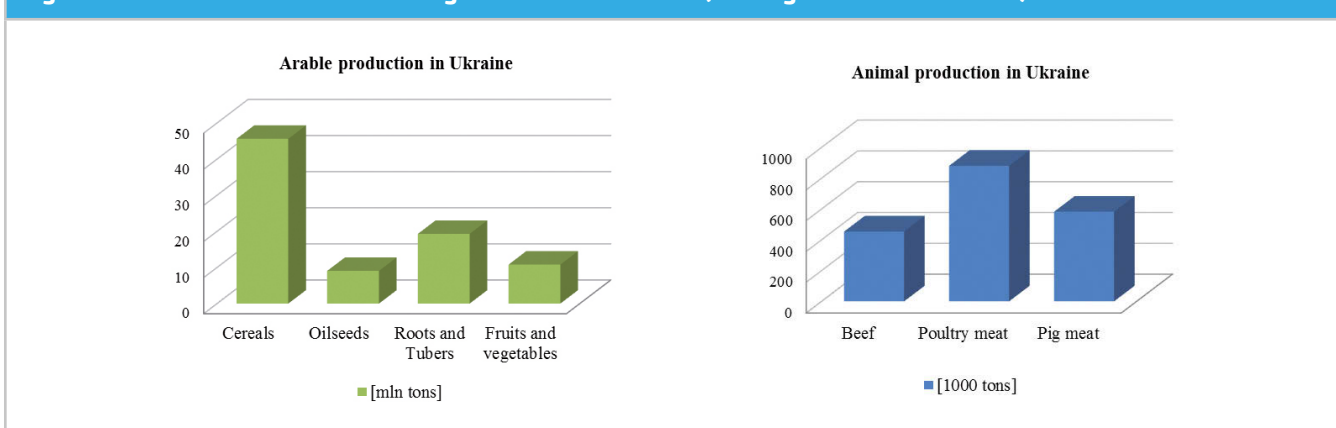
Ukraine’s agriculture is primarily specialized in arable crop production, whose gross output value currently is more than

Figure 4. Shift in sown area of main agricultural crops



Source: State Statistics Service of Ukraine, *Agriculture in Ukraine, Statistical Yearbook 2011*

Figure 5. Production structure of agriculture in Ukraine (average over 2008-2010)



Source: FAOSTAT

twice the level of livestock production. Central districts have the highest crop yields, particularly those situated along the northern part of the Steppes zone and the southern part of Forest steppe, where up to 85% of total land is now in use as arable land.¹ However, this also is the area where land erosion is most severe and nutrient mining is most pronounced, as will be seen in Section 8. Animal husbandry is mainly concentrated around the agglomerations of Kiev, and Lvov, as well as in the relatively urbanized Donetsk basin.

Overall, climatic and soil conditions are quite suitable for cultivation of arable crops, and the largest part of agricultural land is used for crop production (32 mln ha), whereas hay and pastures cover 8 mln ha. During the transitional period 1990-2000, total sown area of the main agricultural crops decreased significantly by about 5 mln ha, but since 2000 a stable level of around 27 mln ha has been maintained. The share of grains and in particular industrial crops increased, however, at the expense of fodder crops,

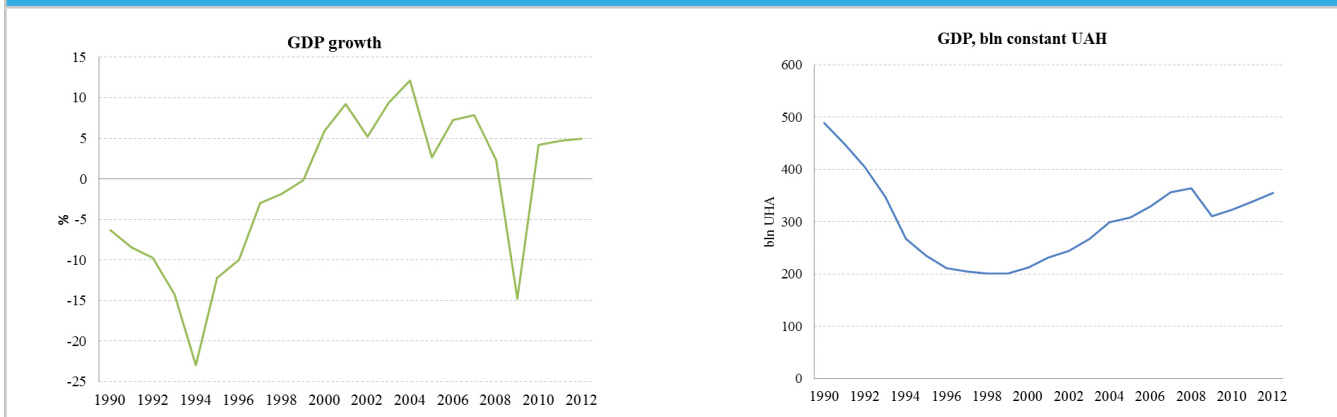
reflecting a transition to crops with higher returns. Figure 4 shows the shift during the past decade.

The livestock sector decreased sharply after the breakup of the Soviet Union and has not recovered completely, so Ukraine still imports about 15% of its meat consumption. For an overview of its agricultural production, see Figure 5.

Grain exports have been rising fast in recent years, and are now around 20 mln ton. Also for the harvesting year of 2012/13 exports are expected to be close to 21 mln tons (that is 7% of the world trade in grains, excluding rice) and 2.6 mln tons of oilseeds (that is 2% of world trade), according to the November 2012 issue of FAO's Food Outlook. Ukraine intends to consolidate and expand its export position and has in this connection made efforts to improve its trade relations.

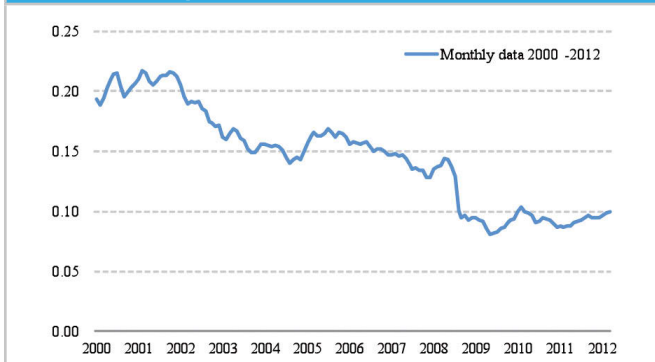
1 Ukraine Statistical Yearbook 2011, chapter 9.

Figure 6. GDP growth rate and levels, 1990-2012



Source: World Bank Indicators (forecasts for 2012)

Figure 7. Monthly exchange rate between UAH (Ukrainian Hryvnia) and Euro, 2000-2012



Note: In July 2012 1 Hryvnia converts to .099 euro (data from www.oanda.com)

Independence and Transition

Ukraine, with a GDP per capita of € 2 799 in 2011 is a lower middle-income country.² At the breaking up of the Soviet Union in 1990 it inherited a fair share of industrial assets and natural wealth, primarily consisting, besides land, of mineral reserves, particularly coal and iron ore but also manganese, titanium and nickel.

The transition has proved difficult. After a few years of economic reorientation and significant drop in economic activity, the country achieved a period of steady growth for almost a decade (see Figure 6). However, clear internal tensions remained between orientation towards Russia and the West, that built up after the Orange Revolution in 2004, with subsequent talks of Ukraine joining NATO, and culminated in 2008 when Ukraine chose Georgia’s side in its conflict with Russia over South Ossetia. Soon after, a dispute emerged about Russia’s gas deliveries to and transport through Ukraine that almost brought the energy intensive industry to a standstill. Amidst these tensions and reinforced

by the financial crisis, tourism from Russia to the Carpathians and primarily Crimea declined. In all, the economy contracted by 15% in 2009.

The political tensions have relented since the 2010 change in government, and economic growth picked up at a steady rate of around 5%, which is also the forecast for 2012, with an equally steady exchange rate since the beginning of 2009, see Figure 7. According to statistics from the World Tourist Organization, after a decline in 2009 of almost one million visitors, tourist flows had more or less returned to previous levels by 2010 and resumed their growth in 2011.

Relations with EU

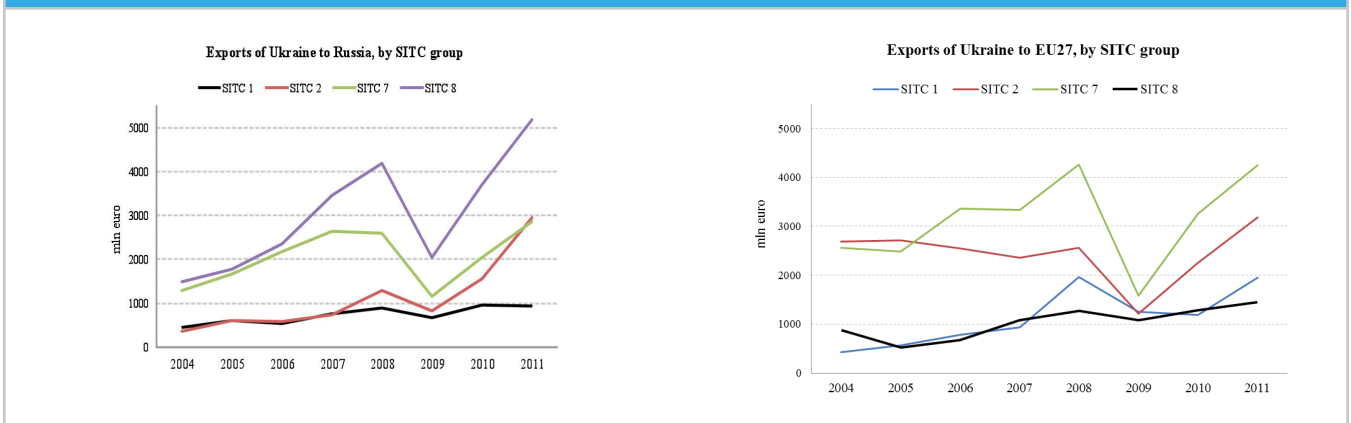
Ukraine clearly has strong cultural and economic ties with Russia. At present, it imports most of its energy from Russia, but also shares borders with four EU member states and participates in the EU Neighborhood Policy programs, which aim at deepening the relationship between the EU and its neighbors. Through various action plans, the EU has become Ukraine’s largest foreign donor. Investing a cumulative total of almost 6 billion Euros since 1992, the European Bank for Reconstruction and Development (EBRD) has maintained a diversified portfolio of projects in the country, in areas such as micro-enterprise lending, financial sector reform, rehabilitation of infrastructure and rationalization of the energy sector.³

Ukraine also started negotiations with the EU on the establishment of a Deep and Comprehensive Free Trade Area (DCFTA), a treaty that would cover all trade-related fields (including services, IPR, customs, public procurement, and competition) and would also address trade-related domestic regulations in Ukraine that may conflict with the Acquis Communautaire. Ukraine’s agricultural trade with the EU is currently subject to tariff-rate quotas (in particular for low quality wheat) and has to meet the EU’s SPS requirements,

² Based on per capita GDP of 3615 USD (World Bank) and the annual USD/EUR exchange rate of .7742

³ http://www.ebrd.com/downloads/country/strategy/ukraine_country_strategy_2011_2014.pdf

Figure 8. Ukrainian exports to Russia and EU-27, 2004-2011



Note: Only the four top exports groups are shown, covering 85% of total Ukrainian exports.
 SITC 1: Food and live animals, SITC 2: Crude materials, inedible, except fuels, SITC 7: Machinery and transport equipment, SITC 8: Miscellaneous manufactured articles
 Source: Trademap database of International Trade Centre, Geneva

which is constraining the exports of higher valued crops such as fruits and vegetables.

Trade

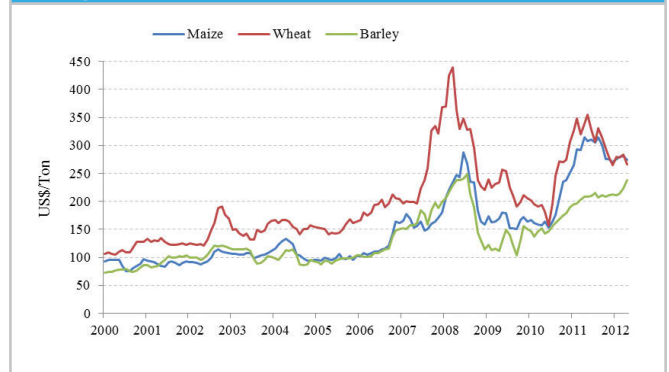
Ukraine typically exports iron and steel to the EU and Russia, which are its main trading partners. Russia also imports rolling stocks such as railways equipment. Exports of the heavy industry suffered severely during the 2009-recession, but also recovered quickly, see Figure 8. Agricultural exports to the EU (dominated by oilseeds and its oils and cereals, mainly for use as animal feed and as biofuel) prove to be less volatile.

Around 2005, when world commodity prices started rising, the external balance of Ukraine turned into a deficit, steadily increasing to levels that now exceed 7.5 bln Euro, as higher steel and grain prices could not compensate for the rise in the energy bill. Given its strong market exposure, with high import values as well as high export values, and its focus on primary commodities with relatively little processing, variable world prices also transmit heavily into the domestic economy, compromising its economic stability.

At the same time, persistence of the upward shift (see Figure 9) in world agricultural prices on average, as compared to the level in the previous decade, suggests that there may be good opportunities for Ukraine to boost the value of its agricultural exports.

On the import side, exposure has worsened significantly since Russia cancelled its preferential agreements for sale of oil and gas in 2006, leaving the Government of Ukraine no

Figure 9. International cereal prices, 2000-2012, in US\$ per ton



Source: IMF price statistics.

choice but allowing domestic energy prices to rise gradually to reach world market level eventually. This controlled increase aims to prevent fast erosion of purchasing power among large segments of the population, and of the competitiveness of the (heavy) industry in one of the most energy intensive economies of the world. The impact on consumer prices was significant, nonetheless. While in 2006 prices in most commodity groups were stable or increased by 5% at most, the price for electricity rose by 50%, for gas by 80% and for central heating by more than 100%.⁴

Ukraine's contribution to global food security

As a major agricultural exporter, Ukraine is an important player on world food markets that is to be reckoned with already. Its stationary population and relatively low crop yields leave ample room for improvement. The country's impact on the global food scene can only be predicted to

⁴ Source: Consumer price indices for goods and services in 2006, State Statistics Service of Ukraine.

become more pronounced in the future, as the need becomes more pressing to feed and clothe nine billion people in 2050 who consume more meat and crops, particularly if authorities worldwide persist on using food crops as fuel.

Ukraine impacts by more than its export potential alone. Its trade policies and product composition play an important role as well, particularly since price volatility on world food markets has risen significantly in the past decade. This change is attributable to several primary and secondary drivers. Ukraine has a distinct role in both.

The primary drivers are weather shocks and consequent output variations. Ukraine is under a strong impact here, because of its frost and drought sensitive conditions, and its limitations in managing irrigation, storage, and plant protection.

