Segmentation and behavior of regional housing markets in Poland

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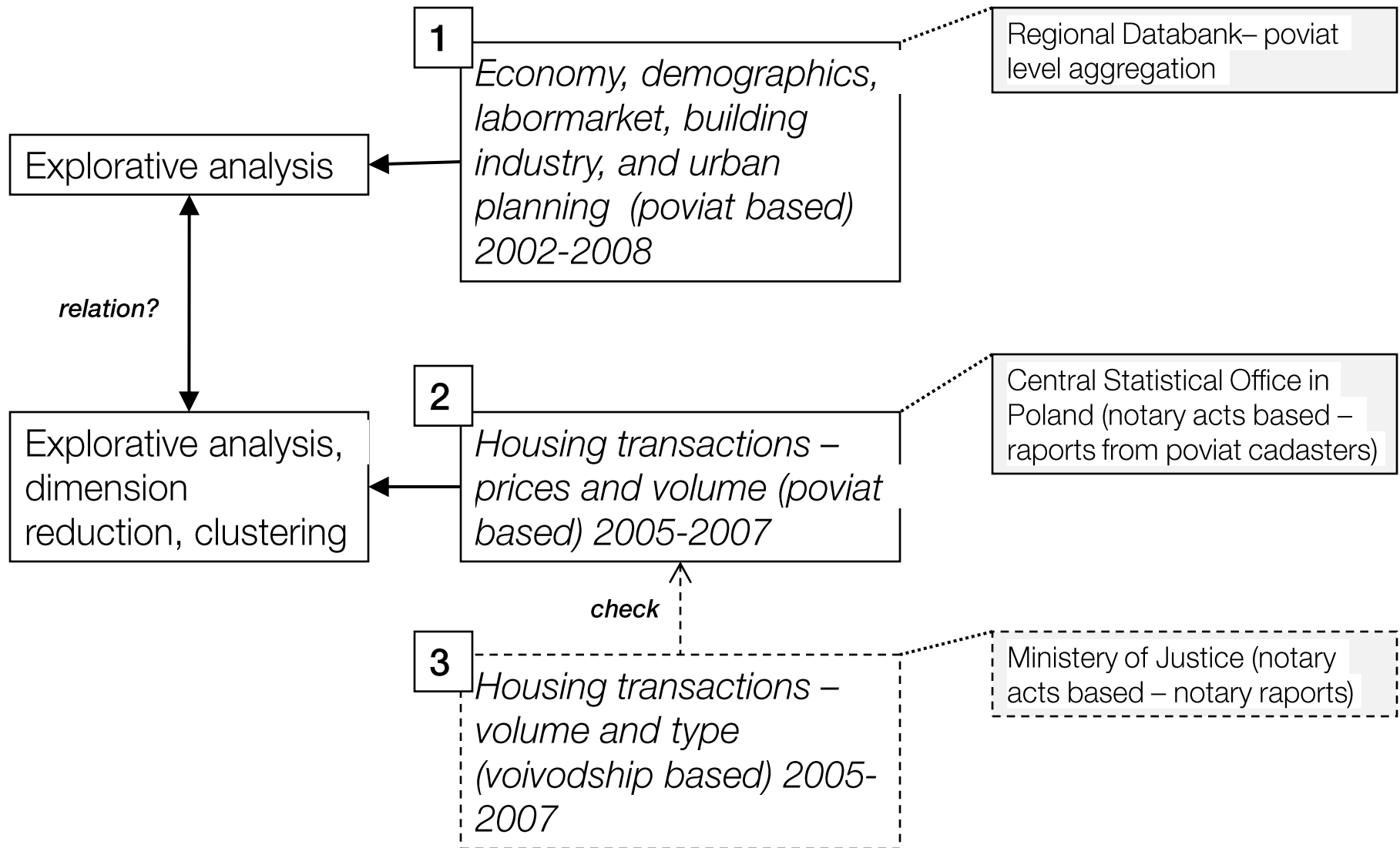
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Project rationale

