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Evidence of Spatial Price Transmission in the Case of Kosovo

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Abstract

This study is focused on the analysis of spatial price transmission and market integration of Kosovo agricultural markets with world and EU markets. The paper employs asymmetric error correction model to quantify the extent, speed and nature of price adjustment for the long-run relationship between Kosovo, world and EU agricultural commodity prices. Monthly price data for key cereals (wheat, maize, barley) and beef meat covering the period 2004-2016 are used. Main findings of the study suggest that Kosovo is vulnerable to price transmitting signals from world and EU markets. Empirical results reveal evidence of asymmetry between Kosovo and world prices and signify stronger long-run relationship with the EU prices. Kosovo agricultural markets reacts to positive and negative price deviations, while world and EU prices do not respond on Kosovo price shocks. Kosovo as a price taker and as a country heavily reliant on agricultural and food imports has limited policy instruments to mitigate transmission of global price vulnerability. Under the current liberal trade regime with the regional and EU countries, any trade restrictive actions would have harming welfare effects on domestic consumers. Findings of this study contribute to agricultural and trade policymakers dealing with food prices and food security.

Keywords

Agricultural trade, price transmission, Kosovo, food prices, error correction model.

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Introduction

After three decades of falling real agricultural prices the situation reversed around year 2000 when prices started to grow significantly reaching peak in 2007 and later in 2011. Since then real agricultural prices declined but still remain higher than before year 2000. Furthermore, international agricultural markets became more volatile creating price shocks to consumers and producers (European Commission, 2008; Irwin and Good, 2009). Global agricultural prices and fluctuations are transmitted horizontally to national markets which impacts domestic food security, welfare and agricultural markets. Many countries adopted specific agricultural and trade policies to insulate themselves from volatility of world agricultural markets, which in the end exacerbated price volatility (Tangermann, 2011).

Importing high and volatile world prices into domestic markets affects among others consumers' real income and as a consequence many households fall into poverty, hunger, and malnutrition. Sharp price spikes over a short time period caused aggravating situation of food security (Minot, 2011; Baquedano and Liefert, 2014). Volatile prices enhance risk to farmers which reduces their welfare. As a result of the recent food crisis, additional 150 million people fell into the pool of more than a billion food insecure people worldwide (Dawe et al., 2015).

From the food and agricultural policy perspective, it is essential to understand the extent and speed to which domestic prices in developing and transition countries are affected by fluctuations in world markets. Transmission of world to domestic prices is an important characteristic of market integration and of the relationship between food-deficit and food-surplus areas (Goodwin, 2006; Abdulai, 2007). Information on horizontal price transmission is relevant in designing policy platform for potential government interventions. Recent price shocks

motivated more than 40 countries to impose export restrictions on key food staples (Liefert and Wescott, 2016). These government interventions reduced welfare (i.e. Abbott, 2012; Götz et al., 2013; An et al., 2016) both at a country level and globally.

This paper studies price transmission from world (EU) to Kosovar national agricultural markets. Kosovo is a small transition country heavily dependent on food imports from the world markets. Furthermore, Kosovo suffers from significant food insecurity problems. About a third of total population (29.2 percent) lives with less than 2$ per day and more than 10 percent of the Kosovar population suffer from extreme poverty (World Bank/KAS, 2011). Most of the rural households rely on their own production of food. The share of food expenditures reaches about 40 percent of total expenditures of households (Latruffe and Desjeux, 2014). High dependence on food imports combined with significant poverty rate and food insecurity make Kosovo vulnerable to transmitting high prices and volatility from international markets.

The main objective of the paper is to quantify effects of horizontal price transmission from the world and EU markets into the domestic agricultural markets in Kosovo. We employ price transmission analysis for wheat, maize, barley and beef meat, which are main agricultural commodities in Kosovo. Monthly time series for the period 2004-2016 are utilized to estimate asymmetric error correction models.

