Consequences of the complexity of structural change in Agriculture

Remaining puzzles after two years of analyses

Structure of the presentation

1. Summary of results from the past two years
   a. The interdependent influence of farm-level characteristics on farm-exits
   b. The ambiguous influence of policies on farms from different size-classes
   c. Neighbourhood-effects in the determination of farm-exits

2. Conclusions with respect to sector-models
   a. Modeling structural change on the farm-level
   b. Modeling the aggregate sector's development
1a Analysis of single farm data

Farm-characteristics' relation to farm-exits

- descriptive
- logistic regression

Non-linear influence of farmer's age

<table>
<thead>
<tr>
<th>Age 2003</th>
<th>Abandonment 03 or 07</th>
<th>Sum</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>younger 49</td>
<td>149,173</td>
<td>65,741</td>
</tr>
<tr>
<td></td>
<td>69</td>
<td>31</td>
</tr>
<tr>
<td>49 and older</td>
<td>140,285</td>
<td>56,735</td>
</tr>
<tr>
<td></td>
<td>71</td>
<td>29</td>
</tr>
<tr>
<td>thereof:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>49-59</td>
<td>78,019</td>
<td>18,752</td>
</tr>
<tr>
<td></td>
<td>81</td>
<td>32</td>
</tr>
<tr>
<td>59-64</td>
<td>30,025</td>
<td>14,104</td>
</tr>
<tr>
<td></td>
<td>68</td>
<td>32</td>
</tr>
<tr>
<td>64-69</td>
<td>23,413</td>
<td>15,962</td>
</tr>
<tr>
<td></td>
<td>61</td>
<td>39</td>
</tr>
<tr>
<td>69 and older</td>
<td>8,828</td>
<td>8,817</td>
</tr>
<tr>
<td></td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Sum 289,458</td>
<td>122,476</td>
<td><strong>411,934</strong></td>
</tr>
<tr>
<td>Percent</td>
<td>70</td>
<td>30</td>
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</table>
Graph of non-linear influence of livestock

Graph of non-linear influence of land
Different picture considering livestock

Grazing-Lifestock Farms in Lower-Saxony

Hectares

Probability of drop-out

young, 83 Vieheinheiten
young, 250 Vieheinheiten
young, 500 Vieheinheiten
old, 83 Vieheinheiten
old, 250 Vieheinheiten
old, 500 Vieheinheiten

Different picture considering livestock

Pig- & Poultry-Farms in Lower-Saxony

Hectares

Probability of drop-out

young, 83 Vieheinheiten
young, 250 Vieheinheiten
young, 500 Vieheinheiten
old, 83 Vieheinheiten
old, 250 Vieheinheiten
old, 500 Vieheinheiten
1b Panel analysis of farm-transitions between size-classes

- economic fluctuations
- development between 1979 and 1999
  - Prices for commodities
  - Prices for production factor
  - Farmers' demand for long-term credits
  - joblessness

- political measures
- Dummies show duration of validity
  - Non-tradeable milk-quota 1984-1994
  - Tradeable milk-quota from 1994 on
  - Premium for extensification and set aside 1988-1992
  - Early-retirement-measure 1989-1998
  - cut of price-support with income-compensation (Mc-Sharry) 1992
  - followed 1999 by Agenda 2000

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Development of share of exiting small farms

- ASE
- aufgrente
- entkopp1
- extens
- GVhaklein
- Mquotahandel

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Early retirement scheme
### Analyses of transition probabilities and mobility-indices with Silke Huettel

#### Table A.5: Description of variance analysis (MANOVA)

<table>
<thead>
<tr>
<th>Source</th>
<th>Upward mobility</th>
<th>Downward mobility</th>
<th>Exit mobility</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Degrees of freedom</td>
<td>Typ3 III sum of squares</td>
<td>Pr &gt; F</td>
</tr>
<tr>
<td>economic cluster</td>
<td>4</td>
<td>0.11</td>
<td>0.024</td>
</tr>
<tr>
<td>production-type-cluster</td>
<td>5</td>
<td>0.04</td>
<td>0.548</td>
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<tr>
<td>structural cluster</td>
<td>4</td>
<td>0.70</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>year</td>
<td>1</td>
<td>0.00</td>
<td>0.640</td>
</tr>
<tr>
<td>year*economic cluster</td>
<td>4</td>
<td>0.08</td>
<td>0.084</td>
</tr>
<tr>
<td>year*production-type-cluster</td>
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<td>0.04</td>
<td>0.553</td>
</tr>
<tr>
<td>year*structural cluster</td>
<td>4</td>
<td>0.11</td>
<td>0.019</td>
</tr>
<tr>
<td>R-square</td>
<td></td>
<td>0.18</td>
<td></td>
</tr>
<tr>
<td>Pr&gt;F</td>
<td>&lt;.0001</td>
<td>0.002</td>
<td></td>
</tr>
</tbody>
</table>

Note: 642 observations (321 districts for two time-periods)
Source: Own calculation based on FDZ 1999 - 2007, Arbeitskreis Volkswirtschaftliche Gesamtrechnung; SAS Proc GLM.

#### Relation between regional farm-structure and exit-mobility

![Graph showing the relationship between average size and % on overall mobility](image)

2a Modeling structural change

- Our approach: Modeling via exogenously estimated, constant coefficients
- Problem:
  - complex relations between factors of influence
  - great number of coefficients to be estimated
    - for example: impact of price-change differentiated by production-type by size-class by type of region
  - In how far do regional differentiated developments have to be modeled?

Alternative approach

- Modeling the rational behind the development by taking into account
  - rents of the status quo and
  - strategic interaction of farms on land market
... because these cause the observed
  - heterogenous reactions
  - non-linear influences and
  - neighbourhood-effects
2b Modeling sector-development on an aggregate level

Due to status-quo-rents and strategic interaction of farms on the aggregate level adverse reactions of production on economic changes are possible

- Loss of 75 farms in the district
- Loss of 229 farms
- Loss of 383 Farms

Another question:

- How do regional differences in adaption towards exogenous changes affect outcomes on the national level?
Resumè

In order to project sectoral developments reliably
• the mechanisms of farm-adaption will have to be understood comprehensively
• models of structural change have to be build on these mechanisms
• regional peculiarities and neighbourhood-effects have to be taken into account
• in order to avoid aggregation errors the right spatial level has to be chosen
• a bottom-up approach of modeling has to be applied

Outlook?

One of the biggest capitals of this research-group is the plurality of models and approaches integrated.
At the same time this should be seen as a challenge.
• What assumptions and paradigms hide behind the different approaches?
• Are the different approaches compatible in their assumptions? If not ...
  – ... what are the underlying theoretic reasons for incompatibility?
  – ... what are the consequences in modeling?
• Might differences be due to pragmatism and if so ...
  – ... under which circumstances does pragmatism lead to satisfactory scientific results?
Thank you very much for the opportunity to take part in this inspiring research-group.

**Back-up: A possible rational**

<table>
<thead>
<tr>
<th></th>
<th>Mengenführer</th>
<th>Mengenfolger</th>
<th>Stabilisierer</th>
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</thead>
<tbody>
<tr>
<td>Mengenführer</td>
<td>-0.05</td>
<td>1</td>
<td>(1-b)<em>0.46 + b</em>1.16</td>
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<td>Mengenfolger</td>
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<td>0.5</td>
<td>0.6</td>
</tr>
<tr>
<td>Stabilisierer</td>
<td>(1-b)<em>0.21 + b</em>(-0.39)</td>
<td>0.3</td>
<td>0.4</td>
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