Seasonality and pricing – The case of Danish holiday cottages

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Overview

1. Introduction
2. Literature / causes / model of seasonality
3. Seasonality and holiday cottages rentals in Denmark
4. Seasonality and pricing of holiday cottage weeks
5. Summary / Discussion

Purpose

The purpose of the paper is to model seasonality in the demand for Danish cottage rentals, and to apply the model for pricing.

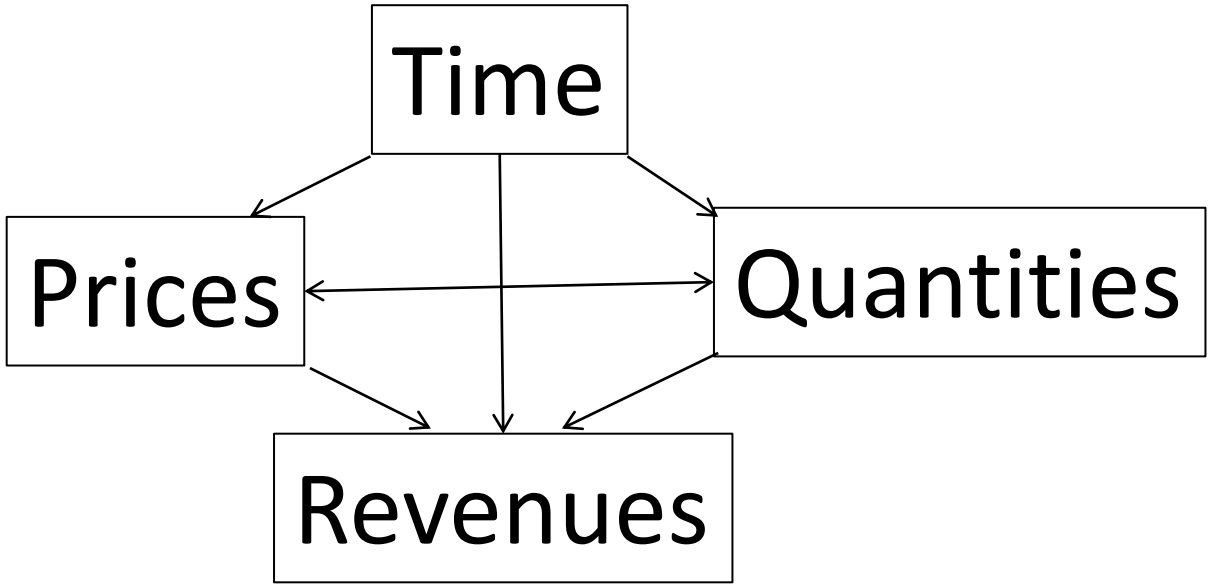
Causes of seasonality (~Bar-On, 1975)

Natural:
- Temperature (normal rather than actual)
- Hours of sunshine (rather than hours of daylight)
- Latitude and altitude
- Climate, rain/snow fall
- Snow depth

Institutional:
- School holidays (moving, in some key markets)
- Religious holidays (moving, in the spring)
- Calendar effects (number of days per month)
- Business seasons

