Market Fundamentals and International Grain Price Volatility

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Abstract

Several studies, focused on the understanding of price volatility determinants in agricultural commodity markets, revealed that the joint influence of a plethora of causes is able to generate market instability. We investigate the contribution of endogenous and exogenous factors to global price volatility of four major grain (wheat, rice, corn, barley), adopting a Seemingly Unrelated Regression Equations model. We analyze global volatility, to conclude on short-run and long-run dynamics of markets instability. Our paper builds on existing literature by proposing a richer set of determinants of grain price volatility.

Keywords: Arbitrage, Grain market, Price dynamics, Shocks, SURE

1. Introduction

During the last decades, the issue of commodity price volatility has become of utmost importance in the international debate and among scholars and policymakers, because of the instability characterizing agricultural markets (Baffes and Haniotis, 2016; Brümmer *et al.*, 2016) and related adverse effects (e.g. food emergency, political crisis, poverty, unbalanced conditions, etc.) (Gutierrez, 2011; Wright, 2011). A vast number of studies focused on the understanding of the determinants of price volatility in agricultural commodity markets[1]. It is clear that not a single factor is able to generate market instability, but rather the joint influence of a plethora of causes is likely to exist (Ott, 2014; Tadesse *et al.*, 2014; Wright, 2014; Baffes and Haniotis, 2016; Santeramo *et al.*, 2017). The partial contribution of different factors is still debated. The economic literature identifies endogenous and exogenous factors that act as amplifiers of instability: the formers are generated by price dynamics; the latters are independent from price fluctuations (Tadesse *et al.*, 2014; Wright, 2014; Santeramo *et al.*, 2017).

Among endogenous factors, ddynamics of market fundamentals have a reasonable influence on grain price volatility, as an extended empirical literature demonstrate. For instance, stock levels contribute to determine price dynamics (Cafiero and Wright, 2011, 2015; Mitra and Boussard, 2012; Serra and Gil, 2012; Bobenrieth *et al.*, 2013; Ott, 2014; Tadesse *et al.*, 2014; Wright, 2014; Guerra *et al.*, 2015); producers' decisions in terms of land allocation influence, via yield, world price volatility (Goodwin *et al.*, 2012; Wright, 2014; Haile *et al.*, 2014, 2016); trade policies, which influence exports, imports, and domestic consumption, contribute to determine international price fluctuations at global scale (Anderson, 2012; Anderson and Nelgen, 2012; Esposti and Listorti, 2013; Gouel, 2013; Ivanic and Martin, 2014; Rude and An, 2015).

Among exogenous factors, the linkage between energy and agricultural markets (Serra and Gil, 2012; Tadesse *et al.*, 2014; Wright, 2014; Baffes and Haniotis, 2016); the exchange rate dynamics (Wright, 2014; Brümmer *et al.*, 2016); the negative consequences of weather shocks and natural disasters (Goodwin *et al.*, 2012; Haile *et al.*, 2014; Tadesse *et al.*, 2014; Wright, 2014), play a major role in affecting grain price volatility.

Because price volatility is the resultant of several drivers and of the interactions between endogenous and exogenous factors, we assess the potential effects that each of them may generate on international price

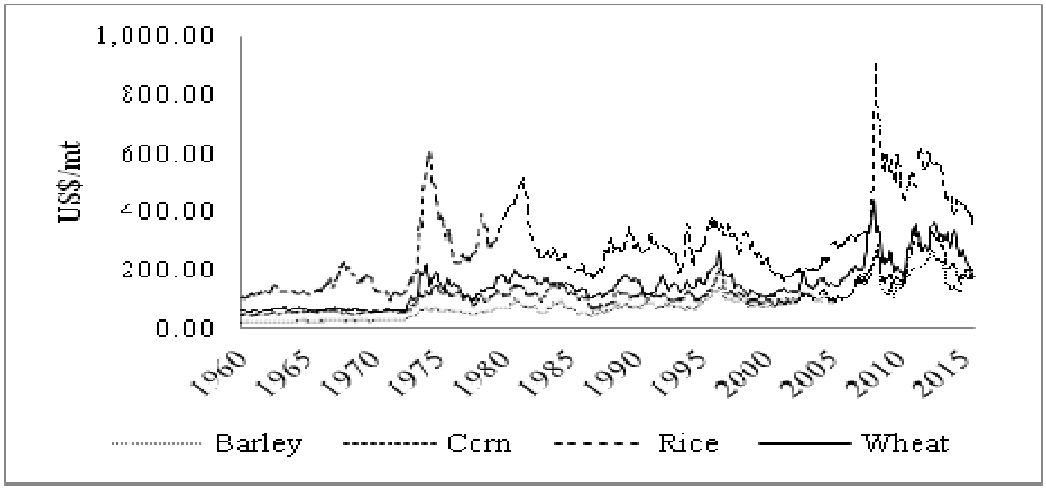
[1] See Santeramo *et al.* (2017) for a detailed discussion on the issue.