The structure of the paper is organized as follows. Section 2 presents overview of previous studies, with special reference on developing economies. This section also provides information on cereal and meat market characteristics in Kosovo. In section 3 we introduce methodology and estimation strategy in measuring effects of spatial price transmission. Section 4 reports results and discusses findings, while in the final section we draw conclusions and make recommendations.

Literature review

A large number of studies examined the issue of spatial price transmission for selected commodities within a single country (Goodwin et al., 1999; Myers and Jayne, 2012; Burke and Myers, 2014; Ganneval, 2016) or commodity price transmission from world to domestic markets (Rapsomanikis et al., 2006; Dawe, 2009; Minot, 2011; Esposti and Listorti, 2013; Ianchovichina et al., 2014; Baquedano and Liefert, 2014; Ceballos et al., 2017). These studies provided information on extent and speed of price transmission and efficiency of the markets. Empirical findings of these studies are particularly relevant for policymakers in developing and transition economies where expenditures on food are high.

While spatial price transmission has been investigated in a number of transition countries from Central and Eastern Europe and Central Asia (e.g. Götz et al., 2013 for Russia and Ukraine; Clark et al. 2015 for Czech Republic; Bakucs et al., 2015 for Hungary and Slovenia; Ilyasov et al., 2016 for Tajikistan; Bobokhonov et al., 2017 for Tajikistan and Uzbekistan, Rajcaniova and Pokrivcak, 2013 for Slovakia), studies on South Eastern European (SEE) transition countries are limited. Some exceptions are studies on Macedonian tomato market integration with neighbouring countries (Jordanov et al., 2013) and a study on effects of Serbian governmental intervention on the domestic wheat market during the period of recent food crisis (Djuric et al., 2011). This gap in literature presents significant challenge for SEE countries which are negatively exposed to transmission of price shocks from international markets.

Kosovo is a small and open market economy that is relatively well-integrated into global markets. Recently Kosovo reported significant yearly GDP growth rates of about 5 percent. However, the country remains one of the poorest European economies suffering from exorbitant unemployment rate of 35 percent, particularly affecting the young people. About 12 percent of GDP of Kosovo comes from remittances from mainly EU countries. Remittances play an important role in poverty mitigation (Meyer et al., 2012; EFSE, 2014; Braha et al., 2017).

Kosovo is heavily reliant on imports of agricultural commodities (Sauer et al., 2012). Agricultural imports provide the only solution in meeting domestic demand, particularly for cereals, meat and dairy products. Agricultural imports form 22-25 percent of total imports. Due to the high proportion of agricultural imports and liberalized trade regime, local prices are determined by import prices (ARCOTRASS, 2006; MTI, 2009). Import prices have therefore significant impact on food security in Kosovo.

Materials and methods

Horizontal price transmission refers to price linkage between different markets spatially separated unlike vertical price transmission which

refers to price linkage between various stages of the supply chain. Theoretical foundation for empirical estimation of horizontal price transmission is the spatial arbitrage which leads to the workings of the Law of One Price (LOP). Most empirical works in this field, therefore, aim to assess whether the LOP holds true under specific conditions (Listorti and Esposti, 2012).

There are several reasons while the LOP may not hold (Conforti, 2004, Rezitis and Stavropoulos, 2010). First, spatial price arbitrage takes time and therefore there could be price differences between different markets in the short-term despite long-term price equilibrium. Second, transportation costs and transaction costs put a wedge between prices of the same product in different markets. Third, regulations including border regulations like tariffs, quotas or non-tariff measures prevent convergence of prices. Fourth, non-tradability of the product, imperfect competition or market failure like imperfect information can prevent the application of the LOP in practice.

Assuming the LOP holds, in two spatially separated markets the change in one price is instantly transmitted to the other price (Listorti and Esposti, 2012) therefore both markets will have ultimately a unique price (Brown et al., 2012). Models of spatial price transmission suggest 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).

