

We are IntechOpen, the world's leading publisher of Open Access books Built by scientists, for scientists

6,900

Open access books available

186,000

International authors and editors

200M

Downloads

Our authors are among the

154

Countries delivered to

TOP 1%

most cited scientists

12.2%

Contributors from top 500 universities



WEB OF SCIENCE™

Selection of our books indexed in the Book Citation Index
in Web of Science™ Core Collection (BKCI)

Interested in publishing with us?
Contact book.department@intechopen.com

Numbers displayed above are based on latest data collected.
For more information visit www.intechopen.com



Agricultural Market Integration in the Commonwealth of Independent States: What Are the Main Driving Forces and Challenges?

Ivan Djuric, Linde Götz, Miranda Svanidze and
Thomas Glauben

Additional information is available at the end of the chapter

<http://dx.doi.org/10.5772/intechopen.69869>

Abstract

Utilizing a price transmission approach, we focus on price relationships between the countries of the Commonwealth of Independent States (CIS) and how price changes on the world agricultural market are transmitted to the domestic CIS markets. In this study, we establish a unique price data set on five different agricultural products (i.e. wheat, pork, beef, poultry and whole milk powder) observed in eight different CIS countries. The results of the price transmission analysis indicate that regional integration within the CIS is strongest for pork and beef, followed by poultry and whole milk powder. The integration of CIS markets in world agricultural markets is strongest for wheat and beef, whereas it is relatively low for pork and poultry. Furthermore, beef markets in the CIS countries are the strongest integrated within the region, with the EU and the world market. Overall, our results indicate that domestic market support and trade policies, physical trade flows between countries, infrastructure, and bilateral or multilateral trade agreements play a key role in market integration of the CIS countries. These determinants should be particularly considered when designing recommendations for improving agri-food supply chain competitiveness in the CIS countries.

Keywords: CIS, agricultural markets, market integration, price transmission

1. Introduction

With quickly changing market structures of the Commonwealth of Independent States (CIS) (from centrally planned economies to open markets), privatization and concentration of supply

chain actors (especially in the processing and retailing sectors), an understanding of market functioning has drawn considerable attention by the general public (consumers), market players (supply chain members), and policy makers.

Recent global agricultural price fluctuations, so called “commodity price peaks” together with geopolitical developments, e.g., creation of the Eurasian Economic Union in May 2014, and its enlargement since January 2015, and the Russian agricultural import ban imposed in August 2014, considerably affected trade relations of the Former Soviet Union/CIS countries not only within the region but also with the rest of the world and had significant effects on the domestic food prices. All these developments put food prices at the top of political agendas around the world and especially in CIS countries. While an extreme increase in commodity prices usually represents a trigger for a surge in consumer prices, commodity price falls are not necessarily reflected in immediate decreases in consumer prices. Thus, understanding the price transmission mechanisms along the supply chain (i.e., between different members of the supply chain) is crucial for setting an adequate agricultural policy which will allow most market participants to benefit from a sustainable distribution of value added along the supply chain [1].

Agricultural supply chains link agricultural producers with food end consumers via the processing food industry and the food-distributing retailers (**Figure 1**). This study focuses on the supply chain stage of agricultural production of the farmers. Following a price transmission approach, we investigate market integration and efficiency in agricultural supply chains in the CIS countries. To what degree are price shocks transmitted between the regions and from the world market to the domestic markets? Well-functioning and efficient markets are characterized by strong integration, which could contribute to cushion price-increasing effects of regional production shortfalls and prevent that prices increase beyond world market prices.

Generally, a unique concept of market integration and efficiency does not exist [2]. In this chapter, we assume that a well-functioning market is a spatially efficient market which is characterized by strong market integration. Thus, price shocks in one region are quickly

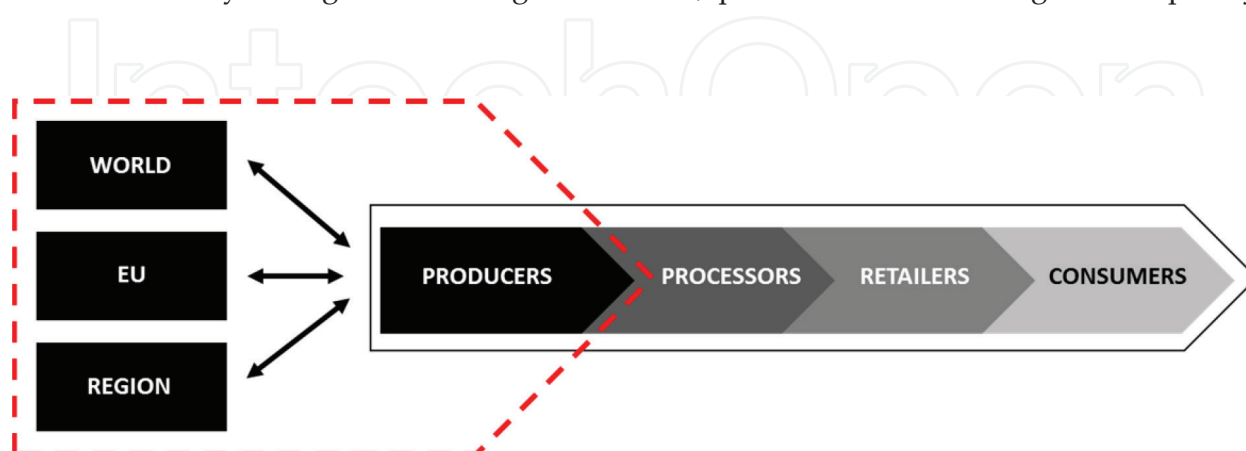


Figure 1. Research scope. Source: own illustration.

transmitted to the other regions inducing interregional trade flows when price differences exceed trade costs [2]. Also, regional prices differ at most by the costs of trade between those regions (Law of One Price), and profitable opportunities for trade arbitrage do not persist. Further, an efficient market is characterized by adequate trade costs, which are determined by many factors, e.g., distance to other markets, quality and quantity of transport and communication infrastructure, corruption, market risk, and legal barriers as phytosanitary license and inspection requirements [3].

We investigate agricultural supply chains in countries of the former Soviet Union which are linked to neighboring countries or even the world market¹ by agricultural imports and exports. Thus, we follow a comparative approach including five different agricultural commodities (i.e., wheat, pork, beef, poultry, and milk) and eight countries of the CIS region (i.e., Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Moldova, Russia, and Ukraine). To allow comparability, we apply a uniform method to the comparable sample of data of the same frequency and period of analysis. Data availability on agricultural prices in the CIS countries is very limited which explains the existence of a research gap. Among the few exceptions are Ref. [4] on Georgian bread, sugar, beef and pork markets, and Ref. [5] on the wheat flour market in Georgia.

The remainder of this chapter is organized as follows: in Section 2, we present our methodological approach and the data used in our analysis. Section 3 presents the agricultural trade characteristics of the CIS countries. Empirical results are presented in Section 4, while the primary determinants of market integration are discussed in Section 5. Conclusions are drawn in Section 6.

2. Methodological approach and data

We analyze spatial transmission of different agricultural and food prices between various CIS countries and between CIS countries and the world market. Specifically, we focus on wheat, meat (beef, pork, and poultry), and milk in eight CIS countries in the region. An overview on the countries included in our analysis is presented in Appendix.

We analyze on the integration of agricultural markets in CIS countries with their regional trade partners within the CIS region but also with the EU market and the world market. We evaluate the integration of domestic CIS markets with the export markets in other CIS countries within the region. We also examine how price changes from the EU market and international markets are transmitted to the domestic markets in the CIS region.

Focusing on the bivariate price transmission model, we characterize long-run dynamics between price pairs consisting of a domestic price of one of the CIS countries and a world

¹We use “world market” and “international market” interchangeably in this article.

market price (or price of some CIS exporting country).² We refer to a domestic market as fully integrated in the world market, if price changes on the world market are completely transmitted to the domestic market. A long-run price equilibrium is given as

$$P_t^d = \alpha + \beta P_t^w + \varepsilon_t \quad (1)$$

where P_t^d and P_t^w are natural logarithm of domestic and world market prices at time t respectively, the intercept parameter α , the slope parameter β , and the residual ε_t denoting the stationary disturbance term. The long-run price transmission parameter β indicates the degree (in %) to which price changes on the world market are transmitted to the domestic market. Perfect market integration is given if $\beta = 1$, implying that a 1% price change on the world market is transmitted by 100% to the domestic market, leading to a 1% price change on the domestic market.

We apply the augmented Dickey-Fuller (ADF) test [6] to test on stationarity of our data series. We test for cointegration between the non-stationary price series using the Johansen test of linear cointegration [7]. In case, we find domestic and world market prices cointegrated, the Ordinary least squares (OLS) regression yields consistent and efficient estimates of the long-run equilibrium parameters [8].

As already mentioned above, data availability is one of the most critical issues when it comes to research on food markets in the CIS countries. In this study, we have created a unique data set for selected food products by combining different data sources, ranging from statistical offices of the respective CIS countries, via different country reports published by various international institutions (e.g., WB, FAO, and OECD), all the way to expert interviews. According to data availability, we are able to conduct the analysis for wheat, meat (pork, beef, and poultry), and milk (i.e., milk powder) markets of all eight selected CIS countries.

