Structural Price Changes Due To H5N1

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Introduction
Poultry meat is the second most important meat type in the European Union today.
To understand how information about Avian Influenza, informally referred to as bird flu (H5N1), affects market prices, we examine market prices’ movements to Avian Influenza (AI) notifications. AI which is a highly contagious viral disease affecting several species of food producing birds, as well as pet birds and wild birds.

Hypothesis
Reports of AI would have had a negative impact on the price of poultry relative to pork. A change in the relative poultry-pork implies a change in the underlying supply and demand structure and enables direct estimation of the price impact of the outbreak. Little literature estimating structural changes of agricultural commodity prices following a food scare.

Data
Weekly nominal European Union 15 market prices (Euro per 100 kg) for poultry and were assembled for the period 6th January 2002 to 6th July 2008. Sourced from the Eurostat database.

Econometric Analysis
1. Natural experiments
a) The outbreak of AI constitutes a natural experiment.
b) Adds to the existing literature which typically uses laboratory experiments to estimate price discounts associated with genetically modified
2. Relative price of a substitute method
a) Although it is known when outbreak occurs, the exact tipping point of how it may change consumer preferences is unknown.
b) Uses the Carter et al (2007) relative price of a substitute (RPS) method which exploits the equilibrium properties of the relative price of a good to the price of a close substitute.
3. Decomposing log relative pork-poultry prices
First we analyse the time series properties of the two series by decomposing the variables into a variety of components - global trend, cycle, seasonal and an irregular component, with sine and cosine functions to smooth variables into an amplitude.

Econometric Results
Decomposition of time series
a) The correlation coefficient between log poultry and log pork prices is 0.57.
b) The individual log prices contain a unit root and the relative log price is mean reverting.
c) The best fitting model of the detrended and deseasoned log relative price is an ARMA (2, 0, 0). The dynamic response suggests that there was a very short time delay in the transmission and the reception of bird flu.
d) The ARMA (2, 0, 0) is tested for specification adequacy by applying Ljung-Box Portmonteau and Dickey-Fuller unit root tests on the model’s estimated residuals. Results strongly suggest that the model achieved literature-established standards of statistical adequacy.

Structural change test
OLS-based CUSUM process of Ploberger et al (1992) producing the plot. The associated structural change test, is significant at the 5 per cent level, signalling that the model parameters are not stable throughout the entire sample. A similar conclusion emerges from the test based on F statistics.

Conclusions
1. Co-movement exists between poultry and pork prices.
2. The relationship between poultry and pork is stationary.
3. Avian influenza and higher commodity prices may have caused a structural change in the relative price of poultry and pork.
4. A cointegrating relation between poultry and pork and that structural change due to AI may exist.
5. Given that there is evidence of structural change in the data, a natural strategy is to find a model that incorporates the changes.

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