Price Transmission in Food Value Chains with Market Imperfections

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Stage 1: Literature & data review

Market power and competition policy has emerged as an important economic issue and a sensitive item on the policy agenda all around the world.

Insights from the literature

Theory I: the simple argument
High concentration \(\rightarrow\) Market power \(\rightarrow\) Inefficiency
- Buyer power: lower prices for suppliers
- Seller power: higher consumer prices

Theory II: some complications
While concentration is a useful first indicator of market power, high concentration does not necessarily translate into market power
- Asymmetries in size, cost or strategy may impede collusion (Compte et al, 2002; Kühn, 2002; Barla, 2000; Dobson et al, 2001)
- Vertical relationships matter (McCorriston & Sheldon, 2007)
Stage 1: Literature & data review (cont.)

Theory III: some more complications
... high concentration may enhance welfare if concentration:
  ▪ Increases scale economies
  ▪ Reduces transaction costs
  ▪ Secures return on investments in R&D
  ▪ Offsets market power of other agents supplier
**Stage 1: Literature & data review (cont.)**

**Empirical Evidence**

Empirical studies have focused mostly on *consumer* side

*Diverging conclusions on the effects of retail concentration & modern retail growth on consumer prices:*

**OECD COUNTRIES**

- **Positive correlation:**

- **Negative or insignificant correlation:**

**DEVELOPING COUNTRIES**

- **Lower prices:**

- **Higher prices:**
  - Minten (2008)
Literature review: Empirical evidence (farm-level)

RICH COUNTRIES
Results vary and depend on variety of model assumptions:
- Market power:
  Lloyd et al (2009)
- No or weak:
  Dobson et al (2001)

TRANSITION & DEVELOPING COUNTRIES
Results vary:
- Competition enhances farmer revenues & growth:
  Sadler et al (2007)
- Strong benefits for farmers with monopoly buyer:
Motivation of the paper

• Recent commodity price behaviour (price spikes) $\rightarrow$ renewed attention for price transmission issues

• Important irregularities in
  – Spatial price transmission
    • world $\rightarrow$ domestic mkts
  – Vertical price transmission
    • farm $\rightarrow$ consumer
    • consumer $\rightarrow$ farm
  – In developing, emerging as well as developed economies
Spatial price transmission in developing countries

Figure 1: Rice transmission

(Sharma, 2011)
Vertical price transmission in EU

Figure 5: Consumer and producer food price changes 2007:7 - 2008:8 (average annual growth rate)

Source: Eurostat

(Bučevičiūtė et al., 2009)
(I) DEVELOPING COUNTRIES

- When food prices were low for decades:
  - NGOs claimed this threatened food security as low food prices impede agricultural development and keep productivity low
- Now that food prices are high:
  - NGOs claim this threatens food security as consumer food bills are inflated
- See Swinnen (2011)
- But... what happens at the farm-level?
  - It is claimed by some that in many cases farm-level prices have remained flat (farmers sold harvest too early?)
  - Surprisingly little micro-level evidence
Reasons for concern?

(II) DEVELOPED COUNTRIES: THE EU

– Price rises in 2007/08 passed on to consumers and caused hardship for consumers
– Price drops in consequent years much less passed on to consumers → Demand recovery impeded → hardship for farmers
– Asymmetries in price transmission supposedly reflect “structural weaknesses in the system, such as the number of intermediaries operating along the chain and the competitive structure” and “pervasive inequalities in bargaining power between contracting parties”
– January 2012: Establishment of Task Force Food within DG Competition to inquire into these issues
State of the art

• Price transmission has been studied extensively in the literature
  – Theoretically (e.g. Wohlgenant 2001, McCorriston, Morgan, and Rayner 2001)
  – Empirically (e.g. Goodwin and Holt 1999; Chang and Griffith 1998; von Cramon-Taubadel 1998; TRANSFOP papers Bonnet and Requillart 2012; Holm, Loy, and Steinhagen 2012; Davidson et al. 2012)
  – But mostly in a ‘developed’ world context, and mostly downstream transmission (from farm to retail) – impact on consumers
Our contribution (1)

• Study price transmission from consumers to farmers
  – Gap in the literature identified by Wohlenber (2001)
  – Important in current context of rapidly transforming global agrifood systems with
    • Increasing vertical coordination
    • Increased importance of food quality standards
    • Increased consolidation at the buyer-level (agrifood processing firms, retailers)
      • Often very unequal power relations between buyers and suppliers
  – Farm-level welfare effects?
Our contribution (2)

- Most studies assume perfect factor markets, perfect contract enforcement institutions.
- We study farm welfare and price transmission in a context of:
  - VC with contract-specific investments by buyer
  - Factor market imperfections
  - Imperfect contract enforcement institutions
- Contract-specific investments can take different forms (External inputs, Training, Monitoring costs, Search costs)
- Model results depend on the type of investment

- But in most cases: highest level of farm welfare does not necessarily coincide with highest degree of price transmission!
Conceptual difference between investment types

<table>
<thead>
<tr>
<th>Frequency of investment</th>
<th>Annually</th>
<th>Once</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>External inputs</td>
<td>Monitoring costs</td>
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<tr>
<td></td>
<td>Training costs</td>
<td>Search costs</td>
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**Value outside of the contract:**

