When does defection pay? The stability of institutional arrangements in clusters

K. Press

DRUID Summer Conference
Knowledge, Innovation and Competitiveness: Dynamics of Firms, Networks, Regions and Institutions
June 18-20th,2006
Copenhagen, DK

Overview

- Introduction: Clusters, local culture, and change
- The model: Method, setup, and dynamics
- Results: Sustainable and beneficial defection
- Discussion: On the stability of local cultures

Clusters, agglomeration externalities and local culture

- The nature of clusters
  - Externalities (increase competitiveness)
  - Local culture (dilemma situations)

Clusters, agglomeration externalities and local culture

- The nature of clusters
  - Externalities (increase competitiveness)
  - Local culture (dilemma situations)
- The stability of institutional arrangements in clusters
  - Prominent notion of collective local culture supported by joint observation and punishment
    - ★ Enforcability (defection)
    - ★ Adjustability (change)

Clusters, agglomeration externalities and local culture

- The nature of clusters
  - Externalities (increase competitiveness)
  - Local culture (dilemma situations)
- The stability of institutional arrangements in clusters
  - Prominent notion of collective local culture supported by joint observation and punishment
    - ★ Enforcability (defection)
    - ★ Adjustability (change)
- Investigation of sustainability of defection and it's benefits in cluster adjustment to change

Modelling defection and cluster adjustment

Agent-based simulation model using the N/K methodology

- Cluster represented by production process
  - Different degrees of interdependence: Low, medium, high
  - Divided between (groups of) firms in the cluster
  - Interdependence within and between firms (agglomeration externalities)

Modelling defection and cluster adjustment

Agent-based simulation model using the N/K methodology

- Cluster represented by production process
  - Different degrees of interdependence: Low, medium, high
  - Divided between (groups of) firms in the cluster
  - Interdependence within and between firms (agglomeration externalities)
- Environment change affects cluster success (fitness)
  - Extent of change (shock/ disturbance)
  - Speed of change (slow/ fast)

Modelling defection and cluster adjustment

Agent-based simulation model using the N/K methodology

- Cluster represented by production process
  - Different degrees of interdependence: Low, medium, high
  - Divided between (groups of) firms in the cluster
  - Interdependence within and between firms (agglomeration externalities)
- Environment change affects cluster success (fitness)
  - Extent of change (shock/ disturbance)
  - Speed of change (slow/ fast)
- Defection and adjustment
  - Defecting agents behave egoistically (own interest)
  - Co-operating agents behave collectively (cluster interest)

Defection and cluster adjustment

- Egoists defecting from a collective local culture propose new solutions faster but their suggestions are inferior to other groups and the cluster as a whole.
- Sustainable egoism: Cases of egoism where the fitness of altruistic groups does not go below that obtainable in the "all egoists" scenario.
- Beneficial egoism: Cases where clusters with egoists perform better in adjustment to environmental changes than the benchmark case of "all altruists".

Results: Adjustment in shock environments

- Similar performance of benchmark cases all altruists/ all egoists
- Egoistic group never sustainable
- Limited amount of sustainable egoism in production processes with medium and high interdependence
- Egoists harm their group as interdependence grows

Results: Adjustment in disturbance environments

- Very different performance of benchmark cases all altruists/ all egoists
- Egoistic group never sustainable
- Sustainable and beneficial egoism in production processes with low, medium and high interdependence - especially for fast disturbances
- Egoists do not harm their group as interdependence grows

Results summary: Sustainable and beneficial defection

	Low	Medium	High
Fast shocks	None	1 or 2 Agents	3 Agents
Slow shocks	None	1 or 2 Agents	3 Agents *2 Agents*
Fast disturbance	*1-4 Agents*	2-3 Agents *4 Agents*	1,3,4 Agents *2 Agents*
Slow disturbance	1-4 Agents	1,3,4 Agents *2 Agents*	1-4 Agents

(Sustainable defection/ *Beneficial defection*)

The stability of institutional arrangements

- Egoistic group never sustainable (PD payoff structure)
- Mixed agent groups are sustainable and at times beneficial (especially when change is fast)
- Egoism (defection) does not always pay for the group
- Cluster's local culture more stable than expected:
  - Some defection (egoism) is sustainable
  - In presence of externalities, defection pays less for the originator