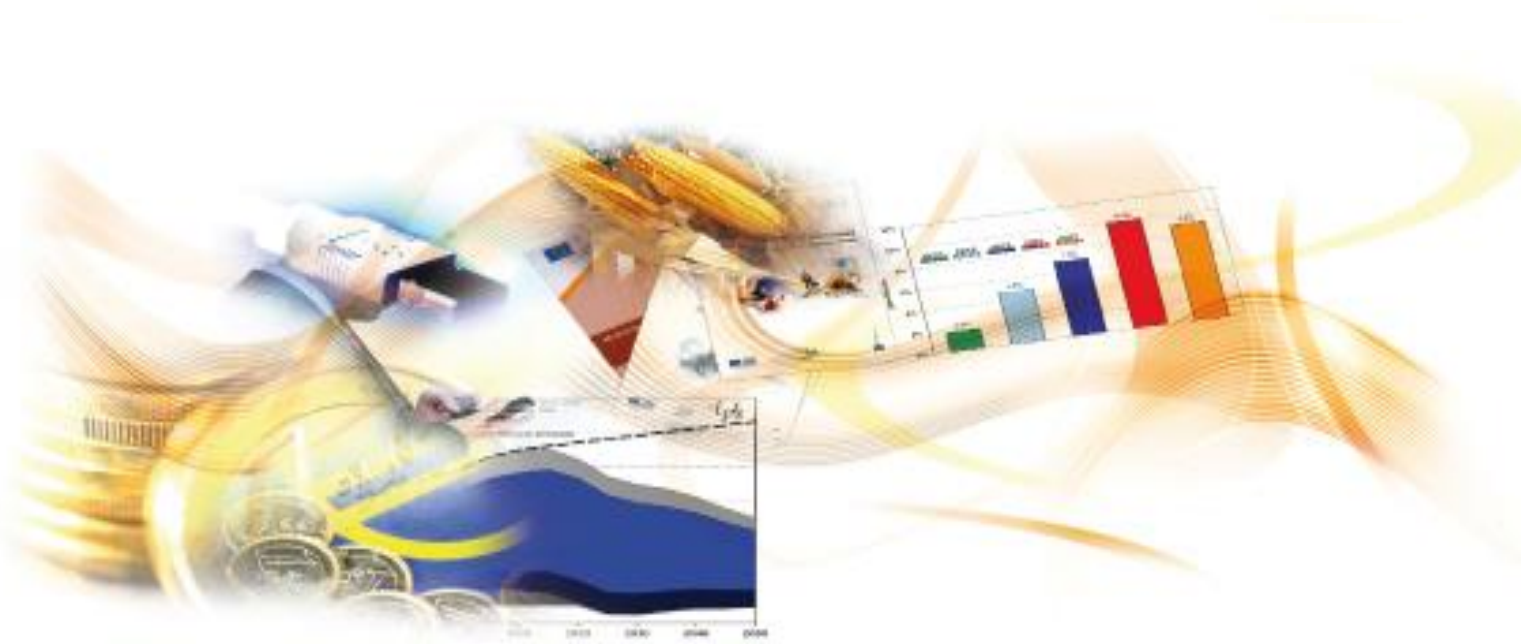


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The role of the Eurasian wheat belt to regional and global food security

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Abstract

Food security remains to be a major societal concern. In the light of the current expectations of population growth, world food production has to be massively increased to sustain the associated food demand rise. While agricultural productivity was rising during recent decades in the US, Europe and also in some developing countries, the corresponding growth rates lately appeared to be slowing down. In fact, the only world region with a significant amount of arable land, which currently is not under cultivation and which at the same time is experiencing rising productivity figures, is the so called 'Eurasian wheat belt', comprising of Russia, Ukraine, Kazakhstan and the Central Asian countries, namely Uzbekistan, Tajikistan, Turkmenistan, and Kirgizstan.

In this light, the Joint Research Centre and the Directorate-General for Agriculture and Rural Development organized a thematic workshop, held during 20 – 22 May 2014 in Istanbul/Turkey, set up to bring experts on the matter together and to discuss to what extent these countries could play a role for regional and international food security. Following the workshop analysis and discussion, this report provides a comprehensive technical overview of the wheat production, and the main factors to achieve full production potential across the Eurasian wheat belt with regards to national, regional and global issues of cereal supply and food security in evolving global markets. It reviews key horizontal issues, such as land policy, credit and finance, privatization, farm structures, social consequences of transition, environmental challenges, against the backdrop of agrarian reforms implemented during the transition period. In addition the report explores production potential and corresponding institutional and policy restrictions in a series of Eurasian countries. Finally, the report closes with expert opined policy-relevant conclusions as a basis for policy suggestions and recommendations.

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Finally we would like to thank Natalya Shagaida (RANEP, Moscow, Russia), Renata Yanbykh (VIAPI, Moscow, Russia), Peter Voigt (IAMO, Germany), and Ashok K. Mishra (Louisiana State University, USA) for acting as rapporteurs for each of the technical sessions and their contribution to respective synthesis reports towards the production and overall realisation of this JRC technical report.

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List of Acronyms

AGLINK-COSIMO	Worldwide Agribusiness Linkage Program + Commodity Simulation Model
AMS	Aggregate Measure of Support
ASEAN	Association of Southeast Asian Countries
CARD	Center for Agricultural and Rural Development
CAP	Common Agricultural Policy
CIS	Commonwealth of Independent States
CDA	Certificado do depósito Agropecuário
CV	Coefficient of Variation
CPI	Consumers Price Index
CUs	Credit Unions
CPR	Cédula de Produto Rural
CCI-RISE	Center for Citizens' Initiatives
DDGS	Distillers dried grains with solubles
EDB	Eurasian Development Bank
ERS	Economic Research Service
EU	European Union
FADN	Farm Accountancy Data Network
FAO	Food and Agriculture Organisation
FINCA	Foundation for International Community Assistance
FCI	Food Corporation of India
FDI	Foreign Direct Investment
FTA	Free Trade Agreement
FADN	Farm Accountancy Data Network
GDP	Gross Domestic Product
GAO	Gross Agricultural Output
GDP	Gross Domestic Product
GDPD	Gross Domestic Product Deflator
GoI	Government of India
GOST	Gosudarstvennyy Standart (State Standard)
IAMO	Leibniz Institute of Agricultural Development in Transition Economies
IIASA-FAO	International Institute for Applied Systems Analysis – Food and Agricultural Organisation
MMI	Malawi Maize Index
MFI	Microfinance institution
Mt	Million tonnes
NFSM	National Food Security Mission
NGO	Non-Governmental Organisation
OECD	Organisation for Economic and Cultural Development
RANEPA	Russian Presidential Academy of National Economy and Public Administration
RMC	Russian Microfinance Center
RUK	Russia, Ukraine, Kazakhstan
RF	Russian Federation
RWMN	Russian Women's Microfinance Network

TPDS	Targeted Public Distribution System
UAH	Ukrainian Hryvnia
USD	United States Dollar
USSR	Union of Soviet Socialist Republics
WWF	World Wildlife Fund
WTO	World Trade Organisation
WHR	Warehouse receipts
ZT	Zero-tillage

Executive Summary

This report synthesises the findings from the workshop on “*The role of the Eurasian wheat belt to regional and global food security*” organised by the Joint Research Centre of the European Commission in Istanbul, Turkey on 20-22 May 2014. The particular emphasis of the workshop was on the potential of wheat production in CIS and its contribution to the regional and global food security. In this context, the past and the current stage of the transition processes as well as the reliability and quality of the implemented institutional framework were discussed, remaining challenges and policy/reform agendas have been outlined and, moreover, relevant aspects due to changing natural conditions were taken into account (such as impact of climate change, water availability, land degradation, etc.).

The report is organised in eight chapters. The chapters (chapters 2-7) were written by a panel of international experts charged with capturing the principle outputs of the respective sessions of the workshop. Chapter 2, by Natalya Shagaida, reviews various horizontal issues affecting agriculture and agricultural development in CIS (Commonwealth of Independent States) followed by chapter 3, by Renata Yanbykh, who describes agrarian reforms and their impacts in CIS countries implemented during the transition period. Chapters 4 and 5, by Peter Voigt, assess the future grain production potentials in CIS and outlines policy actions needed to be undertaken to fully unfold them. Chapter 6, by Ashok K. Mishra, Holly Wang, and Amaranth Tripathi, investigates the wheat sector in neighbouring countries of the East and Southeast of the CIS countries – China and India – and their potential implications for CIS countries trade. Chapter 7, by Thomas Fellmann, René Araujo-Enciso, Jacques Delincé, Guna Salputra, Fabien Santini, Robert M'barek, and Marco Artavia, analyses the impact of yield variability, macroeconomic uncertainty and export restrictions on RUK and international agricultural markets by employing the stochastic module of the AGLINK-COMISMO model. Finally, the introductory chapter 1 and the concluding chapter 8, respectively, provides introductory comments and summarises expert opined relevant conclusions as a basis for possible policy suggestions and recommendations, and were compiled by Stephen Langrell, Pavel Ciaian, Sebastian Mary and Sergio Gomez y Paloma (who also acted as editors). It is stressed that the views and opinions expressed in this report are those of the authors and do not in any way represent a view or opinion of the European Commission.

Chapter 2 (Natalya Shagaida) covers various horizontal issues affecting agricultural development in CIS countries. The chapter discusses social changes in rural areas due to the post-soviet reforming process followed by analysis of key drivers of agricultural development, in particular land policy, credit availability, farm structure and the state of logistics and infrastructure.

The chapter notes that rural areas face huge challenges in CIS (in particular in Russia) induced by depopulation and depleted human resources partially also caused by laggard implementation of agricultural reforms. The reform process implemented during the transition process led to emergence of divergent trends in farm structure development across CIS countries. In a number of CIS countries high transaction costs of land transfers associated with inadequate implementation of new rules and regulations,

have led to distortions in land markets by facilitating expansion of large farming conglomerates in detriment of small farmers. In countries where reforms were not targeted at a complete shift to family type of farming, the conditions of formal and informal institutions remained more favourable for development of large farms (agricultural enterprises). Ukraine and Russia represent countries where large agricultural enterprises dominate the agricultural sector. Countries where individual farms emerged include Turkmenistan, Tadjikistan, Uzbekistan, Kyrgyzstan and Azerbaijan. The chapter further notes, that agricultural production growth was faster in countries with individualised farming structure as compared to countries which maintained large agricultural enterprises.

The chapter highlights that there have been constant problems associated with the development and the state of both *hardware* (e.g. roads, rail, ports) and *software* infrastructures (e.g. commercial logistics services) in CIS countries. Logistics services and infrastructure are important prerequisites for market development. The key challenge of CIS (in particular for Russia and Ukraine) is to convert the existing infrastructure from import-oriented to export oriented.

Chapter 3 (Renata Yanbykh) describes agrarian reforms implemented during the transition period and analyses their impacts on the agricultural sector. The chapter focuses primarily on reforms in Ukraine and Russia.

The reforms and the restructuring process created a dual production structure in Ukraine and Russia consisting of large corporate farms (agricultural enterprises) and individual farms (peasant/family farms and household plots). In parallel with these organizational changes at farm level, the regimes prevailing on agricultural markets were modified, introducing more price flexibility allowing for improved terms of trade for agriculture. Both Russia and Ukraine made a transition from the initial removal of agricultural support to the introduction of a similar support system as established in developed countries.

The chapter identifies the following main impacts of the transition reforms on Russian and Ukrainian agricultural development:

- A dual farm structure has emerged where large agricultural enterprises of various types of ownership coexist with small individual farms (family farms and private households) in the sector.
- Although agricultural enterprises tend to dominate the agricultural sector, there are strong regional differences. Some regions have kept the corporative type of agrarian structure with prevailing agricultural enterprises in gross agricultural output (GAO) (greater than 50%). On the contrary, in a number of other regions, the importance of agricultural organizations has faded, and family farms and household plots produce more than 70% of GAO.
- Within the group of agricultural enterprises, the extreme concentration of land in large agro-holdings is growing particularly from the beginning of 2000s.
- Generally the impact of large agricultural enterprises on development of the rural sector is somewhat overstated. Their share in the aggregate gross agricultural output does not exceed 7% as well as their profitability is not higher than that of individual farms.
- Smaller farms continue to use land much efficiently than agricultural enterprises. Small farms generate twice larger gross agricultural output per hectare than agricultural enterprises.

- The transition to a market economy led to labour outflow from agriculture but stimulated more efficient labour use.
- The transition process also led to a substantial yield increase for most agricultural products
- Variable input use (fertilizers, energy) has decreased but their efficiency has improved.
- The state support to agricultural sector has grown after its initial elimination in the early transition period but the overall sector's dependency to support is rather small.

Chapter 4 (Peter Voigt) assesses the future grain production potential in RUK countries (Russia, Ukraine, Kazakhstan) and outlines the policy actions needed to fully unfold them. The chapter also discusses the role of RUK for price volatility in world commodity markets.

Overall, agricultural production potential of the RUK countries appear generally promising as production, yields and exports are rising, making the region a promising candidate for contributing significantly to ensure global food security in future. Main challenges are seen in social and demographic aspects, disparities of rural and urban areas, an obvious lack of investments, still rather weak market institutions, and in the structure of agriculture in general.

RUK countries are key suppliers of wheat on international market but also represent a source of price volatility on global commodity markets. The main sources of volatility are RUK countries' export restraints and production volatility.

Russia has about 25% of the global arable lands. However, during the previous communist regime, Russia was a net importer of grain. Since about 2001/02, the trade balance has turned around and Russia has emerged as one of the largest grain exporters. Potential sources of further grain production and export growth in Russia are (i) yield increases and the application of modern technologies and (ii) re-cultivation of abandoned agricultural land.

The major constraints for future production growth in Russia represent the shortage of storage, transshipment and carriage infrastructure. Without expansion of this infrastructure the production and export growth cannot be sustained. Other constraints for agricultural and trade development include volatile production, unstable land and agricultural policies, uncompleted transition process and farm restructuring.

Similarly to Russia, *Ukraine* is in a position to significantly increase grain net exports. Ukraine's natural resources provide great productive opportunities. Altogether, 41.6 million ha (almost 69% of total land in Ukraine) is classified as agricultural land. The share of arable land is approximately 78% and, moreover, the available land is highly fertile since Ukraine has approximately 25% of the total black earth soil in the world. During the last 10 years, Ukraine has already gained a considerable share of international agro-food markets as exporter of grains, rapeseed, sunflower oil and seeds.

The grain production potential of Ukraine depends on the same two main factors as in the case of Russia, i.e. expansion of area cultivation and yield growth. However, the grain production is rather unstable from year to year, among others, due to extreme weather conditions (e.g. droughts and frost), unsustainable mid- and long-term state policy, lack of control for crop rotation and other environmental measures. Despite the

fact that environmental and climatic conditions in Ukraine are favourable for agriculture, the grain yields appear to be relatively low. According to IIASA-FAO study, there is an estimated 10% to 40% gap between the actual and the potential grain yield. With regard to wheat production, the estimated difference ranges between 25% and 40%. If these potential yields could be achieved, wheat production could be increased by approximately 30 to 60% of current production levels.

Further a number of factors are considered critical towards unlocking Ukraine's farming potential such as better accommodation of the 'dual' farm structure (large commercial *versus* small individual farms) in agricultural policies; enhancement of land ownership rights and land market institutions; installing transparent and enforceable market institutions including unbiased competition between the different types of agricultural producers, market liberalization, enforcement of contracts, and credit access; and improvement of storage and transshipment infrastructure.

Kazakhstan is the largest land-locked country in the world (larger than Western Europe). Over 80% of the country's total area is classified as agricultural land. Arable land constitutes less than 10% of the country's total land area, but its availability per inhabitant (1.5 ha) is the second highest in the world. Harsh weather conditions (low annual precipitation, frequent droughts, harsh winters) lead to frequent and sharp year-to-year variations in yields which, in turn, affects regional food security and the amount of surplus production available for export. Large scale agro-holding companies play a major role in the wheat sector. Although, according to Fieldsend (2014), both individual farmers and corporate farms appear to be broadly comparable in productivity indicators, an ideological bias against individual farms (i.e. in favour of large scale farming) seems to prevail amongst government officials.

Kazakhstan is vital for food security in several neighbouring countries. In fact, it is the largest wheat exporter in central Asia, exporting wheat and flour principally to neighbouring CIS countries. Beyond CIS, Afghanistan and Iran are the most important destinations for Kazakh wheat. However, export restrictions, imposed by the Kazakh government several times during recent years in the light of unfavourable yields and often implemented simultaneously with neighbouring producers, have proven a remarkable potential of disturbing supply and causing price shocks on regional and international markets.

In a mid-term view perspective, the supply of wheat in Kazakhstan is expected to increase from around 18 Mt currently to 19.5 Mt by 2023/24. Exports are expected to expand by around 10% (from the current annual average of around 7 to 7.7 Mt). Yields are also expected to increase, from around 1.1 tonnes/ha to 1.2 tonnes/ha. However, the present yield levels can only be maintained or increased by using the high intensity of input application. This implies that with intermediate, or rather low input levels, yields will be reduced to less than 1 tonnes/ha, which would put the economic rationale of wheat production into question.

Chapter 5 (Peter Voigt) analyses the potential of Central Asian Countries to emerge as relevant players in international agricultural markets and for global food security. The chapter focuses especially on two key countries from the region: Uzbekistan and Turkmenistan.

Overall for the Central Asian countries, especially Uzbekistan and Turkmenistan, common understanding is that these countries may indeed emerge as potential players for food security in the region and beyond, but a long list of challenges will need to be

addressed before this can happen. However, in the short to medium-term, the Central Asian countries' potential role as supplier of foodstuffs (especially wheat) to other world regions can be considered as rather limited.

Uzbekistan adopted a state regulated system in the economy (including in agriculture); the transition process did not result to emergence of market driven agricultural sector. In terms of land resources, only about 10% of the total area is cultivable land, i.e. approximately 50% are desert pastures, and virtually all agriculture requires irrigation. Cotton and wheat are the main cash crops. In 2012, *Uzbekistan* was the 6th largest producer and 5th largest exporter of cotton in the world. Nevertheless, there is an increasing diversification into cereals (mainly wheat). In fact, wheat area expanded by around 1 million ha since 1991 and the wheat production rose from 610,000 tonnes (1991) to roughly 2 Mt (1995), and lately to 6.5 Mt (2011).

Uzbekistan's approach to land distribution has differed substantially from those initiated in other countries of the former Soviet Union. For instance, the Uzbek state has retained exclusive land ownership (Lerman 2009). The farm restructuring process has involved the allocation of land to producers through leasing contracts. The government has enacted different phases of land reforms during which different farm sizes and tenure arrangements have been considered optimal. Nevertheless, large-sized production units were first fragmented and many smaller units emerged. In 2008, these small units were once again consolidated. In 2011, this number of farms was further reduced (by 20%) in a second consolidation wave.

Immediately after gaining independence in 1991, *Uzbekistan* launched a programme of national grain self-sufficiency, supplemented by state subsidies and production targets. Accordingly, *Uzbekistan* turned from a wheat importer into a net exporting country. Nowadays, about 80-90% of the total Uzbek grain production is wheat (of medium/low quality). Imports of food declined remarkably in the light of the grain self-sufficiency policy.

Overall, it appears rather unlikely to see *Uzbekistan* emerging as a significant player in the region in terms of food security. *Uzbekistan's* agriculture remains to be bound by significant inefficiencies, overregulation, lack of (foreign) investments, especially in the degenerating irrigation system, and by restricted water resources. In the medium-term, deregulation may allow for more entrepreneurial activities, correspondingly some stimulating incentives and increasing agricultural productivity. But it can also result in further diversification, which tends to reduce surplus production of the main crops available for export. Nevertheless, the country has a potential to become a core supplier of (low quality) wheat to neighbouring countries. In the longer-term, however, projections of the agricultural production in *Uzbekistan* remain somewhat uncertain with climate change and decreasing water supply for irrigation as key potential constraints.

Agricultural land in *Turkmenistan* accounts for more than 80% of the total territory. *Turkmenistan* is an arid country and most of its agricultural land is desert pasture with very little cultivable land. Its agriculture is highly dependent on irrigation. *Turkmenistan* has by far the highest per capita water consumption in the world.

Unlike other CIS countries, *Turkmenistan* has almost no large agricultural enterprises engaged in primary production. The large structures of the Soviet period were transformed into peasant associations consisting of individual leaseholders.

The agricultural sector is under strong state control. This is particularly true for crop production, which is heavily controlled by the state, while the livestock sector operates on a more private basis but the latter is predominantly of subsistence nature. Four agricultural subsectors have been almost unreformed since Soviet times: grain, cotton, rice and sugar beet. For these four crops, almost all measures from the Soviet arsenal are still applied today: mandatory state deliveries, state fixed prices, state supply of main inputs at discounted prices, and concessional state lending.

Although a significant effort was put in place with the aim of achieving self-sufficiency, Turkmenistan is currently a net importer of foodstuffs. Kazakhstan, Russia and Ukraine are the main suppliers of food and agricultural products to Turkmenistan, providing mostly wheat, flour, beverages, confectionary products, tobacco and sugar.

In the light of the emergence of wheat as the main grain product in Turkmenistan, it has been observed that the production of wheat, in general, is not driven by economic reasoning rather than by policy decisions. Given the natural conditions, but also the current institutional restrictions (missing market institutions), the production of wheat is not particularly favourable in Turkmenistan and, in this context, economically not profitable. Accordingly, the medium- to longer-term potential of the country to become a relevant player for food surplus production (especially in terms of wheat) appears highly questionable. Export of wheat from Turkmenistan is generally assumed to rather decrease due to the outlined disadvantages and, moreover, in the light of a growing population while the Turkmen government envisages self-sufficiency.

Possible factors for stimulating wheat production and potentially export are linked to issues of regulatory reforms and the removal of restrictions. The opening up of the over-regulated agriculture may lead to entrepreneurial incentives, productivity increases and surplus production, which could then be exported. Similarly as for Uzbekistan, water needs and the impact of climate change for agriculture will be key constraints determining future developments.

Chapter 6 (Ashok K. Mishra, Holly Wang, Amaranth Tripathi) investigates the wheat sector in neighbouring countries of the East and Southeast of the CIS countries – China and India – and their potential implications for CIS countries trade. Being the largest and second most populated countries in the world, prices and availability of food grain and other agricultural products are of greatest importance for China and India. Consequently, food security for a large population is of paramount concern for national governments and policymakers and entrench important impacts on international grain markets.

Agriculture in both China and India is structured to meet national food grain demand or consumption needs first, with a secondary focus on all other agricultural products. Both China and India face unique agricultural challenges due to the changing national diets as a consequence of economic development and urbanization. China and India exhibit differences with respect to their participation in the global agricultural markets. China depends on international markets for a number of key agricultural products (wheat, sugar, soy bean, processed fruit and vegetable, etc.), making it the world's second largest importer of these commodities (9.1 percent in 2013). In contrast, only about 3 percent of Indian food and agricultural demand is met by imports, compared with 13 percent for Asia as a whole.

Both countries have historically preferred to meet national consumption needs of staple food with domestic production, albeit the expensive price support and input subsidies.

At the same time, both countries strive to boost farmer living conditions through income support because of the large number of poor residing in rural areas and the large share of employment is based in smallholder agriculture.

Challenges and developments of *Chinese* agriculture and potential implications for CIS countries trade:

- Food security is main priority of Chinese agricultural policy driven by growing population and economic growth. The main principles of the food security policy include: (1) *avoiding over-dependence on external market* through domestic production and stockholding and regulations on domestic utilization of major food products; (2) *avoiding large shocks to domestic food market* through domestic food price interventions, border interventions and stock measures; and (3) *avoiding social instability caused by unacceptable income disparity* through measures to prevent sharp decline of agricultural prices and safety net schemes targeting low-income urban and rural groups.
- Main policy priority with respect to grains is achieving 90% self-sufficiency; specifically for rice and wheat the target is 97% self-sufficiency.
- On average, China produces 108 Mt of wheat annually. This makes China the world's largest wheat producer. However, China's population of 1.2 billion people, and its domestic consumption averaging to 113 Mt makes it the world's 7 largest importer of wheat at an average of 4 Mt.
- Yields have shown strong growth in China over last five decades: from less than 1 tonne/ha in 1960 to around 5 tonnes/ha today. Improvement in yield is a result of many factors including: chemical usage, mechanization, hybrid varieties, multi cropping, and irrigation system.
- China was a net exporter of grains until 2007. Since then China's demand for imported grains have been increasing and much of it is from the United States.
- Boosted by the booming animal feed and food-processing sectors, the demand for both wheat and other grains (e.g. corn) has surged in the past decade.
- However, imported wheat varieties tend to be used for production bakery goods and less for animal feeding
- Rising income level, urbanization and expansion of meat production associated with dietary transition to a more meat-rich diet are expected to have important impacts on world agricultural markets and in particular for grain imports.
- In particular, China's meat consumption is expected to rise potentially further driving up grain imports.
- Major constraint for production growth on the supply side include: loss of agricultural land due to urbanization, desertification, environmental problems and soil degradation.

Challenges and developments of *Indian* agriculture and potential implications for CIS countries trade:

- After more than 70 years of independence, India become self-reliant in its major food staple such as rice and wheat. Much of the progress in the 1960s and 1970s was achieved through the adoption of yield enhancing Green Revolution technology supported by market policy interventions.
- Wheat is one of the staple food in India and popular food item and provides nearly 50% of the calories and protein requirements for vast majority of population.

- India is second largest producer and consumer of wheat in the world. Wheat output witnessed a quantum leap from a mere 12 Mt in 1965 to around 92 Mt in 2013, while wheat consumption witnessed a 6 fold increase, from 14 Mt in 1960 to around 90 Mt in 2013.
- The wheat demand is expected to continue increasing in both rural and urban areas in India. In particular, growing demand is coming from middle income households because of higher income level and a shift in consumption patterns away from consuming rice to more western food (and wheat based) items like bread, pasta, noodles, and pastries.
- Though India has been self-sufficient in wheat, it is also importing wheat. On average, India imports 1 Mt of wheat, and, exports an average of 0.7 Mt of wheat.
- Russia is one of the major wheat importers to India. Other important importers are Argentina, Canada, Australia and Ukraine.
- Although India experienced a strong growth in agricultural productivity, the grain yields have been virtually stagnant over the past 16 years in all cereal crops, including wheat. Many grain farmers are moving into growing higher yields crops such as fruits.
- Indian wheat production has been volatile during the last five years mainly due to the decrease in productivity level, soil degradation, water shortage, decline in fertilizer consumption, and diversion to other more remunerative cash crops and horticultural products, small marginal land holdings, loss of arable land to non-agricultural uses, climate change, etc. Consequently, sustainability of wheat production is a major challenge in India.
- Despite a significant progress in enhancing food security, India still faces food and nutrition challenges. There is significant portion of the population (about 250 million people) still living below the poverty line and have poor access to staple food items like wheat and rice.

Overall, this chapter highlights that China and India play an important role in the world grain market. Both countries are (or will be) very important with regard to the demand side of the grain market. China and India face limited resources, such as arable land, and agricultural productivity. The rising number of middle income households in both countries will potentially boost demand for grains and food products. Demand for wheat will likely increase in China and India in the coming years. Additionally, demand in China would also increase as a result of increased in demand for feedstock.

Chapter 7 (Thomas Fellmann, René Araujo-Enciso, Jacques Delincé, Guna Salputra, Fabien Santini, Robert M'barek, Marco Artavia) analyses the impact of yield variability, macroeconomic uncertainty and export restrictions on RUK and international agricultural markets by employing the stochastic module of the AGLINK-COMISMO model. The simulation results suggest that international wheat markets are largely affected by yield uncertainty coming from Russia, Ukraine and Kazakhstan. Further, findings show that export restrictions by RUK had likely adverse effects on international food security by adding to instability in world grain markets and spikes in international food prices. The findings of this chapter put international trade policy into focus, underlining that more cooperation on the part of exporting countries is needed to avoid that importing countries are suspended from indispensable grain supplies.

Chapter 8 (Sebastian Mary, Sergio Gomez y Paloma, Stephen Langrell, Pavel Ciaian) summarises main conclusions and provides possible policy suggestions and recommendations. Key players in CIS are RUK countries accounting for the main bulk of

region's wheat production and trade. The report has shown that given the availability of large land resources and low level of current yields, CIS countries have strong potential to further increase wheat production and exports and thus can strengthen their contribution to the global food security. The production growth can be achieved primarily by bringing more land into cultivation, enhancing current yields and by incorporating modern technologies into its farming practices. However, the production potential can be realised fully if agricultural sector is supported by structural changes including (1) enhancing market institutions and property rights; (ii) development of land markets (2) improvement of access to credit and finance to the farming sector; (iv) the creation of a reliable and transparent policy support framework (3), addressing climate and environmental challenges and (4) development of infrastructure.

This chapter formulates key recommendations needed to be undertaken to make possible full realization of production potential of CIS countries:

Land reforms:

- Strengthen land tenure right security
- Facilitate the development of land markets as well as the finalization of land reform process
- Promote and contribute to socially desirable allocation and land resources
- Encourage institutional changes and promote market institutions

Impact of climate change:

- Adopt drought resistant wheat and/or other crop varieties
- Promote investment in irrigation systems
- Adapt wheat-cropping systems to climate change
- Promote investment in storage capacity to diminish climate induced market fluctuations.
- Adopt weather risk management instruments

Access to credit and infrastructure development:

- Strengthen producer associations
- Enhance value chain structures through promoting and establishing contract farming operations
- Encourage development of financial sector for medium-term and long-term credit
- Build lending capacity through microfinance institutions or credit unions
- The role of government in fostering a conducive policy environment is key to the sustainable growth of the industry

Agricultural and trade policies:

- Introduce fair support system that is equitable to all producers, including small individual farms.
- Reduce barriers to trade and refrain from using export restrictions
- Investigate the feasibility of providing WTO consistent support to farmers

Agricultural data use for policy support:

- Enhance data collection on key aspects of the agricultural sector
- Encourage public and private investments in survey data collection efforts

- Develop and maintain databases that can be used to design sound public policies
- Disseminate agricultural statistics to extension agents, researchers and farmers to facilitate conducting analysis and relevant decisions in the sector
- Use data based evidence to design, analyse and monitor impacts and effectiveness of agricultural policies

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Chapter 1 Introduction

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Food security – at regional, national and global level – remains to be a major societal concern. In the light of an increasing population, which is anticipated to account for almost 10 billion in 2050 compared to about 7 billion currently, it is a matter of fact that world food production has to be massively increased. Estimates vary on how much; the actual figure depending on the extent that growth in the 'emergent' economies triggers a switch to a more animal product oriented diet. Basically, there are only two ways to achieve such a growth in food production: (1) expanding the amount of land used for agriculture and/or (2) increasing crop yields and total factor productivity. While agricultural productivity was rising during recent decades in the US, Europe and also in some developing countries, the corresponding growth rates lately appeared to be slowing down. And the potential of increasing the amount of land use for food production in these regions is quite limited. In fact, the only world region with a significant amount of arable land, which currently is not under cultivation and which at the same time is experiencing rising productivity figures, is the so called 'Eurasian wheat belt', comprising of Russia, Ukraine, Kazakhstan (RUK countries) and the Central Asian countries, namely Uzbekistan, Tajikistan, Turkmenistan, and Kirgizstan. This makes this world region to be a hot spot for investigating future perspectives in terms of food production and food security.

In this light, the Joint Research Centre of the European Commission organized a thematic workshop, held during 20 – 22 May 2014 in Istanbul/Turkey, set up to bring experts on the matter together and to discuss to what extent these countries could play a role for regional and international food security. Particular emphasis was on the potential of wheat production and its contribution to the regional and global food security. In this context, the current stage and the persistence of the transition processes as well as the reliability and quality of the implemented institutional framework were discussed, remaining challenges and policy/reform agendas have been outlined and, moreover, relevant aspects due to changing natural conditions were taken into account (such as impact of climate change, water availability, land degradation).

Following the workshop analysis and discussion, this report constitutes a particular and comprehensive technical overview of the wheat production, and the main factors to achieve full production potential across the Eurasian wheat belt with regards to national, regional and global issues of cereal supply and food security in evolving global markets. It reviews key horizontal issues, such as land policy, credit and finance, privatization, farm structures, social consequences of transition, environmental challenges, against the backdrop of agrarian reforms implemented during the transition period. In addition the report explores production potential and corresponding institutional and policy restrictions in a series of Eurasian countries. The special emphasis of the report are RUK countries (Russia, Ukraine, Kazakhstan), through it also discusses the emergence and potential importance of new production regions covering

other CIS (Commonwealth of Independent States) countries such as, e.g. Uzbekistan and Turkmenistan. The report covers current and potential future market developments in the Eurasian region as well as in a wider global context, in particular with respect to the emergence of China and India, their receptive needs, challenges and lessons. Finally, the report closes with expert opined policy-relevant conclusions as a basis for policy suggestions and recommendations. It is envisaged that this report can provide a valuable source of technical and conceptual information for on-going policy considerations, both at EU, and wider global level with respect to international concerted efforts to secure reliable sources of cereal grain production.

Chapter 2: Horizontal Issues

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2.1 Introduction

This chapter covers various issues affecting agricultural development in CIS countries. First, the chapter discusses social changes in rural areas induced by the reforms implemented during the transition process. Then, sub-sections 3 to 6 present the key elements which directly relate to the agricultural development in general and more specifically to land reforms, credit availability, farm structure and the logistics and infrastructure linked to agricultural sector. It is relatively challenging to rank the strategic influence of these issues and therefore the order in which they are presented does not reflect in any way the degree of priority between them. The chapter primarily covers the developments in Russia as an example for illustrating various horizontal challenges faced during the transition process. Other CIS countries are covered to a lesser extent.

2.2 Social Aspects of Agrarian Transition

Significant social changes have resulted from the dismantling of agricultural production system in CIS in the post-soviet era. During the communist period the most valuable skills of directors of agricultural enterprises were the ability to secure sufficient resources for conducting agricultural production activities and thus to fulfil the centrally assigned production plan¹. After the transition process to market economy, enterprises are in demand for managers who can ensure efficient use of resources and generate profits to its owners. The search for a more efficient productive system in agricultural sector and the transformation of the economic and political system have adversely affected rural areas and communities.