Non-negligible shocks originate from linking agricultural and energy markets (the secondary drivers). One channel for this is the cost of production, whereby fuel cost is transmitted to final product price of agricultural products with high supply elasticity, such as horticultural and livestock products (unlike field crops). Biofuel is a second channel of transmission. Since 2004 many countries including the US, EU and China⁵ have started promoting use of biofuel in cars through direct support and blending mandates. Until January 2012 the US provided a subsidy on biofuel output to make it equally profitable, causing food prices to follow the highly volatile fossil fuel prices, especially during the period of 2010-2011.⁶

Also with respect to biofuels, countries that do not offer a direct subsidy, may impose a blending mandate (a minimum percentage of biofuel in gasoline). While this does not establish a direct link to the fuel price, it introduces an almost price inelastic demand component. Starting 2012, the US abolished the price subsidy and border protection on biofuels, leaving only a general subsidy (including tax breaks) for biofuel plants, and an overall delivery quota, to be fulfilled either from direct production or from biofuel stocks. Basically this means that the blending mandate, like in other countries, now imposes a lower bound on demand for biofuel crops, that is, except for biofuel stock adjustment, hardly responsive to crop prices. With 40% of US corn output used as biofuel this significantly reduces demand elasticity and after the drought in 2012, jointly with the rigid mandates of other countries, amplified the price hike on world markets.

Three mechanisms may help addressing the impact of energy markets on agricultural markets. First, the processing industry itself can substitute food and fuel based on relative profitability, as the Brazil sugar-ethanol plants are very apt to do, which of course strengthens the link between food

and fuel prices. Second, adjustment and arbitrage on biofuel stocks can reduce temporary variations, which may soften food price variations, a little. Third, temporary waivers on mandates have been suggested to deal with scarcity. In the US, various organizations have in the fall of 2012 called upon the Environmental Protection Agency (EPA), the agency in charge, to act accordingly but the decision is still pending.⁷ It would seem that in such a highly regulated industry, some international coordination is required both to intervene in crisis situations and to avoid excess production capacity.

If such international coordination could be agreed upon, it would guide Ukraine, just as the other countries, in their decisions about investing in biofuel production, and avoid becoming part of a race to the bottom between highly subsidized biofuel plants worldwide. Nonetheless, given the current doubts about biofuels, it would seem that investments into biofuel production capacity are unlikely to pay off in the longer run, particularly due to presence of highly subsidized biofuel plants worldwide. A more promising direction would be to invest in meeting SPS-measures for food. Then, with a limited capacity in biofuel production and the SPS satisfied, Ukraine could through well-regulated waivers start playing a pivotal role on grain markets and help reducing price volatility.

Finally, turning to another secondary driver, we note that Ukraine had no special part in the deficiencies of financial markets that incited to speculation, particularly during the period 2006-2010 when future prices failed to convergence to spot prices upon expiration of contracts. However, it did worsen price volatility when it imposed export quotas, an issue to which we return in Section 6 below.

Population and labor force

The difficulties of transition also find expression in a population decline that started in 1993 and has never stopped since, dropping from 51.5 mln people at the time to 45 mln in 2012.⁸ Fertility is below reproduction level, and mortality of adult men of working age is extremely high. Overall life expectancy is less than seventy years, ten years shorter for men, which is low for a lower middle-income country, and causes both rural and urban population numbers to fall. High prevalence of HIV/AIDS and abuse of alcohol and drugs are major threats in this regard. At the same time, literacy rates and education levels are one of the highest in the world, as shown by the Human Development Index reported by the UNDP.

The service sector is Ukraine's largest employer (around 60% of total work force, see Figure 10), but the shares

5 Sorda, G., M.Banse and C. Kemfert (2010) An overview of biofuel policies across the world, *Energy Journal* 38: 6977-88.

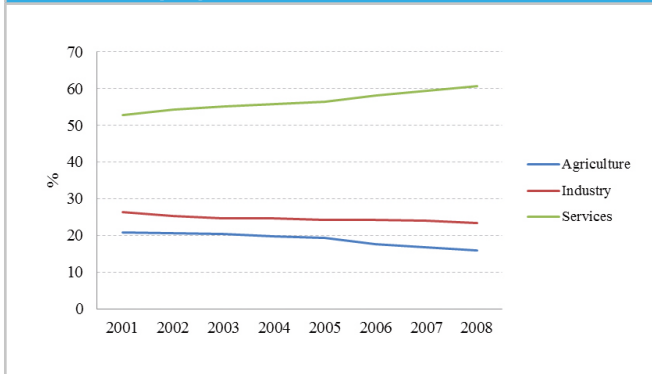
6 In 2009 the US car fleet had reached saturation, hitting the so-called blend wall, and temporarily delinking crop and fuel markets. By the end of 2012 the blend wall has been reached again. It is expected to remain binding in the coming years.

7 EPRINC(2012) Ethanol's lost promise. An Assessment of the Economic Consequences of the Renewable Fuels Mandate, Energy Policy Research Foundation, Inc. (EPRINC), Washington DC.

8 Source: FAOSTAT, Resources

of manufacturing and agriculture are still substantial. These data exclude a presumably large shadow economy, estimated by the World Bank at 55% of GDP on average over the period 1999-2007. About five million people may well be employed in the informal sector, mostly in rural areas.

Figure 10. Employment shares, 2001-2008, as % of total employment



Source: World Bank Indicators

3. Emergence of a dual agricultural system

Following the disintegration of the USSR, Ukraine's agriculture underwent a transition to a market economy characterized by instability, uncertainty, permanent economic crisis and political standoff, in the middle of which the official institutions remained more or less unchanged with respect to their governance and internal culture of administration.

The transition can be subdivided into three stages:⁹ 1991-1999; 2000-2003; 2004-present.¹⁰

First stage: 1990-1999

The first stage created the main *preconditions* for reorganization of collective and state enterprises and privatization of their land and other property. Collective and state farms were transformed into collective agricultural enterprises (CAE) initially owned by their employees as shareholders, who received land certificates among others, and became entitled to start a private farm.

Attempts to set up private farms were, however, impeded by the people's inexperience in independent farm management, lack of theoretical and practical knowledge of launching private business in a transitional economy, unfavorable economic situation in the country, and to some extent by an unfavorable attitude on the part of government officials and of rural communities. By the end of 1999 no more than 10% of agricultural enterprises had effectively been reorganized.¹¹

Reform of the market regimes was slow as well. For example, until 1997 Soviet practices of State procurement of agricultural products remained operational, usually in the form of interest-free state loans at regulated prices.

Given the permanent inflation, and even spells of hyperinflation in 1992-1993, this price rigidity caused the agricultural terms of trade to worsen dramatically and at unprecedented rate. While in 1990 the price of 1 mt (metric ton) of diesel fuel was equivalent to the price of 0.2 mt of wheat, by 2003 it was already 4.6 mt, and by 2004, 6.0 mt.¹² Mineral fertilizer and other inputs showed similar price rises. The terms of trade have improved since, but the relative price of diesel to wheat is still a factor of 7.

These unfavorable developments during the period 1990-1999 led to a sharp decrease of agricultural output, dividing gross agricultural product by half. For agricultural enterprises, it dropped to 28% of the 1990 level, while households were able to maintain their production more or less unchanged, at 98% of the 1990 level.¹³

Second stage: 2000-2003

By December 2000 the preceding downturn led to adoption in Parliament of a Presidential Decree "On urgent measures regarding acceleration of the agricultural sector of economy" that marked the start of the second stage. The Decree effectuated the actual privatization of agricultural land, stipulating that land shares had to be transformed into private land plots with well defined physical boundaries. This implied first that land lease based on land certificates became possible and secondly that on part of the land the holders of a certificate were given the right to claim land plots up to 100 ha but usually less to farm on by themselves.

The institutional changes were significant. Collective enterprises were liquidated and their assets distributed.

9 Actual Problems of Agrarian Reform in Ukraine in Time of Systemic Economic Crisis /ed. I.G. Kyrylenko, UN Development Programme, 2009, p. 24. (Available in Ukrainian at: http://brc.unep.org.ua/img/publications/AgroReform2009_Ukr.pdf)

10 It is common to distinguish two periods only: 1990-1999; 2000-present only, e.g. Andrea Zimmerman, Arnim Kuhn (2006). Impact of Agricultural Policy Reforms on Farm Structures and Performance in Ukraine. Prepared for 96th EAAE Seminar "Causes and Impacts of Agricultural Structures" 10-11 January 2006, Tänikon, Switzerland. Available at: <http://www.ilr1.uni-bonn.de/agpo/staff/zimmermann/Ukraine.pdf>

11 Source: Ministry of Agrarian Policy and Food of Ukraine.

12 Source: State Statistics Service of Ukraine.

13 Calculated according to the data from the State Statistics Service of Ukraine. Agriculture of Ukraine 2000: Statistical Yearbook, State Statistics Service of Ukraine, 2011.

Table 1. Agricultural producers in Ukraine, 2000-2010

Classes, organizational and legal forms	2000		2005		2010	
	Number	%	Number	%	Number	%
Corporate farms						
Agricultural enterprises – total number	13 160	100.0	15 430	100.0	14 767	100.0
including: Partnerships	6 718	51.1	7 900	51.2	7 769	52.6
Private enterprises	2 519	19.1	4 123	26.7	4 243	28.7
Cooperatives	3 136	23.8	1 521	9.9	952	6.5
State enterprises	385	2.9	386	2.5	322	2.2
Others	402	3.1	1 500	9.7	1 481	10.0
Individual farms						
1. Peasant farms – units, 1000	34.8		42.4		41.7	
2. Household plots – units, 1000	...		4 915.3		4 540.4	

Source: State Statistics Service of Ukraine

A variety of new production entities emerged including limited liability companies, private farms, agricultural production cooperatives, open and closed joint stock companies, and household plots.

In all, this process of restructuring eventually created a dual production structure consisting of large corporate holdings (agricultural enterprises) and individual farms (peasant farms and households).¹⁴

In parallel with these organizational changes at farm level the regimes prevailing on agricultural markets were modified, with more price flexibility allowing for improved terms of trade for agriculture.

Yet, after the disastrous first stage of agricultural transition, government policy was now primarily oriented on revival of large scale production. Along with traditional subsidies for production, so-called “soft” loans (with partial reimbursement of interest payments), there was a price support through assured procurement of grain and government interventions, low leasing rates for equipment, supplies of fuel and fertilizers at prices below market level and tax holidays.

However, access to these benefits was reserved to large producers only. In 2001 about 12 600 enterprises received over UAH 5 billion of lending funds, which were allocated to agriculture, of which UAH 2.6 billion were “soft” loans (at a lower interest rate).¹⁵

Third stage 2004-present

The third stage is characterized by intensification of agricultural production based on concentration of land and assets, by consolidation into large holdings.¹⁶ This process largely takes place in the shadow, and is made possible by non-transparent control over the distribution of the former collective enterprises’ property and agricultural lands, and the emergence of an informal land market, whereby lease, lease-to-purchase and purchase agreements led to consolidation of large stretches of farmland in the hands of vertically integrated legal entities and natural persons. Hundred thousands of hectares of consolidated land are now being cultivated as export-oriented corporations. These are often of latifundium type. Thanks to their access to advanced modes of finance they were able to initiate diversified activities along the full product chain from input supply, basic crop production through processing and even exports.

¹⁵ According to the Report of the Accounting Chamber of Ukraine. Available at: http://www.ac-rada.gov.ua/control/main/uk/publish/article/40371?cat_id=38965

¹⁶ O. Borodina (2007). Peculiarities of creation of extra large agricultural companies under conditions of insufficient legislative regulation in Ukraine. Paper prepared for presentation at the 102 EAAE Seminar “Superlarge farming companies in Eastern Europe: emergence and possible impact”. Moscow, May 17-18, 2007, <http://agecon.lib.umn.edu/cgi-bin/view.pl>.

¹⁴ All households that possess land plots and carry out some agricultural activity in both rural and urban areas.

Table 2. Distribution of different types of farms by agricultural land size in 2010

Corporate farms (agricultural enterprises)			Individual farms					
Farm size, ha	Share, %		Peasant farms			Household plots		
	In total number	In land area	Farm size, ha	Share, %		Farm size, ha	Share, %	
				In total number	In land area		In total number	In land area
< 1000	45.0	11.6	<50	64.6	14.2	< 0.25	25.2	3.3
1000-4000	26.1	46.9	50-100	9.8	6.8	0.25-1.0	53.0	24.4
4000-10000	5.5	27.3	100-500	10.9	24.3	1.01-5.0	18.5	30.4
> 10000	0.9	14.2	500-1000	2.4	16.5	5.01-10.0	2.0	11.8
without land*	22.5	–	> 1000	1.9	38.2	> 10.0	1.3	30.1
			without land*	10.4	–			
Total	100.0	100.0	Total	100.0	100.0	Total	100.0	100.0

Source: State Statistics Service of Ukraine.

Note: *without agricultural land

Present state of dualisation

Through its dual production structure, the agricultural sector of Ukraine is currently subdivided into large *corporate farms* and by comparison small *individual farms* that range from household plots to farm cooperatives jointly operated by a few families and small corporations.

Corporate farms include various organizational and legal entities established in accordance with the legislation of Ukraine: state-owned enterprises, private enterprises, economic partnerships, production cooperatives and others. They have the status of legal entity and carry out agricultural production. In 2010 there were 14 800 corporate farms. Their distribution by numbers and composition is shown in Table 1.

Within the group of corporate farms, the group that cultivates more than 10 000 ha has grown significantly since 2004, more than threefold in 2010, on an area that was multiplied by four, as the average size of holdings rose by 31% to almost 22 000 ha.

This trend towards extreme concentration of land is still going on in 2012, as large farms merge further to mega agro-holdings that have considerable power through their land size, assets and access to financial resources, locally as well as nationally. It may be added that these mergers are often not free from coercion.

The agro-holding has by now become the centralized form of agribusiness organization with the parent company owning and managing a number of subsidiaries. Operating as profit

maximization corporations, they attract risk bearing capital from stock exchanges worldwide, albeit foreign investors have become less eager in recent years in view of the large supply of Ukrainian shares and the legal uncertainties in Ukraine.

Examples of such holdings are: “Ukrainian Agrarian Investments” (330 000 ha), “MMK named after Ilich” (225 000 ha), “Mria agroholding” (218 000 ha), State Enterprise “Nafkom-Agro” (200 000 ha), “Astarta-Kyiv” (185 000 ha, which plans to expand shortly its land base to 400 000 ha), “Mironovski Khiboproduct” (180 000 ha), “Agroton” (150 000 ha), “Ukrzernoprom-Agro” (96 000 ha), “Sintal-D” (94 000 ha) and others. In 2010, the 40 largest holdings controlled 4.5 million ha of land, which accounts for 11% of agricultural land.¹⁷

Large corporations and mega agro-holdings rarely register their business as such in Ukraine, as they prefer off-shore registration to benefit from tax exemptions. This makes it difficult to track and to measure statistically their emergence and dynamics. Ukraine could improve the governance of these flows and its finances by setting up an agro-exchange, possibly as subsidiary of an existing and well-reputed commodity exchange. Such an exchange might also promote certification of the social and environmental requirements imposed on the production.

17 The rise of large farms in land abundant countries (2011), Policy Research Working Paper of the World Bank (WPS5588)

Table 3. Share of different types of farms in agricultural production, %

Indicator	Corporate farms		Individual farms			
			Peasant farms		Households	
	2000	2010	2000	2010	2000	2010
Gross agricultural output (value)	32.3	39.9	1.7	5.0	66.0	55.1
<i>Production (quantity)</i>						
Grain and leguminous crops	76.5	63.8	5.1	12.0	18.4	24.2
Sunflower seed	77.5	64.7	10.0	17.8	12.5	17.5
Rapeseed	96.0	85.0	4.0	15.0	–	–
Sugar beet (for processing)	82.1	83.7	5.7	8.4	12.2	7.9
Potatoes	1.1	1.7	0.3	0.9	98.6	97.4
Vegetables	15.5	9.3	1.4	2.6	83.1	88.1
Fruits and berries	18.2	16.4	–	–	81.8	83.6
All types of meat	25.8	52.8	0.5	2.3	73.7	44.9
All types of milk	28.5	18.7	0.5	1.0	71.0	80.3
Eggs	33.7	59.6	0.1	0.5	66.2	39.9
Honey	6.6	2.0	0.2	0.3	93.2	97.7
Wool	38.3	13.8	0.3	3.1	61.4	83.1

Source: State Statistics Service of Ukraine.