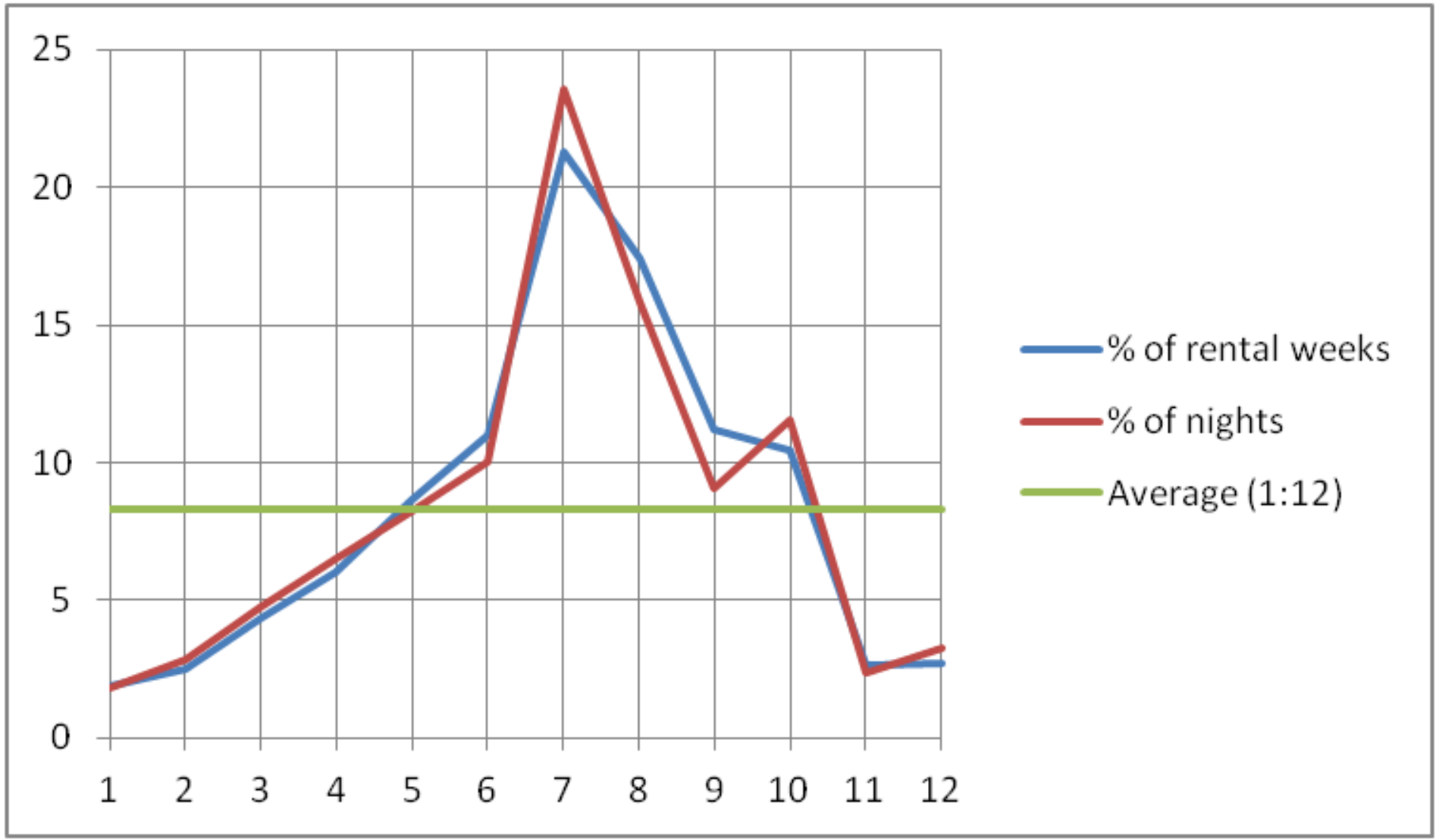
Generic and diamond model of revenues:

Sum of revenues per time unit = sum of (price * quantity)