Many enterprises went bankrupt during the transition process in Russia in the 1990s; incomes of rural residents dramatically decreased; and many rural municipalities did not have access to financial resources needed to address some of the structural changes that took place in their economy. Those changes still affect the rural areas today as 86% of rural municipalities in Russia rely on support from central government (Nikulin, 2013). The drastic reduction in agricultural employment, falling from 8.3 million in 1992 to less than 1.5 million people in 2012, was not accompanied by any government

¹ In the soviet period, a director of an agricultural enterprise had to ensure the availability of sufficient resources to execute the assigned planned production. In a centrally planned economy (as was the case of CIS prior to 1991), the decision regarding the allocation of resources is embodied in a central plan formulated and administered by the state. Given that the allocation of resources was done administratively, key qualities of an enterprise director were negotiation and political skills within the state planning system. After the transition process in the 1990s, the situation has completely changed. Resources are allocated based on private incentives, they can be acquired in the free market and thus principal challenge of managers is their efficient use in the production process.

programme in support of rural employment, such as the provision of training or employee assistance programmes, the provision of support in finding and/or creating alternative employment opportunities nor any support to opt for early retirement (Uzun, 2014). This led to the collapse of rural economies and to a large employment gap between rural and urban areas. A consequence of these developments was an exodus of people from rural regions and most families actively encouraged their children to leave to cities for search of better employment opportunities.

At the start of the reform process in 1993-1995, practically all rural residents acquired the rights to own land in Russia. However, there were significant formal and informal constraints in exercising the newly acquired rights imposed by directors of agricultural enterprises and local administrators who opposed the reforms mainly because of personal convictions and conflicting self-interests. This was particularly the case until 2001. For almost 10 years, farmers were restricted from acquiring land either by purchase or lease. While rural people could have started their own farms, the lack of practical application of the reform led to a massive exodus of active people from rural areas (e.g. Shagaida, 2009). When the Land Code corrected the land access problem in 2001, many active people had already left rural areas and practically the migration process to urban areas had actually been already materialised. Sociologists specialising in rural studies have long observed this phenomena and refer to it with the concept of "Second Russia". The Second Russia (i.e. rural regions) is facing different reality and challenges than urban areas: it is characterised by unemployment and poverty. This development occurred in a large number of rural regions in Russia. These regions quickly become depopulated, not just because of low birth rates, but also because of the outmigration of the most active population. Villages are rapidly disappearing; for example, 10% of rural villages have populations of fewer than 10 people (Nikulin, 2012).

Recent changes in the production organization have also contributed to social changes in rural areas. Specifically, large agro-holdings have appeared in some regions (Epstein, Hahlbrock and Wandel, 2012; Uzun, Shagaida and Saraikin, 2012). Agro-holdings are vertically integrated structures. They use the land of former collective farms (*kolkhozes* and *sovkhozes*). They combine land from several former collective farms in one unit, bring in finance, modern technologies, machinery and new management approaches. Since modern technologies and machinery are much less labour intensive, fewer jobs are created in agricultural sector, further aggravating the unemployment situation in rural areas. The creation of such large businesses compared to the previously existing agricultural organizations has altered the pre-existing interactions with local authorities during the soviet era. In the soviet era local authorities could impose certain conditions on collective farms, for instance, to support the development of some public services in the region. However, agro-holdings objective is to maximize profits and minimize the costs of non-core assets and thus are much less willing to accept demands to support public services for the local community. However, some agro-holdings take a different approach, especially when they are established by foreign investors. Such agro-holdings understand that their enterprises operate in territories with few social services, and, in response, provide necessary services in order to support social cohesion and retain the young population in rural areas.

Not only has there been a drastic outmigration towards urban areas, but this trend has also coincided with the outmigration of skilled specialists that have left many farms without the necessary and adequate workforce. To mitigate the adverse effects of this

issue, the Russian government supports colleges and universities in rural areas (e.g. providing tuition subsidies). Yet, only 20% of graduates actually choose to work in rural areas mainly because of low wage level (Tatarinform, 2014). The government in an attempt to prevent out-migration has also introduced programmes supporting the construction and acquisition of housing for young specialists, however, this was not sufficient to reverse the trend. The main weakness of this programme is that, alongside the federal budget, it is co-financed by the regional budgets and sponsorship from agricultural producers, both of which have no sufficient financial means and thus few specialist can actually benefit from it.

2.3 Structural Change and Access to Land

In principle, Russia already has all the necessary conditions for an agricultural land market to emerge. Private land ownership has been introduced and has been most thoroughly carried out for agricultural land. The share of the privately owned land represents 30% in total agricultural land, out of which about 70% is farm land (cropland, grassland, pastures, etc.). The most of remaining land area, excluding land owned by villages and towns, is in government ownership. In villages and towns the share of privately owned land exceeds approximately 19% of total available land (Rosreestr, 2013). All types of sale and rental transactions on land market are permitted, including using land as collateral for credit. Land cadastres and state record of titles are maintained, and a land assessment is conducted. The government has introduced further regulations aimed at activating the land market. Yet, at the same time, land transaction costs remain extremely high.

Russian land reform has developed in several phases. The first phase implemented in the 1990s included the agricultural privatization process. This phase may be considered successful, because privatization was conducted relatively swiftly. The government created a vertical structure from the federal to the municipal level, which implemented privatization at the local level using a uniform approach. It also developed a simple privatization procedure, established the mechanisms for reallocation of land, created the land title register, established land plot recording system, registered land titles and issued the land documentation free of charge.

Nonetheless, the land privatization process had its specific features as it did not involve individual land plots, but land plots in common ownership of employees of agricultural enterprise, pensioners, and 'social sphere workers'. In other words, vast land plots were established in common ownership. Usually agricultural land of a former state and collective farms (i.e. *kolkhoz* or a *sovkhov*) was distributed to hundreds of people, while each of them receiving a share in ownership on this common land (IFC, 1995). Individuals did not receive ownership rights to a specific physical plot of land but only *land share* of a larger area. It was expected that at first land shares would be traded, and as soon as they are concentrated among fewer owners, the common large plots would be delimited into smaller plots and farmed by owners directly or rented out to agricultural enterprises and/or individual farms. However, the implementation of the reform required participation of local authorities (including managers of enterprises), which rigidly opposed the reform. The trading of land shares and the concentration of land plots was thus largely inhibited. Instead most land remained under common ownership and used by large agricultural enterprises thus hindering the development of individualization of land.

During the second phase of the reform process, starting from 1998, new land institutions were established. However, transaction costs of exercising new regulations were not addressed. In particular a new title register was introduced; nevertheless, the data was not transferred from the old to the new register. As a result, the new register was partly empty. The land registration gradually improved starting from 2004. This was as a result of relaxing regulations on land transactions and the change in assignment of transaction costs associated with land registration (i.e. a shift of costs from seller to buyer).

Despite these developments, the structure of ownership and use of land is gradually changing. The share of agricultural land in common ownership is slowly reducing, the land is split into smaller plots, and the share of land used by small and medium sized farms is steadily increasing (Shagaida, 2014).

However, alongside the growth of small and medium farms, the concentration of land into large agro-holdings, up to 500,000 hectares, took place (BEFL, 2014). This development bears certain risk for land market. For example, there is a risk that land of agro-holdings could be withdrawn from production in the event of bankruptcy. For example, the “Sakho” holding is currently going through the bankruptcy proceedings. This holding controls some 400,000 ha of land. Although this land has been provided to the bank as collateral, it cannot be quickly transferred to other users. This land is expected to be sold through an auction as one large complete lot. As a result, it will likely continue to be cultivated by a large company, whereas small agricultural producers will be restricted in accessing such land.

High transaction costs of land transfers associated with inadequate implementation of new rules and regulations, have led to the situation where responsible authorities, farmers and land owners are unable to formalize land transfers in compliance with the new requirements. As a result, a significant share of land is under incorrect and unclear legal arrangements. That is, this land is in the situation where the old rules for legally using it is not valid any more, but it is administratively difficult (impossible) to switch its legal status to be in compliance with the new rules. Overall, over half of agricultural land is under unclear legal status (Uzun et al., 2014).

An assessment of the grain production potential in Russia may suggest the re-cultivation of unused lands which may represent an important source of future production growth in agriculture. However, it is increasingly evident that currently, the potential of grain production growth lies not in involvement of additional land areas, but in increasing grain yields. Despite the fact that the government attempts to motivate farmers (through punitive measures i.e. by imposing fines for unused land) in bringing unused land into production, it is unlikely that such moves will have the desired effect. According to the data of the 2006 Agricultural Census, large areas of unused land are located in the regions which are not favourable for agricultural activity making them less likely to be re-cultivated (e.g. Magadan, Smolensk, Murmansk and other similar regions) (Rosstst, Census of Agriculture, 2012).²

² The Space Research Institute in Russia is performing regular survey of the land surface for estimation of the changes in climate and Land use. The monitoring of Land use includes a control of land degradation, afforestation, desertification, soil salinization soil erosion, abandonment of arable lands, and crop rotation disturbance. This monitoring is included in a system of the Eurasian agricultural and environmental monitoring system. This work has been in place for about 20 years. According to the State Programme, this activity is expected to be expanded to all territory of the country, as the Russian

Over 20 years of experience of market reforms, the evidence from Russia has allowed for formulating several lessons of land policy implementation. The land policy was successful when its implementation took into account local social and economic conditions, land use developments, and property rights enforcement. The land reforms attempted to create a system of institutions and agencies to facilitate the implementation of the regulations. However, often the actual implementation lagged legal clarity of the adopted regulations ultimately leading to high transaction costs on the land market which enabled land transfer to large enterprises in detriment of small farms.

In conclusion, taking into account lessons from the reform process a number of proposals towards improving land policy can be offered. These include: formulating the policy goal and tasks for achieving the goal; creating the whole range of institutions, which are aimed at fulfilling specific tasks contributing to the policy goal; conducting evaluation and assessment of the newly created institutions; limitation of land concentration; ensuring the access of land to small agricultural producers; delineation of land ownership and delimitation of land plots prior to putting them for sale or lease; and introduction of regional planning as an instrument for promoting rural development (Shagaida, 2014).

2.4 Credit and Finance

In the post-soviet period credit markets in CIS countries was underdeveloped due to several reasons:

- Lack of collateral associated with underdeveloped land market;
- Institutional and policy infancy;
- Low participation of commercial banks in agricultural sector financing;
- Weak insurance market and property right institutions;
- Weak farm management, farm accounting, and credit worthiness.

As a result of these constraints, farms in CIS countries used various alternative credit options, such as trade/commodity credit (i.e. from state, producers, consumers), loan guarantee support (i.e. loan guarantee programme of the state or local authorities), government subsidised credit and warehouse receipts. The role of each of the instruments varied across CIS countries and over time. In the first decade after 1992, the commodity credit dominated as a financial instrument in agriculture in CIS.

For example in Ukraine the following options have been used to provide finance for the development of agricultural businesses: own funds or through producer organizations; government support; banks and non-bank financial instruments; fixed asset acquisition through leasing; credit from input and equipment suppliers; trade credit; and warehouse receipts.

While many credit alternatives are available on the financial markets, agricultural producers have practically access only to domestic credit and government support as a main external source of finance. Larger agro-holdings have better credit access as they have more diversified options in obtaining finance and can attract cheaper credit. For example, in Kazakhstan, 50% of all agricultural credit is received by large agro-holdings

Government considers that there is a potential to integrate unused agricultural land into agricultural production (Ladonina, 2014).

priced at relatively low interest rates and provided for longer term duration. The cost of credit for small farms is, by comparison, much higher and less accessible. As a result, for many small agricultural producers the cost of credit is greater than profit obtained from agricultural investments (Meyers, 2014). In Russia agricultural enterprises and processing enterprises have approximately equal access to subsidized credits (49.9 and 48.4%, respectively), whereas individual farms have significantly more difficult access to such credit (Uzun et al., 2014).

A key factor determining the access to credit in the agricultural sector is the lack of land market development. This is a major constraint given that land markets are underdeveloped in CIS. For example, in Ukraine the moratorium for land sales needs to be lifted, because such restrictions on land transactions usually generate adverse incentives on credit markets. For example, the use of land as collateral requires more than private land ownership. Important is free transfer of land. Further, the allocated land must be fully compliant with the law; the ownership must be transparent and recorded in the register. Land also needs to be owned by the same owner who wishes to obtain the credit (note that most of land in Ukraine is under rental arrangements), it must be liquid as collateral, must have a fair value, etc. Without these conditions, the role of land in credit allocation in agriculture will be small (Shagaida, 2010).

Credit market in most CIS countries is also adversely affected by the existence of weak farm management practices as well as by weak institutional framework which cannot fully sustain the functioning credit markets. There is a role of governments in supporting rural credit market developments. Governments may create incentives to expand the banks and microcredit organizations for agricultural lending. Factor market policies may also have a substantial effect on agricultural credit development. For example, the improvement of institutional framework for well-functioning land market may expand the opportunities for accessing loans in agriculture and may induce farmers to take more risk (Meyers, 2014). At the same time, the question of farm management is central to credit access. Farms need to adapt their management and financial practices to facilitate the monitoring of their creditworthiness by lenders.

2.5 Farm Structure in CIS Countries

The principal elements of a typical agrarian reform in the CIS can be defined as follows (Lerman et al., 2004);

- Land privatization: a shift of land property rights from state ownership to private ownership;
- Farm restructuring: a shift from large-scale collective and corporate farms to small- and medium-sized individual (family) farms.

Currently four CIS countries still exclude private ownership to land, i.e. Tajikistan, Turkmenistan, Uzbekistan and Belarus. In Russia two thirds of agricultural land is state-owned; in Ukraine, on the other hand, about two thirds of agricultural land is privately owned (Lerman et al., 2007). However, care must be taken when comparing the situation between countries as they use different definitions of agricultural land. For example, in Russia the notion of “agriculturally zoned land” includes land used for direct agricultural purposes (arable land, grassland, pastures, gardens, etc.) as well as uncultivated land located in rural areas (e.g. land under buildings, forests, roads). Actually, the share of privately owned land represents two thirds of total land used for

direct agricultural purposes in Russia. In Ukraine, almost 80% of area categorised as “agricultural land” represents land used for direct agricultural purposes. As a result, the shares of privatized agricultural land (i.e. land used for direct agricultural purposes) in these two countries is similar (about two thirds) (Shagaida, 2014).

Although private ownership is widespread in CIS, landowners do not always cultivate the land they own but instead rent it out to other farms. There are several reasons for this development. Some landowners are unable to cultivate their land because of age and health reasons. Also many owners are employed in more profitable, non-agricultural sectors. These types of landowners represent an important share in total land supply on rental markets. This situation stimulates the emergence of land rental markets which allows farms to increase their size through land rentals (Lerman, 2014).

The recovery of agricultural production in CIS countries is directly linked with the individualization of land, i.e. the allocation of ownership rights to land plots to individual farms. There are typically two types of individual farms active in CIS agriculture: household plots and family (peasant) farms³. Small family farms have become the backbone of post-transition structure in the CIS (Lerman, 2013, 2014). The third group of farms active in CIS represent agricultural enterprises (commercial farms) which are transformed former state and collective farms.

Land allocation between these three main farm types varies considerably across CIS countries. For example, in Russia there is extreme concentration of land in a small number of large agricultural enterprises. The average size of agricultural enterprises is 6393 ha in Russia. At the same time, the average size of agricultural enterprises decreased from 3,000 to 1,000 ha in Ukraine. With respect to family farms, the average farm size is approximately the same in Ukraine and Russia, around 100 ha. In Kirgizstan and Tajikistan, the number of farms has rapidly increased, while the average farm size has decreased. The opposite trend was observed in Uzbekistan due to the “land optimization” programme introduced by the government (since 2007-2008) (Lerman, 2013).

The role of individual farms has dramatically increased between 1991 and 2010. All former USSR republics except Latvia, Lithuania and Estonia, may be divided into two groups. The first group includes Turkmenistan, Tadjikistan, Uzbekistan, Kyrgyzstan and Azerbaijan where the individual farms' share of production in total agricultural production was between 33% and 44% at the start of reform process, respectively. Now this share ranges between 95 and 98%. The second group includes Ukraine and Russia, where the share of small individual farms is smaller. Their share increased from 27% and 24% at the start of the reform process to current 60% and 56%, respectively. Kazakhstan takes an intermediate position: in 1991 the share of individual farms was around 25% increasing to 71% in 2010s (Lerman, 2013).

There is a strong link between the degree of land individualization and the increase in agricultural production in the CIS. Production growth was faster in countries that have more land in individual use than in countries with larger share of agricultural enterprises. Thus the recovery of agricultural growth is strongly associated with the individualization of farming (Lerman, 2013).

³ Household plots – traditional subsistence oriented agriculture carried over from the Soviet era (average size approximately 1 ha). Family farms – new commercial farming structure emerged after 1992 (average size approximately 10-100 ha).

The structure of the agricultural sector in Russia and Ukraine is unique among CIS countries. Large agro-holdings occupy an important place in the agricultural sector. While this phenomenon has been widely discussed in the literature, there is however not available statistical data to determine their share in total production and land use, which prevents meaningful analysis of their performance and implications for land markets (Lerman, 2014). Yet, evidence from specific cases may be informative and indicate that large agricultural agro-holdings in Russia use on average large land area amounting to 2-10 thousand or more hectares per farm (e.g. Uzun, Shagayda and Saraikin, 2010).

There is a lively ongoing discussion among economists about the role of small farms in the development of the agricultural sector in CIS. While small farms may be more effective in a particular environment, in other situations they may face difficulties to survive and thus generate growth. It was widely argued that land should be distributed to family farmers to increase efficiency of the CIS agriculture. However, some studies argue that such an approach might be ineffective and lead to lower productivity because of their poverty and lack of access to external finances (Liefert, 2014).

At the same time, land has been a tool contributing to poverty reduction, the improvement of rural population food security and unemployment relief. These factors directly contribute to the sustainable development of rural population, especially in countries where individualization has played a key role.

Some have argued that large farms may “play against” small farms. While small farms still play a significant role in Russia's production, recent events, e.g. avian influenza or swine fever, have liquidated the livestock herd of small farms as they cannot ensure production in compliance with veterinary requirements (Uzun, 2014).

Large holdings can in particular exist and maintain their dominant position in areas where they receive support from regional or central authorities. Large-scale production operations crowd-out local production units in particular family farms. For example, a large dairy agricultural enterprise was built in a region 400 km away from Moscow. Best quality milk is delivered to dairy processing factory in Moscow. The remaining of milk which does not pass quality standards is processed at the local dairy processing factory and is supplied to local market. As a result, there is less room available for expansion of small family farms in milk production for supply on local markets. Family farms are gradually reducing their milk production in this region (Saraikin, 2014).

There is observed a strong heterogeneity of farm structure in CIS countries. The differences in reforms implemented during the transition process led to divergent trends of farm structure development. In countries where reforms were not targeted at a complete shift to family farms, the conditions of formal and informal institutions remained more favourable for development of large farms (agricultural enterprises). However, there are many concerns on the sustainability of these farms as agricultural productivity growth in several CIS was strongly associated with land individualization.

2.6 Logistics, Infrastructure and Export Capacity

Logistics services and infrastructure are important prerequisites for market development. They directly determine the transaction costs of accessing markets and thus determine the competitiveness of agricultural producers on domestic and international markets. In CIS countries there have been constant problems associated

with the development and the state of both *hardware* (e.g. roads, rail, ports) and *software* infrastructures (e.g. commercial logistics services). The issue is aggravated by the fact that in Russia and Ukraine the infrastructure inherited from the previous communist system is import-oriented. However, given that these countries shifted from being major global importers to major global exporters of grains, infrastructure must be replaced or updated to serve the new needs. This relates not only to the construction of ports with corresponding capacities of loading vessels, but also to the development of the internal infrastructure of transporting grain from inland regions to the ports.

An important constraint of internal transportation in Russia is railways system. Most acute problem is visible in Siberia where there is available a sole railway line (Trans-Siberian) which is not sufficient for the actual needs. Exports are channelled mainly through the Black Sea ports. These infrastructure constraints limit the development of export industries. It is also important to have efficient services associated with transportation and delivery of exports. An important area where substantial improvements can be introduced includes administrative procedures such as official border inspections of exported goods and the issue of all necessary export documentation (Liefert, 2014).

In addition to rail as a primary method of transportation of grain, in Ukraine the issue of expanding river carriage is currently broadly discussed. It is estimated that this mode of transportation may bring significant cost reduction, although it will require large investments in fleet and the renovation of the port river infrastructure. Investment would also be needed to modernise load transfer points at terminal sea ports (Pugachev, 2014).

In Russia the grain storage and transportation infrastructure has initially developed to serve the import needs of the country. As Russia has become a grain exporter, the revision and re-organization of the location of the grain elevator network is now necessary. Russia has about 1,100 grain elevators, which are located so as to service cities, rather than production sites. This is why many are located in, or near major urban areas. The larger the city, the larger the grain elevator, irrespective of how much grain is produced in the area. Such strategy was necessary when the cities were net importers; the elevators were filled with imported grain shipped from ports. Now Russia produces enough grain, and the pre-existing inward (import) distribution infrastructure is limiting the emergent export capacities (Liefert, 2014).

Grain producers demand grain storage next to the place of production and market disbursement (sale). The construction of new storage sites could then lead to higher income level of producers (or storage companies) and in turn increased collection of tax revenues. An alternative solution would be to build elevators and storage capacities through producer organizations. However, in Russia there is no experience of investments in assets on a cooperative basis through the producer organizations.

An interesting experience is observed in Germany, where abandoned cow sheds were converted into grain elevators. This experience can be applied in Russia as there exist many abandoned cow sheds throughout the country. Their modernization and conversion to grain elevators may increase local grain storage capacity to producers.

An important factor affecting the storage economics in Russia is linked to price policy of storage. Storage prices are indirectly determined by the government which sets the price for storage of grain purchased through the state procurement interventions. Private elevators set their prices in accordance with the prices set at elevators storing

government grain. For example, 55% of elevators in Stavropol Region are empty because for many farmers state set storage prices are too high.

Limited competition in the transportation industry is another constraint for the sector. Almost all transportation of grain (approximately 90%) is carried out by one private company ("Rusagrotrans") in Russia. Obviously this situation is politically driven. Access to grain transportation market was likely assigned to a company with "good" connections to public authorities. Despite the fact that transportation costs for export grain have reduced since 2001, the monopoly power of the company has likely detrimental effect on price formation and the quality of transportation services (Azarieva, 2014).

Chapter 3. Agrarian Reforms in Post-Soviet Countries

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3.1 Introduction

This chapter describes agrarian reforms implemented during the transition period and analyses their impacts on the agricultural sector. The chapter focuses primarily on reforms in Ukraine and Russia. Other countries are covered to a lesser extent only when relevant for comparison purposes. The next sub-section provides general description of the countries. Sub-section 3 presents the agrarian reforms. Sub-section 4 describes the impacts of the reforms and sub-section 5 concludes.

3.2 General Developments

Despite the fact that Russia, Ukraine, Belarus and Kazakhstan are all former socialist republics of the USSR and, consequently, have a lot in common, there are a few significant differences between them (Table 3.1).

Table 3.1. Belarus-Ukraine-Kazakhstan-Russia: some indicators, 2012

	Belarus	Kazakhstan	Russia	Ukraine
GDP (USD billion)	63	188	1856	165
GDP per capita, PPP (USD)	13427	13189	21093	7208
Land area (thousand km ²)	207.6	2700	16377	579
Population (million.)	9.5	16.7	143	47
Population density (inhabitants/km ²)	46	6	9	75
Rural population in total population (%)	24	45	26	33
Agriculture in GDP (%)	9.4	5.1	4.3	9.6
Agricultural share in employment (%)	10	26.5	7.2	16.8

Source: OECD, Official statistics 'Russia-Belarus'

Russia is a country with vast land and water resources but ranks only 47th in the world in terms of GDP per capita. Agriculture accounts for about 4% of GDP and approximately 7% of employment. Russia, one of the world's top importer of meat, dairy and sugar, has recently strengthened its position as the main player in the grain market. Russia's farm structure is mainly composed by two principle blocks: a large corporate sector and rather small individual farms. These sectors provide most of the agricultural output. Grain is mainly produced by the large corporate sector, while potatoes and vegetables are provided by small producers. Over a quarter of the population lives in rural areas that are characterized by depopulation and lower levels of social and economic development. Population density, at 8 people per km², is one of the lowest in post-soviet countries, with only Kazakhstan having a lower density (i.e. 6 people per km²) (Table 3.1).

According to Table 3.1, the economy of Ukraine is characterised by the lowest GDP per capita based on Purchasing Power Parity - in 2012 it was almost half the figures reported for Belarus and Kazakhstan. The contribution of agriculture to GDP is about 10% (employing 17 % of the active population). Approximately one third of the population lives in rural areas. Demographically the rural population is older and quickly aging, and suffering from high unemployment rates, low income, and poor condition of rural infrastructure. Food expenditure constitutes over half the budget of a rural households. At the same time, Ukraine is a country with a huge agrarian potential, with large areas of fertile land (i.e. 80% of all agricultural land). Ukraine is a net exporter of agricultural raw materials and food, and a global exporter of grain and sunflower oil. As in Russia, about half of the agricultural production is provided by a large corporate sector (or agrarian holdings), while smaller individual farms produce the remainder. Large scale businesses are quite diverse; while some are modern competitive enterprises, many of them are still inefficient and require further investment.

Kazakhstan has a vast amount of arable land as it ranks second behind Russia in terms of arable land per capita. The country is among the upper middle income countries (70th in terms of GDP per capita in the world). Agriculture accounts for 5% of GDP, but employs 27% of the population (despite the fact that 45% of the population lives in rural areas, which is the highest share amongst the countries under consideration). Kazakhstan is one of the 10 largest exporters of grain; most of it is produced by large agricultural enterprises. On the contrary, almost all milk and meat is produced and predominantly consumed by small individual farms. Similar to Russia, Kazakhstan is a net importer of agricultural and food products.

Finally, the economy of Belarus has remained by comparison more closed and consequently has not gone through large-scale economic reforms, unlike Ukraine, Kazakhstan and Russia. Its GDP is the smallest of the four countries, though it is higher than those of Ukraine and Kazakhstan when accounting for the Purchasing Power Parity across countries. The contribution of agriculture to GDP is about 10% (similar to Ukraine), but employs fewer people, approximately 10% of the active population. 24% of the population lives in rural areas. The main specialisation of Belarus is milk and dairy production. Products are heavily subsidised, both directly and indirectly, and therefore it is difficult for farmers from other countries of the Eurasian Customs Union (Russia and Kazakhstan) to compete with local producers⁴.

3.3 Agrarian Reforms

The ultimate goal of agrarian reforms was to create the conditions in which rural citizen could effectively work i.e. have the access to production factors, especially land that was central to the implementation of reforms. To achieve this goal two main tasks were undertaken, i.e. the privatization of agricultural land and the reorganisation of collective and state farms. Agrarian reforms aimed at organising the transition from state regulated agriculture to private agriculture (e.g. Uzun et al., 1994, 2007; IFC, 1995; Lerman et al., 2007; Deininger, 2003).

⁴ Further, it should be noted that Ukraine and Russia are members of the WTO, while Kazakhstan and Belarus are not.

Land Reform

While in many former socialist countries, land and property of former collective and state farms was resituated to the former owners or was distributed in-kind to agricultural labour, in Russia and Ukraine the reform process took a different direction. In Russia and Ukraine, the reform was implemented so that a member of a former collective or state farm obtained the right to a share of land and property of the farm (land share and property share), but neither land, nor property, were split up in-kind. The opportunity to receive land and property in-kind was offered exclusively to the newly formed private farms or agricultural enterprises, established by new owners using the allocated land shares and property shares. In-kind land and property allocation was also permitted for lease, or contribution to capital purposes of the newly formed private farms. This meant that a group of owners could combine its shares and form a new farm. Overall, the reforms in Russia and Ukraine facilitated to preserve the land in transformed former collective or state farms. That is, the property of the former collective or state farm associated to the contributed shares was passed to a new organization, i.e. the new organizations became successors of the former collective or state farms (Uzun, et al., 2013).

It is important to note that the agrarian reform had its own specific features in each region of the Russian Federation. Land privatization was not carried out in 15 regions, where certain regions preferred to keep the state-owned agricultural entities (e.g. Chechen Republic), or established producer cooperatives (equivalent of the former collective farms), whilst some regions focused on establishing family farms and private household plots (i.e. individual farms) (e.g. the Volgograd Region).

Land reform in Ukraine has not yet been completed (Pugachov, 2014). There are still in place several constraints in the land markets. For example, peasant (family) farmers, although they own land, are not allowed to sell it. The moratorium on agricultural land sales was extended until 2016. Overall, most land is rented to agricultural enterprises. However, the land rented by enterprises tends to decrease (e.g. from 22 million ha in 2001 to 17.4 million ha in 2011), whereas the land cultivated by individual farms tends to increase.

Russia has over 70 million ha of abandoned land. However, such land is mainly located in areas of low bioclimatic potential. Such land mainly belongs to non-operational agricultural entities, family farms and household plots, mainly located in the Northern and Eastern territories or in the Non-black Soil Zone. The main reasons leading to land abandonment is low soil productivity (low yields) and constraints associated with allotment, registration and sale.

Agricultural Support

From the centralized state planning and administration of agriculture, both Russia and Ukraine eventually made a transition to the type of support and management practices established in developed countries, which ultimately made them eligible for acceding to the WTO. Russian agriculture support policy is focused above all on producers, with the level of support growing over time. Owing to the subsidies, producers have managed to sustain positive profitability. However, mostly large producers have access to subsidies (e.g. approximately 5% of the largest agricultural enterprises receive almost 40% of all subsidised investment loans). Consumers do not receive any state support. Instead, they

tend to be text for certain products. For example, because of the high duties on imported products, domestic prices on livestock products and sugar are higher than world prices. These efforts are meant to ensure a high level of self-sufficiency with domestically produced food, pursuant to the national food security doctrine. According to the OECD estimates, the rate of support for Russian agriculture is twice higher as compared to the corresponding rate in the USA, and the same as in the EU. In Ukraine the agricultural support has remained minimal (e.g. in 2012 it was a mere 2% of the cost of sold products) and thus it is much lower than in USA and EU.

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 public administration (Keyzer et al., 2013).

A variety of new production entities emerged in agriculture including limited liability companies, private farms, agricultural production cooperatives, open and closed joint stock companies, family farms and household plots. In all, the farm restructuring process eventually leads to creation a dual production structure consisting of large corporate holdings (agricultural enterprises) and individual farms (peasant/family farms and household plots). In parallel with these organizational changes at farm level, the regimes prevailing on agricultural markets were modified introducing greater price flexibility allowing for improved terms of trade for agriculture. Yet, after the disastrous first stage of agricultural transition, government policy was 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 were introduced price support of grains through government interventions, low leasing rates of equipment, fuel and fertilizers subsidies (i.e. prices below market level) and tax holidays.

The main objectives of the state support in Ukraine are formulated in a similar way as in Russia and aim at:

- encouraging production profitability growth to the level, which ensures sustainable production growth;
- creating favourable social conditions for rural residents and improvement of welfare of rural population;
- meeting the needs of population in quality and affordable food products;
- expanding the country's export potential.

The main regulations which determine the state support of the agrarian sector in Ukraine include:

- State Support of the Agrarian Sector in Ukraine,
- The Principles of the State Agrarian Policy for the period until 2015,
- The Tax Code of Ukraine,
- Targeted State Programme for Development of Ukrainian Rural Areas for the period until 2015, and others.

In Russia the procedure of allocating funds for the agrarian sector was structurally changed in 2006. Budget support to farm producers could be rendered only in case it had been envisaged in the State programme for agricultural development and regulation of agricultural and food markets. This practice has its undeniable merits

since all operators in agricultural markets can – theoretically – plan their activities for a 5-year period knowing in advance the targets of agricultural policies, clearly defined measures of state support, as well as the amounts of subsidies they can potentially receive.

The first State programme for agricultural development in 2008–2012 was adopted relatively swiftly without prolonged discussions. The next State programme for 2013–2020 was supposed to be elaborated at the beginning of 2012. The draft programme underwent long discussions and negotiations between several state departments (partially due to the Russia's accession to WTO) and was finally accepted on 10 July 2012.

The Sustainable Rural Development Strategies are the other important documents both in Ukraine and Russia. They support policy measures with the aim to increase employment, income, and living standards of the rural population, as well as to slow down depopulation of rural areas. However, the actual funding of these measures for the 2008-2012 period was three times lower than initially planned in Russia, resulting in intended objectives not being achieved. Indeed, intense depopulation of many regions continues, with the level of income in the rural areas being two times lower than in urban areas. In Ukraine the population decline has started in 1993 and has never stopped since, dropping from 51.5 million people at the time to 47 million in 2012. 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. Needless to mention, poverty both in Ukraine and Russia remains concentrated in rural areas.

3.4 Impacts of Policy Reforms

Structural Change

As a result of the reform, 11.8 million people in Russia obtained land shares (around 120 million hectares) as well as property shares, although the majority of land shareholders leased out their land to agricultural enterprises. Property shares were mainly contributed to the capital of the newly formed private agricultural entities. Only a small share of the shareholders obtained their property in-kind and established family farms. However, in Russia, family farms cultivated 12.5% of total agricultural land by 2011, whereas the share cultivated by the former collective and state farms decreased from 98% to 64%. The average area per owner is approximately 7.8 ha in Russia, whilst in Ukraine it is approximately 4 ha, although varying significantly across Ukrainian regions (Uzun, 2014; Ukrainian Statistical Yearbook, 2013).

With respect to changes that occurred in the Russian agri-food sector it can be stated that a mixed farm structure has emerged, with agricultural enterprises, family farms, private household plots with their share in gross agricultural output representing 45%, 10% and 45%, respectively. Some regions have kept the corporative type of agrarian structure with prevailing agricultural enterprises in gross agricultural output (greater than 50%). On the contrary, in a number of other regions, the importance of agricultural enterprises has faded, and family farms and household plots have begun to provide more than 70% of GAO (Uzun et al., 2013)

In Ukraine the largest share of agricultural area is used by agricultural enterprises (over 45%). Household plots represent approximately of 43% of agricultural lands, whilst 11% of lands are used by family farmers.⁵ Accordingly, household plots produce nearly half of overall agricultural output (the same level as legal entities) but the structure of output is very different.

Some attention has to be paid to the problems of small and medium agricultural operators in CIS countries. During the reform years, smaller family businesses started to prevail in Russian and Ukrainian agriculture, as in many other countries, accounting for the majority of production. Specific features of such agrarian structures include:

- high proportion of micro-farms (household plots and small family farms) with small land plots and small volumes of production. They were inefficient, poorly cooperated, and had difficulties in accessing output and input markets.
- concentration of production in large agricultural organizations and agricultural holdings. They used modern technology, but had difficulties with management and monitoring of labour and safeguarding of inputs and output from stealing.

In 2010 there were 14 800 agricultural enterprises (corporate farms) in Ukraine. Within the group of agricultural enterprises, the group that cultivates more than 10 000 hectares has grown significantly since 2004, more than threefold compared to 2010 and their average size increased by 31% to almost 22 000 ha. The trend towards extreme concentration of land is still ongoing, 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 (Keyzer et al., 2013).