- Knowledge gap:
  » Little effort has been made to understand the nature of demand on emerging markets (CEE countries), after system transformation
  » Regional housing market differences and their long-term consequences

- Availability of data:
  » Database on Housing Transaction in Poland (aggragated at poviat level)

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- Heterogenity and regional differences among housing markets was explored in several studies – mostly in US. Example:
    - » Goetzmann and Wachter (1995)

- Research on local differences of european housing markets is less developed. Some examples:
    - » Pinto (2005) - segmentation of housing market in Italy
    - » Forys (2006, 2008) - clustering of selected local housing market in Poland

1

Economy, demographics, labormarket, building industry, and urban planning (poviat based) 2002-2008

Regional Databank– poviat level aggregation

Explorative analysis

relation?

2

Housing transactions – prices and volume (poviat based) 2005-2007

Central Statistical Office in Poland (notary acts based – raports from poviat cadasters)

Explorative analysis, dimension reduction, clustering

check

3

Housing transactions – volume and type (voivodship based) 2005-2007

Ministery of Justice (notary acts based – notary raports)

A. Exploration

A.1 Goal: Construction of indicators and data audit

B. Principal Component Analysis (PCA)

B.1 Goal: Dimension reduction

B.2 Based on indicators constructed in exploration phase

C. Cluster Analysis (CA)

C.1 Goal: Grouping poviats (counties) in groups sharing same economic conditions

C.2 Based on principal component scores

Principal component analysis

- Indicators
  - » Demographics (net migrations, household compositions)
  - » Labor market (unemploiment, incomes)
  - » Tourism industry (tourists, beds, hotels)
  - » Urbanisation (urbanized and rural land, population density)
  - » Housing stock (dwellings, masterplans)

- Outcomes:
  - » Dimension reduction
  - » 12 economic indicators → 4 principal components

PCA – component extraction

Total Variance Explained

Component	Sums of Squared Loadings	
	Total	Cumulative %
C1 Development	3,11	25,98
C2 Housing stock	2,17	44,04
C3 Migrations	1,38	55,55
C4 Tourism	1,18	65,40

Extraction Method: Principal Component Analysis.

PCA – component description
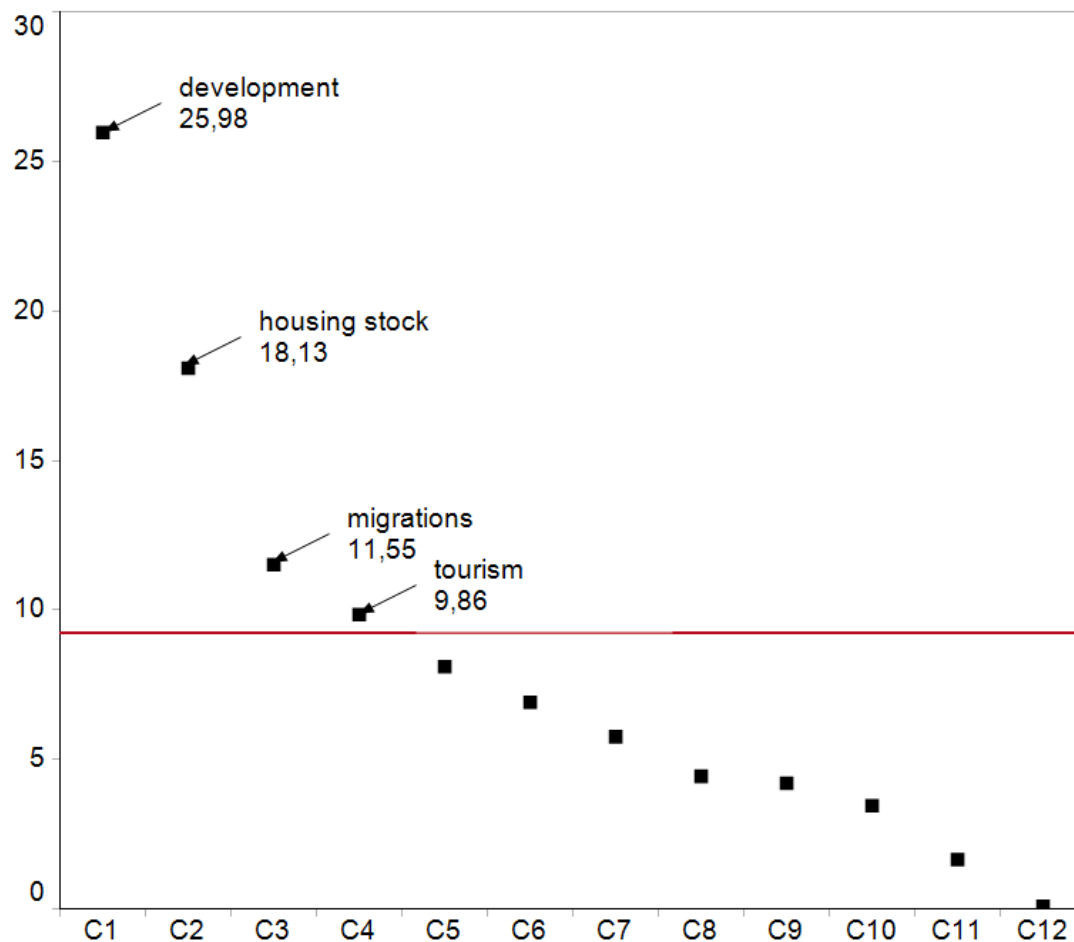
Rotated Component Matrix[a]

