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Cost of new residential property

Introduction

The subject of my project is to analyze the cost of new residential property in Luxembourg. There appears to be a strong and widely recognized dependency of the prices to the distance from Luxembourg City. This dependency is the main motivation of this study which attempts to identify other factors and explanatory variables and to propose a multiple linear regression model of the property prices.

Data

The data are taken from a periodic publication of the prices of the new residential properties available for sale and grouped by region (Center, North, South, West and East) and includes:

- Name of the location
- Type of property (apartment or house)
- Number of bedrooms
- Area of the property (in m^2)
- Price of the property (in Euros)

The distances from a given location to Luxembourg City are published by the government.[1]

In total, prices for 425 different properties were published in a given publication in 2011, grouped by region as detailed in the table below. 87 properties (20% of the total) are located in Luxembourg City.

Table 1 Data Count

Region	Incl. L-City	Excl. L-City
Center	154	67
South	79	79
North	109	109
West	32	32
East	51	51
Total	**425**	**338**

Full data excluding Luxembourg City is listed in Appendix.

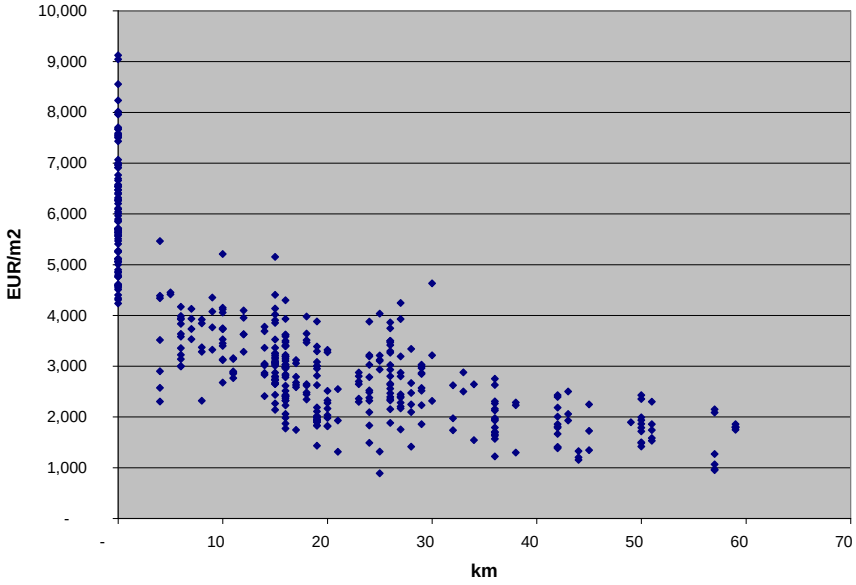
Analysis

As the prices vary greatly between small and large properties, the common practice is to measure the prices in Euros per square meter. We define the response variable **Y** as the prices in Euros per square meter. We start with the first explanatory variable $\mathbf{X_1}$ for the distance from Luxembourg City, in km.

As seen from Chart 1, the property prices in Luxembourg City (at 0 km distance) are considerably higher than in the rest of the country and they have larger variation. This may be explained by a larger heterogeneity of various factors affecting the price, such as: higher variation of the price of the land within the city, city district, infrastructure, higher variation in cost of construction itself, higher demand (in particular for higher class property), etc. Based on these considerations, the Luxembourg City is excluded from further analysis.

[1] The government lists the distances between all pairs of communities in the country and uses these to determine tax deductions for the cost of commuting between place of residence and work. The distances are calculated along a straight line (bird's flight) between the centers of communities.

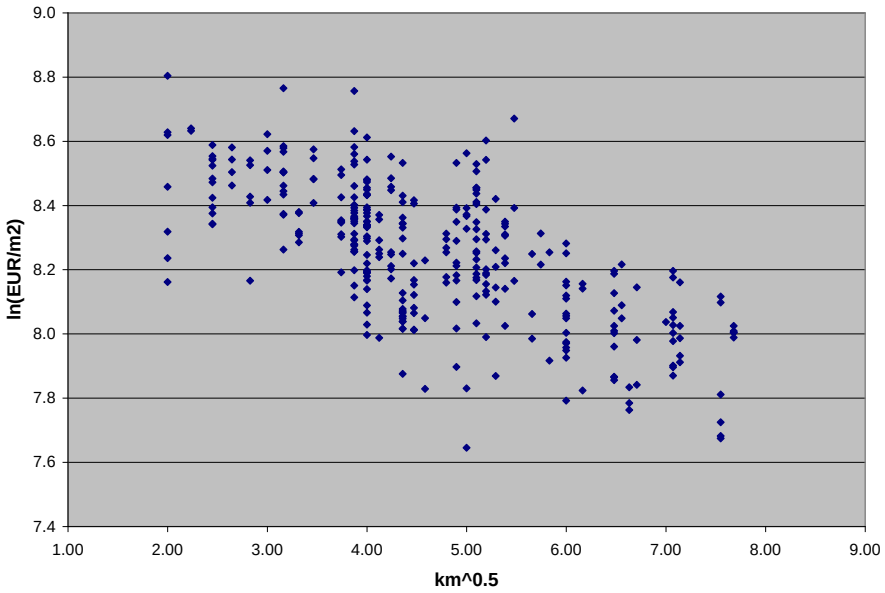
Chart 1 Prices in EUR/m2 as a function of distance from Luxembourg City (all data)



