IMPACT OF THE RUSSIAN IMPORT BAN ON THE SERBIAN PORK EXPORTS AND PRICES

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Abstract

In this paper we analyze the impact of the Russian import ban for pork originating in the EU on the Serbian domestic pork prices. We use an Autoregressive Distributed Lag Model (ARDL) in order to investigate if the Russian import ban affected the short-run and long-run price transmission from the selected reference markets (i.e. EU and Russia) to the Serbian domestic pork prices. The price transmission analyses indicate significant decrease in the long run price transmission between the EU and Serbian domestic pork markets. The opposite is true for Russian-Serbian price relations. The short-run price dynamics indicate significant increase in Serbian price adjustments after the Russian import ban towards price changes in both EU and Russian markets.

Key words: *EU, import ban, pork, price transmission, Russia, Serbia.*

Introduction

In response to the West's economic sanctions imposed in June 2014, the Russian government imposed an import ban in August 6, 2014 on most foods and agricultural products from the European Union (EU), the United States of America (USA), Norway, Canada and Australia. Thus, the most important trade partners lost their market share on the large Russian market.

The importance of Russian market could be explained by the fact that Russia imports about 50% of food products, mainly meat, fruits, vegetables, fish and milk products. Agricultural import in 2013 was about

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40 billion USD (Djuric et al., 2015a). Russian imports also absorb about 15% of the global trade with products such as frozen beef, fruit and butter.

Concerning pork imports to Russia, the EU lost its market share already at the beginning of 2014 when Russia imposed an import ban towards pork originating in the EU. The main reason was the appearance of several cases of the African swine fever (ASF) on the borders between Lithuania and Poland with Belarus (FAO, 2014).

The ban towards the EU caused significant short and medium-term consequences on the Russian domestic market considering that the EU was suppling about 60% of the total Russian pork import prior to the ban (Djuric et al., 2015b).

Considering that some of the largest trade partners of Russia were affected by the import bans, Russian food importers needed urgently to either increase import from the existing partners or to find new suppliers for banned products.

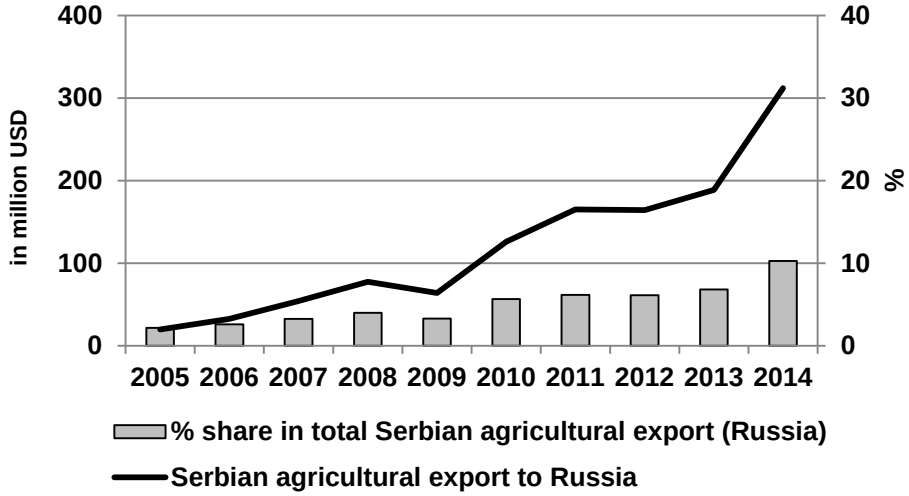
This was a great opportunity for Latin American countries (e.g. Brazil and Chile), former Russian republics (e.g. Belarus, Kazakhstan and Caucasian countries), some Asian countries (e.g. China), and Serbia to increase the volumes of agricultural exports towards Russia.

For Serbia, a small agricultural export oriented country, Russian market becomes especially important, or in other words more open, since 2011 when Russia allowed tariff free import for numerous of Serbian agricultural products. This agreement caused that the Serbian agricultural export almost doubled towards Russia (Figure 1).

The second large increase in the Serbian agricultural export towards Russia was in 2014 which can greatly be contributed to the increase in Russian demand caused by the agricultural import ban.