Concerning wheat prices, we use producer, import, and export prices of wheat in different countries. Data are sorted into two groups. The first group refers to Armenia, Azerbaijan, Georgia, Ukraine, and Moldova where we use average producer wheat prices. Since domestic producer prices for wheat in Georgia are not available, we use the cost, insurance, and freight (i.e., CIF) import price. The second group consists of the Customs Union members, i.e., Russia, Kazakhstan, and Belarus. Considering that Russia and Kazakhstan are, besides Ukraine, the main wheat exporters not only to the CIS region but also to the world market as well, in addition to average producer prices, we also account for their free on board (i.e., FOB) export prices observed at the Black Sea harbors. For Belarus, we use the governmentally fixed wheat purchase prices. We use average French FOB price at the port of Rouen (representative price for the Marché à Terme International de France (MATIF) commodity futures market in Europe) as a measure for the EU market price. Average FOB soft red winter wheat prices of the USA serve as representative for the world market price. The time

²For the simplicity we keep the term world market price for describing the long-run price equilibrium.

period covered by our data set ranges from 2006 until 2014 and differs between countries and products. Thus, the number of observations varies between 74 (for Moldova) and 130 (for Belarus).

Our data set comprises pork prices for Armenia, Georgia, Belarus, Kazakhstan, Russia, and Ukraine. In addition, we consider pork prices for the EU, Brazil, and USA, which are some of the most important pork exporters to the CIS countries. Denmark, Germany, and Spain together have exported more than 50% of total EU pork export to the CIS in 2013. Our data set contains two types of pork prices. First, for Ukraine, we account for producer prices, which refer to the price paid for 1 kg of live animal. Second, we account for the producer price for 1 kg of deadweight for all other countries. The conversion of the prices between 1 kg of live animal and deadweight is done by using the conversion rate of 0.59 for Ukraine [9]. Our data set covers the period from January 2004 until December 2014. The number of observations differs between countries, from 45 observations for Ukraine to 132 observations for Armenia, Russia, EU, and USA.

As was the case for pork, we account for beef prices for Armenia, Georgia, Russia, Kazakhstan, Belarus, and Ukraine. For the EU, we use the EU average beef price. For the world price, we focus on beef prices of USA, Brazil, Uruguay, Argentina, and Australia, which are directly involved in beef export to CIS countries. Our data set covers the period from January 2004 until December 2014. The number of observations differs between countries, from 45 observations for Ukraine to 132 observations for Armenia, Russia, EU, and USA.

Due to very limited data availability for poultry, only Georgia as a representative for the Caucasian countries is covered by our analysis. For the EU price, we account for both EU average and country-specific average poultry prices. Here, we selected Netherlands and Germany as two of the most important EU exporters of poultry meat to CIS countries. The data set covers a period from January 2004 until December 2014. The number of observations differs between countries, from 45 observations for Ukraine to 132 observations for Russia.

The milk prices used for the analysis are average monthly milk producer prices. For the selected international markets, we use EU whole milk powder (WMP) export prices and FOB Oceania WMP prices. In addition, we use domestic WMP prices for Netherlands and Germany, countries that are the largest EU WMP exporters to the CIS countries accounting for 21 and 16% of the total CIS import, respectively. To compare the fluid milk producer prices of CIS countries with the WMP prices of the selected international markets, we transform the fluid milk prices into WMP prices using conversion factors obtained by the national experts of the selected CIS countries [10]. Thus, for Armenia, we use a conversion factor of 7.5, for Belarus 7.3, for Kazakhstan 7.5, For Russia 7, and for Ukraine 8.3. Our data set covers a period from January 2004 to December 2013. As in previous cases, the number of observations differs between the countries, ranging from 36 observations for Ukraine to 106 observations for most other countries.

Overall, considering that most of the agricultural trade of the CIS countries is done in US Dollars (USD), prices in domestic currencies are converted in USD. Thus, all prices used for the analysis refer to USD per measurement unit.

3. Agricultural trade of the CIS countries

In the following, we provide an overview on agricultural trade of the CIS trade regarding wheat, pork, beef, poultry, and milk which provides the basis for the interpretation of our empirical results in Section 4.

Wheat production and trade are of a great importance for the CIS countries. From one side, Russia, Ukraine, and Kazakhstan are becoming large wheat exporters that are important not only for the CIS region but also for the international markets. This is especially the case for Russia that became the largest wheat exporter in the world in 2016 of about 40 million ton. On the other side, Caucasian countries (i.e., Armenia, Azerbaijan, and Georgia) import more than 90% of wheat from the CIS region, notably from Russia and Kazakhstan [11]. From the regional perspective, Russian wheat is the most important for domestic consumption, and its quality is usually improved by imports of the high-quality Kazakh wheat. This is mainly the case for Caucasian countries. Nevertheless, Kazakh wheat is almost the only source of wheat for some Central Asian countries (i.e., Uzbekistan, Tajikistan, and Kyrgyzstan). Besides mentioned wheat exporting and importing CIS countries, Belarus and Moldova produce a sufficient amount of wheat for domestic production but are not large wheat exporters.

All the selected CIS countries are net pork importers. The EU (27) is the largest supplier of pork to the CIS countries with a share of 56% (in 2013). Only about 2% of pork is traded regionally, where the main exporters are Moldova, Belarus, Russia, and Kazakhstan. Significant market changes are recorded for the members of the Customs Union, where each member country is supposed to adjust their meat import tariff according to the Union's common trade policy. This was particularly important for Kazakhstan, which did not have any significant internal market protection before [12]. Nevertheless, most of the selected CIS countries have a higher level of price protection for pork compared to other products [13].

In comparison with pork, CIS beef markets are considerably different. Namely, Caucasian countries (i.e., Armenia, Azerbaijan, and Georgia) are net beef importers. The same is true for Russia and Kazakhstan. About 89% of beef is imported from some of the international markets (excluding EU (27)). Only about 8% is imported from some of the CIS countries. On the other hand, the main beef exporting CIS countries are Belarus, Moldova, and Ukraine. Overall, beef is one of the products that have the smallest level of price protection among CIS countries [13].

Similar to the CIS beef markets, some of the CIS countries are net importers, and some are net poultry exporters. Concerning imports, about 17% is imported from the EU (27) markets, 22% from other CIS countries, and 61% from other international markets (in 2013, [14]). The net importing countries are Armenia, Azerbaijan, Georgia, Moldova, Russia, and Kazakhstan. On the other side, some of the net importers also engage in poultry export but mainly on the regional markets. The only two net exporting countries are Belarus and Ukraine. As is the case with pork, poultry also has high level of price protection among CIS countries [13].

Almost half of the total dairy products imported to the selected CIS countries originate from the region. Namely, 47% of total dairy imports originate from some of the CIS countries, where

Belarus, Russia, and Ukraine are the largest regional exporters. On the other hand, about 44% of the total CIS dairy imports originate from the EU, where Netherlands, Germany, and Finland represent the largest exporters, covering 50% of the EU exports to CIS countries. Only about 9% of dairy products are imported from some of the world markets (excluding CIS and EU). Concerning milk, it is mainly imported in the form of a milk powder. About 65% of total milk powder imports by the CIS countries originate from Belarus and Ukraine, which are net exporters. Further, about 23% of milk powder is imported from EU (27) markets.

4. Empirical results

Empirical results are presented for each of the five agricultural products individually. Besides the comparison of average price levels between countries, we provide a detailed overview on the pattern of market integration for each product. Market integration for the different agricultural products is analyzed on an aggregated level for the CIS countries on average and on a disaggregated level for individual countries. Market integration of the CIS countries is investigated regarding their regional integration in the CIS, the integration with the EU market and the world market.

4.1. Wheat

Domestic price and trade policies are among most important factors determining domestic price developments. Due to different production and trade characteristics of the CIS countries covered in this study, domestic price developments differ between the selected countries (Figure 2). Thus, wheat prices in Armenia, Azerbaijan, and Georgia, three wheat importing countries, are higher compared to the CIS average. On the other hand, wheat prices in Russia and Ukraine, two large wheat exporters, are on average lower compared to the average CIS prices and selected international prices. The most extreme case is Belarus, where the domestic government keeps wheat prices at an artificially low level to support domestic meat production [15]. Furthermore, wheat producer prices in the whole CIS region were affected by

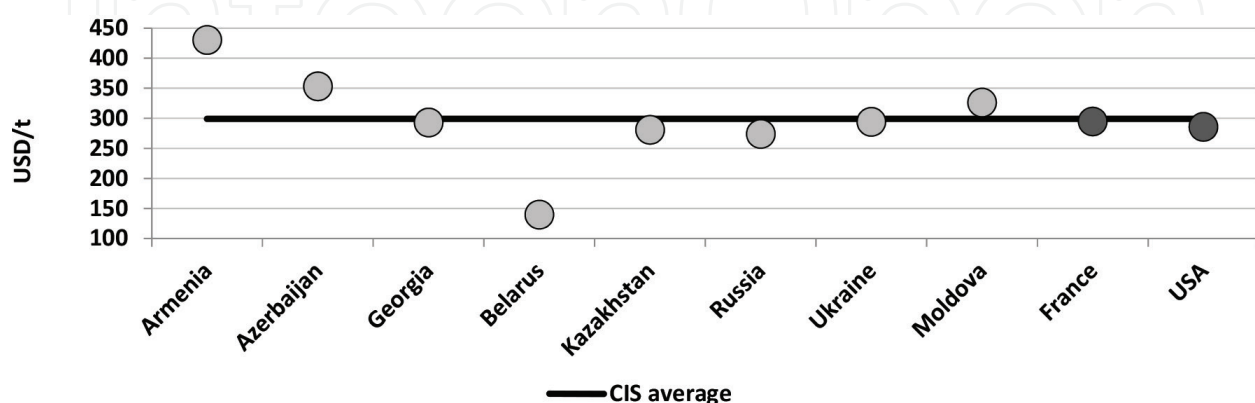


Figure 2. Average wheat price level in the CIS countries and selected international markets (base: 2011–2013). Source: Statistical offices of the respective CIS countries [17, 18], own illustration.

wheat export restrictions imposed by Russia, Ukraine, and Kazakhstan between 2006 and 2012 [16], which ultimately had a strong effect on consumers and overall food security in these countries.