The price of the property has two components: the price of the land and of the construction itself. While one can expect that the land becomes cheaper as the distance from the capital city increases (but still would have a certain limit), the prices of the construction should rather remain consistent throughout the country. Therefore, one would not expect a linear relation between prices per meter squared and the distance, and one can indeed discern a convexity in the chart.

According to Tukey and Mosteller's bulging rule, this particular non-linearity can be corrected by power transformation of either **X** or **Y** or both in the direction of decrease of the power. The Chart 2 shows the plot of **ln(Y)** as a function of $\mathbf{X}^{1/2}$:

Chart 2 Power transformation Y to lnY and X to √X



For simplicity of further analysis, the designations $\mathbf{X_1}$ and **Y** are kept for the transformed variables.

The following table provides the summary of the analysis of variance (ANOVA) for this initial single-variable model.

Table 2 ANOVA for the single-variable model

Regression Statistics	
Multiple R	0.67353
R Square	0.45365
Adjusted R Square	0.45202
Standard Error	0.15841
Observations	338

ANOVA

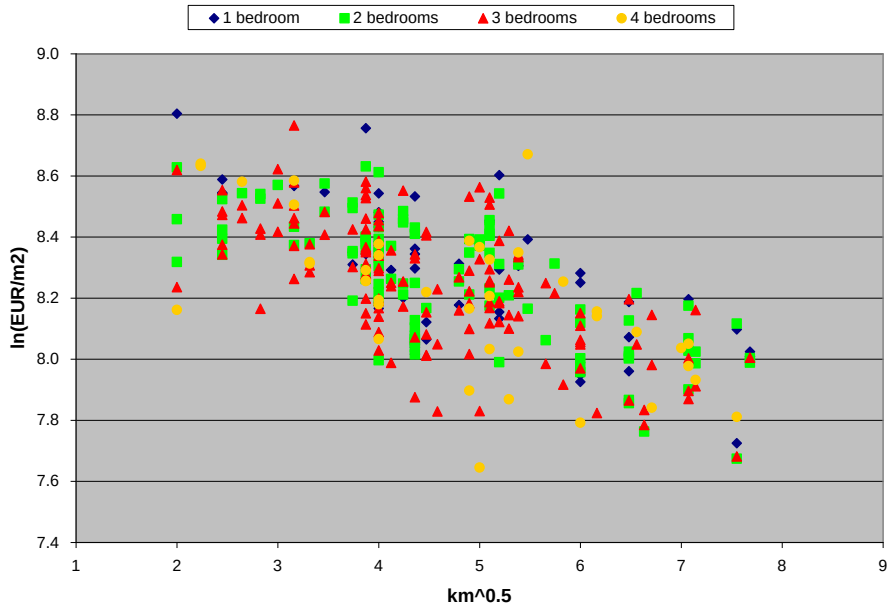
	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	7.00091	7.00091	278.98743	5.05853E-46
Residual	336	8.43159	0.02509		
Total	337	15.43250			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	8.76120	0.03160	277.25710	0	8.69904	8.82336
X Variable 1	-0.10942	0.00655	-16.70292	5.05853E-46	-0.12231	-0.09654

The R^2 of the regression is equal to 45.365%, and the *t* statistic of -16.7 (or the F-test of 279) with the p-value of 5×10^{-46} show that the null hypothesis (the slope B=0) can be rejected. Therefore, this simple regression is highly significant and confirms the commonly recognized decrease of prices as the distance from Luxembourg City increases (the slope B is negative).

Nevertheless, there is significant variation not explained by the distance alone. Based on the available data, it would be possible to consider the number of bedrooms as an additional explanatory variable $\mathbf{X_2}$, as shown in the chart below.

Chart 3 Two-variable model : Distance and number of bedrooms



The correlation between the two variables (distance and number of bedrooms) is only -3%, which means that variables are highly independent.

The table below shows the ANOVA results of the two-variable model.