This is particularly the case for the pig meat export which rose significantly (see section 2).

Figure 1. *Development of the Serbian agricultural export towards Russia, 2005-2014*



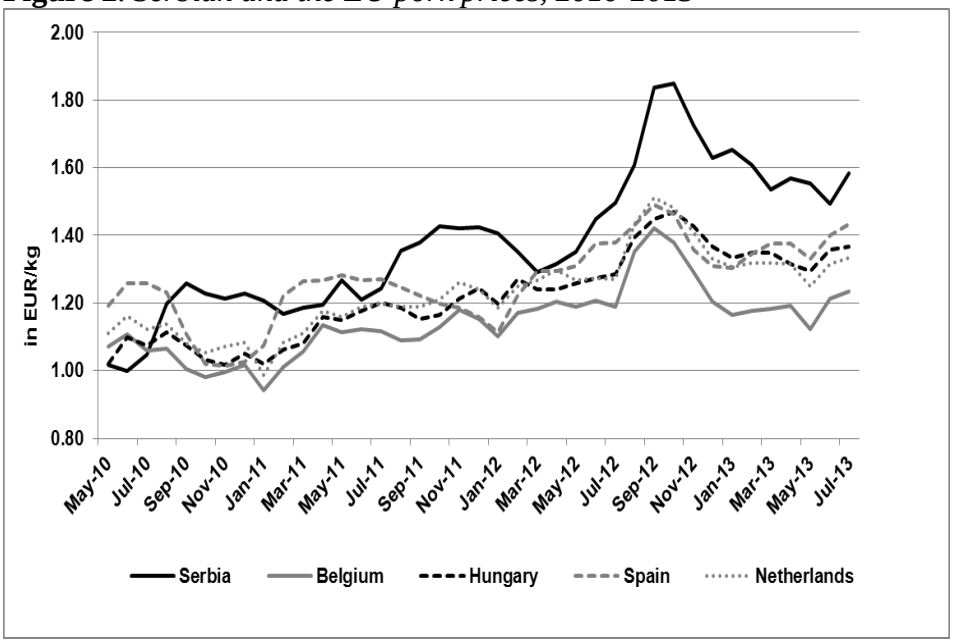
Source: *Statistical office of the Republic of Serbia*

These recent trade developments bring some light to almost devastated Serbian pork production. Unfavorable factors, such as high input costs, low access to capital, the EU ban on Serbian pork export due to the non-accepted vaccination against swine-fever, domestic market uncertainty, and reduced domestic consumption, greatly contributed to the overall critical developments in the Serbian pork sector (Djuric and Petkovic, 2013; Zivkov et al., 2010). Consequently, Serbian pork prices are higher on average compared with the main EU pork producers (Figure 2)

In this paper we aim at investigating if the Russian pork import ban (in February 2014), had an impact on: a) volumes of Serbian pork exports towards Russia; b) level of transaction costs; and c) transmission of price changes from the relevant EU and Russian pork markets towards Serbian domestic prices.

Considering that Serbia was not included in the Russian import ban, we hypothesize that the export of Serbian pork towards Russia increased during the observed period, whereby transaction costs decreased followed by the increase in transmission of price changes from the Russian domestic pork prices towards prices on the Serbian domestic market.

Figure 2. *Serbian and the EU pork prices, 2010-2013*



Source: *Djuric and Petkovic (2013)*

For the analysis we use an Autoregressive Distributed Lag model (ARDL) which allows us to access both the short-run and long-run transmission of price changes from reference markets (i.e. EU and Russia) towards Serbian domestic prices. In the first stage we estimate the model for the period before the ban in February 2014. We refer to this regime as to "free trade" regime.

Second, we estimate the model for the period between the first import ban in February 2014 and the second ban in August (i.e. the "EU ban" regime). Estimation of two models for different time periods allows us to identify if the short-run and the long-run price transmission parameters change due to the Russian import ban.

This paper is structured as follows. Section 2 describes the importance of the Russian market for the Serbian pork export. Section 3 describes methodology and data used for the analysis. Section 4 provides empirical results with discussion. Section 5 provides conclusions.