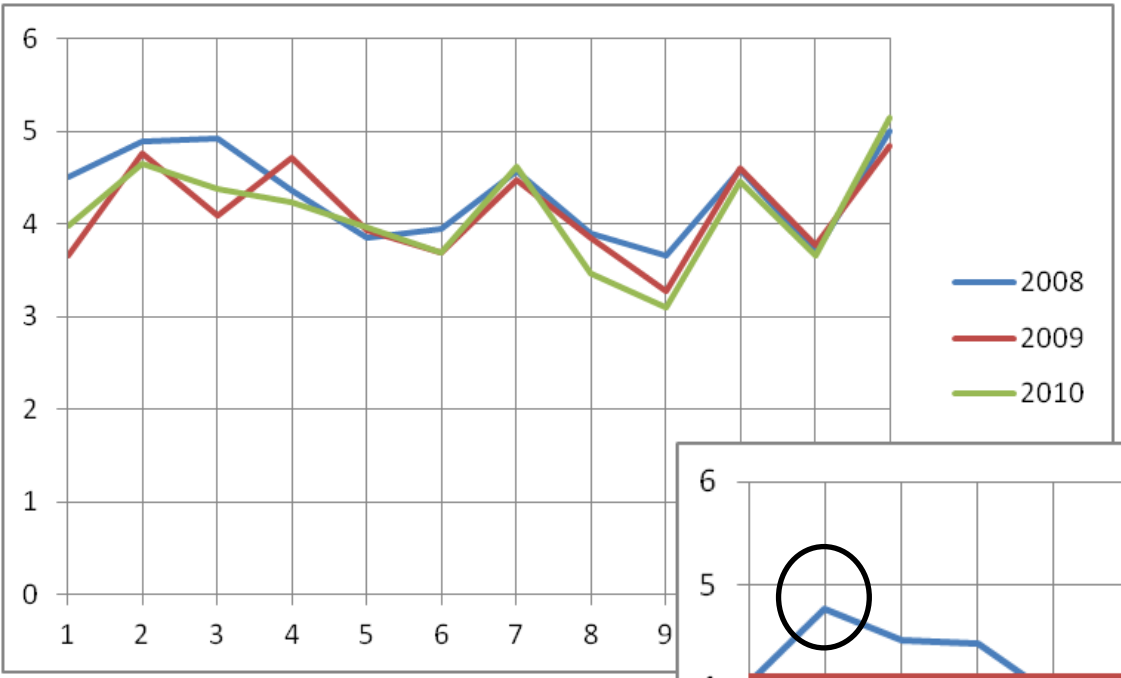


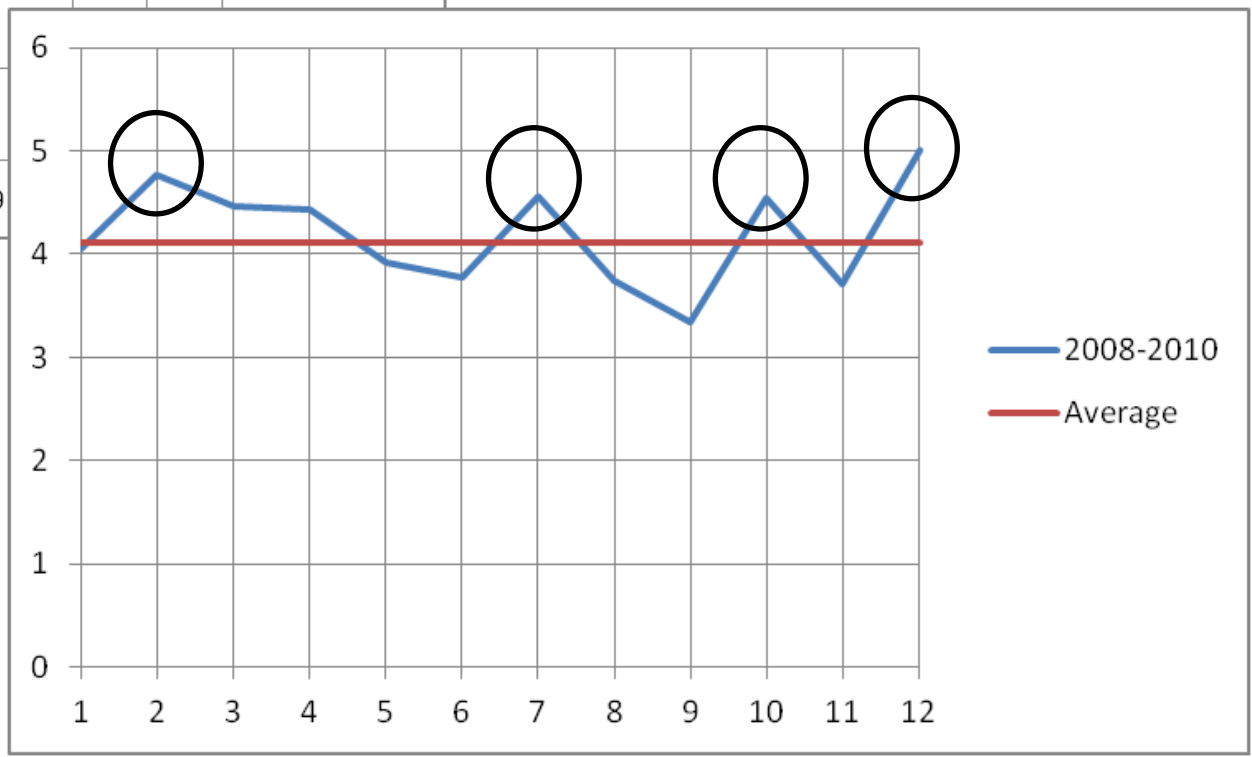
Source: Carl H. Marcussen, Sept. 2011