dynamics. In particular, we investigate the contribution of endogenous factors, such as spatial and temporal arbitrage, as well as drivers of supply and demand shocks, on price volatility of four major grain: wheat, rice, corn, barley. In order to shed light on the dynamics that occur within and among each grain market, we adopt a Seemingly Unrelated Regression Equations (SURE) model, able to capture the relationships linking the four grain commodities. We analyze global volatility, to conclude on short-run and long-run dynamics of markets instability.

2. On grain market dynamics

The long term patterns of stationary prices interspersed by severe growing spikes, that has characterized grain price during the last half century (Figure 1), reveal inherent problems of international grain market: the high concentration of production, trade, and consumption, in few Countries. The higher the concentration, the higher the vulnerability to food security problems, due to the large share of world's food energy consumption provided by grain markets (Wright, 2011; Tadesse *et al.*, 2014). Because grain markets are thin, even tiny changes in domestic markets may generate great international impacts and increase global instability (Santeramo *et al.*, 2017).

Figure 1. World prices of major grain from crop year 1960 to 2015.



Source: Author's elaboration on IMF database.

Prices of major cereal grain (wheat, rice, corn, barley) exhibit a stable growing trend over time, with several sharp peaks (Figure 1). Despite significant declines, prices are still higher than pre-financial crisis levels and characterized by remarkable volatility (IMF, 2015; USDA, 2015). But simply, what is likely to have caused volatility? Several factors help explaining market instability: trade and storage, supply shocks, and demand shocks. As for arbitrage, storage and trade are effective tools to achieve price stabilization (Bobenrieth *et al.*, 2013). The buffering function of prices operates through the incentives to arbitrage on price dynamics, and in particular to store when prices are low and trading when prices are high. This mechanism has been well described by competitive storage theory (Wright and Williams, 1982, 1984; Williams and Wright, 1991; Deaton and Laroque, 1992; Bobenrieth *et al.*, 2013). Arbitrage mechanism reflects also the influence of agricultural trade policies, aiming at stabilizing price fluctuations and avoiding price spikes, but *de facto* they may cause supply shocks, amplifying price volatility (Anderson, 2012; Anderson and Nelgen, 2012; Esposti and Listorti, 2013; Ivanic and Martin, 2014).

On the demand and supply sides, crop yields determine production levels but, differently from the planting decisions, are the result of noneconomic exogenous drivers, which influence prices variability (e.g. weather conditions, pest infestations, environmental conditions and technological changes) (Goodwin *et al.*, 2012; Fisher *et al.*, 2012; Haile *et al.*, 2014). For tradable commodities such as grain, yield shocks and harvest

deficiencies may contribute to global price instability (Goodwin *et al.*, 2012; Fisher *et al.*, 2012; Haile *et al.*, 2014; Haile *et al.*, 2016).
Given this framework, we examine international price dynamics by taking into account the influence of market fundamentals.

3. Materials and methods

3.1 Data

The analysis relies upon global data and country-level information. Covering the period 1960-2015, dataset considers monthly nominal prices[2], as well as annual data for endogenous drivers (ending stock, exports, domestic consumption, harvested area and yield) of four grain commodities: wheat, rice, corn, and barley. In order to estimate the effect of exogenous drivers on price volatility, dataset includes several control variables: namely, international nominal monthly prices of energy commodity (i.e. crude oil); monthly foreign exchange rate (i.e. U.S. Dollar against three currencies, namely Chinese Yuan (CNY/USD), Australian Dollar (USD/AUD), and Indian Rupees (INR/USD)[3]); annual trade reduction index (TRI), specific for each commodity (barley, corn, rice and wheat), which covers all tradable products; quantification of annual damages caused by natural disasters.