Table 3 ANOVA for the two-variable model

Regression Statistics	
Multiple R	0.68300
R Square	0.46649
Adjusted R Square	0.46330
Standard Error	0.15677
Observations	338

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	2	7.19910	3.59955	146.45826	1.97895E-46
Residual	335	8.23340	0.02458		
Total	337	15.43250			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	8.83120	0.03982	221.77900	0	8.75287	8.90953
X Variable 1	-0.10994	0.00649	-16.95020	5.6804E-47	-0.12270	-0.09718
X Variable 2	-0.02708	0.00954	-2.83969	0.00479	-0.04584	-0.00832

As expected, the R^2 increased (from 45.37% to 46.65%) with the addition of the second explanatory variable. The p-value of the variable X_2 is much smaller than 1, and the slope coefficient is non-zero with at least 95% confidence. Therefore, the number of bedrooms variable appears to be significant for the model.

As the data shows a strong correlation between the number of bedrooms and the type of property (apartment or house), with the correlation coefficient of 57%, it is interesting to study the model where the dummy variable $\mathbf{D_1}$ for the type of property (1 for house, 0 for apartment) is used instead of number of bedrooms. The ANOVA summary for this model is given in the table below:

Table 4 ANOVA for the model with one quantitative and one dummy variable.

Regression Statistics	
Multiple R	0.67356
R Square	0.45368
Adjusted R Square	0.45042
Standard Error	0.15864
Observations	338

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	2	7.00143	3.50072	139.09757	1.0525E-44
Residual	335	8.43106	0.02517		
Total	337	15.43250			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	8.76208	0.03223	271.86373	0	8.69868	8.82548
X1	-0.10943	0.00656	-16.67918	6.783E-46	-0.12234	-0.09653
D1	-0.00268	0.01860	-0.14415	0.88547	-0.03927	0.03391

One can see that the addition of the dummy variable does not improve the R^2 of the regression and that this variable is in fact insignificant: its p-value is 0.885, and the confidence interval of the slope value includes zero (-0.039; 0.034).

The same conclusion about the insignificance of the type of property dummy variable can be drawn from the analysis of the model with both $\mathbf{X_2}$ and $\mathbf{D_1}$. Indeed, as seen from the table below, the p-value of $\mathbf{D_1}$ is 0.071, and the null hypothesis is not rejected based on the 95% confidence interval, since it includes the value of zero.

Table 5 ANOVA for the model with two quantitative variables and one dummy variable.

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	3	7.27916	2.42639	99.39648	5.33608E-46
Residual	334	8.15334	0.02441		
Total	337	15.43250			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	8.84898	0.04088	216.45563	0	8.76856	8.92939
X1	-0.11004	0.00646	-17.02251	3.17539E-47	-0.12275	-0.09732
X2	-0.03910	0.01159	-3.37297	0.00083	-0.06190	-0.01630
D1	0.04046	0.02234	1.81098	0.07104	-0.00349	0.08441

Therefore, the dummy variable $\mathbf{D_1}$ for the type of property is not selected for the model.

Finally, it would be interesting to study the differences between regions. First, a set of dummy variables as shown in the table below can be introduced.

Table 6 Dummy variables for the region

Region	**D2**	**D3**	**D4**	**D5**
Center	0	0	0	0
North	1	0	0	0
South	0	1	0	0
West	0	0	1	0
East	0	0	0	1

In this model, we are effectively only varying the intercept, while keeping the slope of each regression line (plane) the same.

The following ANOVA summary is obtained for the model with two quantitative variables ($\mathbf{X_1}$, $\mathbf{X_2}$) and four dummy variables ($\mathbf{D_2}$, $\mathbf{D_3}$, $\mathbf{D_4}$, $\mathbf{D_5}$):

Table 7 ANOVA for the model with 2 quantitative variables and 4 dummy variables

Regression Statistics	
Multiple R	0.72397
R Square	0.52413
Adjusted R Square	0.51550
Standard Error	0.14895
Observations	338