	Component			
	C 1 Development	C 2 Housing stock	C 3 Migrations	C 4 Tourism
Households/Dwellings [2002]	-,085	**,960**	-,076	,103
Small households/Households [2002]	**,705**	-,234	-,244	-,189
Households in separate dwelling rate[2002]	,010	**,973**	-,064	,066
Rural land area/Total area[2002]	**-,747**	-,014	,185	-,033
Area covered by masterplans [2007]	,090	-,138	-,018	**-,500**
Unemployment rate[2007]	-,274	,069	**-,576**	**,535**
Longterm unemployed /Unemployed [2002-07]	**-,403**	**-,356**	-,205	,016
Working population/Population [2008]	**,739**	,121	,096	,052
Net migration [2002-07]	-,058	-,049	**,883**	,096
Economic activity[2002-07]	**,826**	-,029	**,313**	,145
Avarage income [2002-07]	**,578**	-,132	,201	**-,415**
Tourists per 1k inhabitants [2002-07]	**,313**	-,103	,080	**,743**

Extraction Method: Principal Component Analysis.

 Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 6 iterations.

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CA - introduction

- Hierarchical cluster analysis
  - » *Variables:* principal component scores
  - » *Distance measure:* squared Euclidean distance
  - » *Clustering methods:* Ward, furthest neighbor
  - » *Dendrograms analysis:* investigating stability of solutions and final number of clusters

- K-mean cluster analysis:
  - » Number of clusters: 5

CA – description of clusters

C1 *thin* (102)

> » Geographically mostly eastern Poland, rural and underdeveloped
> » Weak economic growth, high unemployment, decreasing population

C2 *satelitte* (41)

> » Geographically in proximity to cities, urbanizing and developing at rapid pace
> » Very high immigration, fast growing, potential urban sprawl

C3 *robust* (71)

> » Solid fundamental economic growth, highly urbanized, mostly largest cities
> » Low unemployment, high average incomes, young and small households

C4 *fashionable* (14)

> » Mostly ski-resorts (in Tatras Mountains) and beach-resorts (Baltic seacoast)
> » Investment, second homes' markets, weak fundamentals

C5 *stagnant* (149)