Importance of the Russian market for the Serbian pork export

Total Serbian export to Russia was 857 million USD on average for the period 2010-2014. In total export, agriculture accounts for 21% with an average value of 181 million USD. About 97% of the total agricultural export refers to export of food and live animals. Export of vegetables and fruits, meat and meat products, and dairy products account for 92% of total food and live animals export to Russia (Table 1).

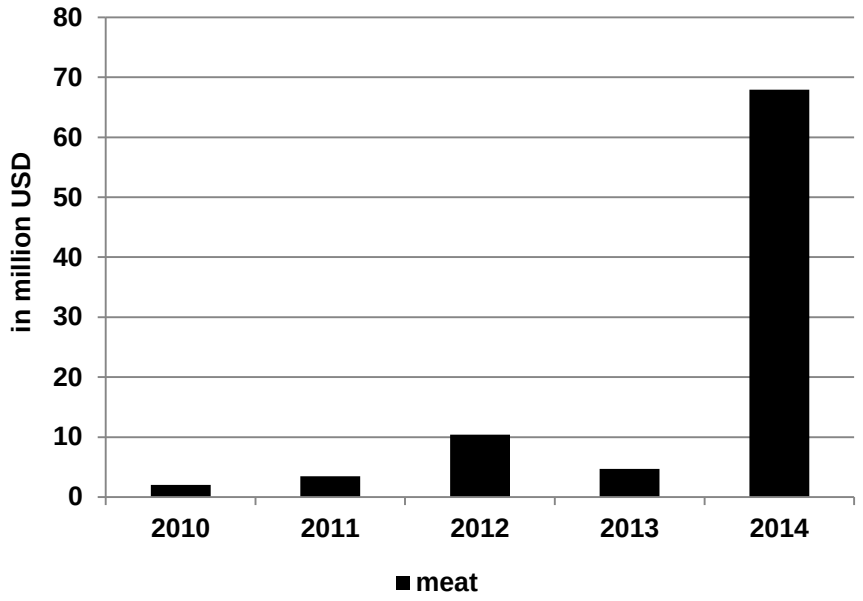
Exports of fruits and vegetables, and meat increased significantly in 2014 compared to the whole observed period (2010-2014). Fruit and vegetable export increased for 34% in value terms compared to 2013, while meat export rose for 1341% (Figure 3). More detailed analysis of exports in 2014 indicate that the average monthly meat export increased for 75%, from 3.6 million USD in the first half 2014 to 6.3 million USD in the second half of the year (Figure 4).

Table 1. *Serbian agricultural export to Russia, 2010-2014*

Product list	Average value (1,000 USD)	Structure Total=100%
00 Live animals	11	0,0
01 Meat and meat preparations	17.719	10,1
02 Dairy products and bird's eggs	13.692	7,8
03 Fish, crustaceans, mollusks	11	0,0
04 Cereals and cereal preparations	6.157	3,5
05 Vegetables and fruit	129.592	74,0
06 Sugars, sugar preparations, honey	179	0,1
07 Coffee, tea, cocoa, spices	251	0,1
08 Feeding stuff for animals	1.803	1,0
09 Miscellaneous edible products	5.793	3,3
0 Food and live animals	**175.207**	**100,0**
11 Beverages	5.844	70,2
12 Tobacco	327	29,8
1 Beverages and tobacco	**6.170**	**100,0**
0+1	**181.377**	**-**

