Response to Reviewer

Thank you very much for a thorough and substantive review of our paper. We have benefited a lot from your comments and suggestions, and we have used them to improve our manuscript.

Below we provide a point-by-point response to the issues raised in the review.

Comment #1

•The authors apply a new method (GVAR methodology; range-based volatility) to a thoroughly investigated research question. However, the authors do not critically review their methods over the others (in particular mgarch). I suggest to list advantages/disadvantages and hypothesize how the results may differ.

Response

The distinction between the Diebold Yilmaz approach and MGARCH approach could be included into the introduction section of the final version of the paper.

The Diebold-Yilmaz approach is not the only possible approach to study relations among volatility of different markets. MGARCH models are the most popular alternative. There are two distinctions between the two approaches mentioned. First, in MGARCH, it is possible to analyse both conditional correlation as well as make inferences about pairwise relations between markets. Second, MGARCH models are typically heavily parametrized with number of parameters growing very fast with each additional variable. In results, computational difficulties in high dimensional cases grow, as well. On the other hand MGARCH models with more parsimonious parametrizations typically impose stringent restrictions on the model structure. Therefore MGARCH applications are usually limited to two or three dimensional models. For example, Menis et al. (2013) studied volatility spillovers between food markets and SP500, and Mensi et al. (2014) between oil markets and food markets using two dimensional models (VAR-GARCH, or different MGARCH). When the DY approach is used, it is possible to analyse models including more variables, which could be critical. For example the omitted variable bias is less likely and there are no serious numerical difficulties when estimating VAR models. Moreover, the FEV decomposition obtained within the DY approach, summarised in the connectedness table, has a more natural interpretation and in fact conveys different kind of information (for example it is possible to compare volatility transmitted and received).

Comment #2

•The authors focus on three strands of literature in their literature review. First, studies examining the relationship between energy and food markets; second research on the financialization of agricultural commodity markets; third, the transmission between different agricultural commodity markets. Certainly, it is not possible to cite the complete literature on the topic, but it would be beneficial to look at studies with a similar research objective, which

is, to my understanding, the identification of the contributors (and their importance) to food price volatility. In my opinion, most relevant to this research objective are studies that look at the fundamental factors, the financialization of commodity markets, and the energy-food nexus jointly, e.g. Tadesse et al. (2014) in Food policy. Moreover, the methods of the other studies are neither discussed nor critically reviewed. Related to the last point, there is no discussion on how the findings of this study differ or coincide with the other works presented. For this comparison, it is important to critically review the methods of the other studies and to explain the advantage/implication of the GVAR methods over the others.

Response

Thank you for paying our attention to the Tadesse et al. (2014) paper. We agree it is a good idea to refer to the paper in the literature review section. The section on literature review will be extended in the following way:

(…) Abderladi and Serra (2015b) consider food and biofuel prices in Spain and find bidirectional and asymmetric volatility spillovers between biodiesel and refined sunflower oil prices. Tadesse et al. (2014) show that energy prices can trigger food price spikes and volatility.

The results obtained in the second strand of literature reveal, in general, limited volatility transmission between food markets and financial markets (see, e.g., Silvennoinen and Thorp 2013; Chevallier and Ielpo 2013; Awartani et al. 2016), which, however, changes in time. Volatility transmission increases during turbulent periods. (…). Grosche and Heckelei (2016) reveal the strongest volatility spillover within the agricultural commodities in comparison to other markets. A more important role of financial markets in the price formation process is found in Tadesse et al. (2014). They demonstrated, however, using the quantile analysis that "financial crisis and speculation do not necessarily trigger volatility, in contrast to price spikes" (Tadesse et al., 2014, p 127).

Comment #3

•The last comment relates to the discussion of the results. I appreciate the detailed analysis and robustness checks by the authors. However, the discussion appears a bit lengthy as compared to the rest of the paper. More importantly, the results are not convincing. The volatility transmitted is always very similar to the volatility received. One could argue that this just reflects the level of correlation between the categories of markets. Moreover, this is different from the literature presented in the review section. Last, the discussion of results and the conclusion is merely descriptive. What drives the results, apart from the heterogeneity of the markets? For instance, the sentence "the most general conclusion of the paper is that the role of the financial and energy markets in creating the food markets volatility is limited" is not explained. The tension between and the theoretical arguments of advocates and opponents of the financialization hypothesis is not mentioned in the paper. The respective literature Irwin et al. is also not cited.

Response

The FEVD could be related to correlations between the series, however, the interpretations is actually different. The FEVD shows how much of the future uncertainty of particular market variability (in our case) is due to future shocks to volatility in other markets. This decomposition evolves over time, so the shocks that hit one market may not be very important in the short run but quite important in the long run. We used a 10-day horizon, which is a common practice in the literature (see for example Diebold and Yilmaz, 2012).

What is novel in our paper is that the large number of markets included in the models enables us to obtain more reliable estimates of volatility spillovers. It turned out that spillovers are mainly within food markets and within non-food markets. This is the reason for having these two groups of markets.

We speculated about the possible explanation of relatively large volatility transmission within food markets responding to the comments received on July 31, 2018:

"the explanation (of volatility transmission among food markets) can be based on common supply shocks. The crops that share the same area, could be vulnerable to the same supply shocks, that is why corn and soybean are so highly related. In particular food markets seem to be related to the area of crops. The crops that require similar conditions, share the same land are mostly related. The maps of US crops show that soybean and corn are grown in the same areas, … while rice is grown in central south, wheat is to the west of corn and soybean crops."

Since the issue seems to be intriguing we will consider including the relevant paragraph in the final version of our paper.

We agree with the point about the respective literature. Thus, we would like to introduce a minor modification in subsection 5.2 (The rolling windows results) by making reference to Irvin (2013), Aulerich et al. (2014) and Etienne et al. (2014), as suggested in the review.

(…) This suggests that the relations between volatility in the stock, energy and foreign exchange markets and volatility in the food markets are not very strong. In this respect our results are similar to those reported in many other studies (see, e.g., Diebold and Yilmaz, 2012; Chevallier and Ielpo, 2013; Jebabli et al., 2014; Awartani et al., 2016; Grosche and Heckelei, 2016). Moreover, this finding is in line with Irvin (2013), Aulerich et al. (2014) and Etienne et al. (2014) who found that the process of financialization did not contribute to an incidence of food prices bubbles.

References

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