Outline

1. Divergent Development of Rural Regions in Germany
2. Policy Trends in European Rural Development
3. Rural Development as a Dynamic Coordination Game
4. Implications for Empirical Analysis
5. Conclusions
Aktuelle Bevölkerungsentwicklung

Bevölkerungsentwicklung 1997 bis 2003 in %

- bis unter -5,0
-5,0 bis unter -1,5
-1,5 bis unter 1,5
1,5 bis unter 5,0
5,0 bis unter 7,5
7,5 und mehr

Quelle: BBR (2005), Bevölkerungsentwicklung 2005, Reihe Bd. 21, Reihe Seite 51

Veränderung des Bruttoinlandsproduktes

Jährliche durchschnittliche reale Wachstumsrate des Bruttoinlandsproduktes zu Marktpreisen 1998 bis 2002 in %

- bis unter -1
-1 bis unter 0
0 bis unter 1
1 bis unter 2
2 und mehr

Quelle: BBR (2005), Raumordnungserhebung 2005, Reihe Bd. 21, Reihe Seite 147
Oldenburger Münsterland vs. NW-Sachsen

Feld, Wald und Wachstum

Dem Oldenburger Münsterland geht es bestens. Warum? Eine Reise durch eine Boomregion

VON KERSTIN BUND

Ein Masthähnchen stritt jung im Oldenburger Münsterland, keine 40 Tage lang in diesem westlichen Zentrum des Landes. Es trank, es wuchste, bis es rund 2000 Gramm gewogen hatte. Es kletterte auf einen Baum, wo die Gebr. St. betrieb. Das Letzte, was das Tier sah, ist das Federvieh kopfüber mit den Füßen an der Wand der Umgebung. Es tritt fort mit einem letzten Flügel durch die Türe und hält sich für ein neues Leben.

Rural race to the bottom

Low population density → Lack of critical mass for services and infrastructure

Out-migration (+ ageing) → Fewer jobs

Lower rate of business creation

EU Policies for Rural Development 2007-13

"LEADER Maintreaming" an important innovation in EU rural development

7 LEADER principles

1. Principle of territory
2. Bottom-up approach, Animation & Training
3. Forming partnerships in the Local Action Group (LAG) as recipients of EU funding
4. Innovation
5. Participation of private, social & public actors
6. Network formation, cooperation among regions
7. Complementary local funding & local management

Source: EU Commission.
Focus of LEADER projects

- Valorisation of natural & cultural resources
- Improvement of quality of life
- Enhancing local value added
- Knowledge & new technologies to improve rural competitiveness

Source: EU Commission.

Neo-endogenous rural development

- Development along a **bottom-up trajectory**, localities can effect change in their favour, need not become victims of broad, exogenous, political and economic forces
- **Intervention** in the form of rural policies, ‘neo’ stressing the influence of the **extralocal**

Christopher Ray 2006, Handbook of Rural Studies, p. 278.

- Neither laissez-faire nor strongly interventionist
  - “**Governmentally-induced spontaneous order**”
Planning vs. Spontaneous Order

„Es ist daher paradox …, wenn heute oft gesagt wird, daß wir die moderne Gesellschaft bewußt planen, weil sie so komplex geworden ist.

In Wirklichkeit können wir eine Ordnung von solcher Komplexität nur dann erhalten, wenn wir sie nicht nach der Methode des „Planens“, d.h. nicht durch Befehle handhaben, sondern auf die Bildung einer auf allgemeinen Regeln beruhenden spontanen Ordnung abzielen.“


Challenges for Economic Analysis of Neo-endogenous Rural Development Policies

- Simultaneity of local collective (in-)action & central government stimulation
- Role of external animation to overcome inefficient structures & conventions
- Path dependency created by initial conditions, e.g., social capital, previous positive experience, cultural background

- Required: a dynamic model of rural development that can identify effects of LEADER-type policies
My contribution

- Analysis of neo-endogenous rural development policy using evolutionary game theory
- Motivate econometric analysis of regional dynamics based on this foundation

Evolutionary game theory

- Models of multiple equilibria
- Historical contingency of outcomes (=path dependency)
- Local homogeneity coexists with global heterogeneity
- Can explain persistence of Pareto-inferior outcomes

An evolutionary, rural coordination game

Three modelling steps:
1. Static one-shot coordination game as analytic narrative
2. Introducing dynamics using evolutionary game theory
3. Extending the model by nesting a collective action game in the evolutionary population game

Step 1: The rural coordination game

<table>
<thead>
<tr>
<th>Mobile stay in rural area</th>
<th>Immobile invest locally</th>
<th>Immobile abstain to invest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile move to urban area</td>
<td>$y$, $y$</td>
<td>$w_r$, $w_r$</td>
</tr>
<tr>
<td></td>
<td>$w_u$, 0</td>
<td>$w_u$, $w_r$</td>
</tr>
</tbody>
</table>

With $y > w_u > w_r > 0$.

