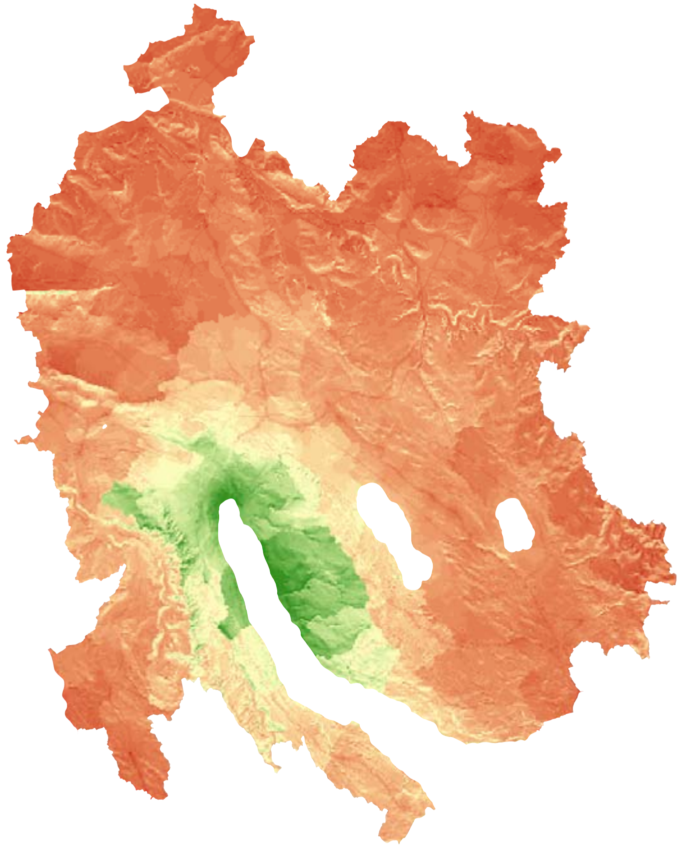

Project
„Infrastructure, accessibility and spatial development“

Real estate and land price models for UrbanSim's Greater Zurich application

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Arbeitsberichte Polyprojekt "Zukunft urbane Kulturlandschaften" **6**
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Abstract

The research project „Infrastructure, accessibility and spatial development" aims at the development of an integrated land use – transport simulation for the Greater Zurich area. The simulation software used, UrbanSim, comprises a number of models, each representing an actor or process in land use and transport. One of these models is the land price model. The considered real estate data, preparation, estimations and modelling results are described in this working paper.

Key words

rent prices, hedonic regression, UrbanSim, Zurich, Switzerland

Preferred citation style

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Immobilien- und Landpreismodelle für UrbanSim's Anwendung im Grossraum Zürich

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Zusammenfassung

Im Rahmen des Forschungsprojekts „Infrastruktur, Erreichbarkeit und Raumentwicklung" wird eine integrierte Landnutzungs-Verkehrs-Simulation für den Grossraum Zürich entwickelt. Die verwendete Simulationssoftware UrbanSim umfasst eine Reihe von Modellen, die Akteure oder Prozesse in Landnutzung und Verkehr abbilden. Eines dieser Modelle ist Landpreismodell. Die berücksichtigten Immobilien-Daten, deren Aufbereitung, Schätzung und Modellierungsergebnisse werden in diesem Arbeitsbericht beschrieben.

Stichworte

Mietpreise, hedonische Regressionen, UrbanSim, Zürich, Schweiz

Zitierungsvorschlag

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1 Introduction

The research project „Infrastructure, accessibility and spatial development" (Bürgle *et al.*, 2005) develops an integrated land use – transport simulation for the Greater Zurich area. The simulation software used, UrbanSim, comprises a number of models, each representing an actor or process in land use and transport. One of these models is the rent and land price model. It has been estimated by an hedonic regression approach, as described in this working paper.

The hedonic approach has been developed by Rosen (1974), Lancaster (1966, 1971), and others, and it has been employed extensively in the study of housing values and rents. The hedonic approach looks at the rent as being determined by the attributes and characteristics of the property and the neighbourhood. The hedonic regression methodology recognizes that housing is a composite product. While the attributes are not sold separately, regressing these attributes on the sales price of the composite product yields the marginal contribution of each attribute to the sales price.

