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Heterogeneous impact of price spikes across countries and supply chain actors: An evidence from Central Asia and the Caucasus. A review

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Abstract: The causes of food price spikes are complex, and their impact on different countries varies depending on production levels and the varied policies in place. Countries in Central Asia and the Caucasus (CAC) region have implemented a wide range of reforms that vary in form and speed. The existing scientific literature reports about the consequences of price spikes in CAC; however, to date, a comparison of impact between those countries has not been made in terms of the entire supply chain perspective. Therefore, this study investigates the impact of the price spikes on the entire wheat supply chain for the first time in CAC and discusses the role of policies. Another contribution of this study is an evidence-based analysis of the role of policy reformation in maintaining food security under price shocks. Our results indicate a very limited effect of price interventions and trade restrictions on dampening wheat prices in all countries. We find that only trade diversification policy had a positive effect on reducing the level of price spikes, and thus it might be a suitable policy measure for maintaining food security.

Keywords: Caucasus; Central Asia; food security; price shocks; procurement policy; subsidies; wheat supply chains

Reasons behind soaring food prices are very complex and may involve an increasing demand for food (Regmi and Meade 2013; Tadesse et al. 2014); production volatilities caused by weather extremes (Gbegbelegbe et al. 2014; Shiferaw et al. 2014); competition for land between agricultural and industrial crops (e.g. biofuels) (Rathmann et al. 2010; Mueller et al. 2011); trade restrictions (Sharma 2011; Anderson et al. 2013); significant exchange rate fluctuations (Gopinath and Burstein 2014).

For countries in Central Asia and the Caucasus (CAC) region, wheat products represent one of the most important dietary components. Per capita wheat consumption is very high and ranges between 94 to 188 kg/year according to the FAO (FAOStat 2015). Wheat consumption in CAC is even higher than in the east and west African countries (USAID 2011). A large part of CAC countries' wheat demand is met by importing grains from Kazakhstan, Russia and Ukraine (KRU). Therefore, the development of wheat markets in CAC, as well as the impact of world food price spikes, cannot be analysed in isolation from KRU trade policies. Weather extremes and export restrictions in KRU are considered the most important factors affecting the volatility of agricultural prices and food security, not only in CAC but also worldwide (Welton 2011; Götz et al. 2015). Nevertheless, several studies report that export restrictions of KRU create wheat availability problems in importing countries, especially in those that are dependent on KRU exports (USAID 2011; Akramov and Shreedhar 2012). Thus, the impact of KRU wheat export restrictions may have a two-fold impact on CAC countries: (i) a decreased supply of wheat available for import (increased domestic wheat prices), and (ii) increased international wheat prices (increased costs of wheat imports and additional domestic wheat price increases).

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Governments of CAC countries implemented several programs to enable food access for their populations, especially for the poor, who were affected the most by the food price surges. Although a wide range of studies globally have investigated the efficiency of such policy reforms on food security issues (Anderson et al. 2013; Crescimanno et al. 2014), the role of policy measures in maintaining price stability and food security has not yet been investigated in cross country settings in Central Asia and the Caucasus. Although there is an emerging list of literature in this topic (Goychuk and Meyers 2014; Svanidze et al. 2019), the effects of changing welfare in the entire supply chain are not compared. Especially, the impacts of policy measures on reducing household vulnerability are not discussed. Therefore, this study aims to contribute to filling gaps in the existing literature and investigate the role of government policies on coping with the negative consequences of export restrictions. This study has the following objectives: (i) to explore the impact of weather extremes on production volatility in the main grain supply regions; (ii) to discuss the role of existing intervention policies in KRU and CAC countries on domestic price stability; and (iii) to explore the impact of export restrictions in KRU on production and consumer welfare and food security in CAC countries.

DATA SOURCES AND METHODS

Scientific journal articles and media information were the preliminary sources used to understand the prevailing socio-economic environment and justify the importance of this topic. Secondary data from national, as well as international statistical agencies, was also used in order to explain production and price fluctuations.

Qualitative interviews with supply chain actors were conducted in two case study countries: Armenia and Uzbekistan. Twenty supply chain actors including farmers, processors and traders were interviewed from each country; semi-structured interviews included questions about production constraints and opportunities. The effect of KRU wheat export bans and the Russian embargo on western food products on the activities of supply chain actors was also a focus of this research and the interviews.

