The stability of regional labour markets over time

Workshop
“Developing European Labour Market Areas”
and training on EU-TTWA method

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Index

1. Motivation
2. Data
3. Method
4. Results
   4.1 Increasing commuting distances
   4.2 Delineation results over time
   4.3 Stability of delineations over time
5. Conclusion
1. Motivation

Functional regions:

- Important tool for analyses of labour market and economic policy
- Based on commuting flows: Areas with strong commuting and economic activity within its boundaries and few connections with outside regions
- Delineations are based on different methods, most use data of one year:
  - **Threshold methods**: Travel-to-Work Areas (TTWAs)
    - Great Britain (ONS and Coombes 1998)
    - Spain (Casado-Diaz 2000)
  - **Cluster analysis**: (Local) Labour Market Areas (LLMAs)
    - Netherlands (Van der Laan and Schalke 2001)
    - USA (Tolbert and Kilian 1987)
  - **Factor analysis**: Regional Labour Markets (RLM)
    - Germany (Eckey, Kosfeld, Türck 2006; Kosfeld and Werner 2012)
1. Motivation

- Increasing number of commuters and average commuting distances during the last decades

- Only a few studies investigate the effects of increasing mobility on labour market delineations:

  ➢ **Result:** Decreasing number of labour markets and increasing size of labour markets over time

  ➢ **How do increasing commuting patterns influence the shapes and sizes of functional labour market regions over time?**

  ➢ **How stable is our delineation method considering changing commuting patterns?**
2. Data

**Commuting data** (German Federal Employment Agency statistics)

- from 1993 to 2013
- of all employed persons in Germany who are subject to social security:
  - ≈ 26.060 - 29.145 million employees
  - ≈ about 70 % of all gainfully employed persons in Germany
- for approximately 12,000 German municipalities
- The 21 years were grouped into seven units of three years: 1993-1995, 1996-1998, … , 2011-2013
3. Method

**Three-Step Method:** combination of graph theory and threshold method

- **First Step:**
  - Computing all bidirectional flows among 12,000 municipalities
  - Comparing the commuters’ relative share with the resident employees
  - Dominant flow = Largest share + from small region to larger region
  - Merging regions if dominant flow > threshold value
  - Recalculation of commuting flows
    - between individual regions,
    - between individual regions and aggregated regions, and
    - between aggregated regions with the same thresholds

Depending on thresholds and iterations:

> **Creation of many meaningful delineations**
3. Method

- **Second Step:**
  - Selection of the best delineation: highest **Modularity value Q** (Newman and Girvan 2004)
  - Comparing the actual link values inside a labour market region with the expected link values if it was random
  - Number of links in LMR > number of links in the null model:
    
    \[
    0 < Q < 1
    \]

    - Network research: \(0.3 < Q < 0.7\)
    - Commuting data: \(0.83 < Q < 0.88\)

- **Third Step:**
  Optimization of results was not applied
4. Results

- Increasing average commuting distances
  - Increasing average commuting distance of all employees from **15 km** (1993) to **23 km** (2013)
  - Increasing average commuting distance for employees crossing municipality borders from **33 km** (1993) to **39 km** (2013)

- Increasing number of commuters crossing municipality borders
  - Decreasing share of employees living and working within the same municipality
  - Increasing share of employees crossing municipality borders
4.1 Increasing commuting distances

Change in commuting distances in Germany from 1993 to 2013 in percent

> 300 km: 1.0% -> 1.7%
100 km – 300 km: 2.0% -> 3.0%
50 km – 100 km: 2.2% -> 3.3%
10 km – 50 km: 25.3% -> 34.1%
<10 km: ≈17%
same municipality: 53% -> 41%
4.2 Delineation results over time

The twenty best modularities for each of the seven three-year groups
4.2 Delineation results over time

Number of labour market regions for the twenty best delineations for each three-year group

Best result: 86 76 66 55 60 59 43
4.3 Stability of delineations over time

- Best overall result: threshold value = 4, iterations = 2
- Labour market regions: 42 - 88, modularity values: 0.841 - 0.881
- This best overall result ranks with one exception among the top 5 results for each of the three-year groups
- Division of Germany into 220 regions:
  - **Core regions**: municipalities are aggregated to the same labour market region in every three-year period
  - **Related regions**: municipalities sometimes form a separate labour market region of their own and sometimes belong to one particular labour market region
  - **Overlapping regions**: municipalities belong to different labour market regions
4.3 Stability of delineations over time

Descriptive statistics for the best overall delineation of labour market regions distinguishing three categories

<table>
<thead>
<tr>
<th>Category</th>
<th>Number of regions</th>
<th>Number of municipalities</th>
<th>Municipalities in percent</th>
<th>Number of employees (thousands)</th>
<th>Employees in percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core</td>
<td>36</td>
<td>6,730</td>
<td>60.5</td>
<td>19,001</td>
<td>66.3</td>
</tr>
<tr>
<td>Related</td>
<td>88</td>
<td>3,473</td>
<td>31.2</td>
<td>8,501</td>
<td>29.7</td>
</tr>
<tr>
<td>Overlapping</td>
<td>96</td>
<td>914</td>
<td>8.2</td>
<td>1,146</td>
<td>4.0</td>
</tr>
<tr>
<td>Total</td>
<td>220</td>
<td>11,117</td>
<td>100.0</td>
<td>28,648</td>
<td>100.0</td>
</tr>
</tbody>
</table>
4.3 Stability of delineations over time

**Best overall result:**
threshold value = 4
iterations = 2

The seven delineations of the best overall algorithm are put one on top of each other:

- **36 CORE REGIONS**
- 88 Related regions
- 96 Overlapping regions

Core regions + related regions that sometimes and exclusively are assigned to this labour market region
5. Conclusion

- Contribution to the literature by examining the stability and robustness of delineations of labour market regions over time

- Increasing commuting distances
  - Number and quality of delineated labour market regions declined

- Distinguishing three types of labour market regions: **core, related and overlapping**
  - Confirmation of stability and robustness of the delineation method over time

- **Disadvantage** of delineations in general:
  - Theoretical concept that tries to find exact borders surrounding functional labour market regions

- **Suggestion:**
  - Mapping the density of labour market interactions when analyzing labour market processes over time
5. Conclusion

- **Advantage:**
  - A more differentiated picture by distinguishing core and related regions, introducing a simple hierarchical relation
  - Category **overlapping** captures an important feature of real world interaction that is usually ignored in functional delineations

- **Recommendation for Germany:**
  - 36 labour markets consisting of a core and its related parts
    - If there is a need of small-scale units:
      - Cores and parts can be analyzed separately (124 labour markets)
    - Overlapping areas:
      - can be ignored for certain research questions or
      - can be assigned to core or related labour markets according to the strongest interaction
Thank you for your attention

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