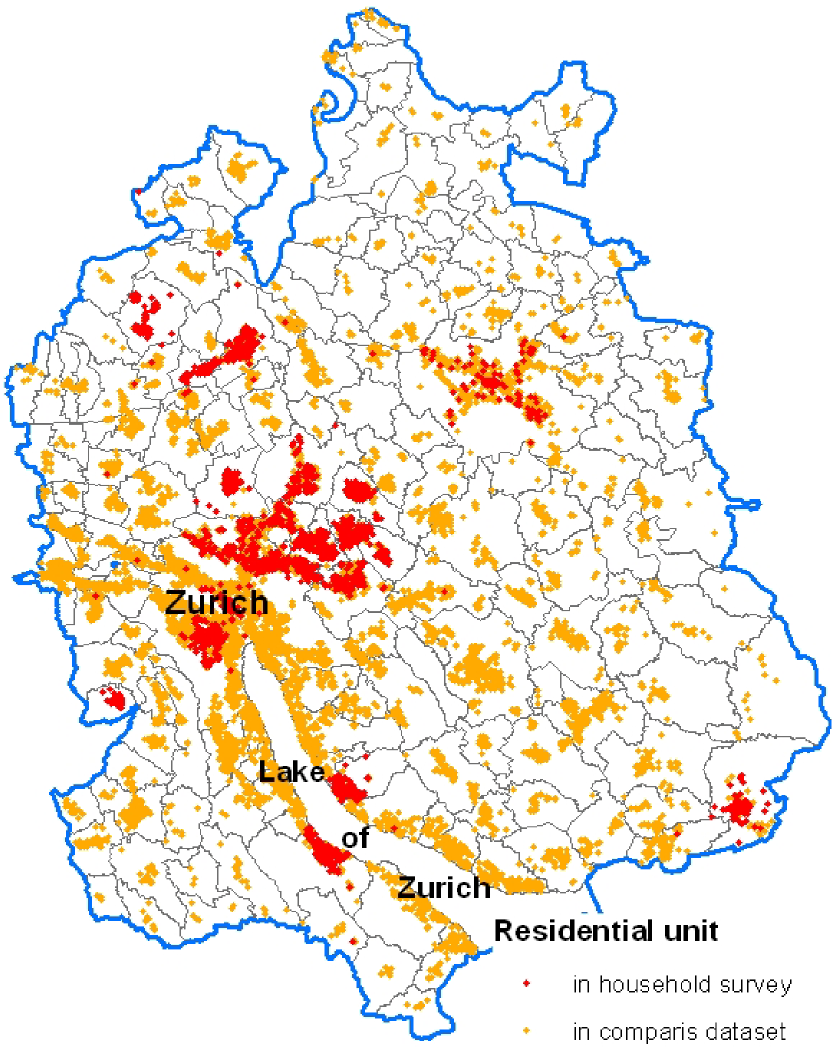
Empirical work has produced substantial lists of attributes and characteristics to be considered and they can be roughly divided into structural and locational attributes. Structural attributes describe the physical structure of a residential unit and comprised characteristics such as size, number of rooms, condition and equipment of the residential unit, age of building etc.. Locational attributes include the surrounding area and locational externalities. Those are neighbourhood characteristics such as density, distances to infrastructure, accessibility and others.

2 Data and preperation

Two datasets have been used for the estimations. First, a household survey was used, which had been conducted in spring 2005 (Waldner *et al.*, 2005). The raw data comprises 3300 households, which are living in rented and owner occupied apartments as well as houses. Among other things, a broad set of structural variables as well as detailed costs and rents are included in the dataset.

On the other hand, data with bid-rent prices from the online real estate database Comparis (www.Comparis.ch) has been retrieved from the webpage for the whole of Switzerland in fall 2004 and spring 2005. Beyond the price variable, the dataset includes a few items about the structural attributes of the dwelling units.

Figure 1 Available data records in Canton Zurich



Administrative units: GG25 (c) 2007 swisstopo (DV033492.2)

The data has been preprocessed for modelling and geocoded (Waldner *et al.*, 2005). Not all data could be used from the household survey as the following Table 1 shows.

Thresholds used for living area and rent price have been set due to the fact that data records with a reported size smaller than 20 square metres are often rooms in shared apartments or institutional residences (hospital, retirement home etc.). The threshold for the rent price per square metres has been set due to the (rare) occurrence of unusually high or low values.

Table 1 Household survey sample size analysis for rent price model (Canton Zurich)

	absolut	percentage
Non-rental residential unit	1071	31.7
Geocoded at municipality level	96	2.8
Household has moved to other municipality	16	0.5
Rent not reported	45	1.3
Additional costs unknown[1]	293	8.7
Parking costs in rent price included, but amount unknown	65	1.9
Misrepresentation (unrectifiable)	3	0.1
Residential unit not within living area thresholds[2]	208	6.2
Residential unit not within sqm rent price thresholds[3]	26	0.8
Useable sample size	1552	46.0
Residential unit not in Canton Zurich	91	2.7
Sample size for rent price model for Canton Zurich	1461	43.3

[1] additional costs unknown, although included in the reported rent price; living area is unknown and consequently imputing by size is impossible

[2] thresholds: ≥ 20 sqm and ≤ 500 sqm

[3] thresholds: ≥ 6 CHF/sqm and ≤ 60 CHF/sqm

Based on those thresholds (residential unit ≥ 20 sqm and ≤ 500 sqm; as well as monthly rent price ≥ 6 CHF/sqm and ≤ 60 CHF/sqm), the Comparis data was filtered as well. In the following, both datasets have been compared to the data from the Federal Building and Apartment Register (GWR) for Canton Zurich. With regard to the amount of liveable rooms, there are some differences, mostly for larger residential units. Moreover, both datasets contain significantly fewer single family houses than the GWR as shown in Table 2.