A survey of 401 household farms was conducted in Armenia in order to determine the impact of the crises on household welfare. Several welfare indicators were used in the scope of this study in order to examine the welfare effect of trade policy changes. Bread prices were analysed as a main food staple in order to evaluate the effects on consumers. Changes in prices during the export restriction period were estimated in order to present the impact of those trade distortions on consumer prices. This study triangulates discussions based on data received from the above-mentioned data sources in order to understand the effect of weather and policy shocks on population welfare, as well as the functioning of the supply chains.

WEATHER EXTREMES AND EXPORT RESTRICTIONS

Grain production is very volatile in KRU and CAC countries because of temperature and precipitation extremes. Extreme cases of this were observed in 2008, 2010 and 2012 in KRU countries, which reduced grain harvest and exports significantly (World Bank 2018). Record heat levels in 2010 were the main cause of more than 500 wildfires in Russia (Wegren 2011). Because of drought and fires in Russia, production declined by more than 20 million tons (t) compared to previous years.

Another major production shortage from unfavourable weather conditions in Russia occurred in 2012 when production declined from 56.2 million t in 2011 to 37.7 million t in 2012. Delayed growth before dormancy with hot and dry conditions in spring is shown as the main reason for crop failure in some regions of Russia.

Similarly, drought also damaged crop yields in Ukraine in 2010, but the reduction of the harvest was not as high as observed in 2003 and 2007. Ukraine had serious crop damage in 2003, which was associated with unusually low temperatures in December followed by hail in February and March. Particularly low levels of planted areas in 2003 are also explained by unfavourable wet weather conditions that delayed or prevented planting winter wheat (FAS USDA 2003). Another yield shortfall was observed in 2007 when there were low production levels due to high temperatures and drought in the spring and summer months.

Kazakhstan was also hit by natural disasters that hit Russia in 2010 and 2012. Kazakhstan produced almost half of the previous years' production during these years because of similar natural disaster phenomena observed in Russia.

With the fear of domestic food price increases, KRU countries implemented several forms of export restric-

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tions during those drought years. Export licensing, export quotas, export taxes, as well as direct export bans, were the main forms of restrictions implemented. Some forms of indirect export controls (e.g. imposing restriction on rail transports) were also implemented by some government agencies.

The Kazakh government introduced a wheat export licensing system in the fall of 2007, followed by an export ban for wheat between April, 2008 and September, 2008 (Table 1). Although the ban was supposed to be for wheat only, there were also unofficial restrictions put in place for flour exports from Kazakhstan. Because of the wheat export ban, the amount of flour exported suddenly rose to 177.4 thousand t in May, 2008 (137.5 thousand t were exported in April, 2008), which is a record amount of flour exported following Kazakhstan's independence. Thus, in response, the government used unofficial ways, such as ordering the state's railroad company to not allow flour as export cargo. Furthermore, complications were also caused when the customs officers did not allow flour wagons to leave Kazakhstan borders.

Russia introduced a 10% export duty for wheat and barley in November, 2007 as a policy measure to cope with soaring food prices. The export tax increased to 40% for wheat in December, 2007, which was maintained until May, 2008. Furthermore, a full export ban was introduced for exports to Belarus and Kazakhstan, countries in a customs union with Russia, because of deflection fear. Ukraine's export restrictions started with the introduction of an export licensing system for wheat and wheat-rye mixes in September, 2006. An export restriction was implemented no later than one month after in October, 2007, when the government introduced a maximum export quota of 400 000 t until December, 2007.

Although most of the CAC countries are grain importers, they have also introduced different forms of export restrictions. Tajikistan imports about 60% of its grain and exports from the country are not widely known. The government introduced a wheat export ban in the 2007–2008 season to reduce the limited amount of wheat flow to Afghanistan (Robinson 2008). Similarly, Kyrgyzstan also imports more than 30% of its grain, but it still banned grain exports on September 25, 2012 for half a year. Nevertheless, grain exports from the country are still not evident from any statistics. Although there was no official ban on grain exports by Uzbekistan, there have been some instances reported of exports not being allowed informally (Robinson 2008).

