Spatial Price Transmission and Food Security: The case of Kosovo

Kushtrim Braha[1], Miroslava Rajcaniova[1] and Artan Qineti[1]

[1] Slovak University of Agriculture in Nitra/ Department of Economics, Nitra, Slovakia
xbraha@is.uniag.sk, kbraha@gmail.com

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Summary

Interest on the empirical assessment of the price transmission has been extended particularly after the global food price shocks of 2007-2008. This study is focused on the spatial price transmission analysis from the world commodity markets into the agricultural commodity markets in Kosovo. Kosovo is characterized as a rural economy, where more than 60% of population is living in rural areas. Kosovo is net food importer and implications of the recent global food price hikes were affecting considerably domestic food demand as well as were raising concerns of food security. Findings of this paper suggest that Kosovo is significantly exposed to the food security risk factors. The set of causal food insecurity factors has been identified in this paper. Official records demonstrate that self-sufficiency ratio of the key food staples in Kosovo varies from 75% for wheat and meat to 82% for maize. On the other hand, annual share of household food expenditures in total consumption exceeds 40%. Empirical analysis of this paper are based on estimations of unit root tests, cointegration tests, Granger causality tests, estimation of error correction models and test of price transmission asymmetry. Spatial price transmission analysis found that Kosovo is vulnerable to the price transmitting signals from the world market. Empirical findings suggest strong evidence of asymmetry for world and domestic prices of wheat and beef and weak evidence of asymmetry for barley and chicken. Based on the results of the error correction models it can be assumed that that prices in Kosovo react with different speed to positive and negative deviations, while world prices do not react to shocks in Kosovo prices. Kosovo as a price taker in the global trade has limited policy instruments to respond to the global food price vulnerability. The main food security policy axis should be directed on productivity improvement and enhancement of the competitiveness of agriculture in those sectors in which Kosovo has comparative advantage.

Keywords: spatial price transmission, food security, agricultural trade

JEL Classification codes: C32, Q11, Q18

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1. INTRODUCTION

Global food commodity markets exhibited significant vulnerability and high price volatility since 2007. A range of casual factors has been identified to explain sudden emergence of high food prices. Group of authors (McDonald, 2010; Mittal, 2009; Wiebe *et al.*, 2011; Ruby, 2012) have classified the main drivers of the recent price volatility into short and long term factors such as increased demand from the emerging economies, speculation in financial markets, increasing use of biofuels, decline in investment in agriculture etc. Since 2007, there have been two sharp waves of food price spikes around the world (Brown *et al.*, 2012). In 2008, prices for grains and oilseeds spiked rapidly leading to an increase in the number of undernourished people worldwide from 915 million to more than 1 billion. Sharp rise of the food prices revived once again at the end of 2010 causing significant increase of food insecurity globally. In this context, the main objective of this paper is to evaluate the extent to which price signals are transmitted from world markets into Kosovo agricultural commodities. Empirical analysis of this study determine if the world price variation is transmitted into the local prices, as well as to indicate whether world price variations play an important role in the state of the food security in the case of Kosovo.

Kosovo went out from the devastating war at the end of 1990s with the significant share of poor population living in the edge of existence. In the year 2000, more than a half of population were considered poor, with 12% living in the extreme poverty (Figure 1). A decade after the war, constraints of poverty remain evident. Poverty data from 2011 show that a third of total population (29.2%) lives with less than 2$ per day, while more than 10% cope with the extreme poverty line (1.2$ per day). Duval and Wolff (2013) stress out that despite progress during the post-conflict reconstruction; social environment in Kosovo remains a mix of extreme poverty and lack of job opportunities. Furthermore, Sen and Kirkpatric (2011) found that many households in Kosovo depend on remittances from abroad in meeting their consumption needs. Food consumption marks the highest proportion on the total share of expenditures in Kosovo. The share of food expenditures in total consumption during the period 2005-2012 exceeds 40% (Figure 2). Kosovo is characterized as consumption economy, where the food diet is diversified but significantly constrained by the low level of income.

Figure 1: Poverty prevalence in Kosovo

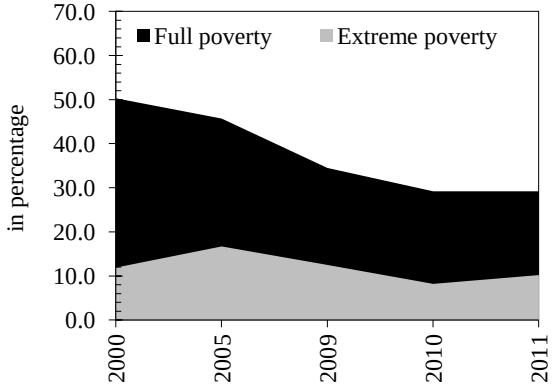
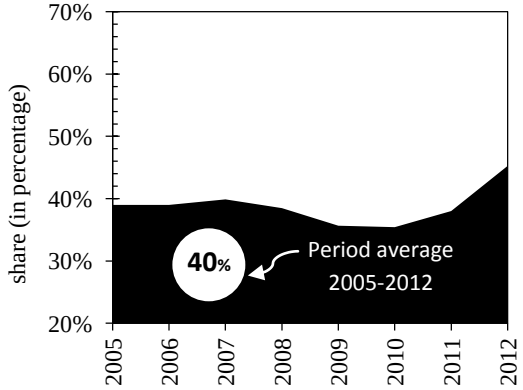