> » Moderate sized cities, weak development potential, large housing stock
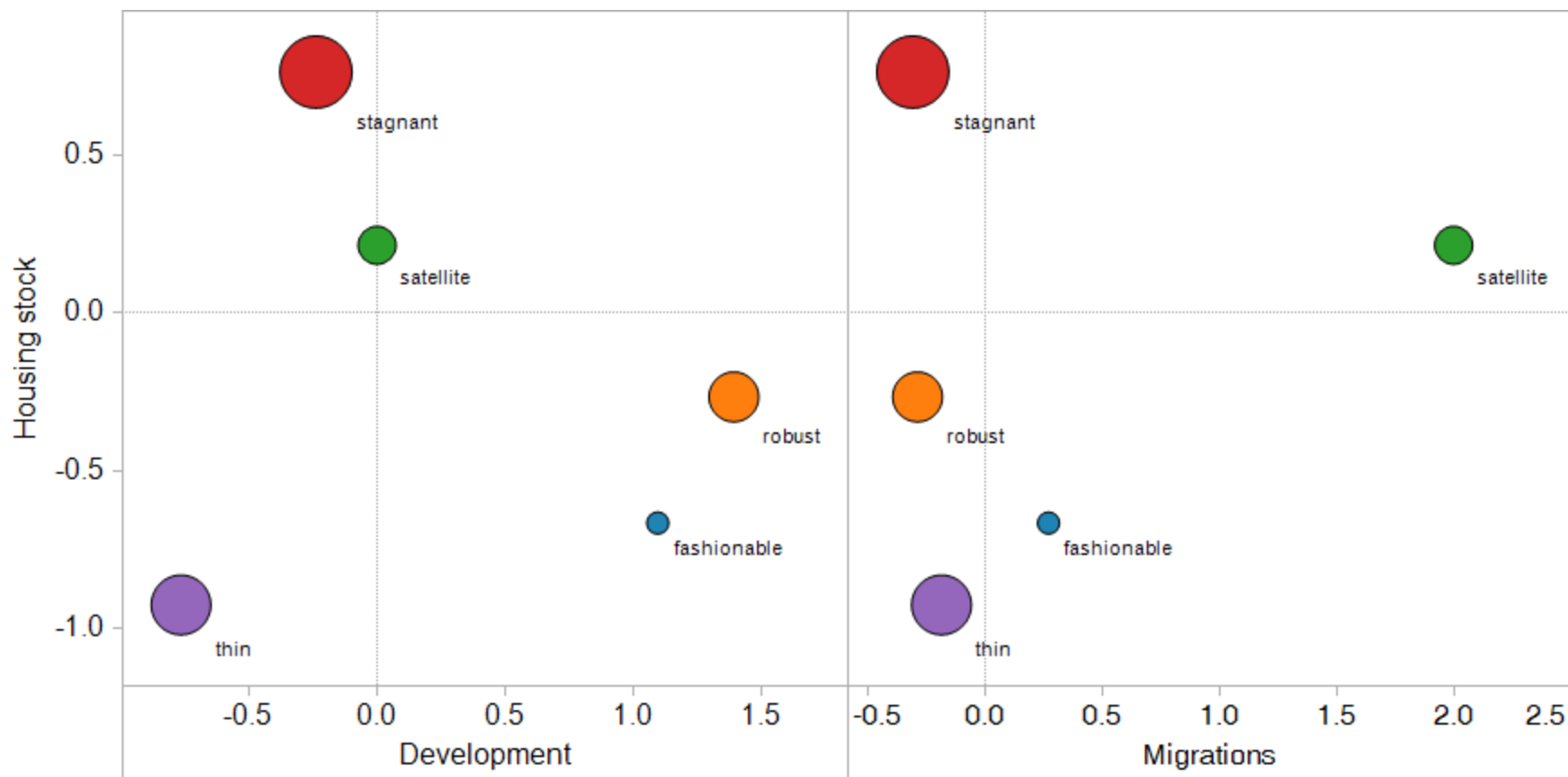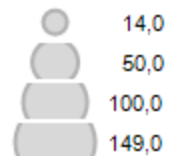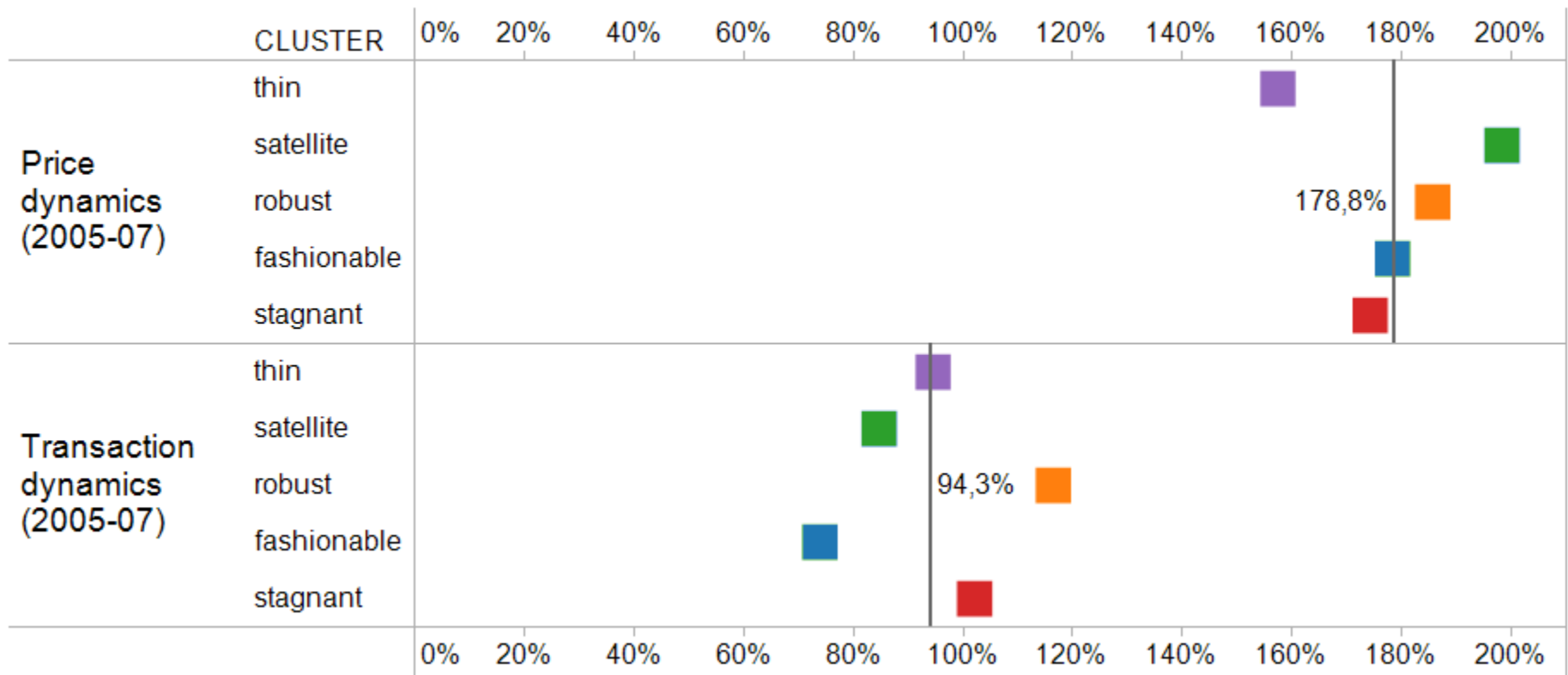> » High