Table 1. Export restrictions in Kazakhstan, Russia and Ukraine (KRU)

Country/number of restrictions	Export restrictions	Date
Ukraine		
1	licensing of export and import of wheat and wheat-rye mix (meslin)	September 28, 2006
2	export quotas for 400 thousand t introduced	October 11, 2006–December 31, 2006
3	export quotas for 3 thousand t introduced	June 20, 2006–January 1, 2007
4	export quotas for 3 thousand t introduced	July 1, 2007–December 31, 2007
5	export quotas for 200 thousand t introduced	January 1, 2008–March 31, 2008
6	export quotas for 1.2 thousand t introduced	April, 2008–July 1, 2008
7	export quotas for 500 thousand t introduced	October 4, 2010–January 1, 2011
8	export quotas for 1 million t introduced	December 6, 2010–March 1, 2011
Russia		
1	export tax of 10% for wheat and barley introduced	November, 2007–December, 2007
2	export tax raised to 40% for wheat, 30% for barley and maintained	December, 2007–May, 2008
3	export ban on wheat exports to Belarus and Kazakhstan	April, 2008–June, 2008
4	export ban on wheat, wheat flour, barley, rye, rye flour and maize introduced; the ban was subsequently extended until June 2011	August, 2010–December, 2010 (June, 2011)
Kazakhstan		
1	export ban on wheat introduced	April, 2008–September, 2008
2	licensing export allowance simplified	2007–2008

Source: Authors' representation based on Sharma (2011), FAO (2012) and FAO GIEWS (2013)

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DOMESTIC INTERVENTION POLICIES

Price controls and consumer subsidies were the main policies implemented against soaring food prices in many countries around the world in 2007–2008 and 2010–2011 (FAO 2008). Provision of pledge prices, intervention purchases and direct price regulations were the main price stabilisation policies implemented in KRU and CAC countries during the crisis periods.

Price intervention policies. The Food Contract Cooperation (FCC) is an important player in the supply chains of Kazakhstan; basically they purchase wheat from producers during the years when the price of grain is low on the market. Apart from Uzbekistan and Turkmenistan, government interventions in CAC countries are very different than in KRU. Grain self-sufficiency has been the main policy goal of the Uzbek and Turkmen governments since the early independence years. These countries produced almost all of their domestic demand, although they imported small amounts of wheat due to poor quality in domestic production (USAID 2011). This policy allowed these countries to maintain the lowest local wheat prices amongst central Asian countries for the basic bread types even though imported flour was expensive (Robinson 2008).

Other CAC countries have had relatively little involvement in agricultural production and trade, although they've started to become more active in supply chains due to export restrictions and production uncertainties in KRU. Armenia, for example, introduced a grain self-sufficiency target in 2008 similar to Uzbekistan and Turkmenistan. The main differences, however, are still the policy tool used to achieve self-sufficiency. Caucasus countries were mainly attempting to boost local production with increasing levels of subsidies to grain production, and several other policy measures were implemented in CAC countries to assist the most vulnerable populations. Tajikistan, for example, distributed USD 58 million in food subsidies in May, 2008, and Kyrgyzstan distributed 600 000 t of flour to low-income families in March, 2011 (FAO GIEWS 2013). Kyrgyzstan also reduced the value-added tax (VAT) on flour for small- and large-scale mills (reduced from 20 to 10%) (Robinson 2008), while Azerbaijan eliminated their import tariffs for grains and also suspended their VAT between May, 2008 and May, 2009.

Grain reserves. The wheat reserves of KRU and CAC countries account for 9% of the world's total wheat reserves (10-year average, 2005–2014), with Russia having the largest reserves among these countries.

Established by the Russian government, the United Grain Company plays an important role in procuring, storing, processing and distributing grain on the domestic market. The state purchased more