Figure 2: Share of food in total consumption



Source: Own elaboration based on the data of KAS

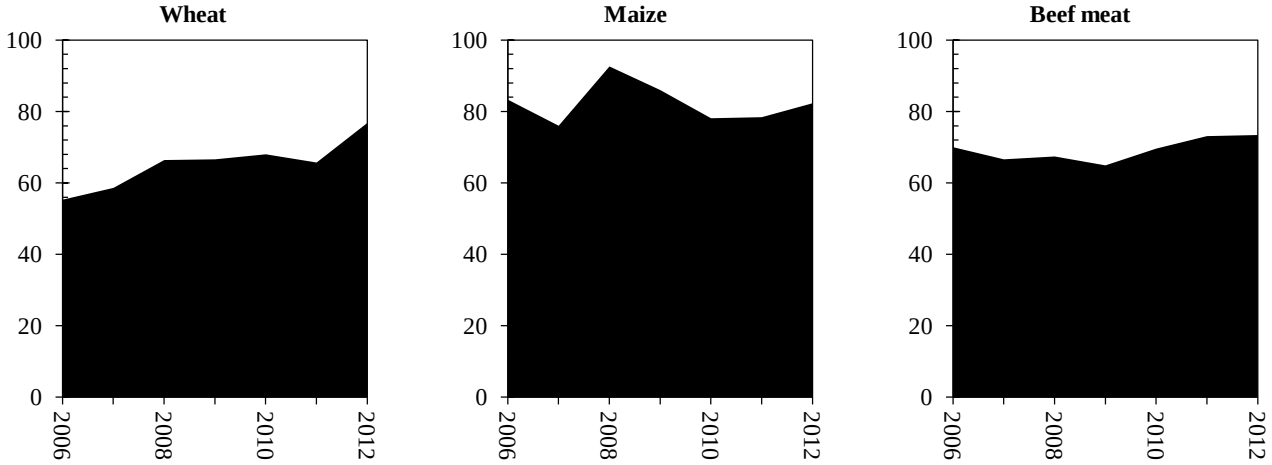
Table 1. Area, production and yield of the selected agricultural commodities

Item	Area ('000 ha)		% of cereal area		Production ('000 tons)		Yield	
	2006	2012	2006	2012	2006	2012	2006	2012
Wheat	68.6	102.9	62.4	75.0	239.5	345.0	3.5	3.4
Maize	36.1	31.2	32.9	22.7	138.2	86.3	3.8	2.7
Barley	2.1	0.6	1.9	0.4	6.1	1.8	3.0	3.2

Source: Own elaboration based on the data of MAFRD (Green report, 2013)

Indispensible role on ensuring food security is attributed to the agricultural sector. Food availability is one of the basic pillars of the food security, and contribution of agriculture at this level remains crucial. In the case of developing countries, such as Kosovo, sufficiency of the agricultural production lacks behind the desired projections. Insufficiencies of agricultural production in meeting domestic demand tend to expose such economies to the external risks. Referring to the latest data from 2012, Kosovo satisfies 76% of domestic demand for wheat, while 24% is imported from the global market (Figure 3). Within the observed period (2006-2012) Kosovo improved self-sufficiency ratio in meeting domestic demand of wheat for about 20%. Such an outcome conveys positive signal, particularly taking into account that Kosovo is characterized as a "bread-eating country"(Lingard, 2003), where wheat is the main food staple. During the same period, maize self-sufficiency ratio remained relatively consistent at the level of 82%, despite the decrease in quantitative terms. Kosovo is self insufficient also in meeting domestic demand for meat; about a quarter of the domestic meat demand is covered from the imports. Group of the selected cereal crops made up 98% of the cultivated cereal area, with the clear domination of the cultivated area by wheat (75%). During the observed period (2006-2012) we find the evidence of expansion of the agricultural area cultivated with wheat, and contraction of the area for the other cereals (maize and barley) (Table 1). After all, we might assume that Kosovo suffers acute shortage in meeting domestic demand of the key agricultural commodities. As a net agricultural importer, Kosovo is qualified as country vulnerable to the risk of price transmission from the global agriculture market.