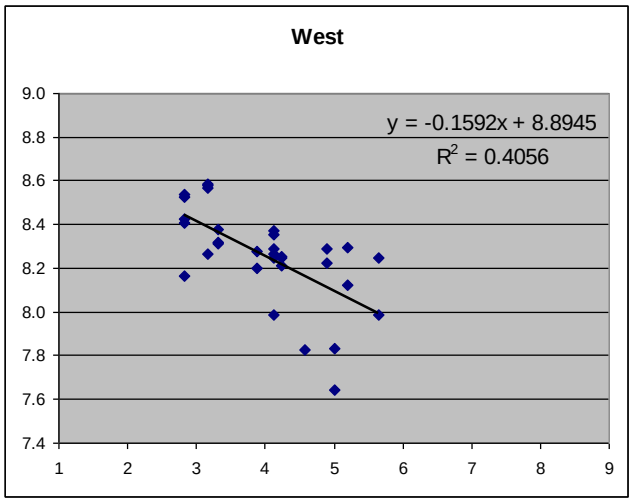
ANOVA

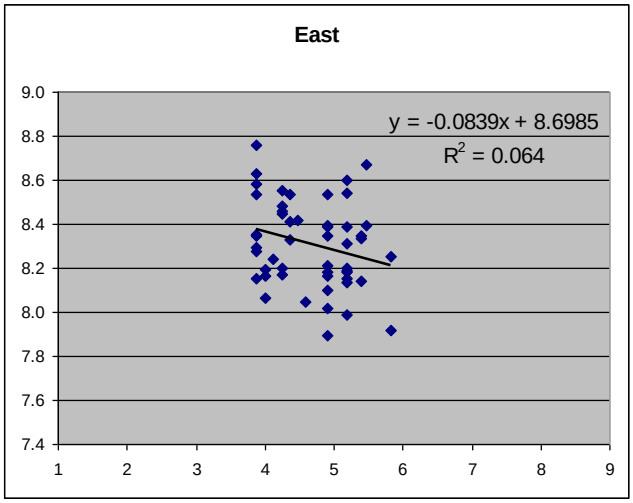
	df	*SS*	*MS*	*F*	*Significance F*
Regression	6	8.08862	1.34810	60.76107	1.63118E-50
Residual	331	7.34388	0.02219		
Total	337	15.43250			

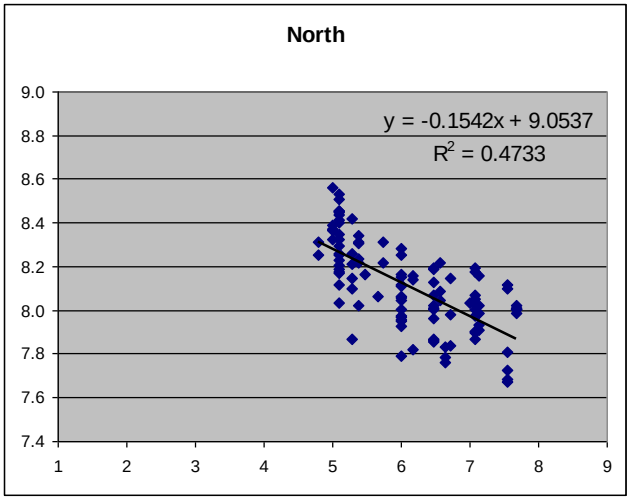
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	8.97864	0.04838	185.60361	0	8.88347	9.07380
X1	-0.13968	0.01104	-12.65190	3.38585E-30	-0.16139	-0.11796
X2	-0.03542	0.00932	-3.80108	0.00017	-0.05374	-0.01709
D2	0.07514	0.03874	1.93946	0.05330	-0.00107	0.15136
D3	-0.07528	0.02639	-2.85281	0.00461	-0.12719	-0.02337
D4	-0.06487	0.03296	-1.96843	0.04985	-0.12970	-4.18455E-05
D5	0.07223	0.03160	2.28604	0.02288	0.01008	0.13438

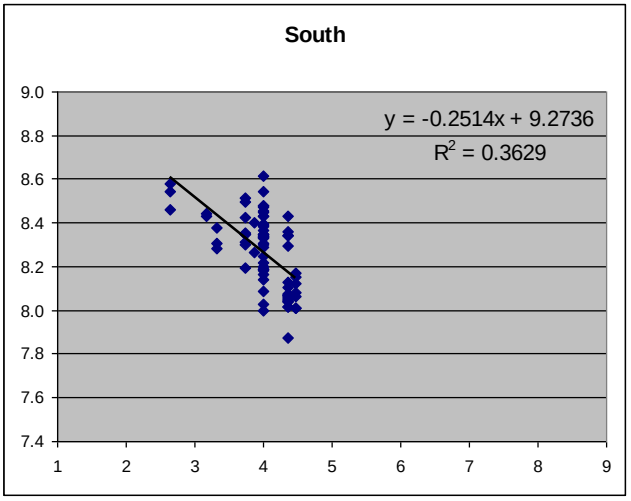
Although one can note the improvement of R^2 to 52.41%, the significance of dummy variable $\mathbf{D_2}$ can be questioned, given the p-value of 0.0533. Furthermore, this model assumes the constant slope coefficient across all regions and only varies the intercept point. However, as seen below, the analysis of the price-distance plots by regions suggests that different regions have different slope coefficients.