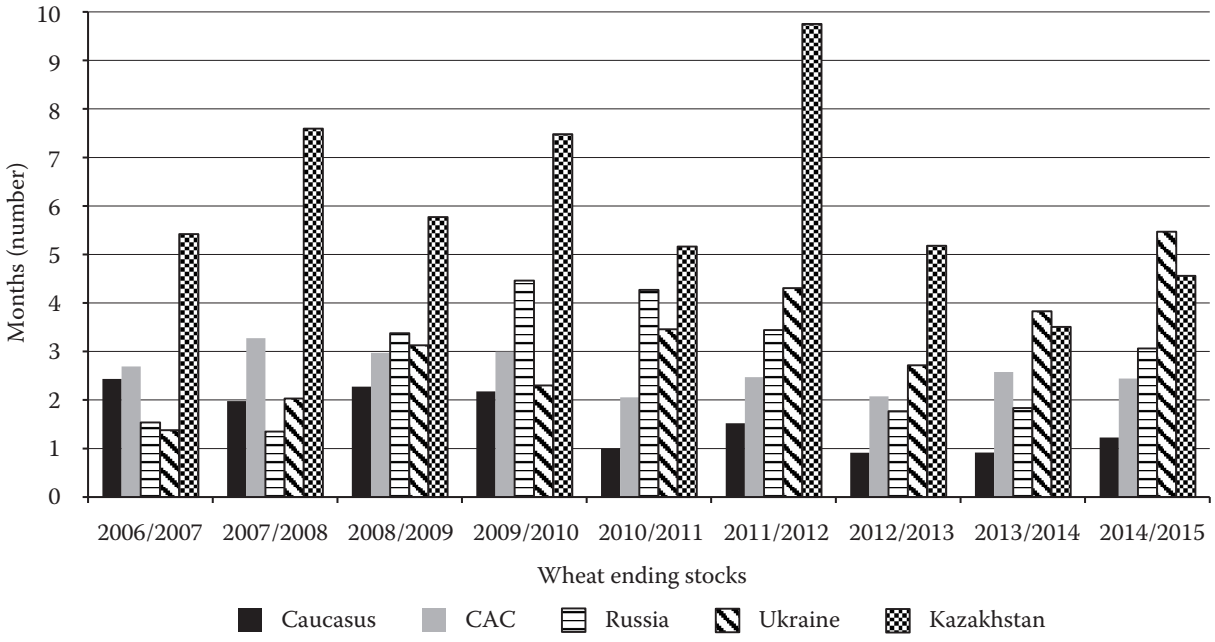

Figure 1. Domestic demand for wheat covered by the wheat end stocks in CIS

CIS – Commonwealth of Independent States; CAC – Central Asia and the Caucasus

Source: FAS USDA (2013), authors' illustration

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than 11 million t of wheat for its reserves in 2009 due to low prices associated with high harvest amounts in 2008 (OECD 2011). Grain reserve amounts estimated by the USDA show that, in 2014, about 9 million t of wheat (end of the year stocks) was available in Russia, which is enough to supply three months of the country's domestic demand (Figure 1). The same figure shows that Kazakhstan had the most in wheat reserves in 2011–2012, almost 7 million t, which was sufficient for ten months of domestic consumption.

In the case of Ukraine, grain procurement and storage is handled by the country's Agrarian Fund, and 580 000 t were purchased in the 2007–2008 marketing year. About 1.2 million t of grain was purchased in 2008–2009 by state reserves (FAO EBRD 2012). In 2010–2011, the state intervention had 1.2 million t of grain available in its silos that was sold to the bakeries when prices increased (FAO 2012).

As is evident, Central Asian (CA) countries have different levels of grain stocks, with Tajikistan having the lowest grain stocks, equal to only 10 000 t of wheat, based on research by Robinson (2008). This amount of grain reserves is equivalent to just two days-worth of wheat consumption in Tajikistan. Meanwhile, the state of Uzbekistan held 700 000 t and Kyrgyzstan had a very limited amount of 132 000 t in its reserves (Robinson 2008).

The lowest grain end stocks were recorded for Caucasus countries, where the average grain end stock amounted to 130 000 t, which is sufficient for about one month of domestic consumption.

WELFARE EFFECTS OF TRADE POLICY CHANGES

Impact on wheat-to-bread supply chain actors. Supply chain actor interviews in Armenia showed that 3 out of 4 interviewed farmers benefited from KRU export restrictions since they could sell their wheat for higher prices. Only one farmer indicated that he did not observe any significant changes in his business during the restriction years. Interviews with representatives of mills in Armenia indicated that the wheat export restrictions hardly caused any changes at all in their businesses. Some of them observed higher prices of wheat if they had used imported wheat; these higher prices were then transmitted to consumers. One of the interviewed bakers indicated that the price of imported Russian flour became very expensive and they needed to switch to other sources. Others indicated that it did not affect their businesses. They paid more for flour but also sold bread for higher prices so that their profit margin did not change. Two importers that were also interviewed in Armenia had their own flour mills. Both of them indicated that the KRU export embargo did not create major problems. One of the millers switched to Iranian wheat during the absence of KRU wheat, and another one smoothed his revenues via increased returns from a livestock farm that owned the company. Furthermore, the supply chain actors were also asked about the expected impact of membership in the Eurasian Economic Union (EAEU) on their business activities (Armenia was in the process of membership during the interview period). All of the respondents indicated that they were not expecting large changes in their everyday business activities.