Figure 3: Self-sufficiency ratio of selected food commodities



Source: Own elaboration based on the data of MAFRD (Green report, 2013)

2. LITERATURE REVIEW

Historically, analyses of the spatial price transmission were applied during the last 60 years, pioneered with an equilibrium model for spatial price equilibrium introduced by Enke (1951), Samuelson (1952) and Takayama and Judge (1971). However, relationship between price transmission and market integration has attracted considerable attention in the past 50 years (Amikuzuno and Ogundari, 2012). At the heart of analysis of horizontal price transmission is the spatial arbitrage and the consequent Law of One Price (LOP), assuming that between two spatially separated markets change in one price is utterly and instantly transmitted to the other price (McNew, 1996; Rapsomanikis *et al.*, 2003; Lisorti and Esposti, 2012) therefore both markets will have ultimately a unique price (Brown *et al.*, 2012). Theoretically, models of horizontal price transmission reveal that, if two markets are associated by trade in a free market regime, excess demand or supply shocks in one market will have an equal impact on price in both markets (Rapsomanikis *et al.*, 2003).

Over the time, price theory has gained an important role in the neoclassical economics, particularly in connection to the resource allocation and market integration (both vertically and horizontally). Integrated markets allow for efficient transmission of price signals and prevent market inefficiencies. In contrary, markets that are not integrated can convey inaccurate price information, leading to misguided policy decisions (Alam and Begum, 2012).

Literature on spatial price transmission (Sexton *et al.*, 1991; Conforti, 2004) guides on the group of factors affecting the price transmission process and market integration, such as transport and transactions costs, imperfect competition, exchange rates, trade barriers, and domestic policies.

Price transmission studies are considered to have theoretical and applied value. Theoretical relevance lays on its strength to drive resource allocation and market integration, while the applied value is based on the achieving distributional balance between food deficit and surplus regions (Amikuzuno and Ogundari, 2012). Price transmission studies were strongly motivated by the belief that co-movement of prices in different markets can be interpreted as a sign of efficient (competitive) markets, while lack of co-movement is an indication of market failures (Minot, 2011). Relevant issue in this context is distinction between short run and long run price transmission. Under the occurrence of the price difference between two markets, arbitrage activities aims to trigger a reversion process which drives prices to their long term equilibrium relationship (Ganneval, 2015). The speed by which prices adjust to their long run relationship is critical in understanding the extent to which markets are integrated in the short run (Rapsomanikis *et al.*, 2003). Particular interest in the price transmission process is devoted to the asymmetry, aiming to identify whether the prices are increasing or decreasing (Meyer and von Cramon-Taubadel, 2004). Most of research on price transmission exploits sophisticated time series econometric analysis techniques, testing for the co-movement of prices. These techniques which include cointegration and error correction models, became standard tool for analysing spatial market relationships (Rapsomanikis *et al.*, 2003), replacing earlier traditional techniques, such as the correlation coefficient and regressions (Minot, 2011).

Implications of the spatial price transmission on the food security are relevant, but ambiguous. The broad prospect driven by the development economics theory suggests that in open economies free trade has a mitigating effect in the importing countries. However, events from the recent years were showing that open economies are also endangered from importing world price shocks. Large price increases over a short time period were aggravating situation of food security (Brown *et al.*, 2012), particularly in developing countries (Minot, 2011). Baquedano and Liefert (2014) highlight that the world price transmission shocks into domestic markets were distressing consumers' real income, bringing many households into poverty and driving poorer households into hunger and malnutrition. Therefore it is relevant to understand the degree to

which vulnerability of the food prices within developing countries is driven by the world price fluctuations. In this context, Cudjoe *et al.* (2010) indicates that impacts of surging food prices are country specific and mostly depend on macroeconomic conditions, net international trade position, and food production and consumption patterns. Moreover, Cudjoe *et al.* (2010) stress out that negative effects of the price shocks are expected to be smaller for those households whose consumption is met by own production then for the households that relay in food purchases from market.

Agricultural market integration remains a fundamental issue in the current global discussion on trade liberalization, price policy and the process of agricultural reforms in the developing countries (Sekhar, 2012). The recent global food crisis has shaken confidence in the reliability of world food markets. As the response, in affected countries, it has renewed interest in food self-sufficiency, trade barriers, and grain reserves (Minot, 2011). Benson *et al.* (2013) suggest that there are three categories of policy actions in mitigating problems arising from higher food prices. Fistly, the short terms actions (such as reduction of consumption taxes, food price controls, export bans or release of food reserve stocks) aiming to reduce domestic food prices. Secondly, the long term policy actions targeting increase of the domestic food production and supply (such as input subsidies or price support for domestic farmers). And third category of policy actions aiming to strengthen social protection programs for the vulnerable social groups (such as food rations, food or cash for work, and cash transfer programs).