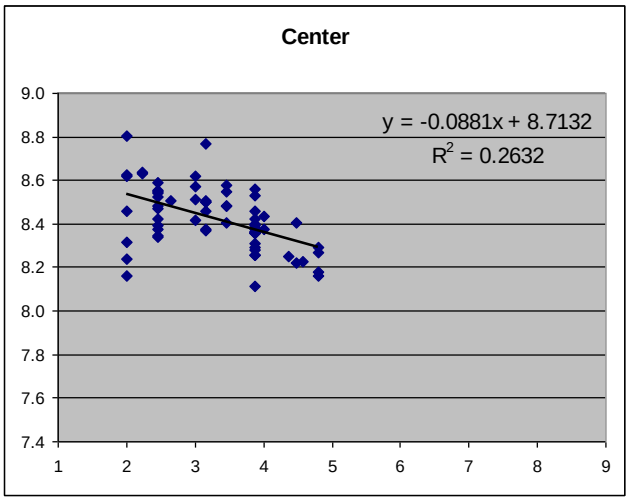
Chart 4 Conditional plots by regions











It would therefore seem reasonable to introduce interactions between the distance variable ($\mathbf{X_1}$) and each of the dummy variables ($\mathbf{D_2}$ through $\mathbf{D_5}$). The results of regression of the model with two quantitative variables ($\mathbf{X_1}$, $\mathbf{X_2}$), four dummy variables ($\mathbf{D_2}$, $\mathbf{D_3}$, $\mathbf{D_4}$, $\mathbf{D_5}$) and four interactions ($\mathbf{X_1D_2}$, $\mathbf{X_1D_3}$, $\mathbf{X_1D_4}$, $\mathbf{X_1D_5}$) are given in the following table:

Table 8 ANOVA for the model with 2 quantitative variables, 4 dummy variables and 4 interactions

Regression Statistics	
Multiple R	0.74484
R Square	0.55478
Adjusted R Square	0.54117
Standard Error	0.14495
Observations	338

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	10	8.56168	0.85617	40.74721	1.06362E-51
Residual	327	6.87082	0.02101		
Total	337	15.43250			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	8.80674	0.07582	116.16059	0.00000	8.65760	8.95589
X1	-0.08253	0.02152	-3.83477	0.00015	-0.12488	-0.04019
X2	-0.04144	0.00916	-4.52421	0.00001	-0.05946	-0.02342
D2	0.37406	0.12280	3.04618	0.00251	0.13249	0.61562
D3	0.64206	0.17843	3.59834	0.00037	0.29104	0.99309
D4	0.20549	0.14217	1.44541	0.14930	-0.07419	0.48517
D5	-0.02701	0.17824	-0.15151	0.87966	-0.37765	0.32364
X1D2	-0.07547	0.02685	-2.81073	0.00524	-0.12829	-0.02265
X1D3	-0.19037	0.04605	-4.13400	0.00005	-0.28096	-0.09978
X1D4	-0.07761	0.03676	-2.11144	0.03549	-0.14993	-0.00530
X1D5	0.00422	0.04067	0.10381	0.91738	-0.07579	0.08423

The R^2 of this model is 55.48%, and the significance is high (F = 40.74). However, as seen in the plots above, the East data exhibits considerable variation, and has a slope and intercept comparable to those of the Center region. The ANOVA results are in line with these observations, showing high p-values and small slope coefficients for $\mathbf{D_5}$ and $\mathbf{X_1D_5}$. Based on these considerations, the model is refined by combining East with Center, i.e. removing the $\mathbf{D_5}$ and $\mathbf{X_1D_5}$ variables. The regression results of this model are as follows:

Table 9 ANOVA for the model with 2 quantitative variables, 3 dummy variables and 3 interactions

Regression Statistics	
Multiple R	0.74477
R Square	0.55469
Adjusted R Square	0.54386
Standard Error	0.14453
Observations	338

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	8	8.56023	1.07003	51.22610	2.13679E-53
Residual	329	6.87227	0.02089		
Total	337	15.43250			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	8.81030	0.05811	151.61465	0.00000	8.69599	8.92462
X1	-0.08437	0.01330	-6.34591	0.00000	-0.11052	-0.05822
X2	-0.04127	0.00911	-4.53210	0.00001	-0.05919	-0.02336
D2	0.37000	0.11190	3.30661	0.00105	0.14987	0.59012
D3	0.63781	0.17068	3.73701	0.00022	0.30206	0.97357
D4	0.20147	0.13279	1.51717	0.13018	-0.05976	0.46270
X1D2	-0.07362	0.02077	-3.54449	0.00045	-0.11447	-0.03276
X1D3	-0.18845	0.04261	-4.42279	0.00001	-0.27227	-0.10463
X1D4	-0.07577	0.03254	-2.32835	0.02050	-0.13979	-0.01175

Note that while R^2 has slightly decreased compared with previous model, the adjusted R^2 is higher than previous (54.39% vs 54.12%) and the F value has improved from 41 to 51. The only remaining questionable significance is that of $\mathbf{D_4}$ and to a lesser extent of $\mathbf{X_1D_4}$. The poor p-values for these variables can be explained by a small amount of data in the West region (32 data points). Moreover, the

standard error of all dummy variables is relatively high, since these variables represent the addition to the intercept value, and there is a leverage effect of the slope error on the intercept error.