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 decisions (Alam and Begum, 2012). Literature on spatial price transmission (Sexton et al., 1991; Conforti, 2004) determines factors affecting price transmission processes and market integration, such as transport and transactions costs, imperfect competition, exchange rates, trade barriers, and domestic policies.

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, whereas the lack of co-movement is an indication of market failures (Minot, 2011). Relevant issue in this context is the distinction between short and long run price transmission. Under the occurrence of price difference between two markets, arbitrage activities aim to trigger a reversion process which drives prices to their long-term equilibrium relationship (Ganneval, 2016). The speed by which prices adjust to their long run relationship is critical in understanding the extent to which markets are integrated and efficient in the short run (Rapsomanikis et al., 2003). Particular interest in the price transmission process is devoted to the asymmetry, aiming to identify whether price increases are equally transmitted to other markets as price decreases (Meyer and von Cramon-Taubadel, 2004). Previous research on price transmission exploits sophisticated time series econometric analysis techniques, testing for the co-movement of prices. These techniques include cointegration and error correction models. They became standard tool for analysing spatial market relationships (Rapsomanikis et al., 2003), replacing earlier traditional techniques, such as the correlation and regression analyses (Minot, 2011).

In our paper, we apply time-series modelling techniques to evaluate spatial 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.

Initially, 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 the 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:

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

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

where Z_t is the 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 εt 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 (4) would be symmetric. To capture the asymmetry 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 μt-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 (threshold autoregressive) model is estimated:

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

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:

$$E_{t-1}^+=I_t\mu_{t-1} \quad (7)$$

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

Enders and Granger (1998) and Enders and Siklos (2001) proposed also a model for cointegration, known as momentum threshold autoregressive model (M-TAR). 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 in 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); Serra and Goodwin (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 is used.

Empirical estimates of this study are based on the monthly time series for key agricultural commodities (wheat, maize, barley, and beef meat). Monthly price data for Kosovo are obtained from the Kosovo Agency of Statistics (KAS, 2017) and cover the period from January 2004 to December 2016. On the other hand, world prices for the same group of agricultural commodities were extracted from the World Bank (2017), respectively Global Economic Monitor (GEM) database. EU-28 prices were obtained from the European Commission - DG Agriculture and Rural Development (EC, 2017). EU prices are the prices received by European farmers for their commodities. These prices are in nominal terms and expressed in euro. Two main reasons determined selection of the group of commodities we assess in this paper: their importance on the food diet in Kosovo and data availability. Estimates in this study are based on relative prices. Kosovo and EU prices were denominated in euro, while the world prices in USD. We use monthly exchange rate from European Central Bank (ECB, 2017) to convert Kosovo and EU domestic prices to USD. Detailed information on variable definition and summary statistics are provided in Table 1.

Variable	Definition	Source	Mean	STD.	Min	Max
Wheat (World)	Wheat (US), no. 1, hard red winter, ordinary protein, export price delivered at the US Gulf port	World Bank	219.3	64.4	128.2	419.6
Wheat (EU)	Breadmaking common wheat, average market price and market stages, Reg. EC 1272/2009	EU Agri	224.8	68.7	133.4	406.6
Wheat (Kosovo)	Wholesale prices	KAS	274.5	87.3	165.0	543.4
Maize (World)	Maize (US), no. 2, yellow, f.o.b. US Gulf ports	World Bank	187.8	66.3	93.7	333.1
Maize (EU)	Feed maize, average market price and market stages, Reg. EC 1272/2009.	EU Agri	221.7	61.8	139.5	356.9
Maize (Kosovo)	Wholesale prices	KAS	315.8	87.9	178.8	535.5
Barley (World)	Barley, Canadian no.1 Western Barley, spot price	World Bank	162.4	48.3	85.4	265.7
Barley (EU)	Malting barley, average market price and market stages, Reg. EC 1272/2009.	EU Agri	204.5	60.4	129.6	349.1
Barley (Kosovo)	Wholesale prices	KAS	367.2	103.5	182.0	554.1
Beef (World)	Beef, Australian and New Zealand 85% lean fores, CIF U.S. import price	World Bank	3.5	0.9	2.1	6.0
Beef (EU)	Cow carcase (D), average fat cover, market price paid to supplier, Reg. EC 1249/2008, 1308/2013	EU Agri	3.3	0.5	2.2	4.3
Beef (Kosovo)	Wholesale prices	KAS	7.1	1.1	5.1	9.0

Source: KAS (2017), World Bank (2017) and EC (2017); own elaboration

Table 1: Variable definition and summary statistics.