3.2 Volatility measurement

Volatility describes price movements in medium-long term and it consists in intervals where sharp jumps in price follow steep falls back to the trend, or *vice versa* (Bobenrieth *et al.*, 2013; Tadesse *et al.*, 2014). Price volatility, measured in terms of price dispersion around a central trend, is an indicator of how much and how quickly prices change over time (Tadesse *et al.*, 2014; Rude and An, 2015). Volatility may have year-by-year or monthly effects: yearly price volatility may affect planting decisions of farmers, whereas monthly price volatility may influence decisions about long term investments of farmers, storers, and traders. In order to capture both monthly and yearly volatility in a single indicator, we measure global volatility as the standard deviation ($\sigma_m^{3y,i}$) of logarithmic changes in monthly price of commodity *i* from a central trend, computed using a moving average on 36 months[4]:

$$\sigma_m^{3y,i} = \sqrt{\frac{1}{34}\sum_{m=2}^{36}\left(ln\left(P_m^{y,i}/P_{m-1}^{y,i}\right) - \mu_y^{3y,i}\right)^2} \quad (1)$$

where $\mu_y^{3y,i} = \frac{1}{35} ln\left(\frac{P_{36}^{y,i}}{P_1^{y,i}}\right)$ is the proportional monthly change in prices of commodity *i*, computed on a three years moving average.

3.3 Empirical model

The basic form of empirical model attempts to quantify the impact of endogenous variables on global volatility of grain prices. We include, in progressive steps, control variables to evaluate the influence of real and financial economy, policy intervention and other exogenous events. In its complete specification the model takes the following form:

$$\sigma = f(endogenous\ drivers, real\ economy, financial\ economy, policy\ intervention, other\ exogenous\ factors) \quad (2)$$

[2] Dataset refers to nominal world price series and have not been deflated due to the lack of a sufficiently accurate consumer price index (CPI) for deflating world nominal prices. This restriction is not able to capture price trend in real economy, but it is justifiable because macroeconomic conditions of the last decades, promoting global economic growth and leveling off differences between developed and developing Countries, have stopped downfall of real prices and reduced the difference nominal-real prices (OECD, 2008).
[3] These specific exchange rates were chosen because China and India are leading producers of wheat, rice, and corn, Australia is the major producer of barley, while the United States is a great producers and exporters of these commodities (USDA FAS PSDO, 2016): in this way we emphasize the weight of major producers in the international scenario.
[4] The formula for global volatility is an adaptation of formula used in Ott (2014).

so that the grain price volatility, σ, is explained by variables that capture the operating principles of markets. *Endogenous drivers* of volatility of grain prices are grain market fundamentals (demand and supply), that operate through storage levels, trade flows, harvested area, yield, and domestic consumption. The model involves those variables to test how spatial (via trade flows) and temporal (via storage levels) arbitrage, shocks of demand (via changes in domestic consumption), and shocks of supply (via variations in harvested area and yield) influence volatility of grain price. Volatility in prices of energy market (i.e. prices of crude oil) proxies tendency of *real economy*, as well as volatility related to exchange rates (between U.S. Dollar and Chinese Yuan (CNY/USD), Australian Dollar (USD/AUD), and Indian Rupees (INR/USD) proxies trend of *financial economy*. Trade Reduction Index (TRI) is an indicator for *policy intervention*, while natural disasters represent *other exogenous factors*.

The model is estimated as a SURE system, in order to capture the close conceptual relationship among dependent variables (Zellner, 1962):

