Emergence of Cooperatives and Farmer Heterogeneity

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AGENDA

1. Observations
2. Positioning and research question;
3. Model;
4. Role for outsider;
5. Selfish outsider;
6. Fair outsider;
7. Conclusions and further research.
OBSERVATIONS

A. Cooperative life cycle;
B. Bottom-up emergence;
C. Top-down emergence;
D. Non-emergence of cooperatives;
E. Policy relevance;
F. Member heterogeneity.
A. COOPERATIVE LIFE CYCLE

Cook and Burress (2009)

Phase 1 – Economic Justification
Phase 2 – Organizational Design
Phase 3 – Growth, Glory, Heterogeneity
Phase 4 – Recognition and Introspection
Phase 5 – Choice
TODAY:

How to model
Emergence of cooperatives
in Phase 1 of the cooperative life cycle?
B. DIVERSE ORIGINS OF BOTTOM-UP EMERGENCE:

– Formed jointly by farmers;
  • 1913 British Long Clawson Dairy cooperative (LeVay, 1983)
  • early (1882) Danish dairy cooperatives (Svendsen and Svendsen, 2000)

– Coop champions;
  • Neil Black, lifelong champion of dairy farmers and the dairying industry in south-western Victoria, Australia;

– Separating from existing cooperatives;
  • Swedish cooperatives (Hakelius et al., 2013);
  • The Greenery (Hendrikse, 2011),

– Cooperative principles (Raiffeisen, Rochdale).
C. DIVERSE ORIGINS OF **TOP-DOWN** EMERGENCE OF COOPERATIVES

- **Government:**
  - Agricultural cooperatives in Russia (Golovina and Nilsson, 2011)
  - Farmer cooperatives in China (Liang and Hendrikse, 2013)

- **Key player (Entrepreneur, NGO, Priest, Farmers Union):**
  - “Core” entrepreneurial farmers – experience in agricultural departments or private firms -> capital, marketing capabilities, social and professional networks
  - Priest Van den Elsen, Southern part of the Netherlands
  - Northern part of USA, initiative from Farmers Union (Olson, 1971)
D. NON-EMERGENCE OF COOPERATIVES

Cooperatives emerge much less in the South of Europe than in the North of Europe (Bijman, et al., 2012);

‘After twenty years of transition, there are still not enough private entrepreneurs to satisfy the needs of the huge number of peasant farms and household plots, and smallholders often feel that they suffer from blatantly exploitative practices of private intermediaries due to lack of competition. Market-oriented scholars accordingly expected to see rapid development of agricultural service cooperatives in CIS in response to smallholders needs.’

(Lerman and Sedik, 2013, p4)
E. POLICY RELEVANCE

Cooperative Policy by governments: Is “outsider’s support” needed?

Nowadays EU support is not allocated to individual farmers anymore but rather to collective associations/producer groups.

Prerequisite is formation of such groups

Policy question: Does emergence of collective associations/producer groups experience problems and could anything be done about it?

Unequal allocation of subsidies among member states due to unequal emergence of producer organizations. For example, cooperatives in the Netherlands acquired Euro 100 million out of the Euro 700 million of the subsidies available for the creation of producer organizations in the European Fruit and vegetables sector.
Iliopoulos and Cook (1999) specify as sources of heterogeneity:

- geographic dispersion
- number of different commodities produced or inputs purchased by members
- variance in members’ age
- variance in members’ educational levels
- differences between members in farm size
- percentage of non-farm income
- differences between members in terms of business objectives.

*Heterogeneity of farmers and large geographical distances* imply:
→ Higher coordination, commitment, decision making, influence and agency costs (Bijman, 2005);
→ More difficult formation of cooperative.
2 POSITIONING:

First attempt to model different types of emergence of farmer cooperatives (in phase 1 of the cooperative life-cycle).
RESEARCH QUESTION:

How does the emergence pattern of cooperatives relate to farmer heterogeneity?
SUBQUESTIONS:

- How to characterize bottom-up and top-down cooperatives?
- When do cooperatives emerge bottom-up / top-down?
- When do coop-champions arise?
- Is emergence of heterogeneous cooperatives possible?
- When do outsiders emerge and does their type matter?
- Do farmers’ decisions change due to the presence of an outsider, and does the type of the outsider matter?
3 MODEL

1 period non-cooperative game with two farmers.
SEQUENCE OF DECISIONS:

Stage 1: Nature determines farmer heterogeneity \( (d \in (0,1), \text{ uniformly distributed}) \);