Results and discussion

Price development during the time period covered in this study is characterized by strong price fluctuations and high volatility. The first wave of agricultural price volatility took place between 2007 and 2008. Such a price development can be attributed to the impact of the global food price resiliency. The second wave of price volatility is recorded between 2010 and 2011. This is particularly true for cereals (wheat, maize and barley). Similarly, prices of the observed commodities revived once again during the period 2012-2013 with the tendency to calm down in the following years. Interestingly, price development of agricultural commodities in Kosovo followed the world and EU-28 price trends. It indicates a significant degree of co-movement and subsequent similarity in the price volatility between the local and international prices. However, despite the analogous price movement there is evidence of a price gap, particularly in the case of maize, barley and beef meat. Main determinants describing differences between the world and domestic prices are influenced by transport costs and profit margin.

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

The stationarity tests showed that the original time series are non-stationary and can be used for cointegration analysis. Johansen cointegration test revealed that there are only two pairs of prices cointegrated between the world market and Kosovo market; however, the long run relationship between EU and Kosovo market was confirmed for all commodities analysed.

Threshold cointegration tests suggest that there is a strong evidence of cointegration relationship between the world and local prices as well as between the EU and local prices of all commodities. As seen from the results, the pairs of prices that have not proved to be cointegrated with the Johansen test are cointegrated with threshold adjustment. This means that Enders and Granger model with threshold fits our data better. From the tests, it also follows that there is weak evidence of asymmetry for world and local prices of wheat and beef. Asymmetric relationship between EU and local prices is highly significant for wheat and barley and weakly significant for other commodities. Thus, one can see that

the link between EU and Kosovo market is much stronger than the relationship between world and local prices. Note that the absolute values of the speed of adjustment of positive price deviations are lower for all cases (except for EU barley and Kosovo barley prices) than the speed of adjustment of negative price deviations. Thus, deviations from the long-term equilibrium resulting from price increases (above the threshold) would be less persistent compared to price deviations resulting from price decreases (below the threshold) Table 2 and 3).

	Rank	Johansen trace statistics	Trend specification	Lags
World - Kosovo				
Wheat	0	34.157	Restricted trend	2
	1	5.288***		
Maize	0	13.497	Restricted constant	2
	1	2.706		
Barley	0	24.270	Restricted constant	3
	1	6.956**		
Beef	0	14.312	Restricted constant	2
	1	3.195		
EU - Kosovo				
Wheat	0	21.083	Restricted constant	2
	1	8.626**		
Maize	0	33.400	Restricted constant	2
	1	7.366***		
Barley	0	29.277	Restricted constant	3
	1	8.937***		
Beef	0	20.452	Restricted constant	2
	1	4.898**		

Note: *,**,*** denote significance at the 1%, 5% and 10% significance levels.
Source: KAS (2017), World Bank (2017) and EC (2017); own elaboration

Table 2: Johansen cointegration test results.