Percent of bednights and percent of rental weeks per month 2008-2010

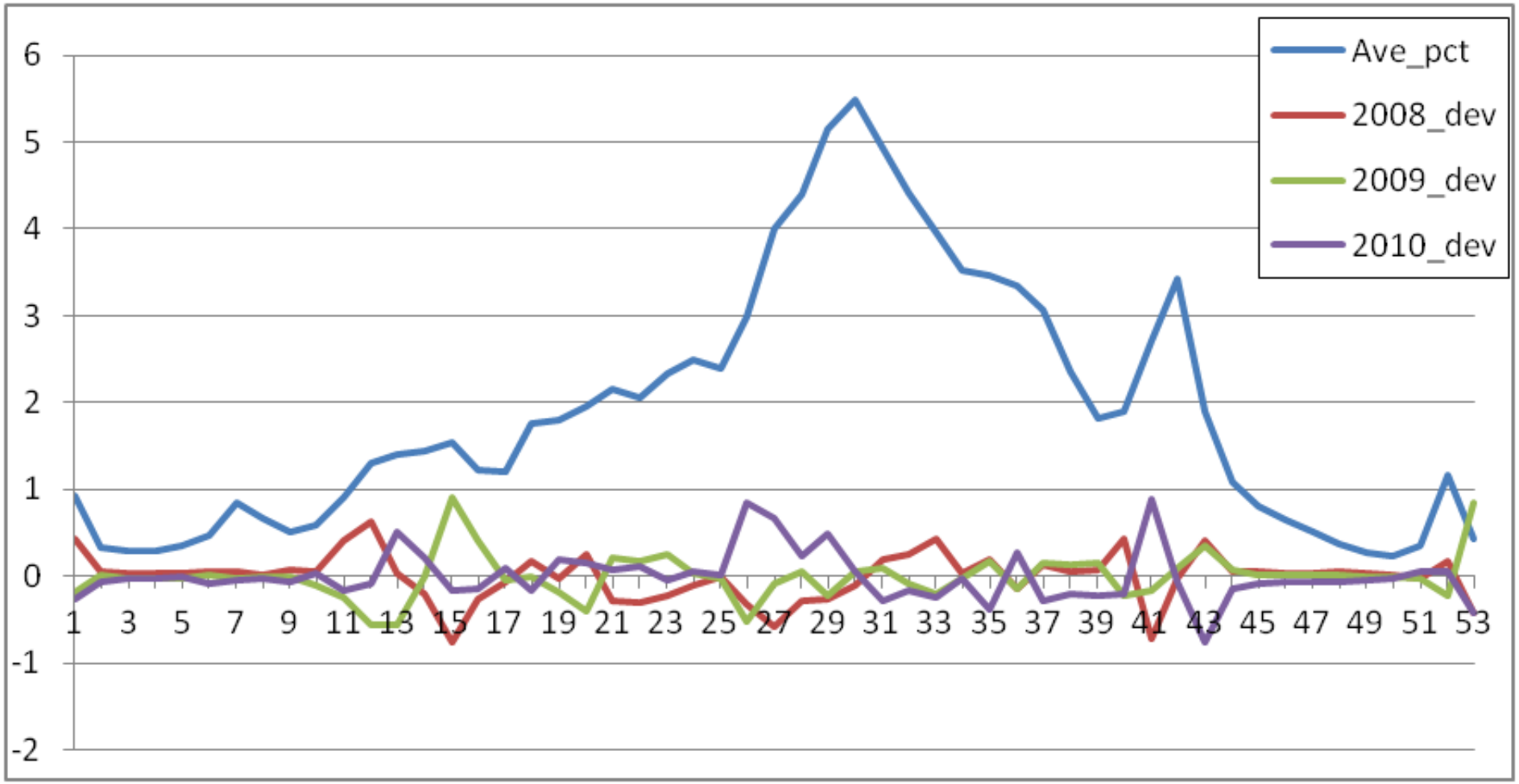


Persons per holiday cottage per month