The three interviewed farmers in Uzbekistan indicated that they did not observe any impact of the KRU export ban on their businesses. Two bakers were interviewed in Uzbekistan, with one of them specifying that the KRU ban did not have a significant impact on his business. Another mentioned that the price of high-quality flour became very expensive during those years and that the high prices were transmitted to end consumers. One miller was interviewed in Uzbekistan, and he indicated that there were no major obstacles importing wheat during those years because some grain was still available under an agreement between the governments of Uzbekistan and KRU. One representative of a grocery store was also interviewed, and he specified that the price of imported wheat products became very expensive. He also indicated that customers were very upset and reduced their purchase of imported wheat products.

Impact of KRU export restrictions on domestic food prices in KRU and CAC countries. Almost the entire supply of wheat for Caucasus countries is from the KRU. On the other hand, CA countries are heavily dependent on wheat and flour imports from Kazakhstan. Thus, any trade distortions between major wheat suppliers, mainly KRU, and major wheat importers (i.e. CAC), could cause wheat scarcities and significant increases in the prices of flour and bread.

Figure 2 shows price developments within the wheat-to-bread supply chain in selected KRU and CAC countries. A steep increase in wheat, flour and bread prices is observed for each selected country during the period of the global commodity price peaks and KRU wheat export restrictions (2007–2008 and 2010–2011). Nevertheless, the magnitude of the price increase is quite different. Table 2 indicates the percentage

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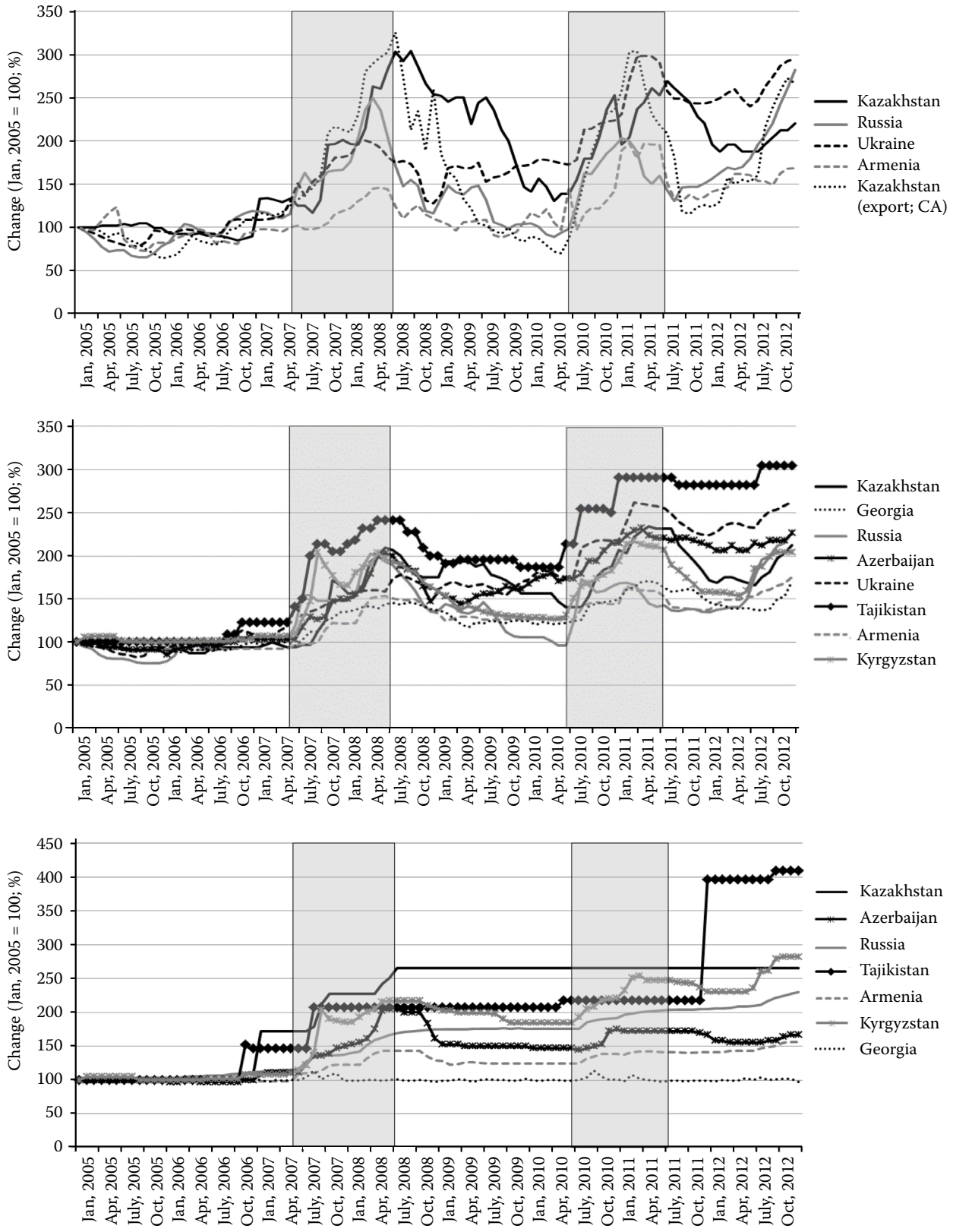

