Reurbanisation processes in a shrinking city

Empirical evidence of reurbanisation processes using an interdisciplinary indicator set

_Dagmar Haase, Nadja Kabisch_
Issues addressed in the paper

✓ Introduction
✓ Research challenge and objectives
✓ Core set of relevant indicators
✓ Empirical evidence of reurbanisation and its stability exemplified at the city of Leipzig
✓ Conclusions
Cyclic model of urban development

$U = \text{urbanization}; \ S = \text{suburbanization}$

$D = \text{disurbanization or counterurbanization}$

$R = \text{reurbanization phase}$

*Van der Berg et al., 1982*
Research challenge

- Recent research evidence across Europe underscores that reurbanisation processes have become increasingly spread in different European countries.

- Reurbanisation is closely linked to demographic changes and related new life styles and housing preferences.

- Do we find an overall “resurgence” of the inner city?

- Does reurbanisation represent a way to make the compact city sustainable also under conditions of population slowdown and ageing in Europe?
Objectives

In this paper we analyse

• if reurbanisation can be identified in inner-city areas by an influx of new residents,

• if reurbanisation needs local settings of spatial, socio-economic and residential environment factors to become not only a momentum but a long-term process.

• We test the appropriateness of an indicator set developed by scientists and practitioners for the observation of inner-city reurbanisation processes (bring in findings of a small-scale municipal time series from 1993-2005).
What indicates reurbanisation?

1. Household number, size
2. Household types
3. Net-migration
4. Age structure
5. Education & prof. structure
6. (Un-)Employment, welfare
7. Housing costs
8. Tenure structure
9. Residential/com. vacancy
10. SME
11. Schools, kindergartens
12. Renovation, construction
13. Public greenery
14. Travel frequency
15. Air quality, noise
16. Land use structure
17. Income, expenditure
18. Municipal budget/capita
19. Local commitment
20. Perceptual values

Haase et al., 2006
Haase et al., 2008
Empirical Evidence

Case study of Leipzig, eastern Germany
Leipzig: population development

- Migration balance
- Natural population growth
- Population saldo

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Methodology

Hypothesis

Quantitative test of reurbanisation indicators for \( t_1 \)

Preliminary identification of reurbanisation sensitive areas

Validation of these sensitivity using time series analysis \( t_n, t_{(n+1)}, \ldots \)

Municipal data for Leipzig for \( t_1 \)

Municipal data for Leipzig for \( t_n, t_{(n+1)}, \ldots \)

EU FP5 Re Urban Mobil

Literature study

Statistics

Spatial GIS maps

Interpretation of the results

Regression
Correlation
Variance
Cluster
Discriminance
Residuals
Household size & number

![Graph showing household size and number from 1995 to 2005. The graph indicates a decrease in household size and an increase in the number of households over time.](image-url)
Household size distribution

old built-up „Wilhelminian“ housing stock

average household size
- ≤ 1.60
- 1.61 – 1.80
- 1.81 – 2.00
- 2.01 – 2.20
- 2.21 – 2.55
Interplay of demographic indicators

1. \[ y = 113751e^{-2.712x} \]
   \[ R^2 = 0.4647 \]

2. \[ y = 0.2402x - 33.589 \]
   \[ R^2 = 0.9167 \]
Inmigration age cohorts

- Zentrum-Nord
- Schönfeld-Ost
- Schleußig
- Knautkleeberg-Knauthain
- Plaußig-Portitz

Old built-up areas

Single house areas

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Local settings for reurbanisation

mean household size

Leipzig 1999
Leipzig 1998

R²


R²


firms

Leipzig 1999
Leipzig 1998

R²


$R^2_{m \rightarrow m+n}$

$((y = ax + b_m) + (y = ax + b_{m+1}) + (\ldots) + (y = ax + b_{m+n}))$
Cluster of reurbanisation?

WARD procedure
Conclusions

• We found young and small households (≤ 2 persons) to be the reurbanisers in Leipzig since 1993.

• This influx of households is supported by the availability of socio-economic, e.g. shopping, health and educational infrastructure.

• Further we identified a ring of “reurbanisation sensitive” districts over a longer term by means of a cluster analysis.
For further reading:


Thank you.

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What indicates reurbanisation?

- changes in *household and age structure*
- changes in the *social composition*
- changes in *migration*
- changes in *economic and commercial (a.o. retail) structures*
- changes in the *residential environment* and *urban amenities*
  (keys to determine housing needs and wants of reurbanisers)
- *changes of the character of the area* and *related perceptions*
  (by both residents and local experts/stakeholders)
Why to monitor reurbanisation?