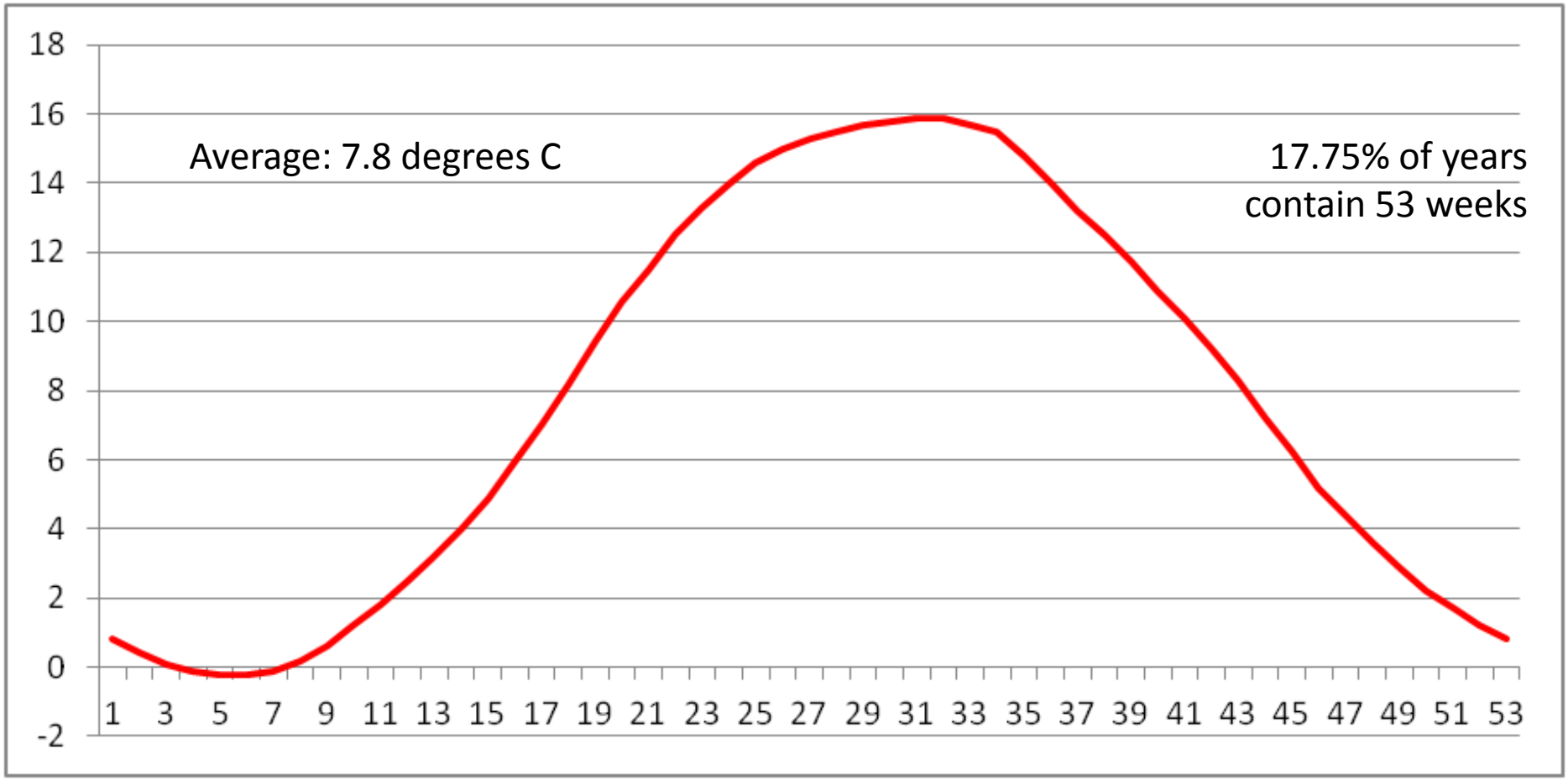




Rentals of holiday cottages per week in Denmark, 2008-2010