Conclusion

The final model selected is determined by the following equation with coefficients from Table 9:

$$\mathbf{Y} = 8.8103 - 0.08437\mathbf{X_1} - 0.04127\mathbf{X_2} + 0.37\mathbf{D_2} + 0.63781\mathbf{D}_3 + 0.20147\mathbf{D_4} - 0.07362\mathbf{X_1D_2} - 0.18845\mathbf{X_1D_3} - 0.07577\mathbf{X_1D_4},$$

where Y is the natural logarithm of the price in Euros per square meter, and X_1 is the square root of the distance from Luxembourg City in km.

Substituting the corresponding values of dummy variables for each region, the following equations are obtained:

Center / East: $\mathbf{Y} = 8.81030 - 0.08437\mathbf{X_1} - 0.04127\mathbf{X_2}$

North : $\mathbf{Y} = 9.18030 - 0.15799\mathbf{X_1} - 0.04127\mathbf{X_2}$

South : $\mathbf{Y} = 9.44811 - 0.27282\mathbf{X_1} - 0.04127\mathbf{X_2}$

West : $\mathbf{Y} = 9.01177 - 0.16014\mathbf{X_1} - 0.04127\mathbf{X_2}$

Note that intercept and slope coefficients for $\mathbf{X_1}$ compare well with those of the single variable regressions in Chart 4.