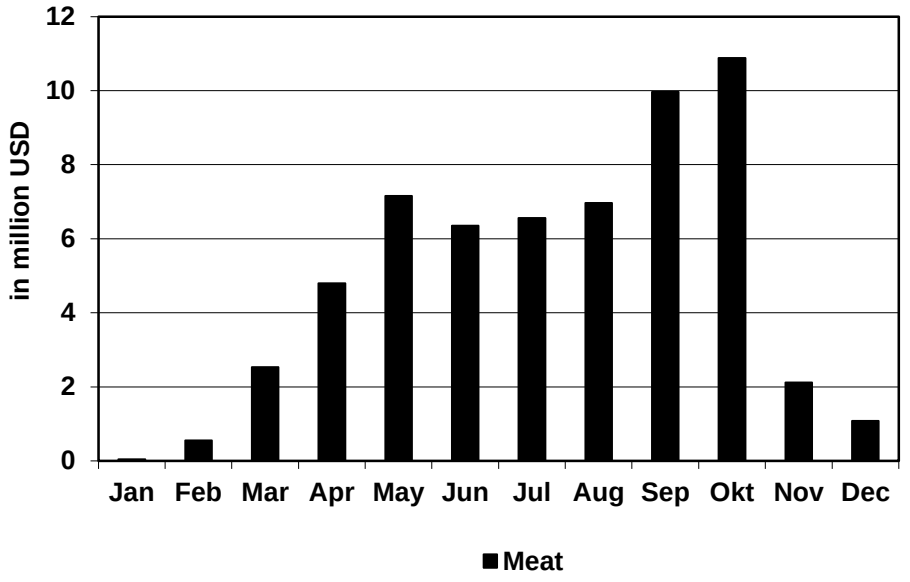
Source: *UN Comtrade, own illustration*

Figure 3. *Serbian exports of meat to Russia, 2010-2014*



Source: *UN Comtrade, own illustration*

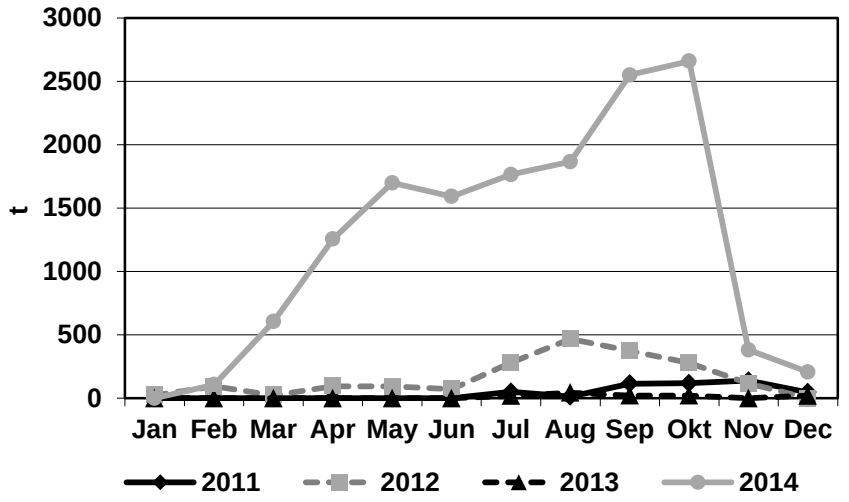
Figure 4. *Development of the Serbian meat exports to Russia, 2014*



Source: *UN Comtrade, own illustration*

Among meat products, exports of pork accounts for the largest share. For the period 2011-2013, Serbian export to Russia was 1,000 t on average. In 2014, export increased to 14,700 t (Figure 5).

Figure 5. *Monthly Serbian pork export to Russia, 2011-2014*



Source: *UN Comtrade, own illustration*

Overall, analysis of trade volumes between Serbia and Russia indicate increased importance of the Russian market for the Serbian agricultural products. Furthermore, Serbian exports of pork grow significantly in 2014, especially after the Russian government imposed import bans in February and August 2014.

Methodology and data

Before conducting the price transmission analysis, we start with identification of the data properties buy conducting the unit root tests. Thus, we tested our time series for stationarity[1] in order to avoid the spurious[2] regression. In this paper we use the augmented Dickey-Fuller (Dickey and Fuller, 1979) and KPSS (Kwiatkowski et al., 1992) unit root tests.

[1]It refers to the covariance-stationarity: mean of the process does not depend on time (Hamilton, 1994).
[2]Nonsense regression. Obtained coefficients can be highly statistically significant.

Once the properties of the data are identified, the preconditions for the price transmission analysis are fellfield. Considering that most of the agricultural prices are non-stationary (Stigler, 2011), the usage of the cointegrating techniques is one of the most common tools for analyzing price transmission. In general, cointegration models allow for analyzing the stationary long-run relationship between non-stationary data. Furthermore, cointegration models allow for identifying both the short-run and the long-run price dynamics.