Individual farms comprise two types of individual-owned farms: peasant farms and household plots.

Peasant farms are formed by a collective of citizens from rural areas. They have the status of legal entity with the main focus on agriculture production activity. They also may carry out processing, marketing and sales for own profits on the land plots given them free of charge for farming. In 2010 there were 41 700 peasant farms (Table 1).

Household plots are basic farms operated by individual households that carry out agricultural production for own consumption as well as for the market. About 9.4 million households have land plots for cultivation.¹⁸ These plots are located in both the countryside and urban areas (cities and towns). There are 4.5 million of such plots, meaning that many households operate one plot jointly (Table 1). The households receive these plots “for individual agriculture activity” under a special Law. The legal norm for the size of land holding is 2 ha, but households that had a land certificate may cultivate a far larger area.

Within both groups – corporate and individual farms – the size of farms varies significantly: 45% of corporate farms below 1 000 ha cultivate 11.6% of farmland, and 0.9% of farms with more than 10 000 thousand ha cultivate 14.2% of farmland. Distribution of corporate and individual farms by their land size is presented in Table 2 but it must be

stressed that these corporate farms can be subsidiaries of much larger agro-holdings.

Farms without land tend to be engaged in livestock and poultry production. For corporate farms these are intensive livestock units specialized in poultry, beef and pork production. As to the peasant farms, it may be mentioned that some of these rent out their land and are not involved in agricultural activity at present.

Developments on agricultural markets

While maintaining procurement at fixed prices in rural areas, the first (1990-1999) stage of the transition opened domestic markets for imports of relatively poor quality product at low prices. This was necessary to meet the supply shortages but it also discouraged domestic production. As domestic production recovered during the second stage agricultural imports were reduced.

In the third stage, agroholdings, which integrated production, processing, marketing and sales seized significant market power. By monopolizing sales channels they were able to cut off individual farms and even some corporate farms from direct access to domestic as well as international markets.

There are both technical and institutional reasons for this. Regarding the former, the marketing chains are underdeveloped and not accessible to all, particularly for wholesale trade and processing of fresh and cold products (fruits and vegetables, milk and meat, etc.). Regarding the latter, restrictive licensing practices by government and

18 Statistical Yearbook «Social and economic characteristics of households in Ukraine in 2010». State Statistics Service of Ukraine, 2010. Data on land plots of households available at: http://ukrstat.org/uk/operativ/operativ2010/gdn/sdh/dod_08.htm.

state trading companies have made agricultural trade highly dependent on lobbying by agroholdings and other interest groups. This obviously distorts agricultural markets very much.

For example, the “sale mechanisms” set up by large grain traders permits earning stable profits from export crops (grains, sunflower, rapeseed, etc.) causing the rapeseed area to skyrocket both in the corporate and the individual farms in practically all regions of Ukraine, substituting food crops

in the fertile central regions of Ukraine, and even moving into the southern regions close to harbors, which is potentially risky as the crop is less suited to the weather conditions in this region.

Generally, the poor state of market infrastructure in Ukraine led to a dualisation of the marketing spheres between corporate and individual farms. Corporate farms supply mostly commercially attractive and export-oriented products, while individual farms mainly supply food for the domestic market, contributing about 60% to the gross product in agriculture (see Table 3).

4. Issues in agricultural production: yields

Weather risk

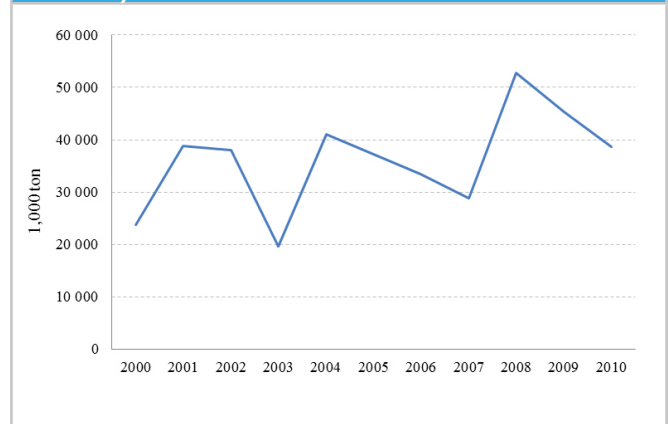
Despite its favorable agro-ecological conditions, Ukraine faces weather risks of two kinds.

One is drought. A recent study by Khokhlov et al. (2012)¹⁹ on the spatiotemporal distribution of droughts in Ukraine over a period of 60 years (1950-2009) has shown that the number of abnormally dry summers and winters have increased in some regions of Ukraine. There is in particular a trend toward increasing droughts in the southern regions that is getting more pronounced starting from second half of the 1990s. Recent statistics and media reports confirm that droughts have had a significant impact on agricultural production in the past years. For example, winter wheat output dropped by 20% in 2010 resulting in decreasing exports (2.5 million tons in the second half of the year, compared to 21 million tons in the first half) and rising grain prices. Also in 2011 and 2012 droughts damaged about a third of the country's winter grains, as seedlings did not appear on significant shares of the sown areas (in total, plants failed to sprout on 1.4 million hectares).

The other risk is frost and snow mold that particularly threaten wheat production, since 95% of it is winter wheat. In 2003 frost and snow mold annihilated half of the planted territory causing wheat production to drop to less than 5 mln tons, from the usual range of 15-20 mln tons. Figure 11 shows the consequent variability of cereals output.

Ukraine's agriculture would benefit from adoption of varieties and farming practices that are less vulnerable to these risks and in the dry areas in the South from rehabilitation of irrigation systems. Programs that return land to nature and afforestation could also avoid this.

Figure 11. Variability of cereals production in Ukraine, 2000-2010



Source: FAOSTAT

Yields well below their agro-ecological potential

Even in good years, yields remain low relative to the agro-ecological potential and also relative to what has been achieved in the past and is currently achieved elsewhere. Estimates based on detailed agro-ecological information, under the assumption of optimal input use and management, show that winter wheat can reach 7 ton/ha, which is 4 tons above the present level.²⁰

The yield gap is in part explained by the presently low application of fertilizer, 2.5 times less in 2010 than in 1990 (see Table 4), with a bottom level in 2000.

19 Khokhlov, V., Yermolenko, N. and Ivanov, A. (2012): Spatiotemporal features of droughts in Ukraine under climate change. Paper prepared for the Workshop on the Development of an Experimental Global Drought Information System (GDIS), 11-13 April 2012, Frascati, Italy.

20 Gumeniuk, K., N. Mischchenko, G. Fischer, H. van Velthuisen (2010) Agro-ecological assessment for the transition of the agricultural sector in Ukraine. Methodology and results for base line climate, IIASA, Austria. This study also provides the spatial distribution of optimal yields over the country, see Figures 3.2 and 3.4.

Table 4. Mineral and organic fertilizer application by agricultural enterprises, 1990 – 2010

Characteristic	1990	2000	2009	2010
Applied mineral fertilizers in nutrients kg per ha	141	13	48	58
Proportion nitrogenous: phosphoric : potash fertilizers	1:0.7:0.7	1:0.2:0.1	1:0.2:0.2	1:0.2:0.2
Applied organic fertilizers tons per ha	8.6	1.3	0.6	0.5

Source: State Statistics Service of Ukraine

The table shows that Nitrogen/Phosphorus/Potash proportions seem to have been unbalanced in 1990 already, and do not follow the fertilizer recommendations for Ukraine²¹, nor the agronomic practice that Nitrogen should be applied for uptake by the plant itself, but that Phosphorus and Potash primarily serve to maintain recommended stock levels in the soils. Hence, on fertile soils it will be possible to obtain adequate yields for decades that are based on mining of the Phosphorus, Potash and micronutrient reserves in the soils. It would seem that Ukraine has followed this practice and that its fertile soils have been and are still being mined heavily, presumably in an unsustainable way.

Furthermore, use of organic fertilizers has dropped significantly. This is because livestock herds have not yet

recovered from the reductions of the early 1990s, and because farming practices hardly rely on green fertilizers, leguminous crops and plowing of crop residuals.

For households and individual farms financing and marketing constraints may explain the lack of incentives to achieve higher yields. More remarkably, corporate farms are not more successful in this respect despite their better capitalization and access to export and input chains. A quick survey of the most important agri-business farms (including Kernel, with 210 000 ha of land, Astarta Holding with 250 000 ha, Agroliga Group with 7 000 ha, Mriya with 295 000 ha) reveals that this may be due to their primary focus on keeping production costs low rather than investing more.

Table 5. Average revenues and costs by crop of agricultural enterprises in UAH/ha

Agricultural products	Input costs (UAH/ha)	Gross revenues (UAH/ha)	Net revenues (UAH/ha)
Grains and leguminous crops – total	2 634	3 891	1 257
incl.:			
Winter wheat	2 487	3 414	927
Spring wheat	1 985	2 543	558
Rye	1 194	1 537	343
Maize for grain	3 998	6 576	2 578
Winter barley	1 940	2 590	650
Spring barley	1 630	2 178	548
Oats	785	1 096	311
Sunflower	2 743	4 972	2 229
Soya	2 792	4 120	1 328
Winter rape	3 855	6 017	2 162
Spring rape	3 426	4 746	1 320
Sugar beet	5 257	8 195	2 938
Potato	19 726	26 400	6 674
Vegetable grown in open	15 092	20 517	5 425
Greenhouse vegetables	1 830 000	2 300 000	470 000

Source: own calculation based on Survey of Agricultural Enterprises (2011).

21 See FAO (2005) Fertilizer Use by Crop in Ukraine, recommending the overall ratio should be 2:1:1.

Net revenues per hectare are low compared to the EU

Low farm-gate prices and low yields lead to low profitability per hectare. The annual Survey of Agricultural Enterprises confirms this and also provides quantitative information, by crop and by input. Table 5 summarizes the results based upon a sample which covers 15% of the agricultural enterprises in Ukraine, covering 9.5 mln ha (that is 30% of arable land). The input costs cover all current inputs (feed, seed, fertilizer, fuel, small materials) and also a component for labor costs.

Gross revenues for, say, wheat are in the range of 340 €/ha (at current exchange rates), which is indeed compatible with an average yield of approximately 3 ton/ha and a farm-gate price of 100 €/ton. Input costs are relatively high, which results in net revenues of less than 100 €/ha. Apart from the labor costs this indicator is comparable to the standard gross margin as computed in the EU, based on data from the Farm Accountancy Data Network (FADN). Typically, high yielding farms in Western Europe have margins for wheat in the range of 1000-1200 €/ha.

5. Issues in agricultural production: access to agricultural land and the Land Moratorium

Ukraine has private ownership of agricultural land but with strict rules on land access and land use. Sale and purchase of agricultural land in Ukraine is strictly prohibited by the so-called Land Moratorium (“Zemelnyi codex”), which was instituted in the early 1990s and developed by further legislation. The basic principles are as follows:

- Rural and urban households who own land for subsistence farming purposes (own gardens to produce fruits and vegetables) from the pre-reform times have the right to sell these plots, since they do not fall under the “agricultural land” category, but are classified as “household plots” that can cover up to two hectares or in some cases more.
- Land that had previously been cultivated by the state and collective farms has been privatized in the 1990s, i.e. split and distributed among the eligible population. Eligible people were in the first instance the workers who had been employed by the collective farms, and in the second instance employees in the social service sector (teachers, medical staff) who lived and worked within the rural council where the farms were located. On record is the land of a farm of 2 000 ha that was distributed equally among 400 eligible persons. The average land size thus given to a single individual was about 3-5 ha. If more than one person per household was eligible, each received their share.
- Only natural persons can own land, not legal entities (organizations, enterprises). Foreigners do not have the rights to own land in Ukraine. Land ownership is granted only if certain conditions were fulfilled, such as permanent residence in the vicinity.
- The maximum land size an individual can own is no more than 100 ha. The maximum land size an individual can lease is no more than 6 000 ha, or 5% of the total agricultural area in the region (oblast). If more than the maximum amount of 100 ha is in the possession of an individual (e.g. through inheritance), the individual is obliged to dispose of the excess land within one year.
- A small share of the land (around 5-10%) was reserved for the state (state property and reserves). This was usually land of low productivity that was reserved to be given to individuals wishing to become farmers.
- There are also property titles on real estate that define passage rights for traffic and for water that can be established by a contract, by law, a will, or a court order, conditional on payment or free, temporary or permanent. For traffic (vehicle or cattle) the rights apply to existing roads. For water there are rights to connect for diversion or extraction of water to another natural reservoir, with connections passing through adjacent land owned by others, rights to water livestock at a natural reservoir located on adjacent land, and the right to drive cattle through a natural body of water.

Impact of the legal regulation on the land lease market

- The legislation is still under construction, which is one of the reasons for the repeated prolongation of the moratorium. Three laws are under revision now: Law on land market, Law on the agricultural bank, and Law on public and communal property.
- At the time of the distribution of agricultural land in the 1990s, eligible individuals received a “certificate” stating the personal details of the owner, and the size of land that he/she owned, without further specifying the exact location of that land. Since the actual location was unspecified, individuals could not cultivate them and had no other choice than leasing collectively to the larger holdings operating the full parcel.
- In response to this problem, a cadastre was set up and certificates were gradually replaced by the “Zemelnyi Act”, a document that specified the land property as well

as defined parcels on the cadastral map. The process of shifting from the certificates to the acts took long, due to high transaction costs, with a registration fee of about 75€ per parcel! Nonetheless, as much as around 90% of all land is currently covered by the Acts.

- These greatly improved titles to land were, however, insufficient enticement for the population to farm these parcels, among others due to their inaccessibility. Large farms were simply divided and distributed geometrically, without attention to road infrastructure. In particular, the Law does not regulate the right of passage across adjacent parcels in the absence of a road, a vital element of any agricultural operation to bring in inputs, laborers and equipment and to move out the produce at harvest.
- Lease contracts can have duration of up to 50 years. Payments can be in cash and in kind. Rent is paid annually or at the beginning of the contract for the full period.
- Consequently, most parcels are still being leased to large farms that know the law better and also enjoy monopsony regarding the terms of lease. Households have little alternatives. Hence almost all (99%) of rented land currently is from private households and substantiated by certificates and acts.
- There are currently only around 40 000 peasant farmers (carrying that official status), i.e. households who did actually started cultivating their land rather than leasing it.
- To terminate a lease contract, owners need to start, at their own expenses, court proceedings that can only succeed in principle, if the farm holding which rented land failed to fulfill the conditions specified in the contract (irregular or insufficient). In practice courts usually take no action, with the motivation that there was no systematic fraud.
- Even though sale and purchase of land are prohibited, corporate farms make frequent use of loopholes:
 - (a) The enterprise pays the whole amount of the rent in advance (e.g. for the next 20 years). This in effect gives it full control of the parcel.
 - (b) Individuals who are in principle not eligible to purchase land (for example persons related

to corporate farms) try to cover purchase of land under various non-purchase contracts. For example they receive land as gifts, or “inherit” it from elderly for lifelong support.

- (c) Although land can only be owned by private persons, the problem of using land as collateral for credit is circumvented by using the “right to lease” as collateral.
- (d) From the mid 2000s onwards limited liability companies began to collect leases of a duration of up to 50 years, to establish large agroholdings as discussed earlier with contracts up to 50 years. Such long leases effectively amount to purchases

- Upon lifting of the moratorium, existing contracts will remain in force until their date of expiration, unless new legislation rules differently.