On the one hand, the agricultural enterprises, the successors of the state and collective farms of the Soviet era, enjoy the advantage of their large scale, particularly with respect to mechanized operations, 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 which the large farms cannot provide. 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 smaller size.

It should be noted here that generally the impact of agricultural enterprises on development of the Russian and Ukrainian rural sector is somewhat overstated. Their share in the gross regional agricultural output does not exceed 7%, and their profitability is not the highest (Uzun, 2014; Lerman, 2014, Pugachov, 2014). It was stressed that in many cases in agriculture the question of optimal size is still an open question and some have argued that the key to successful farming businesses is not their size but their management.

A well-managed small farm also should have a right to exist. There exist examples of successful management of large enterprises and agro-holdings by foreign managers, for instance, from Israel (Azarieva, 2014). They sometimes reduce production costs and asset management costs by a sizable amount. Naturally, some of the saved costs such managers would like to see as their remuneration. But only forward businessmen see the importance of modern management and are prepared to invest in this respect.

⁵ Note that family farms are recognized as legal entities in the Ukrainian legislation.

Productivity

The performance of main economic indicators and main categories of agricultural producers has shown improvements in Russia. In general, agricultural land use efficiency tended to decrease across all types of agricultural producers until 1998. After this initial drop in performance the land use efficiency started to increase in the following period. However, this process had different trends in agricultural enterprises and small individual farms. In agricultural enterprises the continuing reduction of arable land areas with the simultaneous growth of production led to a twofold increase in efficiency between 1998 and 2011. In 2008-2010 the efficiency reached the level of 1990. In the first years of reforms, the efficiency of land use by private household plots sharply dropped while their arable land area kept growing. This trend has since stopped as yields have stabilised in recent years.

Despite the differences in development of the efficiency of land use, smaller farms continue to use land much efficiently than agricultural enterprises. Small farms generate twice larger gross agricultural output per hectare than agricultural enterprises.

In addition, the transition to a market economy stimulated more efficient labour use. The number of labour involved in agriculture increased during the first period of the reform (before 1995). During the next period it started to decrease sharply from 10.3 million in 1994 to 6.6 million by 2011. The number of employees in agricultural enterprises dropped almost 6-fold in the course of the reform. Labour efficiency in 2011 was more than 4 times higher compared to 1990. At the same time, in 1990 gross production output per annual employee was 3.7 times higher for private household plots than for agricultural enterprises. In 2011 the situation completely changed in favour of agricultural enterprises, which demonstrated higher labour efficiency (i.e. 3.3 times higher).

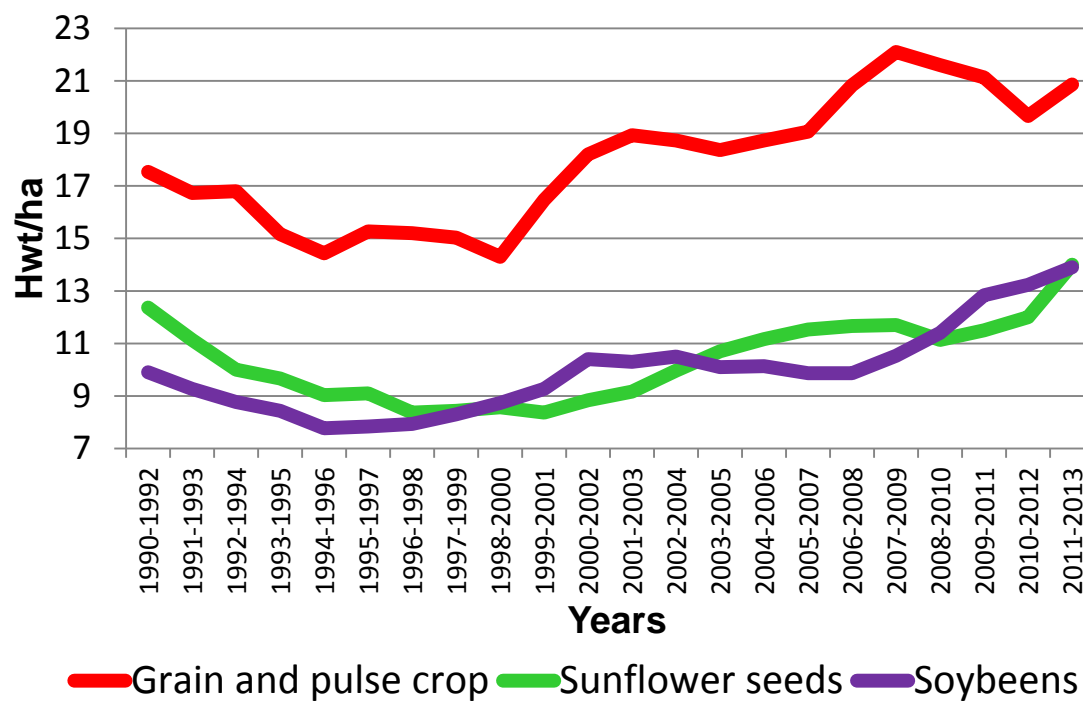
With respect to sugar-beet production and pig weight gain, direct labour costs were 8 to 10 times lower in 2011 than in 1990. For potato and vegetable production, as well as poultry weight gain, direct labour costs were 3.3 to 4.5 times lower. Labour productivity in milk, grain, sunflower and eggs production grew 1.6 to 2 times within the same period (Uzun et al., 2013.)

Yields increased for all major agricultural crops since early 2000s (Figure 3.1). Despite a decrease in crop yields during the first years of reform (1990-1998), it was followed by growth in subsequent years. In 1998 yields of agricultural crops were lower than in 1990. By 2011 the yields surpassed the 1990 level; for example yields of fruit and berry crops was 1.8 times higher than in 1990, sugar beet 1.6 times higher, soy bean, potato and vegetable 1.3 to 1.4 times higher, and grain 1.2 times higher. This observed growth occurred simultaneously with the overall decrease of arable land area.

The increase of yield was also observed in livestock and poultry production, especially poultry and pig production; poultry daily weight gain increased by a factor of 2.5 and pig weight gain by a factor of 1.53. Milk yield per cow was 38.9% higher and egg laying grew by 30.9%. Clear evidence of livestock efficiency improvement was reflected in the lowering of feed consumption per production unit. In 2010 feed costs per production unit dropped, with the sharpest reduction observed in pig farming: in 1990 8.3 hwt of feed units were spent on every hwt of pork, while in 2010 the consumption was 4.2 hwt, almost 2 times lower. Feed consumption per one kilogram of milk dropped by nearly

31%. Overall, productivity growth and feed unit efficiency increase occurred simultaneously with livestock and poultry number reduction.

Figure 3.1. Development of crop yields in Russia (hundredweight per ha of harvested area)



Source: Russian Statistical Yearbooks, 1990-2013.

Overall, the efficiency of inputs has increased, while the consumption of resources in Russia has reduced. Prior to the implementation of the reform process, agricultural producers were buying inputs at prices significantly below the global market. With the transition to a market economy, prices for inputs started to grow much faster than prices for agricultural products. In such situation only agricultural entities that could ensure the rational use and a high degree of resource efficiency were able to keep profitable production. For example, there has been a sharp decrease in electrical power consumption both in absolute values (almost by a factor of 5), and per 100 roubles of gross output (in 2011 it was almost three times lower than in 1990). Further, the actual volume of applied fertilisers over the years of reform has reduced almost by a factor of 5, i.e. by a factor of 3.3 per 100 roubles of gross output. If modern agricultural entities used as much inputs per unit of production as the soviet collective and state farms did, they would be financially unviable under the current market conditions.

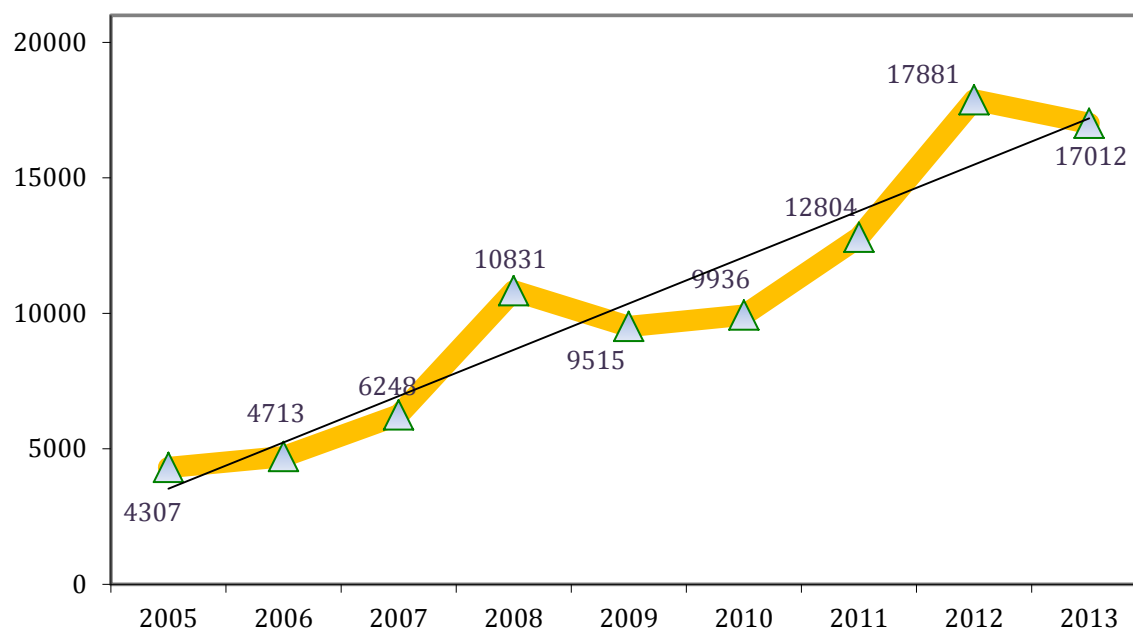
As a consequence of these structural changes, the Russian agrarian sector recovered after the crisis of the mid 1990s and became more attractive for investors and entrepreneurs. Cheap credit contributed to the development of the sector. The programme for subsidising interest rates launched in 2006 covered a considerable number of agricultural farms leading to a reduction in the share of overdue debt and defaults. This suggests that the measure was effective in this respect. However, the increased availability of credit for investors and operational solvent agricultural

entities, especially within the period 2006-2007 (i.e. during the implementation of the National Priority Project), resulted in excessive borrowing and in turn threatened the financial sustainability of the agricultural sector.

Similar to Russia, the agricultural reform in Ukraine resulted in an increase of agricultural production. Since 2000 there has been an increasing trend of agricultural efficiency and output, especially after the crisis of 2008-2009. In recent years, cereals and livestock production are both profitable in Ukraine. However, profitability significantly reduced in 2013.

An increase of production volumes led to an expansion of agricultural exports (Figure 3.2). Ukrainian agricultural export exceeded to 17 billion USD in 2012-2013. Sunflower oil took first place in agricultural export, grain and crop, second, and corn, third. Positive foreign trade balance in agriculture was 8.8 USD billion in 2013. A particularly strong growth in the structure of agricultural exports was observed for cereals over time.

Figure 3.2. Development of agricultural export in Ukraine, million US\$



Source: Pugachov (2014).

Agricultural Subsidies

The increase in State support for agriculture has coincided with lower efficiency of the sector. The nominal value of agricultural support has grown by a factor of 10 in roubles and by a factor of 9 in US dollars in Russia over the period between 2000 and 2010. The total share of support in gross added value of agriculture increased from 11.8% in 2000 to 33.8% in 2010. The main source of support represents transfers from consumers to producers. The growth of support is accompanied by the drop of efficiency of funds allocated for this purpose in term of its output ratio. In 2000 the return on each rouble of state support was equal to 7.4 roubles of gross output, while in 2010 it dropped to 2-2.6 roubles.

According to OECD, in 2008–2010 81% of the aggregate support to agriculture in Russia was provided through the most distorting measures. In 2010 the aggregate support to agriculture in Russia amounted to 555.7 billion roubles including 279.4 billion roubles of price support to farm producers (or 59.3% of total support). At the same time, from 1995 onwards, no support was provided in Russia to consumers of agricultural products.

Evidence suggests that farms have learned to respond to market signals and changed their production structure accordingly. Farms respond to market signals differently depending on the type of agricultural farm and production specialization. However, the main share of agricultural production comes from farms which receive profit from sales. The number of agricultural farms producing just one product has dropped sharply over time. Unprofitable farms are leaving the market. Financial sustainability of farms in Russia has increased: the share of overdue debt reduced from 68% in 2000 to 3% in 2010. Many agricultural enterprises and individual farms went bankrupt in the course of the implementation of the financial revitalization programme.

In Ukraine a significant impulse to the development of agriculture occurred after the country joined the WTO in 2008. The main features of the WTO agreement include the following terms for agriculture:

- financing of the “amber box” state support for the agricultural sector was established within the limits of the annual value of Aggregate Measure of Support (AMS) in the amount of 3.043 billion grivnas (based on the period between 2004-2006).
- the right of *de minimis* support without reduction was obtained (within the limits of 5% level of *de minimis* support for certain agricultural products and for non-food support programmes up to 5% of the annual value of gross agricultural production).

According to these WTO terms Ukraine has no obligations to reduce domestic support delivered through the “amber box” programmes. The only obligation is not to increase the annual level of support beyond the AMS amount. Further, the WTO rules do not restrict the options for using the “green box” programmes. The agreed WTO terms for Ukraine did not require introducing serious changes to the agricultural support. Upon joining the WTO, the support policy was focused not on the changing the support measures but instead on the efficiency of the support. According to indicators provided in Table 3.2, the income and profitability of agricultural enterprises largely increased after the WTO accession.

Table 3.2. Agricultural enterprises efficiency

Indicator	1990	Average			2011
		1996-2000	2001-2005	2006-2010	
<i>Agricultural products all</i>					
Income per 100 hectares (1000 UAH)	14.3	-6	7	34.6	108.0
Profitability index (%)	20.9	-17.5	9.7	14.9	27.0
<i>Cereals</i>					
Income per 100 hectares (1000 UAH)	16.4	2.5	9.8	34.7	93.9
Profitability index (%)	91.1	16.1	23	21.8	32.3
<i>Livestock</i>					
Income per 100 hectares (1000 UAH)	-2.1	-8.4	-2.8	-0.1	14.1
Profitability index (%)	-4.1	-45	-9.5	-0.2	13.0

The specificities of Russian WTO obligations compared to Ukraine, and other countries, have been related to the need to ensure the implementation of the Government programme regarding “the development of agriculture and regulation of Russian agricultural market until 2020”. According to the agreed WTO rules, during the first two years the level of support is fixed at 9 billion USD, and during subsequent years the support is required to be gradually reduced, being finally fixed at 4.4 billion USD in 2018. This corresponds to the average annual level of actual support for agriculture in Russia in the period 2006–2008. This period was chosen as the most representative recent period for which the Russian Federation provided data.

Another important aspect of the Russian WTO obligations is trade measures. On the whole, the average rate of bound tariffs for agricultural products is 10.8% (for comparison the current rate is 13.5 %). The average rate of the applied bound tariff is very close to the level of Ukrainian obligations. In this sense the conditions for joining the WTO are similar in both countries, and, in general, their impact on the agricultural sector is expected to be minor.

The main outcomes of agrarian reforms in Russia and Ukraine can be summarised as follows:

- Privatization of land which led to the emergence of large farms (latifundia).
- Formation of a mixed agrarian structure, with a polarization of farm sizes (small *versus* large farms).
- Adaptation of agricultural producers to market environment.
- Improvement of financial stability of farms over time.
- Increase in labour productivity, but rising unemployment level in rural areas.
- Improvement of land use efficiency, with a reduction of the average land plot size.
- Increase in yields and productivity, with a reduction of cropping areas and the total number of livestock.
- Increase in input returns and reduction of input use.
- Growth of state support to agricultural sector but the overall sector's dependency to support has reduced compared to the former soviet period.

3.5 Conclusions

Post-Soviet countries have come a long way since agrarian reforms have been introduced in the 1990s. Some argue that the aim of agrarian reforms has been largely fulfilled, because land privatisation and farm restructuring have taken place, and the efficiency of the agricultural sector and farm management has improved (e.g. Uzun, 2014; Lerman, 2014). Others argued that the reform has not been completed, as the institutional environment has not been fully formed, in particular land markets do not yet fully function (e.g. moratorium on land sales in Ukraine) (e.g. Pugachov, 2014; Sedik, 2014).

The degree of reform success in the CIS varies from country to country; while in Russia and Ukraine the policy over all these years had been more or less consistent, in Kazakhstan and other countries of Central Asia there had been involvement of other factors, for example, strong administrative pressures, not to mention Turkmenistan and Belarus, where private land ownership had not been introduced (Lerman, 2014).

Most CIS countries inherited similar economic problems from the previous centrally planned system and thus faced similar challenges prior to the start of the transition process in the early 1990s. The agricultural sectors of Ukraine, Kazakhstan and Russia went through deep reforms. The agriculture in these countries fully recovered 20 years after the start of the reform process from the initial decline in economic performance. An exception is Belarus which did not carry out privatization of agricultural land, yet new family farmers emerged although their share is small. Belarus is not facing the specific problems of large corporate capitalist agricultural enterprises, like Ukraine, Russia and Kazakhstan. However, there is no doubt that there is a common problem of economic efficiency of agricultural production.

Estimates of Uzun et al. (2013) indicate that the technical efficiency of large farm enterprises (all specializations) has shown a significant growth in Russia over the recent 15 years. The share of efficient farms has increased. Compared to 1995, their share has increased across agricultural operators except pig-farming. The fastest growth of technical efficiency was observed at enterprises growing vegetables and potato. Individual farms also experience higher profitability rates. Unfortunately there is still a large group of enterprises which use their land, labour and other inputs extremely ineffectively. While the exit of inefficient enterprises continues, the use of resources in better performing farms is expected to further strengthen, meaning that the share of efficient enterprises will grow. Once the number of such farms is large, then one can conclude that post-soviet agricultural enterprises have successfully and fully adjusted to market conditions.

What challenges are CIS countries expected to face in the near future? For Kazakhstan, Belarus and Russia, entering the Eurasian customs union challenges are quite obvious. They must harmonize not only their customs duties, quotas and tariffs, but also the entire agrarian policy. Yet the main subsidies and other measures are different in each country in their nature, importance and type of intervention mechanism. The agricultural support in Russia amounts to 17% of production value, in Kazakhstan to 12%, while in Ukraine it amounts only 1%. No evidence exists for Belarus; however, recent research of the Center for Agrarian Policy has shown that in Belarus the share of budget support exceeds that of Russia and Kazakhstan. Given this context much work, negotiations and policy changes will be needed to be completed before developing a common agricultural policy for this customs union.

Chapter 4 Production Potential of Russia, Ukraine and Kazakhstan

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4.1 Introduction

Although progress has been achieved in terms of transition towards becoming market oriented economies, this process is still ongoing in all countries belonging to the Eurasian wheat belt. Comprehensive literature is available on the subject, in particular with respect to characterisation of the individual transition paths and corresponding country specifics. Furthermore, there exists a large body of studies with respect to the assessment of progress in transition.⁶ What concerns agrarian reforms in transition countries, the following two main steps can be typically observed;

- (1) Land privatization - i.e. the shift from exclusive state ownership to private ownership, and,
- (2) Farm restructuring - shift from large-scale collective and corporate farms to small, and medium-sized (i.e. rather family-type) farms.

However, when looking at the countries belonging to the Eurasian wheat belt, remarkable differences are apparent. For instance, while in all RUK countries (Russia, Ukraine, Kazakhstan) land is titled and transferable,⁷ the Central Asian countries widely exclude private ownership of land. In fact, in Tajikistan, for example, land is state-owned with transferable use rights; in Uzbekistan it is also state-owned, with non-transferable use rights; whilst in Turkmenistan land is in non-transferable 'pseudo-private' ownership. In this light, a controversial discussion emerged concerning the role of private land ownership and land markets for the development of agricultural productivity and the emergence of large farms/agro-holdings as well as the persistence of subsistence agriculture as a pillar for agricultural production. Obviously, the corresponding answers are ambiguous, but appear nevertheless of vital importance for estimating the growth potential of agricultural production (i.e. capability to achieve production surplus available for export and thus for ensuring food security beyond the region).

⁶ Exemplary see e.g. EBRD (2013) which provides a comprehensive assessment of progress in transition based on a series of compound indicators. Moreover, see e.g. Falcetti et al. (2004) for a study of the link between progress in transition and economic growth. Thus, a robust causal impact of reforms on growth and an important feedback influences from growth to reform was both confirmed.

⁷ Note that according to Lerman (2014), in Russia still about two thirds of the land is state-owned and in the Ukraine less than 30% is owned by the state (Figure 4.3 in Annex 4.1).

Since 1990, a major restructuring took place in all countries formerly belonging to the Soviet Union, leading initially *inter alia* to a massive drop in total agricultural production. However, since the 2000s, the corresponding figures have tended to be increasing once more.

While production of agricultural commodities at household plots still plays a decisive role in many countries, peasant farms of any size, and also rather large scale production units, have emerged, the latter partly forming agro-holdings, which are typically controlling up to hundred thousands of hectares (especially in RUK countries).⁸ In view of this, it is worth considering what an appropriate and sustainable farm structure would be, and, further, what restructuring and development in land markets would be beneficial for achieving significant (and rising) production surpluses.

The emergence of RUK countries as agricultural surplus producers' trajectories, and recent evidence, such as export restrictions in the light of the economic and financial crisis, have been put in context in order to arrive at a reliable assessment of future production potentials and an outline of the policy actions still needed to fully unfold them. Here, a consideration of volatility in world commodity markets as well as a more specific examination and consideration of RUK countries brings such emerging issue to the fore and are dealt with in turn below.

4.2 The Impact of RUK countries on the Volatility of World Commodity Prices

The remarkable agricultural production potential in RUK countries (which at least partly still remains unfold) and the possible surpluses potentially available for export, together, are commonly assumed to be a promising way for ensuring global food security with a view to the rising global population. However, there are also some concerns linked to the emergence of the RUK wheat producers and the corresponding impact these new exporters may have on the volatility of world commodity prices. No doubt, volatility in terms of prices and/or quantities affects food security of households around the world. Accordingly, three related aspects appear worth to be discussed more in detail:

- World wheat price volatility and their relevance
- RUK countries' export restraints as a source of price volatility
- RUK production volatility as a potential source of price volatility and its causes

In general, world market prices (*inter alia* also wheat prices) have been fairly volatile during the last 50 years, with peaks in the 1970s (highest) and again in the mid-1980s and mid-1990s. The latest peak encompasses the period 2006-2011. Volatility is thus defined as significant fluctuation of prices (risk) combined with a high degree of unpredictability (uncertainty). While poor households may cope with predictable variability through coping strategies, uncertainty is more detrimental to living standards and food security due to the households' inability to devise corresponding coping strategies. In this light, the question emerged to what extent RUK countries'

⁸ For instance, according to data from Uzun, Shagaida and Saraikin (2012) a small number of major agro-holdings in Russia control 6.6% of sown area and produce 7.7% of the grain harvest, i.e. about 6 Mt (2006). The relative importance of agro-holdings in the Ukraine and Kazakhstan appears equivalent. See e.g. EC (2014), Wandel (2009, 2011), Petrick et al. (2011) and Petrick et al. (2014).

wheat production and export figures may affect the volatility of the corresponding world market price? According to Sedik (2014a), the export restraints imposed during the years 2006 – 2010⁹ were the main source of the peak in global wheat price volatility that occurred during the same time. In other words, already at the current production and export volumes (which are assumed to be further rising),¹⁰ RUK countries are decisive for the world market wheat price and its volatility, which is making both a possible subject of political/strategic decisions. Moreover, all RUK countries were found to exhibit relatively volatile production figures compared to other main wheat producers (as outlined below in Table 4.1). And their exports are even more volatile, presumably as they incorporate the volatility from production as well as export constraints.

Table 4.1: Variability of production and exports of leading wheat exporters

	Coefficient of variation and average annual growth rates, 2000-2012			
	Production	Average annual production growth	Exports	Average annual export growth
World	7	1.5	14	3.2
United States	11	-0.1	13	0.3
EU-27	8	0.8	28	8.2
Canada	14	0.2	16	0.1
Argentina	19	-2.3	24	-4.0
Australia	29	1.1	32	1.6
Kazakhstan	29	4.2	39	5.9
Russia	20	3.6	62	23.0
Ukraine	33	2.4	71	9.4

Source: Sedik (2014a)

Evidence, and especially the reason behind the highly volatile production, remains controversial, focused around three main emergent issues in RUK: (1) the generally rather rapid production growth since year 2000; (2) comparably low input applications;¹¹ and (3) a shift from spring to winter wheat in Russia.¹²

In sum, the high production variation for wheat in RUK countries may lead to (even over-proportional) export variation and, as evidence from recent years suggests, may serve as justification for export restraints. The latter, in turn, were shown to affect significantly world wheat price volatility (2006/08 and 2010/11). However, high production variation can possibly be addressed by higher input applications. The latter can be argued to be vital towards achieving the full potential of agricultural production in RUK in the mid to long-term.

⁹ In 2006/07 and 2010, politicians from all three RUK countries imposed individual wheat export restraints, motivated mainly due to low production and low stocks/use ratio and in order to protect domestic consumers from high wheat prices. Further export restraints in 2007/08 and 2010 led to a "Cascading effect" and ultimately to less supply response and investment incentives.

¹⁰ See for example Lioubimtseva and Henebry (2012).

¹¹ It has been outlined that the average amount of fertilizer application in all three RUK countries, compared to other leading wheat producers, was lower by order of magnitude.

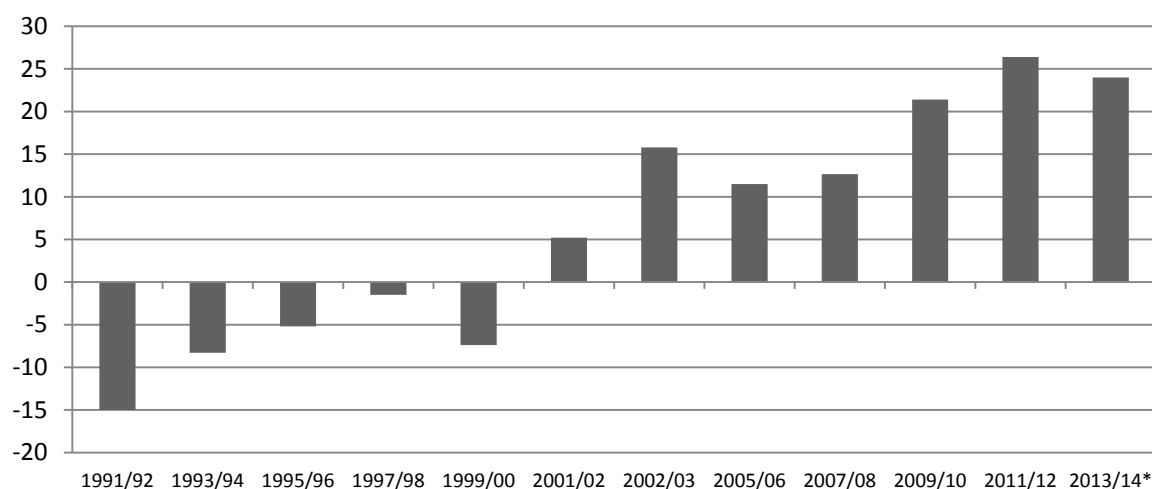
¹² Winter wheat yields are more variable, though yields tend to be generally higher.

In the following sub-sections, country specifics of Russia, Ukraine and Kazakhstan, and some comprehensive studies of their individual production potentials, are addressed.

4.3 Russia

Russia has accumulated about 25% of the global arable lands. However, at the time when the Soviet Union fell apart, Russia was a net importer of grain. Since about 2001/02, the trade balance has turned around and Russia has emerged as one of the largest grain exporters (see Figure 4.1).

Figure 4.1 Development of grain trade balance in Russia, Mt



Source: Rosstat, 1991-2012, *2013/14 forecast; see Yanbykh and Saraikin (2014)

According to Russian politicians, grain production and export figures will keep on rising. In this regard, Prime Minister Dmitry Medvedev has recently stated that, in future, Russia will feed the world.¹³ According to the Russian Minister of Agriculture, during the next 10–15 years, grain production is due to increase up to 120–125 million metric tonnes per year, which will lead to grain exports totalling up to 30–40 Mt.¹⁴ Even leading American experts estimate that Russian grain exports could outnumber the US figures by 2020 (Liefert et al. 2010). Nevertheless, it is unclear whether Russia really has such a remarkable grain production and export potential, and, if so, which factors would be vital?

On first inspection, it would appear that Russia's potential to increase agricultural production is viewed primarily with respect to the availability of a significant amount of currently unused agricultural land. Given that, it has to be questioned to what extent this idle agricultural land can, and will, be brought back to cultivation. During the last 20 years, according to Russian statistics, the total arable land area in Russia decreased by

¹³ Source: <http://vz.ru/news/2013/1/24/617280.html>

¹⁴ At the beginning of August 2014, the USDA in Moscow forecasted Russia's grain exports for 2013-14 at approximately 24 Mt, including 17 Mt of wheat and wheat flour, 3.5 Mt of barley, 2.5 Mt of maize, and about 1 Mt of other grains and pulses (Source: world-grain.com).

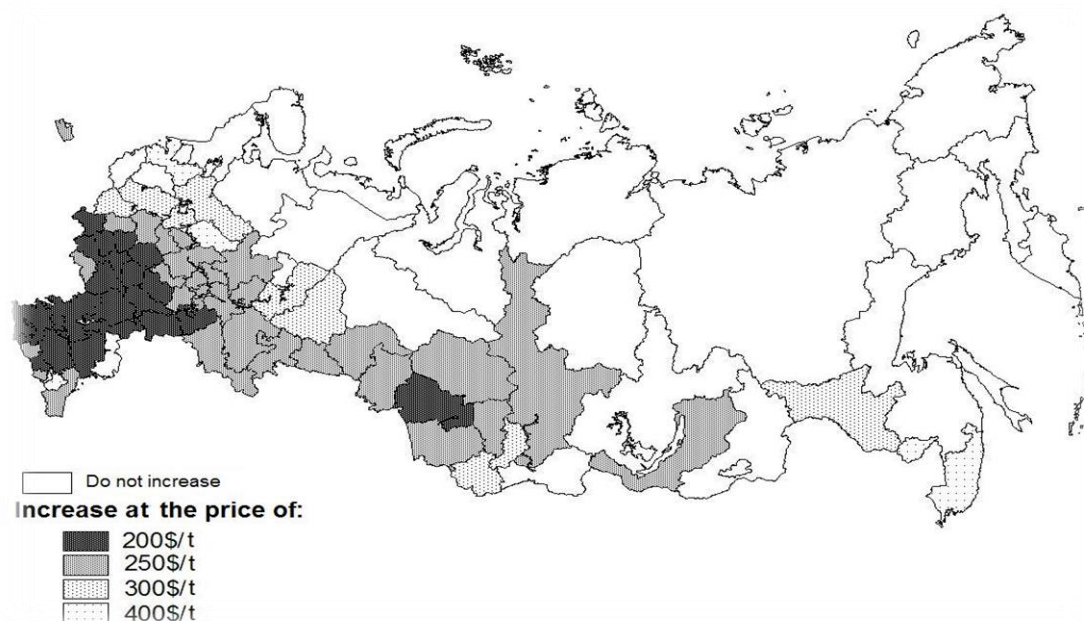
16.3 million ha (i.e. 12.4% compared to the 1990 figures) and the total area under crops even dropped by 41.3 million ha. Land area under grain crops was thus reduced by about 20 million ha in total (-31%).¹⁵ While the reduction of land area under grain crops was noticed across almost all regions of Russia,¹⁶ it was found to be more significant in regions with less favourable physical and economic conditions, having low bioclimatic potential, high costs per tonne of output and low yields. In other words, mainly marginal areas lie idle because grain production in these regions is economically not profitable, given the corresponding costs and the current local/world market prices. The latter, in turn, means that these areas may return to be used for agricultural production, given that the commodity prices will surpass the corresponding break-even levels. Hence, the reactivation of idle land in Russia, in essence, is directly linked to grain prices at the world market level.

A recent study jointly elaborated by the Russian Presidential Academy of National Economy and Public Administration [RANEPA] and the JRC-IPTS evaluated the potential of increasing grain production surpluses at regional level, thus considering available land, share of idle crop land, production costs, relative transport costs to export terminals, and global grain prices (Uzun et al. 2013). Several scenarios in terms of grain export prices at a sea port were simulated (\$200–\$400 per tonne). Given each anticipated export price, the increases in cultivated area in each region have been calculated. The volume of potential additional grain exports has thus been determined on the basis of area growth by assuming constant average regional yields per hectare (and the assumption of some minimum profitability). Overall, the empirical results suggest that additional grain exports produced at formerly abandoned land could potentially reach 40 Mt by 2025. Figure 4.2 illustrates the regional distribution of the anticipated production increases, given the scenarios in terms of world market price levels for grain.

¹⁵ Note that, while the share of land area under crops in terms of total arable land areas has reduced from 89% to 66%, the share of land under grain crops in total cropland areas has increased slightly from 53.6% to 58.2%.

¹⁶ Between 1990 and 2010, grain cropland area increased in only three regions of the Southern Federal District: Krasnodarsky Kray, Stavropolsky Kray and Kabardino-Balkarskaya Republic.

Figure 4.2: Regional distribution of potential production increases, given ad hoc scenarios of world market price levels for grain (USD per ton)



Source: Uzun et al. (2013), p. 117

Although it is recognised that Russia indeed has the potential of increasing remarkably its grain export by re-cultivating abandoned agricultural land, given the current global grain market situation and the investments (and additional costs) such expansion of production would require, it has been questioned whether the outlined scenarios as presented in the above mentioned study are realistic. In fact, exploiting Russia's production potential in full, and achieving the estimated 40 million additional tonnes or more simply by expanding the cultivated area, can be considered to be hardly conceivable and economically fairly unrealistic, unless market conditions drastically change. Instead, it can be argued that Russia has a higher potential for leveraging its grain production through yield increases and the application of modern technologies on land which is presently used for grain production. Moreover, such production growth through productivity increases would be independent from price scenarios at the world market and could strengthen Russia's position as an exporter due to higher international competitiveness. However, some obstacles in this regard remain evident. For instance, it has been argued that Russia experiences a serious mismatch between its grain production potential and its export potential. The latter is structurally restricted by the lack of storage and the capacities of transshipment (28 Mt) and carriage. In fact, given the gross grain yield forecasts and the expected growth of crop yields, the existing shortage of storage capacity is unlikely to be eliminated without significant investments. The same holds for developing the infrastructure for transport.