$$\begin{bmatrix} \sigma_m^{3y,BA} \\ \sigma_m^{3y,CO} \\ \sigma_m^{3y,RI} \\ \sigma_m^{3y,WH} \end{bmatrix} = \begin{bmatrix} 1 & S_m^{y,BA} & EX_m^{y,BA} & A_m^{y,BA} & Y_m^{y,BA} & C_m^{y,BA} & \sigma_m^{3y,OIL} & \sigma_m^{3y,USD/AUD} & TRI_{m-12}^{y,BA} & Z_m^y \\ 1 & S_m^{y,CO} & EX_m^{y,CO} & A_m^{y,CO} & Y_m^{y,CO} & C_m^{y,CO} & \sigma_m^{3y,OIL} & \sigma_m^{3y,CNY/USD} & TRI_{m-12}^{y,CO} & Z_m^y \\ 1 & S_m^{y,RI} & EX_m^{y,RI} & A_m^{y,RI} & Y_m^{y,RI} & C_m^{y,RI} & \sigma_m^{3y,OIL} & \sigma_m^{3y,INR/USD} & TRI_{m-12}^{y,RI} & Z_m^y \\ 1 & S_m^{y,WH} & EX_m^{y,WH} & A_m^{y,WH} & Y_m^{y,WH} & C_m^{y,WH} & \sigma_m^{3y,OIL} & \sigma_m^{3y,CNY/USD} & TRI_{m-12}^{y,WH} & Z_m^y \end{bmatrix} \cdot \begin{bmatrix} \alpha \\ \beta_1 \\ \beta_2 \\ \beta_3 \\ \beta_4 \\ \beta_5 \\ \gamma \\ \delta \\ \eta \\ \theta \end{bmatrix} + \begin{bmatrix} \varepsilon_m^{y,BA} \\ \varepsilon_m^{y,CO} \\ \varepsilon_m^{y,RI} \\ \varepsilon_m^{y,WH} \end{bmatrix} \quad (3)$$

Where m is the month and $3y$ stands for a time span of 36 months; σ_y^{BA}, σ_y^{BA}, σ_y^{BA}, σ_y^{BA} are current volatilities of barley, corn, rice, and wheat, expressed in logarithmic terms; α is a constant; β_1, β_2, β_3, β_4, β_5 are parameters, referred to endogenous drivers; γ, δ, η, θ are parameters, referred respectively to real economy, financial economy, policy intervention, and exogenous variables; S, EX, A, Y, C, indicate for each commodity (BA, CO, RI, WH) the logarithmic form of storage levels, export flows, harvested area, yield, and consumption at current time; σ_y^{OIL} stands for the logarithm of current volatility of price of crude oil; $\sigma_y^{USD/AUD}$, $\sigma_y^{CNY/USD}$, $\sigma_y^{INR/USD}$ denote the current volatilities related to the logarithm of exchange rates between U.S. Dollar (USD) and Australian Dollar (AUD), Chinese Yuan (CNY), and Indian Rupees (INR); TRI stands for a measure of policy intervention degree[5]; Z is the loss of economic value related to natural disasters, taken into account as a proxy of totally exogenous events; ε_y^{BA}, ε_y^{CO}, ε_y^{RI}, ε_y^{WH} are error terms for each equation.

The left side of the equation is the vector of grain price volatilities. The right side (RHS) of the equation includes the matrix of explanatory variables, namely a constant term, endogenous drivers, variables of real and financial economy, variable of policy intervention, exogenous variable. The RHS also includes the vector of parameters to estimate; and the vector of error terms with expected value zero and variance-covariance matrix which is non zero.

Because volatilities and endogenous variables are expressed in a logarithmic form, the associated estimated parameters can be interpreted as elasticities: a percentage change in explanatory variable cause a percentage change in volatility of commodity price of the amount of the estimated parameter. As for the coefficient related to variables of exogenous factors and policy intervention, an unitary variation determines a change in volatility equal to the 100% of the amount of the estimated coefficient.

4. Results and discussion

Table 1 shows results of SURE estimates for global volatility. The model fits well for each commodity: almost each endogenous variable presents statistically significant results, when model involves all control factors.

[5] We consider lagged TRI for each commodity to avoid endogeneity carried out by the introduction of restrictive trade measures, according to Trefler (1993).