Table 2 Comparison of the datasets with the Federal Building and Apartment Register (GWR) (Canton Zurich)

	Household survey data in %	Comparis data in %	GWR[1] data in %
Rooms			
1 to 1.5	5.9	8.0	7.9
2 to 2.5	14.7	14.5	13.9
3 to 3.5	36.1	31.8	29.4
4 to 4.5	33.0	33.5	26.6
5 to 5.5	7.7	9.8	13.6
6 and more	2.7	2.4	8.2
Floor space[2]			
20 to <40 sqm	4.4	6.5	6.1
40 to <80 sqm	37.1	31.6	39.9
80 to <120 sqm	42.3	42.2	32.5
More than 120 sqm	16.2	19.7	21.4
Proportion of single family houses	7.1	2.5	16.7

[1] The Federal Building and Apartment register includes both rented and owned residential units.
[2] Only residential units from 20 sqm have been considered.

In the following Table 3, the useable data from both the household survey and the Comparis database are compared. The rents are considerably lower in the household survey dataset, both absolute and per square metre. One reason is that the survey data contains residential units, which have been rented a long time ago while the Comparis data contains only current offers. Moreover, the Comparis data reflect bid prices while in the household survey dataset only actual rents are included. With regard to floor space and amount of liveable rooms, the average values in the household survey dataset are slightly smaller.

Table 3 Comparison of key figures of both household survey and Comparis data for rented dwellings[1] (Canton Zurich)

	Household survey data			Comparis data		
	Mean	Median	Std.Dev.	Mean	Median	Std.Dev.
Monthly rent absolute	1418.24	1359.50	564.11	1881.68	1680.00	985.40
Monthly rent per sqm	16.88	16.65	5.12	20.91	20.91	5.85
Floor space in sqm	87.51	85.00	33.77	92.02	89.00	37.91
Number of liveable rooms	3.46	3.50	1.15	3.66	3.50	1.26

[1] taking into account aforementioned thresholds

3 Model specifications

Most of the residential units in urbanised Switzerland are rented. Therefore, the analysis focuses in the following on rent price models. The models include both rented apartments and houses. The dependent variable is always the logarithmic monthly rent price per square metre in Swiss Francs (CHF). In order to have only a limited and most crucial set of variables, the forward regression function of SPSS Version 14.0 has been used.

3.1 Rent price models with structural and locational variables

For the first models, the household survey data was used in order to model rent prices. An overview of the locational variables tested is given in Table 9 in the Annex. Transformations have been considered as well. Nevertheless, most significant variables in the model are structural. The size of the dwelling showed as expected highest relevance, as the rent price is decreasing per square metre when the dwelling becomes larger. Also relevant are the level of equipment standard (originally the 5 classes “simple”, “rather simple”, “normal”, “good” and “luxurious” had been grouped into a dummy variable “low equipment standard” for the first two classed and “high equipment standard” for the last two classes) and the amount of available baths measured by the number of baths per square metre.

Table 4 Logarithmic rent price model for Canton Zurich with household survey data (structural and locational variables) [CHF/sqm]

Variable	Standardised β	Unstandardised β	t	Sign.
Constant		3.075	48.043	***
Net living area (sqm)	-0.334	-0.003	-12.985	***
Low equipment standard of dwelling unit (dummy)	-0.229	-0.141	-9.727	***
Property owner is a cooperative (dummy)	-0.207	-0.157	-9.544	***
Percentage of inhabitants in municipality with university degree	0.205	0.014	8.012	***
Number of baths per sqm (multiplied by 100)	0.200	0.098	8.573	***
Number of years since dwelling unit is occupied by current household	-0.196	-0.006	-9.112	***
High equipment standard of dwelling unit (dummy)	0.119	0.086	5.138	***
Number of jobs in hotel and catering industry employment in 500m radius (divided by 1000)	0.117	0.186	4.809	***
Municipal tax rate for natural persons	-0.113	-0.002	-4.595	***
Number of balconies per sqm (multiplied by 100)	0.105	0.037	4.571	***
Number of inhabitants living in 500m radius (divided by 1000)	-0.085	-0.186	-2.689	***
Residential unit has a terrace (dummy)	0.058	0.037	2.668	***
Lift in the house available (dummy)	0.055	0.035	2.506	**
Linear distance to next school building (km)	-0.048	-0.080	-2.176	**

n = 1390; adjusted R^2 = 0.394; F = 65.400***
*** = sign. at 1% level ** = sign. at 5% level

There could be several reasons for the relatively low explanation power of the model. With regard to the locational variables, there is certainly a cluster sampling problem as the surveyed municipalities are widely but not evenly distributed in the canton in order to reach the original sampling target of having all spatial types defined by ARE (Swiss Federal Office for Spatial Development) appropriately captured. Consequently, the locational variables lack sufficient variances.

Another problem might be the amount of the reported rent. It has been stated elsewhere that there are two rather recent tendencies in the rent composition in Switzerland (Geiger 2000, 10). On the one hand, some landlords substitute unusual costs from the net rent to the additional costs. Other landlords are proceeding the other way by asking for unrealistic low additional costs while increasing the net rent. Therefore, the rent for the hedonic calculations had to carefully take into account what rent had been actually reported respectively what additional costs apply.