4.4 Ukraine

Similarly as outlined above for Russia, Ukraine is one of the few countries in the world that is in a position to significantly increase grain net exports, both due to its strategic location and the agro-ecological potential of its soils. In fact, especially Ukraine's natural

resources provide great productive opportunities. Altogether, 41.6 million ha (almost 69% of total land in Ukraine) is classified as agricultural land. The share of arable land is approximately 78% and, moreover, the available land is highly fertile since Ukraine has approximately 25% of the total black earth soil in the world. Hence, Ukraine holds considerable agricultural potential, which has yet to be unleashed (Deininger et al. 2011). Nevertheless, during the last 10 years, Ukraine has already gained a considerable share of international agro-food markets as exporter of grains, rapeseed, sunflower oil and seeds.¹⁷

In general, the grain production potential of Ukraine depends on the same two main factors as outlined above for Russia, i.e. amount of land area cultivated and per hectare yields. The share of land under grain production is very high in Ukraine. However, it is of a rather unstable character, i.e. growing or falling from year to year. Besides changes due to extreme weather conditions, the strong fluctuations across years relate to unsustainable mid- and long-term state policy in grain production, lack of control for crop rotation and other environmental measures, as well as the absence of a crop insurance system, etc. Despite the fact that environmental and climatic conditions in Ukraine are favourable for agriculture and well above average, the grain yields per ha appear to be relatively poor (below the corresponding worldwide averages for the last decade). A joint IIASA-FAO study (Fischer et al. 2012) revealed that, given the average yield ratio for grain crops and the soils and agro-climatic conditions in Ukraine, there is an estimated 10% to 40% gap between the actual and the potential yield that could be achieved.¹⁸ With regard to wheat production, the estimated difference ranges between 25% and 40%. In other words, provided that the potential yields could be achieved and, accordingly, Ukraine's production possibilities may be fully exploited (thus assuming constant amount of land use), wheat production could be increased by approximately 30 to 60% of current production levels.

Towards this, another comprehensive research project, jointly carried out by JRC-IPTS, the Dutch Centre for World Food Studies (SOW), and the Institute for Economics and Forecasting (IEF) of the National Academy of Sciences of Ukraine, addressed the question on how the Ukrainian farming sector could unleash its potential in order to contribute to the economic development of the country and ultimately help ensuring global food security. The main objectives of this joint study were (i) to understand the potential of Ukraine to increase grain production and export, and (ii) to explore the current state of institutional reform that is needed for unleashing Ukraine's production and export potential (Keyzer et al. 2012; Acs et al. 2014). The study illustrated that the Ukrainian wheat exports have been highly volatile so far and that recent fluctuations occurred, to a major extent, in response to climate induced domestic variation in production, frost and snow-mold (winterkill) in the forest steppes, and droughts in the steppes zones. Nevertheless, export potentials in the near future (under mean weather

¹⁷ In fact, since 2000, grain exports have risen significantly. According to Keyzer (2014), this is partly due to reform efforts and partly due to contraction of the domestic livestock sector. Overall, wheat stands for about 25% of total agricultural exports (in 2010). Other important export products include: animal or plant fats and oils (26%), oil seeds and fruits (11%), milk and milk products (6.5%). See e.g. Kobuta et al. (2012) for a comprehensive study on the wheat export economy in Ukraine.

¹⁸ Yield gaps have been estimated by comparing potential attainable yields and actual yields from downscaling year 2000 statistics of main food and fibre crops. For more details see Fischer et al. (2012) and for an adaptation and interpretation see e.g. Keyzer et al. (2012) and Keyzer (2014).

conditions) were estimated to be generally increasing.¹⁹ The total area sown was assumed to increase slightly (+4%), while the figures for wheat, maize and barley are expected to change by +7%, +17%, and -5%, respectively. Yield increases thus vary: 30% for wheat and maize and almost 70% for barley, resulting in total production increases of 40% for wheat, 50% for maize, and even 60% in terms of barley, which, in sum, could allow expanding total grain exports significantly. However, production increases in terms of maize and barley were assumed to be mainly absorbed by increasing internal feed use and biofuels, while the estimated surplus production of wheat, in fact, may be exported.

Further based on the results from the aforementioned study, a number of points are considered critical towards unlocking Ukraine's farming potential. For instance, it has been argued that policies should better take into account the 'dualization' between large commercial and small individual farms. In this light, an increase in plot size, especially for rural farm households, has been suggested in order to benefit from mechanization. Further, supplementing land ownership rights with the introduction of other formal titles, for instance the right of passage and user rights of the commons (e.g. pastures), has been suggested in addition to an end to wasteful cadastral registration of parcels in smaller units than individual fields. Owners of such parcels should be treated as shareholders of the field, or of the farm, and land users should be made to pay rent to land owners in cash. Overall, high importance is attached to installing transparent and enforceable institutions and, by that means, to ensuring a widely unbiased competition between the different types of agricultural producers. In fact, several studies argue that Ukraine's failure to tap its full production and export potential is mainly a result of its market-unfriendly institutional base. According to the 2013 Index of Economic Freedom, Ukraine was ranked 161 out of 177 countries; with scores well below the European average with respect to property rights, freedom from corruption, fiscal freedom, government spending, and dimensions such as business freedom, and freedom in terms of labour, monetary, trade, investments, and financial affairs. It is generally argued that, even though there is significant support from the EU and other international organizations, there is still a lot to be done in the Ukraine in order to develop an adequate institutional framework. The necessary measures to support grain market liberalization include clearly defined property rights, enforcement of contracts, credit access, and better market infrastructure.

Yet, the main challenges for increasing grain exports from Ukraine arguably relate to the physical infrastructure, export restrictions and customs regulations. Indeed, the logistics and trade infrastructure should be improved, not only to cope with the expected increase in production in Ukraine, but also with the transit of grain from other countries such as Russia and Kazakhstan. Increase of grain exports will not be possible without improving Ukraine's infrastructure, but also not without removing current barriers for free and timely export of grain from Ukraine. Improved infrastructure and transparency in grain export market could reduce transportation and marketing costs, increase competition and attract further investment into agribusiness. In addition, it could generate higher farm gate prices for grain producers. Further relevant

¹⁹ Currently Ukraine accounts for about 6% of the total world grain production and close to 15% of the world export of grain, which is expected to rise to 8% and 18% by 2020, respectively. In fact, according to agricultural market projections, based on OECD-FAO Agricultural Outlook (2011), EU AGLINK (2011) and AGMEMOD (2012), the role of Ukraine in the world grain market is significant and is due to further increase (Acs et al. 2013, p. 22).

restrictions to foreign trade are seen in the fact that until recently (by 2013) only few trading companies possessed export licenses. In this regard, legislation to ease access to export licenses should be applied forcefully.

Another sensitive issue in terms of exports relates to the trilateral trade-relations the Ukraine has with the EU on one side and Russia on the other (as its two main trading partners). In fact, in the light of the negotiations of the Ukraine-EU Association Treaty, *inter alia*, gradual convergence to the *Acquis Communautaire* (EU standards, norm, laws and regulations, etc.) has been required. In turn, the Eurasian Union has been outlining its own rules (thus in some details deliberately deviating from EU rules). Obviously, Ukraine cannot abide by two systems, given the corresponding rules are contradictory and either system requires corresponding convergence in norms, regulations, etc. Hence, international diplomacy is called to take this antagonism into account, ultimately for the sake of easing food exports and thus global food security. Dropping the convergence requirements on either side or making a general attempt to bring them in line might be the way forward.

In summary, Ukraine has considerable scope for stepping up its grain exports towards significantly contributing to global food security. However, it should stabilize its currently volatile export volumes by a better management of irrigation and nutrient imbalances, storage and plant protection systems, as well as improving infrastructure and market institutions, abstaining from imposing export bans in case of domestic shortfalls, and by reducing support to biofuels.

4.5 Kazakhstan

Kazakhstan has a territory of 2.7mio km² (larger than Western Europe) and is the largest land-locked country in the world. With 16.7 million inhabitants, it is also one of the least densely populated. Agriculture accounted for 4.6% of Kazakhstan's GDP in 2011. Grain and livestock are the most important agricultural commodities. Over 80% of the country's total area is classified as agricultural land, including almost 70% occupied by pasture. Arable land constitutes less than 10% of the country's total land area, but its availability per inhabitant (1.5 ha) is the second highest in the world. Major crops include wheat, barley, cotton and rice. The most relevant wheat production regions are located in the northern/north-central territories,²⁰ where the topography is mainly flat and where production on rich and productive *chernozem* and *kashtan* soils accounts for roughly 70% of the country's total wheat harvest.

In general, all agricultural areas are characterised by low annual precipitation (150-320 mm). The climate is typically semi-arid, with cold winters and warm summers. Droughts are frequent (two years in every five, on average, predominantly during the May-August growing season when poor rainfall and heat often persist). Large scale irrigation widely does not exist. Moreover, harsh winters regularly affect agricultural production. Hence, yield losses/crop failure are not exceptional, leading to frequent and sharp year-to-year variations in yields which, in turn, affects regional food security and the amount of surplus production available for export. Wheat cultivation in Kazakhstan ranges from 10 to 14 million ha annually and the average annual output is 9 to 22 Mt of grain. Spring wheat comprises 90% of the country's total wheat production. Owing to

²⁰ Some winter wheat is grown in southern Kazakhstan, but the annual harvest is a minor share in total.

the dry climate, northern Kazakhstan produces good quality hard wheat. In general, the yield per hectare is below regional and international levels, indicating significant potential for growth.

Currently, the wheat sector in Kazakhstan is mostly privatized, but most farmland is still rented from the government at low prices and land sales remain relatively rare. Broadly equivalent to Russia and Ukraine, as outlined above, essentially three different farm types exist: large privately operated agricultural enterprises (especially in the North of the country), small peasants' farms, and household plots with fragile integration into markets. Large scale agro-holding companies play a major role. For instance, in *Kostanai* oblast, which is the most important grain-producing region of Kazakhstan, over 40% of the agricultural areas are held by the four largest holding companies only. In contrast, individual farmers control on average approximately 650 ha. However, according to Fieldsend (2014), both farm types appear to be broadly comparable with regard to indicators such e.g. annual change in total land use, gross agricultural output per ha, and wheat yields per ha. An ideological bias against individual farms (i.e. in favour of large scale farming) nevertheless seems to prevail amongst government officials.

Kazakhstan is self-sufficient with respect to many foods. Potential risks in terms of food security in Kazakhstan are now mostly confined to food price volatility arising from market volatility and the variances in production due to fluctuations in weather conditions (including water scarcity). Kazakhstan is vital for food security in several neighbouring countries. In fact, it is the largest wheat exporter in central Asia, exporting wheat and flour principally to countries of the CIS.²¹ Beyond CIS, Afghanistan and Iran are the most important destinations for Kazakh wheat. However, export restrictions, imposed by the Kazakh government several times during recent years in the light of unfavourable yields and often implemented simultaneously with neighbouring producers, have proven a remarkable potential of disturbing supply and causing price shocks on international markets.

In this light, a comprehensive research project jointly elaborated by JRC-IPTS and the Szent Istvan University (Hungary) was set up to identify and describe the critical elements essential for, and limitations against, increased sustainable growth and competitiveness of the wheat sector in Kazakhstan as a strategic global production region. Ultimately, it was due to assess the extent to which Kazakhstan can become one of the key actors in meeting world wheat needs. In this regard, quantitative analyses relied on data series concerning the core export market segments between 1990 and 2013 and on using linear and polynomial regression techniques on controlling variables such as, for instance, wheat harvested area, wheat output, starting stocks, domestic wheat consumption, wheat exports, domestic feed consumption, (food, seed and industrial) consumption, and imports.²² Based on a series of assumptions,²³ the

²¹ Note that a joint Customs Union with several CIS countries was set up after Belarus, Russia and Kazakhstan signed a corresponding Treaty in October 2007. For Kazakhstan, the establishment of the Customs Union involved an increase in tariff levels on agro-food products, which were largely aligned with those applied by Russia. Russia's official WTO accession in 2012 is likely to prompt Kazakhstan to take the final steps necessary for becoming a member too.

²² Note that there are further relevant studies on this subject; see for example Bruinsma (2012); Petrick, Wandel, and Karsten (2011); and Helmar (2014).

²³ For instance, average annual precipitation was assumed to be in accordance with the scenario of the GAEZ 3.0 system based on the CSIRO Mk2 model. Accordingly, evapotranspiration will highly increase in the main wheat growing areas as the mean temperature will increase and the amount of precipitation is

following trends were identified: The regional market of wheat for human consumption is becoming saturated; demand for feed wheat will increase (which was seen as a non-acceptable alternative for Kazakhstan's excellent milling quality wheat output); decelerating import growth; and a general economic decline in some countries. Moreover, stagnation in domestic production and markets until 2018 was anticipated; i.e. according to Fieldsend (2014), harvested area will likely to be 100.9% of the present area, the domestic consumption at 98.7%, and the food, seed and industrial consumption at 95.0% of present figures.

With a mid-term view, however, the supply of wheat in Kazakhstan is expected to increase from around 18 Mt currently to 19.5 Mt by 2023/24. Total utilisation (feed, food etc.) is then assumed to raise from around 10 Mt presently to around 11.8 million. The harvested area is thus expected to increase by around 4% over this period, while exports will expand by around 10% (from the current annual average of around 7 to 7.7 Mt). Yields are also expected to increase, from around 1.13 tonnes/ha to 1.24 tonnes/ha in average. Nevertheless, it was argued that beyond this horizon, and thus with a view to the long-term wheat production capacity of Kazakhstan, the present yield levels can only be maintained or increased in the main wheat growing areas by using the highest possible input levels. In turn, with intermediate, or rather low input levels, yields will be reduced to less than 1 tonnes/ha, which would put the economic rationale of wheat production into question.

As a general conclusion, according to Fielsend (2014), wheat production levels in Kazakhstan are due to increase. However, two key problems will remain: (1) technological factors and (2) climate change (i.e. worsening of the agro-ecological potential). Moreover, the anticipated trend of increasing domestic consumption as well as fast development of animal husbandry will considerably affect the surplus available for export.

A number of immediate areas have been identified related to the question how to address the afore mentioned challenges, such as, for instance, providing enhanced financial support for farm modernisation; setting up a system of farm level data collection; improving knowledge base and expert skills in the sector as well as the cooperation between farmers and their marketing activities. Modernizing transport and storage facilities are also of considerable importance.²⁴ Finally, the existing mechanisms for policy support / distribution of subsidies in Kazakhstan should arguably become more transparent. Need for further research is generally seen in the possible impact the development of the livestock sector, especially in Russia and Ukraine (particularly given some recent policy initiatives), may have on wheat production and export from Kazakhstan.

due to decrease. The AI (ratio of annual precipitation and potential evapotranspiration) will increase in the main wheat producing areas. Further assumptions were made concerning the Fournier (FI) and the Suitability Index (SI).

²⁴In Kazakhstan, most of the wheat and flour is shipped by rail. The country is considered to be reasonably well linked to the central Asian railway network. It could potentially make its way in Central Asia as a major logistical axis.

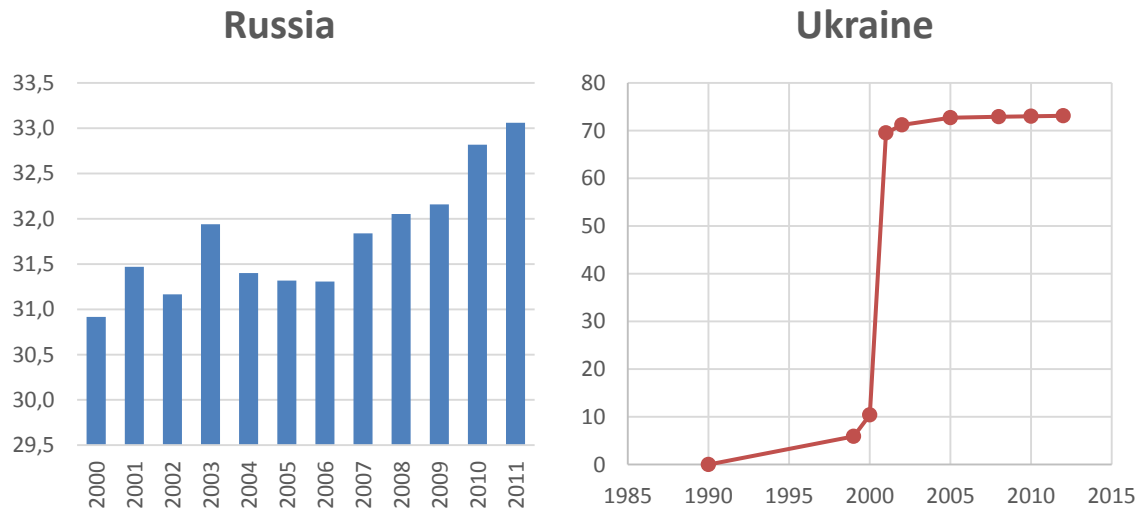
4.6 Conclusions

In summary, agricultural production potential of the RUK countries appear generally promising as production, yields and exports are rising, making the region a promising candidate for contributing significantly to ensure global food security in future. Main challenges are seen in social and demographic aspects, disparities of rural and urban areas, an obvious lack of investments, still rather weak market institutions, and in the structure of agriculture in general, i.e. the average plot and farm sizes and the corresponding question whether more individualization of agriculture should be the way forward (thus mainly allowing household-plots to grow and to play an increasing role for the total agricultural output).

In the same light, and with a look at increasing the overall production of foodstuff in the RUK countries, attention (and investments) should be directed towards improving yields on the land currently in use rather than a rush to trying to bring back abandoned land. Production potentials are widely assumed to be higher when following this strategy. Indeed, abandoned land is marginal land, i.e. out of current production for good reason and not profitable given current retail prices. However, this may change in the light of rising world market prices. In other words, to the extent that water is generally available for irrigation where needed and no other eminent restrictions for production exist, the amount of land under cultivation in the Eurasian wheat belt is a function of food prices at world market level.

Annex 4.1

Figure 4.3: Private ownership of agricultural land in Russia and Ukraine (percent of total agricultural land)



Note: Note that the data of 'agricultural-zoned' land and 'agricultural land' (in the sense of arable land) do not correspond to 100%. However, directly comparable figures were not available.

Source: Lerman-(2014)

Chapter 5 New Players in the Region: The Central Asian Countries

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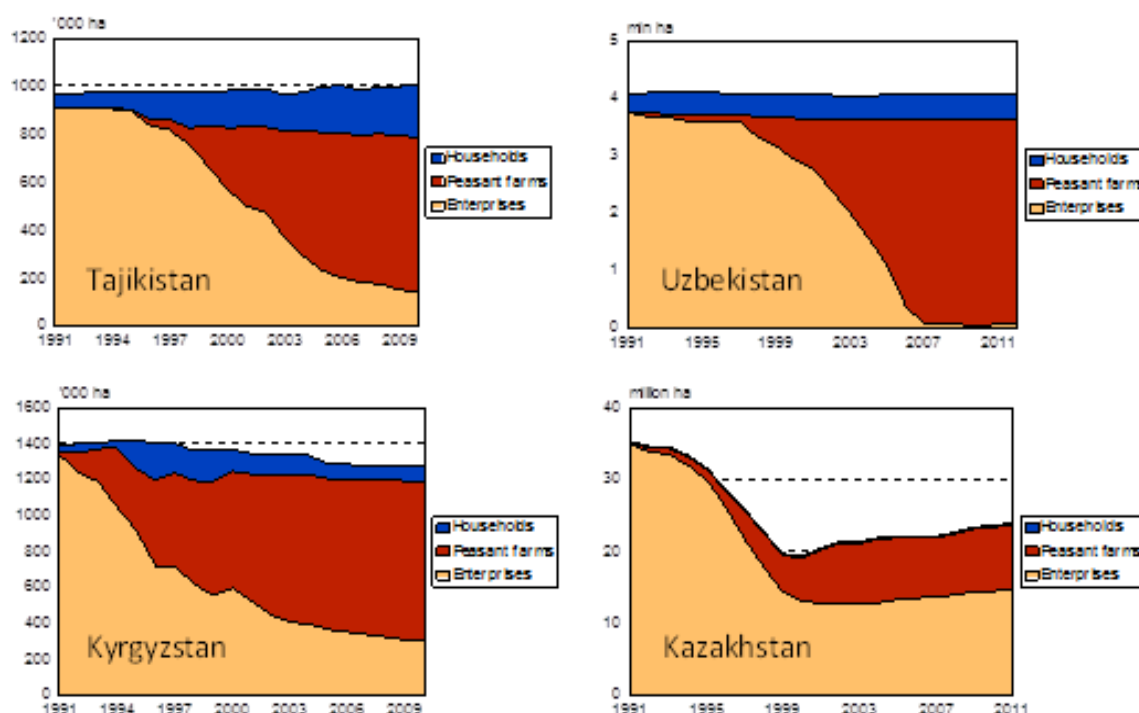
5.1 Introduction

In post-Soviet countries, in general, the transition from a planned to a market economy has been motivated by various political and economic objectives (see e.g., Csaki and Nucifora, 2005). The discrepancies between centrally set plans and actually realizable farm output in the late-1980s led to substantial losses in agricultural production (Lerman, 2009) and, moreover, to increasing deterioration of the environment (Spoor, 2002).

Since these countries gained independence in 1991, various agricultural reforms have been implemented, such as the abolishment of state planned production and the distribution of land to individual producers. However, in some countries, the main agricultural policies remain to be centrally set even until now, as, for instance, in Turkmenistan. In Uzbekistan this holds e.g. with regard to policies related to cotton and wheat production. The 'individualization' of agriculture, and thus especially land tenure, is affected accordingly. As outlined above, in contrast to RUK, Central Asian countries still widely exclude private ownership of land, although all have gone through substantial reform processes in this regard: In Tajikistan land is state-owned with transferable use rights; in Uzbekistan it is also state-owned, with non-transferable use rights; whilst in Turkmenistan land is in non-transferable 'pseudo-private' ownership.

With a view to the distribution of arable land among the main groups of agricultural stakeholders, as presented in Figure 5.1, there are significant differences in terms of the country specific relevance of household plots. Since the latter rather corresponds to subsistence agriculture (and is thus driven by local and regional market constraints) and, *inter alia*, also food security considerations, a look at the corresponding perception of food security risks appears vital and has been addressed by Sedik (2014b).

Figure 5.1: Individualization of land tenure: Arable land in Central Asia



Source: Lerman and Sedik (2009), p. 5

Further, Table 5.2 illustrates some of the potential food security risks across Central Asian countries. In fact, if these countries were assumed to be emerging as relevant players in terms of international food security, first of all, food sufficiency on their home ground had to be ensured, and corresponding risks evaluated in detail, since they may translate into risks for producing surpluses possibly available for export. This chapter considers each of these nations, and their respective potential, in turn.

Table 5.2: Matrix of potential food security risks in Central Asian countries

Type of risk	Factor	Kazakhstan	Kyrgyzstan	Tajikistan	Turkmenistan	Uzbekistan
Access	Poverty	-	✓	✓	-	✓
Food prices volatility	Market volatility and fluctuation	✓	✓	✓	✓	✓
Malnourishment	PPP/Income	-	✓	✓	✓	✓
Import dependency	Limited local production	-	✓	✓	✓	✓
Climate change, weather conditions and natural resources	Frequent weather fluctuation and water scarcity	✓	✓	✓	✓	✓
Weak food safety net	Fiscal situation and shortage of emergency reserves	-	✓	✓	-	-
Financial constraints and macro-economic conditions	High interest rate, limited access to financial resources	-	✓	✓	-	-

Source: Sedik et al. (2011), adapted by Fieldsend (2014).

5.2 Uzbekistan

As highlighted in a recent Policy Brief released by the European Commission (09/2013), "...Uzbekistan is the Central Asian Republic that suffered the less from the collapse of Soviet Union. GDP was restored to pre-independence levels as early as 2002, and the country has since enjoyed a protracted phase of sustained economic growth. Uzbekistan is currently a medium-low income country, and living conditions in the country have significantly improved, though mainly in urban areas. Regional and social disparities are high. Rather than liberalise its economy and adopt the economic reforms suggested by international financial institutions, Uzbekistan has preferred to set-up a system based on import substitution under strict state control. This has had the merit of protecting the country from external shocks but has also led to a relatively inefficient system where state interference in the economy is the rule rather than the exception." (European Commission 2013)

In 2011, 19% of Uzbek GDP was generated in agriculture (compared to 34% in 2001). According to World Bank figures, the drop in the GDP share mainly corresponds to significantly rising production volumes in non-agricultural sectors, such as e.g. energy, petrochemical and automobile manufacturing. The processing of domestic agricultural output contributes another 5–10% to GDP. Only about 10% of the total area is cultivable land, i.e. approximately 50% are desert pastures, and virtually all agriculture requires irrigation (currently around 4.2 million ha irrigated, i.e. the total irrigated area has remained about constant since 1990). Cotton and wheat are the main cash crops. In 2012, Uzbekistan was the 6th largest producer and 5th largest exporter of cotton in the world. Nevertheless, there is an increasing diversification into cereals (mainly wheat, but also barley, corn, and rice).²⁵ In fact, cropland under wheat expanded by approximately 1 million ha since 1991 (cotton area was reduced by about 0.5 million ha) and the wheat harvest rose from 610,000 tonnes (1991) to roughly 2 Mt (1995), and lately approximately 6.5 Mt (2011).

According to Muesaev (2010), Uzbekistan has achieved a secure supply of food at national level. More recently, the growth rate of agricultural production has been significantly higher than the population increase; i.e. food availability has gradually improved further. Nevertheless, in 2012, the share of population below the poverty line was still 17.7% (27.5% in 2001), of which about 73% live in rural areas (see: EC, 2013).

As outlined above, Uzbekistan's approach to land distribution has differed substantially from those initiated in other countries of the former Soviet Union. For instance, the Uzbek state has retained exclusive land ownership (Lerman 2009). The farm restructuring process has involved the allocation of land to producers through leasing contracts. Subsequently, the government has enacted different phases of land reforms during which different farm sizes and tenure arrangements have been considered optimal (see e.g. Sartori and Trevisani, 2007). Consequently, large-sized production units were first fragmented and many smaller units emerged. In 2008, these small units were once again consolidated under the declared objective of the 'governmental programme of farm optimisation'. In 2011, this number of farms was further reduced

²⁵ Other relevant products are sesame, onions, flax, tobacco, (dried) fruits, melons, and silk. Cattle, sheep, and chickens are raised for meat. In total, about 5 million liter milk is produced in Uzbekistan (3 million cows), i.e. yield/cow is among the lowest within the CIS.

(by 20%) in a second consolidation wave.²⁶ According to the Uzbek government, the main rationale for these reforms was to increase agricultural productivity. However, Djanibekov et al. (2012) argued that the land consolidations as implemented since 2008 will have a limited effect because increasing farm size alone will provide insufficient incentives for creating economically efficient farm enterprises.

Immediately after gaining independence in 1991, Uzbekistan launched a programme of national grain self-sufficiency, supplemented by state subsidies and production targets. Accordingly, Uzbekistan turned from a wheat importer into a net exporting country. To reduce competition in terms of water use with cotton, varieties of winter wheat were introduced. This led to a gradual increase in wheat area and yields, although at the costs of reduced fodder production and partly unsustainable crop rotation. Nowadays, about 80-90% of the total Uzbek grain production is wheat (of medium/low quality). There is mainly state procurement for both 'strategic crops' (i.e. cotton and wheat) with rather strict corresponding regulations.²⁷ Wheat productivity is slightly above the average yield per ha in neighbouring countries and has lately experienced a positive trend. However, standard deviation, i.e. the production risk, remains comparably high.

Imports of food declined remarkably in the light of the grain self-sufficiency policy. However, the amount of smuggling rose considerably and the overall success of the policy should be judged in connection with the related economic, political, social costs. In fact, expanding wheat cultivation reduced the area devoted to other products, possibly with negative consequences for the population's diet and nutrition.

In this context, questions arise whether further increase of foodstuff production, especially wheat, will be feasible, and, accordingly, if Uzbekistan is capable to emerge as an increasingly relevant player in the region? The answers, as expanded below, are somewhat ambivalent.

In fact, the country experienced sustained economic expansion, with real growth rates averaging 8.3% annually between 2005 and 2012. And growth is expected to continue at around 7 - 7.5% annually over the medium-term, i.e. Uzbekistan is due to play an increasing economic role in the region with a considerable potential for further development since it is rich in natural resources (gold, copper, natural gas, oil and uranium) and, lastly, but not least, because of its strong agricultural base. Its size and population (Uzbekistan is the most populous Central Asian nation), its large workforce and its position make the country a natural regional leader in both political and economic terms. Moreover, according to FAO data, Uzbekistan's wheat import dependency ratio was 82% in 1992 (964,000t wheat produced, 4.45 Mt wheat imported, no exports). By 2003, self-sufficiency in terms of wheat was basically achieved. Indeed, as production volumes kept on rising further, there is surplus available for export and correspondingly the potential to play a vital role for international food security. However, the country is land locked, which makes external trade both more difficult and more expensive. Furthermore, Uzbekistan still suffers from its incomplete transition to a fully market oriented system. The country is still

²⁶ Note that the farm restructuring process in Uzbekistan has been described by a number of scholars from different angles (e.g. Lerman 2005, 2008a,b; Trevisani 2007; Veldwisch and Spoor 2008).

²⁷ Cotton and winter wheat play a vital role in Uzbek agriculture: the first crop is a vital component of the national export revenues, while the latter is key in achieving independence from grain imports. Due to these strategic roles in the national economy, both crops are part of the state procurement system and, hence, are subject to strict regulations imposed to ensure budget revenues and self-sufficiency.

excessively reliant upon a handful of commodities (gold, oil, gas and cotton). Added to this, Uzbekistan is ranked fairly low in the World Bank's 2012 "Doing Business Assessment" (ranked 152 of 185, while e.g. Kyrgyz Republic was ranked 67). In the 2012 World "Corruption Perception Index" Uzbekistan was ranked almost last (170 out of a total 174 (Transparency International 2012)).²⁸

In other words, there are a number of challenges for Uzbekistan to be addressed before emerging as a relevant player in terms of food security in the region and possibly beyond. In fact, despite some moderate improvements, agriculture in Uzbekistan remains largely inefficient, over-regulated (especially in terms of cotton and wheat), and exposed to severe environmental risks. Liberalizing agriculture (i.e. removing state order and regulations; monocultures, etc.) may lead to diversification in the production portfolio (with a number of desirable side-effects, see e.g. Bobojonov et al., 2013). But, by the same token, this could result in less surplus production available for export. Djanibekov et al. (2013) argued, moreover, that deregulation may also increase the demand for irrigation water. Furthermore, the lack of investments in agriculture and infrastructure (especially in the irrigation but also in the transport system), as a result of the correspondingly low confidence of international investors (see "Doing Business Assessment" and "Corruption Perceptions Index"), turns to be an obstacle.

And finally, in the light of water consumption that is already extremely high (per capita consumption is 2nd highest in the world, just after Turkmenistan), a general increase of irrigation and/or expansion of irrigated land would hardly be feasible. According to the World Bank, Uzbekistan's water deficit is projected to increase from 2 km³ in 2005 to 11-13 km³ by 2050 (EC 2013, p.13; CIA 2014a).²⁹ The country is therefore largely dependent on 'imported water' from Kyrgyzstan and Tajikistan, which are situated on higher ground. However, water supply might rather be decreased than expanded in future. In fact, the dam on the Tajik river Vakhsh is intended to enable Tajikistan to reach self-sufficiency in terms of power generation, but it is also likely to wreak dramatic effects on the Uzbek agricultural sector. What the real impact on downstream agriculture in Uzbekistan will be is subject of controversial debate. Jalilov (2011) concluded that water shortages may cost up to €450 million annually in agricultural losses, with a potential 2% reduction in Uzbekistan's GDP. In this scenario, irrigated area may be reduced by 300,000 ha, with 35-40% less water available for cultivation. However, recent IAMO studies suggest that especially wheat production will be relatively less affected by the dam as wheat is commonly grown in about the period

²⁸ Although these low rankings, according to UNCTAD (2013), the investments in Uzbekistan were remarkably high: US\$ 7.6 billion in 2011, compared to US\$ 2.4 billion in 2010. FDI inflows in 2010 accounted for US\$ 820 million or 2.1% of GDP. However, according to EC (2013), in 2012, the share of FDI/GDP fell below 2% again. As outlined by the US Department of State's [Country Commercial Guide for U.S. Companies doing business in Uzbekistan](#), Tashkent follows a very selective approach with regard to FDI. The government generally welcomes investments that are in line with its import-substitution and export-oriented industrialization policies, and discourages investments in import-consuming sectors. Overall, the vast majority of FDI (around 80%) goes to the fuel, energy, petrochemical, and automobile manufacturing sectors. FDI in the agro-processing sector is growing, especially in fruit and vegetable processing and dairy and mineral water sectors. Since independence, for instance, the fruit and vegetable sector has attracted more than US\$ 100 million and there are more than 200 joint-ventures (with investors from Germany, Turkey, the Netherlands, Austria, Russia, Switzerland, Italy, Spain and the USA).

²⁹ For a comprehensive (and somewhat controversial) discussion see, for instance, UNFCCC (2008).

when there is water available / assumed to be released through the dam. In turn, the impact on cotton production might be significant.³⁰

On reflection, it appears rather unlikely to see Uzbekistan emerging as a significant player in the region in terms of food security as a result of increasing substantially its foodstuff surplus production. As outlined above, in the short-term, Uzbekistan's agriculture remains to be bound by significant inefficiencies, overregulation, lack of (foreign) investments, especially in the degenerating irrigation system, and by restricted water resources. In the medium-term, deregulation may allow for more entrepreneurial activities, correspondingly some stimulating incentives and increasing agricultural productivity. But it can be assumed to result also in further diversification, which tends to reduce surplus production of the main crops available for export. Nevertheless, the country has a potential to become a core supplier of (low quality) wheat to neighbouring countries. In the longer-term, however, projections of the agricultural production in Uzbekistan remain somewhat uncertain with climate change and decreasing water supply for irrigation as key variables.

5.3 Turkmenistan

In 2008, according to World Bank data, the Turkmen GDP per capita was (i.e. USD 3,918) was closer to the level of other rather energy-based economies such as Azerbaijan and Kazakhstan than the GDP per capita of Turkmenistan's agrarian neighbours. The Turkmen agricultural sector represents currently approximately 19% of the country's GDP, which is comparable to the figures, for example, in Uzbekistan. In turn, the country has a comparably high share of rural population (around 58%) and agricultural labour (48% of the total labour force compared to approximately 40% e.g. in Uzbekistan). Recently, rural population and agricultural employment have increased, since Turkmenistan, like other Central Asian economies, has been unable to generate sufficient jobs outside the agricultural sector.