Interest of the policy makers to associate price changes and transmission process from the world to the domestic agricultural markets recently provoked large body of research particularly in developing countries (Baquedano and Liefert, 2014; Mofya-Mukuka and Abdulai, 2013; Götza *et al.*, 2013; Akpan *et al.*, 2014). Protectionist agricultural policy instruments such as import tariffs, tariff quotas and export subsidies or taxes were adopted in order to mitigate harming effects of the international price transmission. Research findings from Mitra and Josling (2009), Minot (2011) and Götza *et al.* (2013) highlight that rising number of exporting countries responded to rising food prices, by restricting grain exports in order to keep prices low within domestic food market. According to Mitra and Josling (2009) only in the case of wheat, about 15 countries restricted exports in during the period of price spikes (2007-2008), including large wheat exporters such as Argentina, Russia, and Ukraine.

2.1 Agriculture and trade policy in Kosovo

Food commodities have a dominant position on the structure of import in Kosovo since the early post-war period of 1990s. About a quarter (22-25%) of the total imports constitutes food imports (MTI, 2009). From the governmental policy perspective, there are no facts of the adoption of any short run restrictive trade measures during the period of food price volatility evidenced in this study. The main axis of the food trade policy in the case of Kosovo are melted within the agricultural policy and seems to target long term objectives, such as improving agricultural productivity and competitiveness of domestic farmers, increase of the food self-sufficiency, import substitution, generating employment in agriculture sector etc. In achieving such objectives, Kosovo governmental program 2011-2014 (Government of Kosovo, 2011) set up priorities suggesting an increase of budgeting resources for agricultural sector up to 3% of the governmental budget, establishment of the subsidy scheme through direct payments for domestic farmers, access to favourable credits and loans for domestic farmers, investment on infrastructure (such as irrigation system) and technical assistance in promotion of the agricultural export. Moreover, Kosovo agricultural policy (MAFRD, 2015a) targets specifically support of agricultural sectors (mainly labour intensive sectors) in which Kosovo has comparative advantage, such as: fruits and vegetables, milk and meat, grapes and eggs. These agricultural sectors were perceived to have a job-creation potential that is particularly important in the Kosovo where the

high unemployment remains the key socio-economic constraint. In terms of the farmers' subsidy scheme, the MAFRD Program for the farmers direct payments (MAFRD, 2015b) suggests that direct payments for cereals (wheat and maize) are 150 euro per hectare. While the subsidies in form of direct payments for meat producers varies between 30 euro per head of bovine cow and 15 euro per head of sheep.

3. METHODS AND MATERIALS

We apply time-series modeling techniques to evaluate horizontal price transmission from world market to Kosovo and vice versa. In this study an asymmetric error correction model is employed to quantify the extent, speed and nature of price adjustment.

As the first step, we test the stationarity of time series using two unit root tests: the Augmented Dickey-Fuller (ADF) test and the Phillips-Perron (PP) test. The number of lags of a dependent variable is determined by the Akaike Information Criterion (AIC). If both time series are not stationary, they are suitable to test for cointegration relationship between them. We employ the Johansen approach to test for cointegration.

The Johansen approach starts with a vector autoregressive model and reformulates it into a vector error correction model:

$$Z_t = A_1 Z_{t-1} + ... + A_k Z_{t-k} + \varepsilon_t \quad (1)$$

$$\Delta Z_t = \sum_{i=1}^{k-1} \Gamma_i \Delta Z_{t-i} + \Pi Z_{t-k} + \varepsilon_t \quad (2)$$

where Z_t is a vector of non-stationary variables (producer and consumer prices), A are different matrices of parameters, t is time subscript, k is the number of lags and ε_t is the error term assumed to follow i.i.d. process with a zero mean and normally distributed $N(0, \sigma 2)$ error structure. The estimates of Γ_i measure the short-run adjustment to changes in the endogenous variables, while Π contains information on the long-run cointegrating relationships between variables in the model.

The above cointegration tests assume symmetric price transmission. In order to capture asymmetric movements in the residuals, Enders and Granger (1998) and Enders and Siklos (2001) propose to use threshold cointegration approach. Assuming the long run relationship between two nonstationary variables X and Y

$$Y_t = \lambda_0 + \lambda_1 X_t + \mu_t \quad (3)$$

where μ is the error term. Engle and Granger (1987) show, that cointegration exists if the null hypothesis $\rho=0$ is rejected in:

$$\Delta\mu_t = \rho\mu_{t-1} + \xi_t \quad (4)$$

where ξ is the error term for the residuals. Adjustment of the series of residuals expressed in $\rho\mu_{t-1}$ would be symmetric. To capture the assymetry in adjustment process, a two-regime threshold cointegration approach should be used:

$$\Delta\mu_t = I_t \rho_1 \mu_{t-1} + (1 - I_t)\rho_2 \mu_{t-1} + \xi_t \quad (5)$$