One of the most common specifications of the cointegration models is the vector error-correction model (VECM). The main idea of VECM is based on the equilibrium relationship between the observed variables. "*Temporary deviations from the equilibrium are called equilibrium errors, and the forces correcting these equilibrium errors are said to have an error-correcting behavior. The vector included in the model allows for more than one equation with at least two endogenous variables, and for complex interdependencies among them. Thus, the idea is that the part of the disequilibrium from one period is corrected in the next period*" (Djuric, 2014). The VECM can be formulated in the following way:

$$\Delta p_t = \alpha \beta' p_{t-1} + \sum_{i=1}^{k-1} \Gamma_i \Delta p_{t-i} + \varepsilon_t \qquad (1)$$

where p_t represents a vector of prices; Δ donates the first difference operator; matrix β is a stationary long-run relationships between the prices (cointegration vector); term $\beta' p_{t-1}$ refers to equilibrium errors of each co-integration relationship for each point in time; α donates the matrix containing the rates at which the price differences react on the deviations from the long run equilibrium (speed of adjustment). The matrices Γ_i contain the short-run reactions of the price differences on past differences and ε_t donates an error term.

One of the main limitations of the VECM model is that it request the time series to be integrated at the same order. Thus, both series should contain a unit root. Nevertheless, some of the price series could be stationary while others contain a unit root. In this situation the VECM is not an appropriate model to assess the cointegration between time series. One of the solutions is to use the ARDL model developed by Pesaran and Shin (1999) and Pesaran et al. (2001):

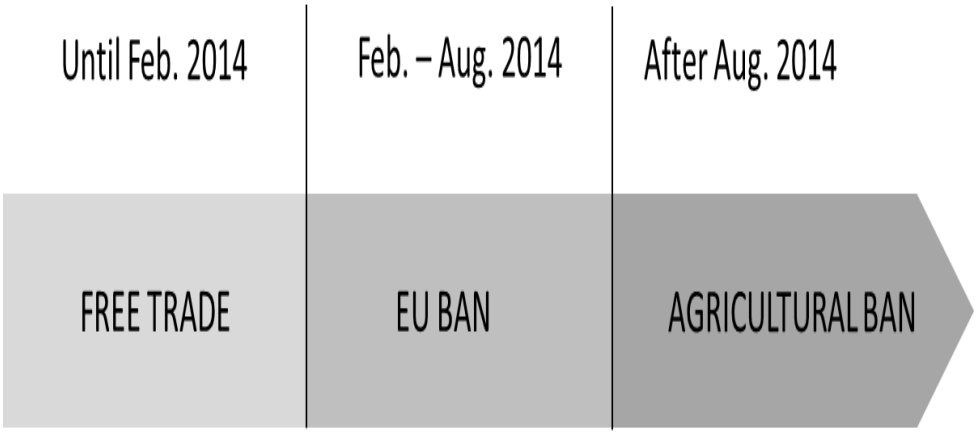
$$y_t = \beta_0 + \beta_1 y_{t-1} + \cdots + \beta_k y_{t-p} + \alpha_0 x_t + \alpha_1 x_{t-1} + \cdots + \alpha_q x_{t-q} + \varepsilon_t. \quad (2)$$

The autoregressive part of the model refers to the fact that y_t is partially explained by its own lagged values (y_{t-p}). In addition, it accounts for the lagged value of the explanatory variable (x_{t-q}). Thus, the main advantage of this model is that it relies on the bound testing methodology, which allows for cointegration testing between the price series that are stationary and non-stationary, and it allows for estimating both long-run and short-run relationship between prices. This model type allows us to estimate both the long-run and short-run relationship between the time series that are stationary and contain the unit root.

We use the ARDL model for estimating the price-transmission parameters for two different regimes (Figure 6). The "free trade" regime accounts for the period before the Russian pork import ban towards EU (August 2014). The second regime, the "EU ban" regime, accounts for the period between the ban in February 2014 and the agricultural import ban in August 2014.