Appendix – Original data, excl. Luxembourg City, sorted by distance

Price, EUR	Area, m2	Bedrooms	Type	Distance, km	Region
524,713	128	2	A	4	Center
592,430	157	3	A	4	Center
588,608	168	4	A	4	Center
495,000	105	2	A	4	Center
612,900	92	1	A	4	Center
457,950	82	2	A	4	Center
575,900	104	3	A	4	Center
971,006	173	4	H	5	Center
1,017,500	180	4	H	5	Center
272,500	53	1	A	6	Center
377,500	75	2	A	6	Center
487,500	94	3	A	6	Center
551,240	121	2	A	6	Center
338,236	63	1	A	6	Center
611,961	128	3	A	6	Center
515,873	123	2	A	6	Center
520,966	124	3	A	6	Center
393,592	89	2	A	6	Center
481,454	111	3	A	6	Center
312,642	61	1	A	6	Center
565,642	117	3	A	6	Center
853,450	173	3	H	7	Center
461,900	90	2	A	7	South
539,500	114	3	A	7	South
730,100	137	4	A	7	South
476,000	93	2	A	8	West
791,343	225	3	H	8	West
795,375	174	3	H	8	West
529,400	105	2	H	8	West
556,000	124	3	A	8	West
437,694	83	2	A	9	Center
476,650	96	3	A	9	Center
968,347	214	3	H	9	Center
777,300	140	3	H	9	Center
1,268,673	198	3	H	10	Center
979,076	198	4	H	10	Center
709,420	150	3	H	10	Center
562,000	114	3	H	10	Center
272,899	63	2	A	10	Center
427,721	99	3	A	10	Center
887,581	180	4	H	10	Center
423,183	92	2	A	10	South
609,196	131	3	H	10	South
840,000	157	4	H	10	West
268,021	51	1	A	10	West
628,025	162	3	H	10	West
1,052,940	198	3	H	10	West
440,166	101	2	A	11	South
611,950	151	3	A	11	South
590,700	149	3	A	11	South
655,495	160	4	H	11	West
750,000	184	4	H	11	West
469,000	108	3	A	11	West
334,806	65	1	A	12	Center
407,892	77	2	A	12	Center
492,352	102	3	A	12	Center
439,500	91	2	A	12	Center
1,035,325	231	3	H	12	Center
310,000	73	2	A	14	South
413,080	83	2	A	14	South
474,369	104	3	A	14	South
296,160	70	1	A	14	South
356,952	73	2	A	14	South
419,346	104	3	A	14	South
227,622	56	1	A	14	South
328,769	78	2	A	14	South
256,392	71	2	A	14	South
372,000	85	2	A	15	Center
732,402	145	3	H	15	Center
488,000	114	3	H	15	Center
593,000	130	3	H	15	Center
743,910	173	3	H	15	Center
539,000	140	4	H	15	Center
428,227	97	2	A	15	Center
465,199	109	2	A	15	Center
460,587	106	2	A	15	Center
395,850	93	3	A	15	Center
501,000	150	3	H	15	Center
448,000	110	3	H	15	Center
595,000	114	3	H	15	Center
598,000	140	3	H	15	Center
394,000	100	3	H	15	Center
458,587	103	2	A	15	Center
732,402	155	3	H	15	Center
698,000	175	4	H	15	Center
539,000	140	4	H	15	Center
405,000	91	2	H	15	South
310,000	80	2	A	15	South
638,000	125	3	H	15	East
311,261	49	1	A	15	East
431,562	77	2	A	15	East
549,293	103	3	A	15	East
227,130	54	1	H	15	East
375,970	94	2	H	15	East
425,240	108	3	H	15	East
469,738	111	3	A	15	East
350,000	101	3	A	15	East
706,017	180	3	H	15	West
570,735	157	3	H	15	West
470,100	102	3	H	16	Center
743,094	171	4	H	16	Center
685,000	192	4	H	16	South
498,000	137	3	A	16	South
237,736	57	1	A	16	South
393,460	93	2	A	16	South
293,790	67	1	A	16	South
303,240	73	2	A	16	South
349,808	114	3	A	16	South
320,290	91	1	A	16	South
319,076	79	2	A	16	South
488,593	150	3	A	16	South
285,840	77	2	A	16	South
493,530	124	3	A	16	South
610,470	139	3	H	16	South
251,339	49	1	A	16	South
387,569	81	2	A	16	South
488,680	104	3	A	16	South
476,890	114	3	A	16	South
248,146	54	1	A	16	South
390,303	85	2	A	16	South
558,400	116	3	A	16	South
187,831	45	1	A	16	South
316,450	83	2	A	16	South
385,511	96	3	A	16	South
598,905	143	4	A	16	South
284,604	59	1	A	16	South
434,293	79	2	A	16	South
214,900	46	1	A	16	South
349,250	79	2	A	16	South
444,100	105	3	A	16	South
364,068	101	2	A	16	South
349,808	97	3	A	16	South
459,146	134	3	A	16	South
377,282	127	2	A	16	South
365,608	85	2	A	16	South
745,000	234	4	H	16	East
598,988	170	3	H	16	East
673,042	186	4	H	16	East
530,000	140	3	H	17	East
471,203	160	3	H	17	West
380,100	88	2	A	17	West
485,400	114	3	A	17	West
846,042	221	3	H	17	West
211,520	53	1	A	17	West
263,600	68	2	A	17	West
461,805	99	2	A	18	East
411,427	85	2	A	18	East
1,300,000	367	3	A	18	East
532,265	146	1	A	18	East
461,805	98	2	A	18	East
512,550	99	3	A	18	East
279,913	76	2	A	18	West
316,838	83	2	A	18	West
376,800	98	3	A	18	West
375,000	98	2	A	19	Center
268,000	84	2	A	19	South
445,270	106	3	A	19	South
306,000	95	2	A	19	South
200,000	66	1	A	19	South
215,000	65	2	A	19	South
329,000	125	3	A	19	South
231,156	54	1	A	19	South
256,796	56	2	A	19	South
175,000	56	1	A	19	South
230,000	73	2	A	19	South
245,000	77	2	A	19	South