Combined, the share distribution of land and the Land Moratorium are a precious institutional arrangement that has prevented fragmentation of holdings into small parcels, the loss of agricultural land to construction projects around cities and, in principle, concentration of ownership of former state and collective farms in the hands of oligarchies.

Lifting the Moratorium could, therefore, have dramatic consequences in two directions. One is fragmentation of fields into plots that are hardly accessible, with all ensuing conflicts within local communities. The other, opposite direction is excessive concentration by fair as well as unfair means of all property rights by agroholdings and other large players on the land market. We return to these aspects in Section 8 below.

Marketing

Marketing is a significant bottleneck for small to medium farm enterprises. Even maintaining a market share proves increasingly difficult due to stiff competition from imported products. Therefore, there is a need for better communication along the product chain from primary producers to retailers, and for cooperation among suppliers to consolidate their shipments and to supply better quality crops as required by the market. Box 1 shows an example of such a project that was successfully conducted with technical assistance from Canada.

Box 1

The Ukraine Horticulture Development Project (UHDP) is being implemented in two regions of Ukraine (Crimea Region and Zaporizhzhya Region), within the framework of the international technical assistance by the Canadian International Development Agency (CIDA). The project's objective is to assist small farmers and households having farmland to develop their production potential. Project experts assist them in applying new technologies and finding new marketing channels to get higher benefits from their small farms.

The project has developed a consolidation model where small and medium farmers create a producer group with a local leader. In one geographical location one group can be created. Afterwards, groups can be united to regional clusters, belonging to one geographic area.

The implementation experience of this model in Nyzhnohirskiy District, Crimean AR, showed that households have achieved substantial success in improving their commercialization potential after consolidation - about 1400 tons of agricultural products were consolidated and sold within the period from early spring until late autumn 2011. These are primarily radish, cucumbers, tomatoes, and table grapes. Farmers consolidated in one group started to see each other as partners rather than competitors. They understood that individual success of each group member depends on the neighbor's success. Additional proof of positive aspect from consolidation is that in 2011, three times more products were consolidated and sold compared to 2010, and the number of group members has doubled.

In 2011, UHDP funded the construction of a local market in Sadove village. Also, two refrigerators were installed for storing products, which allow consolidating big lots and storing products while prices are fluctuating. A great success has been reached in cooperation of Sadove small producers with large Ukrainian super markets and Russian wholesale buyers. Nowadays, supermarkets provide producers with unified plastic boxes for products to be stored and then transported. This satisfies supermarkets' strict requirements for the quality of products. There have been days in summer and autumn when up to ten trucks were loaded simultaneously in the Sadove village market.

Source: <http://www.uhdp.org.ua/>

6. Issues in agricultural trade

Since consumer demand is rather stable and average per capita availability of food is already above 3 200 kcal per day,²² there is little room for further growth in demand for Ukraine's main crops. Consequently, the country needs to address inevitable variation in output by adjusting its foreign trade and public stockholding with sufficient flexibility. This has not proved easy, particularly because of the unstable course of Ukrainian politics.

Export restrictions

As wheat products are Ukraine's main staple and the population spends a large fraction of its revenue on food, the government is permanently concerned with keeping the price of bread in check when shortages arise, activating a host of interventions in production and trade in such situations.

Hence, in 2006 rising food prices and poor harvests resulted in the imposition of export quotas for wheat, barley, maize and rye that remained effective until 2008, causing grain exports to drop from 12 mln ton in 2005 and 2006 to 4 mln ton in 2007.²³ Combined with the export restrictions of Russia and Argentina, this was one of the factors leading to the price spike on international markets. Export quotas were also implemented in 2010 and 2011.

Though the procedures of quota distribution and the certification requirements for export were particularly unclear, it was evident that specific trading companies had access to the quotas issued by the Ministry of Agrarian Policy and Food (such as Khlib Investbud, a trading division of a larger state-run enterprise, the State Food and Grain Corporation of Ukraine), while most of the domestic grain traders receive small shares or no share at all. These companies also had discretionary access to the Agrarian Fund, enabling them to start a campaign for domestic purchase of grain on the basis of forward contracts. The scheme was supposed to alleviate financing needs of farmers, and supplying them with fertilizer and fuel at reduced prices. However, the particulars of the arrangements remain cloudy, not to mention their effectiveness; USDA reports that the quotas

have cost Ukrainian farmers around one billion US\$, due to lower prices.²⁴

In 2011 the grain export restrictions were lifted again and replaced by custom duties, of about 10% of export prices. As this discouraged exports, the duties were suspended in January 2012. For the harvesting years 2011-12 and 2012-13 cereals exports are estimated to exceed 20 mln tons, well above the preceding years. Although exports are now apparently growing at a steady pace, the procurement of grains and the subsequent shipping from domestic to international markets still operate under a semi-closed, informal regime, driven by interest groups. This creates rents that undermine the country's competitiveness.

Overall, it would seem that the export quotas and duties have served varying interests but not contributed to the country's welfare. A country with an after all far from dominant share in world trade has little to gain from such restrictions, since it is too small to lift world prices, and both food consumers and the treasury are better served by higher export revenue.

The grain import regime of the EU

One valid reason for restricting grain exports may be that foreign markets impose import quotas that discriminate against the country. The export quotas in this case serve as voluntary export restraint, essentially to prevent the importing country from earning the rent on this quota. This is not relevant for a country that has free access to the world market but Ukraine has significant limitations in this respect, in terms of geography and constraints in trade infrastructure but also because it has so far not been able to secure MFN-status ("most-favored nation") on many markets. Hence it has some ground for considering such voluntary export restraints at times.

For instance, in 2002 Ukraine had built up a considerable surplus of wheat after two consecutive years of bumper crops and it managed to export 4.6 mln tons of wheat to the EU (against 1 mln ton in 2001 and 0.2 mln tons in 2003).²⁵ This raised concerns among the feed grain producers in Europe, fearing that future inflow of cheap Ukrainian feed grains

22 According to data from the Food Balance Sheets of FAOSTAT

23 FAO Food Outlook, various issues.

24 OECD (2012) Competitiveness and private sector development: Ukraine 2012.

25 Source: Eurostat COMEXT

Table 6. EU grain import tariffs, €/ton

	Bound tariff
Durum wheat	148
Wheat, high quality	95
Wheat, medium/low quality	95
Barley	93
Rye	93
Maize	94

Source: TARIC, the online customs tariff database of the EU's Directorate-General Taxation and Customs Union

Table 7. EU tariff rate quotas (TRQ) for grains, €/ton

	TRQ (tons)	Tariff (€/t)
Durum wheat	50 000	148
Quality wheat	30 000	0
Wheat, medium/low quality		
- for US	572 000	12
- for Canada	38 853	12
- for other countries	2 371 600	12
Barley	306 215	16
Malting Barley	50 000	8
Maize	242 074	0

Source: TARIC, the online customs tariff database of the EU's Directorate-General Taxation and Customs Union

would depress domestic EU-prices. The EU operated at the time a variable levy system and had no specific instruments in hand to control such a surge of imports.

Yet, preparations to adjust the import regime and make it compatible with WTO rules were already well underway and in 2003 the EU had established a new import regime for grains that prevails to date, with import protection through tariffs up to a maximum ad valorem level notified at WTO (see Table 6). This tariff may be combined with a system of tariff rate quotas (TRQ), whereby consignments of imports up to the quota level can be imported at a lower, possibly zero, tariff rate (see Table 7). These consignments may be allocated to specific countries or on a first-come first-serve basis.

Table 6 shows that import tariffs raised by the EU are currently rather high, about half of the import price. Yet, the EU can lower or suspend these bound rates, for example when domestic prices are high and stock levels are low. It has done so in the past for durum and high quality wheat, and

for the tariffs of the TRQ of low quality wheat. But typically, rates for low quality wheat for shipments in excess of the quotas are being maintained, providing import protection for European feed grain producers.

Ukraine can thus profit from low-duty access to the EU, but only as far as it can secure a TRQ, and for this it has to compete with other exporting countries on a first-come first-serve base, except for Canada and the US that possess TRQs of their own. For most of the years after 2002, Ukraine's exports to the EU have hardly surpassed the mark of 1 mln tons, presumably because it could not get hold of more TRQ access.

Clearly, duty free access of all types of Ukrainian grain would be very favorable for Ukrainian traders and to farmers who have access to this trading channel and receive market prices. Hence one of the central questions to be settled in the upcoming Free Trade Arrangement between the EU and Ukraine is whether the EU will award duty free access, or a country specific TRQ to Ukraine.

7. Social issues in rural areas

In Soviet times the collective and state farms operated both as companies and as communal public services. They offered assured employment to the rural population in crop and livestock production. They were engaged in numerous support activities such as transport, construction, repair of housing and equipment as well as in agricultural processing and other industrial production. They supplied a wide range of social services including kindergartens, health care facilities, and entertainment, and provided financial and other support to the state-run communal facilities.

The abrupt ending of all this at the beginning of the first stage of transition (1990-1999), obviously weighed heavily on rural areas. Most critical was the loss of guaranteed employment that started a wave of labor migration to the cities, worsening the demographic situation, and led to loss of morale and motivation in rural communities. Supply of social services dropped dramatically also due to lack of purchasing power.

Since 2000, the dismantling and associated exodus from the countryside have slowed down, but little recovery can be noticed, and the newly formed corporate farms were released from any duty in the social sphere, as a presidential decree “On some measures of improvement of non-State agricultural enterprises’ economic activity conditions” (2000)²⁶ entrusted local government with the task of providing social, cultural, entertaining and servicing facilities, formerly residing with collective and state farms, while some facilities were privatized.

Lack of financial resources prevented local government from properly conducting these tasks and many social facilities were closed eventually, whereas privately owned facilities

adopted a commercial orientation with higher service charges that took them out of reach of common rural people.

Several attempts were made at state level to halt the ongoing degradation of living conditions in rural areas. Presidential decrees approved “Main actions for development of the social sphere in rural regions” (2000) and a short-term “State program of rural regions’ social sphere development for the period to 2005” (2002). Yet, the implementation of these decrees was deficient, as insufficient funds were made available.

In practice, much of the declared “support of rural areas” amounted to promotion of a commercially profitable mode of agricultural production. The “Governmental Program on the development of the Ukrainian village for the period up to 2015” that was approved in 2007 is a case in point.²⁷ Despite its name most of the program focuses on raising agricultural production and only a small part relates to improving the rural population’s access to public goods. The program also failed to address the central issue of unemployment and lack of economic diversification in rural regions, and it was not properly financed, and the 2008 financial crisis caused all funding of rural development projects within this program to be stopped altogether.

Employment in agriculture

According to the State Statistics Service, Ukraine’s labor force counts 22 mln people by 2010, which amounts to a participation rate of 48%, which is lower than in Russia (53%), Kazakhstan (52%) and Czech Republic (51%). Rural labor force has declined following outmigration, ageing, and

Table 8. Structure of agricultural labor force in 2009, 1000 people.

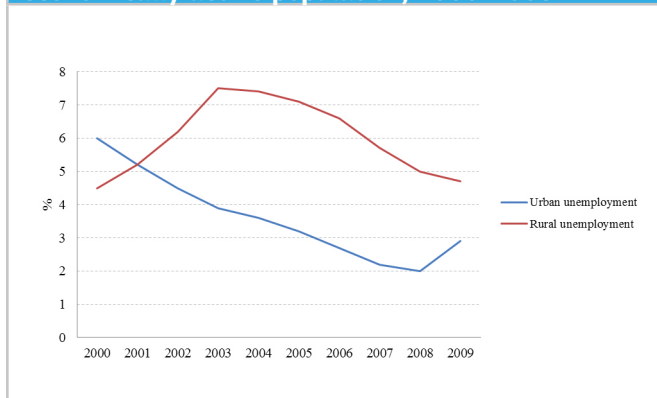
Indicator	Individual farms		
	Corporate farms	Peasant farms	Household plots
Number of people employed in agriculture, hunting, forestry, fishing, and fish farming	868.0	102.8	2 181.4

Source: Calculations based on household survey data from the State Statistics Service of Ukraine.

Note: Employed in agriculture are all those persons who could report during the survey period at least one hour per week employment in their own household with the aim to produce or sell agricultural products.

26 Available at: <http://zakon2.rada.gov.ua/laws/show/398/2000>.

27 Available at: <http://zakon1.rada.gov.ua/laws/show/1158-2007-n>

Figure 12. Registered unemployment rates of the economically active population, 2000-2009


Source: State Statistics Service of Ukraine

low fertility in rural areas, and by 2010, 3.5 mln workers, equivalent to 16% of the labor force were employed in agriculture (see Figure 3). Survey information processed within the present project confirms this, see Table 8.

Hence about 3.1 mln people are considered employed under this broad definition as compared to the agricultural labor force of 3.5 mln. This very crude estimate is provided here only to indicate that the officially registered unemployment (see Figure 12) of less than 5% is presumably too low.

Moreover, the activities are likely to be quite simple, due to lack of better opportunities rather than to lack of skills.

Income composition

Table 9 presents the composition of rural income based on socio-economic household surveys. It appears that since 2000, farming households (FH) have been able to recuperate paid employment, and become less subsistence oriented. The value of sales and own consumption of agricultural production has dropped from 50% in 2000 to 24 % in 2010, also because of increased dependence on social transfers.

In terms of the percentage of population below the national poverty line, poverty has dropped significantly since 2000, from 85% to 28% in 2010. The World Bank usually bases its poverty estimates on \$1.25 or \$2 a day criteria, which is a much lower threshold than the national subsistence level (\$4.4 or € 3.43 per day in 2012). Using these criteria for a lower middle-income county such as Ukraine, the poverty count is insignificant and less than 0.2% of the population.

Non-monetary aspects of poverty: housing and social services in decline

Several qualitative aspects of poverty are not well accounted for by surveys that measure income in cash and in kind. We mention a few.

Table 9. Composition of rural income (average per household per month, UAH)

Indicators	2000	2005	2010	Increase 2000-2010 (in %)	
				at current prices	adjusted for consumer price index*
Total income	435.8	1 210.8	3 086.8	708.2	246.7
cash income	274.3	993.9	2 607.3	950.4	331.1
including:					
- salary	85.4	342.2	1 011.9	1 184.6	412.7
- revenue from output sales	61.5	171.3	343.5	558.3	194.5
- pensions	60.7	313.9	782.7	1 289.9	449.4
- social assistance	4.3	30.4	109.2	2 544.5	886.6
income in kind	161.5	216.9	479.5	296.9	103.4
including:					
- value of own products consumed by FHs	160.0	186.7	406.9	254.3	88.6
% of population with average per capita consumption per month less than poverty line**	85.2	54.1	28.6	x	x
% expenditures spent on food	71.5	62.1	56.1	x	x

Source: Calculations based on HERd (2000, 2005, 2010), the Household Expenditures and Resources data of the SSSU (State Statistics Service of Ukraine).

Notes: *Consumer price index of 2010 as to 2000: 287. **Since 2007 the poverty line is based on per capita income and it is adjusted regularly for inflation; to 701 UAH/month in 2009, to 1044 UAH/month (that is 103 €/month) in July 2012.

Housing conditions. During the transition, the housing conditions in rural areas have deteriorated significantly, due to lack of maintenance and obsolescence of buildings as well as of water supply systems and sewage networks. Roads and transport infrastructure were equally degraded.

Following the overall trend of dismantling in rural areas, construction of new housing sharply dropped in the 1990s, to one-third of the 1990-level by 2001. Construction picked up after this until the crisis of 2009. Even the highest level reached in 2008 was 20% below that of 1990 and 20% less per 1000 inhabitants than the level in urban areas.