- Suppliers can ‘run away’ with buyer’s investment
  - Diverting external inputs/training to other uses
  - Sideselling high-quality product to alternative buyers
- To make contract self-enforcing: buyer may offer an ‘efficiency premium’
- Suppliers will earn above-opportunity cost payoffs even in unequal bargaining positions
- E.g. Swinnen & Vandeplas 2011 (focus on developing co)
Conceptual difference between investment types

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<tbody>
<tr>
<td>Annually</td>
<td>Value &gt; 0</td>
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<tr>
<td></td>
<td>External inputs</td>
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<tr>
<td>Once</td>
<td>Value = 0</td>
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<td></td>
<td>Monitoring costs</td>
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- **Frequency of investment:**
  - If only once, higher surplus generated in repeated contracting relationship than in new contract
  - To keep suppliers ‘loyal’ in long term → create win-win situation, with surplus above opportunity cost
  - Relational rather than transactional exchange (Geiger et al. 2012; Dwyer, Schurr, and Oh 1987)
  - Higher surplus share to suppliers?
  - E.g. Sexton (2012) (focus on developed co)
Price determination under imperfect factor markets and imperfect enforcement

- Supplier invests labour $l$
- Buyer invests capital $k$ and can sell processed product quantity $q$ at value $p_h$
- Contract surplus is $S = p_h q - \gamma k - \bar{l}$

- Supplier may breach contract:
  - Input diversion: $Y_i = \bar{l} + \alpha k - \varphi^f$
  - Sideselling: $Y_s = p_s - \varphi^f$
Price determination under imperfect factor markets and imperfect enforcement

- Then, two parties bargain over surplus — but outcome must satisfy supplier incentive compatibility constraints.

- The resulting contract \( (Y, \Pi) \):
  \[
  \begin{align*}
  Y &= \max \left[ \bar{l} + \beta(p_h q - \gamma \bar{k} - \bar{l}); \bar{l} + \alpha \bar{k} - \phi_f; p_s q - \phi_f \right] \\
  \Pi &= p_h q - Y 
  \end{align*}
  \]
  with \( Y \) farm income
  and \( \Pi \) buyer income

- The resulting producer price:
  \[
  p = \frac{1}{q} \max \left[ \bar{l} + \beta(p_h q - \gamma \bar{k} - \bar{l}); \bar{l} + \alpha \bar{k} - \phi_f; p_s q - \phi_f \right]
  \]
<table>
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<tr>
<th><strong>Baseline scenario</strong></th>
<th><strong>Producer price</strong></th>
<th><strong>Price transmission</strong></th>
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<td>( p = \frac{1}{q} \left[ q - \bar{k} + \beta (p_h q - \bar{k}_i - \bar{l}) \right] )</td>
<td>( \frac{\partial p}{\partial p_h} = \beta )</td>
</tr>
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| VC with external input costs | \( p = \frac{1}{q} \max \left\{ \bar{l} + \frac{\beta}{p_h q - \bar{k}_i - \bar{l}}; \bar{l} + \alpha \bar{k}_i - \varphi_f; p_s q - \varphi_f \right\} \) | If term 1 binding: \( \frac{\partial p}{\partial p_h} = \beta \)  
Otherwise: \( \frac{\partial p}{\partial p_h} = 0 \)  
Except: \( \frac{\partial p}{\partial p_h} = \frac{\partial p}{\partial p_s} \) |
| VC with training costs | \( p = \frac{1}{q} \max \left\{ \bar{l} + \frac{\beta}{p_h q - \bar{k}_i - \bar{l}}; \bar{l} + \alpha \bar{k}_i - \varphi_f; p_s q - \varphi_f \right\} \) | If term 1 binding: \( \frac{\partial p}{\partial p_h} = \beta \)  
Otherwise: \( \frac{\partial p}{\partial p_h} = 0 \)  
Except: \( \frac{\partial p}{\partial p_h} = \frac{\partial p}{\partial p_s} \) |
| VC with monitoring costs | \( p = \frac{1}{q} \left[ q - \bar{k} + \beta (p_h q - \bar{k}_m - \bar{l}) \right] \) | \( \frac{\partial p}{\partial p_h} = \beta \) |
| VC with search costs | \( p = \frac{1}{q} \left[ q - \bar{k} + \beta (p_h q - \gamma_s (k_s) - \bar{l}) \right] \) | \( \frac{\partial p}{\partial p_h} = \beta \) |
Findings (1)

• If outside options (input diversion, sideselling) are binding:
  – Farmer gets a better price (‘efficiency premium’)
  – Price transmission is 0
• This applies to the cases of Training, External input provision
• Hence:
  – Weaker price transmission does not necessarily mean lower farm welfare
  – Degree of price transmission is not always informative on the process of price formation
Findings (2)

• The management literature suggests that if search costs become important, buyer-supplier relationships may transform from transactional exchange into relational exchange.
• This could be reflected in an increase in $\beta$.
• If so, apart from training and external input costs, search costs in high-value supply chains will also lead suppliers to earn above-opportunity cost incomes.
• Further need to formalize this.
Link with further work in WP6

- Price transmission depends on
  - Sharing rule $\beta$
  - Effectiveness of contract enforcement institutions (through $\varphi$, might be problematic especially for New Member States)
  - Market structure and strength of vertical relationships (through $p_s$)
    - Are there attractive outside options?
    - How large are switching costs?