unemployment, deacreasing population, weak economic base
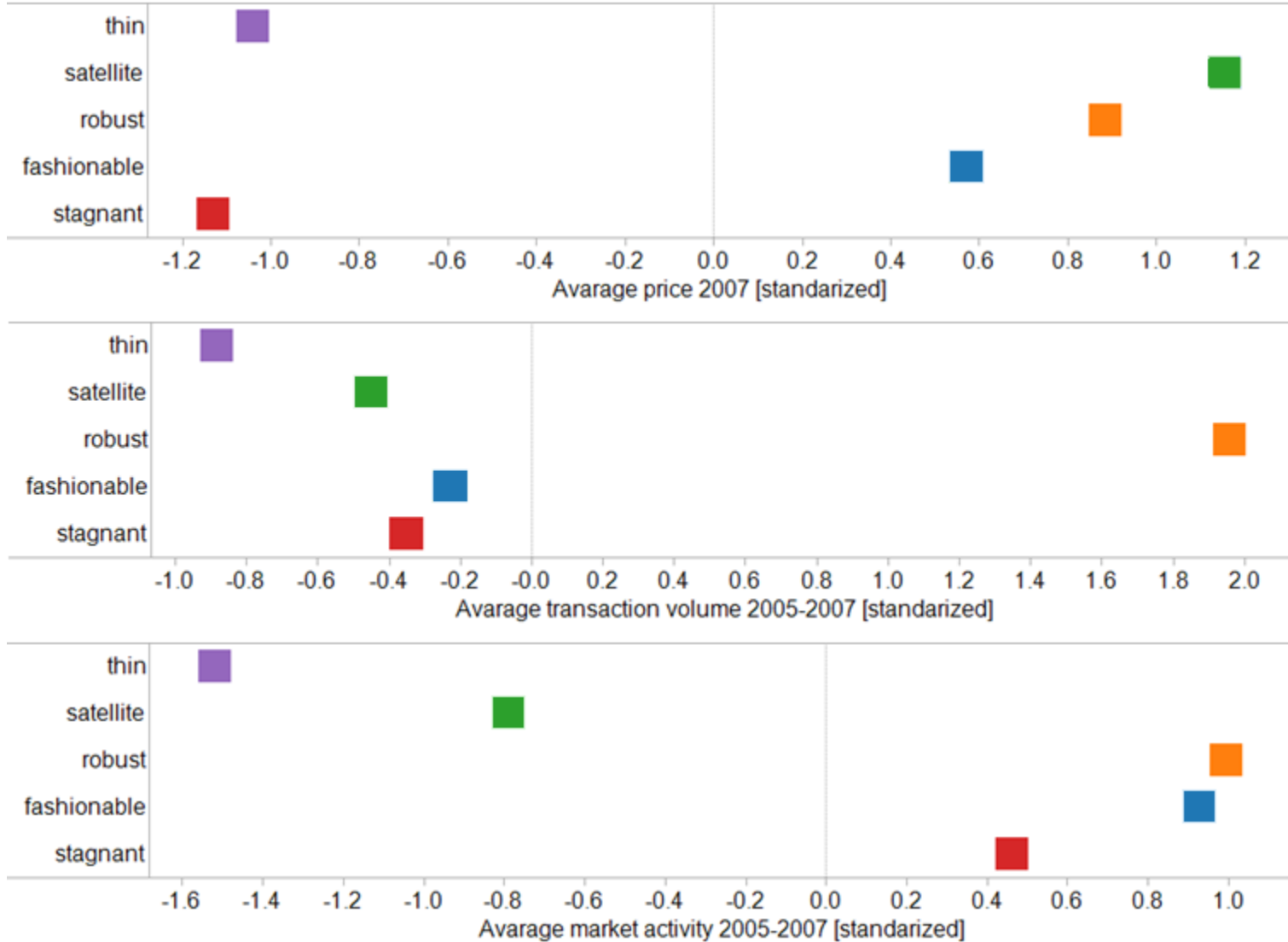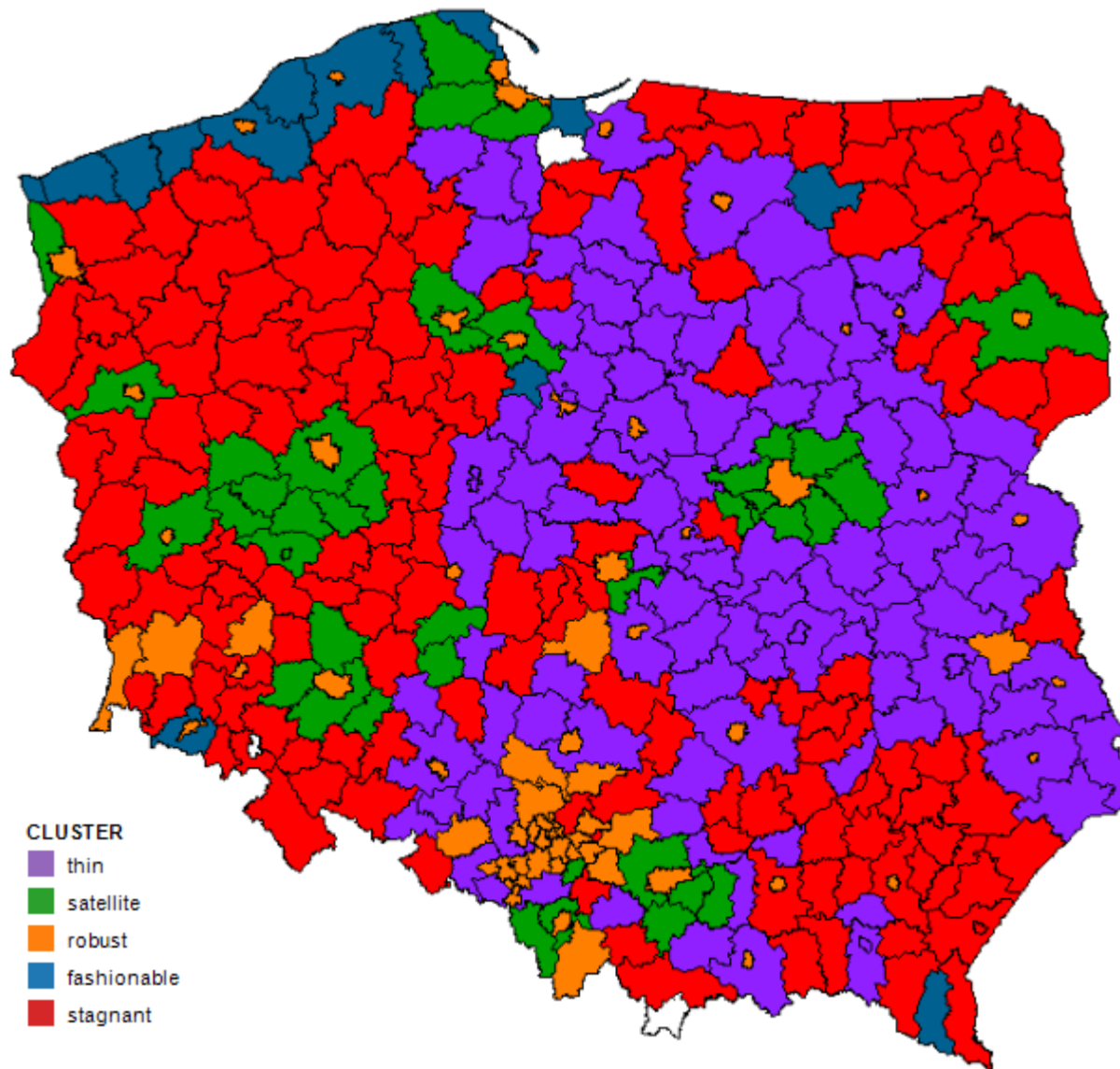
CLUSTER
- thin
- satellite
- robust
- fashionable
- stagnant