Table 1. SURE results for global volatility

	BASIC				*REAL ECONOMY*				*FINANCIAL ECONOMY*				*EXOGENOUS EVENTS*				*POLICY INTERVENTION*			
VARIABLES	BARLEY	CORN	RICE	WHEAT	BARLEY	CORN	RICE	WHEAT	BARLEY	CORN	RICE	WHEAT	BARLEY	CORN	RICE	WHEAT	BARLEY	CORN	RICE	WHEAT
Ending stock	-4.00E-3	-1.00E-3	4.00E-3	-0.03***	-0.01	-5.97E-05	0.01**	-0.01***	-0.01***	0.01***	4.00E-3	-0.01***	-0.01***	0.01***	0.01	-0.01***	-0.02***	3.00E-3**	-1.00E-3	-0.02***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Exports	0.02***	0.04***	-0.05***	-0.01	0.02***	0.03***	-0.03***	0.02***	0.02***	0.04***	-0.02***	0.02**	0.02***	0.04***	-0.02***	2.00E-3	0.02***	0.03***	-0.02***	0.02***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Harvested area	0.08***	0.02**	0.21***	0.03	0.08***	0.02*	0.11***	-0.03	0.12***	0.03**	0.11***	0.01	0.12***	0.02	0.11***	0.07***	0.09***	0.08***	0.13***	-0.01
	(0.01)	(0.01)	(0.04)	(0.02)	(0.01)	(0.01)	(0.04)	(0.02)	(0.01)	(0.01)	(0.03)	(0.02)	(0.01)	(0.01)	(0.03)	(0.02)	(0.01)	(0.01)	(0.04)	(0.02)
Yield	0.05***	0.06***	0.24***	0.01	0.04***	0.04***	0.18***	-0.01	0.05***	0.06***	0.14***	0.04***	0.05***	0.05***	0.12***	0.03***	0.03***	0.05***	0.15***	0.08***
	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)
Domestic consumption	0.01	-0.07***	-0.12***	0.05***	-4.00E-3	-0.05***	-0.11***	0.01	-0.07***	-0.08***	-0.11***	-0.02**	-0.06***	-0.08***	-0.11***	-0.03***	-0.03***	-0.08***	-0.12***	-0.08***
	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)
Oil	NO	NO	NO	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
USD/AUD†	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	NO	YES	NO	NO	NO	YES	NO	NO	NO
CNY/USD†	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES
INR/USD†	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	NO	YES	NO	NO	NO	YES	NO
Natural disasters	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	YES	YES	YES	YES	YES	YES	YES
Barley TRI_{t-12}‡	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	NO
Corn TRI_{t-12}‡	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO
Rice TRI_{t-12}‡	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO
Wheat TRI_{t-12}‡	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES
Constant	-2.72***	-0.45***	-4.49***	-0.98**	-2.38***	-0.35**	-1.94***	0.45	-1.68***	-0.43***	-1.68***	-0.22	-1.78***	-0.20	-1.39**	-1.06***	-1.69***	-1.27***	-2.11***	0.79**
	(0.12)	(0.159)	(0.59)	(0.49)	(0.11)	(0.14)	(0.59)	(0.41)	(0.10)	(0.16)	(0.57)	(0.40)	(0.103)	(0.16)	(0.57)	(0.36)	(0.11)	(0.18)	(0.66)	(0.31)
Observations	637	637	637	637	637	637	637	637	637	637	637	637	637	637	637	637	601	601	601	601
R-squared	0.44	0.36	0.35	0.13	0.54	0.50	0.53	0.51	0.74	0.50	0.55	0.52	0.74	0.53	0.56	0.61	0.74	0.61	0.53	0.77

Standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

†USD/AUD is the exchange rate between U.S. Dollar and Australian Dollar, CNY/USD is the exchange rate between Chinese Yuan and U.S. Dollar, INR/USD is the exchange rate between Indian Rupees and U.S. Dollar.

‡TRI is the Trade Reduction Index.

As regard practices of temporal arbitrage, in quite some cases grain price volatility is negatively correlated with ending stock, as also found in Serra and Gil (2012), Bobenrieth *et al.* (2013), and Ott (2014): when we control for all factors, we found that a 1% reduction in storage levels leads to an upsurge of 0.02% for barley and wheat (Table 1). As for the spatial arbitrage, an inverse relationships linked price volatility and trade flows (Rude and An, 2015): a 1% increase in exports causes a reduction of 0.02% in rice global volatility, when model involves all control factors (Table 1). Surprisingly we found a positive correlation of volatility with exports levels for barley, corn, and wheat, as well as with corn storage levels (Table 1): the nature of these relationships is not clear understanding and it requires further investigation.

