Do Cooperatives Offer High Quality Products?
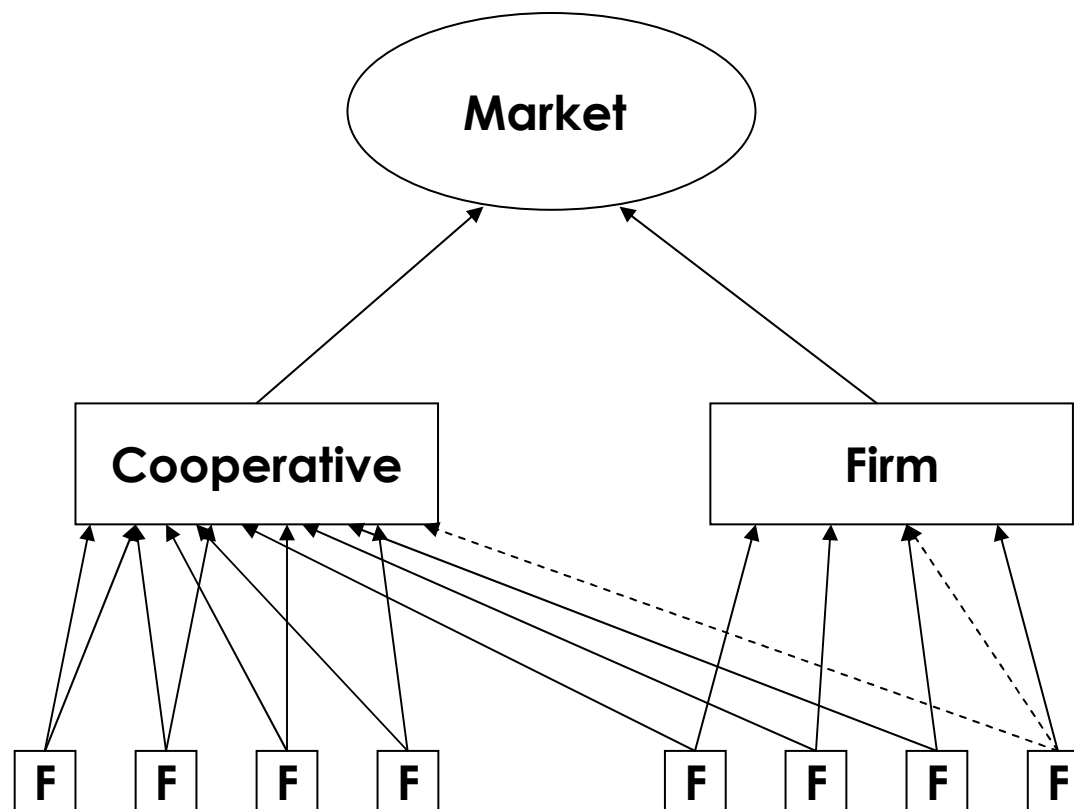# Vertical Product Differentiation in a Mixed Oligopoly

Dieter Pennerstorfer

Austrian Institute of Economic Research

Christoph Weiss

Vienna University of Economics and Business

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The Model: Setup and Motivation

- **Frick (2004): Does Ownership Matter? Empirical Evidence from the German Wine Industry**

- **Dilger (2005): Prinzipal-Agenten-Probleme im deutschen Weinbau**

- **Choi and Shin (1992): A comment on a model of vertical product differentiation**

- **Motta (1993): Endogenous quality choice: price vs. quantity competition**

- **Lehmann-Grube (1997): Strategic choice of quality when quality is costly: the persistence of the high-quality advantage**

- **Hoffmann (2005): Ownership Structure and Endogenous Quality Choice: Cooperatives versus Investor-Owned Firms**

WIFO ■

n … **number of producers (farmers)**

$$n = n_F + n_C$$

s … **quality** $\qquad s^g > 0$, $g \in \{H, L\}$ **whereas** $s^H > s^L$

c … **costs** $\qquad c(q) = \dfrac{1}{2} cq^2 + f^{g_i}$ **whereas** $f^H > f^L$