Figure 2. Wheat, flour and bread price developments in CIS (2005–2012)

CIS – Commonwealth of Independent States

Source: National statistic services, FAO GIEWS (2013), authors' illustration.

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Table 2. Wheat, flour and bread price changes in KRU and CAC for selected crisis periods (2007–2008 and 2010–2011)

Crisis period	Price changes (%)							
	Kazakhstan	Russia	Ukraine	Azerbaijan	Armenia	Georgia	Tajikistan	Kyrgyzstan
Wheat prices								
June, 2007–July, 2008	+78	+65	+55	+100	+31	+52	+107	
June, 2010–July, 2011	+28	+66	+43	+35	+53	+63	+151	
Flour prices								
June, 2007–July, 2008	+52	+15	+35	+51	+35	+33	+75	+62
June, 2010–July, 2011	–5	+5	+35	+24	+17	+22	+36	+39
Bread prices								
June, 2007–July, 2008	+42	+20	+23	+51	+28	+29	+51	+67
June, 2010–July, 2011	+0	+10	+14	+10	+10	+19	+5	+18

Price changes for the selected crisis periods are compared with the corresponding base periods without crisis or the KRU governmental interventions; selected base periods are August, 2006–May, 2007 and August, 2009–May, 2010; wheat prices for Kazakhstan, Russia, Ukraine, Azerbaijan and Armenia refer to the domestic producer prices (national averages); wheat prices for Georgia refer to the CIF import prices (prices include costs, insurance and freight); as a proxy for wheat prices in Tajikistan and Kyrgyzstan, we use Kazakh (Sary-Agash) DAP (delivered at place) export prices; flour prices for all countries except for KRU are end consumer prices; for KRU, we use wholesale flour prices, and bread prices for all countries are end consumer bread prices; KRU – Kazakhstan, Russia and Ukraine; CAC – Central Asia and the Caucasus

Source: National statistic services, FAO GIEWS (2013), authors' calculations

change in wheat, flour and bread prices for each crisis period separately.

Data in Table 2 indicates that wheat prices doubled in Azerbaijan, Tajikistan and Kyrgyzstan during the 2007–2008 crisis period. Consequently, these countries recorded a more than 50% increase in flour and bread prices. Not only did the prices increase in importing countries, but there was also an increase in KRU countries that heavily intervened in their domestic markets. The highest price increases for wheat, flour and bread prices were recorded in Kazakhstan, which led to high price increases in CA countries. Armenia and Georgia also recorded a surge in wheat, flour and bread prices, but to a much lower degree compared to other countries. The main reason lies in the fact that they have more alternatives and lower transaction costs for importing wheat outside of the post-Soviet area.

In 2010–2011, the Russian and Ukrainian governments heavily intervened once again on their domestic