The following model estimated with the Comparis data has a considerable larger adjusted R square of 0.453 compared to 0.394 for the best model with the household survey data. The reason might be a larger sample and particularly a spatially even distribution of data points as can be observed in Figure 1. For all tested regional accessibility measures (see Table 9 in the Annex), car travel time to Bürkliplatz/ downtown Zurich has shown highest relevance. This underlines the importance of the City of Zurich for the region. Because of multi-collinearity, all other regional accessibility measures, i.e. potential accessibility measures by public transport, could not be considered in the final model. Further work will focus on incorporating particularly public transport accessibility, as it is crucial to make the model system sensitive to changes in the public transport supply.

Table 5 Rent price model with Comparis data in Canton Zurich (structural and locational variables) [CHF/sqm]

Variable	Standardised β	Unstandardised β	t	Sign.
Constant		3.565	88.212	***
Ln (Car travel time to Bürkliplatz)	-0.385	-0.265	-33.353	***
Number of rooms in residential unit	-0.223	-0.042	-27.931	***
Federal tax revenue per capita in municipality (divided by 1000)	0.194	0.047	22.870	***
Number of jobs in hotel and catering industry employment in 500m radius (divided by 1000)	0.145	0.042	15.337	***
Percentage of buildings built before 1971	0.115	0.002	11.855	***
Sun radiation index	0.097	0.004	12.448	***
Slope (percent)	0.083	0.006	10.321	***
Distance to next Autobahn exit (km, ln)	0.075	0.023	8.338	***
Lift available in the house (dummy)	0.073	0.040	9.564	***
Airplane noise (dB)	-0.065	-0.002	-7.765	***
Distance to next rail station (km, ln)	-0.039	-0.012	-4.892	***
Residential unit has a garden terrace	0.027	0.054	3.575	***
Autobahn within 100m distance (dummy)	-0.026	-0.044	-3.284	***
Rail tracks within 100m distance (dummy)	-0.020	-0.016	-2.532	**

n = 8889; adjusted R^2 = 0.500; F = 635.334***
*** = sign. at 1% level ** = sign. at 5% level

3.2 Rent price models with locational variables only

As only locational variables and no structural variables are available within the UrbanSim application for Zurich, the models with locational variables are of particular interest. The following Table 6 shows the corresponding model for the household survey data. Again, an overview of the locational variables tested is given in Table 9 in the Annex. Transformations have been considered as well. However, it became apparent that models without structural attributes explain not much of the variation in rent prices in the household survey.

Table 6 Logarithmic rent price model for Canton Zurich with household survey data (locational variables) [CHF/sqm]

Variable	Standardised β	Unstandardised β	t	Sign.
Constant		3.064	31.776	***
Number of jobs in hotel and catering industry employment in 500m radius (divided by 1000)	0.166	0.266	5.788	***
Municipal tax rate for natural persons	-0.115	-0.002	-3.248	***
Distance to Bürkliplatz (min, inverse)	-0.094	-0.042	-3.244	***
Federal tax revenue per capita in municipality (divided by 1000)	0.069	0.021	2.019	**

n = 1423, adjusted R^2 = 0.055; F = 21.738***
*** = sign. at 1% level ** = sign. at 5% level

The result for the Comparis data is much better. The adjusted R square is with 0.440 larger and the estimation includes more significant variables. Consequently, the model with the Comparis data has been selected for the UrbanSim application as it explains price variations by locational variables better. Further work will incorporate available structural variables in the final model and use average structural values for the estimations per hectare. Descriptive statistics of the significant variables in the current model are given in Table 10 of the annex.

Table 7 Logarithmic rent price model for Canton Zurich with Comparis data (locational variables) [CHF/sqm]