The analysis of market integration indicates that the CIS wheat markets are strongly integrated within the region (integration between CIS countries) and with the EU (i.e., France) and world markets (i.e., USA; **Figure 3**). Surprisingly, integration in world wheat markets is highest amounting to about 76%. Regional wheat market integration lies by on average 68%, and integration with the EU wheat market lies by 61%.

Figure 4 provides a detailed overview on the pattern of market integration. On the regional level, Georgia and Moldova are strongest integrated with the other CIS countries (**Figure 4**). Moderate regional integration is recorded for Armenia and Azerbaijan, countries that are heavily dependent on wheat imports from other CIS countries. A moderate level of integration might indicate certain market inefficiencies, which might be connected to certain market regulations set by the government, for example, in the case of Azerbaijan.

The integration of the CIS countries within the CIS regional market is very similar to their integration in the EU market and the world market. The main reason is that both markets, EU and world, are used as reference markets for price negotiations in wheat trade by CIS traders. Price discounts or mark-ups might result from quality differences and internal price determining factors. It is striking that the Ukrainian wheat market has stronger integration with world markets compared to the EU. Overall, the Russian, Ukrainian, and Moldavian wheat markets are strongly integrated with both the EU and world markets. These results are in accordance with the trade status of these countries. Namely, Russia and Ukraine are large wheat exporters not only in the CIS region but also on the international level as well. Thus, international price changes have a great impact on their domestic producer prices. On

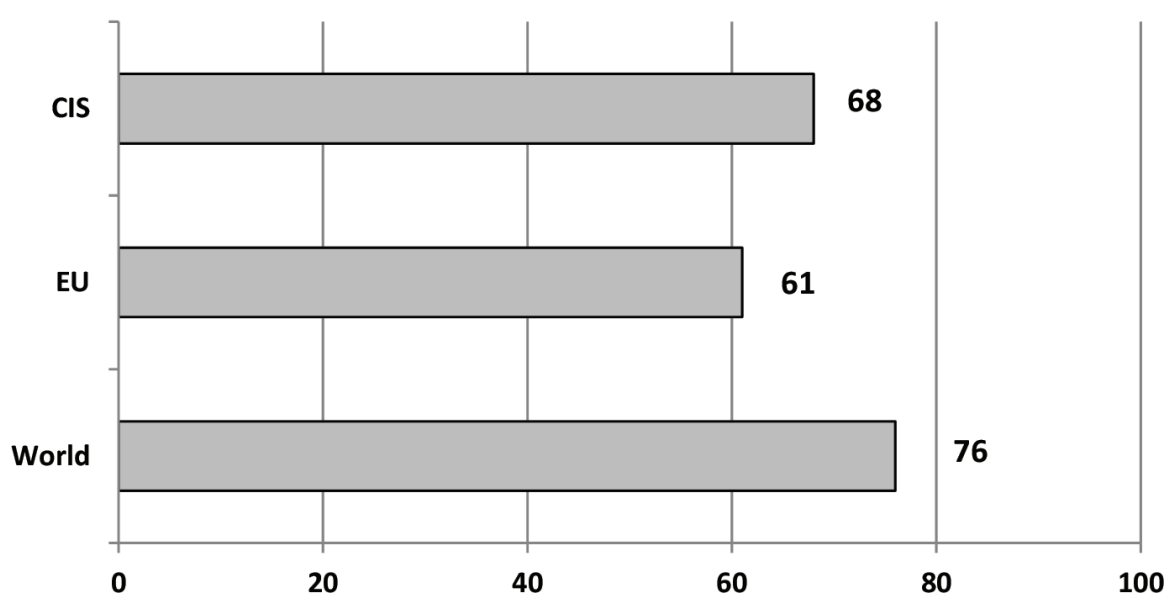


Figure 3. CIS wheat market integration—aggregated level. Source: Own calculation based on the estimation results, own illustration.

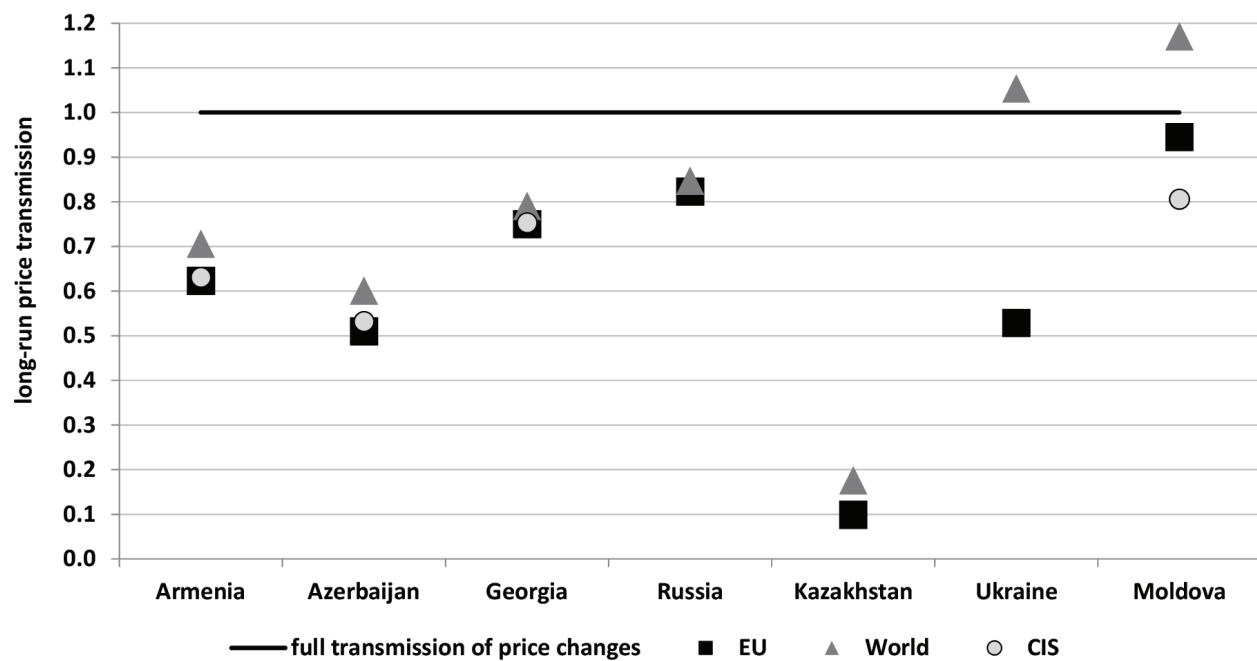


Figure 4. CIS wheat market integration—disaggregated level. Source: Own calculation based on the results, own illustration.

the other hand, Moldova is also an exporting country but with no significant relevance for the regional and international wheat trade. It is interesting to observe that there is almost no integration between Kazakh and international wheat markets. The main reason is that Kazakh wheat export is mainly concentrated on Central and East Asian countries, and thus, Kazakh domestic prices do not react much to price shocks from the “Western” markets.

4.2. Pork

The 3-year pork price averages presented in **Figure 5** indicate that the CIS prices are higher than the prices on the EU (i.e., Denmark, Germany, and Spain) and world markets (i.e., Brazil and USA). For the Customs Union members (i.e., Belarus, Russia, and Kazakhstan), we can observe that Russian pork prices are at the level of the CIS average price but by 20 and 11% higher than the average Belarussian and Kazakh prices, respectively. The Belarus price level is not reflecting actual market conditions but is rather the result of the price targeting by the Belarussian government [13].

The results of the price transmission analysis indicate that the CIS countries are on average well integrated with both regional and international pork markets. The highest integration level is recorded with the EU market where we observe full transmission of price shocks (**Figure 6**). Besides the EU, regional markets seem to be very well integrated among each other, where about 80% of the price shocks are transmitted in the long run. In particular, regional market integration is very strong between Belarus, Russia, and Kazakhstan. International market price shocks are only by about 50% transmitted to the domestic markets in the CIS countries. Obtained results are in accordance with the CIS pork trade developments where we observe that 56% of the total CIS pork import (for selected CIS countries) originates from the EU.

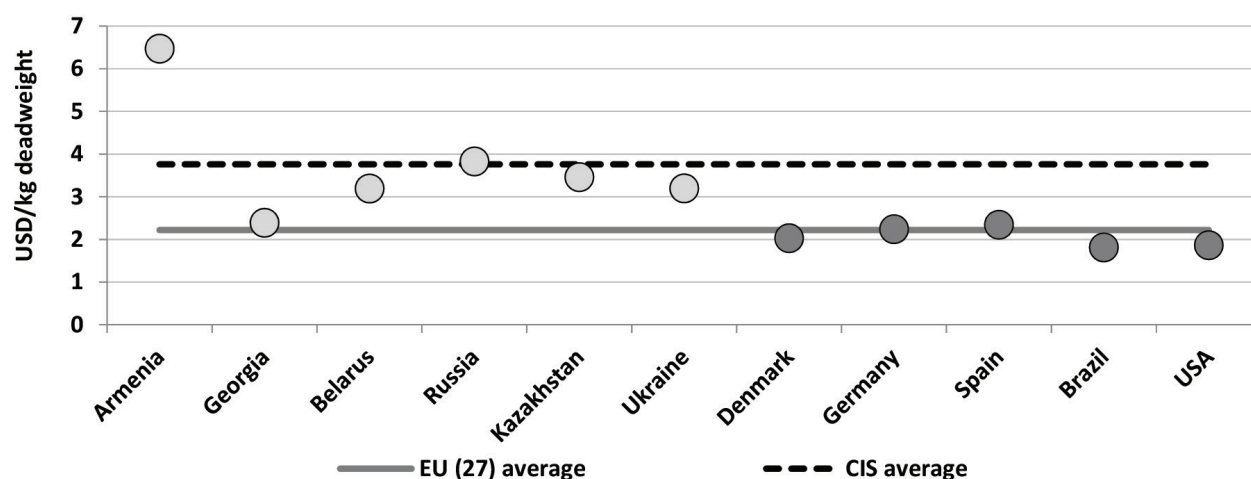


Figure 5. Average pork price level in the CIS countries and selected international markets (base: 2011–2013). Source: Statistical offices of the respective CIS countries and [19], own illustration.