Because of the exodus from rural areas, numerous houses stay vacant especially in distant villages. Moreover, the rural population has limited access to credit for building or buying well equipped houses. At the same time, lack of employment opportunities and unsatisfactory conditions for independent farming provide little incentive to the young and middle aged for envisaging a future in these villages.

Most construction in rural areas is currently undertaken by commercial developers around big cities and in recreational zones. There is one assistance program of house construction for rural people through long term preferential credits (at 3% interest rate) but only 6-7% of the new houses are built under this program, because access to it is very limited and far from transparent.

Water and sanitation are generally underdeveloped: 22% of villages have a water supply system and only 2.6% villages have a sewage system.

On the positive side, the number of villages with access to gas increased. This is an example of successful cooperation between rural communities, government authorities and the private sector. With state funds and sponsors' assistance, inter-village pipelines were built, while villagers paid for the network and connections within the settlements. The results proved impressive: the number of villages with gas connection rose by a factor of 5.5 since 1990, currently reaching 47% of villages.²⁸

Access to social, cultural and entertainment services. For the reasons mentioned earlier (collective and state farms no longer in charge; households lacking purchasing power; no funds allocated by government) the transition witnessed a major decline in access to social, cultural and entertainment services. The closing of schools was slow initially but accelerated after 2000, at a rate of 4% in the period 2001-2005 and by 5.6% in 2006-2009, partly in response to the drop in numbers of school-age children in

rural area. A "school bus" program was initiated to alleviate the consequences but it remains insufficient and chronically underfinanced: in 2010 only 112 school buses were procured instead of the planned 496.²⁹

A reform of the healthcare system was also decided, with the announced intent of improving service quality by modernization of healthcare centers, and improvement of the ambulance networks. However, in practice this often amounts to accelerated closing of village's nurse-midwife stations and of district hospitals while the proposed modernization is actually being postponed.

In response to these deficiencies in the public sector, large corporate farms have recently taken up the provision of social services, in the footsteps of their predecessors, the collective and state farms. While this keeps some areas livable that would be deprived of all services otherwise, it also is being criticized for revamping old paternalist structures in rural communities and for tying communities to corporate structures' interests with all ensuing clientelism in the political sphere.

The distribution of poverty

Table 9 pointed to the important rise in pensions and social assistance during the period 2000-2010. These transfers were not distributed evenly across the rural population, and resulted in rising income inequalities.

Figure 13 shows that over 50% of young and middle-aged families with children³⁰ are classified as "very poor" (income below poverty line or subsistence level, see the notes to Table 9), whereas only 0.1% of retired people belong to the "very poor" category. This suggests that current policy measures such as financial assistance to families with children are ineffective or insufficient.

The quantitative and qualitative analysis of the rural sector in Ukraine, performed by IEF-NASU in this project, has identified two policy options that appear to be promising in addressing some of the social issues in rural areas. The first is an increase in the area cultivated by small rural households, and the second improved governance of land rental markets.

Policy option 1: Increasing area cultivated by small rural households

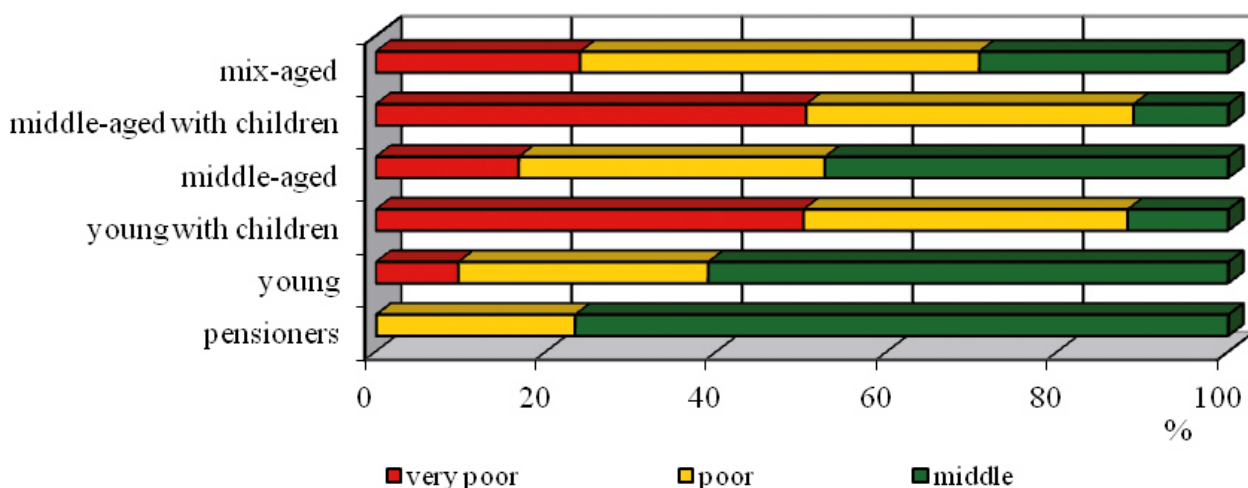
It would seem that addressing poverty among young and middle-aged families with children, should not be too difficult since these groups are still of working age and can

28 Source: Calculated on the base of dataset "1-Selo" (Survey of rural settlements).

29 Source: Calculated on the base of dataset «1-Selo» (Survey of rural settlements).

30 Pensioners – all members are retired; young – household head is younger than 35 years old, without children and retired members; young with children; middle-aged – household head is between 36 and 60 years old, without children and retired members; middle-aged with children; mix-aged households – all others are not included in the above mentioned groups.

Figure 13. Social description of poverty in rural Ukraine



Source: authors calculations by GRCP, based on HERd (2009) of SSSU.³¹

Table 10. Sales revenue increase depending on increasing area of land in use*, UAH per farm household per year

Household social categories	Land in use		
	0.26-0.55 ha	0.56-1.99 ha	2 ha and more
Pensioners	715	2 063	5 565
Young	1 445	-	-
Young with children	2 628	5 190	3 985
Middle-aged	1 217	3 667	12 685
Middle-aged with children	1 774	4 290	15 674
Mix-aged	1 660	3 014	5 420
Rural Ukraine	1 232	2 930	9 795

Source: Calculations based on HERd (2009), SSSU

* compared to households with land area less than 0.25 ha (non-treatment class)

contribute to the rural economy. A natural option would be to increase the size of their land holdings.

A statistical analysis was conducted to estimate the probable impact of such an intervention (for a brief description of the methodology, see Annex 1). It appears that the impact on revenue from sales would be significant.

As shown in Table 10, an improvement in annual sales revenue (SR) of 1 232 UAH per household would result from an increase in cultivated land from 0-0.25 ha to 0.26-0.55 ha per household. Larger increases (up to 0.56-1.99 ha, and over 2 ha) would result in an increase of sales revenues by 2 930 UAH and 9 795 UAH, respectively, where we recall that a poverty line of UAH 701/month per capita was applied in early 2009.

Crossing poverty status and land size (Table 11) demonstrates that the share of households without land or with less than 0.25 ha is relatively large among the young farm households with children, compared to average. These groups would, therefore, seem natural targets for land redistribution programs.

While the relatively small land size for young families with children can be explained to a certain extent by their low willingness to engage in farming activities, there also is a maximum level of 2 ha that farm households can cultivate, as set in 2003 under a law "About private rural households". Most importantly, the land they would receive has to be released either from state land reserves that are modest, and unevenly spread, or from corporate farms and from other households. Both would need appropriate incentives for this.

31 The HERd survey of 2009 has a sample size of 10 459 households, including 3 382 rural.

Table 11. Farm household distribution according to the land in use area, %

Household social categories	Categories according to the income level	Land in use				
		no land	≤ 0.25 ha	0.26-0.55 ha	0.56-1.99 ha	2 ha≤
Young families with children	very poor	4.7	35.5	36.5	18.7	4.6
	poor	4.9	21.0	39.5	25.9	8.6
	middle	-	40.0	36.0	20.0	4.0
Middle-aged families with children	very poor	1.2	29.3	34.7	31.3	3.5
	poor	1.0	24.9	32.5	32.0	9.6
	middle	2.0	22.8	28.0	29.7	17.5
Rural Ukraine		2.0	27.0	33.0	33.0	5.0

Source: calculations using GRCP package based on data of HERd (2009), SSSU

Policy option 2: Improved governance of land rental markets

Agricultural land leasing in Ukraine: basics

As discussed in Section 5 above, under the Moratorium on Land, all transactions in land formerly owned by state and collective farms take the form of lease, and no land in agricultural use shall be converted to any other use, specified categories of public use excepted. At present, most of the land is cultivated by farm households, and by corporate and peasant farms that lease land from others for their operations. In 2000, 22.4 million ha was leased or almost 83% of cultivated land in Ukraine.³²

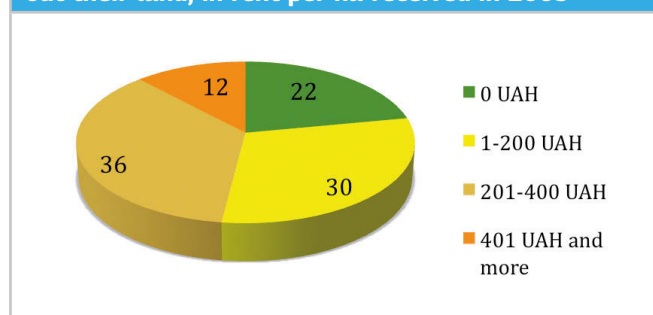
The zoning restriction prohibiting non-agricultural use limits the market value. Another important limitation is that there is no effective price disclosure regarding the rent paid.

The rent paid is agreed upon individually between lessor and lessee. Usually, the minimal lease payment is calculated as percentage of the nominal land valuation (NLV), as “recommended” by presidential decrees, currently a minimum of 3% of NLV.³³

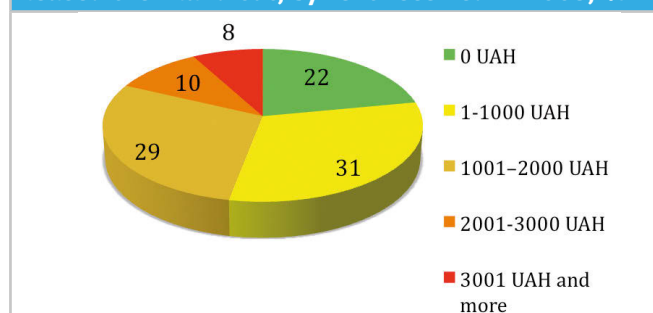
From the Household dataset 2009 it can be inferred that the majority of the households who lease out their land receive no more than 400 UAH per hectare (30% in the 1-200 bracket and 36% in the 200-400 bracket) (see Figure 14A). Remarkably, as much as 22% of households receive nothing at all, since lessors often delay payments or do not pay at all.

³² See APHD (Agricultural Policy for Human Development Project), “Agricultural Policy in Ukraine in 2001: Review and Outlook. V. Artiushin, I. Chapko et al., Policy Analysis Unit, Government of Ukraine.

³³ NLV levels are used for leasing rates for state and municipal agriculture lands, and define the minimal lease rates for private-owned land shares and for some other purposes. The 2011 levels were 11 949 UAH for arable land, 44 566 UAH for perennial crops, 5 893 UAH for hayfields, 3 581 UAH for pastures.

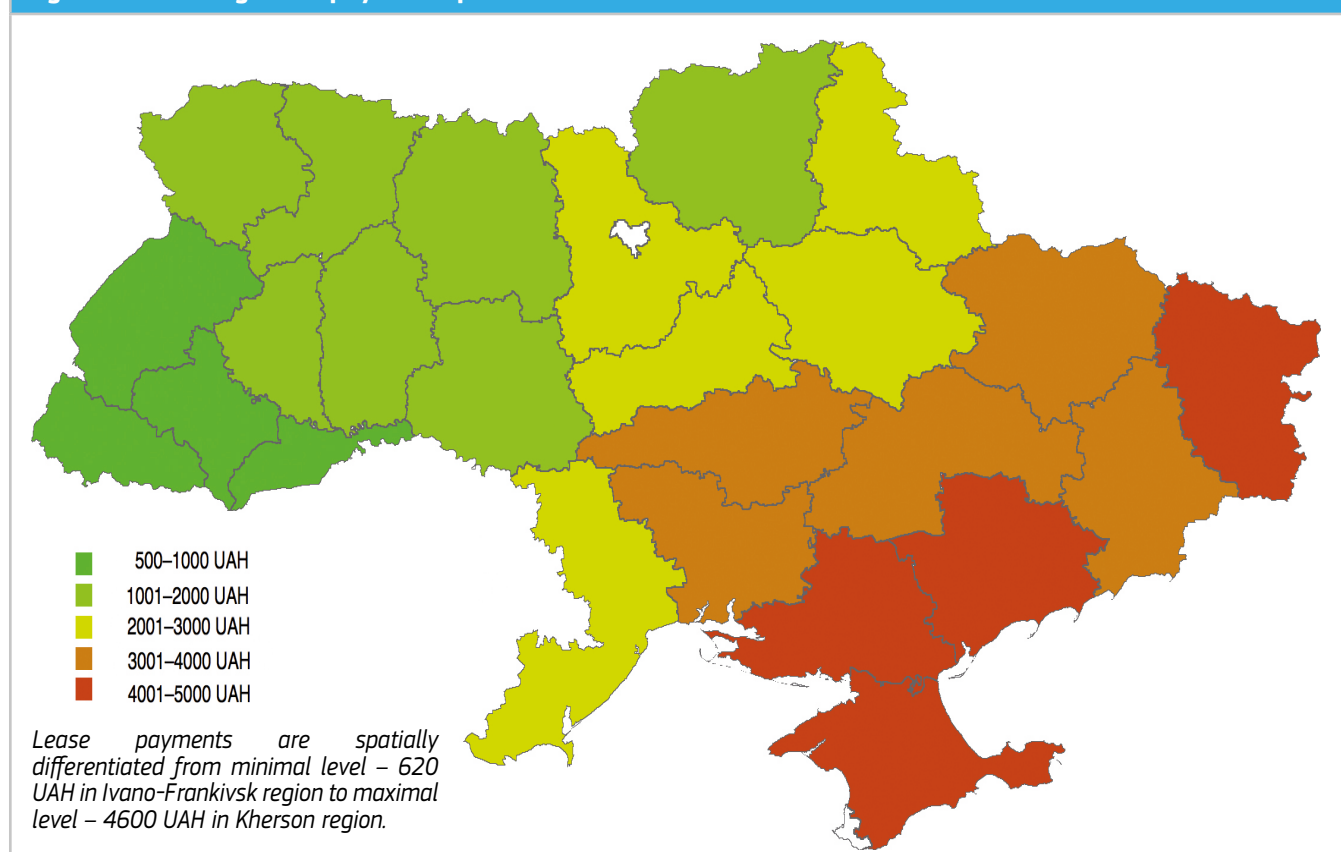
Figure 14A. Distribution of households, which leased out their land, in rent per ha received in 2009


Source: HERd (2009), SSSU, using GRCP computations

Figure 14B. Distribution of households, which leased their land out, by rent received in 2009, %


Source: HERd (2009), SSSU, using GRCP computations

From the same dataset it also appears that 31% receive no more than 2 000 UAH in income and 29% between 2 000 and 3 000 UAH as income supplement (see Figure 14B), implying that most households presumably lease out less than 10 ha. Indeed, the income shares from land rent prove to be modest: lease payments make up for less than 5% of total income for about 62% households and for only 5% lease payments are more than 15% in their total income.