Agricultural land in Turkmenistan accounts for more than 80% of the total territory. Turkmenistan is an arid country and most of its agricultural land is desert pasture with very little cultivable land. Its agriculture is highly dependent on irrigation. According to WWF (2002), Turkmenistan has by far the highest per capita water consumption in the world.³¹ Nevertheless, it is the only Central Asian country where the irrigated area in 2007 to 2008 was substantially above the 1990 level.

As outlined above, all post-Soviet countries experienced a decline in agricultural production during the early 1990s and, however, at the end of the 1990s, this transitional decline was followed by a phase of recovery. In the case of Turkmenistan, the extent of this recovery is generally difficult to assess due to the uncertainties associated with national production statistics, which conflict with independent sources (the figures and facts discussed here correspond to Lerman et al. 2013).

³⁰ See in this context the studies by Djanibekov et al. and Bobojonov et al. (2012 and 2013). For a discussion of possible effects on agricultural yields due to climate change see e.g. Sommer et al. (2013) and Bobojonov and Aw-Hassan (2014).

³¹ For country statistics on freshwater withdrawal per capita see also CIA (2014b): The total (domestic / industrial / agricultural) estimated for Turkmenistan was 5,752 m³/year (in 2004) compared to, for instance, 1,583 m³/year (USA, 2005) and 2,113 m³/year (Uzbekistan, 2005).

Unlike other CIS countries, Turkmenistan has almost no large agricultural enterprises engaged in primary production. The large structures of the Soviet period were transformed into peasant associations consisting of individual leaseholders. These peasant associations are subjected to state orders, i.e. they are obliged to sell their output and buy their inputs through state controlled channels. This is particularly true for crop production, which is heavily controlled by the state, while the livestock sector operates on a more private basis.

During Soviet Union times, Turkmenistan's agriculture was characterized by the monoculture of cotton. The country ranked second after Uzbekistan in cotton production among the six cotton republics of the Former Soviet Union. This situation began to change rapidly after 1990, when the government started to stimulate wheat production in order to achieve a higher degree of national food self-sufficiency. However, despite the relative decline of cotton production, Turkmenistan remains a significant cotton producer in the region. Moreover, in contrast with what happened in most CIS countries, after 1992, the contribution of livestock production to the total national output grew.³² Finally, the country also produces about 620,000t of vegetables (compared to more than 6 Mt in Uzbekistan³³) and limited quantities of fruits (150,000t as compared to 2.2 Mt in Uzbekistan). Production of melons and grapes was 254,000t and 222,000t, respectively, in 2008.

The food processing industry in Turkmenistan accounts for 9 to 10% of GDP; with cotton fibre adding another 1 to 2% to the GDP (data for 2000 to 2007). Figures are thus comparable to those from Uzbekistan, while value added in the food chain has been assessed as comparably low.³⁴ In fact, since the general production decline of the early 1990s, only the production volumes of bread products and flour, processed fruits and vegetables, and non-alcoholic beverages have increased significantly compared to pre-reform output levels. In turn, the output of the meat and dairy industry is still much below the pre-reform period³⁵ and, given the reported increase in livestock production in Turkmenistan, this means that the livestock sector predominantly is of subsistence nature.

The agricultural policy of Turkmenistan also reflects the duality of the political and economic system in the country. On the one hand, the state tightly controls some so-called strategic sectors, while it has a more permissive approach to private business in other sectors. Four agricultural subsectors have been almost unreformed since Soviet

³² Milk production grew very sharply from 436,000 tonnes in 1990 to 2,100,000 tonnes in 2007, partly due to a significant improvement in milk productivity: yields rose from pre-1998 levels of 1,300 kg per cow to 2,000 kg per cow in 2006 to 2007. In the same period of time, meat production tripled.

³³ Sources: FAOSTAT for Uzbekistan and National Institute of State Statistics and Information for Turkmenistan.

³⁴ Note in this regard that the food industry is subject to state licensing. Moreover, there is mandatory syndication of companies, i.e. all enterprises of a branch are united in a union or association whose main task is to implement state policies rather than lobbying the interests of their members. In fact, agricultural associations consider themselves as governmental bodies and are often established in former Soviet ministries and agencies.

³⁵ Note that food processing companies of the pre-Soviet period were not privatized during the transition period. However, private processors – predominantly small scale – have emerged in most sectors of the food processing industry including meat, dairy, vegetable canning, and bakery. While flour and other milled products appear to be controlled by a virtual monopoly of state processors, the share of private-processing ranges from 30 to 50% for meat and dairy products, and from 80 to 90% for bread and canned vegetables.

times: grain, cotton, rice and sugar beet. For these four crops, almost all measures from the Soviet arsenal are still applied today: mandatory state deliveries, state fixed prices, state supply of main inputs at discounted prices, and concessional state lending. Turkmen farmers who produce under state orders receive input subsidies, but they also get only comparably low prices for their outputs. Accordingly, taken together, farmers' income would be higher if they were paid at world market prices and received no subsidies at all (i.e. farmers are implicitly taxed in Turkmenistan). The nominal protection rate, calculated on the basis of market exchange rates for wheat and cotton, is strongly negative, although improving. As outlined by Lerman et al. (2013), it increased from -86 to -27% between 2005 and 2009, and from -60 to -37%, for wheat and cotton, respectively.

In a nutshell, Turkmenistan has not yet implemented comprehensive economic reforms; at least not to the extent as seen in many other transition countries. However, the political will for reforms and for becoming a more market-oriented economy has been emerging over recent years. Although most analysts seem to agree that these reforms will be slow, especially as the elimination of the distortions of the economic policy, conducted with extreme dirigisme by the previous government, will require a long period of time. Despite many declarations of reform by the current leadership, the overall economic environment in Turkmenistan remains highly restrictive and lacks many of the institutions that would be required to support a market economy. Although the private sector is important for some agricultural products, the state sector still heavily dominates the production and processing of main ('strategic') commodities, particularly cotton, wheat, sugar beet and rice.

What concerns foreign trade of agricultural products, and thus the question whether Turkmenistan may emerge as a relevant player for food security in the region and beyond, relates to the fact that the country does not belong to any international or regional multilateral trade system. It is also the only country of the Former Soviet Union that has not applied for membership to the World Trade Organization (WTO). Foreign trade is thus, *de facto*, controlled by the state through the obligation to register all wholesale and export-import contracts with the State Raw Material and Commodity Exchange. As a result, the Turkmen economy is relatively isolated. Yet, a positive trade balance has been maintained for many years, mainly driven by export revenues from mineral fuels (in particular natural gas). Cotton lint accounts for about 2% of total export revenues. Although significant efforts with the aim of achieving self-sufficiency, Turkmenistan is currently a net importer of foodstuffs. Kazakhstan, Russia and Ukraine are the main suppliers of food and agricultural products to Turkmenistan, providing mostly wheat, flour, beverages, confectionary products, tobacco and sugar.

Foreign investments in Turkmenistan are difficult and highly centralized.³⁶ In fact, while there may be opportunities, constraints for investment in Turkmenistan's agri-food sector are manifold. Apart from administrative obstacles (which to some extent appear

³⁶ Large foreign investments including investments in the food industry can be implemented only after the personal decision of the President of the Republic. The President also allocates plots of land for green field investment. In the last 15 years, there has been no allocation of land for the food industry but the new President recently endorsed the construction of 48 new food enterprises, mainly dairy, fruit and vegetable processing companies. Foreign investors can bid, but their chances to win are usually determined by agreements between Turkmenistan and other countries. So far, foreign investors have been attracted mainly by the following sectors: wholesale and retail, manufacturing, construction, agriculture, forestry and services.

to be deliberate), lack of reliable information and institutions are limiting factors in general. For instance, ownership rights and the enforceability of these rights as well as general contract enforcement are all crucial issues for both domestic and foreign investors, but all remain to be uncertain in Turkmenistan. According to Stanchin (2014), it appears that some decisions are still taken on an *ad hoc* basis (e.g. sudden confiscation of land from *daikhan* farms based on farm performance, despite strong growth of the private sector). In general, implementing functioning market institutions is needed and better access to finance is seen as vital. It is further considered important in this regard that there are no private commercial banks in Turkmenistan as all banks are state-owned and the availability of credit for entrepreneurial activities outside of the state order system is fairly limited since existing bank services are not adapted to the needs of private/small businesses.

Much of the material as discussed above is novel, given the difficulties to obtain reliable figures from Turkmenistan. Issues such as water supply and the different programmes adopted with regard to the production and processing of grain (especially the governmental programme 'Wheat') remain controversial. Moreover, in the light of the emergence of wheat as the main grain product in Turkmenistan (5% in 1991 and 47% of total production in 2013, while e.g. cotton dropped significantly), it has been observed that the production of wheat, in general, is not driven by economic reasoning rather than by policy decisions. In fact, given the natural conditions, but also the current institutional restrictions, the production of wheat is not particularly favourable in Turkmenistan and, in this context, economically not profitable. Accordingly, the medium- to longer-term potential of the country to become a relevant player for food surplus production (especially in terms of wheat) appears highly questionable. Furthermore, currently, a comparably high export tax applies to wheat which tends to be prohibitive. Hence, in the eyes of country experts, export of wheat from Turkmenistan is generally assumed to rather decrease due to the outlined disadvantages and, moreover, in the light of a growing population while the Turkmen government envisages self-sufficiency.

What regards a possible way forward for Turkmenistan, issues of regulatory reform and the removal of restrictions, specifically those that discourage investment, are seen as most important. For instance, it would be advantageous to shift from GOST standards to more modern standards compatible with a market economy and the principles of the WTO international trading system to allow the establishment of marketing cooperatives. Overall, a general opening up of the over-regulated agriculture is assumed to lead to entrepreneurial incentives, productivity increases and surplus production, which could then be exported. However, it is commonly recognised that the country has still much to achieve, and, even in case of accomplishing all the mentioned above, it remains to be seen whether Turkmenistan can emerge as a relevant player for food security in the region and beyond. Similarly as for Uzbekistan, water needs and the impact of climate change for agriculture will be key variables in the future.³⁷

³⁷ For further details concerning Turkmenistan see e.g. Lerman et al. (2013), Lerman and Stanchin (2004, 2006) especially on institutional changes and agrarian reforms, respectively, Stanchin and Lerman (2010) on water needs, and Stanchin et al. (2011) on the potential for crop diversification in Turkmenistan.

5.4 Conclusions

A comprehensive consideration of the agricultural production potential of the countries belonging to the Central Asian countries, especially Uzbekistan and Turkmenistan, common understanding is that these countries may indeed emerge as potential players for food security in the region and beyond, but that a long list of challenges will need to be addressed before this can, or indeed, could happen. In other words, in the short to medium-term, the Central Asian countries' potential role as supplier of foodstuffs (especially wheat) to other world regions can be considered as rather limited.

With regard to the overall production and export potential, a controversial debate concerning the most beneficial development of agricultural structures, and thus especially what regards optimal farm types and sizes, is ongoing. This debate is overarching for entire CIS (not only for Central Asian countries). On the one hand, household plots have proven to be flexible enough for adapting to changing environments and in many countries they stand for a significant share of total agricultural production. On the other hand, it is indeed more plausible to assume significant production increases, especially in terms of wheat, and accordingly rising surpluses available for export from rather large scale farming. The latter suggests that the evident concentration process and the emergence of large agro-holdings, which are partly controlling already more than 100,000 hectares, could be a move into the right direction. However, some scholars argue that the emergence of these agro-holdings and their growth beyond the average farm sizes observed in Western countries are just the results of distorted and still not fully appropriate market institutions, which remain weak in terms of coordinating agricultural production and consumption in RUK and Central Asia. In other words, large scale holdings seen now are simply the appropriate answer given by the markets to a correspondingly inappropriate institutional setting. In fact, it can be further argued that, commercially, the emergence of large agro-holdings can be seen as the way to overcome deficiencies and in-appropriateness of any kind of 'soft infrastructures' (e.g. institutions, etc.), i.e. economies of scale do exist but rather emerge through the better overcoming of market dysfunctions than through mere production technologies. Indeed, for doing business in agriculture in RUK, simply one has to be big in order to avoid being engulfed by other huge operators. Tax incentives might be another relevant driving force for the growth of agro-holdings, i.e. key determinants for the emergence of such holdings arise from outside of the agricultural sector. In turn, others argue that agro-holdings, due to their mere size, work beyond the restrictions given due to imperfect market institutions, i.e. de facto creating their own, thus benefiting from strong ties to politics, lobbyists, etc. Indeed, certain opinion holds that the emergence and growth of agro-holdings, in general, goes into the wrong direction. It is commonly highlighted in this context that the turnaround after transitional decline in the 1990s was mainly due to / came with the 'individualization' of agriculture, i.e. transferring land to individuals and letting them operate in the market. It therefore can be argued that further individualization (and thus especially facilitating land markets and the increase of average individual/household plot sizes) would bring the envisaged productivity and output increases needed for ensuring food security within and beyond the region. This hypothesis, although somewhat controversial, in particular with a view to the question how further liberalizing of land markets would change the scene, should be considered in a wider context towards the objective of unlocking production potential.

Given the emphasis on production statistics presented for each of the countries under consideration (and thus especially the focus on trade balances and self-sufficiency in production), it has been opined that it is not merely about who is producing what and how much of it, as international labour distribution, i.e. specialisation, and making the most of given comparative advantages. Doing this consequently (and thus overcoming the currently widely seen attitude of seeking self-sufficiency in terms of many agricultural commodities) could leverage significantly the overall production volumes in the region and thus help ensuring food supply for even much more people. In order to achieve significant increases in agricultural production and exports and to establish a generally promising base for further agricultural development in the region (relevant for entire CIS), a number of policy needs have been identified, such as, for instance, (i) supporting the rise of farm productivity with general more attention given to farm sustainability from the environmental point of view (i.e. protection of soils, air and water); (ii) improving market institutions and, for example, working towards reduction of excessive market transaction costs from the farm gate to markets with more financial and technical support provided to small farmers; (iii) the creation of an open and reliable grain market without export restrictions and the monopoly position of grain exporters; (iv) improving transport infrastructure (i.e. railways and roads) and storage facilities; and (v) ensuring the rule of law (e.g. protection of property rights and fight against corruption). For Central Asian countries, moving ahead with the reform process, and thus making general progress in terms of transition, is a key policy recommendation.

Overall conclusions, as outlined above, are consistent with the findings of other research. Examples can be seen in the IAMO Policy Brief, where it is explicitly stated: "...because of its enormous land and yield potentials, the breadbasket of the East, i.e. Russia, Ukraine and Kazakhstan are increasingly important for world grain markets. However, counterproductive market and trade policies, continual farm-level productivity gaps and deficits in marketing infrastructure consistently obstruct the breadbasket's production and market potentials. A prerequisite for their realization would be prioritizing market-conforming and export-oriented policies, as well as massive investments into spatial and farming infrastructures." (IAMO, 2014b)³⁸

³⁸ See in this regard also IAMO (2014a).

Chapter 6: The Role of China and India for the Eurasian Wheat Sector

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6.1 Introduction

The objective of this chapter is to investigate the wheat sector in neighbouring countries of the East and Southeast of former Soviet Union countries such as China and India—two important players in the region. Being the largest and second most populated countries in the world, prices and availability of food grain and other agricultural products are of greatest importance for China and India. Consequently, food security for a large population is of paramount concern for national governments and policymakers and entrench important impacts on international grain markets.

On one hand, agriculture is a vital component of the national economies of China and India, accounting for a significant portion of both employment and overall economic output. On the other hand, unequal land resource endowments have led to great differences in the agricultural production systems of China and India. Only about 13 percent of China's total land area is arable or planted to permanent crops, compare with 57 percent in India (FAOSTAT, 2012). Agriculture in both China and India is structured to meet national food grain demand or consumption needs first, with a secondary focus on all other agricultural products. Both China and India face unique agricultural challenges due to the changing national diets as a consequence of economic development and urbanization. Despite all the similarities including large agricultural production and the shared challenge of feeding large populations, China and India exhibit vastly some differences at varying degrees, especially with respect to their participation in the global agricultural markets. For instance, China depends on international markets for a number of key agricultural products (wheat, sugar, soy bean, processed fruit and vegetable, etc.), making it the world's second largest importer of these commodities (9.1 percent in 2013). In contrast, only about 3 percent of Indian food and agricultural demand is met by imports, compared with 13 percent for Asia as a whole (Narayanan and Walmsely, 2008).

Both countries have historically preferred to meet national consumption needs of staple food with domestic production, albeit the expensive price support and input subsidies. However, this strong hold to local consumption will be relaxed if trade keeps domestic prices under control for the benefit of poor consumers. At the same time, both countries strive to boost farmer living conditions through income support because of the large number of poor residing in rural areas and the large share of employment is based in smallholder agriculture. Moreover, in that vein China and India do not have to look far

for trading partners especially when it comes to wheat. Just around the corner, the Eurasian countries constitute major trading partners, in the region. Finally, land constraints, low labour productivity, environmental degradation, and slowing crop productivity pose significant hurdles for both countries, even with significant additional investments in domestic agriculture.

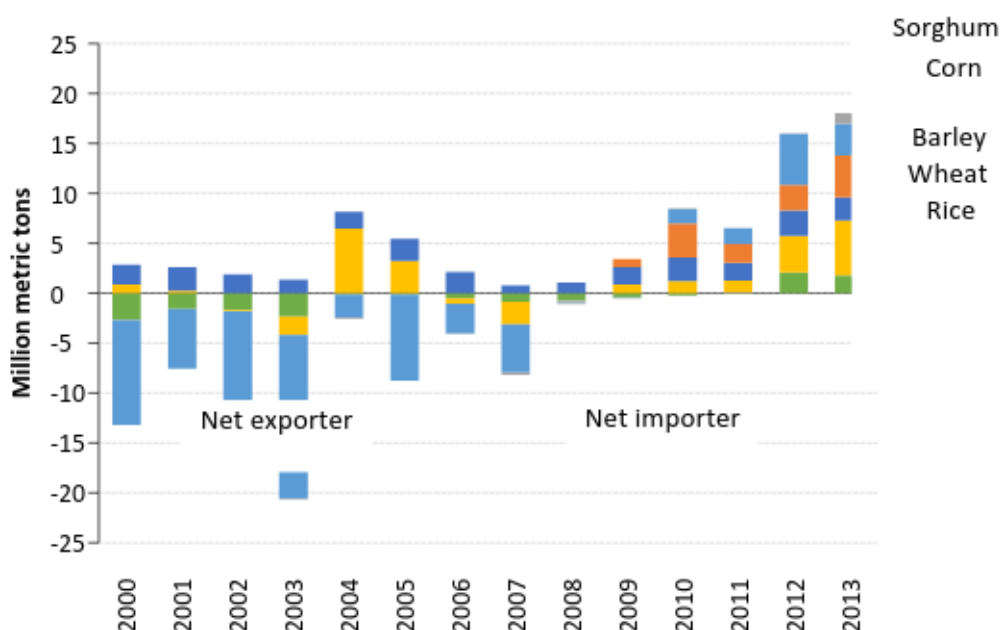
Presentations in this chapter will show how both countries can address these challenges, in part, through imports and policies that impact international trade. Understanding the factors affecting China's and India's production, consumption and trade in agricultural products like wheat can help to enhance the export capacity of Eurasian countries that depend on agricultural trade for foreign exchange earnings and economic growth.

6.2 Experience from China

The Eurasian wheat region stretches from Ukraine in Western Europe to Mongolia in the Asian continent and farm east region of Russia. It covers many countries and time zones extending to Northeast China (Heilongjiang, Hebei, and Jilin province) and Central China (Shandong, Gansu, Qinghai and Henan province), where majority of wheat production takes place. China is located in the eastern part of Kazakhstan, Kyrgyzstan, Uzbekistan, and other small countries like Tajikistan and Turkmenistan, which have a growing wheat sector and are likely to be a major wheat exporter in the Eurasian countries. China is the world's largest country in term of its population and has the second largest economy in the world. Rapid development inside china and its role as a major world grain trader have brought new and sometimes destabilizing forces to bear on its domestic market and on the global wheat market. Since launching its reforms, Chinese leaders have witnessed both burgeoning stocks and relatively serious food shortfalls (Tisdell, 2009).

In spite of recent interest by policymakers, within and outside China, in understanding future trends in the wheat market, clear predictions of national wheat stock, domestic price, and international are not well captured by researchers and policy analysts (Westcott and Trostle, 2014). Since 1980s, researchers and policymakers have anticipated that China's dietary transition to become a more meat-rich diet, which would have important impacts on the world agricultural products' market. For example, China's meat consumption is expected to rise at a pace following to the trend over the past decade. Pork plays a central role in China's meat economy. Per capita pork consumption is projected to rise 6.6 kg by 2023/24, more than three times the increase in poultry (2.7 kg) and more than seven times the increase in beef (0.85 kg) (Westcott and Trostle, 2014). China was a net exporter of grains until 2007, after which China imported modest amounts of premium rice from Thailand and imported wheat to replenish stock reserves during 2004-05. There are now signs of a surge in China's demand for imported grains and much of it from the United States. During 2013, imports of cereal grains rose to 18 Mt which included 3 Mt of U.S. corn and 4 Mt of DDGS (distillers dried grains with solubles), a co-product of U.S. corn ethanol production that Chinese livestock producers use for feed. Overall, in 2013 the United States supplied 70 percent of China's wheat imports and Figure 6.1 highlights china's net import of grains between 2012 and 2013.

Figure 6.1: China's net imports of grains, 2012-13



Note: Net imports = imports - exports. Data for calendar years. DDGS = Distillers Dried Grains with Solubles.

Source: USDA, Economic Research Service analysis of China customs statistics

China is now attempting to move into a new stage of economic development that will feature continued urbanization and more attention to improving living standards for its citizens. China with its large population, rapid economic growth, and anticipated dietary change is a key component for increased imports of grains. Since at least the 1980s, agricultural analysts have anticipated that China's dietary transition to a more meat-rich diet would have important impacts on world agricultural markets. Urbanization and rising living standards could prompt further dietary change, while the transition to larger-scale, capital-intensive modes of farming will likely promote the use of feed grains in place of traditional locally sourced feeds. Food safety incidents, disease epidemics, and issues pertaining to waste management provide further impetus to push production away from traditional "backyard" operations. China's meat consumption is expected to rise with pork accounting for half of world production and consumption. Meanwhile, poultry is gaining popularity largely because it is getting cheaper than pork. China's soybean and corn imports will continue and expected to reach over 70 percent of global soybean imports by 2023/24, while China's corn imports are projected to rise to 22 Mt by 2023/24.

On average, China produces 108 Mt of wheat annually. This makes China the world's largest wheat producer, producing 42 Mt more than India, which is the world's second largest wheat producer. However, China's estimated population of 1.2 billion people, and its domestic consumption averaging to 113 Mt makes it the world's 7 largest importer of wheat at an average of 4 Mt (see table 1). Major winter wheat production is primarily coming from the central part of china (Shandong and Henan), while major spring wheat production comes from the northern part of China. Shandong produces 21.2 percent and Henan produces 20.4 percent of the winter wheat supply. Winter

wheat in China is planted in September and October, and it is harvested in late May and June. The main growing areas for spring wheat are Heilongjiang and Inner Mongolia. Heilongjiang accounts for 26.5 percent of spring wheat production and Inner Mongolia produces 24.4 percent of all the spring wheat in China. Table 1 provides wheat production, consumption, imports and growth rate in China from 2000-2014.

Table 6.1. Production, consumption, imports and growth rate of import of wheat in China: 2000-2014

Growth rate in imports (%)	Imports (1,000 tonnes)	Consumption (1,000 tonnes)	Production (1,000 tonnes)	Year
-80.69	195	110,278	99,640	2000
460.00	1,092	108,742	93,873	2001
-61.72	418	105,200	90,290	2002
796.89	3,749	104,500	86,490	2003
79.97	6,747	102,000	91,952	2004
-83.27	1,129	101,500	97,445	2005
-65.63	388	102,000	108,466	2006
-87.37	49	106,000	109,298	2007
881.63	481	105,500	112,464	2008
189.81	1,394	107,000	115,120	2009
-33.50	927	110,500	115,180	2010
216.40	2,933	122,500	117,400	2011
0.92	2,960	125,000	121,023	2012
136.49	7,000	123,500	121,720	2013
-57.14	3,000	121,000	123,000	2014

Source: <http://www.indexmundi.com/agriculture/>

Looking at the table, wheat consumption remains stable about 122 Mt although demand for flour continues to grow for higher value bakery products. Industry sources reported that the protein content found in imported wheat varieties is preferable for producing specialty bakery goods. Imported wheat is used to make cakes, biscuits, and Asian noodles. However, China's Tariff-Rate quota (TRQ) limits the purchase of wheat imports, which invariably affects the growth of China's burgeoning bakery industry. On the other hand, livestock farmers are expected to use less wheat for feeding on expectations of relatively lower corn prices. Moreover, because the wheat crop was affected by head blight disease many and feed mills reportedly are utilizing less wheat due to feed safety concerns.

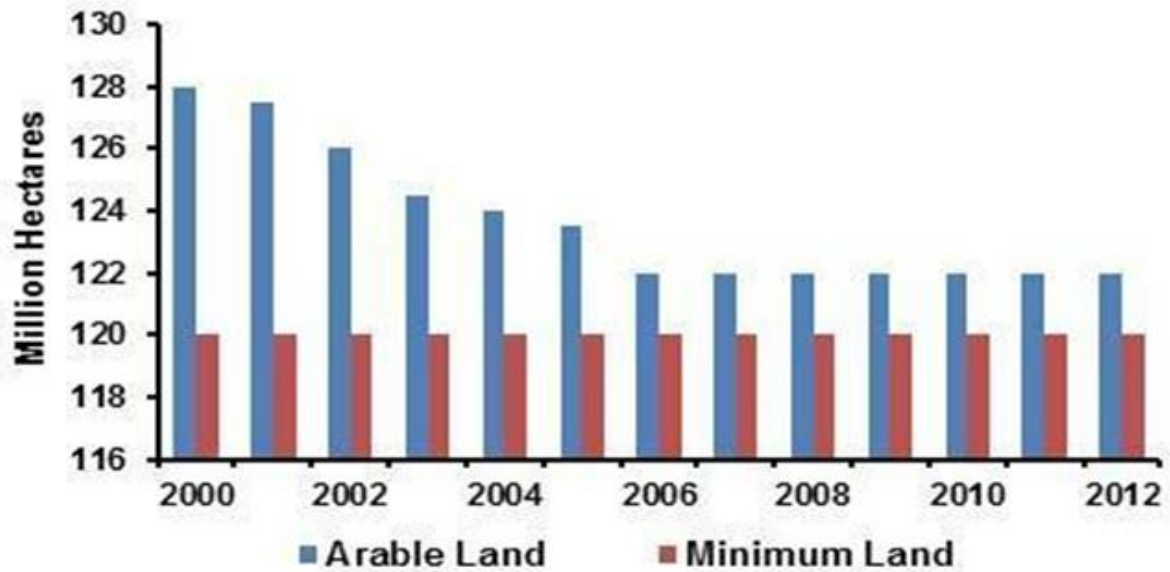
China's wheat imports are expected to hit a nine-year high in 2014, as the country continues to turn to the international market to meet a surging demand of grain for use in high-protein foods, animal feed, industry and processed goods. Customs data (cited) show that China imported 970,000 tonnes of wheat from the US, France, Canada, Australia and Kazakhstan in November 2013. Boosted by the booming animal feed and food-processing sectors, the demand for both wheat and corn has surged in the past decade. More than 120 Mt of corn and 10.7 Mt of wheat were consumed by Chinese livestock in 2012, while food-processing manufacturers used 21 Mt of wheat, up 9 percent year-on-year. China has been a member of the World Trade Organization (WTO) since Dec. 2011. In addition, China has free trade agreements (FTA) with several countries and group of countries. For example, China has FTA with Association of

Southeast Asian Countries (ASEAN) a regional affiliation; partnership agreement with Hong Kong, Macau. China has FTA with Peru, Costa Rica, Chile in South and Central America and New Zealand in the Southern Hemisphere. Several other FTAs are in negotiations or consideration stages (see MOFCOM 2014). FTA agreement with CIS countries can play a vital role in strengthening food security issues both in China and CIS countries.

Food security is top most priority of Chinese government. Food security issues in China rest on providing sufficient quantity and quality of food. From the demand side China needs to feed a growing population of 1.3 billion people at an increasing rate of 0.6% annually. Economic growth has fuelled higher income for household and empirical evidence suggests a positive relationship between income and food consumption in China (Du et al., 2002). In china, food consumption is widely used to measure poverty and welfare. Additionally, Chinese population will be utilizing more calories per capita and urbanization can lead to structural changes in food consumption patterns for several reasons. First, given different lifestyles, calorie requirements of urban and rural residents differ to some extent. Second, food availability and an individual's ability to purchase food differ greatly in urban and rural areas. Finally, urban areas are centers of economic opportunity and have a greater percentage of women working outside the home. Consequently, studies have indicated that increased opportunity cost of women's time increases the demand for non-traditional 'fast food' in many countries, and China is no exception.

Average caloric intake by a person living in the United States is about 3,700 calories and that of China 2,900. To reach the additional calories, demand for meat and meat products has increased in China, recently. While the world's population has doubled in the past 50 years, its demand for meat has quadrupled. It is estimated that to produce more than 200 Mt of meat a year, livestock are now fed about 40% of all grains harvested. Additional grain, especially corn and soybean, will be needed to feed livestock as well. However, in China arable land is limited and perhaps reduced due to several reasons. First, arable land is lost to urbanization and desertification is about 1.7 million square kilometers of land lost. Second, farmland segmentation due to increasing population and land policy is an impediment to arable land. Third, arable land is lost (about 2% annually) to environmental problems and soil degradation (37% area). Figure 6.2 shows that arable land decreased dramatically since 2000, however, since 2006 Chinese government, through its policies, has been able to maintain at least 120 million hectares of arable land (Wang, 2014).

Figure 6.2: Arable land in China, 2000 to 2012



It should be noted that only 40% of the arable land is irrigated and per capita water capacity is about 1/4th of world average. About 21 million hectare of arable land is under drought. Northern areas water use 40%-90%, higher than the international warning line of 40%. This problem is intensified by the fact that Northern China plains have seen 12 centimeters drop on water table over the past 16 years. Part of the problem also lies in the inefficient irrigation technology (<50%) and polluted water that cannot be used for irrigation purpose.

Figure 6.3: China wheat yield (tonne/hectare)



Figure 6.3 shows that wheat yield is on a steady growth path. Acreage is determined by market. Improvement in yield is a result of many factors including: (1) chemical usage, (2) mechanization, (3) hybrid varieties, (4) multi cropping, and (5) irrigation system. It is believed that the policymakers in Beijing want 90% self-sufficiency in grains; 97% self-sufficiency in rice and wheat (600 Mt, 2013); import 60, 5, and 1.5 Mt of soybean, corn, and others, respectively to meet the demand of burgeoning livestock sector. From a policy perspective the Chinese government is taking steps to achieve, self-sufficiency in grains. To meet this goal, the Chinese government is relying heavily on import even though import do not suggest lack of domestic supply, but rather the need for diversified grain varieties. China should allow a greater role for the market to determine trade patterns in order to increase their comparative advantage gains. This would probably mean increased overall agricultural trade domestically among provinces and internationally, and a shift towards importing more land intensive agricultural products and exporting more labour-intensive agricultural products. Policy steps to achieve comparative advantage gains might include removing implicit taxes on farmers and reforming domestic grain pricing and marketing system. In the past, China's agricultural policy on domestic agricultural product marketing has been biased against producers. Finally, let the market determine prices convey the accurate information to consumers and producers in the choice of wage, inputs and the planning of outputs.

Chinese farmers are finding other varieties rather than the highest yielding ones are the most effective at increasing efficient production. Farmers may choose to use crop varieties that have less than the highest yield because they demand some production or marketing trait (e.g., it requires lower input or is higher priced). In a growing economy characterized by a large number of small farmers, Chinese government can play an important role in the creation and delivery of new technology. Therefore, the government must reduce the cost of discovery and/or learning and research and

development. For example, looking at the case of seeds, making technologies available through government-sponsored seed companies that will guarantee the reliability of the product can provide advice through the local seed station or network of township and village leaders which will also reduce the transaction costs and risk of technologies adoption and marketing. Table 2 shows the expenditures in four types of subsidies such as expenditures on improved seeds and agricultural machinery which seems to have increased substantially, while subsidies to grain producers have remained constant over the time period (2003-2011). Farmers (or cooperatives) purchase machines at subsidized prices. Comprehensive farm inputs subsidy was initiated in 2006 as a compensatory measure to mitigate rising prices of farm inputs. Even though expenditures on farm inputs has increased dramatically since 2006. Farm inputs subsidies existed long ago, but payments were made to manufactures only. Now, the new programme pays subsidies to producers directly and the fund come directly from the central governments' budget and is adjusted upward, annually, based on changes in input costs and fiscal revenues. Gale et al., argue that payments are usually made in the same way as direct payment to grain producers (Gale, Lohmar, and Tuan, 2005). Table 6.2 show subsidies to agriculture, 2003-2011 (billion Ren Min Bi, RMB).

Table 6.2: Subsidies to agriculture, 2003-2011 (billion Ren Min Bi, RMB)

2011	2010	2009	2008	2007	2006	2005	2004	2003	Type of subsidies
15.10	15.10	15.10	15.10	15.10	14.20	13.20	11.60	-	Payments to grain producers
22.00	20.40	15.48	12.07	6.61	4.15	3.87	2.85	0.30	Improved seeds
17.50	14.49	13.00	4.00	2.00	0.60	0.30	0.07	0.04	Purchase of agricultural machinery
86.00	83.50	79.50	71.60	27.60	12.00	-	-	-	Farm inputs
162.80	143.9	127.45	103.04	51.36	30.37	17.37	14.52	0.34	Total

Note: 1 RMB=\$0.16

The core to understanding China's food security policy is controllability perceived by policymakers. Specifically, (1) *Avoiding over-dependence on external market*, includes: (a) domestic production and stockholding; (b) regulations on domestic utilization of major food products. (2) *Avoiding large shocks to domestic food market*, includes: (a) domestic food price interventions; (b) border interventions; (c) stock measures. (3) *Avoiding social instability caused by unacceptable income disparity*, includes: (a) measures to prevent sharp decline of agricultural prices; (b) safety net scheme targeting low-income urban and rural groups.

China's future policies for national food security would be determined within the broad strategy of national development. It is expected that China will adhere to the direction of further integration into the global economy on the basis of comparative advantages, so as to sustain its economic growth at low environmental costs. However, the strategies and concrete measures will depend on perceived internal and external factors. Therefore, achieving national food security with perceived controllability is the core for policymaking. The government will strive for appropriate high rate of grain

self-sufficiency and some of the ways to achieve this self-sufficiency include, regulation on agricultural resources; technological improvement (like genetically modified crops); organization restructuring.