320,200	100	3	A	19	South
164,164	53	1	A	19	South
215,000	71	2	A	19	South
243,984	58	1	A	19	South
291,225	86	2	A	19	South
244,800	61	1	A	19	South
198,090	63	1	A	19	South
257,108	83	2	A	19	South
259,000	51	1	A	19	East
350,400	78	2	A	19	East
452,300	109	3	A	19	East
787,139	176	3	H	20	Center
816,956	220	4	H	20	Center
276,000	82	1	A	20	South
162,180	51	1	A	20	South
333,020	103	3	A	20	South
380,000	126	3	A	20	South
289,000	82	2	A	20	South
435,000	144	3	H	20	South
364,902	105	3	A	20	South
682,645	151	3	H	20	East
550,960	147	3	H	21	Center
334,890	107	3	A	21	East
477,324	190	3	H	21	West
295,336	83	1	A	23	Center
368,282	92	2	A	23	Center
381,156	109	3	A	23	Center
495,000	127	3	A	23	Center
272,991	67	1	A	23	North
326,745	85	2	A	23	North
658,005	187	4	H	24	East
349,000	79	2	A	24	East
418,000	127	3	A	24	East
660,000	130	3	H	24	East
768,500	175	4	H	24	East
410,000	97	2	A	24	East
610,440	227	4	H	24	East
485,000	160	3	H	24	East
316,800	86	2	A	24	East
411,600	115	3	A	24	East
478,000	120	3	H	24	West
565,742	152	3	H	24	West
628,000	120	3	H	25	North
667,000	155	4	H	25	North
363,200	84	2	A	25	North
339,600	77	2	A	25	North
459,000	111	3	A	25	North
480,775	230	4	H	25	West
402,420	160	3	H	25	West
359,500	77	1	A	26	North
436,100	97	2	A	26	North
228,000	54	2	A	26	North
685,557	187	4	A	26	North
296,900	79	2	A	26	North
380,668	108	3	A	26	North
245,000	69	2	A	26	North
498,600	130	3	H	26	North
472,242	118	3	H	26	North
513,820	143	3	H	26	North
524,191	136	3	H	26	North
536,952	130	4	H	26	North
449,813	146	4	H	26	North
433,803	94	2	A	26	North
388,500	87	2	A	26	North
571,842	113	3	A	26	North
408,952	87	2	A	26	North
618,281	125	3	A	26	North
466,000	139	3	H	26	North
286,501	61	1	A	26	North
738,295	144	2	H	27	East
584,096	133	3	H	27	East
490,119	90	1	A	27	East
309,365	76	2	A	27	East
385,450	107	3	A	27	East
312,922	106	2	A	27	East
191,400	55	1	A	27	East
149,800	44	1	A	27	East
160,389	44	2	A	27	East
401,175	112	3	A	27	East
235,939	59	1	A	27	West
424,230	126	3	A	27	West
425,000	129	3	A	28	North
431,430	165	4	H	28	North
673,116	174	3	H	28	North
330,637	90	2	A	28	North
406,509	118	3	A	28	North
590,000	130	3	H	28	North
495,000	162	4	H	29	North
516,600	123	3	A	29	North
404,754	100	1	A	29	North
434,861	107	2	A	29	North
427,308	115	3	A	29	North
539,320	143	3	A	29	North
558,000	134	3	H	29	East
596,150	141	4	H	29	East
603,881	176	3	H	29	East
320,000	91	2	A	30	North
827,760	142	4	H	30	East
255,971	58	1	A	30	East
336,253	106	2	A	32	North
414,087	141	3	H	32	West
631,083	165	3	H	32	West
554,940	150	3	H	33	North
305,750	75	2	A	33	North
395,000	144	3	A	34	East
672,500	175	4	H	34	East
229,188	58	1	A	36	North
319,122	91	2	A	36	North
218,000	77	1	A	36	North
220,000	77	2	A	36	North
238,000	86	1	A	36	North
302,000	101	2	A	36	North
327,000	113	3	A	36	North
416,000	120	3	H	36	North
351,147	145	4	H	36	North
598,740	180	3	H	36	North
206,353	71	2	A	36	North
250,806	79	3	A	36	North
460,000	147	3	H	36	North
272,000	71	1	A	36	North
262,000	78	2	A	36	North
391,000	124	3	A	36	North
453,000	130	4	H	38	North
407,344	163	3	H	38	North
463,283	135	4	H	38	North
273,201	76	1	A	42	North
287,636	85	2	A	42	North
457,079	126	3	A	42	North
270,799	90	2	A	42	North
198,609	62	1	A	42	North
284,147	93	2	A	42	North
235,000	82	1	A	42	North
245,000	82	2	A	42	North
232,154	89	2	A	42	North
180,713	70	2	A	42	North
268,268	103	3	A	42	North
248,000	67	2	A	43	North
316,000	101	3	A	43	North
440,000	135	4	H	43	North
204,618	87	2	A	44	North
343,300	136	3	A	44	North
310,000	129	3	H	44	North
482,476	140	3	H	45	North
497,248	170	3	H	45	North
442,510	174	4	H	45	North
680,500	220	4	H	49	North
216,000	80	2	A	50	North
246,000	94	3	A	50	North
272,079	75	1	A	50	North
272,710	89	2	A	50	North
346,736	116	3	A	50	North
446,050	166	3	H	50	North
298,400	84	2	A	50	North
445,300	142	4	A	50	North
268,100	84	2	A	50	North
408,100	140	4	A	50	North
197,060	67	2	A	51	North
275,000	90	2	H	51	North
354,716	130	3	H	51	North
560,143	160	3	H	51	North
342,504	123	4	A	51	North
129,049	57	1	A	57	North
208,816	97	2	A	57	North
214,699	99	3	A	57	North
434,344	176	4	H	57	North
253,104	77	1	A	57	North
274,623	82	2	A	57	North
111,240	37	1	A	59	North
221,370	74	2	A	59	North
326,490	109	3	A	59	North
180,259	59	1	A	59	North
232,880	79	2	A	59	North