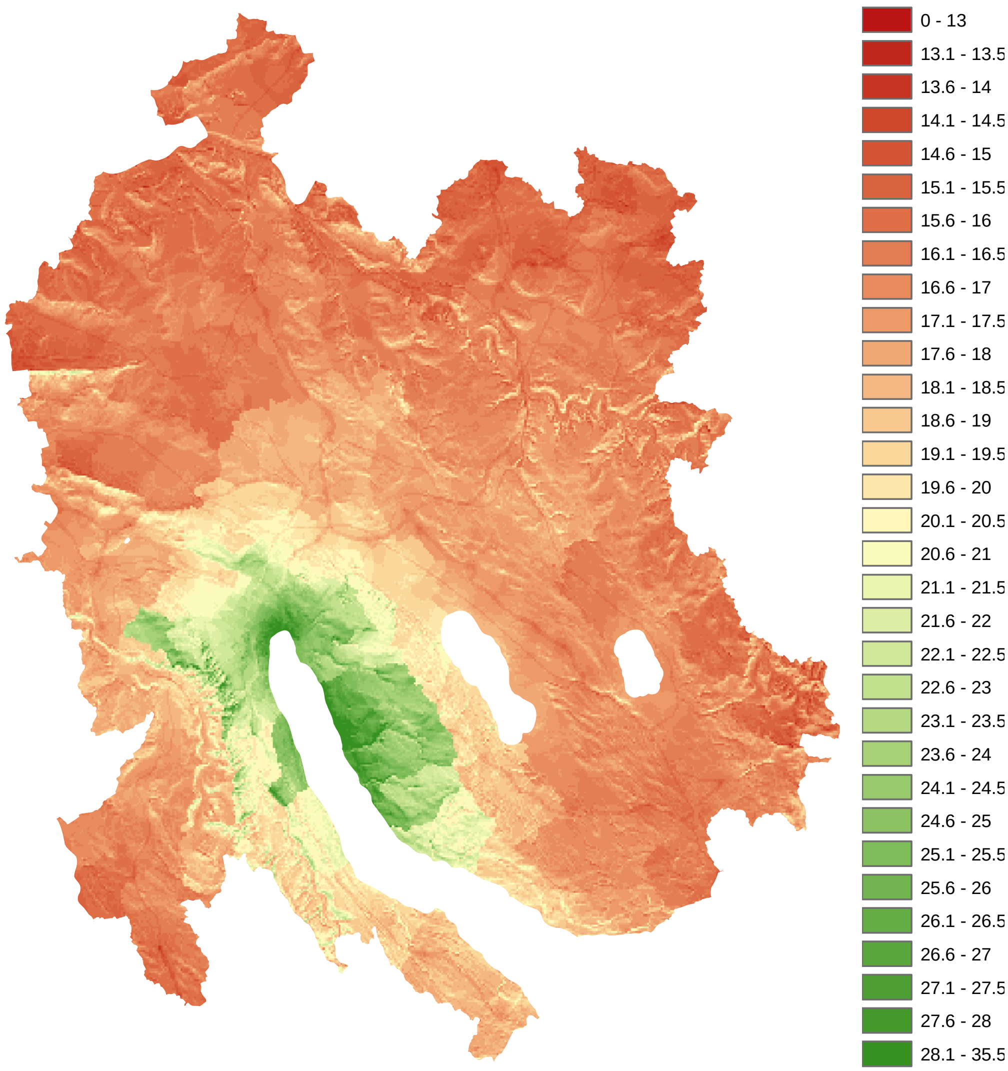
Variable	Standardised β	Unstandardised β	t	Sign.
Constant		3.360	79.149	***
Ln (Car travel time to Bürkliplatz)	-0.372	-0.259	-29.608	***
Federal tax revenue per capita in municipality (divided by 1000)	0.163	0.041	18.135	***
Percentage of buildings built before 1971	0.156	0.002	15.940	***
Number of jobs in hotel and catering industry employment in 1km radius	0.132	0.039	13.471	***
Ln(Distance to next large lake in km)	-0.100	-0.019	-10.348	***
Sun radiation index	0.086	0.003	10.761	***
Ln(Distance to next Autobahn exit in km)	0.057	0.018	6.241	***
Slope (percent)	0.057	0.004	6.870	***
Ln(Distance to next rail station in km)	-0.037	-0.012	-4.549	***
Rail tracks within 50m distance (dummy)	-0.025	-0.035	-3.167	***
Autobahn within 100m distance (dummy)	-0.020	-0.035	-2.467	**

n = 9199; adjusted R^2 = 0.440; F = 658.584***
*** = sign. at 1% level ** = sign. at 5% level

The following Figure 2 shows the resulting surface of rent prices for the simulation area. The range is from slightly below 13 CHF up to 35 CHF and does reflect the occurrence of the locational variables in the model as shown in Table 7 for an average property with regard to the structural variables at the particular location. Highest rent prices can be found in Zurich and the surrounding municipalities along the upper Lake Zurich.

Of course, this is only a theoretic price surface, as not all hectars in Canton Zurich can be occupied. This is determined by the land use regulation which is also considered in UrbanSim.

Figure 2 Map of monthly rent price estimates[1] [CHF/sqm]



[1] calculated from the logarithmic rent price model for Canton Zurich with Comparis data

4 Generating land prices

UrbanSim does require land prices as input. Since the spatial unit in the modelling application is the hectare, the land price data has to be provided at hectare level for the base year. The only land price data available are annually provided figures by the Canton Zurich, which do reveal average land price per square metre per land use (residential and commercial use) and per region ("Raumplanungsregion"). Therefore, the rent price data has been transformed to land prices. This has been done by assigning the percent rent deviation by hectare from the overall average in the simulation area (18.61 CHF) to the average land price by region (Table 8). The average of the last ten years has been used since there are large deviations among the years per region.

Table 8 Average land price over the last 10 years in simulation area by region[1]

ID	Name	Undeveloped residential land	Undeveloped commercial land
101	Zürich	1329	1912
102	Glattal	634	562
103	Furttal	624	249
104	Limmattal	708	449
105	Knonaueramt	547	249
106	Zimmerberg	741	582
107	Pfannenstil	887	433
108	Oberland	517	325
109	Winterthur & environs.	510	348