	Model	Threshold	Lags	ρ_1	ρ_2	$\Phi(H_0;\rho_1=\rho_2=0)$	$F(H_0: \rho_1=\rho_2)$
World - Kosovo							
Wheat	cMTAR	-0.02	4	-0.059	-0.200***	5.404***	3.099*
						[0.005]	[0.080]
Maize	cTAR	-0.437	3	-0.079*	-0.202***	4.976***	2.111
						[0.009]	[0.149]
Barley	cMTAR	-0.012	3	-0.04	-0.084**	3.915**	1.022
						[0.022]	[0.314]
Beef	cMTAR	-0.004	1	-0.004	-0.105***	5.278***	5.543**
						[0.006]	[0.020]
EU - Kosovo							
Wheat	cMTAR	-0.045	3	-0.056	-0.430***	11.717***	14.327***
						[0.000]	[0.000]
Maize	cMTAR	-0.029	1	-0.043	-0.234***	7.813***	6.630**
Barley	cMTAR	0.048	3	-0.221***	-0.025	8.878***	11.479***
						[0.000]	[0. 001]
Beef	cMTAR	0.006	3	0.005	-0.072***	4.333**	3.867*
						[0.015]	[0.051]

Note: *,**,*** denote significance at the 1%, 5% and 10% significance levels, with P values in the brackets
Source: KAS (2017), World Bank (2017) and EC (2017); own elaboration

Table 3: Threshold cointegration test results.

Because there is strong evidence of cointegration relationship between the world and local, and EU and local prices, we have estimated error correction models for these commodities following equation (6). Results reveal that EU market is more influential than the world market from the short run as well as from the long run perspective. Presumably, negative and significant error correction terms of Kosovo prices show a tendency to come back to the long run equilibrium after the shock in world or EU market. Lastly, point estimates of coefficients for the error correction terms in Kosovo imply that prices in Kosovo react with somewhat different speed to positive and negative deviations.

Discussion and policy implications

Our results confirm a strong influence of international agricultural markets on Kosovar domestic prices. Domestic prices for key food staples, particularly wheat and maize, are extensively affected by world and EU markets. In the case of food deficit economies, such as Kosovo, consequences of absorbing international price shocks are usually translated into diminishing domestic welfare effects. As noted by McLaren (2015) adverse effects are particularly vigorous in the case of countries where subsistent farmers often live close to the poverty line.

During and after the period of the global food price shocks, governments in many developing countries pursued a wide range of policies in attempt to mitigate transmission of higher international prices to the domestic markets. Profound literature (Zorya et al., 2014; Baltzer, 2014) draws critical attention on governmental isolationist policy responsiveness during the recent global price shocks. Policy instruments, such as trade restrictions, import tariffs or export bans deterred transmission of price signals from international markets. For example, Götz et al. (2013) quantify effects of wheat export controls in Russia (export tax) and Ukraine (export quota) during the recent global food crisis. They find out reduction of the degree of integration of Russian and Ukrainian domestic markets into world wheat markets. Furthermore, negative market effects discouraged private investors, preventing Russia and Ukraine from maximizing their grain potential and contributing to global food security. Similarly, Djuric et al. (2011) estimate effects of Serbian government intervention on domestic wheat market during the period of food crisis. The authors demonstrate that export restrictions influenced negatively market equilibrium as well as domestic market stability. As a result, domestic wheat price increased above the world price level, despite the short-run decline of the wheat price. Baffes et al. (2017) provide evidence on adverse impact of Tanzanian export bans on its maize markets. The authors suggest that, comparatively to external factors, domestic restrictive policies exert a greater influence on Tanzanian maize markets. Porteous (2017) investigate effects of 13 short-term export bans on maize in the case of five countries in East and Southern Africa. According to the study export bans appear to increase prices and volatility in the implementing country, and therefore policy-makers should reconsider the use of bans for price stabilization purposes. Deuss (2017) suggests that impact of export restrictive policies during the recent commodity price spikes was not limited only to countries applying these measures, these policies influenced heavily consumer prices of importing partners too. Results of the study stress out long-lasting effects of export bans, despite their temporary nature. The author reveals that export bans have significantly higher aggravating effects on import reliant countries compared to self-sufficient countries.