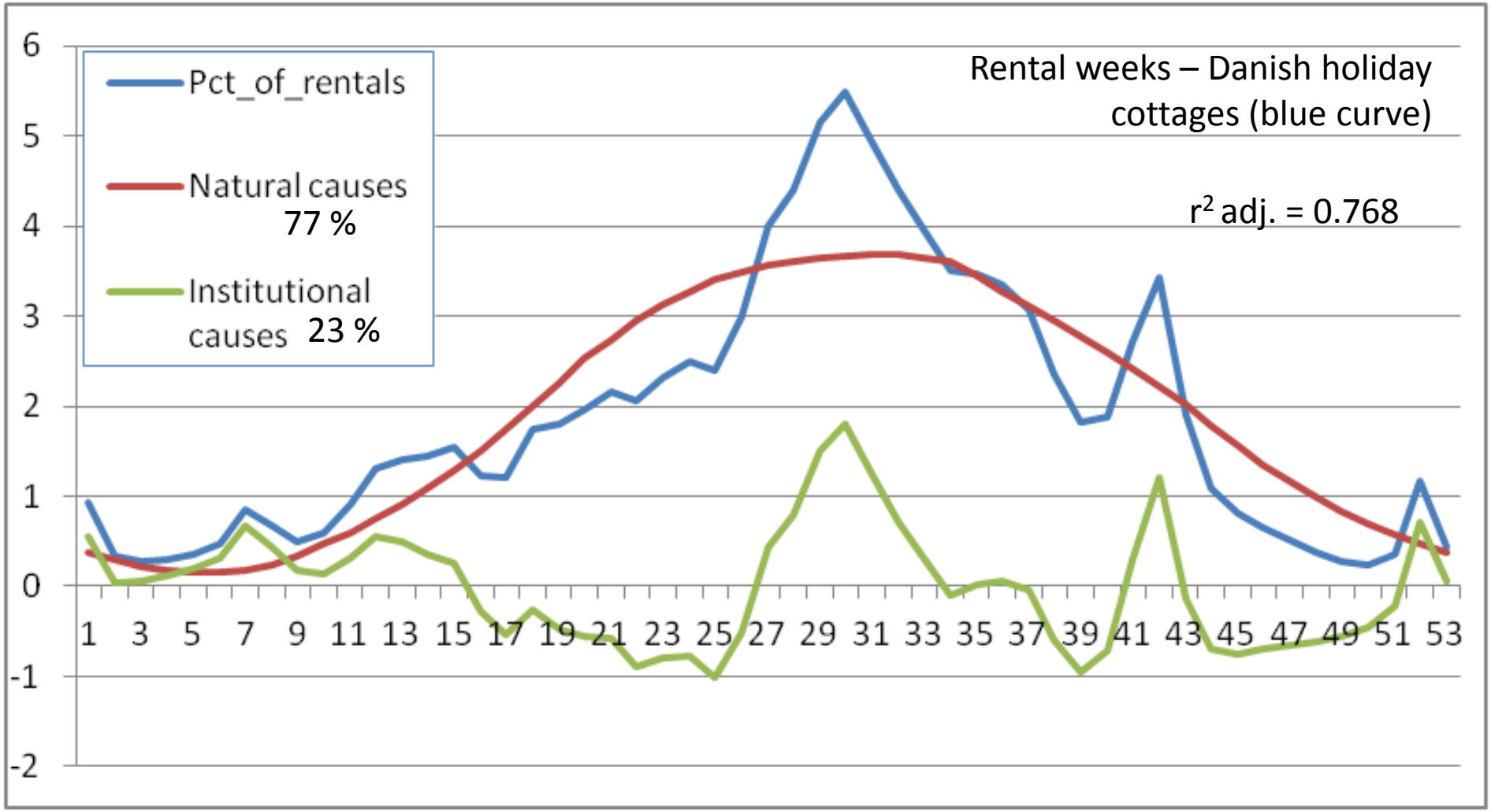


Normal* temperatures per week in Denmark



* Average historic highest daily temperatures.