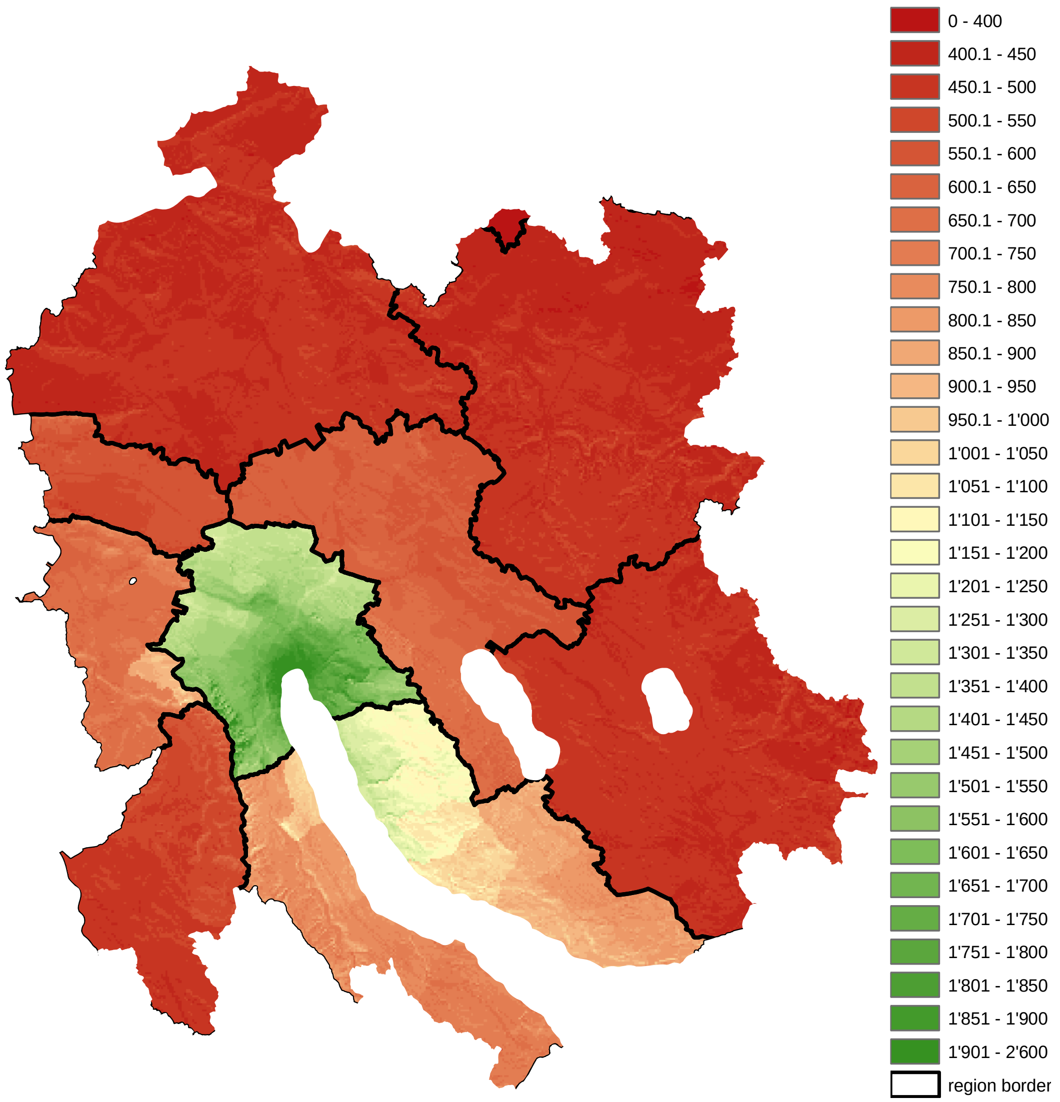
[1] region = Raumplanungsregion

Sources: Jahrbücher des Statistisches Amtes des Kantons Zürich

Clearly, this is a very rough and pragmatic approach, but sufficient for the first runs of UrbanSim. Further efforts should be put either in modelling land prices or in acquiring suitable land price data.

