WHY RESIDUALS CAN BE USEFUL IN REAL ESTATE VALUATION

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DELFIT 2007
Residuals as a simplified representative of stochastic factors exerting influence on real estate value

\[ e_i = y_i - f(x_i, \beta_i) \]

- Empirical value
- Value from a model

Residuals

- Error in statistical analyses
- Unpredictable of the systems reactions (evidence of random processes and uncertainty)
Reasons for developing different method for mass appraisal of real estate

- failure in the use of the linear regression (classical method)
- not only the causal-effect of dependence on the market
- low predictability of the reliable real estate value
- huge changes in the real estate market in Poland
- the growth of interest in the mass appraisal of real estate in Poland
- government - studies on the mass appraisal for tax load aims
POLAND and UE
RESIDENTIAL CONDITIONS - THE AREA OF FLATS

average area of flats
area of flats per person

Denmark
Luxemburg
Spain
Sweden
UK
Italy
Netherlands
Germany
Austria
France
Finland
Ireland
Malta
Belgium
Slovenia
Portugal
Hungary
Estonia
Greece
Slovakia
Lithuania
Latvia
Poland
THE PRICES OF FLATS ON THE SECONDARY MARKET

The prices of flats on the secondary market for different regions of Poland have increased significantly over the years. The graph shows the price data from December 2002 to December 2006 for various regions, including Mazowieckie, Podkarpackie, Podlaskie, and others. The prices are measured in zl/euro, with a notable increase observed across all regions during this period.
THE PRICES OF FLATS ON THE SECONDARY MARKET

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THE PRICES OF FLATS ON THE SECONDARY MARKET

The prices of flats on the secondary market in various Polish cities from Dec. 2005 to Mar. 2007 are presented in the chart. The prices are given in zl/euro, with the following ranges:

- 1,000/250 zl/euro
- 2,000/550 zl/euro
- 3,000/800 zl/euro
- 4,000/1,000 zl/euro
- 5,000/1,300 zl/euro
- 6,000/1,600 zl/euro
- 7,000/1,900 zl/euro
- 8,000/2,200 zl/euro

Cities included in the chart are: Wrocław, Bydgoszcz, Toruń, Lublin, Gorzów Wlkp., Zielona Góra, Łódź, Kraków, Warszawa, Opole, Rzeszów, Białystok, Gdańsk, Katowice, Kielce, Olsztyn, Poznań, Szczecin.
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THE AREA OF THE FLAT, WHAT CAN BE PURCHASED FOR AVERAGE GROSS WAGES

- Mar-06
- Mar-07
THE FORM OF THE RESIDUALS DEVELOPMENT FOR USES IN THE VALUATION OF REAL ESTATE

\[ e_i = y_i - f(x_i, \beta_i) \]

Graphical form – maps
Numerical form – the geostatistical model

\[ \hat{y} = a + \sum_{i=\text{pociech_front}} a_i \log x_i + \sum_{j=UT} a_j x_j + \sum_{k=\text{dataGT,DO,Ld,PZP}} (a_k x_k + b_k x_k^2) + \sum_{l=K,W,E} (a_l x_l + b_l x_l^2 + c_l x_l^3) + \sum_{m=\text{atrW,atrLodH,odILodIK}} (a_m x_m + b_m x_m^2 + c_m x_m^3 + d_m x_m^4) \]

Full
Partial
Full

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POLAND
"The possibility of the utilization of the residuals from the model in the interpretation of innovative spatial processes"
Analysis of the spatial distribution of residuals, after their division, we can trace and see occurrence and diffusions of the innovation and analysis of reasons spatio-temporal changes at a time.
Market space
(information about transactions on the market)

Deterministic inference with stochastic elements

Deterministic value

Individual counselling with an average level of risk

Individual counselling with a great level of risk

Taxation solutions

Speculative (forecast) value

The spatial residuals

Stochastic inference

Developmental-strategic solutions

Analyses of optimization and profitability

Planning and urbanistic solutions

Formal-legal solutions in REM and SM

Essential analysis and knowledge

Conception

Innovations, perturbations, disturbances of the market system

Issue
Surfer is a grid based Graphics program used for Mapping XYZ data into grids.

The gridding methods in Surfer allow you to produce accurate contour, surface, wireframe, vector, image, and shaded relief maps from your XYZ data.

The data can be randomly dispersed over the map area, and Surfer's gridding will interpolate your data onto a grid. You have a multitude of gridding methods (*Inverse Distance, Kriging, Minimum Curvature, Polynomial Regression, Triangulation, Nearest Neighbor, Shepard's Method, Radial Basis Functions, Natural Neighbor, Moving Average, and Local Polynomial*) to choose from, so you can produce exactly the map you want.
These grids can be used to create many map types including Contour maps, Vector Maps, Wire frame maps, and surface maps.

**Contour maps** - two-dimensional representation of three-dimensional data
GIS program - SURFER

Surface maps - enable the perfect visualization of three-dimensional data maps
Wireframe maps – these maps provide a three dimensional display of data and enable use color zones in independent X,Y,Z scaling.
Vector Maps - show direction and magnitude of data at points on a map.