Optimization problem for the Cooperative (for one member)

$$\pi_{C,i}^g = p^g q_{C,i} - \frac{1}{2} cq_{C,i}^2 - f^{g_i} \qquad\qquad \lambda \equiv \frac{\partial q_j}{\partial q_i}$$

Optimization problem for the Firm

$$\Pi_F^g = n_F \pi_F^g = p^g Q_F - n_F \frac{1}{2} c^g \left(\frac{Q_F}{n_F}\right)^2 - n_F f^g$$

There is a continuum of consumers distributed uniformly over the interval $[\theta-1,\theta]$ **, whereas** $\theta > 1$

Each consumer maximizes her utility function

$$u_{\tilde{\theta}} = \begin{cases} \tilde{\theta} v_i - p_i & \text{if he buys from firm } i \\ 0 & \text{otherwise} \end{cases}$$
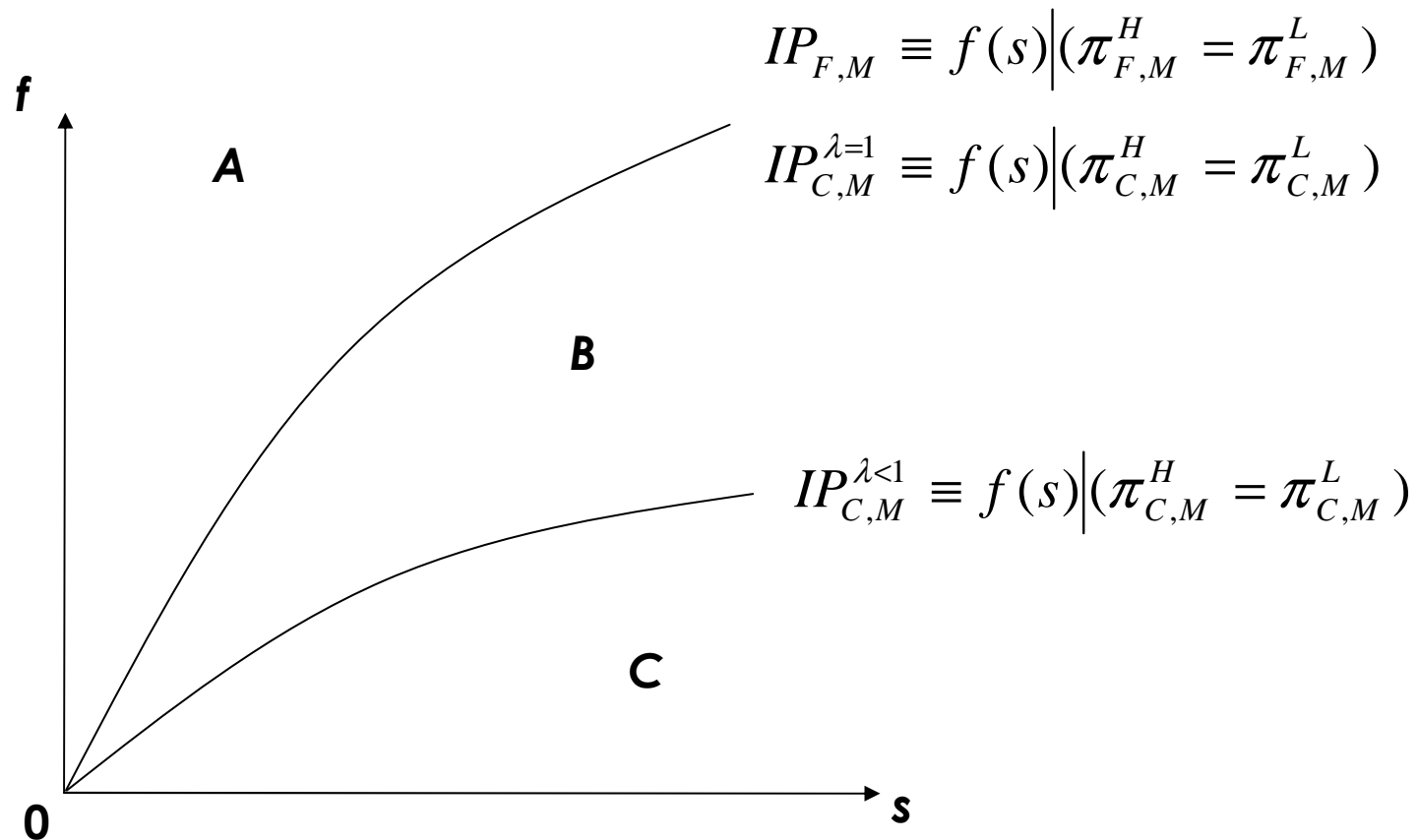
Inverse demand functions