Taking into account findings of this study, as well as empirical evidence from transition economies, we argue that policymakers in Kosovo have limited trade instruments to mitigate transmission of high prices from international markets. Firstly, Kosovo is a price taker in international agricultural markets. Secondly, Kosovo has liberalized trade regime with neighbouring region through CEFTA 2006 free trade agreement, as well as with EU common market through SAA (Stabilization and Association Agreement). Thirdly, net importer of food position of Kosovo significantly limits the use of border measures as their use would harm consumers and worsen food security situation in the country. Therefore, we recommend that Kosovo should intensify accomplishment of its development agenda, with special reference on incentives to improve agricultural productivity, restructure actual small and subsistent farms, provide know-how through establishment of extension institutions, and offer direct support to agricultural sectors in which Kosovo has comparative advantage. Lastly, social protection policies (such as income transfers and food safety nets), despite budgetary restrictions, should target in particular vulnerable social cohorts. Targeting support programs to the poor and vulnerable cohorts is essential to provide social protection without jeopardizing fiscal sustainability. Investing in safety nets before the laps of crisis allows their rapid and cost-efficient scale-up.

Conclusion

This study aims to provide empirical evidence for policymakers in the field of agricultural trade policy analysis. Kosovo is self-insufficient in meeting domestic demand for key food staples. Self-sufficiency ratios for key agricultural commodities served as a proxy to determine vulnerability of the food system in Kosovo. Despite its potential to contribute to national food security, actual contribution of agricultural sector at this level remains weak and neglected from governmental institutions. Underinvestment and non-supportive environment turned local farmers into non-competitive actors towards heavily subsidized EU imports.

Empirical estimates affirm close relationship between world and domestic market, especially in case of maize and barley. In cases with identified presence of price transmission process we also investigated symmetry of this process. We confirmed that there is strong evidence of asymmetry for world and local prices of wheat and beef and weak evidence of asymmetry for barley. Based on results of error correction models for these commodities it can be concluded that prices in Kosovo react with different speed to positive and negative deviations, while world prices do not react to shocks in Kosovo prices, as expected due to tiny size of Kosovo markets.

Kosovo as a small country is a price taker in the global trade, therefore transmission of food price volatility from world (and EU) markets into the domestic market has been empirically evidenced. Spatial price transmission analysis found that Kosovo is vulnerable to price transmitting signals from the international markets. Based on findings of this study, under the current conditions of the liberalized trade regime it is difficult for policies to respond adequately. Indeed, Kosovo is a part of EU preferential autonomous trade measures (ATMs) and part of the regional Central European Free Trade Agreement (CEFTA 2006) and most of the Kosovo imports have their origin from EU and CEFTA 2006 member states.

Furthermore, Kosovo has limited budgetary resources to undertake robust social and welfare improving policies to respond to transmitting effects of global food price shocks. In the short run, food assistance programs, food safety nets and income transfers might serve as attractive policy instruments to mitigate the impact of transmitted high prices. But in the long run, policy actions should incentivize farmers and consumers in order to respond to market signals. This should be achieved through continuous investments in agricultural sectors with comparative advantage. In the case of Kosovo, protectionist driven trade policies would generate negative price and welfare effects.