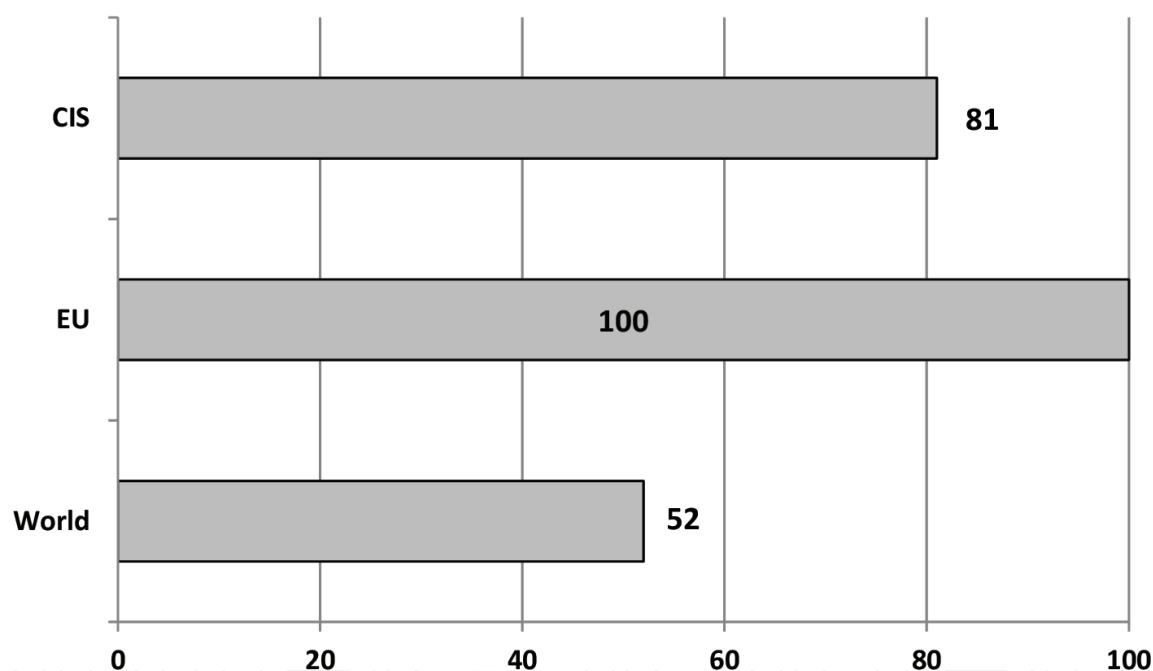


Figure 6. CIS pork market integration—aggregated level. Source: Own calculation based on the estimation results, own illustration.

A cross-country comparison of the price transmission results is presented in **Figure 7**. As already mentioned, our results indicate highest integration of the CIS pork market with the EU. This is certainly the case for Belarus, Russia and Kazakhstan, members of the Customs Union, for which we found full transmission of price shocks from the EU market in the long run. These results are not surprising considering that Belarus, Russia, and Kazakhstan import 98, 59, and 57%, respectively, of their total pork import from the EU. On the other hand, Belarus, Russia, and Kazakhstan have a very low level of integration with other CIS countries. Concerning market integration with the international markets (**Figure 7**), our results

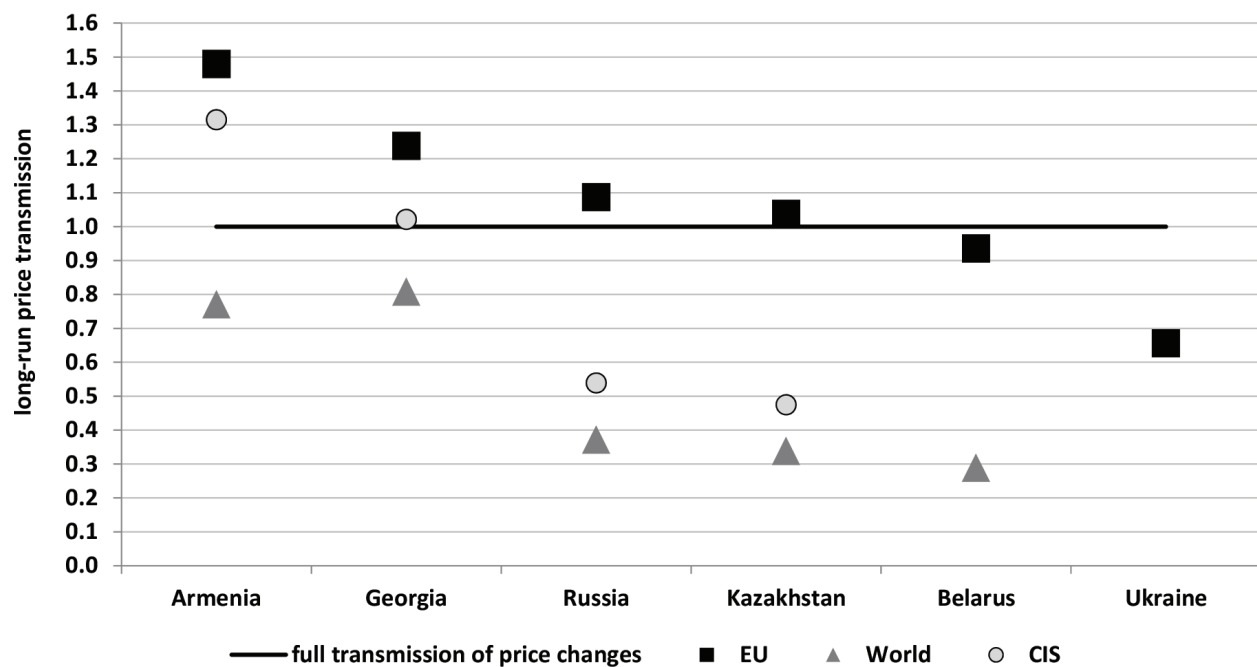


Figure 7. CIS pork market integration—disaggregated level. Note: Missing marker means no integration with the respective market. Source: Own calculation based on the results, own illustration.

indicate strong integration of Georgian and Armenian pork markets, while Belarus, Russia, and Kazakhstan show very weak integration.

4.3. Beef

The 3-year beef price averages presented in **Figure 8** indicate that the average CIS prices are 29% lower than the EU price (i.e., EU average price) but are similar to the price level of the world markets (i.e., Brazil, Uruguay, USA, Argentina, and Australia). Armenia, Russia, and Kazakhstan have the highest beef prices, which are 50, 35, and 20% higher than the CIS average prices, respectively. Our data indicate that Ukraine has relatively low beef prices compared to other CIS countries, the EU and the world market, with the price level about 60% lower than the CIS average. Overall, the data presented in **Figure 8** show significant differences in average beef prices between the CIS countries.

Our price transmission results indicate very strong integration of CIS beef markets both regionally and internationally. We find that price shocks are perfectly transmitted from the EU market and by 88% from the world market to the CIS countries on average. But even regional integration is high amounting to 86% of the CIS on average (**Figure 9**).

The cross-country market integration results on the disaggregated level presented in **Figure 10** indicate that Kazakhstan and Belarus are strongly integrated with other regional markets. A moderate level of regional integration is recorded for Russia, while Georgia seems not to be integrated with other regional markets in the long run. Concerning market integration with the EU, our results indicate almost full transmission of price shocks in the long run. In contrast, our results do suggest no market integration of the Ukrainian market with the EU.

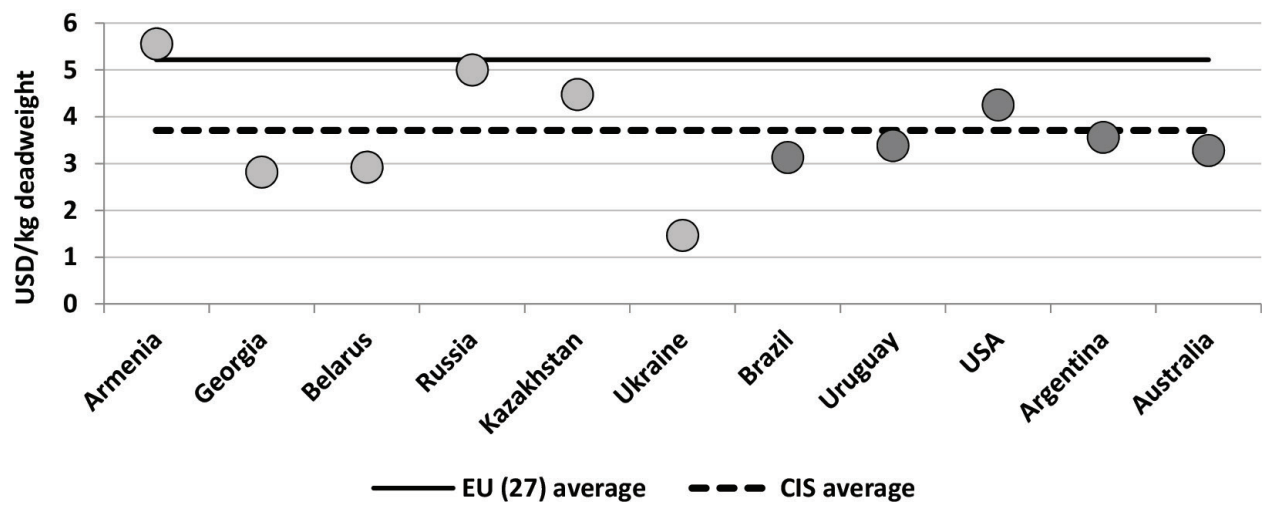


Figure 8. Average beef price level in the CIS countries and selected international markets (base: 2011–2013). Source: Statistical offices of the respective CIS countries and [19], own illustration.