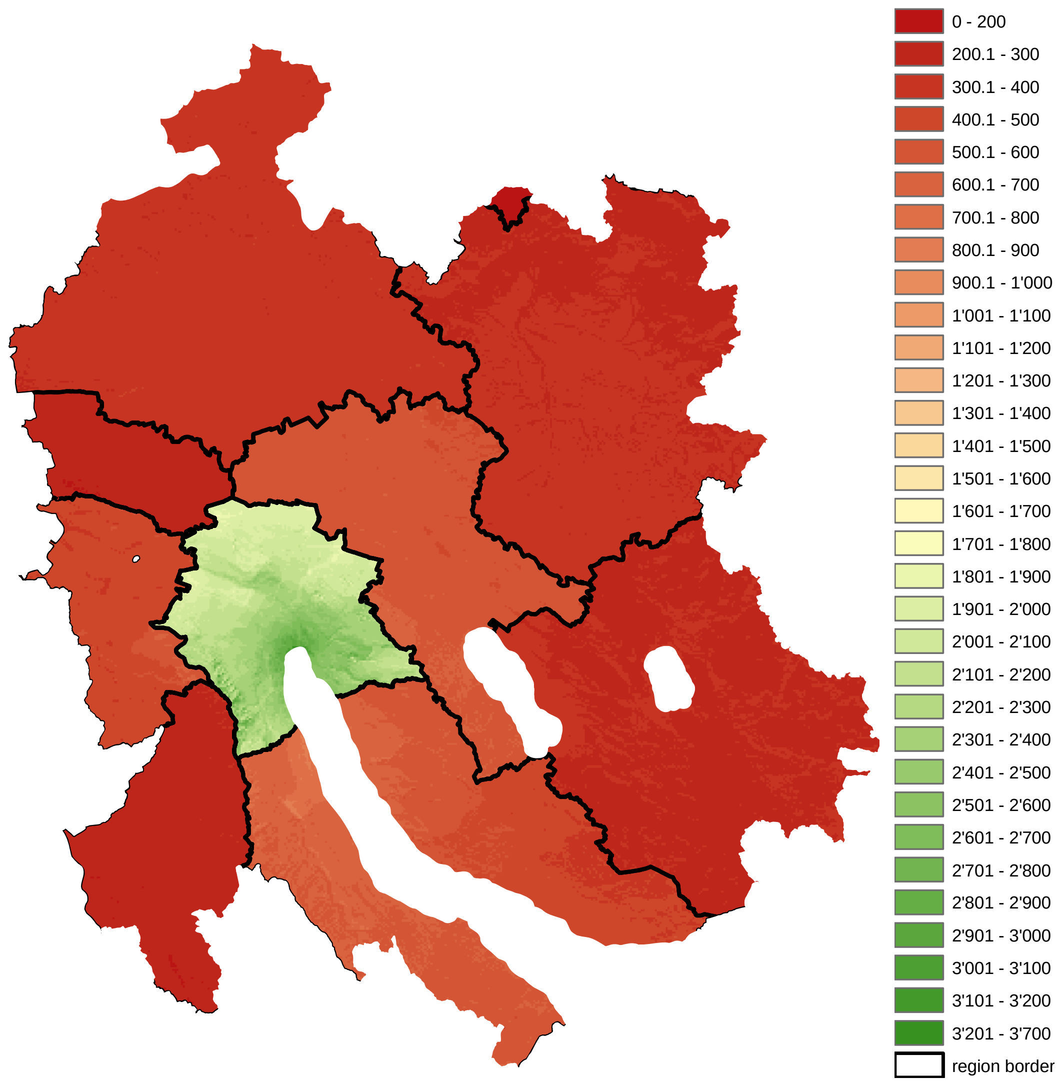
The modelled and mapped land price surface for residential land use in Figure 3 shows that the variation among the regions is the main determinant for the price level. Deviations adopted from the rent price distribution has a rather minor contribution to the calculated price as borders of the regions and therefore the input region price level has by far the strongest effect on the price. This is even more obvious for the land price surface for commercial land use in Figure 4.

Figure 3 Land price for residential use per sqm in CHF (based on 10 year average)



Administrative units: GG25 (c) 2007 swisstopo (DV033492.2)

Figure 4 Land price for commercial use per sqm in CHF (based on 10 year average)



Administrative units: GG25 (c) 2007 swisstopo (DV033492.2)

5 Conclusions

A rent price surfaces have been calculated by an hedonic modelling approach based on two datasets. The results are used for the rent and land price model in UrbanSim.

It is possible that despite the large amount of variables tested in the models not all relevant could be considered. For example it has been shown that rental concessions and management quality affect rents (Jud, Benjamin, Sirmans, 1996). Anyway, rent control plays an important role in Switzerland in the face of low vacancy rates, particularly within the agglomerations. As one of the earliest who studied the regulation issues, Marks (1984) comes to the conclusion that regulation lowers implicit characteristic prices of housing units. Distortions exist even if the legislation allows for fair returns to owners.

Nevertheless, the applied methodology has proved to be useful and sufficient in the first application of UrbanSim for the Greater Zurich area. It is planned to further enrich and improve the rent price model in the near future both with more sophisticated and more current data as it becomes available (i.e. employment survey/“Betriebszählung 2005”).

6 Acknowledgment

The work of Urs Waldner, who has calculated the sun radiation index and did some early work on data collection and preparation, is gratefully acknowledged.

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Annex

Table 9 Considered locational variables[1]

Variable	Name in database	Description	Spatial reference	Unit
Density of population	VZ00d500 VZ00d1km	Average number of inhabitants per hectare measured in a radius of 500m and 1km (based on census 2000)	hectare	inh./hectare
Density of children	childVZ00d500 childVZ00d1km	Average number of children per hectare measured in a radius of 500m and 1km (based on census 2000)	hectare	children/hectare
Density of open space	OpenSpaceDens500m OpenSpaceDens1km	Average sqm of open space per hectare measured in a radius of 500m and 2 km (based on ARE Bauzonen)	hectare	sqm/hectare
Density of jobs	BZ01d500 BZ01d1km	Average number of jobs in 2nd and 3rd sector per hectare measured in a radius of 500m and 1km (based on Betriebszählung 2001)	hectare	jobs/hectare
Number of jobs (i.e. in hotel and catering industry) in a radius of 500m or 1km	BZ01Ad500 BZ01Ad1km	Total number of jobs in measured in a radius of 500m and 1km (based on Betriebszählung 2001)	hectare	jobs/hectare
Distance to next creek	CREEK_DIST_KM	Linear distance to next creek (based on Swisstopo Vector 25)		km
Distance to next stream	STREA_DIST_KM	Linear distance to next stream (based on Swisstopo Vector 25)		km
Distance to next rail tracks	RAIL_DIST_KM	Linear distance to next rail tracks (disregarding tunnels and irregular used tracks)		km
Distance to next rail station	RAILST_DIST_KM	Linear distance to next rail station		km