where I_t is the Heaviside indicator $I_t=1$ *if* $\mu_{t-1} \geq \tau$ or $I_t=0$ *if* $\mu_{t-1} < \tau$. If μ_{t-1} is bigger than the threshold τ, then adjustment is at the rate ρ_1. If μ_{t-1} is smaller than the threshold τ, adjustment is shown in ρ_2. When $\rho_1=\rho_2$, then the adjustment process is symmetric. If the null hypothesis $\rho_1=\rho_2=0$ is rejected, then X and Y are cointegrated and the following TAR model is estimated:

$$\Delta Y_t = \theta_Y + \delta_Y^+ E_{t-1}^+ + \delta_Y^- E_{t-1}^- + \sum_{j=1}^{J} \alpha_{Yj}^+ \Delta Y_{t-j}^+ + \sum_{j=1}^{J} \alpha_{Yj}^- \Delta Y_{t-j}^- + \sum_{j=1}^{J} \beta_{Yj}^+ \Delta X_{t-j}^+ + \sum_{j=1}^{J} \beta_{Yj}^- \Delta X_{t-j}^- + \upsilon_{Yt} \quad (6)$$

where ΔY_t and ΔX_t are dependent and independent variables in their first differences, E is the error correction term, δ represents the speed of adjustment coefficients of ΔY_t if Y_{t-1} is above and below its long-run equilibrium, θ, δ, α and β are coefficients and υ is the error term, t is time subscript and j is the number of lags.

Two error correction terms are defined as:

$$E_{t-1}^{+} = I_t \mu_{t-1} \tag{7}$$

$$E_{t-1}^{-} = (1 - I_t)\mu_{t-1} \tag{8}$$

Enders and Granger (1998) and Enders and Siklos (2001) proposed also a model for cointegration, known as momentum threshold autoregressive model. The term "momentum" describes the rate of acceleration of prices and takes into account steep variations in the residuals; it is especially valuable when the adjustment is believed to exhibit more momentum in one direction than the other. Heaviside Indicator in this case is $I_t=1$ *if* $\Delta\mu_{t-1} \geq \tau$ or $I_t=0$ *if* $\Delta\mu_{t-1} < \tau$.

Threshold error correction models were used for example by Goodwin and Holt (1999); Goodwin and Harper (2000); Goodwin and Piggott (2001); Abdulai (2002); Serra and Goodwin (2003); Gonzales *et al*. (2003); Vavra and Goodwin (2005); Liao and Sun (2011) or Ning and Sun (2012). Abdulai (2000, 2002) used both TAR and M-TAR models and found out, that the M-TAR models fit data better than the others.

To summarize, four asymmetric models are considered in our study. They are threshold autoregression model with threshold value equal to zero; threshold autoregression model with threshold value estimated (consistent threshold autoregression model); momentum threshold autoregression model with threshold value equal to zero; and consistent momentum threshold autoregression model with threshold value estimated. A model with the lowest AIC and BIC will be used.

3.1 Data

Assessment of the spatial price transmission here is based on the monthly time series data for the key agricultural commodities (wheat, maize, barley, beef meat, and chicken meat). Monthly price data for Kosovo are obtained from the Kosovo Agency of Statistics (KAS) and cover the period January 2005 to December 2012. At the same time, the world prices of the same agricultural commodities were extracted from the World Bank (World Global Economic Monitor (GEM) Commodities). Two main reasons were driving selection of the group of commodities we assess here, data availability and their importance on the food diet in Kosovo. Empirical assessment is based on the relative prices obtained from abovementioned data sources. Kosovo prices were denominated in EUR, while the world prices in USD. The current exchange rate from ECB (European Central Bank) is used to convert world prices in EUR. Specification of the world price data from the World Bank are described as follows:

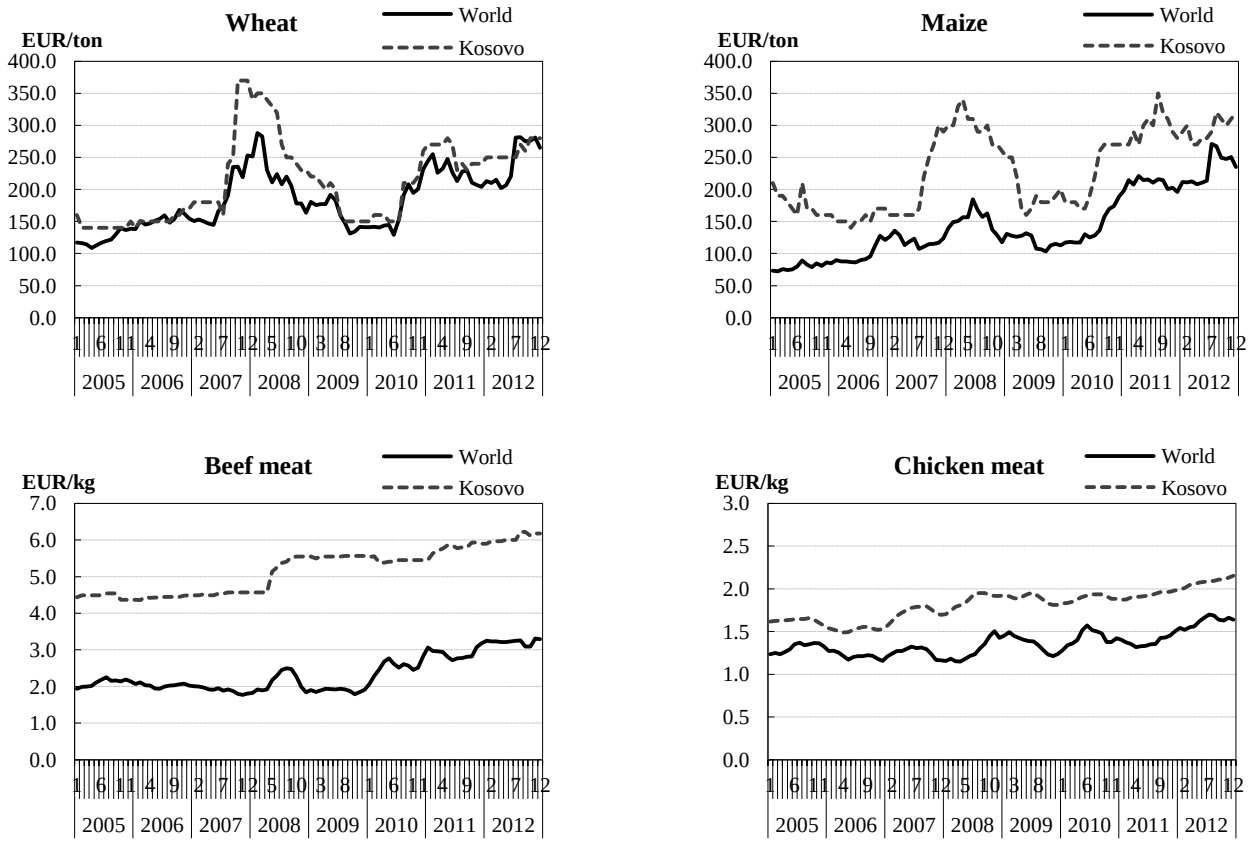
- Wheat (No.1 Hard Red winter, fob Gulf of Mexico),
- Maize (No. 2, yellow, f.o.b. US Gulf ports),
- Barley (No.1 Western, Canada),
- Beef (Japan, beef import price, cif, chilled beef cuts),
- Poultry (Brazil, export value for chicken, fob).

4. RESULTS

4.1. Price development of the selected agricultural commodities

Time period covered here highlights the strong price fluctuations and high volatility. The first wave of agricultural price volatility (both in the world and Kosovo) took place at the end of 2007. Such price development can be attributed to the impact of the global crisis. The second wave of the price volatility is recorded in the mid of 2010. This is particularly true for the group of cereal commodities (wheat and maize). Price development of the agricultural commodities in Kosovo followed the world price trends. However, despite the analogous price movements there is an evidence of the price gap, particularly in the case of maize and beef meat. At this stage, due to the lack of reliable source of information, we were not able to distinct whether such price differences were determined by the transport costs, profit margin, taxes or other market factors (Figure 3).

Figure 3: Price development for selected agricultural commodities (World and Kosovo)



Source: Own elaboration based on the data of KAS and World Bank (GEM)

4.2. Testing the stationarity of time series: ADF test and Phillips Perron test

As the initial step of our empirical approach we test the stationary of time series using two unit root tests: Augmented Dickey-Fuller (ADF) test and the Phillips-Perron (PP) test. Results of the tests (Table 2 and 3) confirm that all our time series are non-stationary. We stationarized them by taking first differences. The tests indicate that all variables are stationary in first differences. The lags of the dependent variable in the tests were determined by Akaike Information Criterion (AIC).

Table 2. Augmented Dickey Fuller test results

	Level		1st Diff	
	ADF_c	ADF_t	ADF_c	ADF_t
World				
Wheat	-1.586	-2.243	-7.171***	-7.141***
Maize	-1.405	-2.437	-5.790***	-5.770***
Barley	-1.543	-1.985	-7.085***	-7.076***
Beef	-1.043	-2.379	-5.735***	-5.745***
Chicken	-1.735	-2.857	-5.630***	-5.610***
Kosovo				
Wheat	-1.965	-2.275	-5.453***	-5.425***
Maize	-1.619	-2.230	-9.682***	-9.637***
Barley	-0.625	-2.244	-10.120***	-10.219***
Beef	-0.310	-2.212	-8.633***	-8.610***
Chicken	-0.529	-2.527	-4.331***	-4.366***

Note: ADF_c is the ADF with an intercept and ADF_t with an intercept and a deterministic trend.
*,**,*** denote significance at the 1%, 5% and 10% significance levels.
Source: Own elaboration