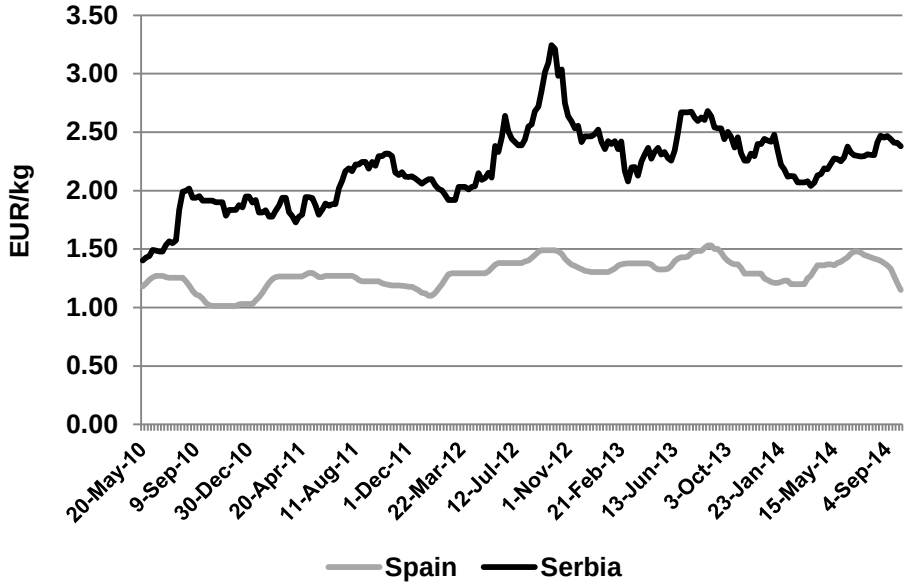
Data used for the analysis are average weekly prices for pork carcass measured as spot market price at the largest trade markets in Serbia, Spain and Russia (Figures 7 and 8). Pork prices for Spain and Serbia are expressed in EUR/kg. On the other side, pork prices for Serbia and Russia are expressed in USD/kg.

Figure 6. *Regime classification*



Source: *own illustration*

Figure 7. *Weekly pork prices in Serbia and Spain, 2010-2014*



Source: *GEA info center, Irish Food Board, own illustration*

Figure 8. *Weekly pork prices in Serbia and Russia, 2010-2014*

Source: *GEA info center, ROSSTAT, own illustration*

Empirical results

The analysis of the Russian pork import, after the first ban in February 2014, indicate that the non-EU trading partners took over the largest part of the previous EU market share. Namely, Canada increased the share of pork imports to Russia from 13% before the ban to 46% after the ban. Also, Brazil increased the market share from 21% to 38%. For the same period Serbia increased the share in total Russian pork import from 0.5% before the ban to 3% after the ban. After the second import ban in August 2014, Brazil increased the share in total Russian pork import to 78%. For Serbia, market share increased to 8%. The increase in import of pork from the non-EU countries can also be seen by the number of the additional companies that obtained import licenses in 2014 (Table 2).

Concerning the price transmission analysis, statistical properties of the data indicate that some of the price series are stationary and some are containing unit roots[1] (Table 3, A). This is one of the main reasons for using the ARDL model for identifying if the price series are cointegrated.

Table 2. *Number of companies licensed for pork import to Russia (selected countries)*

Country	until 2014	Additional number of enterprises		Total
		1st ban	2nd ban	
		February – August 2014	After August 2014	
Canada	27	+5	+4	36
USA	169	+9	+1	179
Brazil	3	+5	+20	28
Chile	2	+4	+3	9
Serbia	**3**	**+1**	**+3**	**7**

Source: *Djuric et al. (2015b)*

For the period before the Russian ban, our results indicate that there was no transmission of price changes from the Russian pork prices towards pork prices in Serbia (Table 4). Concerning the short-run price dynamics, our results indicate almost similar adjustment of Serbian prices towards the short-run equilibrium with both Russian and Spanish pork prices. We also observe that that the estimated intercept, which could be interpreted as the transaction costs, for the Serbian-Russian price pair is almost three

[1]Results are based on ADF and KPSS unit root tests.

times higher compared to the Serbian-Spanish price pair. The main reason might be a very low volume of export towards Russia before 2014.

The results for the "EU ban" regime indicate significant reduction of transaction costs between Serbia and Russia, and increase in transection costs between Serbian and Spanish pork prices. The long-run transmission of price changes between Spanish and Serbian pork prices is reduced for a half after the ban followed by significant increase in the short-run price adjustments.