Trade in food products, including grains, will be actively used as supplementary way for supply to domestic market. Then the government will continue to maintain sufficient stocks of major food items for both security and market stability. The government will devote effort to improving infrastructure related to food logistics. It is expected that that urbanization process will alter distribution of demand and thus flows of food with significant ease. In addition, the government should take measures to reform food marketing' policies. Recall in the 1990s, the government was to give up ownership and control of small and medium sized state enterprises, while keeping the control of large enterprises. First, many small and medium sized state enterprises have been privatized in the sense that most shares are in private hands and that the enterprise is truly financially independent and cannot rely on government subsidies. Second, many large state enterprises are still government owned, are managed by government bureaucrats, and can depend on government subsidies. Finally, the Chinese government is likely to exercise control over processing uses of food materials continuously. For example, expansion of grain-based bio-energy is already strictly prohibited and processing of corn into various derived products is also restricted (Wang, 2014; Wang, 2011).

6.3 Experience from India

India, located in the southeast of the Eurasian countries is a fast growing country. Its population is growing by 2% a year (current population estimated at 1.24 billion). However, about 59 percent of the population still lives in rural areas, and heavily depend on agriculture for their employment and livelihood. Agricultural sectors contribution to the GDP has fallen from 43 percent to 14 percent between 1970 and 2011. Rapid growth in non-agricultural sectors (service and manufacturing sectors) has led to migration of labour out of agriculture. Nonetheless, agriculture is an important sector of the economy, which accounts for around 14 percent of GDP and 11 percent of the country's exports. About 55.5 percent land mass is agricultural land and only 42.6 percent is net cultivated area; only about 45 percent of cropped area is reported to be irrigated. The net cultivated area has increased significantly from about 18 percent from 119 million hectares in 1950-51 to about 140 million hectares in 1970-71, since then it is more or less stable which is about 140 million hectares; only 3.47 percent area is under permanent crops. Average holding size is about 1.3 hectares, and about 85 percent farms fall into this category.

After more than 70 years of independence, progress in India's agricultural sector has become self-reliant in its major food staple such as rice and wheat. Much of the progress in the 1960s and 1970s was achieved through the successful adoption of yield enhancing Green Revolution technology supported by market interventions that sought to balance producer and consumer's interest. India progressed substantially in food production both in quantity and quality. During the 1990s, both yield and consumption growth slowed dietary diversification from staples to high value food items and as a result, the Government of India (GoI) enacted producers' incentives like minimum support price and better targeting of consumer subsidies. Since then, the wheat sector has become more volatile. Recent average estimated growth rate in food grains is 4.6% and main source of growth is improvement in yield. Average growth rate in yield of

major crops has improved significantly 11th Planning period (2007-2008 to 2011-12) compared to 10th Planning period (2002-2003 to 2006-2007).

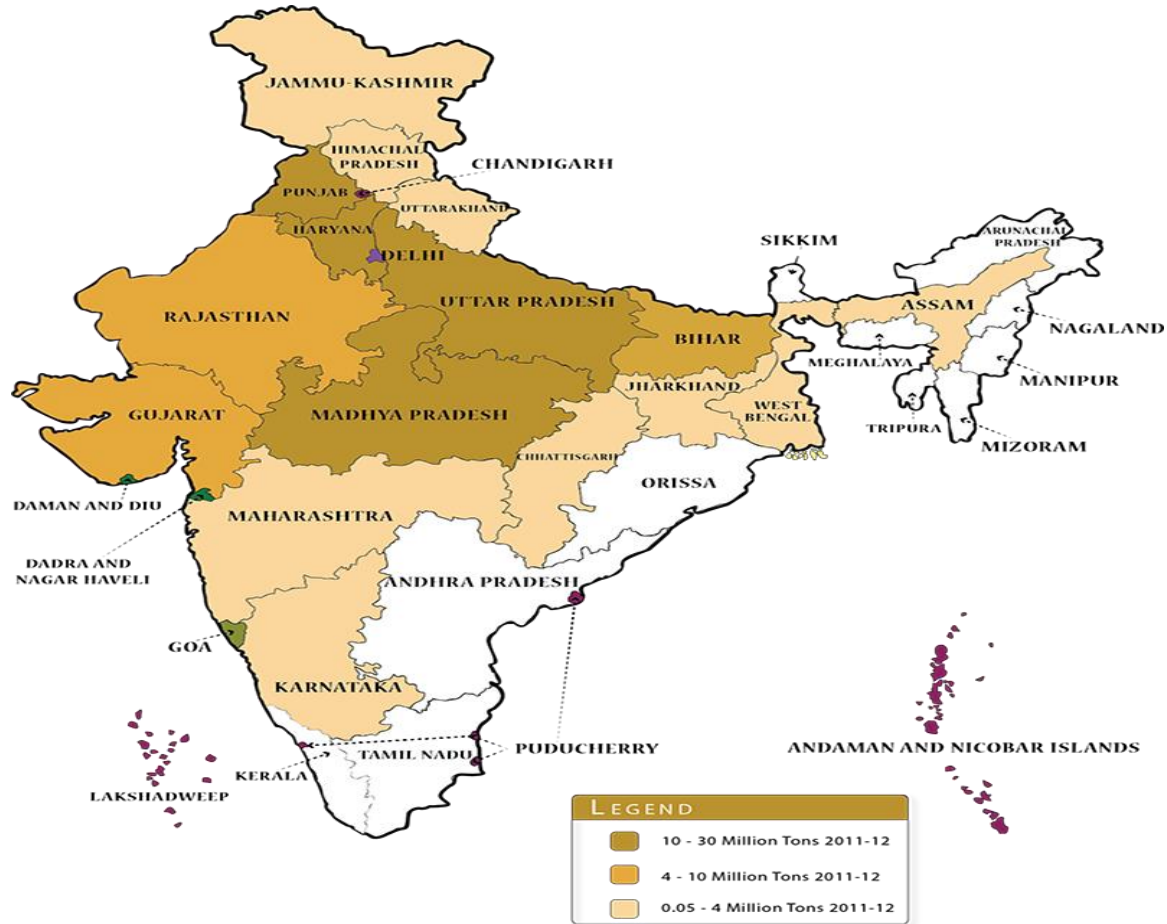
In the early 21st century, the Government of India faced with combination of record grain surpluses, high domestic prices, declining per capita consumption and soaring budgetary costs related to payments to farmers and storage costs for excess wheat and rice production which led to a shift in government support for agriculture in general and better structuring distribution system for subsidized consumption to low income households. As a result, since late 2006, these policies have led low producer prices for wheat and rice, to weak yield growth, and depletion of public stocks due to rising subsidized consumption. These factors led to the re-emergence of large wheat deficits where rice and wheat account for the largest share of cropped acreage. Wheat is an important crop in terms of both production and consumption. India raises almost exclusively winter wheat. Wheat is mainly grown in *Rabi* season (Oct./Dec. to Feb./April) along with barley, lentil, pea, mustard, and potato. The planting of winter wheat begins about the first of October and runs through the end of December. Wheat will usually begin to head in January, with harvest following in March and May. Wheat acreage has been increasing from 13 % between 1990 and 1991 (total cropped area) to about 15 % in between 2009-2010. Wheat production is mainly done in the Indo-Gangetic Plains region (See figure 4) specifically in three northern states, Uttar Pradesh (35.53%), Punjab (18.96%), and Haryana (13.39%), supply 72% of total wheat output in the country. In addition, two states, such as Rajasthan (8.31%) and Madhya Pradesh (8.78%), also contribute to total output 86%. Wheat is one of the staple food in India and popular food item among both vegetarian and non-vegetarian and provides nearly 50% of the calories and protein requirements for vast majority of population. India is second largest producer of wheat in the world, averaging an annual production of 66 *Mt*. On average, India consumes 65 *Mt* of wheat, ranking them as the second largest consumer of wheat in the world. Though India has been self-sufficient in wheat, it is also importing wheat. On average, India imports 1 *Mt* of wheat, and, for various reasons, exports an average of 0.7 *Mt* of wheat.

India, though self-sufficient in food staples, productivity in wheat lags behind Brazilian, U.S, and French farmers. Total factor productivity is still low (about 2%) because agriculture sector is dominated by smallholdings, however, compared to China (agricultural production about 6%), which is also dominated by smallholdings. There is scope for productivity gains and total output gains in Indian agriculture, especially in wheat. The yields have been virtually stagnant over the past 16 years in all cereal crops, especially wheat, rice and maize. Many grain farmers are moving in to growing higher yields crops such as fruits and Figure 6.5 shows that there is a considerable variability in growth rate of wheat production in India. Wheat output witnessed a quantum leap from a mere 12 *Mt* in 1965 to around 92 *Mt* in 2013. Much of the increase in food grains and wheat in particular can be attributed to producer price policy in India. Specifically, minimum support price³⁹ (MSP), which is revised annually and defended by Indian Government purchases in surplus areas during harvest. In case of wheat, the MSP is paid directly to farmers in the primary markets where they sell their grains. The government of India also supports grain producers through numerous input subsidies. These include subsidized irrigation, electricity, diesel fuel, seeds and fertilizer (USITC

³⁹ MSPs are set by the Commission for Agricultural Costs and Prices. When determining MSPs the commission takes into account factors such as the costs of production and the condition of domestic and world markets (CACP 2013).

2009). One example of a programme that provides such subsidies is the National Food Security Mission, a targeted programme aimed at increasing wheat, rice and pulse production. Through this programme producers of these commodities receive subsidies for seed, inputs and product specific investments (Hoda and Gulati 2013).

Figure 6.4: Wheat producing regions of India

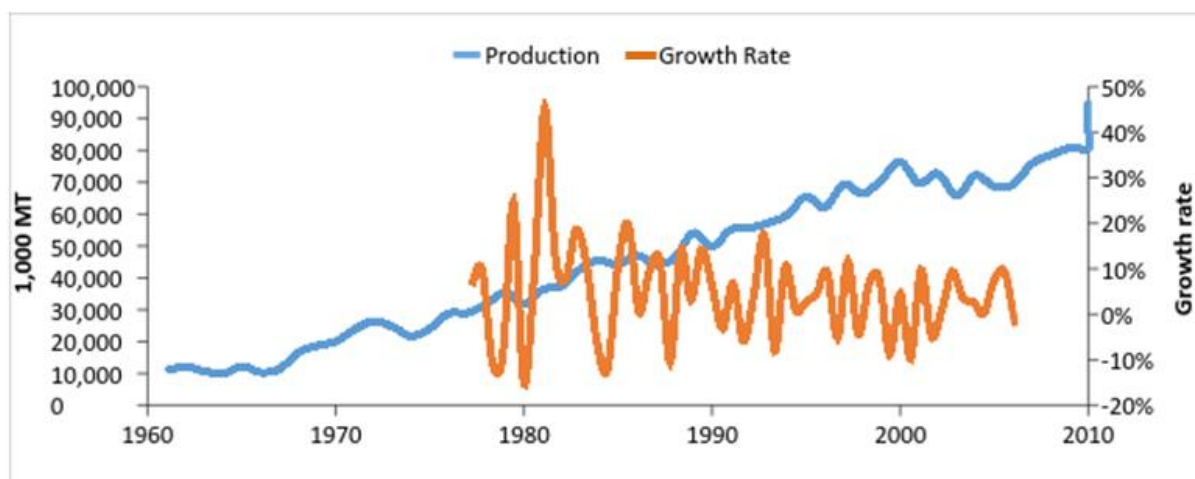


Recall, in India, 60% of the total cropped area is still rainfed and rainfall dependent relatively on uncertainties of monsoon. India's food grain production and especially wheat production slumped in early 2000s due to widespread drought, during 2002-2003. Climate change adversely affects the food security in all countries through agriculture production. Its effects on food security is in four dimensions, food availability, food accessibility, food utilization and food system stability. High variation in environmental factors such as temperature, rainfall and others affect crop growth negatively or positively due to change in these environmental factors. Thus, change in climatic variables may have positive or negative impact on agricultural productivity and food security in the economy (Greg et al., 2011).

Indian wheat production has however, been inconsistent and unsteady during the last five years, challenging the soundness of the food security system. This is mainly due to the decrease in productivity level, soil degradation, water shortage following over-exploitation, decline in fertilizer consumption, and diversion to other more remunerative cash crops and horticultural products, small marginal land holdings, fall

in arable land, climate change, etc. Consequently, sustainability of wheat production is a major challenge now facing the Indian Government.

Figure 6.5: Wheat production and production growth rate, 1960-2013

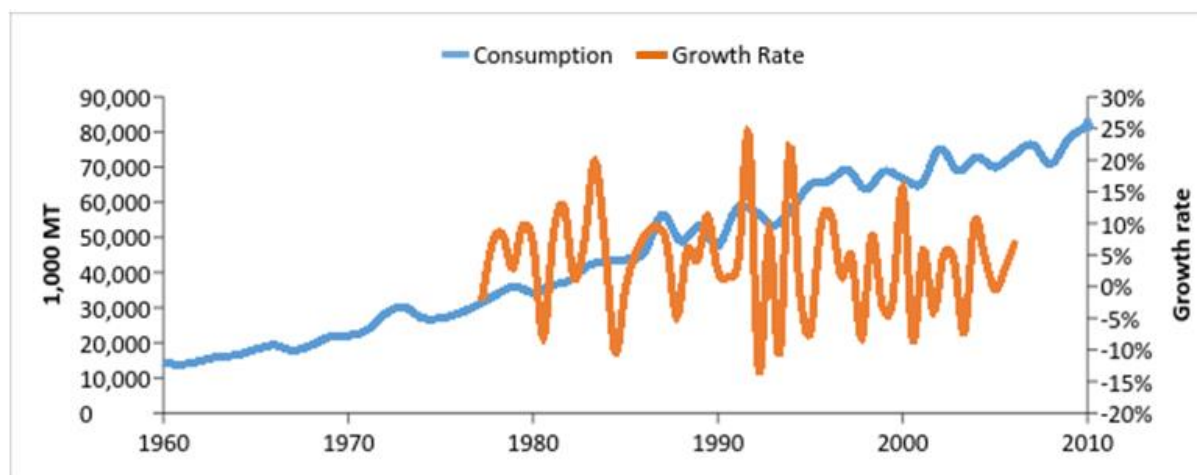


Similarly, Figure 6.6 also shows that there is a consistent growth in consumption, whereas a considerable variability in growth of wheat consumption has been documented (Mishra and Tripathi, 2014). Wheat consumption witnessed a 6 fold increase, from a mere 14 Mt in 1960 to around 90 Mt in 2013. Per capita consumption of wheat has been quite variable during past 13 years (2000-2012) ranging from 72 kilograms in 2002 to a low of 61 kilograms in 2008, when wheat prices were at a record level. However, despite Indian Government's decision to import wheat announced in Feb 2006 to counter the spiralling domestic prices in the wake of production shortfall and widespread hoarding by the unscrupulous traders during 2006, there has been a consistent rise in per capita wheat consumption from a low in 2008 to about 70 kilograms in 2012. Furthermore, wheat imports have increased during the same period.

The principal policy instrument targeting food security on the consumption side is the Targeted Public Distribution System (TPDS), a government subsidized food distribution programme that provides low cost food grain to Indian consumers. The FCI provides grain to the TPDS from government stocks. Grain is first allocated to state governments and union territories which in turn will distribute grain to some 492,000 fair price shop dealers throughout India (AIFPSDF, 2013). The price of wheat and rice sold by the Indian Government through the TPDS has been held constant since 2002. In recent years, these prices have been well below the minimum support price offered on procurement (FCI 2014). Since April 2002, eligible households from each income group have been able to purchase up to 35 kilograms of food grains per household per month (DFPD, 2014b). Wheat attracts more attention in the booming retail food market because of better nutritional value as compared to rice, which is consumed by a large population. Ready to eat wheat food products with better shelf life are the key components of retail shops which attract a large number of consumers particularly in urban areas. For example, wheat based products such as bread, noodles, pasta, and biscuits figure prominently in the shopping list of a large number of consumers in urban areas. With a projected annual increase of nearly 10% in India's middle income group,

currently estimated at around 350 million and with more disposable income, consumption of such wheat products are likely to witness a significant increase.

Figure 6.6: Wheat consumption and consumption growth rate, 1960-2013



As mentioned above the Indian market has opened up for wheat imports after a span of about 7 years with the Indian Government's decision to import wheat through the State Trading Corporation of India Ltd (STC) starting in Feb. 2006. An analysis of the Indian official import data for wheat between 2007 to 2008 (April/March) indicates that Russia followed by Argentina Canada and Australia, in that order emerged, as major suppliers with total exports amounting to US\$650 million and accounting for nearly 90 % of the overall imports in value terms. The share of Canada and Russia respectively in overall imports into India during the above period has been about 17 % and 42% in value terms. The low share of Australia during the period (1,498 tonnes worth US\$0.81 million) is attributable to the prevailing drought and consequently to the difficult export availability challenges. Other suppliers include Ukraine which tightened export controls on wheat shipments.

India's wheat demand will not slow down. There is significant evidence that wheat demand is increasing in both rural and urban areas; highest demand is coming from middle class households in both rural and urban areas. This is because middle income households have higher income and want to move away from consuming rice and more western food items like bread, pasta, noodles, and pastries. Empirical evidence show that income elasticity is positive and elasticity is found to be, greater than one in many States, like Andhra Pradesh, Karnataka, Kerala, Orissa, and Tamil Nadu regardless of expenditure class⁴⁰. It should be pointed out that these states have traditionally been consuming rice as staple food. This change may be due to health problems associated with rice consumption (Hu 2012) and interstate migration (Tripathi and Srivastava, 2011). However, price elasticity of demand for wheat, by expenditure class, is high or fairly elastic (Jha, Srinivasan and Landes, 2007).

⁴⁰ Expenditure class is divided into three classes, such as: Rural (poor, middle, rich); Urban (poor, middle, rich).

Despite, India's significant progress in food sector, India still faces food and nutrition challenges. Current trend in production and consumption indicate significant variability and supply could lag and slow down growth in agricultural productivity. Additionally, loss of arable land to non-agricultural uses and increased land fragmentation due to rising population has put significant pressure on increasing productivity through increased yield per acre such as high yielding varieties, and adoption of stress tolerant varieties of wheat and rice. Finally, climate change, land degradation which is about 37% of geographical land is degraded land and rising cost of agricultural production is of concern for farmers and policymakers. It emphasizes further increase in food production to meet the demand at home. India's low average wheat yield compared to other major world producers suggests that there is a significant scope to boost yield and output.

To this end, the Government of India (GoI) has already taken the above mentioned issues into account and has launched several flagship programmes for both crop and horticulture sector to increase agriculture production during 11th and 12th Five year plan. These programmes and schemes are National Food Security Mission, Macro Management of agriculture scheme, Rastriya Krishi Vikas Yojana, Integrated Scheme oilseeds, pulse, oil palm and maize, Finance commission grant for agriculture project, National Horticulture Mission, Horticulture mission for North East and Himalayan states, and Vegetables initiatives for Urban Clusters. As a result of the above initiatives, public investment has increased tremendously and production and productivity of many crops, for example, wheat, rice etc. has increased remarkably in the 11th five year plan. This improvement is also reflected in crop profitability. Both profitability and margin to profits of some crops like rice, wheat, sugarcane etc. have realized improvement in recent periods (Tripathi, 2013).

Another policy that was implemented in 2007 was the National Food Security Mission (NFSM). In the NFSM programme wheat crop gets special attention in this programme. The programme aims at achieving an additional production of 8 Mt of wheat by the end of 2012 through promotion and extends improved technologies and farm machinery along with capacity building of farmers with effective monitoring and better management. More importantly, the programme has focused in areas (or districts) in which productivity of wheat was below the state average. As a result the programme has been implemented in 142 districts, and 9 states, for wheat crop. Of these districts, 74, 96, and 82 districts recorded yield gains during the 2007-2008, 2008-2009, and 2009-2010, respectively (GoI, 2013). Consequently, the productivity of wheat, at the national level, has increased from 2,602 kg/hectare in 2004-2005 to 3,177 kg/hectare in 2011-2012.

Finally, with all the accomplishment in solving food problem, India still faces significant challenges. For example, there are about 250 million people still living below the poverty line and have poor access to staple food items like wheat and rice. Although roughly 90 percent of wheat area is already planted to high yielding varieties, average wheat yields in major states remain about 25% lower than levels achieved in experiment stations scope for improvement. Scope to boost average yields by improving: poor quality of seed, protection and pest control, water input, development of stress tolerant varieties drought and flooding and adapting to climate change.

6.4 Conclusions

In summary, this chapter highlights that China and India play an important role in the world grain market. Both countries are (or will be) very important with regard to demand. China and India face limited resources, such as arable land, and agricultural productivity. The rising number of middle income households in both countries will potentially boost demand for grains and food products. Demand for wheat will likely increase in China and India in the coming years. Additionally, demand in China would also increase as a result of increased demand for feedstock.

Chapter 7: Eurasian Markets in an Uncertain World

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7.1 Introduction

Uncertainty due to weather conditions and restrictive trade policies can have a significant impact on availability of food and farm products for both domestic and international markets. Specifically, natural disasters and policy interventions can have an impact on production and trade for agricultural commodities. For instance, take the case of harvest failure, a consequence of natural disaster or extreme weather events, and temporary export ban, a policy intervention by policymakers, by major grain exporting nations like Russia, Ukraine, and Kazakhstan (RUK) can lead to a shortage on world grain markets. During the last decade availability of grains for exports from RUK has been repeatedly diminished by harvest failure and temporary export restrictions (like for example in 2007-2008 and 2010-2011).

After the breakup of the Soviet Union in 1991 the RUK began their transition from centrally planned to market economies. This transformation included an overall restructuring of the agricultural sector, which led to a dramatic reduction in the production of agricultural commodities. During the 2000s agricultural output in these countries rebounded and RUK once again became major players on international agricultural markets, especially regarding exports of grains. By the end of the 2000s, RUK exports in wheat accounted for about a fifth of total grain traded on the world market, with Russia having a share of 13% of total international wheat exports, followed by Ukraine (7%) and Kazakhstan (5%). However, drought and temporary export restrictions have repeatedly diminished RUK exports during the last decade, which influenced grain availability and prices on the agricultural markets.

The uncertainty in production and export restrictions in RUK can have significant impacts on international grain market and have adverse effects on international food security, resulting in instability in world grain markets and volatility in international food prices. This chapter discusses the impact of production uncertainty and export restrictions on RUK and the world wheat markets. The chapter drives from a set of studies analysing the role of these uncertainties and drivers for agricultural markets using the AGLINK-COMISMO model.

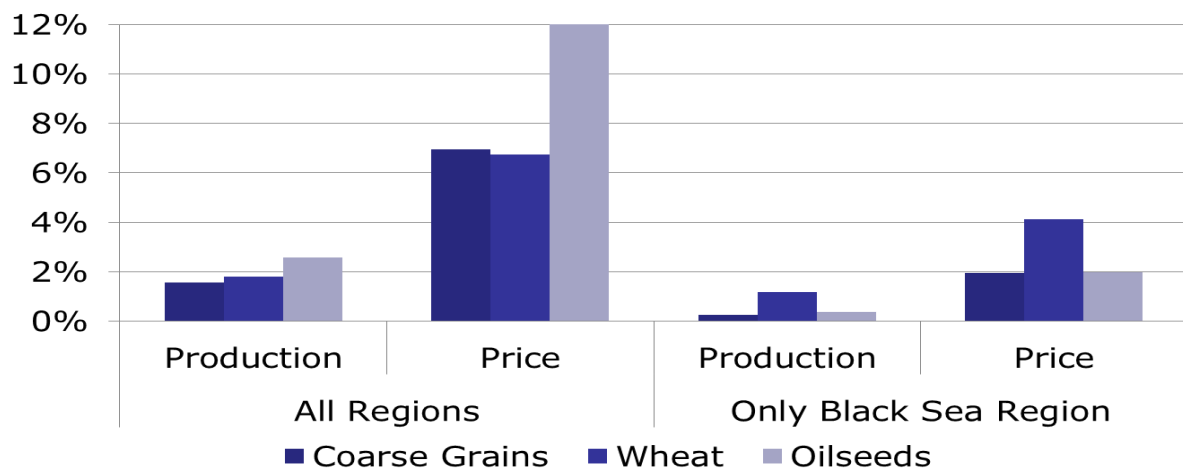
7.2 Uncertainty Analysis

To assess how macroeconomic and yield uncertainty may affect availability of RUK grain exports in the future, the stochastic module of the AGLINK-COMISMO model was employed by Fellmann et al. (2014a). AGLINK-COSIMO is a recursive dynamic partial equilibrium model with a detailed representation of world agriculture and policy. The uncertainty analysis considers the following exogenous macroeconomic indicators

which are likely to have an effect on the projection of agricultural market developments: GDPD (GDP Deflator), CPI (Consumers Price Index), GDP (Gross Domestic Product), exchange rate and oil price. Furthermore, variation from historical yields is also accounted for (using historical data starting in 1996). The analysis focuses on analysing the variation of variables like production, consumption and prices. For this the Coefficient of Variation (CV) is used (which can be interpreted as the change in percentage). Further, the AGLINK-COSIMO was also employed to analyse the impact of weather effect (drought) and export restrictions in RUK on regional and international markets.

Figure 7.1 depicts the effect of yield uncertainty on projections of world grain production and world grain prices. Two scenarios are considered: (i) yield uncertainty in 'all' regions of the world (left panel) and (ii) the yield uncertainty only in the Black Sea Region (right panel; i.e. in RUK countries). As expected, the effect on world production and prices is higher if yield uncertainty in all regions is considered. However, in the scenario with uncertainty in all regions, part of the yield uncertainty in RUK can be offset in other regions, i.e. a year with low yields in RUK can be compensated by a year with above average yields in the EU or North America. Moreover, yield uncertainty coming from RUK is affecting international wheat markets the most, which is due to the fact that the three countries are very important in wheat production and exports.

Figure 7.1: Effect of yield uncertainty in all regions and the effect of RUK yield uncertainty on the projection of world market supply and prices (for the year 2023)



In general, the uncertainty analysis serves as a tool for distinguishing the effect that different sources of uncertainty have on the agricultural market projections done with the AGLINK-COSIMO model. The analysis carried out with the stochastic module of AGLINK-COSMIO shows that international wheat markets are largely affected by yield uncertainty coming from Russia, Ukraine and Kazakhstan.

In another study, Fellmann et al. (2014b) analysed the impact of grain harvest failures and subsequent temporary export restrictions in RUK. Export restrictions, including export bans, export quotas, export taxes, are introduced by a country to reduce the flow

of export of a given good, usually leading to increased volumes available of the product on the domestic market and decreased domestic prices (Mitra and Josling 2009). Temporary export restricting policies are usually enacted when a country's production is lower than usual or/and international prices are rising and they are commonly justified on the grounds of national food security (Abbott, 2009). As mentioned above, temporary export restrictions were repeatedly introduced in RUK during the last decade. Recent examples of temporary grain export restrictions include the introduction of an export quota in Ukraine between July and October 2007, an export tax of 40% on wheat in Russia, an export ban in Kazakhstan from April to September 2008, an export ban in Russia from August 2010 to June 2011 or a grain export quota in Ukraine from October 2010 to July 2011 (OECD 2011; FAPRI 2013; OECD 2013a). Given the importance of RUK countries in international grain markets, temporary export restriction by RUK had likely adverse effects on international food security by adding to instability in world grain markets and spikes in international food prices. However, the magnitude does not seem to be clear (Anderson and Nelgen 2011; Headey 2011; Sharma 2011).

Using the AGLINK-COSIMO model (without the stochastic module), Fellmann et al. (2014b) assessed how international grain markets and food security would be affected if (i) the 2010 poor wheat and coarse grain harvest in RUK would reoccur in 2015 and (ii) if the RUK countries would apply temporary export restrictions (export bans, export quotas, export taxes) as a reaction to the domestic harvest failures. Fellmann et al. (2014b) used several scenarios to explore the effects of the RUK harvest failures and subsequent temporary export restrictions (see Table 7.1).

Table 7.1: Uncertainly scenarios with AGLINK

Scenario assumptions regarding weather conditions and temporary grain export restrictions in RUK in 2015		Scenario Name
Normal weather conditions	No temporary export restrictions are introduced	Baseline scenario
Production decline in 2015 due to severe droughts in RUK	No temporary export restrictions are introduced	Benchmark scenario
	Export bans in RUK	Scenario 1 (ban)
	Export quotas in RUK	Scenario 2 (quotas)
	Export taxes on ad valorem basis in RUK	Scenario 3 (taxes)

Source: Fellmann et al. (2014b)

For the baseline scenario, normal weather conditions, steady demand and yield trends (following recent time path) and no temporary export restrictions were assumed. In the benchmark scenario it is assumed that RUK suffers from a drought in 2015, mimicking the 2010 RUK harvest conditions (i.e. wheat and coarse grains production levels are set at the same levels as in 2010). Under these assumption Fellmann et al. (2014b) observe that (see also Table 7.2);

- Total wheat production in RUK would decrease by 29% compared to the baseline projections for 2015.
- The RUK production decrease equals a 4% decrease in world output of wheat, wheat exports from RUK decrease by 70% compared to baseline scenario which leads to a 23% increase in world wheat price.

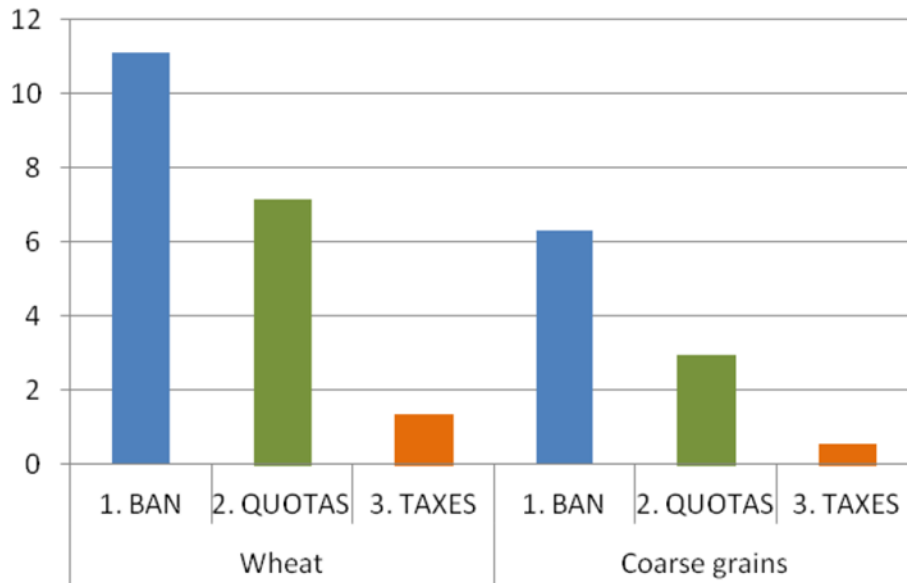
- Higher world prices means countries like US and EU would likely export more wheat, but from existing stocks or from domestic use, substitution of wheat in livestock ration, i.e. other countries can only partly compensate for the decrease in RUK exports as in the short run production cannot be increased and the RUK drought is not known until after farmers have planted wheat acreage.
- Higher world market prices for wheat translate into higher consumer prices for wheat, flour, and flour products.
- The increase in consumer price leads to a decrease in consumption of wheat by 2% at world level.

Table 7.2: Impact of simulated drought on the world and RUK wheat market, 2015.

Benchmark scenario (drought) versus baseline (%)					
Producer price	Consumption	Exports	Production		
30	-5	-45	-27	Ukraine	
50	-8	-86	-27	Russia	
36	-5	-67	-41	Kazakhstan	
NA	-7	-68	-29	RUK	
23	-2	-11	-4	World	

Not surprisingly, the situation worsens in the scenarios with RUK export restrictions on top of the harvest failure (scenarios 1-3). World wheat prices would increase more with RUK temporary export restriction, but the impact varies with the level of restriction adopted. As a complete ban of RUK exports would be the most extreme reaction, the impact on the world market would be the greatest in this scenario. Due to high share of RUK in the world wheat market, wheat world trade decreases by 6% and the world wheat price increases by 11% compared to baseline scenario. Effects are lower in the scenarios with export quotas and taxes (see Figure 7.2).

Figure 7.2: Changes in world prices due to RUK export restrictions (%-change versus benchmark in 2015)



Source: Fellmann et al. (2014b)

7.3 Conclusions

In summary, the scenarios examined by Fellmann et al. (2014a; 2014b) underline the importance of RUK's grain production for world grain markets and international food security. Findings indicate substantial price increases for wheat due to the simulated yield uncertainty as well as drought and temporary export restrictions. Temporary export restrictions can substantially worsen the situation, which has especially negative effects on food security for grain net importing countries (Fellmann et al, 2014b, exemplify this on the example of Egypt, the major wheat importing country in the world). The results of Fellmann et al. (2014b) actually put international trade policy into focus, underlining that more cooperation on the part of exporting countries is needed to avoid that importing countries are suspended from indispensable grain supplies.

Chapter 8: Discussion, General Considerations and Possible Policy Recommendations

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8.1 Introduction

This report highlights main factors affecting wheat sector and its potential future development in CIS countries. Some of key structural factors identified in the report as important determinants of the CIS countries' production and export potential of wheat include: (1) socio-economic changes; (2) changes in agricultural policies, access to farm credit and finance; (3), climate and environmental changes and (4) infrastructure. The report also provides an in-depth understanding of agrarian reforms in key Post-Soviet countries in the Eurasian grain belt (in particular Belarus, Russia, Ukraine, and Kazakhstan). Agrarian reforms have been introduced with varying degree and established heterogeneous farm structure across CIS countries. In all, this process of restructuring eventually created a dual farm structure consisting of large corporate farms (agricultural enterprises) and individual farms (family farms and household plots). The share of corporate farms decreased over time since the beginning of the transition process, while family farms are gaining in importance. However, in some CIS countries corporate farms still maintain a dominant role (in particular in wheat production). Moreover, trend towards extreme concentration of land took place thus leading to creation of large agro-holdings which are typically control several thousands hectares of land. However, the use of land, labour, and other inputs remains inefficient by commonly accepted standards for a large number of corporate farms. It is clear that the economic well-being of *small farms can be improved with access to additional land which, in turn, increases incomes and employment in rural areas. Regardless, improvement in management practices is critically important in increasing farming efficiency* regardless of the size of the farming unit.

The Eurasian belt is a key player in the world grain market. Key players in the region are RUK countries accounting for the main bulk of region's grain production and trade. The evidence has shown that *volatility in production* in these countries could lead to instability in the domestic and international markets which ultimately could threaten global food security. One of the leading factors contributing to higher volatility in production of wheat in the RUK are unstable yields with high year to year fluctuations. The two key causes of yield volatility are *weather dependency of production* and the *low application rate of fertilizers* in the production process. Traditionally, RUK countries experience relatively higher rates of volatility in wheat production as compared to other global wheat producers. Volatility in production leads to much higher *volatility in exports* of wheat from RUK countries which gives rise to concerns as to their reliability as a supplier and thus having implications for global food security.