$y$ is the (equal) net payoff of an endogenous rural project carried out jointly by Immobile and Mobile, and $w_u$, $w_r$ are the urban and rural net wage rates, respectively. Nash-equilibria marked by underbar.
Step 2: Making the game evolutionary

- Interaction of 2 subpopulations (species), each with 2 strategies (phenotypes), paired once per period
- Limited cognitive capacities of agents, trial-and-error learning
- Periodical updating of strategies ("selection") based on successful phenotypes of previous period
- Idiosyncratic deviation from best-response possible, innovation
- Equilibria reached via "Evolutionary Stable Strategies" (ESS)
- Multiple equilibria, some may be Pareto-inferior

Dixit/Skeath 2001, Bowles 2004

Expected payoffs in the evolutionary game

Mobile

- Payoffs of Mobile
- Move
- Stay
- Benefit for staying Mobile: \( B_w = w + \beta y \)
- Benefit for moving Mobile: \( B_{uw} = w_i \)
- Tipping point: \( \beta^* = \frac{w_i - w}{y} \)

Immobile

- Payoffs of Immobile
- Abstain
- Invest
- Benefit for investing Immobile: \( B_i = \alpha y \)
- Benefit for abstaining Immobile: \( B_{ui} = w_i \)
- Tipping point: \( \alpha^* = \frac{w_i}{y} \)
State space in the evolutionary game

"Prosperity"

"Decline"
Less favoured regions

Implications of the evolutionary game

- For successful rural development, $\alpha^*$ & $\beta^*$ must be small, i.e., investing-staying (“prosperity”) equilibrium is robust
- Determining factors:
  - Initial conditions (+/-)
  - Innovation rate (+/-)
  - Pay-off to endogenous project (+)
  - Urban wage (-)
  - Rural wage (+ via Mobile, - via Immobile)
  - Relative share of subpopulations (- if unequal)
Two ways to introduce regime change:

a) Stochastic idiosyncratic play, leads to statements about “long-term evolutionary universals” (not followed here)
b) Intentional collective action (detailed in the following)
   - Endogenise idiosyncratic play
   - Introduce capacity to look forward

Step 3: Collective action

- Possibility to induce collective non-best response play in a single period (inspired by Bowles 2004)
- Individual propensity to engage \( (\bar{\delta}) \) influenced by
  - External financial stimulus \( T \) (e.g., LEADER-type policy)
  - Size of gains to be had from coordination (difference btw joint project and reservation wage, \( y - w \))
  - Social costs of free-riding \( c \), expressed by number of participating peers \( \theta \) (conformism effect)

- Benefit from participation: \( B_p = \bar{\delta}(T)(y - w) - (1 - \theta)c \)
- Benefit from non-participation: \( B_n = w - \bar{\theta}c \)
The collective action game

Benefit from participation for moving Mobile (abstaining Immobile): $B_p = \delta(T)(y - w) - (1 - \theta)c$
Benefit from non-participation: $B_N = w - \theta c$
Collective action successful if more than $\theta^*$ participate: $\theta^* = \frac{1}{2} \frac{\delta(T)(y-w) - w}{2c}$

Implications of collective action game

- Collective action a self-reinforcing process once critical value is passed
- Determining factors of low $\theta^*$ (successful change of regime):
  - Individual propensity to participate (+)
  - Level of financial support through policy (+)
  - Pay-off to endogenous project vs reservation wage (+)
Growth econometrics

- Basic growth regression: \( \log \left( \frac{Y_t}{Y_0} \right) = \beta \log Y_0 + \varepsilon \)

- \( Y_t \) GDP per worker at time \( t \), \( Y_0 \) initial GDP per worker, \( \beta < 0 \) convergence parameter

- To be estimated on a dataset of regions

Implications for econometric analysis

- Rejection of absolute convergence hypothesis
- Existence of bipolar divergence, or convergence clubs
- Policies may or may not move regions from downward to upward trajectory
- Growth equation to be augmented by additional variables outlined above
- Threshold regression (Bruce Hansen 2000, Econometrica)
- Panel data econometrics
## Conclusions

- Theoretical workhorse for analysing rural development
- Rural outcomes cannot be planned or engineered, initial conditions matter
- “Spontaneous rural order” may lead to Pareto-inferior outcomes
- Organisational principles involving government (“intervention”) & local collective action (“bottom-up”)
- Econometric implementation & tests yet to be carried out