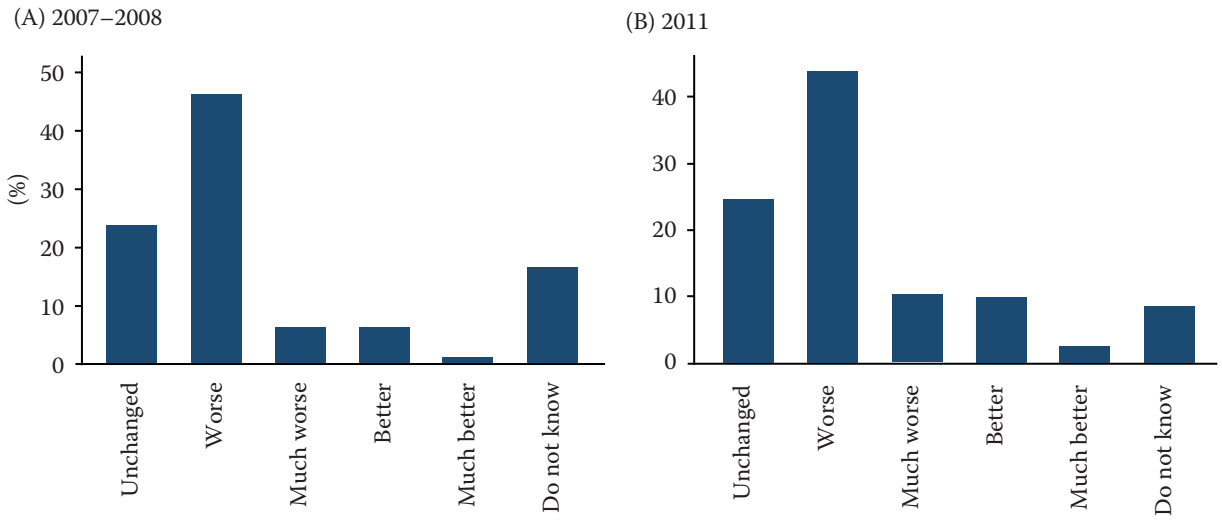

Figure 3. Financial situation of farms compared to previous years

Source: Authors' calculations from survey data and authors' illustration

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wheat markets; this period was characterised by record-high wheat prices in the CA countries. Due to the complete Russian ban on wheat exports, Armenia and Georgia have recorded higher wheat price increases compared to the 2007–2008 crises. Concerning flour and bread prices, all countries recorded strong increases, but too much lower extents compared to 2007–2008.

Overall, we argue that the wheat export restrictions imposed by KRU in 2007–2008 and 2010–2011 had an increasing price effect not only on the domestic markets of CAC countries but also on their own domestic markets. Price surges of the most important food products (i.e. flour and bread) contributed to the welfare loss of consumers in the entire region.

Farm-level effects of the financial crises. Data obtained from interviews of 401 agricultural producers in Armenia show that about 45% of household producers in 2007–2008 and the 2001 year indicated that their financial situation in those years was worse than in previous years. Their household situations were about 6% worse in 2007–2008 and 10% worse in 2011 (Figure 3). Since interviews were conducted several years after, a large number of people did not remember the impact, as can be seen from the figures.

Data limitations in this study did not allow analysing the household level impact of price shocks in other countries and this need to be considered as an important aspect for further research.

CONCLUSION

The impact of trade distortions was significant in CAC countries, but at different levels depending on the country and the intervention policy implemented. Differences in trade diversity, grain reserves, price and local production support policies are the main determinants that may explain differences in the trade distortion impact. However, this study did not find significant evidence for the impact of grain reserve amounts, price of wheat and production support policies in maintaining lower prices of the grain products. This can be largely explained by low levels of grain reserves and production support policies in CAC countries. The diversity of import sources, however, explains the bulk of the price differences. Prices in the Caucasus increased less when compared to Central Asia since Caucasus countries have more diverse import sources compared to Central Asian countries. Lower prices and existing infrastructure mainly explain the import dependency of Central Asian countries on KRU. In this respect, diversification of trade amongst KRU countries could function as the second-best solution under the lack of trade with world markets. Interviews with the supply chain actors indicate that importers, mills, bakeries and retailers did not experience negative effects from the KRU export restrictions. Higher prices were usually transmitted to end consumers. Price controls were implemented by KRU, as well as by some CAC countries, to protect the poorer and more vulnerable citizens. Nevertheless, our analysis showed little impact of the price controls on prices.

REFERENCES

Akramov K.T., Shreedhar G. (2012): Economic development, external shocks, and food security in Tajikistan. IFPRI Discussion Paper 01163. Washington DC.

Anderson K., Ivanic M., Martin W. (2013): Food price spikes, price insulation and poverty. The World Bank Policy Research Working Paper. Washington DC, World Bank Development Research Group, Agriculture and Rural Development Team.

Crescimanno M., Galati A., Bal T. (2014): The role of the economic crisis on the competitiveness of the agri-food sector in the main Mediterranean countries. Agricultural Economics – Czech, 60: 49–64.