Russia can *potentially increase its wheat production* by (i) cultivating more land for wheat production; (ii) enhancing current yields; (iii) incorporating modern technologies into its farming practices; and by (v) enhancing market institutions. Important requirement for Russia to sustain the *increase in its wheat export potential* is the need to expand its storage facilities and improve its grain transportation and handling infrastructure.

Similarly, Ukraine's wheat sector has experienced volatility in both production and exports. Much of the volatility in production is a result of droughts and climatic changes. Other factors negatively impacting both production and export activities include market-unfriendly institutional base. Production can potentially be increased through: (i) increasing farming efficiency through mechanization; (ii) clearly defining property rights; (iii) enforce contracts; (iv) enhance access to credit; and (v) build market infrastructure.

The wheat sector in Kazakhstan is mostly privatized while the majority of the farmland is rented from the government at low rates. Large scale agro-holding companies play a major role in the wheat sector. Kazakhstan is vital for food security in several neighbouring countries. In fact, it is the largest wheat exporter in central Asia. However, the present wheat production and exports can only be maintained or increased by applying high input intensity. With intermediate, or rather low input levels, yields will likely reduce in future, which would put the economic rationale of wheat production into question. Other potential problems impacting Kazakhstan's wheat production and export potential are: (i) technological factors; (ii) climate change; and (iii) expansion of animal husbandry which would divert wheat to animal production.

Additionally, there are countries around the corner that could potential garner interest from wheat producing Eurasian countries. These include China and India that together have a total population of approximately 2.5 billion which holds major implications for the demand of wheat on the world market. Global food security would be in peril should these two countries be affected by severe drought and/or temporary export restrictions from wheat exporting countries. Although both countries claim to be self-sufficient in wheat production, data shows that both have been importing wheat in recent years for various reasons. China needs wheat for human consumption as well as for its livestock sector. As the middle class expands in both China and India (Kharas, 2010), its demand for meat is expected to increase. Eurasian countries are in unique positions, based on location, to satisfy the majority of the import demand for wheat from these two countries. Both India and China have a common set of *constraints limiting their production agriculture sector's* capacity to domestically produce grains. This common set of constraints include: (i) limited arable land; (ii) limited irrigation capacity; (iii) an increasing share of degraded production land base; (iv) climate change; and (v) increasing incidence of droughts and floods.

The economic implications of RUK's grain production capacity for the world's grain markets and international food security needs can only be ignored at great peril to humanity. In addition to the noted constraints identified above, Eurasian countries are also not exempt from climate variability and its impacts on wheat production. The uncertainty attributable to climate variability can result in export restrictions of indeterminate lengths on wheat from the RUK countries in particular. Evidence indicates that substantial price increases for wheat would result from both potential drought conditions and temporary export restrictions. The uncertainty of production

from exporting countries and temporary trade restrictions alone or in combination can be devastating to the societies of wheat importing countries like Egypt because of the consequences of high consumer prices for wheat and a smaller buffer stock inventory. However, that same uncertainty in production and export restrictions can prove to be boom for EU and other wheat exporting countries. The boom would generate greater revenues from their wheat exports to world markets while reducing any instability associated with an excess supply at home while also increasing global food security.

Several important issues and policy actions necessitate immediate attention to strengthen position of RUK countries on global wheat market. This particular set of issues and policy actions include: (i) the introduction of fair competitive and institutional environment for all farm types; (ii) the promotion of good management practices; (iii) respecting the terms of commercial contracts and other agreements and the avoidance of export restrictions; (iv) the creation of a reliable and transparent policy framework; (v) improvement of the functioning of land markets and the implementation and enforcement property rights; (vi) improvement of access of credit to farmers; (vii) improvement of agricultural and farm data collection and dissemination to enhance knowledge sharing and exchanges of information regarding the performance of agricultural sector and public policies, and enhanced utilization of research findings for policy support, (viii) improving transparency throughout administrative systems and policy-making processes, and (ix) promoting consistency in the implementation and application of policies within and between countries.

Next we present a set of policy recommendations, which if implemented and adhered to, could be of value to policymakers in designing and resolving some of the pressing issues plaguing agricultural communities and rural populations in general and grain and wheat sector in particular.

8.2 Challenges and Policy Recommendations: Eurasian Countries

Agricultural trade remains important for Eurasian countries especially for Russia, Ukraine and Kazakhstan. According to a 2000 World Bank report titled, “Social Protection Developments: Eurasian *versus* European Approach”, earnings from self-employment accounted for a larger share of household incomes. The majority of that self-employment income came from the agricultural sector and trade. Many of the Eurasian countries have faced challenges in adjusting to their domestic markets and becoming competitive in international export markets.

8.2.1 Untapped Potential of Land and Land Reforms

Recent price hikes in agricultural commodities worldwide has brought the issue of global food security back into economic and political agendas. They have also led to a rediscovery of the agricultural sector not only by those interest groups concerned with rural area and the wellbeing of the farming population but also by potential institutional investment groups. For example, Visser and Spoor (2011) note that recent data by the United Nation’s Food and Agricultural Organization (FAO) suggests that four countries in the world have a “significant untapped capacity to make a major impact on meeting growing global food demand”. These countries include Russia, Ukraine, Kazakhstan and Argentina. Interestingly, three of these countries are in Eurasia.

Since 1991, the agricultural systems of Russia, Ukraine, and Kazakhstan (RUK) have undergone enormous institutional changes that have resulted in exclusion of approximately 23 million hectares of arable lands from production, 90% of which had been used for grain (FAOSTAT, 2012 and Visser and Spoor, 2011). The major changing trends in the 1990s included the disintegration of the centrally planned institutions in the agricultural sector and introduction of market based institutions. However, this transition was not always successfully completed. Reforms led to adoption of several impediments and uncertainties into the legal status of land and the organization of the agricultural sector. An accompanying change during the transition was a substantial decline in agricultural subsidies, reductions in the use of technology, and reduced access to markets (Lerman et al., 2004). The rate of recovery of food production in the post-Soviet economies and the ability to realize their full agricultural potential are likely to have a significant impact on global food security in the near future. However, both developments will depend on several internal and external factors, such as success of completion agricultural reforms, subsequent land-use changes, climate variability and changes and global economic trends.

Table 8.1 compares a number of indicators of the RUK's agricultural potential inherent in agro climatic conditions for wheat production against those for Argentina, Canada, and the USA. Russia and Kazakhstan are sparsely populated and land rich countries. RUK countries are important wheat exporters. Yet according to estimates by Deininger et al. (2011), as reproduced in table 1 below, they still have large, untapped reserves in cropland areas suitable for wheat production. Yield levels are moderate, at least in Russia and Kazakhstan.

Table 8.1: Eurasian Agricultural Potential: A Comparison

	Russia	Ukraine	Kazakhstan	Argentina	Canada	USA
Population density (person/km ²) ^a	8.7	79.8	5.8	14.6	3.7	33.3
Area under wheat production (1,000) ^b	26,070	7,054	12,906	4,284	10,032	22,542
Potential area suitable for wheat (1,000) ^b	35,722	2,430	2,948	6,472	8,639	3,877
Wheat yield (tonnes/ha) ^b	2.45	3.67	0.97	1.97	2.85	3.02
Wheat exports (1,000 tonnes) ^c	18,393	13,037	5,701	6,767	18,876	27,635
Stock of foreign investment in agriculture (million USD) ^d	953.0	557.6	22.1	NA	1,497.8	2,561

Notes: Wheat exports for marketing year 2008–9, investment stocks for 2007, all other figures for 2008. NA, not available. Potential area suitable for wheat is currently non-forested, unprotected, and uncultivated with a population density lower than 25 persons/km² (Deininger et al., 2011).

^a World Development Indicators; ^b Deininger et al. (2011); ^c USDA PSD online database; ^d UNCTAD (2009).

A fundamental prerequisite for agricultural development is enforcement of property rights. This is necessary in order to stimulate both increase the land under cultivation

and investments in land. Specifically, there is the need to reduce uncertainties in the legal status of land.⁴¹ While it appears that agricultural enterprises have been re-emerging more persistently than small individual farms in recent years (particularly in cereal sector), the land productivity growth tends to be associated with land individualization. Structural adjustments of agriculture in many of the transition countries is limited by policies that aim to preserve structures from the past, i.e. large-scale agriculture in the form of collective farms or in some other organizational form. This situation, which exists in most of the CIS countries, results from the perception by policy-makers and other important stakeholders that large farms are superior to other kinds of farm structures. Serova (2000) pointed out that this tendency is of particular importance in countries where privatization process has led to collective ownership or personal ownership that is used collectively. Generally, a negative attitude exists within the population regarding the removal of agricultural subsidies and the redistribution of farmland by government actions. Stakeholders attitudes may well be the key factor in explaining why the RUK-countries have been quite slow and inconsistent in implementations of adopted land reforms and a return to some agricultural policies not in line with the creation of a market driven system (Lissitsa and Odening, 2005; Uzun 2005).

Policy recommendations:

- *Strengthen land tenure right security.* Secure land tenure rights which will create incentives for investment and productivity growth, a key element underlying sustainable economic growth. This economic growth, in turn, helps in proper usage of land and to improve the welfare of the poor, by enhancing the asset base for those (such as women and small farmers) whose land rights are often neglected. At the same time, it allows the majority of private farms, under family management and part-time farms, to attain importance in market economies.
- *Facilitate the development of land markets as well as finalization of land reform process.* This involves creation of institutions supporting land exchanges and physical delimitation of land plots (land shares), elimination of land transaction restrictions, and ensuring equal access to land to all market participants.
- *Promote and contribute to socially desirable allocation of land resources.* Consider the case of Armenia and Armenia which in 1992 redistributed all of its agricultural lands traditionally held by large collectives to rural households. As a consequence, virtually all of its agricultural lands today are held under individual tenure arrangements and the entire agricultural output comes from its family farms. Lerman (2009) attributes the increased productivity of the land to the sweeping land reforms that by transferring ownership of the land to individual farmers “activated” the incentives of private initiative and personal accountability. The evidence from CIS countries tend to show that the creation of small individual farms sustains the productivity of the land, and acts to enhance employment in the agricultural sector, the incomes of farm households and growth within the rural sector.

⁴¹ There are three dominant groups of agricultural producers in Eurasia: large corporate agricultural enterprises including agro-holdings; smaller individual farms mostly engaged in grain production; and tiny household economies focusing on vegetables and livestock.

- *Encourage institutional changes and promote market institutions.* Educate the public, especially rural population, on the benefits of private land ownership and markets confer upon growth and improvement of rural livelihood. The effectiveness of policies depends, to a large extent, on the acceptance of policy reforms by the population at large. Because rural societies are often constrained by tradition and cultural values than urban societies, they very well may be functioning under rules created in earlier times to address situations that no longer exist and thus may impede institutional change. Policies need to be designed taking into account the perceptions of main stakeholders and strategies can be developed to change some of these perceptions where they are advantageous from development point of view.

8.2.2 Impact of Climate Change

Climate change and increasing incidences of climate variability are likely to bring changes in production levels, cropping patterns, and land suitability. (Bell and Fischer, 1994; Lobell et al., 2005). One approach to deal with these climate variability constraints is to improve wheat germplasm to create a higher tolerance to stresses associated with these environments. Wheat breeding could genetically enhance the crop to maintain yield under higher temperatures. Also, certain conservation agricultural practices could help in mitigating some weather risk. These conservation practices include reduction in tillage, surface retention of adequate crop residues, and diversified, economically viable crop rotations. Moreover, resource-conserving practices like zero-tillage (ZT) allow farmers to sow their wheat sooner and generate several environmental benefits.

Climate change and natural disasters may have potential impact on agricultural productivity in CIS and thus may contribute to significant land use changes. Relevant in this direction is the monitoring of the land. A programme of agricultural land use monitoring has the capacity to monitor, among others, land quality, land abandonment and cropping patterns that could be easily used in productivity (yield) assessments, including climatic and environmental risks such as winterkill and droughts.

Adverse weather changes is one of the most pernicious risks to the livelihoods of smallholders in emerging economies, leading to the depletion of incomes and assets which may result in a condition of persistent poverty. Weather risks also have broader adverse consequences for the extended value chain and the regional economy. Shortfalls in agricultural production can lead to financial disruptions for businesses and individuals who depend on agricultural inputs and commerce including processors, exporters, input suppliers and transporters. Long-term changes in average precipitations and temperatures associated with climate change are expected to exacerbate the incidences of extreme weather, in addition to altering growing conditions throughout the agricultural production sector. Expanding the options for managing weather risks is an important component of efforts to incentivize producers and enterprises to make adaptive and resiliency-improving investments to minimize the negative consequences of this major source of current and future risk and uncertainty.

Policy recommendations:

- *Adopt drought resistant wheat and/or other crop varieties.* Drought tolerance research is complicated by the highly temporal and spatial variability of rainfall. To this end, the international research community (for example, International Center for Agricultural Research in the Dry Areas, ICARDA) in wheat breeding programmes has germplasm development programme that may help maximize yield during good seasons and minimize losses during dry periods (Nezhadahmadi, Prodhan and Faruq, 2013). Additionally, throughout the 1980s and 1990s, the Centro Internacional de Mejoramiento de Maíz y Trigo (CIMMYT) together with its partners in the developing world undertook wheat research in heat-stressed, dry areas and rice–wheat farming systems to develop varieties that can withstand extreme weather conditions. Further research is needed to develop varieties suitable for CIS countries.
- *Promote investment in irrigation systems (tube well, canal, dams, etc.).* Policy incentives that ensure the efficient use of water resources need to be identified and implemented. Lessons and experiences from other regions (e.g. from South and West Asian countries) which have similar institutional and resource challenges need to be documented, assessed as to their potential contributions for minimizing weather risks and, where appropriate, incorporated into the identification, design and implementation of appropriate strategies for coping with adverse weather conditions in CIS (Babu and Tashmatov, 2000).
- *Adapt wheat-cropping systems to climate change.* For example, Cammarano et. al., (2012) investigated the impact of changing sowing date as an adaptation strategy in coping with future climate change scenarios. It was found that both sowing date and irrigation practice influenced wheat yield and water use in subtropical environment in Darling Downs region in Australia. To adapt and mitigate climatic change effects on wheat supplies, germplasm scientists and agronomists are developing heat-tolerant wheat germplasm, as well as cultivars, better adapted to conservation agriculture. Ortiz, et al. (2008) has reviewed and updated a set of approaches including germplasm adaptation, system management and mitigation with regards to their expected responses to climate change on wheat in some of the most important wheat growing areas.
- *Promote investment in building storage capacity to diminish climate induced market fluctuations.* Eurasian Development Bank (EDB) projects in Kazakhstan’s agricultural sector have been implemented by three large producers: APK-Invest Corporation, Kazexportastyk Holding, and Ivolga Holding as well by Kazagrofinance, a component of the national Kazagro holding. EDB’s funds were primarily used to: (i) finance agricultural producers during sowing and harvesting seasons; (ii) purchase agricultural machinery and equipment to process grain; (iii) process wheat into flour and install modern equipment at flour mills; (iv) improve grain storage capacity; (v) enhance the grain export infrastructure, in particular by building a grain terminal in Ukraine; and (vi) to provide pre-export financing for grain and oil-seed procurement from Kazakh farms. The introduction of on-farm cooling tanks has been particularly important in increasing the quantity and quality of milk deliveries to processing plants in the dairy sector. The use of on-farm milk cooling tanks is part of a trend noted by Dries and Swinnen (2004) for Poland. The enhancement of storage capacities

may contribute to mitigation of adverse climate impacts on the agricultural sector in general and on the farming sector in particular.

- *Adopt weather risk management instruments including futures, options and a range of over-the-counter products.* In the United States weather derivatives and catastrophe bonds are used to provide contingent financing in the event of extreme natural disasters. Another example is the index-based weather derivative used by the government of Malawi, Malawi Maize Index (MMI), to insure farmers against revenue shortfalls due to insufficient rainfall during the maize production period (Syroka and Nucifora, 2010). Payouts are triggered when the realized value of the MMI is less than a specified trigger value (e.g., 90 percent of the historical average MMI) (Abousleiman and Mahul, 2011).

8.2.3 Access to Credit and Infrastructure Development

Two critical variables influencing potential grain production and export growth in Eurasia are the establishment of credit institutions and the modernization of infrastructure (Sedik, 2004; Lissitsa and Odening, 2005). Transportation and storage are physical and economic activities critical to the creation of space and time utilities. Capacity to move grain (space utility) and to store it (time utility) is critical for the economic development and the food security. Capacity concerns exist at both the farm and country levels.

The limited access to credit at the farm-level contributes to the chronic state of economic insecurity for the producers and food insecurity for the country and especially so for the small farm household producers (Lissitsa and Odening, 2005). Despite awareness of the recommended levels of fertilizers, herbicides, and pesticides to use for optimizing physical production, farms in many CIS countries either drastically reduce or even completely eliminate their uses of purchased inputs for economic reasons linked to the absence of credit. The decreases in herbicide use and the increased numbers of idled and /or abandoned area have created a considerable weed problem that is detrimental to yields (Longmire and Moldashev, 1999). This credit problem induced low input use and under investment in agriculture underscores an urgent need for innovation of wheat cultivation practices with improved productivity, less damaging to the land and low in input intensity.

Infrastructure at the national level is deteriorating throughout the CIS. The CIS agriculture needs major infusions of investments in infrastructure in order to allow development of the sector to its full potential. Investments in the infrastructure is particularly required for enhancing export channels followed with vital improvements to the handling capacity of grain terminals along with the creation of large grain, meat and dairy production assets. For example, the European Development Bank's plays an important role in this direction. It provides assistance with the aim to strengthen trade and economic ties between its member states including the development of a common transportation infrastructure and a CIS market in agricultural products. Baydildina et al. (2000) noted that the Government must necessarily underwrite the costs of road construction and other investments not feasible to private investors, but critical to the creation of an infrastructure facilitating increased economic activity. Government policies could be designed to foster investments in agriculture by private entities to accompany investments in infrastructure which private sector cannot fully undertake.

Absence of credit for replacing obsolete machinery restricts the ability of farming sector efficiency and productivity. Replacing existing agricultural machinery and purchasing new equipment would require large investments. The existing credit system and leasing arrangements limit the flow of commercial capital for investments in agriculture. In the absence of commercial banks, creation of a cooperative bank or banks supported by the state may be a viable option for financing the agricultural sector. For example, the state agency KazAgro, in Kazakhstan, appears to be one of the few viable sources of financing for many farmers due to the withdrawal of commercial banks from lending to the agricultural sector (Petrick, Wandel, and Karsten, 2011).

Policy recommendations:

- *Strengthen producer associations.* Establishment of producer associations (e.g. production, marketing and credit cooperatives) is essential to serving the needs of CIS farmers as well as contributing to the economic development of rural areas. Producer associations may yield various benefits to farmers such as credit access at lower costs, obtaining higher prices and help farmers increase the quality of their products.
- *Enhance value chain structures through promoting and establishing contract farming operations.* An example of a possible implementation of this policy comes from the dairy sector in CIS countries. The dairy sector is an important component of rural economies in several CIS countries, providing vital employment and income to rural residents and farmers. Dairy processors are the most common buyers of milk from farmers. However, there are significant variations between countries. In Armenia, over 75 percent of the raw milk from the farms is sold directly to dairy processors while the comparative figure for Ukraine is just 11 per cent. In Moldova, the majority of both households and corporate farms sell directly to dairy processors albeit corporate farms are more likely to do so (Gorton and White (2007) for details). Milk marketing cooperatives are important for household farms in Moldova as 'others' in the buyer group account for approximately one quarter of the users of their milk. Finally, the vast majority of small-scale household farms in Ukraine sell directly to intermediary entrepreneurs without any form of written or oral contract.
- *Encourage development of financial sector for medium-term and long-term credit.* Agricultural credit system can develop if three goals are achieved: independent commercial crediting, attractiveness of deposits, and diversity of financial resources. As a first step, financial development (state and international) agencies need to supply financing for the development of private financial sector. Commercial banks must resume their main function as financial mediators. The induced improvement of capitalization of banks, may allow them to end their dependence on the system of centralized crediting. Furthermore, financial sector must develop the potential to issue medium-term and long-term credit which is critical for supporting long-term investments in agriculture.

An alternative way to enhance finances in the agricultural sector is by issuing specialised bonds. For example, Brazil introduced the *cédula de produto rural* (CPR) in 1994 to finance the short-term financial needs of farmers. CPRs are bonds that can only be issued by farmers and farmers' associations, including cooperatives, in which the borrowers pledge an agreed share of the crops at harvest or cattle in returns for credit. This system was further refined by

introducing different forms of CPRs. The success of the CPRs was proven by the fact that it became an underlying instrument for a vibrant financial market in the country (see De Sousa and Pimentel, 2005). Finally, CPRs have expanded into pre-harvest (i.e., certificates of agribusiness credit rights) and post-harvest (i.e., Certificado do depósito Agropecuário (CDA) and Warrant agropecuário (WA)) instruments that are specifically used to finance pre-harvest and post-harvest activities on the farm. Post-harvest bonds like CDA and WA are issued by the warehouses with the goods in the warehouses serving as the underlying collateral.

An important instrument for strengthening financing options in the agriculture (alongside having a stabilizing role for agricultural prices) are warehouse receipts (WHR). WHR system allows collateralization of agricultural output which may be conducive to creation of a viable credit system. In addition, WHR reduce the agency and information costs characterizing intertemporal contracts. The benefits of stabilization of WHR are well illustrated in the case of the post-harvest credit provided by credit union (CU) networks in Madagascar which has helped producers to almost double the value of their crop by enabling them to store it for sale three to four months after the harvest season.

- *Build lending capacity through microfinance institutions or credit unions.* Microfinance represents the provision of sustainable financial services to low-income individuals and farmers. Microfinance schemes originate in developing countries as a tool to alleviate and minimize the incidences of poverty. Microfinance schemes gained ground in Western economies in recent years to bridge financing gaps occurring in mainstream banking. In 2003, a European Microfinance Network was established to introduce microfinance into Western Europe to promote self-employment in response to growing unemployment levels (Nowak, 2005). For example, in the Philippines, the Center for Agricultural and Rural Development (CARD) was established as an NGO in 1986. CARD, NGO, had less than 500 clients in the early 1990s and now has over 55,000 clients. The key to CARD's growth was its transformation in 1997 from a NGO to a rural bank.
- *The role of government in fostering a conducive policy environment for microfinance is key to the sustainable growth of the industry (i.e., supporting interest rate stabilization, adjusting legal and regulatory frameworks to support the development of a wide range of financial service providers).* In Brazil, a combination of strong government policy support coupled with targeted capacity building assistance significantly increased excluded groups' access to finance over a relatively short period of time. In India, certain innovations in securing agricultural loans seem particularly promising, including agricultural warrants, loan delegation, jointly managed guarantee funds and mutual guarantee associations. These security mechanisms make available new types of financial options and contracts between the various partners in agricultural activities: producers, farmer organizations, processors, and traders (Hess, et al., 2003).

In Russia, microfinance was recently identified as a necessary component of a new banking sector development strategy. The Russian Microfinance Center

(RMC) is the Russian Federation's leading microfinance think-tank, service provider, and advocate (RMC 2015).⁴²

8.2.4 Agricultural and Trade Policies

Economic reforms implemented in early stages of economic transition resulted in a much larger than expected drop in production. Among others, this was also linked to removal of agricultural subsidies. Additionally, price liberalization in the early 1990s led to an increase in the cost of key inputs that were much larger than the increase in the market value of farm outputs. Although agricultural subsidies have increased in the CIS countries in the subsequent period, they are now comparable with U.S. subsidy levels but are lower than those in EU and in particular in Japan. According to OECD, the producer support estimate, as a share of total farm receipts, amounted to 13% and 0% in Russia and Ukraine in 2012, respectively. For comparison this figure is 20% in the EU, 55% in Japan, and 8% in the US (OECD, 2015). An important shortcoming of subsidy allocation system in CIS countries is that individual farms receive much less payments than the larger scale agricultural enterprises. That is, public support for agriculture is biased toward large-scale agricultural enterprises, which puts in disadvantage small farms.

In response to rising international food prices, Russia, Ukraine, and Kazakhstan have already imposed export restrictions on some of their agricultural products to protect their domestic consumers by artificially holding down prices. For example, Ukraine has been using export quotas on key sectors (e.g. wheat, barley, maize) to ensure sufficient supplies for the domestic market (EBRD-FAO, 2008) and Kazakhstan has introduced licensing measures to control the exports and have also lowered import duties on all basic foodstuffs. CIS countries (in particular RUK) have frequently used temporary export restrictions during recent years as a response to unfavourable yields which had adverse effects on international food security by adding to instability in world grain markets and spikes in international food prices. Analysis presented in this report suggests that while such policies may protect domestic consumers in the short-run, they can also harm domestic agricultural producers in the long-run. By restricting the incorporation of international prices into the national markets, such trade measures tend to reduce the profits of domestic agricultural producers which act to limit opportunities for rural development.

Policy recommendations:

- *Introduce fair support system that is equitable to all producers, including small individual farms.* Analysis in this report has shown that individualization of agriculture led to productivity growth in CIS (Lerman 2009). Often small individual farms are discriminated in allocation of subsidies. Fair treatment of these farms may thus act as a catalyst for their further development. Small individual farms could act as tools for poverty reduction initiatives while providing rural population with access to food and employment.

⁴² The main microfinance institutions reviewed here are those sponsored by CCI-RISE, FINCA International, Opportunity International, Russian Women's Microfinance Network (RWMN), and Working Capital.

- *Reduce barriers to trade and refrain from using export restrictions.* Reductions in export quotas and/or export taxes in CIS countries could increase the welfare of both producers and consumers in the medium-run. Avoiding the application of measure aiming at partial or complete ban of exports would contribute to reduction of price volatility and instability on international agricultural markets.
- *Investigate the feasibility of providing WTO consistent support to farmers (e.g. crop insurance).* The WTO agricultural agreement does exempt agricultural income insurance or income safety-net programmes from domestic support limits under certain conditions. Crop insurance programmes are of particular importance to CIS given the high production volatility and its strong weather dependency.

8.2.5 Agricultural data use for Policy Support

Agricultural development is an essential engine of growth which, in turn, provides an effective mechanism for combating poverty and food insecurity. Despite the importance of the agricultural sector and its critical role in providing for the economic well-being of farmers and their households, serious weaknesses in the state of agricultural development persist throughout Russia, Ukraine, Kazakhstan and other CIS countries. Accurate and reliable sets of agricultural data are essential to the realization of better decisions in business, national policy, international planning and advising consistent with agricultural development activities that improve agricultural development and food security. Knowledge of agriculture's contributions to the rural economy and rural households is limited by the lack of available, high quality, and consistent data at agricultural sector level (such as land use and transactions, land quality, prices of agricultural commodities, exports and imports of agricultural commodities, values of agricultural sales) and in particular detailed farm level data. The data availability is essential for analyses and evaluations policies and can contribute to their more efficient design, implementation and monitoring by policymakers.

Policy recommendations:

- *Eurasian countries should exert concerted efforts to design agricultural surveys to enhance collection of data on all key aspects of its agricultural sector.* The survey on the structure of agricultural holdings, income and economic performance of farms and households can be enhanced as done in the United States, the EU or other countries (Ronzon et al. 2014). For example, agricultural policymakers require information on how U.S. farming is organized in order to better monitor and design public policies. The Agricultural Resource Management Survey (ARMS) is conducted annually by the USDA's Economic Research Service (ERS) and the National Agricultural Statistics Service (USDA 2015). The ERS uses information gleaned from the surveys in creating its periodic reports, *Family Farm Report*. The *Family Farm Report* provides agricultural policymakers with an accurate, detailed, and objective information on the structure and performance of U.S. farms. The report, among others, includes information on the relationships of farm sizes and types to agricultural production, financial performance, sources of farm household income, and the extent of operators' off-farm work. The report provides a perspective of the financial position of family farms both in general and across different types of farms.

In the EU, the Farm Accountancy Data Network (FADN) is a European system of sample surveys conducted every year to collect structural and accountancy data on farms. Its aim is to monitor the income and business activities of agricultural

holdings and evaluate the impact of measures taken under the CAP. The FADN covers the entire range of agricultural activities on farms. FADN is conducted by all member countries. The European Commission is the primary user of analyses based on FADN-data. However, aggregated data can be found in the Standard Results database and is often used for policy impact analysis (European Commission 2015; Langrell et al. 2012; Louhichi et al. 2015).

The CIS countries can use the ARMS and FADN survey as a model to design their data collection system, conduct their information gathering activities and compile their analysis regarding their farming sector's performance.

- *Encourage public and private investments in survey data collection efforts.* The collection of survey data requires major initial investments. To that end, perhaps CIS countries can seek funding from international private donors and request national government expertise from the United States and EU in designing and implementing the survey, collecting and compiling survey findings into indicators of financial well-being. New countries that become members of the EU often seek help in the conduct of survey questionnaire development, sampling strategies, collection of data, and processing of data. The potential value of collaboration is that it introduces uniformity which can translate into more useful and valid assessments across countries. For example, the U.S. provided technical expertise on technical agricultural survey data in the Economic Research Service to Poland in the early 1990s.
- *Develop and maintain databases that can be used to design sound public policies.* The frequency of survey data collection could be decided by CIS countries. It all depends on time and funding. For example, ARMS data is collected yearly using a probability survey. However, to properly monitor the performance of the farming sector, it is necessary to update its key indicators on a yearly basis. Annual updates are critical to identifying the direction and magnitudes of developing trends in the performance indicators. Timely identification of trends within the indicators have implications for the resolution of problems at reduced implementation costs as well as provides pre-conditions for design of more efficient policies. Further, research into the technical and economic efficiency within the agricultural sector can benefit from the availability of current survey data. Ideally, yearly data is required to create useful databases for analysing current and emerging issues while providing reliable information to policymakers. For example, the *Family Farm Report* provides comprehensive information about the structure and finances across the diverse types of family farms in the US. Similarly, the EU's FADN data provides annual data on economic performance of farms across different typologies and in all member countries.
- *Disseminate agricultural statistics to extension agents, researchers and farmers to facilitate conducting analysis and relevant decisions in the sector.* Dissemination of data to the public may promote information access relevant to farmers' decision making about their agricultural activities as well as these data can benefit researchers and extension agents in conducting applied and scientific analysis of the farming sector and efficiency of agricultural policies.
- *Use data based evidence to design, analyse and monitor impacts and effectiveness of agricultural policies.* For example, the European Commission supports research analysis and creates reports based on FADN data assessing various aspects of the CAP and the performance of EU farms (European Commission 2015; Louhichi et al. 2015). In the US, ARMS alongside with other databases are

also used for policy and research analysis of US farming sector and impacts of public policies.

Referencies

- Acs, S., O. Borodina, S. Gomez y Paloma, A. Kharchenko (2014). Ukraine's agriculture: potential for expanding grain supply - Economic and institutional challenges. In: JRC Scientific and Policy Reports, European Commission (ed.), EUR – Scientific and Technical Research Series – ISSN 1831-9424 (online). <<ftp.jrc.es/EURdoc/JRC84652.pdf>>
- Abbott, P. (2009). 'Development dimensions of high food prices'. OECD Food, Agriculture, and Fisheries, Working Papers, No. 18, Paris: OECD publishing.
- Abousleiman, I., and O. Mahul (2011). "Weather Derivative in Malawi: Mitigating the Impact of Drought on Food Security." Case Study, Disaster Risk Financing and Insurance (DRFI), Global Facility for Disaster Reduction and Recovery (GFDRR). Washington, DC: World Bank (Accessed July 29, 2014).
- OECD (2013). Agricultural policy monitoring and evaluation. OECD. <www.oecd-library.org>
- AIFPSDF (2013). 'About us', All India Fair Price Shop Dealers' Federation, Kolkata, India, <aifpsdf.org/aboutus.html>
- Azarieva, J. (2014). Discussion. Workshop on the role of the Eurasian wheat belt to regional and global food security, 20-22 May 2014, Istanbul, Turkey.
- Babu, S. and A. Tashmatov (2000). Emerging Issues and Challenges for Attaining Food Security in Central Asia. Chapter in food policy reforms in Central Asia: setting the research priorities. Eds. Suresh Babu and Alisher Tashmatov. International Food Policy Research Institute. Washington DC.
- Baydilynina, A., A. Alishinbay and M. Bayetova (2000). Policy Reforms in Kazakhstan and Their Implications for Policy Research Needs. Chapter in Food policy reforms in Central Asia: setting the research priorities. Eds. Suresh Babu and Alisher Tashmatov. International Food Policy Research Institute. Washington DC.
- Bell, M.A. and R.A. Fischer (1994). Using yield prediction models to assess yield gains—a case study for wheat. *Field Crops Research* 36, pp. 161–166.
- BEFL (2014). The Largest Landowners in Russia. <www.befl.ru/upload/iblock/483/483810b362f214326ff5f343d7d663ce.pdf>
- Bruinsma, J. (2012). European and Central Asian Agriculture towards 2030 and 2050. Budapest: FAO Regional Office for Europe and Central Asia.
- Bulut, H., K. Collins and T. Zacharias (2011). Optimal Coverage Demand with Individual and Area Plans of Insurance. Presented at the 2011 Annual Meeting of the Agricultural and Applied Economics Association, Pittsburgh, PA.
- CACP (2013). 'Determination of minimum support prices', Commission for Agricultural Costs and Prices, Ministry of Agriculture, Government of India, <cacp.dacnet.nic.in>
- Cammarano, D., J. Payero, B. Basso, L. Stefanova and P. Grace (2012). Adapting wheat sowing dates to projected climate change in the Australian subtropics: analysis of crop water use and yield. *Crop and Pasture Science* 63, 974–986.