Figure 15. Average rent payments per land share in 2012

Data: Regional (Oblast) aggregates, provided by the State Statistics Service of Ukraine and State Agency of Land Resources.

Current regulations suffer from the major limitation that the minimal lease rate of 3% NLV has the status of recommendation only. Furthermore, the NLV needs to be set in accordance with market value. Finally, even agreed rates are often not paid, without consequences for the lessee. Originally, there was a general sense that the rent was too low, but that a rise would occur soon, partly because a moratorium was imposed on land sales, now scheduled to be lifted by the end of 2012 (but the date was postponed earlier). This prevented active selling of land shares after introduction of the land rent market.

For a differentiated picture of the land lease market in Ukraine, a spatially explicit analysis has been conducted, which shows the geographical distribution (at regional level) of major indicators.

Increase the Normative Land Valuation (NLV)

The Government of Ukraine recently made attempts to increase NLV, multiplying them by a factor 1.76 as of 2012.³⁴ Recently, a new methodology was developed by the State Agency for Land Resources. Figure 15 shows the implications, assuming that all rents are paid at 3% of new NLV levels.

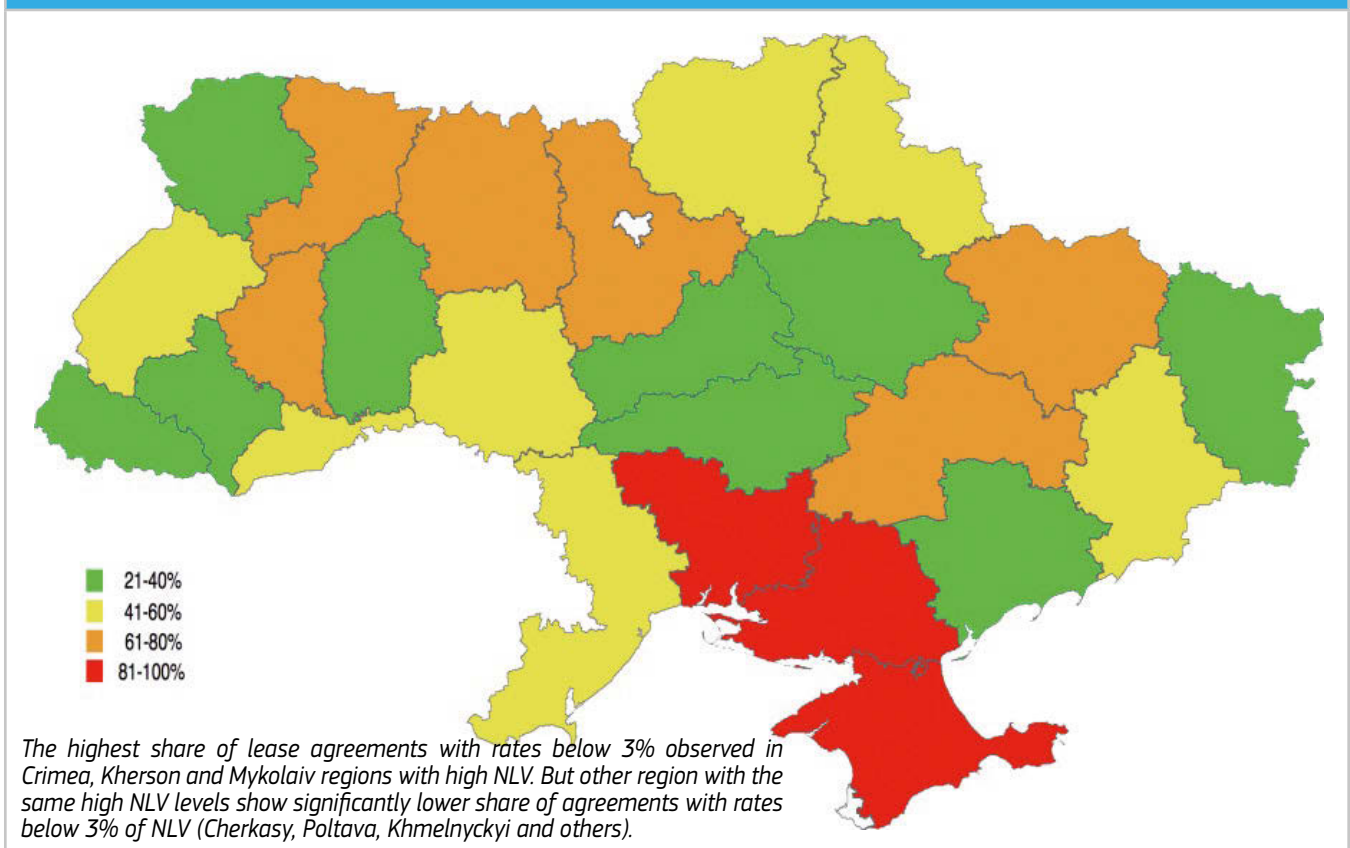
Such a change would obviously put a burden on lessees. According to the statistics many corporate farms except those engaged in production of wheat, sunflower, corn, rapeseed for exports would not be able to pay the consequent sums. However, it is common knowledge that corporate farms have a tendency to underreport their earnings so as to minimize taxation and receive subsidies from government.

Lessors abide by established minimum rental rate

Out of the 4.6 million land lease agreements signed in 2011, almost 39% of stated lease rates are below 3% of the NLV, including 5% of the agreements with a lease payment of 1.5% of the normative land valuation. Figure 16 shows the spatial differentiation of lease agreements by lease rates below 3% of NLV.

Figure 17 shows the increase in lease payments in the different regions of Ukraine if the lessees were actually paying the minimal lease rate of 3% of NLV. This suggests that the land rental market functions poorly, and explains that land rents are low. A remedy to this would mobilize significant revenues for vulnerable households in rural areas. It would also free public resources currently spent on income transfers for more productive purposes. Since government

34 Source: <<http://zakon2.rada.gov.ua/laws/show/1185-2011-n>>.

Figure 16. Share of rental rates below 3% of NLV (2011)

Data: Regional (Oblast) aggregates for NLV, provided by the State Agency of Land Resources.

itself is an important holder of land certificates, this would also directly contribute to the public revenue.

Health issues

A discussion of social conditions in rural areas of Ukraine cannot escape from mentioning HIV/AIDS. According to Unicef Statistics, Ukraine numbered 350 000 HIV-positive persons in 2009, which amounts to 1.1% percent of the adult population.

The illness was first identified in 1987, and could spread fast in the years thereafter, in particular after the breakup of the Soviet Union. The explosive growth was facilitated by the wide availability of drugs in Ukraine, since Ukraine has become a transit country for opium transport from the Middle East to Europe. Ukraine is even known to grow opium

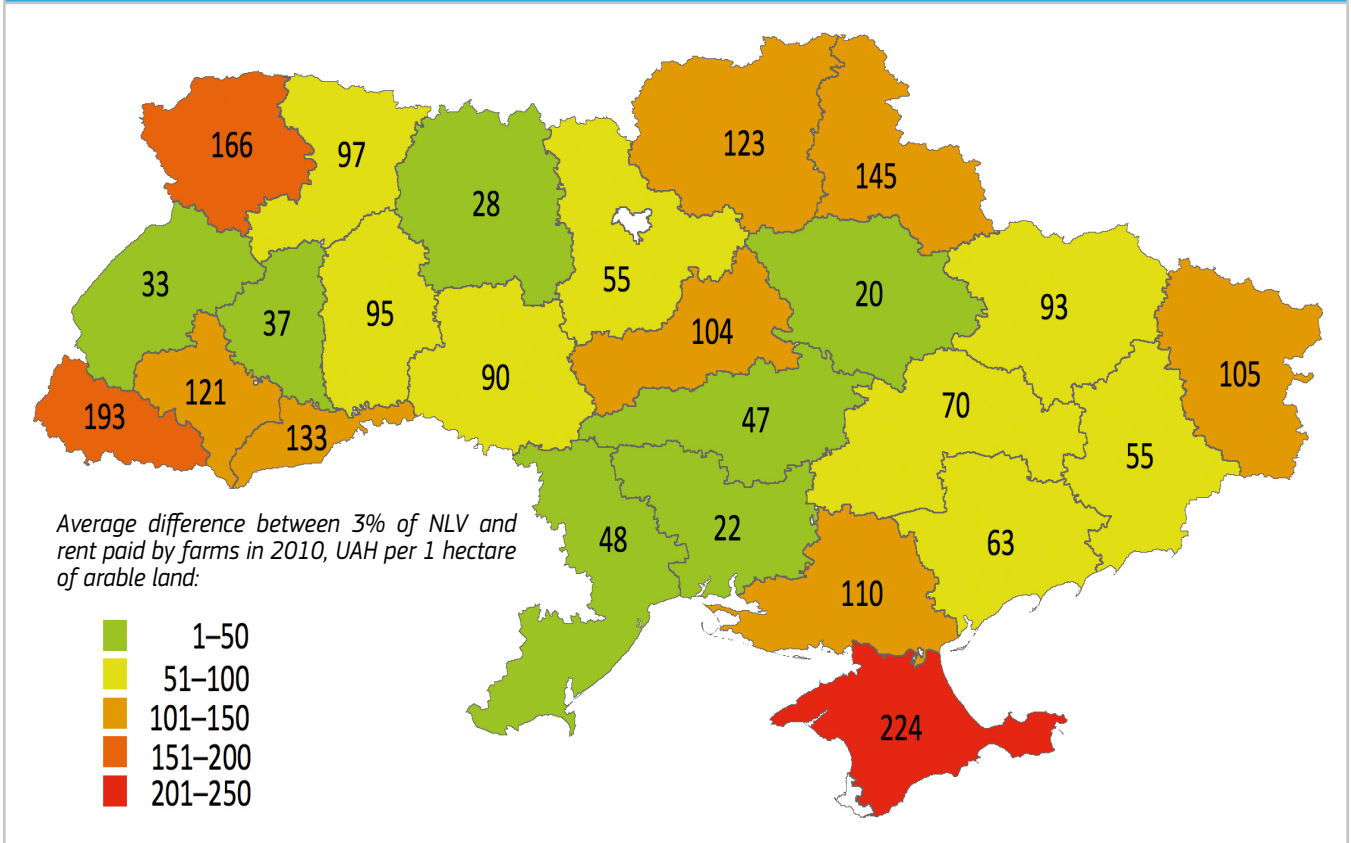
of its own. It has a strong chemical industry, and oversight over the pharmaceutical industry in terms of selling drugs without prescription is inadequate.

Initially the disease was mainly transmitted via infected syringes, but now also via sexual contacts, violence in prisons, and infection at birth. In fact, half of the HIV-infected persons are now women at child-bearing age.

In 2001, the government launched a national plan for combating HIV/AIDS, mainly for treatment of patients. However, it is still hard to reach marginalized groups. Prevention activities are largely funded by international organizations. These seem to pay off, as most recent data suggest that even though prevalence remains high, the number of patients no longer is on the rise.³⁵

³⁵ For the most recent updates, see the Millennium Development Goals, at <http://mdgs.un.org/unsd/mdg>.

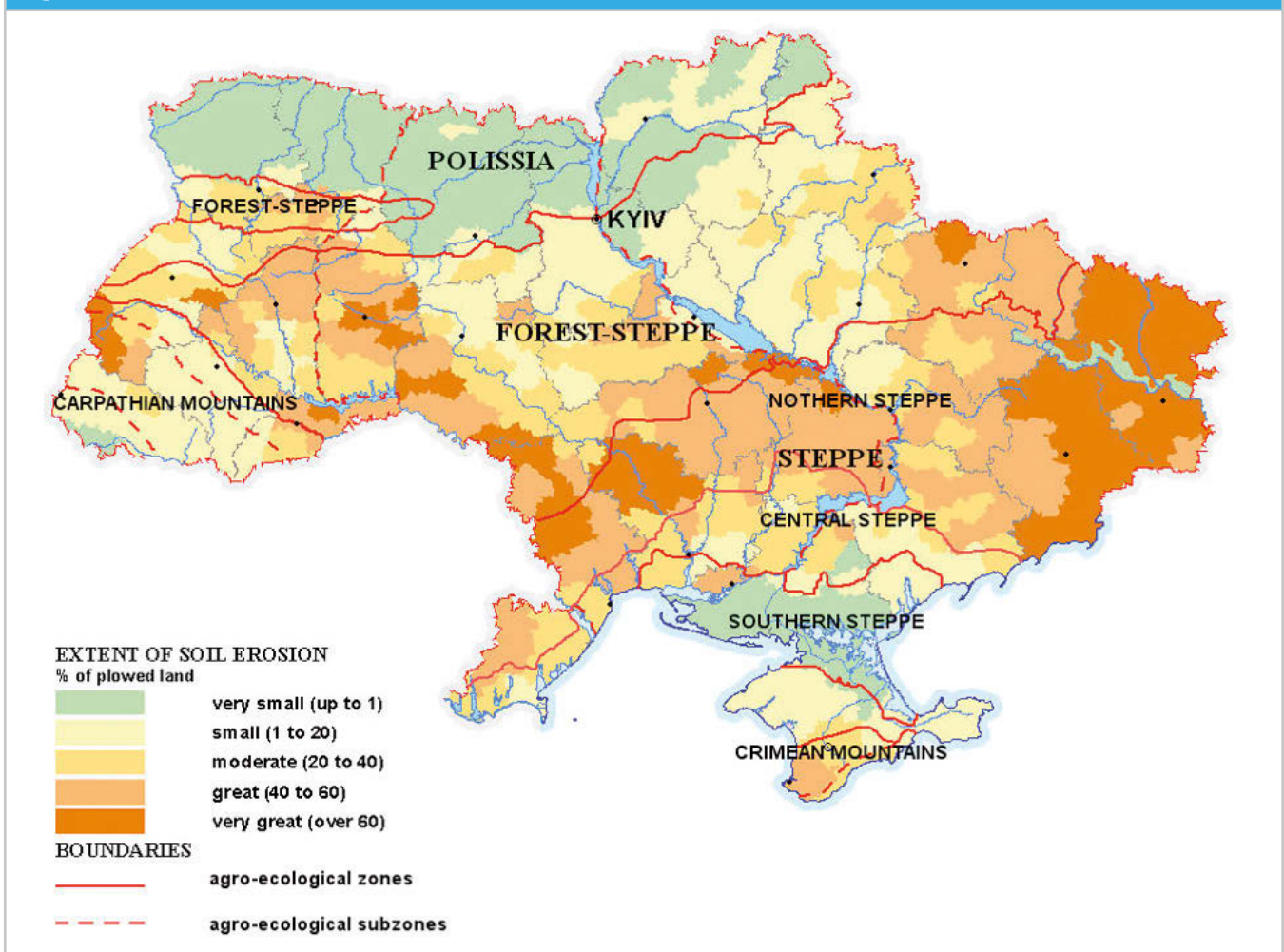
Figure 17. Increase in lease payments per hectare in 2010, when the minimum rate of 3% of NLV is paid



Data: Agricultural Enterprises Survey (SSSU) and Regional (Oblast) aggregates for NLV, provided by the State Agency of Land Resources .

8. Environmental issues in agriculture

Figure 18. Extent of Soil erosion in Ukraine



Source: Atlas of Ukraine, 2000, Institute for Geography NASU / Intelligence Systems GEO.