$$p^H = \theta s^H - s^H Q^H - s^L Q^L$$

$$p^L = s^L(\theta - Q^H - Q^L)$$

Simplifications

$$s^L = 1, \ s^H = 1 + s \geq 0, \ f^L = 0, \ f^H = f$$

$$IP_{F,M} \equiv f(s)\big|(\pi_{F,M}^{H} = \pi_{F,M}^{L})$$

$$IP_{C,M}^{\lambda=1} \equiv f(s)\big|(\pi_{C,M}^{H} = \pi_{C,M}^{L})$$

$$IP_{C,M}^{\lambda<1} \equiv f(s)\big|(\pi_{C,M}^{H} = \pi_{C,M}^{L})$$

f

A

B

C

0

s

		Member i	
		H	**L**
	$s^T \leq \sum_{j \neq i} \omega_j s_j^g + \omega_i s_i^L$	$\pi_{C,M}^H$	$\pi_{C,M}^{H+}$
All other members	$\sum_{j \neq i} \omega_j s_j^g + \omega_i s_i^L < s^T \leq \sum_{j \neq i} \omega_j s_j^g + \omega_i s_i^H$	$\pi_{C,M}^H$	$\pi_{C,M}^L$
	$s^T < \sum_{j \neq i} \omega_j s_j^g + \omega_i s_i^H$	$\pi_{C,M}^{L-}$	$\pi_{C,M}^L$