- UNFCCC (2008). Second National Communication of the Republic of Uzbekistan under the United Nations Framework Convention on Climate Change. Report prepared as Uzbekistan's reporting commitments under the United Nations Framework Convention on Climate Change (UNFCCC). <unfccc.int/resource/docs/natc/uzbnc2e.pdf>
- CIA (2014a). The World Factbook – Uzbekistan. Central Intelligence Agency <www.cia.gov/library/publications/the-world-factbook/geos/uz.html>
- CIA (2014b). The World Factbook, Freshwater withdrawal (domestic/industrial/agricultural). Central Intelligence Agency, <www.cia.gov/library/publications/the-world-factbook/fields/2202.html>
- Csaki, C. and A. Nucifora (2005): Ten years of transition in the agricultural sector: Analysis and lessons from Eastern Europe and the former Soviet Union. In: M. Holt, J.P. Chavas (Eds.), *Essays in Honor of Stanley R. Johnson*, Berkeley Electronic Press (2005).
- DFPD (2014). Note on TPDS, Department of Food & Public Distribution, Ministry of Consumer Affairs, Food and Public Distribution, Government of India, <dfpd.nic.in/?q=node/101>.
- De Sousa, E.L. and F.L. Pimentel, (2005). Study on cedula de produto rural (CPR) – farm product bond in Brazil. World Bank, February.
- Deininger, K. (2003). Land Markets in Developing and Transition Economies: Impact of Liberalization and Implications for Future Reform. *American Journal of Agricultural Economics*, 85(5), pp. 1217-1222.
- Deininger, K.W., D. Byerlee, J. Lindsay, A. Norton, H. Selod and M. Stickler (2011). *Rising global interest in farmland. Can it yield sustainable and equitable benefits?* Washington, DC: World Bank.
- Djanibekov, N., R. Sommer, and U. Djanibekov (2013). Evaluation of effects of cotton policy changes on land and water use in Uzbekistan: Application of a bio-economic farm model at the level of a water users association. In: *Agricultural Systems* 118 (2013) 1–13
- Djanibekov, N., K. van Assche, I. Bobojonov and J.P.A. Lamers (2012). Farm Restructuring and Land Consolidation in Uzbekistan: New Farms with Old Barriers, *Europe-Asia Studies*, 64:6, 1101-1126.
- Dries, L. and J.F.M. Swinnen (2004). Foreign direct investment, vertical integration and local suppliers: evidence from the Polish dairy sector, *World Development*, 32 (9),1525-1544.
- Du, S., B. Lu, F. Zhai, and B. Popkin (2002). A New Stage of the Nutrition Transition in China, *Public Health Nutrition*, 5(1A), 169–174.
- EBRD (2013). Transition Report. European Bank for Reconstruction and Development (ed.), <www.ebrd.com/downloads/research/transition/tr13.pdf>
- Epstein D., K. Hahlbrock and J. Wandel (2012). Why are Russia's Agroholdings so Pervasive in the Oblast Belgorod? Evidence from Case Studies and Farm-Level Data? IAMO Forum 2012 "Land Use in Transition: Potentials and Solutions between Abandonment and Land Grabbing" 20 June 2012

- Sedik, D. and Z. Lerman (2008). Land Reform, Transition, and Rural Development. *Development and Transition*, №11, December, 2008.
- European Commission (2013). Uzbekistan - Selected trade and economic issues. In: Policy Briefing of the Directorate General for External Policies - Policy Department, DG EXPO/B/PolDep/Note/2013_246 <www.europarl.europa.eu/RegData/etudes/briefing_note/join/2013/491518/EXPO-INTA_SP%282013%29491518_EN.pdf>
- European Commission (2014). The case of wheat production in Kazakhstan, Interim report EUR 2013, EC, Joint Research Center.
- European Commission (2015). The Farm Accountancy Data Network (FADN). European Commission, <ec.europa.eu/agriculture/rica/>
- European Commission (2015). The Farm Accountancy Data Network (FADN) - Publications. European Commission, <ec.europa.eu/agriculture/rica/publications_en.cfm>
- Falcetti, E., T. Lysenko and P. Sanfey (2004). Reforms and growth in transition: Re-examining the evidence. EBRD (ed.), <www.ebrd.com/downloads/research/economics/workingpapers/WP0090.pdf>
- FAOSTAT (2012). Food and Agriculture Organization Statistics. <www.fao.org/faostat>.
- FAOSTAT (2012). "China country profile." accessed August 6, 2014.
- FAO/REU (2012). Policy Study No.2012-2 (07/ 2012): Агрохолдинги России и их роль в производстве зерна Узун В.Я. , д.э.н., проф., Шагайда Н.И., д.э.н., Сарайкин В.А.
- FAO (2013). Eastern Europe and Central Asia Agroindustry Development Country Briefs – Uzbekistan. In: Food and Agriculture Organization of the United Nations (ed.) - Regional Office for Europe and Central Asia, <www.fao.org/fileadmin/user_upload/Europe/documents/Publications/AI_briefs/AI_briefs2012/fao_uzbekistan.pdf>
- FAPRI (2013). Analysis of the Asymmetric Price Transmission in the Ukrainian Wheat Supply Chain. FAPRI-MU Report #05-13, Food and Agricultural Policy Research Institute (FAPRI), Colombia, University of Missouri.
- FCI (2014). Procurement in details: Specifications of Food grains, Food Corporation of India, New Delhi, <fciweb.nic.in/qualities/view/9>
- Fellmann, T. and O. Nekhay (2012). Agricultural sector and market developments: a special focus on Ukraine, Russia and Kazakhstan – Workshop Proceedings. In: European Commission (ed.), JRC – Scientific and Policy Reports., <ftp.jrc.es/EURdoc/JRC65172.pdf>
- Fellmann, T., R. Araujo-Enciso, J. Delincé, G. Salputra, F. Santini, R. M'barek and M. Artavia, (2014a). "Eurasian markets in an uncertain world." Paper presented at the Eurasian Wheat Belt: Future Perspectives on Regional and International Food Security, Workshop, Istanbul Turkey, May 20-23, 2014.
- Fellmann, T., S. Helaine, and O. Nekhay (2014b). Harvest failures, temporary export restrictions and global food security: the example of limited grain exports from

- Russia, Ukraine and Kazakhstan. *Food Security* 6: 727-742, DOI: 10.1007/s12571-014-0372-2.
- Fieldsend, A. (2014). Production Potential of Eurasian Countries: Kazakhstan. Workshop on the role of the Eurasian wheat belt: Future perspectives on regional and global food security, 20-22 May 2014, Istanbul, Turkey
- Fischer, G., F.O. Nachtergaele, S. Prieler, E. Teixeira, G. Tóth, H. van Velthuisen, L. Verelst, and D. Wiberg (2012). Global Agro-Ecological Zones (GAEZ v3.0) – Model Documentation. IIASA and, FAO (eds.). <www.fao.org/fileadmin/user_upload/gaez/docs/GAEZ_Model_Documentation.pdf>
- Gale, F., B. Lohmar and F. Tuan (2005) China's new farm subsidies. Working paper series-05-01, Economic Research Service, US Department of Agriculture, Washington DC.
- Government of India (2013). State of Indian Agriculture 2011-12. Department of Agriculture and Cooperation. Ministry of Agriculture. Government of India.
- Gorton, M. and J. White (2007). Transformation and contracting in the supply chains of the former Soviet Union: Evidence from Armenia, Georgia, Moldova, Ukraine, and Russia. In J.F.M. Swinnen (ed.), *Global supply chains standards and the poor: how the globalization of food system and the standards affects rural development and poverty*, Wallingford: CABI, pp.175-187
- Greg, E.E., B.E. Anam, M.F. William, and E.J.C. Duru (2011). 'Climate change, food security and agricultural productivity in African: Issues and policy directions', *International Journal of Humanities and Social Science* 1(21): 205-223.
- Headey, D. (2011). 'Rethinking the global food crisis: The role of trade shocks.' *Food Policy* 36, 136-146.
- Helmar, M.D. (2014). International Crops Baseline Briefing Book. Technical Report UCED 2013/14-07, prepared in cooperation with the Food and Agricultural Policy Research Institute, University of Missouri. Reno: University of Nevada.
- Hess, U., K. Richter and A. Stoppa (2002). Innovative financial services for rural India: monsoon indexed lending and insurance for smallholders. Agricultural and Rural Development Working Paper 9. The World Bank: Washington DC.
- Hoda, A and A. Gulati (2013). " India's agricultural trade policy and sustainable development goals." Issue paper no. 48, International Centre for Trade and Sustainable Development, Geneva, <ictsd.org/downloads/2013/04/indias-agricultural-trade-policy-and-sustainable-development-goals-draft1.pdf>.
- Hu, E., A. Pan, V. Malik and Q. Sun. (2012). "White rice consumption and risk of type 2 diabetes: meta-analysis and systematic review." *BMJ* 2012;344:e1454.
- IAMO (2014a). Policy Brief No. 15/2014: A policy agenda for agricultural development in Kazakhstan. Contributing authors: Petrick, M., Gramzow, A., Oshakbaev, D., Wandel, J., IAMO (ed.), Halle (Saale), Germany, 02/2014. <ageconsearch.umn.edu/bitstream/166080/2/IAMOPolicyBrief15_en.pdf>
- IAMO (2014b). Policy Brief No. 16/2014: Eastern breadbasket obstructs its market and growth opportunities. Contributing authors: Glauben, T., Belyaeva, M., Bobojonov, I., Djuric, I., Götz, L., Hockmann, H., Müller, D., Perekhozhuk, O., Petrick, M., Prehn,

- S., Prishchepov, A., Renner, S., Schierhorn, F., IAMO (ed.), Halle (Saale), Germany, 04/2014. <
<ageconsearch.umn.edu/bitstream/171752/2/IAMOPolicyBrief16_en.pdf>
- Jalilov, S., T. DeSutter and J. Leitch (2011). Impact of Rogun dam on downstream Uzbekistan agriculture. *International Journal of Water Resources and Environmental Engineering*. 3 (8), 07/2011, 161-166
- Keyzer, M.A., M.D. Merbis, R. Witt, V. Heyets, O. Borodina and I. Prokopa (2012): Farming and rural development in Ukraine: Making dualisation work. In: JRC Scientific and Policy Reports, European Commission (ed.), EUR – Scientific and Technical Research Series – ISSN 1831-9424. <agrilife.jrc.ec.europa.eu/documents/UkraineTechnicalReport.pdf>
- Keyzer, M., M. Merbis, R. Witt, V. Heyets, O. Borodina and I. Prokopa (2013). Farming and Rural Development in Ukraine: making dualisation work. Report EUR 25878 EN, JRC-IPTS, Seville.
- Keyzer, M.A. (2014). Production Potential of Eurasian Countries: Ukraine. Workshop on the role of the Eurasian wheat belt: Future perspectives on regional and global food security, 20-22 May 2014, Istanbul, Turkey
- Kienzler, K.M., I. Rudenko, J. Ruzimov, N. Ibragimov and J.P.A. Lamers (2011). Winter wheat quantity or quality? Assessing food security in Uzbekistan. In: Food Security 3:53–64
- Keyzer, M. (2014). Production Potential of Ukraine: outcomes of joint IPTS projects. Workshop on the role of the Eurasian wheat belt to regional and global food security, 20-22 May 2014, Istanbul, Turkey.
- Kharas, H. (2010). The Emerging Middle Class in Developing Countries. OECD Development Centre Working paper NO. 285. Paris.
- Kobuta, I., O. Sikachyna and V. Zhygadlo (2012). Wheat Export Economy in Ukraine. FAO Regional Office for Europe and Central Asia, Policy Studies on Rural Transition No. 2012-4, <www.fao.org/docrep/017/aq344e/aq344e.pdf >
- Ladonina N. (2014). "Environmental and abiotic challenges." Workshop on the role of the Eurasian wheat belt to regional and global food security, 20-22 May 2014, Istanbul, Turkey.
- Land Privatization and farm Reorganization in Russia (1995). IFC. Washington, D.C
- Land Privatization and farm Reorganization in Russia (1995). International Finance Corporation in conjunction with the Overseas Development Administration. Washington, D.C.
- Langrell, S., P. Ciaian, S. Gomez y Paloma, D.L. Cunningham, J.F. Garnier, F. Isermeyer and A.K. Mishra (2012). Sustainability and Production Costs in the Global Farming Sector: Comparative Analysis and Methodologies, *JRC Scientific and Policy Reports EUR 25436*, European Commission, Joint Research Centre.
- Lerman, Z., C. Csaki and G. Feder (2004). Agriculture in Transition: Land Policies and Evolving Farm Structures in Post-Soviet Countries. Lexington Book, Lanham, MD.

- Lerman, Z. and I. Stanchin (2004). Institutional Changes in Turkmenistan's Agriculture: Impacts on Productivity and Rural Incomes. In: Eurasian Geography and Economics, Vol. 45, No. 1, pp. 60-72.
- Lerman, Z. (2005). The Impact of Land Reform on Rural Household Incomes in Transcaucasia and Central Asia, Discussion Paper 9.05 (Jerusalem, Hebrew University of Jerusalem).
- Lerman, Z. and I. Stanchin (2006). Agrarian Reform in Turkmenistan. In: Babu, S., and Djalalov, S. (eds.): Policy Reforms and Agriculture Development in Central Asia, Springer, New York, pp. 221-236.
- Lerman, Z., D. Sedik, N. Pugachov and A. Goncharuk (2007). Rethinking Agricultural Reform in Ukraine. Studies on the Agricultural and Food Sector in Central and Eastern Europe, IAMO: Halle, Volume 38.
- Lerman, Z. (2008a). Agricultural Development in Uzbekistan: The Effect of Ongoing Reforms, Discussion Paper 7.08 (Jerusalem, Hebrew University of Jerusalem).
- Lerman, Z. (2008b). Agricultural Development in Central Asia: A Survey of Uzbekistan, 2007–2008. In: Eurasian Geography and Economics, 49:4, 08/2008.
- Lerman, Z. (2009). Land reform, farm structure, and agricultural performance in CIS countries. *China Economic Review*, 20 (2009), pp. 316–326.
- Lerman, Z. and D. Sedik (2009). Agricultural Recovery and Individual Land Tenure: Lessons from Central Asia. In: FAO Regional Office for Europe and Central Asia, Policy Studies on Rural Transition No. 2009-3, <www.fao.org/3/a-aq335e.pdf>
- Lerman, Z., D. Prikhodko, I. Punda, D. Sedik, E. Serova, I. Stanchin and J. Swinnen (2013). Turkmenistan – Country Highlights: Agricultural sector review. Food and Agriculture Organization of the United Nations [FAO Investment Centre] and European Bank for Reconstruction and Development [EBRD] (eds.). <www.fao.org/fileadmin/user_upload/tci/docs/Turkmenistan_web_OK.pdf>
- Lerman, Z. (2013). Structure and Performance of Agriculture in Central Asia. Center for Agricultural Economic Research, Hebrew University of Jerusalem, Discussion Paper No. 8.13, <departments.agri.huji.ac.il/economics/en/publications/discussion_papers/2013/index.html>
- Lerman, Z. (2014). Privatisation, farm structure and agro-farms. Workshop on the role of the Eurasian wheat belt: Future perspectives on regional and global food security, 20-22 May 2014, Istanbul, Turkey.
- Liefert W., O. Liefert, G. Vocke and E. Allen (2010). Former Soviet Union region to play larger role in meeting world wheat needs. ERS-USDA, Amber Waves, Volume 8, Issue 2, 2010.
- Liefert, B. (2014). Logistics, infrastructure and export capacity. Workshop on the role of the Eurasian wheat belt to regional and global food security 20-22 May 2014, Istanbul, Turkey
- Lioubimtseva, E. and G.M. Henebry (2012). Grain production trends in Russia, Ukraine, and Kazakhstan: New opportunities in an increasingly unstable world? *Frontiers of Earth Science* 6(2), pp 157-166.

- Lissitsa, A. and M. Odening (2005). Efficiency and total factor productivity in Ukrainian agriculture in transition. *Agricultural Economics* 32(3): 311–325
- Lobell, D. B., I. Ortiz-Monasterio, G.P. Asier, P.A. Matson, R.L. Naylor and W.P. Falcon. (2005). Analysis of wheat yield and climatic trends in Mexico. *Field Crops Research*, 94 (2005), pp. 250–256.
- Longmire, J. and A. Moldashev (1999). Changing Competitiveness of the Wheat Sector of Kazakhstan and Sources of Future Productivity Growth. CIMMYT Economics Paper 99-06. Mexico City.
- Louhichi K., P. Ciaian, M. Espinosa, L. Colen, A. Perni and S. Gomez y Paloma (2015). An EU-wide Individual Farm Model for Common Agricultural Policy Analysis (IFM-CAP). JRC Science and Policy Report EUR 26910, Joint Research Centre, European Commission.
- Mishra, A.K., and A. Tripathi (2014). “Wheat Sector of India”. Paper presented at the Eurasian Wheat Belt: Future Perspectives on Regional and International Food Security, Workshop, Istanbul Turkey, May 20-23, 2014.
- MOFCOM (2014). [China's Free Trade Agreements](http://fta.mofcom.gov.cn/english/fta_qianshu.shtml). China FTA Network, <fta.mofcom.gov.cn/english/fta_qianshu.shtml>
- Mitra, S. and T. Josling (2009). Agricultural export restrictions: welfare implications and trade disciplines. IPC Position Paper. Agricultural and Rural Development Policy Series, Washington DC: International Food and Agricultural Trade Policy Council.
- Meyers, W. (2014). Credit and Finance in Post-Soviet Countries. Workshop on the role of the Eurasian wheat belt to regional and global food security, 20-22 May 2014, Istanbul, Turkey
- Musaev, D., Y. Yakhshilikov, and K.Yusupov (2010). Food Security in Uzbekistan, UNDP.
- Narayanan and Walmsley, Global Trade, Assistance, and Production, 2008.
- Nezhadahmadi, A., H. Prodhan, and G. Faruq (2013). Drought tolerance in wheat. *Scientific World Journal* Vol. 2012
- Nikulin A. (2013). Никулин А. Особенности мировоззрения муниципальных служащих: между государством и гражданами; Вестник РУДН, Серия Социология, 2013, №2, С.65
- Nikulin A. (2014). Discussion. Workshop on the role of the Eurasian wheat belt to regional and global food security, 20-22 May 2014, Istanbul, Turkey
- Nikulin. A. (2014). Social Consequences of Transition in Rural Districts. Discussion. Workshop on the role of the Eurasian wheat belt to regional and global food security, 20-22 May 2014, Istanbul, Turkey
- Nowak, M. (2005). On ne prete (PAS) qu’aux riches.
- OECD Statistics (2013). <www.oecd-library.org>.
- OECD (2011). Agricultural policy monitoring and evaluation 2011, OECD countries and emerging economies, Paris: OECD publishing.
- OECD (2013a). Review of agricultural policies: Kazakhstan 2013, Paris: OECD publishing.

- OECD (2013b). Agricultural policy monitoring and evaluation 2011, OECD countries and emerging economies, Paris: OECD publishing.
- OECD (2015). Producer and Consumer Support Estimates database. Paris: OECD publishing, <www.oecd.org/tad/agricultural-policies/producerandconsumersupportestimatesdatabase.htm#tables>
- Ortiz R, Sayre KD, Govaerts B, Gupta R, Subbarao GV, Ban T, Hodson D, Dixon JM, Ortiz-Monasterio JI, Reynolds M. (2008). Climate change: can wheat beat the heat? *Agric Ecosyst Environ* 126: 46–58.
- Petrick, M., J. Wandel, and K. Karsten, (2011). Farm restructuring and agricultural recovery in Kazakhstan’s grain region: An update. IAMO Discussion Paper, 137. Halle (Saale): IAMO, <www.iamo.de/dok/dp137.pdf>
- Petrick, M., D. Oshakbaev and J. Wandel, (2014). Kazakhstan’s wheat, beef and dairy sectors: An assessment of their development constraints and recent policy responses. In: IAMO Discussion Paper Series, IAMO (ed.), DP No. 145, Halle (Saale). <link>
- Pugachov, V. (2014). Agrarian Reform in Ukraine. Workshop on the role of the Eurasian wheat belt to regional and global food security, 20-22 May 2014, Istanbul, Turkey.
- Ronzon, T., P. Ciaian, S. Gomez y Paloma and J. Delincé (2014). Literature review on Cost of Production Methodologies. Technical Paper Series GO-04-2014, Global Strategy, Improving Agricultural and Rural statistics (GSARS) <<http://www.gsars.org/wp-content/uploads/2014/09/Literature-Review-on-Cost-of-Production-Methodologies.pdf>>
- Rosreestr. Land Fund of the Russian Federation, 2013.
- Rosstat (2006). Rosstat database Census of Agriculture. Rosstat <www.gks.ru/news/perepis2006/totals-osn.html>
- Russian Land Committee Statistics (2005-2013).
- RMC (2015). Russian Microfinance Center. <www.rmcenter.ru/en>
- Russian Statistical Yearbook (2014). Rosstat.
- Sartori, P. and T. Trevisani (2007). Patterns of Transformation In and Around Uzbekistan, Reggio Emilia: Diabasis, 2007.
- Sedik, D. (2004). Missing pillars: the failures of rural finance in Ukraine. In: Macey, D., A. J. Pyle, W. Wegren S K, eds. Building Market Institutions in Post-Communist Agriculture: Land, Credit, and Assistance. Lanham: Lexington Books, 89–106
- Sedik, D., G. Kurbanova and G. Szentpali (2011). The status and challenges of food security in Central Asia. FAO Regional Office for Europe and Central Asia. Background paper for the 3rd Central Asia Regional Risk Assessment (CARRA) Meeting in Astana, Kazakhstan, 14-15 April 2011 <europeandcis.undp.org/uploads/public1/files/vulnerability/Senior%20Economic%20Web%20site/FoodSec_Central_Asia_April_5_2011_15h_final.pdf>
- Sedik, D. (2014a). Production Potential of Eurasian Countries: Regional Overview. Workshop on the role of the Eurasian wheat belt: Future perspectives on regional and global food security, 20-22 May 2014, Istanbul, Turkey

- Sedik, D. (2014b). New Players in the Region: Central Asian Countries – Introduction and setting the scene. Workshop on the role of the Eurasian wheat belt: Future perspectives on regional and global food security, 20-22 May 2014, Istanbul, Turkey
- Sedik, D. (2014). Regional Overview of Production Potential of Eurasian countries. Workshop on the role of the Eurasian wheat belt to regional and global food security, 20-22 May 2014, Istanbul, Turkey.
- Serova, E. (2000). Public opinion concerning Russia's agrarian reforms. In A.L. Missing Source Document
- Shagaida N. (2010). Crediting of peasant (individual private) farms on land mortgage. Russian Economy: Trends and Perspectives - April 2010, IET, www.iep.ru/ru/russian-economy-trends-and-perspectives-april-2010-3.html
- Shagaida N. (2010). Land Market in Russian Agriculture: institutes' transformation and practice. Gaidar Institute for economic policy, 2010. www.iep.ru/files/text/working_papers/142.pdf
- Shagaida N. (2014). Land policy in Russia Workshop on the role of the Eurasian wheat belt to regional and global food security, 20-22 May 2014, Istanbul, Turkey.
- Shagaida N. (2009). Transferability of agricultural land: the problem of institutional adjustment// Russian Economy: Trends and Perspectives - October 2009, IET, www.iep.ru/ru/russian-economy-trends-and-perspectives-october-2009.html
- Sharma, R. (2011). Food export restrictions: Review of the 2007-2010 experience and considerations for disciplining restrictive measures. FAO Commodity and Trade Policy Research Working Papers, No. 32, Trade and Markets Division, FAO Rome.
- Sommer, R., Glazirina, M., Yuldashev, T., Otarov, A., Ibraeva, M., Martynova, L., Bekenov, M., Kholov, B., Ibragimov, N., Kobilov, R., Karaev, S., Sulstonov, M., Khasanova, F., Esanbekov, M., Mavlyanov, D., Isaev, S., Abdurahimov, S., Ikramov, R., Shezdyukova, L., de Pauw, E. (2013). Impact of climate change on wheat productivity in Central Asia. *Agriculture, Ecosystems and Environment* 178: 78–99.
- Sorenson, V.W. (1964). Agricultural Market Analysis. Michigan State University. East Lansing, MI.
- Spoor, M. (2002). The Aral Sea basin crisis: transition and environment in former Soviet Central Asia. *Development and Change*, 29 pp. 409–435
- Stanchin, I. and Z. Lerman (2010). Water in Turkmenistan. In: Arsel, M. and Spoor, M. (eds.): Water, Environmental Security and Sustainable Development: Conflict and Cooperation in Central Eurasia, Routledge, London, pp. 250-266.
- Stanchin, I., Z. Lerman and D. Sedik (2011). 'Потенциал роста доходов сельского населения Туркменистана на основе альтернативных сельскохозяйственных культур'. In: FAO - Regional Office for Europe and Central Asia. Policy Studies on Rural Transition, 2011-1. < www.fao.org/3/a-aq340r.pdf>
- Statistical book - Russia-Belarus (2012). Rosstat.
- Syroka, J., and A. Nucifora (2010). National Drought Insurance for Malawi. World Bank Policy Research Working Paper 5169. Washington, DC: Africa Region, Southern Africa Poverty Reduction and Economic Management Unit, World Bank.

- Tatarinform (2014). www.tatcenter.ru/article/111664/>
- Tisdell, C. (2009). Economic reform and openness in China: China's development policies in the last 30 years. *Economic analysis and policy* Vol. 39(2):271-294.
- Transparency International (2012). Corruption Perceptions Index 2012, www.transparency.org/cpi2012/results>
- Trevisani, T. (2007). After the Kolkhoz: Rural Elites in Competition. In: *Central Asian Survey*, 26:1, 03/2007.
- Tripathi, A. (2013). Profitability, Crop Productivity and Farm Income in India. In: K. Suman Chandra, V. Suresh Babu & P. K. Nath (Eds.). *Agrarian crisis in India: The Way out*. Academic Foundation: New Delhi.
- Tripathi, A. and S. Srivastava (2011). Interstate Migration and Changing Food Preference in India. *Ecology of Food and Nutrition* Vol. 50(5): 410-428.
- Ukrainian Statistical Yearbook (2014). Ukrainian Statistical Agency.
- UNCTAD (2013): World Investment Report 2012. United Nations Conference on Trade and Development, unctad.org/en/PublicationsLibrary/wir2012overview_en.pdf>
- UNCTAD (2009). World investment report 2009. Transnational Corporations, Agricultural Production and Development. United Nations Conference on Trade and Development, New York: United Nations.
- UNCTAD (2012). World investment report 2012. Towards a New Generation of Investment Policies. United Nations Conference on Trade and Development, New York: United Nations.
- USDA (2012). Doing Business in Uzbekistan: 2012 - Country Commercial Guide for U.S. Companies, US Department of State. uzbekistan.usembassy.gov/doing-business-local.html>
- USDA (2015). Agricultural Resources Management Survey (ARMS). U.S. Department of Agriculture, www.ers.usda.gov/data-products/arms-farm-financial-and-crop-production-practices.aspx>
- Uzun, V., Brooks, K., Krylatykh, E. et al. (1994). Agricultural reform in Russia: a view from the farm level. World Bank discussion paper 327.
- Uzun, V. (2005). Large and small business in Russian agriculture: adaptation to market. *Comparative Economic Studies* 47(1): 85-100
- Uzun V. (2005). Adapting to a market economy: Changes in Russia's farm structure, Basis Brief, Number 34.
- Uzun V., Shagaida N., Saraikin V. (2012). Russian Agroholdings and their role in the Grain Production. FAO, Policy study No. 2012-2, 2012. V., *Агрохолдинги России и их роль в производстве зерна. ФАО, Региональное бюро по Европе и Центральной Азии, исследование по политике перехода сельского хозяйства*, №2012-2 www.fao.org/fileadmin/user_upload/Europe/documents/Publications/Policy_Studies/Agroholdings_ru.pdf>

- Uzun, V., V. Saraikin, E. Gataulina, N. Shagayda, R. Yanbykh, S. Mary and S. Gomez y Paloma (2013). Prospects of the farming sector and rural development in view of food security - The case of the Russian Federation. In: JRC Scientific and Policy Reports, European Commission (ed.), EUR 26256 EN – Scientific and Technical Research Series (JRC-IPTS, Seville), <ec.europa.eu/jrc/sites/default/files/final_online_jrc85162_russia.pdf>
- Uzun, V. (2014). Agrarian Reform in Russia. Workshop on the role of the Eurasian wheat belt to regional and global food security, 20-22 May 2014, Istanbul, Turkey.
- Veldwisch, G. J. A. and M. Spoor (2008). Contesting Rural Resources: Emerging 'Forms' of Agrarian Production in Uzbekistan'. *Journal of Peasant Studies*, 35, 3, pp. 424-451.
- Visser, O., and M. Spoor (2011). Land grabbing in post-Soviet Eurasia: The world's largest agricultural land reserves at stake. *Journal of Peasant Studies*, 38(2), 299–323.
- Voigt, P. (2014): New Players in the Region: Uzbekistan. Workshop on the role of the Eurasian wheat belt: Future perspectives on regional and global food security, 20-22 May 2014, Istanbul, Turkey
- Wandel, J. (2009): Agroholdings and clusters in Kazakhstan's Agro-food sector. In: Discussion Paper Series of the Leibniz Institute of Agricultural Development in Central and Eastern Europe (IAMO), Dp No. 126/2009. <econstor.eu/bitstream/10419/32793/1/613840038.pdf>
- Wandel, J. (2011). Integrierte Strukturen im Agra- und Ernährungssektor Russlands – Entstehungsgründe, Funktionsweise, Entwicklungsperspektiven und volkswirtschaftliche Auswirkungen. In: Studies on the Agricultural and Food Sector in Central and Eastern Europe, IAMO (ed.), Vol. 63/2011. <econstor.eu/bitstream/10419/58997/1/689801637.pdf>
- Wang, H. (2011). Building a regulatory framework for biofuels governance in China: Legislation as the starting point. *Natural Resources Forum*, Vol. 35(3): 201-212.
- Wang, H. (2014). "Food security: China Experience." Paper presented at the Eurasian Wheat Belt: Future Perspectives on Regional and International Food Security, Workshop, Istanbul Turkey, May 20-23, 2014.
- Westcott, P. and R. Trostle (2014). USDA Agricultural Projections to 2023. Economic Research Service, U.S. Department of Agriculture, Washington DC.
- World Bank (2000). "Social Protection Developments: Eurasian vs. European Approach." World Bank, <siteresources.worldbank.org/ECAEXT/Resources/publications/Balancing-Protection/1.pdf>
- World Bank and International Finance Corporation (2012). Doing Business in a more transparent world - Comparing regulations for domestic firms in 183 economies. WB and IFC (eds.), <www.doingbusiness.org/~media/FPDKM/Doing%20Business/Documents/Annual-Reports/English/DB12-FullReport.pdf>
- WWF (2002). Living Planet Report, World Wide Fund, <www.footprintnetwork.org/images/uploads/lpr2002.pdf>

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Annex

Programme/agenda

20 MAY 2014		
18:00-19:30	Registration and welcome reception	
	Welcome and cocktail reception	Host: Jacques Delincé, EC-JRC-IPTS

21 MAY 2014		
08:00-08:30	Morning coffee	
08:30-09:30	Session 1: Setting the scene	Chair: Jacques Delincé, EC-JRC-IPTS
08:30-08:40	Welcome. Background of workshop	Jacques Delincé, EC-JRC-IPTS
08:40-09:00	Eurasian wheat – Implications for the EU?	Giampiero Genovese, DG AGRI, European Commission
09:00-09:30	Eurasian wheat and global markets	Bill Liefert, USDA
09:30-13:00	Session 2: Horizontal issues	Chair: Natalya Shagaida, Centre for Agrifood Policy of RANEPa, Russia
09:30-09:35	Introduction and setting the scene	Natalya Shagaida, Centre for Agrifood Policy of RANEPa, Russia
09:35-10:00	Land policy	Natalya Shagaida, Centre for Agrifood Policy of RANEPa, Russia
10:00-10:25	Credit & finance	William Meyers, University of Missouri, Columbia, USA
10:25-10:50	Privatisation, farm structure and agro-farms	Zvi Lerman, Hebrew University, Israel
10:50-11:20	Coffee Break	
11:20-11:45	Logistics, infrastructure and export capacity	Dmitry Rylko, IKAR, Russia
11:45-12:10	Environmental and abiotic challenges	Nina Ladonina, Space Research Institute, Russia
12:10-12:35	Social consequences of Transition in Rural Districts	Alexander Nikulin, Center for Agrarian Studies, RANEPa
12:35-13:05	Open discussion	
13:05-14:15	Networking lunch	
14:15-16:10	Session 3: Agrarian reforms in post-soviet countries	Chair: Zvi Lerman, Hebrew University, Israel
14:15-14:20	Introduction and setting the scene	Zvi Lerman, Hebrew University
14:20-14:40	Ukraine	Nikolay Pugachov, Institute for Agricultural Economics, Ukraine
14:40-15:00	Russia	Vassily Uzun, Centre for Agrifood Policy of RANEPa, Russia
15:00-15:20	Kazakhstan	Dauren Oshakbayev, Astana, Kazakhstan
15:20-15:40	Belarus	Alexander Shpak, Institute for System Research of Agrofood Sector in Belarus
15:40-16:10	Open discussion	
16:10-16:30	Coffee Break	

16:30-18:15	Session 4: Production Potential of Eurasian Countries: outcomes of joint IPTS projects	Chair: Sergio Paloma y Gomez, EC-JRC-IPTS
16:30-16:35	Introduction and setting the scene	Sergio Paloma y Gomez, IPTS
16:35-16:55	Regional overview	David Sedik, FAO
16:55-17:15	Ukraine	Michiel Keyzer, Centre for World Food Studies, The Netherlands
17:15-17:25	Russia	Valery Saraikin & Renata Yanbykh, RANEP, Russia
17:25-17:45	Kazakhstan	Andrew Fieldsend, Research Institute of Agricultural Economics, Hungary
17:45-18:15	Open discussion	

22 MAY 2014

09:00-11:30	Session 5: New Players in the Region: Central Asian countries	Chair: David Sedik, FAO
09:00-09:05	Introduction and setting the scene	David Sedik, FAO
09:05-09:35	Uzbekistan	Peter Voigt, IAMO, Germany
09:35-10:05	Turkmenistan	Ivan Stanchin, VEPI, Russia & Zvi Lerman, Hebrew University, Israel
10:05-10:35	Open discussion	
10:35-11:05	Coffee break	
11:05-12:45	Session 6: Global/regional insights	Chair: Stephen Langrell, EC-JRC-IPTS
11:05-11:10	Introduction and setting the scene	Stephen Langrell, EC-JRC-IPTS
11:10-11:30	Eurasian markets in an uncertain world	Thomas Fellmann, EC-JRC-IPTS
11:30-11:50	Experience from India	Ashok Mishra, Louisiana State University, USA
11:50-12:10	Experience from China	Holly Wang, Purdue University, USA
12:10-12:45	Open discussion	
12:45-14:00	Networking lunch	
14:00-16:00	Session 7: Open discussion and general considerations	Chair: Jacques Delincé, JRC-IPTS
14:00-14:05	Introduction	Jacques Delincé, JRC-IPTS
14:05-15:20	Session presentations	Session rapporteurs
15:20-15:50	General discussion	All participants
15:50-16:00	Concluding remarks	EC-JRC-IPTS and RANEP
16:00	End of workshop	

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