

Annex 1 – Extended abstract for Contributed Paper session

Paper Title	Analysing production shocks in global wheat markets using GVAR models
--------------------	---

Contributed Paper abstract prepared for presentation at the 91st Annual Conference of the Agricultural Economics Society, Royal Dublin Society in Dublin, Ireland

24 - 26 April 2016

Abstract	<i>200 words max</i>
<p>This study analyses the global wheat market with a relatively new modelling strategy in agricultural market studies: the global vector autoregression (GVAR) model. This methodology provides a solution to the high dimensional structure of complex systems by weighting average foreign variables, and allows for analysing market developments on both a short-run and long-run basis. The objective of this study is to analyse the advantages and disadvantages of using a GVAR modelling approach for the global wheat market. To this extent, existing literature is analysed and the key characteristics of the model are explored. Next, a small model of the global wheat market is developed including five major exporting countries and monthly data on their wheat export prices, their nominal exchange rate and the oil price. The country-specific weights are constructed using export shares, which are then used to develop country-specific foreign wheat price variables. After estimating the country-specific equations, the global model is solved. To test the reliability of the weights, the model is also estimated as an unrestricted VECM with the same model structure. Although the GVAR modelling approach was found to be suitable to model the global wheat market, some disadvantages were found that call for further research.</p>	
Keywords	GVAR models, commodity markets, wheat
JEL Code	C32, Q02, Q13
Introduction	<i>100 – 250 words</i>
<p>In analyzing global commodity markets two different types of models are commonly used: Computable General Equilibrium (CGE) models and time-series econometric models. CGE models are simulation models based on economic theory where parameters are calibrated and most often yearly data is used. Time-series econometric models, on the other hand, are based on time-series observations, parameters are estimated and higher frequency data (monthly, weekly, daily) can be used. Whereas CGE models are often considered as complex with results that are difficult to interpret (Piermartini et al., 2005), econometric commodity market models are often criticized for their weak theoretical basis. Moreover, econometric commodity market models based on VAR or VECM specifications are often limited in the number of variables they can accommodate.</p> <p>This paper presents a Global Vector Auto-Regression (GVAR) model for the global wheat market. A GVAR model is a macro-econometric model that relies on time-series observations, which is often estimated subject to long-run relationships obtained from economic theory. Due to this structure, the long-run relationships are</p>	

consistent with economic theory while the short run relationships are still consistent with the time-series observations (di Mauro and Smith, 2013). Besides the fact that the model is taking economic theory into account, another advantage of the GVAR modeling approach is that it allows for international linkages among a large number of countries.

Methodology

100 – 250 words

The most important feature of the GVAR approach is that it accounts for the interaction and interdependencies between various countries or regions. The model is constructed in two steps; in the first step country-specific VAR models are estimated and in the second step all the estimated coefficients are stacked together and solved in one system, the GVAR. The country-specific models include domestic variables and common foreign variables, which link the country-specific models to each other and makes co-integration possible not only between domestic variables of a country but also between the domestic and foreign variables. In these specific-country models long-run co-integrating relationships can be tested and imposed. The foreign variables are a weighted average of the countries included in the sample and are assumed (and tested) to be weakly exogenous. Assuming the foreign variables to be weakly exogenous, as di Mauro and Smith (2013) discuss, is a key characteristic of the model. In this way the number of equations to be estimated is significantly reduced and therefore it bypasses the curse of dimensionality which is a common problem in global macroeconomic modeling using unrestricted VAR models (Chudik and Smith, 2013). From the solution of the GVAR impulse response functions can be derived, which investigate the effects of a shock in one of the variables on the other variables in the model (Pesaran and Smith, 2006).

Results

100 – 250 words

This paper presents a simple GVAR model of the global wheat market in order to investigate the advantages and disadvantages of the GVAR modeling approach in analyzing global agricultural commodity markets. A small GVAR model of the global wheat market is developed including five major exporting countries (US, Canada, EU, Australia and Argentina) using monthly data on their wheat export prices, their nominal exchange rates and the oil price. Country-specific weights are constructed using export shares, which are then used to develop country-specific foreign wheat price variables. After estimating the country-specific VAR models, the global model is solved. To test the reliability of the chosen weights, the model is also estimated as an unrestricted VECM with the same model structure.

Results show how effects of shocks in different markets (e.g. Argentina vs. Australia) have different spill-over effects on related markets. This is done by graphing the Generalized Impulse Response functions of a one standard deviation shock in a particular wheat price.

Discussion and Conclusion**100 – 250 words**

From this study a number of conclusions can be drawn on the suitability of the GVAR approach in analysing agricultural commodity markets. First, the approach has several advantages over standard cointegration studies, such as the ability to include as many countries and variables as desirable and the compactness and flexibility of the model. However, although the GVAR modelling approach was found to be suitable to model the global wheat market, two disadvantages were found that call for further research. First, the weakly exogeneity assumption of the US variables was rejected and no appropriate solution was found. Further research could elaborate different solution strategies and their theoretical implications. Second, the results shows that the reliability of the chosen weights is questionable, which requires further research on alternative weight specifications.