$$IP_F^3 \equiv f(s)\big|(\pi_F^H = \pi_F^L)$$

$$IP_F^1 \equiv f(s)\big|(\pi_F^H = \pi_F^{LL})$$

$$IP_C^1 \equiv f(s)\big|(\pi_C^H = \pi_C^{LL})$$

A

B

$$IP_F^2 \equiv f(s)\big|(\pi_F^{HH} = \pi_F^L)$$

$$IP_C^2 \equiv f(s)\big|(\pi_C^{HH} = \pi_C^L)$$

C

f

s

0

WIFO ■
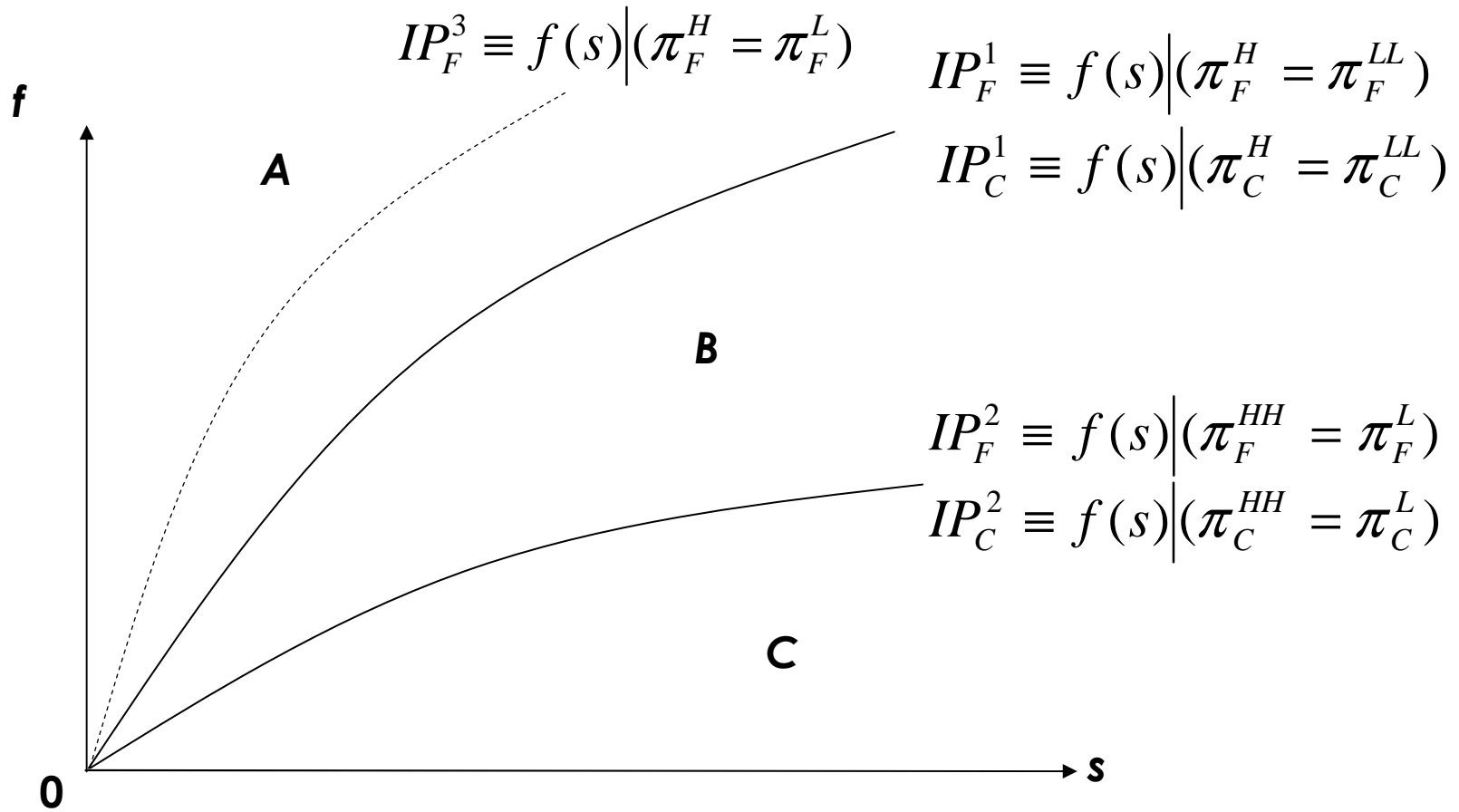
		Member i	
		H	**L**
All other members	$s^T \leq \sum\limits_{j \neq i} \omega_j s_j^g + \omega_i s_i^L$	π_C^H	$\pi_{C,M}^{H+}$
	$\sum\limits_{j \neq i} \omega_j s_j^g + \omega_i s_i^L < s^T \leq \sum\limits_{j \neq i} \omega_j s_j^g + \omega_i s_i^H$	π_C^H	π_C^{LL}
	$s^T < \sum\limits_{j \neq i} \omega_j s_j^g + \omega_i s_i^H$	π_C^{LL-}	π_C^{LL}

Conclusions and Extensions

WIFO ◼

- **Monopoly**
  - Cooperative never delivers higher quality as the firm (coordination problem)
  - Problems coordinating output makes quality coordination more difficult

- **Oligopoly**
  - Cooperative will never delivers higher product quality (coordination and free-riding problem)
  - Except: Quality is determined by lowest quality of inputs

- **Extensions**
  - Quality continuous instead of discrete; Quality affects variable costs
  - Open-membership equilibrium
  - Empirical examination of main results in a market where quality is important and cooperatives are present (wine industry?)