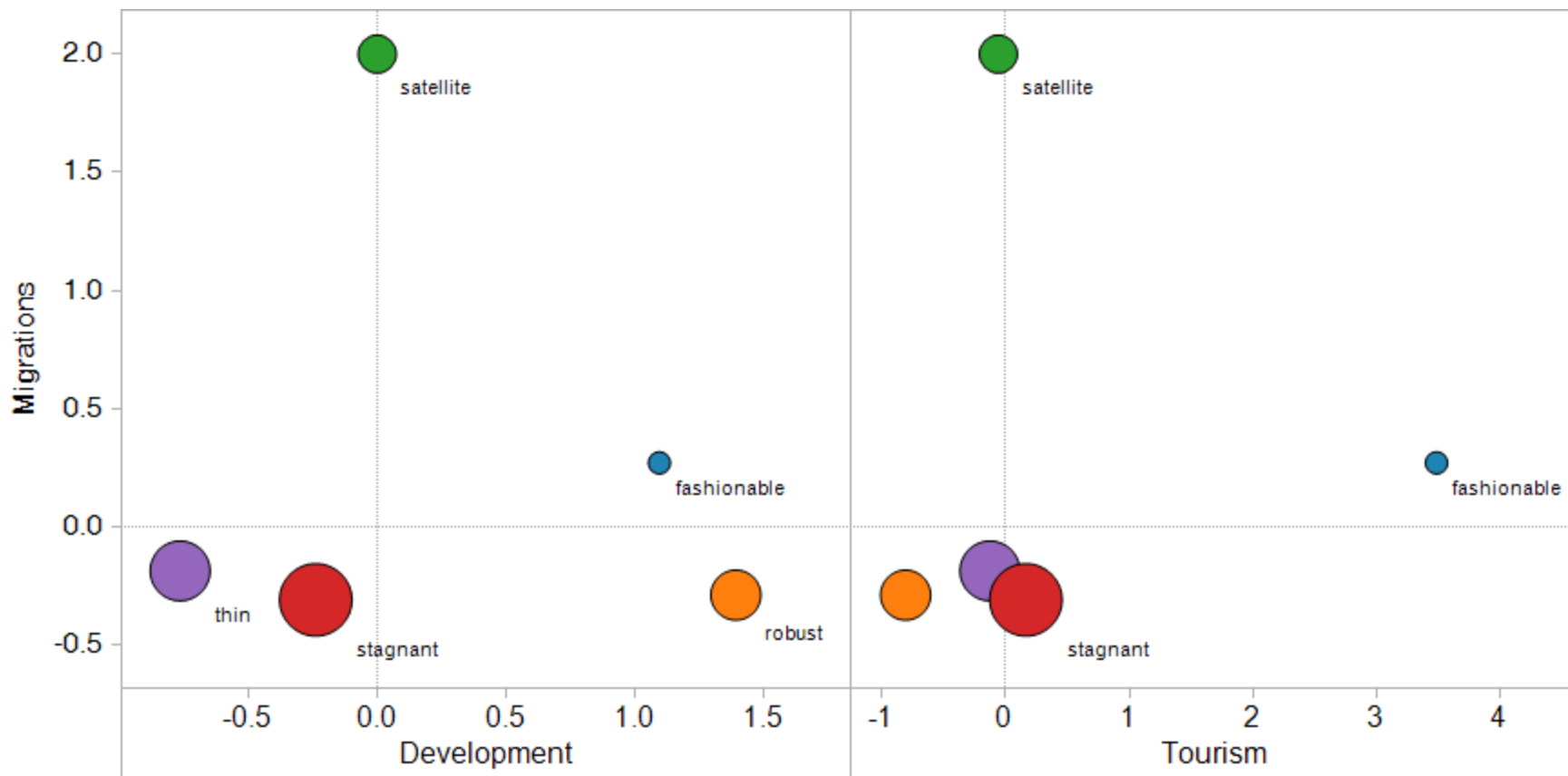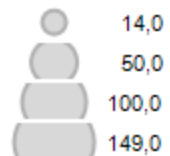
- Polish housing markets are heterogenous, but several local markets share similar economic base

- Local fundamentals have influence on housing market outcomes (transaction, prices, dynamics)

- Post EU accesion housing boom was not shared by every polish poviat:
  - » Biggest boom (and bubble potential) in *robust* and *fashionable* market clusters
  - » Strong urban sprawl in proximity to major agglomerations – *satellite* cluster
  - » Weak effects in most of *stagnant* and *thin* markets driven by weak demographic and economical fundamentals