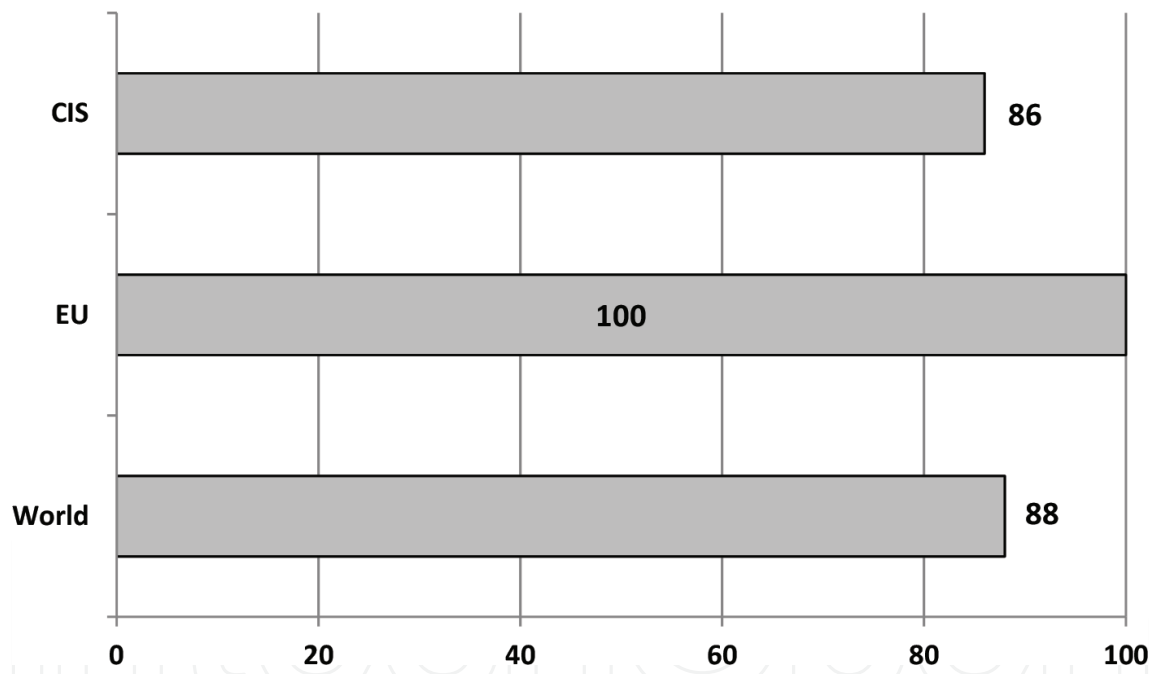


Figure 9. CIS beef market integration—aggregated level. Source: Own calculation based on the estimation results, own illustration.

4.4. Poultry

The 3-year average poultry prices presented in **Figure 11** indicate that the CIS prices are 26% lower than the EU price (i.e., Netherlands and Germany) and are similar to the world market price level (i.e., Brazil and USA). This is especially the case for Georgia, Ukraine, and Kazakhstan, where prices are below the CIS average. In contrast to pork and beef prices, poultry prices are not characterized by a great dispersion for the observed period.

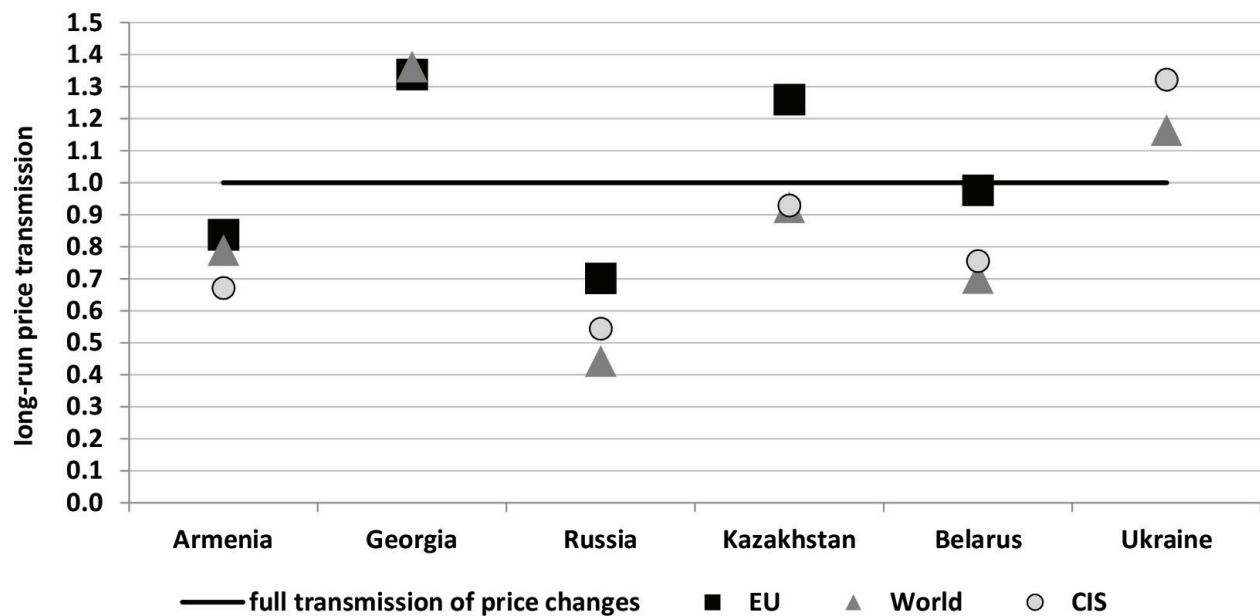


Figure 10. CIS beef market integration—disaggregated level. Note: Missing marker means no integration with the respective market. Source: Own calculation based on the results, own illustration.

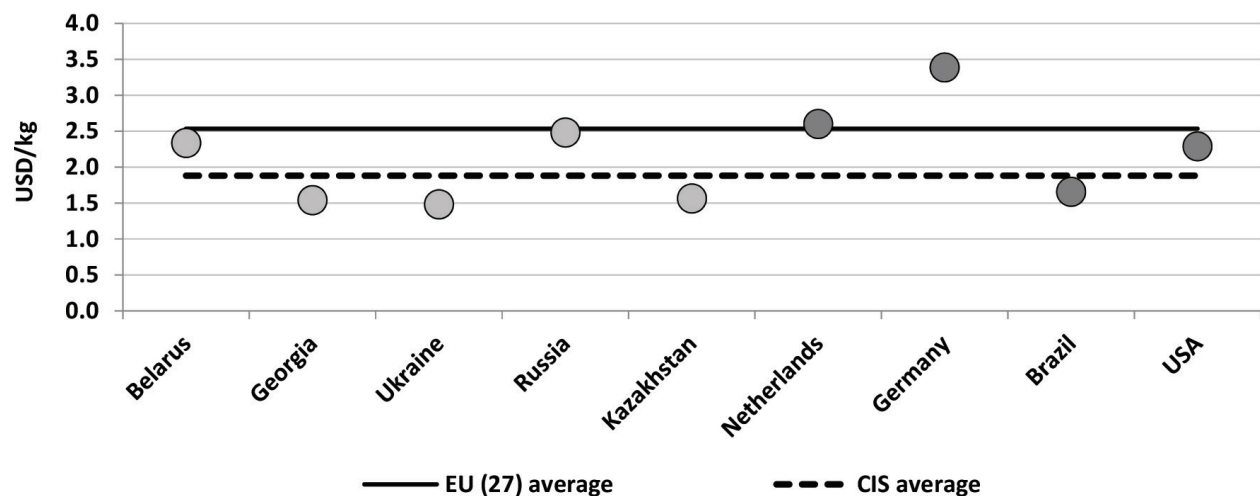


Figure 11. Average poultry price level in the CIS countries and selected international markets (base: 2011–2013). Source: Statistical offices of the respective CIS countries, own illustration.

Concerning the price transmission analysis, our results indicate that the CIS poultry markets are integrated regionally, with the EU and with selected international poultry markets. Strongest integration is recorded with the EU market, where 73% of the price shocks are transmitted to the domestic CIS markets in the long run (**Figure 12**). Moderate transmission is recorded from regional markets, while relatively slow transmission is recorded from the selected international markets.

The results from the disaggregated cross-country comparison indicate that the Russian poultry prices are strongly integrated with both regional and EU poultry markets, where we observe

almost full transmission of price shocks (**Figure 13**). However, our results of Ukraine indicate no market integration with regional and EU poultry markets.

4.5. Milk

For investigating the country-level assessment of CIS milk market integration, we focus on the milk powder prices [i.e., whole milk powder (WMP)] rather than on fluid milk prices.