Table 3. Phillips Perron test results

	Level		1st Diff	
	PP_c	PP_t	PP_c	PP_t
World				
Wheat	-1.546	-2.167	-8.459***	-8.426***
Maize	-1.340	-1.903	-8.353***	-8.332***
Barley	-1.602	-1.928	-7.920 ***	-7.923***
Beef	-0.825	-2.020	-6.132***	-6.140***
Chicken	-1.324	-2.343	-6.430***	-6.423***
Kosovo				
Wheat	-1.833	-2.030	-8.961***	-8.926***
Maize	-1.539	-2.199	-9.682***	-9.637***
Barley	-0.726	-2.287	-10.120***	-10.219***
Beef	-0.315	-2.024	-8.633***	-8.610***
Chicken	-0.531	-2.267	-4.381***	-4.394***

Note: PP_c is the PP with an intercept and PP_t with an intercept and a deterministic trend.
*,**,*** denote significance at the 1%, 5% and 10% significance levels.
Source: Own elaboration

4.3. Threshold cointegration

Threshold cointegration models allow for non-linear relationship between world and local prices and vice versa. The theory does not guide us in the exact model specification and therefore we used four different threshold models: threshold autoregression model, consistent threshold autoregression model, momentum threshold autoregression model, and consistent momentum threshold autoregression model. Here we report the results for models with the lowest AIC and BIC (Table 4).

Table 4. Threshold cointegration test results

	Model	*Threshold*	*Lags*	ρ_1	ρ_2	$\Phi(H_0:\rho_1=\rho_2=0)$	$F(H_0: \rho_1=\rho_2)$
Wheat	cMTAR	-1.067	0	-0.250***	-0.585***	12.886***	4.154**
						[0.001]	[0.048]
Maize	cMTAR	0.538	0	-0.299***	-0143*	7.030***	1.646
						[0.009]	[0.086]
Barley	cMTAR	0.311	0	-0.195***	-0.033	3.668**	3.153*
						[0.029]	[0. 079]
Beef	cMTAR	-1.603	2	-0.027	-0.185***	4.509**	4.795**
						[0.014]	[0.031]
Chicken	cMTAR	-4.872	2	-0.037	-0.194***	4.428**	3.929*
						[0.015]	[0. 051]

Note: *,**,*** denote significance at the 1%, 5% and 10% significance levels, with P values in the brackets
Source: Own elaboration

According to threshold cointegration tests, there is a strong evidence of cointegration relationship between world and local prices. As seen from the results, the pairs of prices that have not proved to be cointegrated with the Johansen test (Table 5) are cointegrated with threshold adjustment. This means that Enders and Granger model with threshold fits data better. From the tests it also follows that there is strong evidence of asymmetry for world and local prices of wheat and beef and weak evidence of asymmetry for barley and chicken. Note that the absolute value of the speed of adjustment of positive price deviations in case of maize and barley is higher (lower in case of wheat, beef and chicken) than the speed of adjustment of negative price deviations. Deviations from long-term equilibrium resulting from price increases (above the threshold) in world maize and barley market would be more persistent compared to price deviations resulting from price decreases (below the threshold).

Table 5. Johansen cointegration test results

	Rank	**Johansen trace statistics**
Wheat	0	12.965
	1	4.084
Maize	0	10.677
	1	2.187
Barley	0	13.609
	1	1.701
Beef	1	9.152
	0	3.795
Chicken	1	13.980
	0	2.270

Note: *,**,*** denote significance at the 1%, 5% and 10% significance levels.
Source: Own elaboration

Because there is strong evidence of cointegration relationship between world and local prices we have estimated error correction models (Table 6) for these commodities following the equation 6. As seen from the results, most of the short term adjustments and error correction terms are not significantly different from zero. The best fitting are the models for wheat and maize. The point estimates of the coefficients for the error correction terms in Kosovo are negative as expected and significantly different from zero. It implies that prices in Kosovo react with somewhat different speed to positive and negative deviations. On the other side world prices do not react to shocks in Kosovo prices.

Table 6. Results of the asymmetric error correction model with threshold cointegration