After the Chernobyl accident, large areas of Ukraine, Belarus and Russia were contaminated by radiation, resulting in the evacuation and resettlement of over 300 thousand people. Due to unsafe levels of radiation, about 180 000 ha of arable land were removed from agricultural use.³⁶

Soil erosion

Soil degradation linked to the exploitation of land resources is a widespread problem influencing land productivity in Ukraine (Figure 18). According to the National Report on Environment, soil erosion affected 57% of the arable land,

³⁶ Mishchenko, N. and K. Gumeniuk (2006) Agro-ecological assessment for the transition of the agricultural sector in Ukraine, IIASA Report IR-06-052, IIASA, Austria.

of which some 32% by wind erosion, 22% by water erosion, and 3% by a combination of both. The loss of organic matter in soils, due to the excessive removal of crop residues from the fields, is in the range of 0.6-1.0 ton per ha annually.³⁷

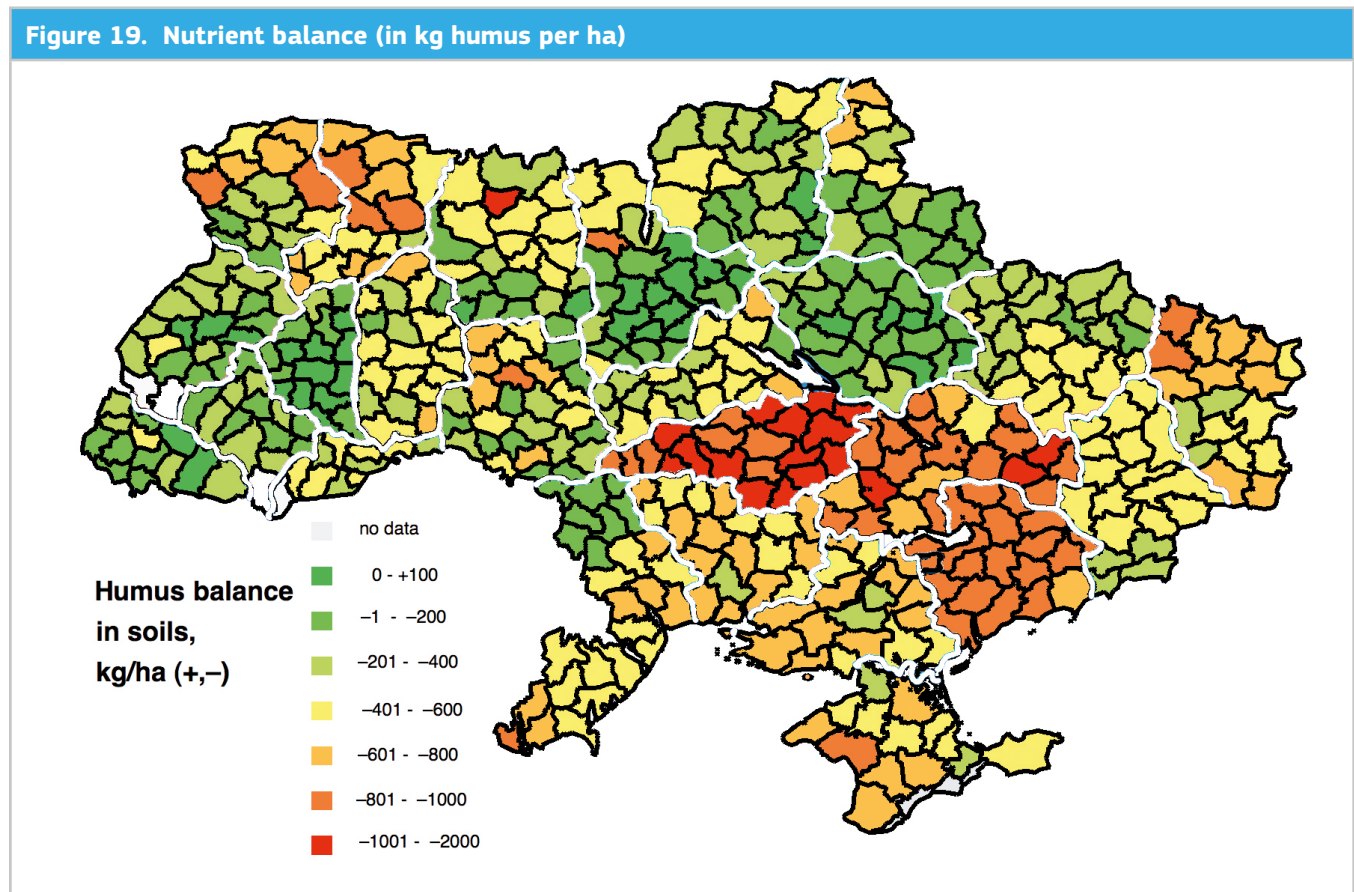
Compaction of the topsoil is a major cause of soil degradation, resulting from inappropriate tilling practices. Compacted soils suffer from deteriorated soil structure as well as from reduced water holding capacity, which lowers infiltration capacity and increases run-off and loss of mineral fertilizers. Furthermore, inadequate replenishment of plant nutrients, particularly the mining of P and K (cf. Table 4 above) under uninterrupted cultivation has impoverished the soils.

Lack of crop rotation is another explanatory factor. Repeated alternation between wheat and sunflowers causes quick mineralization of organic elements and restrains humification. This soil depletion is only to a limited extent compensated by fertilizer and manure from livestock, in some scattered areas

in the western and central parts of the country, see Figure 19, in particular the dark green areas.

Activities on land conservation have speeded up lately, especially in soil chalking, plastering and building soil-saving constructions. At the same time efforts towards protection of banks have increased, which illustrates the importance to deal with flooding and water logging in Ukraine, but other soil conservations measures are still below the level of the 1990s (Table 12).

Forests can provide shelter against soil erosion and dust storms and their role in a flat country like Ukraine is critical. Up to 100 forest shelterbelts were created recently, but it does not meet actual needs. Most of the shelterbelts are in poor condition, since they are thinned due to ageing, storms, deforestation and fires.



Source: County-level data provided by the State Center on Soil Fertility Protection.

37 Medvedev, V. and M. Lisovyy, eds.(2001) State of soils fertility in Ukraine and forecast of its changes under conditions of present-day farming. Shtrih Press, Kharkiv, Ukraine.

Table 12. Land conservation activities in Ukraine, 1990–2010

Characteristic	1990	2000	2005	2010
Application of chalking, 1000 ha	1 407.9	23.9	41.7	73.2
Chalky flour and other chalky materials applied, 1000 tons	6 930.7	169.7	243.1	340.8
Application of gypsum, 1000 ha	285.4	5.1	2.7	4.4
Gypsum and other gypsum-containing materials, 1000 tons	1 275.9	27.0	12.1	23.4
Building soil-saving constructions: swells, drains, km	135.2	9.3	3.6	4.1
terrace embankments, km	5.4	10.9	6.6	0.0
outfall regulators, units	51	18	2	12
bank stabilization, km	1.0	4.7	3.9	4.3
Grassland renovation of degraded and polluted arable land, ha	12 785	14 974	6 342	1 015

Source: State Statistics Service of Ukraine

Salinization

Irrigation may lead to water-logging and evaporation directly from the water surfaces. Consequently, a residue of relatively mineralized water is left in the soil, which may drain to the surface water system or may reach an aquifer and contribute to increased salinity of groundwater. In addition to this process, pollutants may enter the groundwater system. Typical examples are road salt (applied in winter), fertilizers, domestic, industrial and agricultural effluents. The coastal areas of Ukraine, which are mostly dry and where irrigation takes place, suffer from such salinization.

The International Groundwater Resources Assessment Centre (IGRAC)³⁸ made in 2009 a world-wide inventory of saline groundwater occurrence, and identified extensive bodies of brackish and saline groundwater along the Northern shores of the Black Sea. Rehabilitation of irrigation systems or returning lands to nature or perennials, and forestry are strategies to counter these processes. For example, in a USAID-funded project on sustainable development of Ukraine in 2001, the suggestion has been made to re-naturalize about 20% or 10 million ha of arable land, partly for afforestation and partly for use as grassland and pasture.³⁹

Biodiversity

The International Union for the Conservation of Nature (IUCN) has listed Ukraine among the countries with high biological diversity level, and classified 11 of the nation's 15 nature reserves as Category 1a reserves, the highest category of protection. Ukrainian lands in the Carpathians and Danube delta are recognized as "hot spots" for conserving biological diversity. There are also other protected landscapes, such as national parks and biosphere reserves. Ukraine harbours flyways for migratory birds, the last virgin steppes in Europe, and shares with Romania the second largest wetlands of Europe. Ukraine itself adopted legislation for the preservation and maintenance of its protected areas, under supervision by the newly created Ministry of Ecology and Natural Resources.

Nonetheless, both national and international sources provide evidence of a decline in biodiversity over past decades.⁴⁰

38 Van Weert, F, J. van der Gun and J. Reckman (2009) Global Overview of Saline Groundwater Occurrence and Genesis, Int. Groundwater Resources Assessment Centre, http://www.un-igrac.org/dynamics/modules/SFIL0100/view.php?fil_id=135

39 Bogovin, A.V. (2006) "Country Pasture/Forage Resource Profiles: Ukraine." FAO, Rome.

40 See http://www.ulrmc.org.ua/services/binu/prmaterials/Biodiversity_Agriculture.pdf by the Ukrainian Land and Resource Management Research Centre (ULMRC) and USAID (2007) 'Ukraine. Biodiversity analysis', US Agency for International Development, Washington DC, prepared by DevTech Systems.

*Pesticides and their leakage into groundwater*⁴¹

Besides erosion and salinization, which are essentially due to the agro-ecological circumstances, Ukraine's agriculture also has a particular environmental vulnerability that is a legacy from its past. In the heydays of central planning, Ukraine used to produce and apply high quantities of pesticides and chemical fertilizers. Intensity of pesticide use culminated in 1986-1987 when vast quantities of highly toxic and persistent organochlorines, were spread on the lands to a level of up to 3-4 kg/ha. In those days, lack of protective clothing and labels, and absence of safety information or training, were common practices.

Since the late 1990s, pesticide production and use have dropped significantly. Since pesticides have improved and are now active at considerably lower concentrations, and since many farmers cannot afford purchase of pesticides at previous levels, application intensity has now come into the range of 0.7-1 kg/ha. Toxic residues have generally decreased in soil and food, with a reduction in the frequency of detection of organochlorines in soil of 71% and in crops of 83% since the peak period of chemical application.

However, these old and obsolete pesticides have not disappeared by this and their persistent stockpiles, estimated to exceed 13 520 tons, constitute one of the major environmental problems in the country. Most accumulated in the 1970s outdoors, in temporary storage, or in containers that are by now broken and silently leaking into ground water, generally without any monitoring or surveillance.

This pesticide problem has been noticed quite soon after the break up of the Soviet Union, as it became manifest in most of the former Soviet republics, and was topic of discussion at the Stockholm Convention on Persistent Organic Pollutants, which resulted in various initiatives to clean up these stocks. Most recently, in 2012, the FAO and the EU have launched, under the EU's Neighborhood Policy, a partnership to assist countries in reducing the risks of contamination from pesticide stocks.

Genetically Modified Organisms (GMOs)

Of course, the debate about GMO is still open. Most GMO-crops in the US that have a (possibly specific) resistance built in against predators such as insects appear to use less pesticides, while there is also a modest increase of yields (not more than 5%).⁴² In developing countries, in particular in those where chemicals are not widely used, the yield effect

appears to be larger (up to 30%).⁴³ Another advantage may be to add a second crop in a multiple cropping system, such as done in Argentina with soybeans.

Some GMOs have been developed to increase tolerance against weeds. This is mainly intended as a labor and herbicide cost saving measure, since it makes it possible to apply an all-purpose herbicide at significance dosages without hurting the GMO-crop. As was extensively pointed by GMO-opponents, the downside of this is obviously that it promotes indiscriminate use of herbicides, which could be particularly damaging to Ukraine's biodiversity in rural areas that are already plagued as it is by excessive pesticide use and leakage.

Whatever the objective merits and drawbacks of GMOs, Ukraine is a major agricultural exporter and has to account for concerns among its customers, the EU in particular, and to supply them with GMO-free products if they ask for it. To meet WTO regulations, Ukraine aspires to establish a regulatory and monitoring framework for approval and testing of GMO products. In the absence of such a framework, current practice appears to be that half of soybean production is Round-up ready, while other crops such as corn and sugar beet are partly GMO-based. Overall about 5% of production is, according to USDA not free from GMO.⁴⁴

To control this process, government has issued legislative proposals that envisage mandatory GMO labeling for food products and started with the creation of certified laboratories for GMO-testing. This should ease exports to GMO free zones such as the EU, but at a cost, since it calls for splitting marketing channels into GMO- and GMO-free crops, with adequate testing protocols. Segregation would actually not be too difficult at present, because trade is currently in the hands of large conglomerates that would have the means and power to effectuate the necessary measures via their own channels say, to the EU (for GMO free crops) and the Middle East (for the remainder).

Nutrient recycling

Ukraine will need significant volumes of plant nutrients to improve its crop yields. Nitrogen supply is solely limited by availability of energy. Whether Ukraine should import it or produce it by itself on the basis of its own resources is purely a matter of comparative advantage. For the other two macro-nutrients phosphorus P, and potash K, the situation is quite different though.⁴⁵ Both are essential for all life and have no conceivable substitutes. Phosphorus is only mined in

41 This section is based on Stefanovska T., and V. Pidlisnyuk (2002) Ukrainian struggle with pesticides. Women bear the brunt, Pesticides News, 2002: 57.

42 National Research Council (2010) Impact of Genetically Engineered Crops on Farm Sustainability in the United States. Committee on the Impact of Biotechnology on Farm-Level Economics and Sustainability. Washington, D.C.: The National Academies Press.

43 National Research Council (2010) op. cit.

44 See Ukraine: Agricultural Biotechnology Annual (2011, 2012) GAIN report, Foreign Agricultural Service, USDA, Washington DC.

45 Malingreau, J.P., H. Eva and A. Maggio (2012) NPK: will there be enough plant nutrients to feed a world of 9 billion in 2050? JRC Science and Policy Report 25327. Brussels, Joint Research Centre.

a major way in a few countries (primarily Morocco, China and US), and deposits are limited. For potash supply is abundant but the cost of development of new mines is particularly high. Both P and K originate from mineral deposits of mixed composition that are contaminated by toxic metals, uranium and cadmium in particular. Spreading vast quantities on Ukraine's land creates additional contamination, unless it is avoided by purification of fertilizers or by recycling of organic matter, which also prevents irrecoverable loss of P as it drips into rivers, and eventually to flush into the sea. These are important priorities for a country that seeks to realize its potential in a sustainable way.

The problem is particularly relevant for Ukraine because of its nutrient imbalances across the territory (Figure 19 above),

which mean that nutrients in animal feed are hardly returned to the land of origin, and because of the size of exports which currently attain 40% of production. If grain exports rise by 60 mln tons, as would be possible in the case mentioned earlier that grain yields rise to 7 tons/ha, the ratio increases to 70%. This loss of nutrients has to be compensated eventually, by imports of chemical fertilizer, which will become increasingly expensive, or of organic manure, and by domestic (organic) nutrient recycling. The organic pathway offers the advantage of avoiding recurrent infusion of contaminants.

Ukraine is not the only country facing this challenge. All major grains exporters see the ratio rising fast. Further concentration of agricultural production at high yielding locations will only accelerate this trend.

9. Main policy challenge: make dualized agriculture work

Overall, we conclude that rural development currently faces a major policy challenge that stems from a basic dilemma.

On the one hand the corporate farms, successors of the state and collective farms of the Soviet era enjoy the advantage of their large scale, particularly with respect to mechanized operations and to purchase of inputs and marketing of outputs in large quantities. Such large companies are best suited to supply exports, with their peers in the plains of Canada and the US as guiding examples.