Regarding variables of supply and demand side, the model fits well for each commodity, when controls for all factors. Variables that proxy production (harvested area and yield) are positively correlated with grain price volatility, differently from previous evidence by Haile *et al.* (2016). Decrease in domestic consumption causes upsurge of price instability (Cafiero and Wright, 2011; Thompson *et al.*, 2012). Analyzing barley, when a 1% upward variation occurs in variables of production side, price volatility rises of 0.09%, due to change in harvested area, and of 0.03%, due to changes in yield. For corn, a 1% growth in harvested area and yield leads to an increase in price volatility of 0.08% and of 0.05% respectively. After a 1% upsurge in rice harvested area volatility increase of 0.13%, while it grows of 0.15% when yield of rice rises of the 1%. For wheat, price volatility suffers an upward variation of 0.08%, due to a 1% increase in yield. As regard variable of demand, after a 1% growth of domestic consumption price volatility goes through a reduction of 0.03% for barley, of 0.81% for corn, of 0.12% for rice, and of 0.8% for wheat (Table 1). Following shocks of demand, grain price volatility decreases because of the rigidity of the demand with respect to the supply (Cafiero and Wright, 2011; Thompson *et al.*, 2012). For this reason, shocks of demand are more impacting than shocks of supply on grain price volatility. When we consider shocks of demand and supply in absolute value, we find that the magnitude of the estimated coefficient of production, deriving from the sum[6] of the harvested area and the yield ones, is greater than the magnitude of domestic consumption coefficient. Effectively, when a supply shock occurs, domestic consumptions firstly absorb surplus of production, while the remaining part is devoted to exports or to storage, depending on the economic advantage. In every occasion shocks of supply are, in absolute value, more impacting than shocks of demand: this is particularly evident in results of global volatility. In particular, the more remarkable effects occur for rice, for which price volatility increase of 0.29% after an upward 1% variation in production and of 0.12% when domestic consumption decrease of a 1%. Barley price volatility suffers an upward change of 0.12% when production increase of a 1% and of 0.03% following a 1% decrease in domestic consumption. Also the magnitude of the estimated coefficients for corn is comparable: price volatility growth of 0.13% when production rises of 1% and of 0.08% following a reduction in domestic consumption of 1%. A lower difference occurs for wheat, for which price volatility upsurge of 0.08% both in case of uptrend shocks of production and with downward shocks of consumption (Table 1).

5. Conclusions

Uncertainty is a typical feature of grain commodity prices driven by several factors. Understanding them is a way to define actions able to limit negative consequences of price instability. Among determinants of grain price volatility, market fundamentals deserve particular attention (Santeramo *et al.*, 2017): for this reason we have classified them in spatial and temporal arbitrage, demand and supply side drivers, to quantify their influence on price volatility. The paper has presented a comprehensive price volatility assessment of the four most important grain (wheat, rice, corn, and barley), using a SURE model, able to capture the interconnection among their markets. Our findings confirm the negative relationship that links drivers of arbitrage side to grain price volatility, already established in literature. Storage acts as an authentic buffer of volatility in grain market, thanks to the storability features of grain (Ott, 2014; Tadesse *et al*, 2014; Guerra *et*

[6] It is not necessary that supply shocks occur simultaneously. We would be able to consider separately shocks both in harvested area and yield. For this reason we sum, instead of multiply, them.

al., 2015). Although results highlight a not straightforward evidence for trade flows effects on grain price volatility, it is clear the presence of a deep dependence between them, as shown by Ivanic and Martin (2014). More work needs to be done to support the idea of free trade as a key element able to control volatility of agricultural commodity price. We also found that while demand absorbs price volatility, supply shocks exacerbate it. This result, surprisingly in contrast with Haile *et al.* (2016), needs to be deepened in further researches.

The contribution of our paper to existing literature is at least twofold: first, we proposing a richer set of determinants of grain price volatility; second, we explicitly assess the role of endogenous drivers, also controlling for exogenous factors.

Given that price formation mostly takes place on a global scale, policies aiming to prevent price volatility would have to be tailor-made to the international grain market. For storable and tradable commodities, such as grain, those policies should take into account the different role played by spatial and temporal arbitrage, domestic consumption, land and inputs use, etc. Our analysis speaks directly to those interested in understanding how it may be reached a new era of stable prices.

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