MATHEMATICAL MODEL DEVELOPMENT FOR REAL ESTATE VALUATION

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SUMMARY

Data
Methodology
Results as is
To be
## AVAILABLE DATA

### Deeds
- Type of deed
- Price of transaction
- Cadastral parcel
- Property rights

### Cadastral documentation
- Type of property
- Usable surface
- Built surface
- Construction year
- Modification year
- Comfort

### Other
- Statistical sectors
- Aggregated sectors
IDEA?

1. An identical building has the same construction cost wherever the location (intrinsic value, cost of the brick)

2. What makes the rest of the value is the extrinsic value
   - Working in 2 phases
METHODOLOGY INTRINSIC VALUE

• Hedonic models only based on property characteristics

Value = Usable surface + Type of property + Comfort + Construction year + Modification year + Plot size + residuals
METHODOLOGY EXTRINSIC VALUE

The objective is to determine the impact of the neighbourhood and to maximise the number of samples in each zone

- Multiples neighbourhoods (statistical sector) can form a single zone of value
- Manual work done by the experts when insufficient data in a given sector (aggregation)

19.795 statistical sectors
14.081 aggregated sectors
METHODOLOGY EXTRINSIC VALUE

Working with a surface yield to determine the zones of value

Median intrinsic surface yield
Median extrinsic surface yield
Median surface deviation

iSy  eSy  Sd

Property value = intrinsic value + extrinsic value
= iSy * US + eSy * US + ξ
MARKET VALUE ZONES

- 15 different market value zones by aggregated statistical sector
- Each zone represents a band of 10% deviation around the median

Example:
Zone 7 = deviation between -5% en 5%
RESULTS AS IS

Working model for houses
Mean error = 18%

Working model for apartments
Mean error = 15%

Proportion of the variation explained by the variables = 85%

More complicated for commercial buildings (working with raster zones)
• Improve the performance of the existing models
  • Add new data like energy performance (regional data)
• Elaborate models for other types of properties (grounds, parking spaces, …)
• Implementation for risk management
TO GO FURTHER

• Use those models to compute a new tax base (actual value already used for foreign properties owned by Belgians)
  ➢ To restore tax fairness among taxpayers