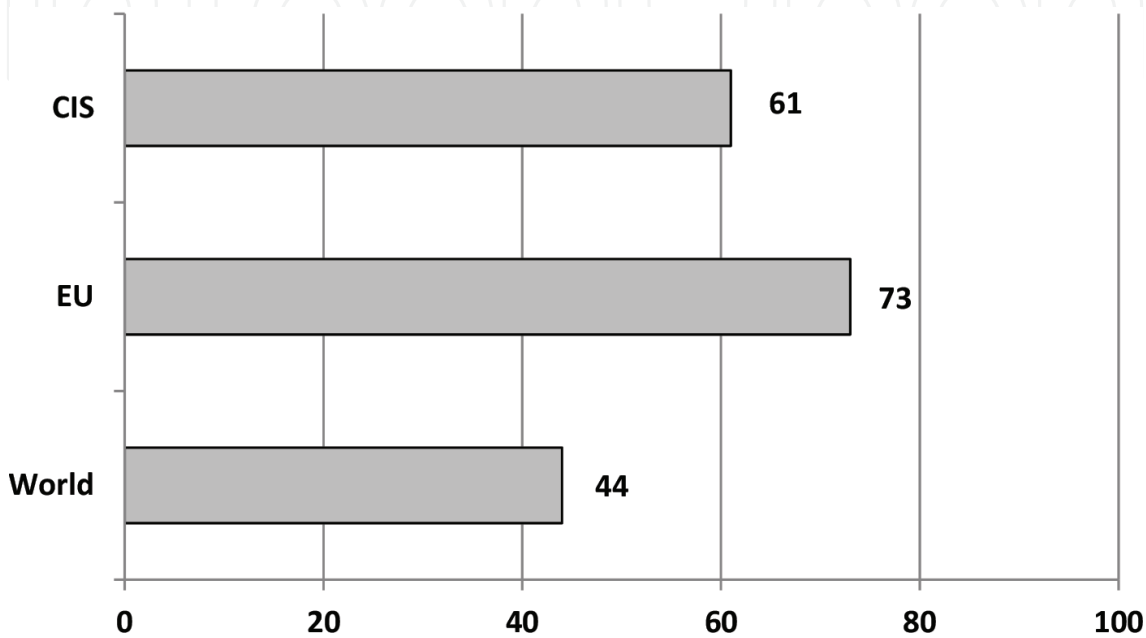


Figure 12. CIS poultry market integration—aggregated level. Source: Own calculation based on the estimation results, own illustration.

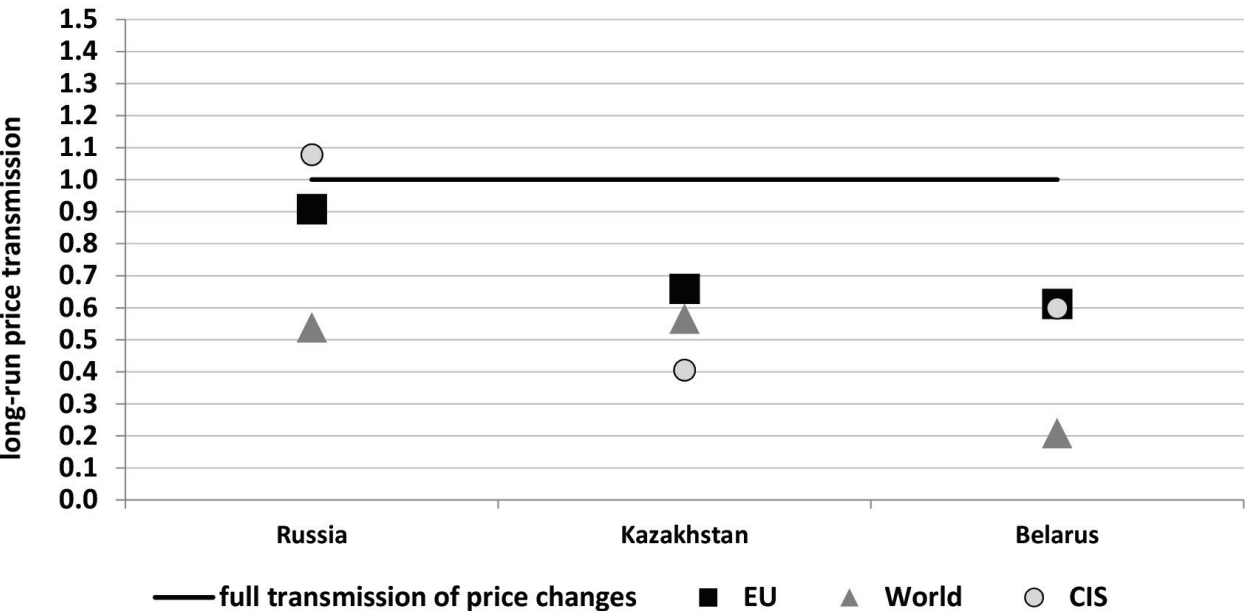


Figure 13. CIS poultry market integration—disaggregated level. Source: Own calculation based on the results, own illustration.

Figure 14 shows the estimated 3-year WMP price averages for the CIS countries. Compared to selected EU markets (i.e., EU 27 average price, Netherlands, and Germany) and world markets (i.e., Oceania), estimated CIS average prices are by on average 28% lower. The highest WMP prices are recorded for Russia and Kazakhstan (14% above the average), while the lowest prices are recorded for Belarus (27% below the average). Armenian and Ukrainian WMP prices are almost at the level of average CIS WMP prices.

The price transmission results indicate relatively moderate integration of the CIS WMP markets with both regional and selected international markets (**Figure 15**). The results from the

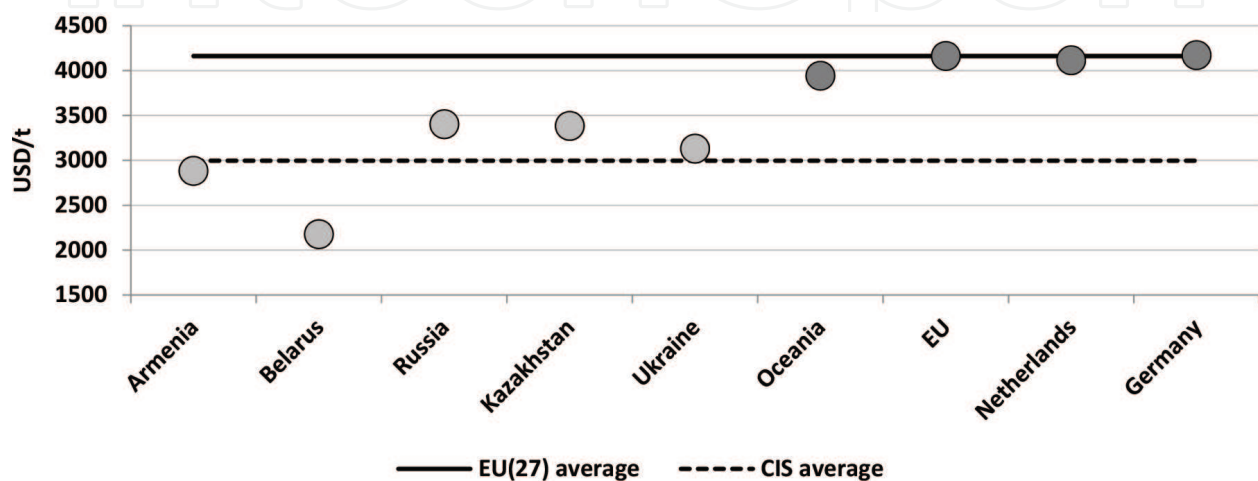


Figure 14. Average milk price level in the CIS countries and selected international markets (base: 2011–2013). Source: Statistical offices of the respective CIS countries and [18], own illustration.

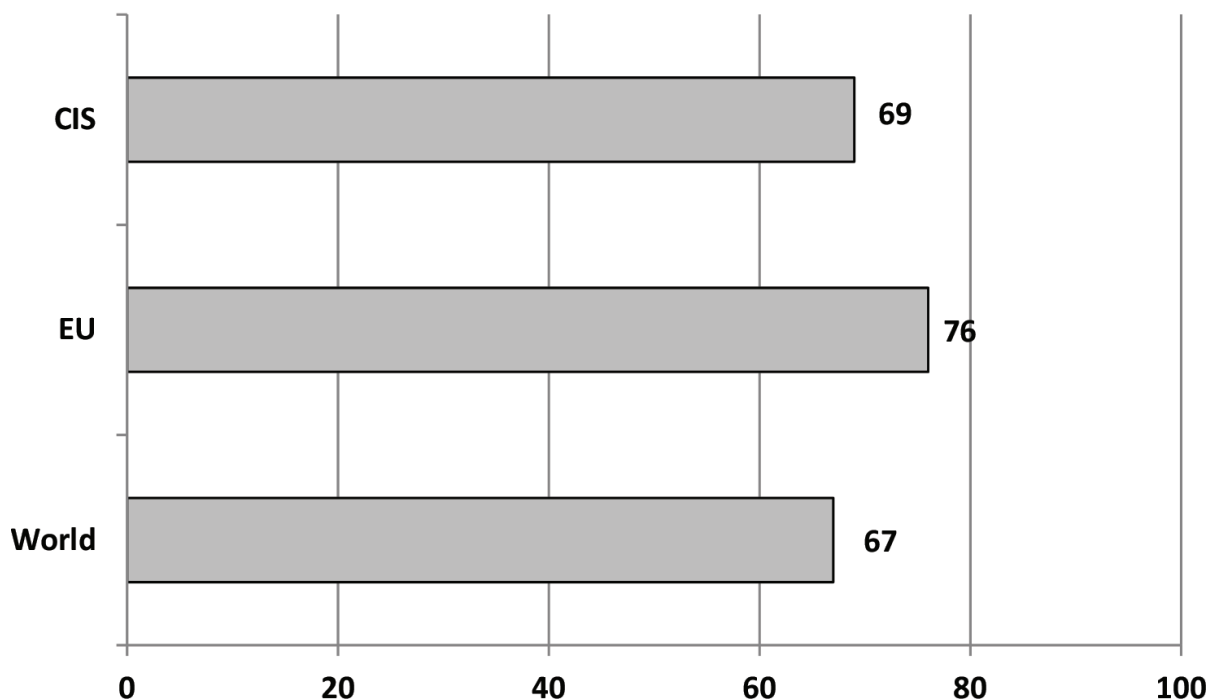


Figure 15. CIS whole milk powder market integration—aggregated level. Source: Own calculation based on the estimation results, own illustration.

cross-country comparison indicate that the Kazakh WMP market is strongly integrated with the regional markets, where we observe almost full transmission of price shocks (**Figure 16**). The Russian WMP market is strongly integrated with the EU market where we also observe almost full transmission of price shocks. Changes from the selected international market (i.e., Oceania) are transmitted to the Russian and Kazakh markets to the higher degree compared to other CIS countries (**Figure 16**).