Stage 2: Farmers choose independently to form a link with each other by choosing from a set of actions:

- Active
- Passive
- Leave
CHOICES OF FARMERS:

Choice set: \{A,P,L\}

- Active, reflecting an enthusiastic leader, taking an initiative, potentially having higher costs (if another player remains passive);
- Passive, reflecting not taking an initiative, avoiding additional costs;
- Leave, reflecting leaving the current market and producing elsewhere; if one player chooses to leave, another player produces in isolation.
PAYOFFS:

- If both farmers choose Active, then each farmer earns 4-2d;
- If only one farmers chooses A, then this farmer earns 4-4d, and the other (passive) farmer 3.
- If both farmers choose Passive, then each farmer chooses 2-d.
- If one farmer chooses to Leave, he earns 0, and another player gets 1 if active and 0.5 if passive.
FIRST PERIOD EXTENSIVE FORM

Nature

Farmer 1

Farmer 2
EQUILIBRIUM:

Coordination game
{A,P}, {P,A}, mixed

Efficient equilibrium
{A,A}

Prisoner's dilemma
{P,P}

Emergence (bottom up)

No emergence
I. {Active, Active}; Efficient

II. {Active, Passive}, {Passive, Active}: Scope for improvement is 1

III. {Passive, Passive}: Scope for improvement is 4-2d

There is scope for a third party because value can be created when d is sufficiently high (d>2/3).
4 OUTSIDER:

In the 2nd period, farmers have a choice of either accepting the offer from the outsider and forming a top-down cooperative or rejecting the offer and repeating 1st period game without the outsider.

• Selfish: maximize own profits;
  – Ultimatum game, “take-it-or-leave-it” contract

• Fair: divide surplus according to a fair rule
  – Shapley value.
ROLE OF THE OUTSIDER

• Brings value: $V$ if both farmers accept, $V/2$ if one accepts;

• Has a cost: $0*c$ if both farmers are active, $1*c$ if one farmer is passive, and $2*c$ if both farmers are passive, i.e. it is more costly to organize a top-down cooperative with more passive farmers.
5 SELFISH OUTSIDER - RESULTS

Emergence (top-down)

Emergence (bottom-up with one active farmer)

No emergence/Top-down emergence

No emergence
6 BENEVOLENT OUTSIDER – RESULTS

Emergence (top-down)

\[
V = 2c - 8d/3
\]

\[
4c - 4d/3
\]

\[
\{A,A\}
\]

\[
\{A,A\}, \{P,P\}, \text{mixed}
\]

Emergence (top-down)

No emergence/
Emergence top-down

Emergence (top-down)
### SELFISH VS. BENEVOLENT OUTSIDER

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<thead>
<tr>
<th></th>
<th>High Value V&gt;2c-3</th>
<th>Medium Value c-5.5&lt;V&lt;2c-3</th>
<th>Low Value V&lt;c-5.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selfish Outsider</td>
<td>5.45+V-5c/12</td>
<td>3+V/2</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>7.25+V-5c/12</td>
<td>6+V/2-d</td>
<td>6-10d/3</td>
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<tr>
<th></th>
<th>High Value V&gt;2c-8d/3</th>
<th>Medium/Low Value V&lt;2c-8d/3</th>
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<tbody>
<tr>
<td>Benevolent Outsider</td>
<td>V/2+4d/3</td>
<td>V/3+8d/3</td>
</tr>
<tr>
<td>Total</td>
<td>8+V</td>
<td>6.7+V/3-2d/3</td>
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• Benevolent type provides **better incentives** for farmers to become active than a selfish outsider:

  – When the outsider is selfish, additional surplus generated in a top-down cooperative is kept by the outsider;
  – With benevolent type, farmers capture part of the additional surplus and thus their final payoffs increase.
7 CONCLUSIONS

– Characterization of **bottom-up** and **top-down** cooperatives;
– In the absence of outsider:
  • Bottom-up emergence only when heterogeneity is low, i.e $d<1/2$
  • Initiative of one of the farmers, $1/2<d<2/3$
  • No emergence, $d>2/3$;
– Selfish outsider:
  • Reduces coordination and hold-up problems
  • Low-powered incentives to farmers due to a “selfish” contract;
– Benevolent outsider:
  • High-powered incentives to farmers due to their ability to capture some of the additional surplus in the top-down cooperative.
FURTHER RESEARCH:

• Incomplete information?
• Path-dependency and cooperative life-cycle;
  – Are top-down cooperatives “doomed to fail”? 
• In what environments do we expect a benevolent/selfish outsider to emerge?