Does speculation influence agricultural commodity spot prices?

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Abstract - **There are widespread believes that speculation with agricultural commodities on the financial market has led to rising agricultural commodity spot prices. We empirically analyse the causal relationships between spot prices and agricultural commodity futures trading activities. Theoretical linkages are discussed and relationships between spot prices and financial variables are tested for Granger-causality. Hardly any empirical evidence for causal relationships between changes in traded futures contracts and changes in spot prices has been found. The lack of empirical findings casts considerable doubt on the belief that speculation is a major driver of rising agricultural commodity prices.**

INTRODUCTION

What has driven up food prices during the years 2007-2008 and 2011? Different schools of thought exist and try to explore this question. Some argue that the extreme rise in food prices on the spot market is fairly explained by market fundamentals of demand and supply such as a strong demand from China, the growing bio-fuel production, supply shortfalls, or monetary policies. Others respond that disruptive non-fundamental drivers – trading activities with futures – are responsible for soaring agricultural commodity spot prices. Speculation with agricultural commodity futures is often blamed to be a major driver for increasing (or decreasing) spot prices by politicians and the public. Thus, we empirically investigate the causal relationships between spot prices and futures trading activities.

Basically, there are two groups of participants on futures markets with different objectives. One group are commercial traders (hedgers) such as producers, processors, and wholesalers, who aim to reduce price risks associated with selling or buying a physical commodity. The other group are non-commercial traders (speculators), who are willing to take price risks and provide liquidity in the expectancy of higher profits.

Some researchers such as Gilbert (2010) argue that agricultural commodity futures positions held by commodity index investments possibly led to increasing food prices in 2007-2008, because they follow a long-only trading strategy. In recent years index-based investments showed a rapid growth, hence a strong rising demand for futures positions. Between the years 2004-2008, about $100 billion of new investments flew into commodity futures markets, which is often called "financialization" of agricultural markets.

However, there are some theoretical inconsistencies in the arguments that trading activity leads to increasing spot prices. A major one is that of equating the demand for futures positions (i.e. money inflow) with the demand for the physical commodity. Long positions are not considered to be a new demand as short positions are not a new supply of the physical commodity. There is a long for every short position such that futures markets are a zero-sum game. Money flows on futures markets do not necessarily impact prices, and any theoretical relationship is unclear at best (Irwin and Sanders, 2011).

Therefore, it has been empirically tested whether changes in long futures positions of hedgers and speculators are causal for changes in the particular commodity spot price and vice versa.

DATA AND METHODS

Agricultural commodity spot price data for maize, wheat, rice and soybean prices are available from FAO (2011). Four futures positions data series have been used for each commodity: open interest data (long positions of commercials, long positions of non-commercials, total reportable positions) and volume traded at the Chicago Board of Trade (CBOT) from CFTC (2011). All data are available on a monthly basis. Time series start in January 2002 and end in May 2011 providing 113 observation points. The data describe mainly the situation in the US. All data have been logarithmized.

Granger-causality tests have been conducted in a multivariate framework to test causal relationships between time series. A time series X is said to (Granger-)cause a time series Y, if X helps to improve the forecasts of Y. The null hypothesis in the test is no Granger-causality. Our econometric procedure follows Lütkepohl and Krätzig (2004). Since Granger-causality tests are incorrect in the presence of non-stationarity in the time series data, the procedure of Toda and Yamamoto (1995) has been applied. In addition, a vector autoregressive (VAR) process has been fitted whose order exceeds the true order with additional lags equal to the maximum order of integration. Thus the time series have been tested for unit roots and the order of integration by applying Augmented Dickey-Fuller (ADF)

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tests. Each commodity is subject to four hypotheses (position data Granger-cause price) and delivers eight results, as the Granger-causality procedure tests for (possible) bi-directional relationships.
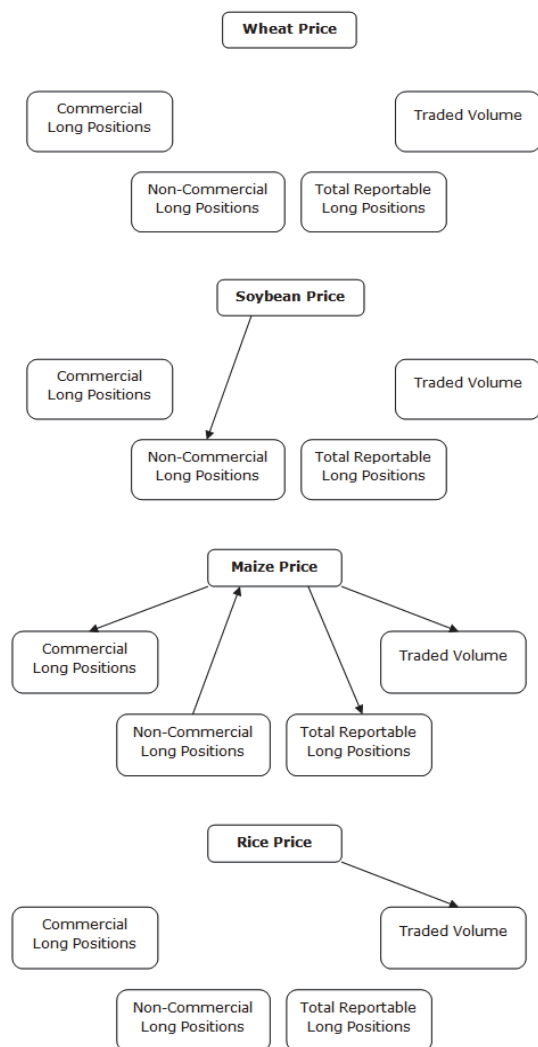

Figure 1. Significant Granger-causality relationships between maize, rice, wheat and soybean prices and CBOT position data (p<0.05).

RESULTS AND DISCUSSION

In accordance with the research question, whether rising long positions of agricultural commodity futures help to explain the phenomenon of soaring agricultural commodity spot prices between January 2002 and May 2011, Granger-causality test mostly failed to reject the null hypotheses at the 5% significance level. Merely six out of 32 hypotheses (16 hypotheses have been tested bi-directionally) are rejected.

Figure 1 depicts the tested Granger-causality relations. The arrows indicate Granger-causality between particular data series. Four out of six rejected null-hypotheses are associated with maize, one with soybean, and one with rice. None of the hypotheses for wheat are rejected. Overall findings indicate only very weak evidence for Granger-causal relationships.

Given the arguments that futures trading activities have led to rising spot prices, we have expected that the financial variables would be Granger-causal for the prices. This has been approved just once out of 16 tests: Non-commercial long trading (speculative open interest) with maize. The remaining five rejected cases may weakly indicate that spot prices do Granger-cause futures market positions.

CONCLUSION

There is hardly any empirical evidence that financial trading activities are Granger-causal for changes in spot prices. However, we have found some weak evidence that spot prices are Granger-causal for changes in long trading positions or volume traded. Market participants might react to changing prices in their positions, but not vice versa. If financial trading activities are a major driver of rising commodity prices, this causal linkage should be clearly detectable in the data. Therefore, the lack of empirical evidence for causal relationships between traded positions on futures markets and changes in spot prices calls for more cautious discussion when policy measures "against speculation" in agricultural commodity markets are requested, as their overall impact on spot price levels is vague. In contrast, historical quantitative studies suggest that futures markets are associated with, and most likely caused, lower commodity price volatility (Jacks, 2007).

However, there is no doubt that overall agricultural price risks have risen particularly in recent years. Researchers and policy-makers should further empirically investigate causalities of fundamental market factors before limiting futures markets.

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