4.6. Summary of market integration results

The results of the price transmission analysis (**Figure 17**) indicate strongest market integration of the CIS beef market with all three reference markets, i.e., regional CIS, EU, and the world market. As already mentioned, one of the main reasons for almost full transmission of price shocks from reference markets to the domestic CIS markets might be the fact that beef markets in CIS countries have lowest level of price protection compared to other products [13].

The observed strong market integration of the CIS pork markets with the EU market might result from comprehensive pork imports (trade flows) from the EU (until 2014). Similarly, significant pork trade between Belarus, Russia, and Kazakhstan, supported by the removal of trade barriers within the Customs Union, contributed to the rather strong regional pork market integration of the CIS countries.

The strong integration of the CIS wheat markets with the world market is might be explained by two main factors: (1) Russia and Ukraine have advanced to global leaders in wheat trade

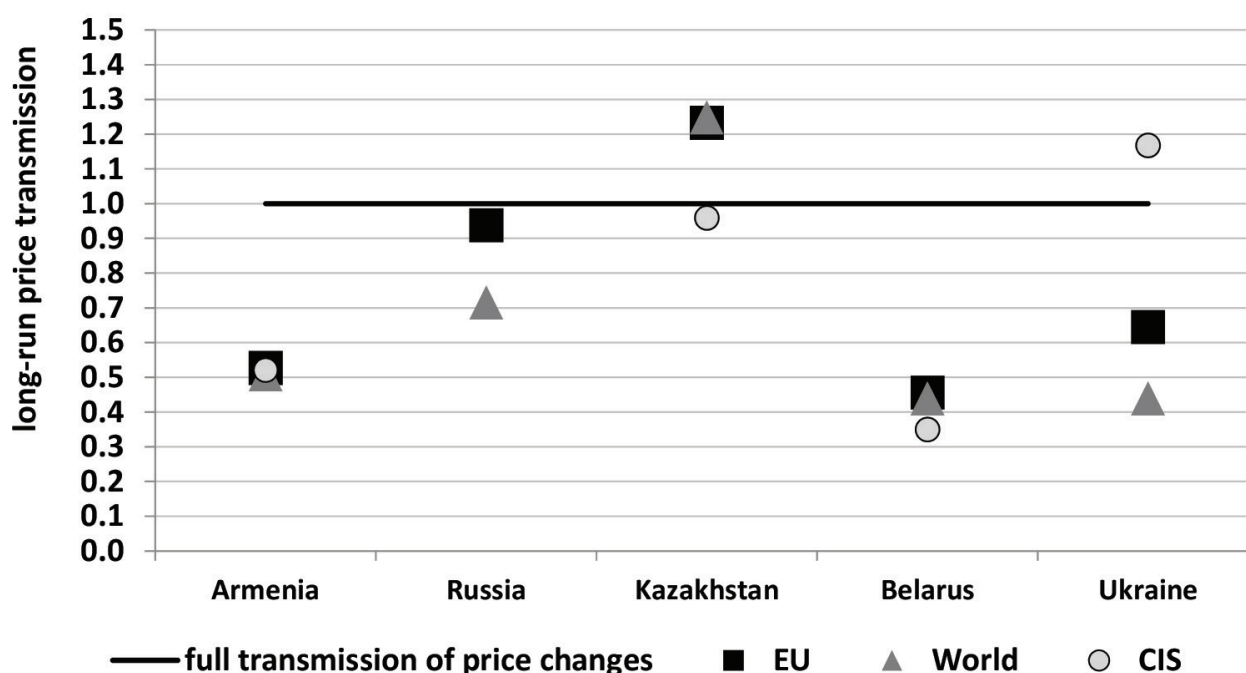


Figure 16. CIS whole milk powder market integration—disaggregated level. Note: Missing marker means no integration with the respective market. Source: Own calculation based on the results, own illustration.

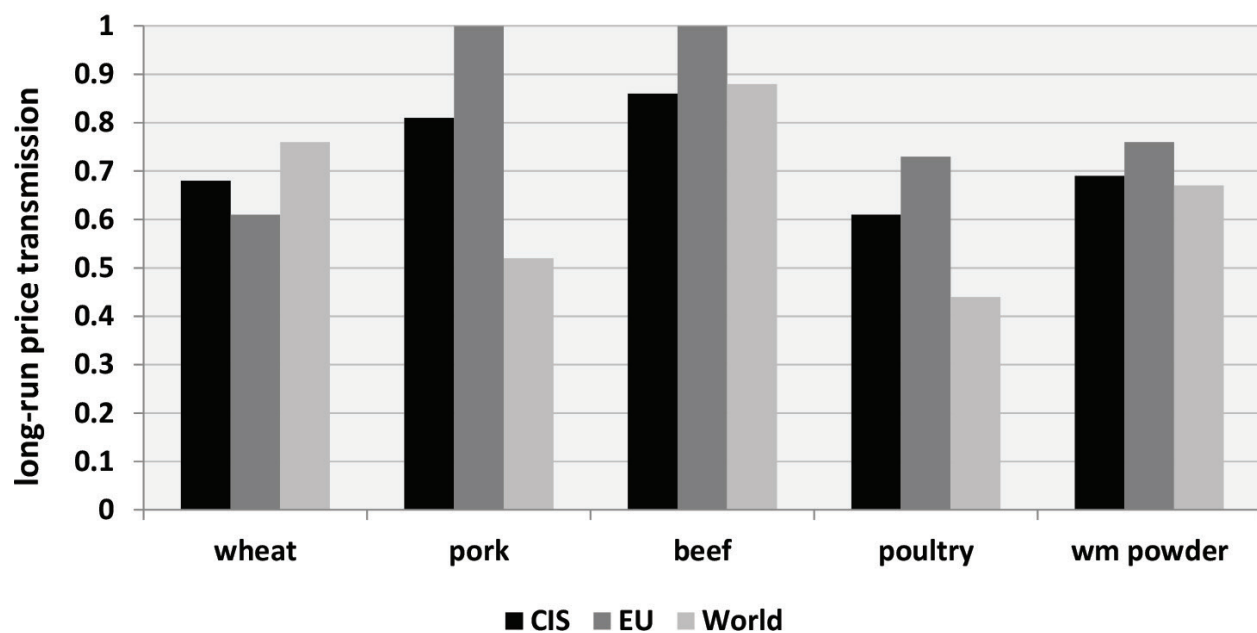


Figure 17. CIS market integration by product. Source: Own calculation and illustration.

and thus have a strong influence on world wheat prices; (2) World market prices are used as a benchmark price for regional wheat trade among CIS countries.

Considering that none of the CIS countries is a large poultry and whole milk powder importer or exporter and thus not a significant player on the world market, market integration is lower with the world market compared to EU and CIS regional markets. The EU market prices are used as a benchmark for negotiating poultry and whole milk powder trade between CIS countries.

Overall, all selected CIS markets are well integrated with the EU market due to market proximity and significant trade flows supported by numerous bilateral trade agreements. Integration with world markets is strong for products where CIS markets are large exporters (e.g., for wheat) or importers (e.g., for beef). Regional market integration greatly depends on trade volumes, infrastructure issues, and market barriers (i.e., removal of tariffs within the Customs Union).

5. Determinants of the CIS market integration

Differences in market integration observed between regions or countries might result from the influence of a variety of different factors. In the following, we link major influencing factors, in particular, the level of domestic market support, trade policies, the size of physical trade flows, infrastructure, and bilateral or multilateral trade agreements with our results on market integration of the CIS countries.

First, market support and trade-oriented policy measures have a strong impact on market integration [20]. For markets characterized by a high level of state support, the results indicate moderate or even no integration with international markets. This is especially the case with the CIS pork and poultry markets. On the country level, Belorussian attempts to support livestock production by strongly regulating grain prices is one of the main reasons why the Belorussian wheat market is not integrated with any of the reference markets. On the contrary, CIS markets with almost no state support, such as wheat and beef markets, are strongly integrated with international markets. Besides direct state support, sudden changes in CIS trade policies are significantly affecting CIS market integration. In particular, numerous export-oriented measures (e.g., export bans, export taxes, or export quotas) were implemented on CIS wheat markets in the last decade. The results for Russia and Ukraine indicate that wheat export restrictions significantly decrease the level of market integration and thus the transmission of price changes from international reference markets to domestic markets [21]. Furthermore, the decrease in price transmission is higher for regions within a country that are strongly integrated with international markets when trade is freely possible (e.g., North Caucasus for Russia and Odessa for Ukraine).

