# Price transmission and market power: an application to the Belgian meat market

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**Abstract** The aim of this paper is twofold: from one hand to study the degree of vertical integration in the meat markets (producers, wholesale/transformation and retail) and on the other hand to shed a light on the transmission mechanism of prices. The analyses shows that the transmission between producer and wholesale pork prices to retail is asymmetric. In particular, a substantial difference is observed according to the type of transformation process to which the final product undergoes. A causal ordering is set up and the equations of prices are estimated in a VECM framework, which allows for testing for the presence of market power. Through the impulse response analysis is evaluated the market response to exogenous shocks useful for the analysis of the pass-through mechanism.

**Key words:** prices, meat market, Vector error correction model, market power.

## 1 Introduction

The issue of market integration and the pass-trough mechanism have been extensively treated in the economic literature. Particular attention has been devoted to the asymmetries existing in the transmission of prices along the producers-wholesalers-retailers chain. This work focuses on the meat market in Belgium, mainly beef and pork are considered. Though the industries and the food chain is very similar, beef market is mainly domestic since it is dominated by the BBB (Blanc Bleu Belge) meat, whereas pork meat is traded abroad with the main EU commercial partners of Belgium, such as France, The Netherlands, Luxembourg. Apart these differences in the market, the economic players in the sector are mainly the farmers (producers), the intermediate industry (including abattoirs, cutters, packers, industry of transfor-

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mation and conservation, and more in general wholesalers), retailers. Three markets are therefore relevant for understanding the extent of vertical integration of the chain: the producer/wholesalers, the wholesalers/retailers, the retailers/consumers.

## 2 The Econometric Model

The theoretical model follows Sanjuan and Dawson(2003) and consists of the equations

- Supply $P = k(A, A^M, B)$
- Demand $Q = h(R, R^s, X, Y)$
- Profit $\pi_i = R(Q)Q_i - P(A)A_i - C_i(Q_i)$, $i = 1, \ldots, n$
- Costs of retailing $F = z(W, G)$

which translate into the optimization problem with first order conditions given by

$$R - \theta \frac{Q}{b} = P + g\mu Q + F.$$

The endogenous variables are $P$, $Q$, $R$, $R^T - P$ (transformation industry margins) and the margins of retailing $R^D - P$. To study the extent of market power, we test whether the shifters are significantly different from 0. $H_0 : \theta = \mu = 0$ perfect competition $H_1 : \theta = \mu \neq 0$ market power.

The econometric model of the pork meat is estimated for the raw meat and the transformed one using monthly series from 01/1999 to 12/2008. The model is quite complex and its features are

- 26 cointegrated variables (common unit root) $\longrightarrow$ VECM(2)
- 7 cointegration relations identified
- 2 lags included
- dummies for shocks like dyoxine, EBS, blue tongue.

## 3 Data and Results

Concerning the producers, there are three main types of exploitation activity: breeding the piglets, fattening up the animals so that they can be slaughtered (around the age of 6-7 months and 100 kg) and the two activities combined in a closed circuit. As shown in the report on ..., in 2005 and 2006, the most profitable activity was breeding, whereas in 2007 fattening is more profitable than breeding due to the rapid decrease of the piglet prices (5,4% between 2007 et 2006) combined with an increase of the staple food prices (+14,7%). In 2008 the situation is reverted in favor of the breeders.

### 3.1 Beef: model estimates

The cointegrating relations identified are

$$r_t^b = .03 - 1.10r_t^m + 1.85r_t^p + 13.10g_t^{(1)} + 8.99g_t^{(2)} - .01w_t \quad (1)$$

$$(r_t^b - p_t^b) = -.13 + 3.40g_t^{(1)} - .01w_t - .02s_t + .0.1n_t \quad (2)$$

where $r_t^b$, $r_t^m, r_t^p$ are the roast-beef, pork and chicken retail price (eur/kg), respectively, $p_t^b$ is the producer price for a BBB carcass (eur/kg), $g_t^{(1)}, g_t^{(2)}$ are the transformation costs (wages of abattoirs and packaging), $w_t$ are wages in the retail sector (total/full-time equiv), $s_t, n_t$ are the demand supply shifters (consumers and firms). All variables are deflated using the GDP price deflator. The main results can be summarized as

1. sostitute/complemento nei prezzi al dettaglio (pollo sostituto, maiale complementare), non significative nella determinazione del margine
2. costi di trasformazione: impatto + sui prezzi al consumo e sul margine
3. attese del consumatore: impatto − sul margine e 0 sui prezzi al consumo. Segnale di potere di mercato nel settore alimentare
4. salari distribuzione: impatto − nel lungo periodo, impatto + nel breve periodo

### 3.2 Pork: model estimates

The pork-meat model is estimated, the 7 long-run relationship are identified as displayed below

$$p_t = .7 + 1.8b_t + .1a_t^M + .5c_t^M + .6c_t^X - 4 * 10^{-7} I_t \quad (3)$$

$$r_t^{(1)T} - p_t) = 3.8 - .9c_t^M - .1w_t^{(1)} - 4 * 10^{-8} q_t^{(1)} - 3 * 10^{-8} q_t^{(1)X} \quad (4)$$

$$r_t^{(2)T} - p_t) = -5.6 + 2.0ch_t^M + .5w_t^{(2)} + 2 * 10^{-6} q_t^{(2)} + 2 * 10^{-6} q_t^{(2)X} \quad (5)$$

$$r_t^{(1)D} - p_t) = -2.2 + 8 * 10^{-8} q_t^A - .5r_t^{(1)T} + 2.2w_t^D \quad (6)$$

$$r_t^{(2)D} - p_t) = -5.5 + 1 * 10^{-7} q_t^A + .6r_t^{(2)T} + 3.6w_t^D \quad (7)$$

$$r_t^{(1)D} = -5.4 + 9 * 10^{-8} q_t^{(1)X} + .5r_t^b + .6r_t^y - 8 * 10^{-5} y_t + 7 * 10^{-7} d_t^{(1)} \quad (8)$$

$$r_t^{(2)D} = 5.2 - 7 * 10^{-7} q_t^{(2)X} + .6r_t^v + 2 * 10^{-3} y_t + 4 * 10^{-7} d_t^{(2)} \quad (9)$$

where 1 indicates the raw meat and 2 the delicatessen. The main results are shown by means of the impulse response analyses, by which we get to following conclusions.

1. Producer's Supply function: the raw materials and the supply surplus are very important (especially those imported);

2. the transformation price of the raw meat is not influenced by the retail price of meat. On the other opposite, when the price of transformation affects the retail price, ($\longrightarrow$ price transmission is different for category of products);
3. retailers wages: asymmetric effects in the margins of retailing. They are negative for the raw pork meat, positive for the delicatessen;
4. importance of substitution/complementary products (chicken, beef);
5. both domestic and foreign demand stimulate retail prices increases;
6. an increase of the revenues results in an increasing demand in delicatessen and decreasing demand in raw meat.

## References

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