	Wheat		**Maize**		**Barley**		**Beef**		**Chicken**	
	World	Kosovo	World	Kosovo	World	Kosovo	World	Kosovo	World	Kosovo
(Intercept)	-0.674	-0.323	5.043**	0.227	0.720	0.200	2.249	0.608	-2.013	1.971*
X.diff.world.t_1.pos	0.100	0.030	-0.197	0.044	0.043	-0.004	0.015	-0.006	0.595***	0.042
X.diff.world.t_2.pos	-0.145	0.007	-0.397**	-0.031	-	-	0.245	-0.028	0.121	0.182
X.diff.world.t_3.pos	0.043	-0.010	-0.011	-0.031	-	-	-	-	0.337*	-0.077
X.diff.world.t_4.pos	0.279	0.064**	-	-	-	-	-	-	-	-
X.diff.world.t_1.neg	-0.202	0.040	-0.101	-0.024	0.109	-0.041	0.387*	0.026	0.169	0.129
X.diff.world.t_2.neg	-0.278	-0.033	0.095	0.040	-	-	-0.132	0.015	-0.367**	0.001
X.diff.world.t_3.neg	-0.171	0.030	-0.188	-0.013	-	-	-	-	-0.185	0.108
X.diff.world.t_4.neg	-0.183	0.040	-	-	-	-	-	-	-	-
X.diff.domestic.t_1.pos	1.793*	0.105	0.071	0.027	-0.315	0.075	-1.539**	-0.080	0.140	0.487***
X.diff.domestic.t_2.pos	-0.562	0.107	-1.049	0.121	-	-	-1.475**	-0.016	-0.197	-0.081
X.diff.domestic.t_3.pos	-2.308**	-0.149	-0.615	0.249	-	-	-	-	-0.251	-0.620***
X.diff.domestic.t_4.pos	1.370	0.250*	-	-	-	-	-	-	-	-
X.diff.domestic.t_1.neg	1.138	-0.075	-0.133	0.101	-0.819	0.260	-0.977	0.019	0.600**	0.640***
X.diff.domestic.t_2.neg	1.575	0.207	1.799*	0.236	-	-	0.126	0.002	0.275	-0.274
X.diff.domestic.t_3.neg	3.639**	0.042	2.019**	0.128	-	-	-	-	0.056	-0.060
X.diff.domestic.t_4.neg	0.739	-0.241	-	-	-	-	-	-	-	-
X.ECT.t_1.pos	0.752	-0.074	0.233	-0.270**	0.284	-0.240	0.110	0.000	0.106*	0.032
X.ECT.t_1.neg	-0.746	-0.679***	0.626	-0.088	-0.059	-0.021	0.320	-0.100*	0.276***	0.070
R-squared	0.288	0.473	0.216	0.161	0.025	0.112	0.221	0.064	0.464	0.478
Adj-R2	0.113	0.343	0.075	0.011	-0.041	0.052	0.127	-0.049	0.368	0.384

Source: Own elaboration

5. CONCLUSIONS

The main findings of this paper were showing that Kosovo is significantly exposed to the food security risks. Relevant food security risk factors indentified here involve: existence of high degree of the poverty prevalence, high unemployment accompanied with the low level of incomes, high share of food expenditures in total consumption coupled with sharp food trade deficit. In support to such findings, comparative estimations were determining Kosovo as self-insufficient in meeting domestic demand for food. Self-sufficiency ratios of the key agricultural commodities observed here served as a proxy in defining the state of food availability at the national level. Despite its potential to contribute on national food security, contribution of agricultural sector at this level remains weak and neglected from the governmental institutions. Underinvestment and non-supportive environment turned domestic agricultural producers into non-competitive actors towards heavily subsidized EU imports. Food security in the case of Kosovo furthermore is affected by the prevalence of poverty. One out of three individuals in Kosovo copes with the budget constraint less the 2$, while one out of ten lives in extreme poverty (less then 1.2$).

On the other hand, empirical estimates confirmed close relationship between world and domestic market, especially in case of maize and barley. Storage and transportation of these commodities is not very demanding and there are not significant market barriers which would prevent price transmission process. In cases, where was identified presence of price transmission process was also investigated symmetry of this process. Investigation proved there is strong evidence of asymmetry for world and local prices of wheat and beef and weak evidence of asymmetry for barley and chicken. Based on the results of the error correction models for these commodities it can be concluded that that prices in Kosovo react with somewhat different speed to positive and negative deviations, while world prices do not react to shocks in Kosovo prices.

In conclusion, Kosovo as a small country is a “price taker” in the global trade, therefore implications of the food price volatility from the global market into the domestic agricultural commodity markets, were clearly and empirically evidenced. Spatial price transmission analysis found that Kosovo is vulnerable to the price transmitting signals from the world market. Based on the empirical findings, it is very difficult to policy-respond under the current conditions of the liberalized trade regime. Indeed, Kosovo is a part of EU preferential autonomous trade measures (ATMs) and part of the regional Central European Free Trade Agreement (CEFTA) and most of the Kosovo imports have their origin from the EU and neighbouring CEFTA member states. Furthermore, Kosovo has limited budgetary resources to undertake robust socially driven policies in order to respond on the transmitting effects global food price hikes. In the short run, safety nets may serve as attractive policy instrument to mitigate the impact of the transmitted high prices. But in the long run, the policy actions should incentivize farmers and consumers in order to respond to market signals. This should be achieved through continuous investments in agriculture sectors in which Kosovo has comparative advantage. This in turn will lead on improvement of productivity, food self-sufficiency and competitiveness of the local farmers. Protectionist driven trade policies in the case of Kosovo would generate negative price effects.

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