Second, the size of physical trade flows and the importance of the reference market for global trade (e.g., US wheat price) play an important role for market integration of the CIS countries. Strong regional integration of the CIS countries is based on the fact that Armenia, Georgia, and Azerbaijan are among the largest CIS wheat importers with wheat imports almost completely originating from other CIS countries (i.e., Russia, Ukraine, and Kazakhstan). At the same time, these countries have strong integration with international markets as well. We argue that price information coming from the main international markets is used by regional CIS traders as a benchmark for negotiating prices in regional trade. Similar considerations could be used for explaining strong market integration between CIS pork markets with regional and EU markets.

Third, underdeveloped infrastructure presents a great obstacle for the market integration of many CIS countries. This is especially visible on a disaggregated country-level analysis. Difficulties to obtain sufficient railway wagons, small capacity of port terminals on the Caspian Sea, and underdeveloped national roads significantly contribute to low market integration of the Kazakh wheat market with international markets. Besides a deficient grain transport infrastructure, large distances between grain producing and consuming regions strongly influence the degree of market integration of different regions in Russia. Infrastructural problems are also one of the main factors influencing market integration of Caucasian countries (i.e., Armenia, Azerbaijan, and Georgia) with the EU and international markets.

Fourth, strengthening trade relations through bilateral or multilateral trade agreements significantly contributes to market integration of the CIS countries. The establishment of the Eurasian Customs Union (EACU) facilitates the trade process between Belarus, Russia, and Kazakhstan. The results indicate that the EACU members have almost identical regional and international levels of integration. This is especially the case for pork markets. In addition, the results indicate strong market integration of CIS pork, beef, poultry, and milk markets with

the EU. The main reason for almost full transmission of price shocks from the EU markets might be associated to numerous bilateral trade agreements between the EU and almost all CIS countries.

6. Conclusions

In this chapter, we have analyzed to which extent selected CIS markets are integrated in regional and world agricultural markets.

Based on a unique data set which we have created utilizing a wide variety of different data sources available for the CIS countries, we have conducted the analysis for the wheat, meat (i.e., pork, beef, and poultry), and milk markets. The selected markets represent the most important agricultural sectors of the CIS countries. Well-functioning efficient agricultural markets are essential for food security in the CIS countries and are thus of great interest for policy makers.

The results of the price transmission analysis indicate that regional integration within the CIS is strongest for pork and beef, followed by poultry and whole milk powder. The integration of CIS markets in world agricultural markets is strongest for wheat and beef, whereas it is relatively low for pork and poultry. All in all, beef markets in the CIS countries are the strongest integrated within the region, with the EU and the world market.

Overall, our results indicate that domestic market support and trade policies, physical trade flows between countries, infrastructure, and bilateral or multilateral trade agreements play a key role in market integration of the CIS countries. First, our results indicate that markets characterized by a high level of state support, integration with international markets is weak or even a lack of integration is observed compared to markets where market support measures are absent. Second, our results indicate that CIS markets might be well-integrated with both regional and international markets due to the fact that regional integration is more connected to the physical trade flows (import dependency), while integration with international markets is more based on defining the benchmark price for the products that are traded on the regional level. Third, for most of the CIS countries, underdeveloped infrastructure significantly reduces market integration. Fourth, strengthening trade relations through bilateral or multilateral trade agreements significantly contribute to market integration of the CIS countries. That is especially the case for members of the Eurasian Customs Union and CIS agreements with the EU.

Acknowledgements

Research project supported by the European Commission under the 7th Framework Programme: "Exploring the potential for agricultural and biomass trade in the Commonwealth of Independent States" (www.agricistrade.eu).

Appendix. List and classification of countries

	Domestic markets	World regional markets	World reference markets	
Countries	CIS	CIS	EU	World
Armenia	x			
Azerbaijan	x			
Georgia ^a	x			
Belarus	x			
Moldova	x			
Kazakhstan	x	x		
Russia	x	x		
Ukraine ^a	x	x		
France			x	
Denmark			x	
Germany			x	
Netherlands			x	
Spain			x	
Oceania				x
Brazil				x
Australia				x
Argentina				x
Uruguay				x
USA				x

^aAlthough Georgia and Ukraine are no longer CIS members, in this study, we still refer them as CIS countries due to their tight regional trade connections with other CIS members.

Author details

Ivan Djuric*, Linde Götz, Miranda Svanidze and Thomas Glauben

*Address all correspondence to: djuric@iamo.de

Leibniz Institute of Agricultural Development in Transition Economies, Halle (Saale), Germany

References

[1] European Commission. Analysis of price transmission along the food supply chain in the EU. Accompanying document to the communication from the Commission to the European Parliament, the Council, the European economic and social committee and

the committee of the regions. Commission of the European communities, Commission stuff working document SEC 1450, Brussels, 28.10.2009 http://groupedebruges.eu/sites/default/files/publications/downloads/publication16067_price_transmission_ec.pdf

- [2] Fackler P, Goodwin B. Spatial price analysis. In: Gardner B, Rausser G, editors. Handbook of Agricultural Economics. Vol. 1B. Amsterdam: Elsevier; pp. 971-1024. DOI: 10.1016/s1574-0072(01)10025-3.ch17
- [3] Tomek W, Robinson K. Agricultural Product Prices. 4th ed. Cornell University Press, Ithaca, New York, United States of America; 2003. ISBN-13: 978-0-8014-5230-7
- [4] Bluashvili A, Safaryan S. Global food price shocks transmission to local markets and welfare implications for Georgian households. Policy Paper 2014. The research is conducted in the framework of the project "Policy Research for Sustainable Growth", implemented by Konrad Adenauer Foundation in cooperation with PMC Research Center, Washington, United States of America. 2014
- [5] Katsia I, Mamardashvili P. Price transmission on wheat flour market in Georgia. Paper presented at the Samarkand Conference "Regional and International Cooperation in Central Asia and South Caucasus: Recent Developments in Agricultural Trade", Samarkand, Uzbekistan, 2-4 November 2016
- [6] Dickey DA, Fuller WA. Distribution of the estimators for autoregressive time series with a unit root. Journal of American Statistical Association 1979;**74**(366):427-431. DOI: 10.2307/2286348
- [7] Johansen S. Statistical analysis of cointegration vectors. Journal of Economic Dynamics and Control. 1988;**12**(2-3):231-254. DOI: 10.1016/0165-1889(88)90041-3
- [8] Stock JH. Asymptotic properties of least squares estimators of cointegrating vectors. Econometrics. 1987;**56**:1035-1056. DOI: 10.2307/1911260
- [9] FAO. Red Meat, Agribusiness Handbook. Food and Agriculture Organization of the United Nations, Rome, Italy. 2009
- [10] Acosta A, Ihle R, Robles M. Spatial price transmission of soaring milk prices from global to domestic markets. Agribusiness: An International Journal 2014;**30**(1):64-73. DOI: 10.1002/agr.21358
- [11] Svanidze M, Götz L, Djuric I, Glauben T. South Caucasus's wheat import from Black Sea region: What are the lessons for Central Asia? Paper presented at the 155th EAAE-Seminar: "European Agriculture towards 2030 – Perspectives for further East-West Integration", Kiev, Ukraine, 19-21 September 2016
- [12] Syzdykov R, Aitmambet K, Dautov A. AGRICISTRade Country Report: Kazakhstan. Analytical Centre of Economic Policy in Agricultural Sector, Kazakhstan. 2015. Available from: <http://www.agricistrade.eu/document-library>
- [13] Volk T, Erjavec E, Rac I, Rednak M. AGRICISTRade – Deliverable 2.3: Agricultural Policy in the European Union's Eastern Neighbours. 2015. Available from: <http://www.agricistrade.eu/document-library>

- [14] United Nation International Trade Statistics Database (UN Comtrade). Available from: www.comtrade.un.org. 2016
- [15] Akhramovich V, Chubrik A, Shymanovich, G. AGRICISTRADe Country Report: Belarus. Belarus: Research Centre of the Institute for Privatization and Management; 2015. Available from: <http://www.agricistrade.eu/document-library>
- [16] Götz L, Djuric I, Glauben T. Wheat export restrictions in Kazakhstan, Russia, and Ukraine: Impact on prices along the wheat-to-bread supply chain. In: Schmitz A, Meyers WH, editors. Transition to Agricultural Economies: The Future of Kazakhstan, Russia and Ukraine. CABI (Commonwealth Agricultural Bureaux (CAB) International), Wallingford, Oxfordshire, United Kingdom; 2015. pp. 191-203. DOI: 10.1079/9781780645353.0000.ch19
- [17] APK-Inform. AgriNews, various issues. Available from: <https://www.apk-inform.com/en>. 2016
- [18] United States Department of Agriculture (USDA). Available from: <http://apps.fas.usda.gov/psdonline/psdquery.aspx>. 2016
- [19] Irish Food Board. Available from: www.bordbia.ie. 2016
- [20] Djuric I, Götz L. Export restrictions – Do consumers really benefit? The wheat-to-bread supply chain in Serbia. Food Policy. 2016;**63**:112-123. DOI: 10.1016/j.foodpol.2016.07.002.
- [21] Götz L, Djuric I, Nivievskiy O. Regional price effects of extreme weather events and wheat export controls in Russia and Ukraine. Journal of Agricultural Economics 2016;**67**(3): 741-763. DOI: 10.1111/1477-9552.12167