FAO (2008): Soaring food prices: Facts, perspectives, impacts and actions required. In: Proceedings High-Level Conference on World Food Security: The Challenges of Climate Change and Bioenergy. FAO, Rome, June 3–5, 2008.

FAO (2012): Wheat Export Economy in Ukraine. Policy Studies on Rural Transition No. 2012-4. Budapest, FAO Regional Office for Europe and Central Asia.

FAO EBRD (2012): Grain markets in Kazakhstan, the Russian Federation and Ukraine. St. Petersburg, Russian Federation, FAO, EBRD.

FAO GIEWS (2013): Main Food-Related Policy Measures. Asia. Rome, FAO.

FAOStat (2015): Food Supply Quantity per Capita. FAOStat. Available at www.faostat.org (accessed on Oct 29, 2015).

FAS USDA (2003): Ukraine: Extensive Damage to Winter Wheat. Production Estimates and Crop Assessment Division Foreign Agricultural Service. FAS USDA. Available at http://www.fas.usda.gov (accessed March 6, 2013).

Gbegbelegbe S., Chung U., Shiferaw B., Msangi S., Tesfaye K. (2014): Quantifying the impact of weather extremes on global food security: A spatial bio-economic approach. Weather and Climate Extremes, 4: 96–108.

Gopinath G., Burstein A. (2014): International prices and exchange rates. In: Gopinath G., Helpman E., Rogoff K. (eds): Handbook of International Economics. Amsterdam, North Holland Publishing Company (Elsevier): 391–451.

https://doi.org/10.17221/130/2019-AGRICECON

Götz L., Glauben T., Djuric I. (2015): Wheat export restrictions in Kazakhstan, Russia, and Ukraine: Impact on prices along the wheat-to-bread supply chain. In: Schmitz A., Meyers W.H. (eds): Transition to Agricultural Market Economies: The Future of Kazakhstan, Russia and Ukraine. Wallingford, Oxfordshire, England, CABI.

Goychuk K., Meyers W.H. (2014): Black Sea and world wheat market price integration analysis. Canadian Journal of Agricultural Economics, 62: 245–261.

Mueller S.A., Anderson J.E., Wallington T.J. (2011): Impact of biofuel production and other supply and demand factors on food price increases in 2008. Biomass and Bioenergy, 35: 1623–1632.

OECD (2011): Agricultural Policy Monitoring and Evaluation 2011. OECD Publishing.

Rathmann R., Szklo A., Schaeffer R. (2010): Land use competition for production of food and liquid biofuels: An analysis of the arguments in the current debate. Renewable Energy, 35: 14–22.

Regmi A., Meade B. (2013): Demand side drivers of global food security. Global Food Security, 2: 166–171.

Robinson I. (2008): World food programme regional market survey for the central Asian region. Food markets and food insecurity in Tajikistan, Uzbekistan, Kyzgyzstan, Kazakhstan In: Robinson W.I. (ed.). WFP, Regional Bureau Middle East, Central Asia & Eastern Europe (OMC).

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 Paper No. 32. Rome, FAO.

Shiferaw B., Tesfaye K., Kassie M., Abate T., Prasanna B., Menkir A. (2014): Managing vulnerability to drought and enhancing livelihood resilience in Sub-Saharan Africa: Technological, institutional and policy options. Weather and Climate Extremes, 3: 67–79.

Svanidze M., Götz L., Djuric I., Glauben T. (2019): Food security and the functioning of wheat markets in Eurasia: a comparative price transmission analysis for the countries of Central Asia and the South Caucasus. Food Security, 11: 733–752.

Tadesse G., Algieri B., Kalkuhl M., von Braun J. (2014): Drivers and triggers of international food price spikes and volatility. Food Policy, 47: 117–128.

USAID (2011): A regional view of wheat markets and food security in Central Asia. With a focus on Afghanistan and Tajikistan. USAID, EWSNET, WFP.

Wegren S. (2011): Food Security and Russia's 2010 Drought. Eurasian Geography and Economics, 52: 140–156.

Welton G. (2011): The Impact of Russia's 2010 Grain Export Ban Oxfam Research Reports. Oxford, Oxfam.

World Bank (2018): The Impacts of the El Niño and La Niña on Large Grain Producing Countries in ECA: Yield, Poverty and Policy Response. Washington DC, World Bank.

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