These results indicate that the Serbian pork prices are adjusting very fast to the disequilibrium with Spanish pork prices in the short-run. The main reason is that Serbia started importing large quantities of pork meat from the EU in order to satisfy domestic demand, considering that the largest amount of the domestically produced pork started being exported to Russia.

Table 3. *Unit root and Johansen's cointegration tests*

A) Unit root tests							
Series	Augmented Dickey-Fuller test				KPSS test		
	test statistic	specification	5 % critical value		test statistic	specification	5 % critical value
$\ln p_t^{S\_eur}$	-2.948	0 lags, constant	-2.874		0.278	11 lags, constant and linear trend	0.146
$\ln p_t^{S\_usd}$	-3.493	0 lags, constant	-2.874		0.231	11 lags, constant and linear trend	0.146
$\ln p_t^{Sp}$	-2.576	1 lag, constant	-2.874		0.132	11 lags, constant	0.146
$\ln p_t^{R}$	-1.708	1 lag, constant	-2.874		0.185	11 lags, constant and linear trend	0.146
$\Delta \ln p_t^{S\_eur}$	-13.530	0 lags, none	-1.942		0.184	8 lags, constant	0.463
$\Delta \ln p_t^{S\_usd}$	-13.125	0 lags, none	-1.942		0.276	0 lags, constant	0.463
$\Delta \ln p_t^{Sp}$	-5.477	0 lags, none	-1.942		0.095	9 lags, constant	0.463
$\Delta \ln p_t^{R}$	-10.449	0 lags, none	-1.942		0.076	9 lags, constant	0.463

Note: Number of lag length is selected according to the AIC.
Source: *Own calculation*

Table 4. *Price transmission results*

country	Spain	Russia
regime	Free trade regime	
model	ARDL (1,0)	ARDL (2,1)
intercept	0.486***	1.120
slope	1.291***	-0.008
speed of adjustment	-0.07***	-0.05***
	EU ban regime	
model	ARDL (1,0)	ARDL (3,2)
intercept	0.604***	0.766***
slope	0.644***	0.237***
speed of adjustment	-0.33***	-0.60***

Note: ***<1% significance level.
Source: *own calculation*

Concerning Serbian-Russian price pair, our results indicate the increase in the long-run price transmission between Serbian and Russian pork prices followed by the significant increase in the short-run price adjustments. Furthermore, the short-run price adjustments are double higher for the Serbian-Russian price pair compared to the price adjustments toward the disequilibrium with Spanish pork prices. We argue that the main reason for the increase in the short-run price adjustments lies in the fact that trade volumes between Serbia and Russia increased tremendously, whereby Serbian exporters have to compete with large non-EU pork exporters. Thus, price changes on the domestic Russian market play an important role for the Serbian traders.

Conclusions

In this paper we analyze the impact of the Russian pork import ban on the Serbian pork export and prices. We also observe the changes concerning Serbian and the EU pork trade and price relations.

Our main approach is based on the price transmission analysis where we use the Autoregressive Distributed Lag model to distinguish between the short-run and the long-run transmission of price changes between the Serbian and the pork markets of the selected countries (i.e. Russia and Spain). Furthermore, we look at the pork export volumes before and after the Russian ban in order to identify a possible trade diversion of the Serbian pork export.

Our analysis of trade volumes indicate that the Russian market become the most important export market for the Serbian pork exporters, especially after the Russia implemented pork meat import ban for the pork originating in the EU. This is also supported by the fact that the transaction costs for the Serbian pork exports towards Russia dropped for almost 31% compared for the period before the ban.

Furthermore, our results indicate significant increase in speed of price adjustment of the Serbian pork prices towards the disequilibrium with the Russian pork prices. Thus, we argue that the short-run changes of pork meat prices on the Russian market started playing an important role for the pork prices in Serbia. The main reason could be the facts that Serbian pork exporters have to be competitive in order to keep the share of pork exports towards Russia.

For further analysis we plan to account for the effects of the agricultural import ban implemented by the Russian government in August 2014. Furthermore, we plan to investigate what are the effects on the Serbian domestic pork market concerning price changes along the pork supply chain.

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