On the other hand, the countryside is also inhabited by rural populations that need income and employment the large farms cannot provide them with. Moreover, high value agricultural products in livestock and horticulture need practices quite different from those traditionally applied on such farms, some of which are best conducted on family farms of limited size.

Indeed, all over the world, traditional family farms currently feel the pressure of global markets and technological advances forcefully pushing them towards large scale production. Social and environmental considerations in the policy sphere and society at large can only to a limited extent counter these trends. In many regions, fragmentation of parcels into ever tinier plots as a result of inheritance, seizure of collaterals by creditors, and development of housing and infrastructure can be observed. Land consolidation programs are being enacted to end this.

Similarly, many family farms in the EU currently suffer from an excessive debt burden, with high interest payments and mortgaged land. They find it very hard making venture capitalists invest in their enterprise.

At the same time Ukraine's corporate farm holdings have access to international capital markets offering large sums of risk bearing capital, while over the past twenty years social and political pressures have driven agriculture in the opposite direction of redistributing the land to small farmers, without giving them sufficient means to cultivate it. Is family farming or corporate farming the way to go? This is a political dilemma that needs to be addressed, primarily

by recognizing that dualisation is a reality that cannot and should not be reversed. The evidence presented in this report suggests that Ukraine has ample room for both. Its well educated population and rich resource base enable it to solve current problems as and where they emerge, without prioritizing exports over domestic needs or vice versa.

Dualized farming

More specifically, the historical account in Section 3 has indicated that in the early years of independence distribution of land of the previous state and collective farms turned rural households into passive shareholders: they received a share of land (and in some cases equipment) without knowing which parcel this share referred to, much like a shareholder in a company does not know and does not have to know which part of the buildings or equipment the share refers to. Yet, rural households do not have access to any mechanism for price disclosure of the rent on their shares, or any serious competition among its users, much unlike the traditional shareholder for equity that is traded on the stock exchange. In later years, these shares became truly linked to land, through a costly cadastral registration that currently covers almost all leased land. However, since the fields are very large with very few public tracks or roads crossing, there is no way in which an individual farmer can effectuate his/her right to independent cultivation, particularly since the rights of passage have not been established in any formal sense within them.

Casting all these features as shortcomings would be a serious mistake. As emphasized earlier, the Land Moratorium and the land distribution it maintained are a precious institutional arrangement that should not be reformed without adequate legislation to replace it, let alone be lifted overnight.

In areas of Ukraine where large scale cultivation of grains and oilseeds is efficient such a further partitioning with right of passage would seem inappropriate. Farms with multiple owners do not need their shareholders to know which parcel of land their property right refers to. Hence there is no need for cadasters and other registration of individual parcels, since they amount to making a spatially explicit property

title that does not need this. Consequently, investments into such registration will turn out to be a waste of effort and also of foreign exchange, to the extent they involve external assistance.⁴⁶

Corporate farms have to be modernized, and their mode of operation made to comply with social and environmental standards. Implementation of corporate taxes will be an intrinsic part of this modernization process as well. The proceeds can be used to finance various land development and rehabilitation programmes. All this might discourage some venture capitalists but demand prospects on world agricultural markets seem to be sufficient to guarantee that others will take their place, particularly if Ukraine succeeds in enhancing its access to EU markets.

Regarding individual farms, we have seen that household plots play a central role in domestic food supply and national food security. They also provide essential social safety nets to their owners and their relatives. In their absence the transition of the past twenty years would have been far more painful than it already was. With continued aging of the rural population and migration to cities, many of these plots will be vacated soon. If family farms succeed in acquiring them this will contribute to making the countryside more vibrant and attractive for the workers of the corporate farms and their families, and enable local government to supply better social amenities in the countryside. Yet, some vacated arable parcels will remain idle. This land should be prevented from degrading into wasteland, without environmental protection. Programs will have to be devised to turn them into forests and extensive pastures, and in some cases into urban developments.

We have also seen that young and middle-aged families with children formed the most vulnerable group in rural areas. They could benefit from effective property of land, and access to credit in a way that offers them sufficient autonomy to become independent farmers. Those with ambition and skills in farming could acquire parcels from corporate farms as well as from household plots of the elderly and from other families with more penchant to processing, transport, trade and services, particularly in the areas less suited for livestock and horticulture. These new family farms would need institutional support to achieve land consolidation, and to secure access to roads and to waterpoints.

Dualized marketing

Marketing has become dualized as well. Whereas corporate farms largely produce for exports of feed grains and biofuel feedstocks, individual farms are primarily oriented to the domestic market.

Despite this divergence in orientation and the present segmentation, both farming groups have similar yields for cereals of about 3 tons per hectare. Therefore, there is a substantial potential for increase. Every additional ton per hectare raises exports by 15 mln tons of grains (assuming no change in cultivated area and domestic demand) With an optimum yield at about 7 ton/ha, this amounts to 60 mln tons, a significant quantity that realistically can be attained over an horizon of 15-20 years. For a world population expected to increase by one billion during that period and to require an additional 300 mln tons, Ukraine could by itself contribute 20%!

Until then Ukraine's trading system will have to overcome two major impediments – monopolized trade and inadequate grading.

With respect to monopolized trade, the discretionary power of trading agencies, and the opacity of their relations to individual agricultural holdings prevent development of a competitive sector with sufficient capacity to cushion the variability of exportable surplus and to reward all farms equitably. Since Ukraine is too small to affect world market in its favor, it has nothing to gain from export licensing on any grounds other than product quality. Reforming the marketing chain in this direction would seem to be prerequisite for balanced rural development in the near future.

With respect to product quality, Ukraine currently mainly exports grains of medium and low quality to the EU, for which import protection is the highest. Higher quality would fetch better prices, and meet lower import tariffs. To comply with the standards, Ukraine will have to implement more refined grading with reliable certification along the full product chain, from the field to the country border. This supply of certified grades will have to cover physical aspects of product quality (good variety in good condition), product safety (free from bacteria and chemical residues), as well as social aspects (acceptable working conditions, proof of adequate payment of rent to land owners), environmental aspects (good agricultural practice; no pollution of air, water and soil above given standards; respect of biodiversity; animal welfare). Specifically on the agricultural practice, various shortcomings such as deficient and unbalanced fertilizer applications, inadequate use of pesticides, short or absent fallow periods need to be addressed by better extension services, monitoring and law enforcement.

The benefits of reliable grading and certification reach far beyond exports as such. Experience in most of the BRICS indicates that premium quality exports can serve as engine for development of the domestic market through the experience gained as well as confidence and appreciation of home consumers for brands that meet export requirements. Also internationally certified labeling on exports, with adequate inspections, can accomplish a lot in support of local governance. The requirements may pertain to social and environmental standards, but also extend to payment

46 See the Rural Land Tilting and Cadastre Development Project, of which progress reports are available at <http://documents.worldbank.org>.

of adequate contributions to tax revenues, as proof of good citizenship.

However, Ukraine's contribution to world food markets would obviously be seriously diminished if a significant fraction of its output were to end up as biofuel in cars. Currently, Ukraine's own production of bioethanol remains quite modest. The country produces 500 mln liter of bioethanol, the equivalent of about 1% of Brazil or US output and 7% of the EU-27. This bioethanol essentially originates from sugar beet production that exceeds domestic sugar demand by a factor three. Biodiesel production is negligible. Far more important are the rising exports of oilseeds to the EU for processing into biodiesel. There are intentions to set up domestic biodiesel production, but the available infrastructure and distribution network still lag far behind the stated ambitions.

Such a biofuel program would further reduce net food supply and do this by channeling oilseeds or grains away from food markets, hence contributing to global food scarcity. Furthermore, this demand for biofuel feedstocks, given the mandates, would be price-inelastic and hence add to price volatility of world markets.

Nonetheless, we may recall that a biofuel chain, be it domestically based or partly located in importing countries, could also serve to cushion price fluctuations, if blending mandates are kept flexible, and to be reduced temporarily under conditions of food scarcity (for example, as mentioned in Section 3, there are calls in the US to reduce the mandates, as response to the current drought in the Mid-West). Yet, making the mandates flexible cannot legitimate the blending mandates themselves, which remain a cartel-like policy measure that by pushing up world prices favors net sellers of agricultural product while burdening poor net buyers.

Capacity building: towards an independent information platform

We end with some remarks on the project itself. The project has served a double purpose. One has been to report on prospects as indicated in its title. The other has been to establish cooperation with Ukrainian researchers in the domain of agricultural economics, so as to benefit from reliable as well as detailed information.

The introduction identified extensive use of primary survey data as one of this project's distinctive features. Availing of reliable and coherent information on the trade, social and environmental conditions is critical for policy makers within the government but also for those conducting a dialogue with civil society and with foreign partners. Access to primary surveys is critical because of the information they can disclose but also because these surveys tend to be too large and available at too many locations to be manipulated in any particular direction by anyone.

The present project could only make a modest contribution to *capacity building* in this regard. A concrete way to pursue the objective of further improving the *capacity building* may consist in promoting development of an independent information platform on agriculture and rural development. The platform would operate an independent and recognizable unit that can on a regular basis provide an update on main developments affecting the country, initially focusing on agriculture and food security. It would offer a window for answering specified queries as formulated by a selected group of organizations from government, civil society and abroad. The platform would also conduct analysis on the basis of the data available to it, and relate its findings to those obtained from other sources, such as national account statistics, and market information. Its specialized function would be to process available surveys, maps, and census data on Ukraine, according to transparent protocols, and to document the sampling frames for each of them, so as to build trust and credibility for the resulting statistics and for the studies derived from these. IPTS may contribute to the achievement of this objective via facilitating the federation of relevant institutions and researchers, and in co-defining and co-implementing consistent lines of research.

Annex 1. GRCP – Polling

The “Polling” component of the GRCP software package (Gridding, Regression, Classification and Polling), developed at the Center for World Food studies (SOW-VU),⁴⁷ is a multifunctional tool, which employs numerical procedures for conditional frequency estimation and maximum likelihood prediction on large scale maps and surveys (comprising mostly qualitative data). It allows for an integrated processing of maps and surveys, combining “people and pixels”. For example, it is possible to link several survey data sets for analysis, through joint georeferencing of the data. The user can also easily link information available from geographical maps to a survey or a census dataset, or project survey and census information on a map.

In a nutshell, Polling is a non-parametric, GIS-based, analytical tool, which can be used for very diverse purposes, for example:

- non-parametric estimation of conditional probabilities (like in regression),
- non-parametric estimation of treatment effects by matching,
- variable selection for further specification of parametric and semiparametric regression and classification models,
- projection of survey data on maps and vice versa,
- interpolation at household or grid level.

Through combining different datasets and maps (even with different resolution), polling allows for a comprehensive descriptive or analytical processing of social, spatial or intertemporal data. It is worth to note that polling is a part of the GRCP package, which means that it can easily be connected to other components of the package, such as Gridding, Classification or Regression. Thus, for example, the user can also use polling and gridding as a stand-alone, independent GIS.

The core operations in polling are (1) the calculation of conditional frequencies, and (2) matching and calculation of treatment effects. Both tools are operating on a dual structure, i.e. on the one hand, purely numerical operations on data, producing output files with main results, and on the other hand, performing projections on maps, e.g. showing the (joint) geographical distribution of several variables, conditional frequencies, or predictions on the most important characteristics that are jointly affecting some outcome variable. It is also possible to treat maps as a survey, interpreting pixels as observations, or conduct interpolation on the map (filling empty gridcells with values inferred from available data).

For the analysis in the policy brief “The improvement of rural incomes – commercialization of farming households” (key results are in Section 7) the authors used the matching methodology to estimate the treatment effects for the policies considered. The aim of this analysis is to quantify the expected gains in some outcome variable (in this case: Sales Revenue) through pairwise matching of observations which belong to the treatment and the non-treatment groups, and are otherwise arguably identical. The outcome of the non-parametric estimation in matching is the average treatment effect on the treated, possibly conditional on some categorical variable (in this case: Social groups of farming households).

The second policy brief “Land lease and rent rates: towards benefit of smallholders” (key results are in Section 7) predominantly employs the multivariate profiling and spatial projection facilities of polling in order to identify structural patterns in the agricultural sector in Ukraine. It calculates the conditional frequencies of selected variables of the rent on land paid and received, and shows the classes with the highest frequency on a map.

⁴⁷ See Keyzer, M.A. (2005) ‘Rule-based and support vector (SV-)regression/classification algorithms for joint processing of census, map, survey and district data’. SOW-VU Working Paper WP 05-01, for the basic principles and launching of GRCP and Keyzer, M.A. and S. Pande (2010) ‘Classification by crossing and polling for integrated processing of maps and surveys; An addendum to GRCP-software’ SOW-VU Working Paper WP 10-01, for the subsequent additions. These papers and applications can be found at the website of SOW-VU, see www.sow.vu.nl

Annex 2. Surveys used in this project

1. Ukrainian Household Expenditures and Resources data (HERd) survey

This is an annual rural survey of around 10 000 households. The present study used the 2009 round, the latest version will be available in 2012. The survey records general information on structure and type of households, employment, educational level, professional skills, budget, social and economic priorities of households and household size. It has been used in the Agricultural Report and in the policy briefs on rural incomes and land lease, using GRCP.

2. Social and economic characteristics of rural settlements in Ukraine

All rural settlements are surveyed every 5 years, providing information on population and labor resources, economic

entities (enterprises, households), social characteristics of villages, and social infrastructures. It has been used for background information in the Agricultural Report, and analyzed in depth in the Briefs, since the latest version is only for the year 2005 and the envisaged issue of 2010 did not materialize.

3. Main Economic Indicators of Agricultural Enterprises

Information on approximately 7 000 enterprises on production and sales of products, costs of main production, assets and average number of workers and employees, land use, collected annually (data for the latest year 2010 is used in the brief). It has been used in the Agricultural Report and in Policy Brief 3, where it is merged with the HERd survey and data of NLV values at regional (Oblast) level provided by the State Agency of Land Resources.

European Commission

EUR 25878 - Joint Research Centre - Institute for Prospective Technological Studies

Title: Farming and rural development in Ukraine: making dualisation work

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Luxembourg: Publications Office of the European Union

2013 - 58 pp. - 21.0 x 29.7 cm

EUR - Scientific and Technical Research series - ISSN 1831-9424 (online)

ISBN 978-92-79-29052-7 (pdf)

doi:10.2791/85743

Abstract

This report synthesises the findings of the European Neighbourhood Policy project on Ukraine “Prospects of the farming sector and rural development in ENP-countries, the case of Ukraine”. After independence in 1991, a dualized agricultural system has emerged in Ukraine, comprising corporate farms and traditional family farms. Corporate farms are largely oriented on exports and benefit from important economies of scale, particularly in mechanized operations, input purchase and marketing of outputs. Traditional family farms cultivate the former private plots. They specialize more on products from animal husbandry and horticulture with higher value added per hectare but their access to foreign markets and even to domestic marketing chains is limited. Furthermore, traditional farmers lack the social amenities they used to have access to before the transition, and their parcels are fragmented over many plots.

With its wealth of natural resources and its relatively well educated population, Ukraine has ample means to let both parts of this dualized agriculture flourish in parallel. There is no need to prioritize either of them. Rather the study advocates implementing property rights beyond the regular ownership titles of parcels, such as the right of passage across plots to ensure their accessibility and user rights in commons. Land productivity needs protection as well. Large agricultural exports amount to large outflow of nutrients. Domestic recycling of plant nutrients and fertilizer imports are needed to prevent soil fertility loss. Finally, as regards foreign trade, it draws attention to product labeling as a vehicle for institutional innovation and improved governance, with labels requiring satisfaction of social as well as environmental standards.

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ISBN 978-92-79-29052-7