- To get a broader picture of evidence, progress and local specifics of reurbanisation processes (*e.g.* for an entire city)

- To answer the question whether reurbanisation needs certain settings of socio-economic and residential environment factors to become a stable component of urban development

- To provide practitioners with appropriate knowledge how to endeavour and better support reurbanisation processes to stabilize the inner city in a sustainable way
Leipzig: population density

<table>
<thead>
<tr>
<th>Year</th>
<th>Density</th>
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<tr>
<td>1850</td>
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<tr>
<td>1890</td>
<td>8.42</td>
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<tr>
<td>1910</td>
<td>7.58</td>
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<tr>
<td>1939</td>
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<td>1998</td>
<td>2.43</td>
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<td>2006</td>
<td>1.65</td>
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Leipzig’s ‘situation’

Population growth 1995-2004

Youth quota 1995-2004

Haase & Nuissl, 2007
Leipzig: age classes
Leipzig: population density
Leipzig’s municipal districts
## R² of immigration

<table>
<thead>
<tr>
<th>Year</th>
<th>Households R²</th>
<th>Households R² (borders before 1994)</th>
<th>Firms R²</th>
<th>Firms R² (borders before 1994)</th>
<th>Kindergartens R²</th>
<th>Kindergartens R² (borders before 1994)</th>
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<tr>
<td>1993</td>
<td>-</td>
<td>-</td>
<td>0.31**</td>
<td>0.31</td>
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<td>0.54**</td>
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<tr>
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<td>-</td>
<td>-</td>
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<td>0.01</td>
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<td>0.34</td>
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<td>0.33**</td>
<td>0.33</td>
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<td>0.54**</td>
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<td>0.03</td>
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<tr>
<td>1998</td>
<td>0.08*</td>
<td>0.08*</td>
<td>0.42**</td>
<td>0.42</td>
<td>0.45**</td>
<td>0.45**</td>
</tr>
<tr>
<td>1999</td>
<td>0.19**</td>
<td>0.09*</td>
<td>0.54**</td>
<td>0.40**</td>
<td>0.51**</td>
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<td>0.52**</td>
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<td>2002</td>
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<td>0.18**</td>
<td>0.50**</td>
<td>0.44**</td>
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<td>2003</td>
<td>0.47**</td>
<td>0.20**</td>
<td>0.53**</td>
<td>0.44**</td>
<td>0.40**</td>
<td>0.29**</td>
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<tr>
<td>2004</td>
<td>0.45**</td>
<td>0.20**</td>
<td>0.53**</td>
<td>0.44**</td>
<td>0.40**</td>
<td>0.29**</td>
</tr>
<tr>
<td>2005</td>
<td>0.48**</td>
<td>0.24**</td>
<td>0.61**</td>
<td>0.53**</td>
<td>0.34**</td>
<td>0.24**</td>
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**p = 0.01  * p = 0.05
Socio-economic change after 1990

\[\Delta \text{Share of companies} \quad 1993-2005\]
- 100 und mehr
- 50 bis unter 100
- 25 bis unter 50
- 0 bis unter 25
- bis unter 0

\[\Delta \text{Share of kindergardens} \quad 1993-2005\]
- 25 und mehr
- 0 bis unter 25
- -50 bis unter 0
- -75 bis unter -50
- unter -75

\[\Delta \text{Share of schools} \quad 1993-2005\]
- 0 und mehr
- -25 bis unter 0
- -50 bis unter -25
- -75 bis unter -50
- unter -75,00

\[\Delta \text{Share of doctors} \quad 1993-2005\]
- 100 und mehr
- 50 bis unter 100
- 0 bis unter 50
- -25 bis unter 0
- -25 bis unter 50
- -75 bis unter -50
- bis unter -25
Household income

\[ y = -23,231x + 64,78 \]
\[ R^2 = 0,3215 \]

\[ y = 17,046x - 20,061 \]
\[ R^2 = 0,3225 \]
Cluster stability over time

Cluster stability according to the 4 variables:
- Stays in the same cluster (stable)
- Moves between 1 clusters
- Moves between 2 clusters
- Moves between 3 clusters
- Moves between 4 clusters
Where do reurbanisers come from?

Immigrants (per 1000 inhab.)
- unter 1,3
- 1,3 bis unter 2,5
- 2,5 bis unter 10
- 10 und mehr

Trend 2000-2006
- x same
- - decreasing
- + increasing

Südvorstadt
Neustadt-Neuschönefeld
Household size & local settings

- Immigrants:
  - $y = 113751e^{-2.7126x}$
  - $R^2 = 0.4647$

- Share of residential vacancy (%):
  - $y = 107251e^{-2.7126x}$
  - $R^2 = 0.4647$

- Household size & inmigration:
  - $y = 0.2402x - 33.589$
  - $R^2 = 0.9167$

- Household size & number of persons < 40 years:
  - $y = 2562e^{-3.5313x}$
  - $R^2 = 0.7394$

- Household size & rate of foreigners (%):
  - $y = 2562e^{-3.5313x}$
  - $R^2 = 0.7394$
Net-migration innercity+total

$y = 0.4734x - 38.066$

$R^2 = 0.578$
Inmigrants ...

\[ y = 0.1721x^{0.8483} \quad R^2 = 0.5462 \]

\[ y = 7.552x^{0.5853} \quad R^2 = 0.6166 \]

\[ y = 0.3459x - 11.224 \quad R^2 = 0.9175 \]

\[ y = 0.0303x^{0.8806} \quad R^2 = 0.4454 \]
Ratio of immigrating cohorts

... compared to the total number of the respective cohort for the entire city

20 ... 30 years

60 ... 70 years
Time series of indicators

\[ y = 0.0143x + 0.4797 \]

\[ R^2 = 0.6771 \]

Change of \( R^2 \) between immigration and doctors (social infrastructure)

\[ R = \frac{(I_i + I_c)_n}{P_c} \]
Clusters of urban development

unemployment

net-migration

mean age

foreigners (%)

unemployment

net-migration

mean age

foreigners