Distance to next public transport stop	PTSTOP_DIST_KM	Linear distance to next public transport stop		km
Distance to next autobahn	AUTOB_DIST_KM	Linear distance to next autobahn (based on Swisstopo Vector 25)		km
Distance to next autobahn exit	AUTOA_DIST_KM	Linear distance to next autobahn exit (based on Swisstopo Vector 25)		km
Distance to next arterial	STR1KL_DIST_KM	Linear distance to next arterial (street class 1, based on Swisstopo Vector 25)		km
Distance to next collector	STR2KL_DIST_KM	Linear distance to next collector (street class 2, based on Swisstopo Vector 25)		km
Distance to next open space area	OSpaceDist_KM	Linear distance to open space area larger than 100sqm (only Canton ZH, based on Bauzonen Canton ZH)		km
Distance to next school	SchoolDist_km	Linear distance to middle point of next hectare with school (hectare with >200sqm school buildings per hectare, based on Gebäudeversicherung ZH/ARV)		km
Airplane noise	AirNoise00	Nominal airplaine noise from air traffic departing/arriving at Zurich Airport (from Unique, 2000)	seamless	dB
Rail noise	RailNoiseDay RailNoiseNight	Rail noise night and day (adopted from Waldner, 2005)		dB
Slope	Slope	Slope (calculated with Swisstopo DHM 25)	hectare	percentage
Exposure	Exposure2	Orientation of the slope calculated with Swisstopo DHM25 (north = 0; south = 180, calculated with Swisstopo DHM 25)	hectare	degrees
Sunshine index	SUNTIME	Average sunshine exposure on 9 representative days		

Federal tax revenue	FedTaxRev00	Federal tax revenue per municipality (from Eidg. Steuerverwaltung, 2000)	munici-pality	CHF
Municipal income tax revenue	IncomeTaxZH	Municipal income tax revenue (from Canton Zurich, 2004)	munici-pality	CHF
Regional accessibility to population	PT03AccVZ00 IV03AccVZ00	Public transport and car (Transport Models of Canton Zurich 1998 and 2003; census 2000)	travel zone	
Regional accessibility to employment	PT03AccBZ01 IV03AccBZ01	Public transport and car (Transport Models of Canton Zurich 1998 and 2003; Betriebszählung 2001)	travel zone	
Travel time to CBD	DistRegToCBD	Car travel time to Zurich Bürkliplatz (shortest route; Transport Models of Canton Zurich 1998 and 2003)	travel zone	min
Travel time to CBD	TimeRegToCBD	Car travel time to Zurich Bürkliplatz (fastest route; Transport Models of Canton Zurich 1998 and 2003)	travel zone	min
National accessibility to population	IBEV00	Public transport and car combined (Nation Transport Model; Betriebszählung 2001)	travel zone	
National accessibility to employment	IB3SEKT00	Public transport and car (Nation Transport Model; Betriebszählung 2001)	travel zone	
Ownership	Ownership	Share of real estate ownership in municipality (from BFS Statweb)	municipality	percent
Percentage of building build before 1971/91 in municipality	ConstructBefore71 ConstructBefore91	Percentage of buildings constructed before 71/91 in municipality (from BFS Statweb)	municipality	percent
Vacancy of residential in municipality	Vacancy	Percentage of vacancy of residential units in municipality (from BFS Statweb)	municipality	percent

Vacancy of rented residential units in municipality	RentVacancy	Percentage of vacancy of rented residential units in municipality (from BFS Statweb)	municipality	percent
Inhabitants with foreign language	ForeignLanguage	Percentage of people with non-German mother tongue in municipality (census 2000)	municipality	percent
Inhabitants with university degree	UnivDegree	Percentage of people with university degree in municipality (census 2000)	municipality	percent

[1] For the modelling of prices based on building data, the data has been calculated based on the exact building location

Table 10 Selection of variables considered for real estate price estimation with Comparis data (locational variables)

Variable	Description	Mean	Median	Std.Dev.	Unit
Ln (Car travel time to Bürkliplatz)	Logarithmic car travel time to Zurich Bürkliplatz (fastest route, 2003)	3.33	3.39	0.34	Ln(min)
Federal tax revenue per capita in municipality	Federal tax revenue per capita in municipality (2000)	1.36	1.24	0.95	CHF/ 1000
Percentage of building build before 1971	Percentage of buildings constructed before 1971 in municipality	59.13	57.59	16.44	Perc.
Amount of jobs in hotel and catering industry employment in 500m radius	Amount of jobs in hotel and catering industry employment in 500m radius (2001)	0.33	0.9	0.81	jobs/1000
Sun radiation index	Average sunshine exposure on 9 representative days	88.90	89.32	6.05	
Ln(Distance to next Autobahn exit)	Logarithmic linear distance to next autobahn exit	0.49	0.51	0.75	Ln(km)
Slope	Slope	3.54	2.54	3.18	Perc.
Airplane noise	Nominal airplaine noise from air traffic departing/arriving at Zurich Airport	44.86	45.27	9.19	dB
Ln(Distance to next rail station)	Logarithmic linear distance to next rail station in km	-0.34	-0.29	0.73	Ln(km)
Autobahn within 100m distance	Autobahn within 100m linear distance	na	na	na	dummy
Rail tracks within 50m distance	Rail tracks within 50m linear distance	na	na	na	dummy