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Appendix

	Wheat		Maize		Barley		Beef	
	World	Kosovo	World	Kosovo	World	Kosovo	World	Kosovo
(Intercept)	-0.012	-0.037***	-0.006	0.034	-0.005	-0.004	0.005	0.003
X.diff.world.t_1.pos	0.256*	0.474***	0.249	0.175	0.364**	0.156	0.380***	-0.014
X.diff.world.t_2.pos	-0.271*	0.130	0.212	0.132n	-0.366**	-0.384**	-	-
X.diff.world.t_3.pos	-0.115	0.061	0.434**	-0.178	0.120	-0.316**	-	-
X.diff.world.t_4.pos	-0.138	0.279*	-	-	-	-	-	-
X.diff.world.t_1.neg	0.067	-0.024	0.309	-0.056	0.257*	-0.183	0.498***	0.081
X.diff.world.t_2.neg	-0.046	-0.093	0.008	0.558	-0.017	0.049	-	-
X.diff.world.t_3.neg	-0.148	0.057	-0.163	0.215	-0.162	-0.036	-	-
X.diff.world.t_4.neg	-0.050	0.116	-	-	-	-	-	-
X.diff.domestic.t_1.pos	0.352**	0.077	-0.075	0.213	0.076	0.460***	-0.091	0.161
X.diff.domestic.t_2.pos	-0.020	0.145	-0.015	-0.166	0.093	0.075	-	-
X.diff.domestic.t_3.pos	-0.001	-0.131	-0.018	-0.063	-0.031	0.136	-	-
X.diff.domestic.t_4.pos	0.372***	0.156	-	-	-	-	-	-
X.diff.domestic.t_1.neg	0.031	0.002	-0.046	0.087	-0.039	-0.132	-0.085	0.232
X.diff.domestic.t_2.neg	0.012	-0.053	0.043	-0.161	-0.091	0.054	-	-
X.diff.domestic.t_3.neg	-0.080	-0.174	0.027	0.348**	-0.007	0.098	-	-
X.diff.domestic.t_4.neg	0.039	0.067	-	-	-	-	-	-
X.ECT.t_1.pos	-0.115*	-0.144***	-0.102**	0.074	-0.060**	-0.081***	0.019	0.012
X.ECT.t_1.neg	-0.022	-0.182***	-0.038	0.326***	-0.010	-0.80**	0.123	-0.047

Source: own elaboration

Table A.1: Results of the asymmetric error correction model with threshold cointegration (World - Kosovo prices).

	Wheat		Maize		Barley		Beef	
	World	Kosovo	World	Kosovo	World	Kosovo	World	Kosovo
(Intercept)	-0.002	-0.020**	0.002	-0.010	0.004	-0.013	-0.003	-0.002
X.diff.world.t_1.pos	0.677***	0.697***	0.380**	0.370	0.716***	0.189	0.401**	0.033
X.diff.world.t_2.pos	-0.367**	-0.367	-	-	-0.195	-0.382	0.081	-0.011
X.diff.world.t_3.pos	0.206	0.577**	-	-	0.015	0.084	0.036	0.071
X.diff.world.t_4.pos	-	-	-	-	-	-	-	-
X.diff.world.t_1.neg	0.634***	0.381*	0.600***	0.020	0.574***	-0.120	0.515***	0.045
X.diff.world.t_2.neg	0.159	0.173	-	-	-0.095	-0.213	-0.030	-0.133
X.diff.world.t_3.neg	-0.110	-0.109	-	-	-0.022	-0.125	0.100	0.302*
X.diff.world.t_4.neg	-	-	-	-	-	-	-	-
X.diff.domestic.t_1.pos	0.166*	0.025	0.051	0.031	-0.112	0.450***	-0.150	0.113
X.diff.domestic.t_2.pos	-0.062	0.038	-	-	-0.127	0.060	-0.029	0.271
X.diff.domestic.t_3.pos	-0.068	-0.168	-	-	-0.227**	0.069	0.095	-0.080
X.diff.domestic.t_4.pos	-	-	-	-	-	-	-	-
X.diff.domestic.t_1.neg	0.024	-0.042	-0.012	-0.013	0.017	-0.036	-0.098	0.158
X.diff.domestic.t_2.neg	-0.233**	-0.135	-	-	0.009	0.059	-0.236	-0.053
X.diff.domestic.t_3.neg	0.055	-0.180	-	-	-0.020	0.078	-0.191	-0.181
X.diff.domestic.t_4.neg	-	-	-	-	-	-	-	-
X.ECT.t_1.pos	-0.017	-0.095*	-0.045	-0.138***	-0.079**	-0.283***	-0.050	-0.032
X.ECT.t_1.neg	-0.176**	-0.584***	-0.030	-0.265***	-0.027*	-0.058**	0.016	-0.058*

Source: own elaboration

Table A.2. Results of the asymmetric error correction model with threshold cointegration (EU - Kosovo prices).