Natural causes of seasonality: 77%
Institutional causes: 23%



Moving holidays, spring. DK

Easter:

1. (Wednesday before) **Maundy Thursday**
2. (Maundy Thursday before) **Good Friday**
3. (Easter Sunday before) **Easter Monday**

4. (Thursday before) **Prayer Day** (Friday) *
5. (Wednesday before) **Ascension Day** (Thursday)
6. (Whit - Sunday - before) **second Whit** (Monday)

* Prayer Day is an official Danish public holiday that falls on the fourth Friday after Easter, and thus three weeks before Pentecost (a.k.a. Whit)

Moving summer holidays, Germany: e.g., Niedersachen

Week\year	2008	2009	2010	2011	2012	Total
25	0	0	4	0	0	4
26	0	4	7	0	0	11
27	0	7	7	4	0	18
28	4	7	7	7	0	25
29	7	7	7	7	0	28
30	7	7	7	7	7	35
31	7	7	3	7	7	31
32	7	3	0	7	7	24
33	7	0	0	3	7	17
34	3	0	0	0	7	10
35	0	0	0	0	5	5
Total	42	42	42	42	40	208

Explanatory variables for percentage of rental per week

(Constant)

1. Temp_norm
2. Sum_Niedersach
3. Week_42
4. Easter_3_days
5. New_Years_eve

Week_30
Week_41
Week_36
Week_35
Week_32
Week_31
Week_29
Week_33

Week_37
Week_28
Week_27
Week_34
Easter_2nd
Palmesondag
Week_1
Week_43
Week_52

R2 adjusted=0.956

The model – R2 adjusted=0.956

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.270	.047		5.804	.000		
	Temp_norm	.147	.006	.587	24.209	.000	.478	2.091
	Sum_Niedersach	.104	.023	.151	4.601	.000	.260	3.848
	Week_27	.993	.209	.093	4.744	.000	.731	1.369
	Week_28	1.219	.224	.114	5.433	.000	.636	1.571
	Week_29	1.845	.237	.173	7.771	.000	.568	1.761
	Week_30	2.164	.238	.203	9.110	.000	.568	1.762
	Week_31	1.741	.221	.163	7.888	.000	.657	1.522
	Week_32	1.454	.199	.136	7.308	.000	.809	1.236
	Week_33	1.144	.193	.107	5.928	.000	.860	1.162
	Week_34	.865	.189	.081	4.579	.000	.897	1.115
	Week_35	1.029	.188	.096	5.470	.000	.906	1.104
	Week_36	1.016	.187	.095	5.443	.000	.919	1.088
	Week_37	.854	.185	.080	4.604	.000	.931	1.074
	Week_41	.966	.182	.091	5.313	.000	.969	1.032
	Week_42	1.802	.181	.169	9.949	.000	.977	1.024
	Week_43	.404	.181	.038	2.236	.027	.982	1.018
	Week_52	.542	.186	.051	2.915	.004	.928	1.078
	New_Years_eve	.556	.147	.067	3.790	.000	.903	1.107
	Palmesondag	.657	.181	.062	3.633	.000	.980	1.021
	Easter_3_days	1.314	.180	.123	7.285	.000	.984	1.016
	Easter_2nd	.665	.180	.062	3.693	.000	.987	1.013

a. Dependent Variable: Pct_of_rentals

Y=Pct of rentals

Application of the model for future price decision support. R2 adj.=0.929

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	71.951	.848		84.873	.000		
	Temp_norm	2.445	.099	.516	24.687	.000	.625	1.599
	New_Years_eve	65.242	3.394	.327	19.225	.000	.942	1.061
	Week_27	31.079	3.409	.156	9.117	.000	.934	1.071
	Week_28	41.181	3.414	.207	12.062	.000	.931	1.074
	Week_29	52.470	3.419	.263	15.346	.000	.928	1.077
	Week_30	52.176	3.422	.262	15.246	.000	.927	1.079
	Week_31	51.932	3.425	.260	15.163	.000	.925	1.081
	Week_32	49.163	3.425	.247	14.352	.000	.925	1.081
	Week_33	35.210	3.421	.177	10.292	.000	.927	1.079
	Week_34	22.425	3.416	.112	6.564	.000	.930	1.075
	Week_52	18.674	3.388	.094	5.512	.000	.945	1.058
	Palmesondag	12.430	3.320	.062	3.744	.000	.985	1.016
	Easter_3_days	15.074	3.313	.076	4.550	.000	.989	1.011
	Easter_2nd	12.824	3.307	.064	3.878	.000	.992	1.008

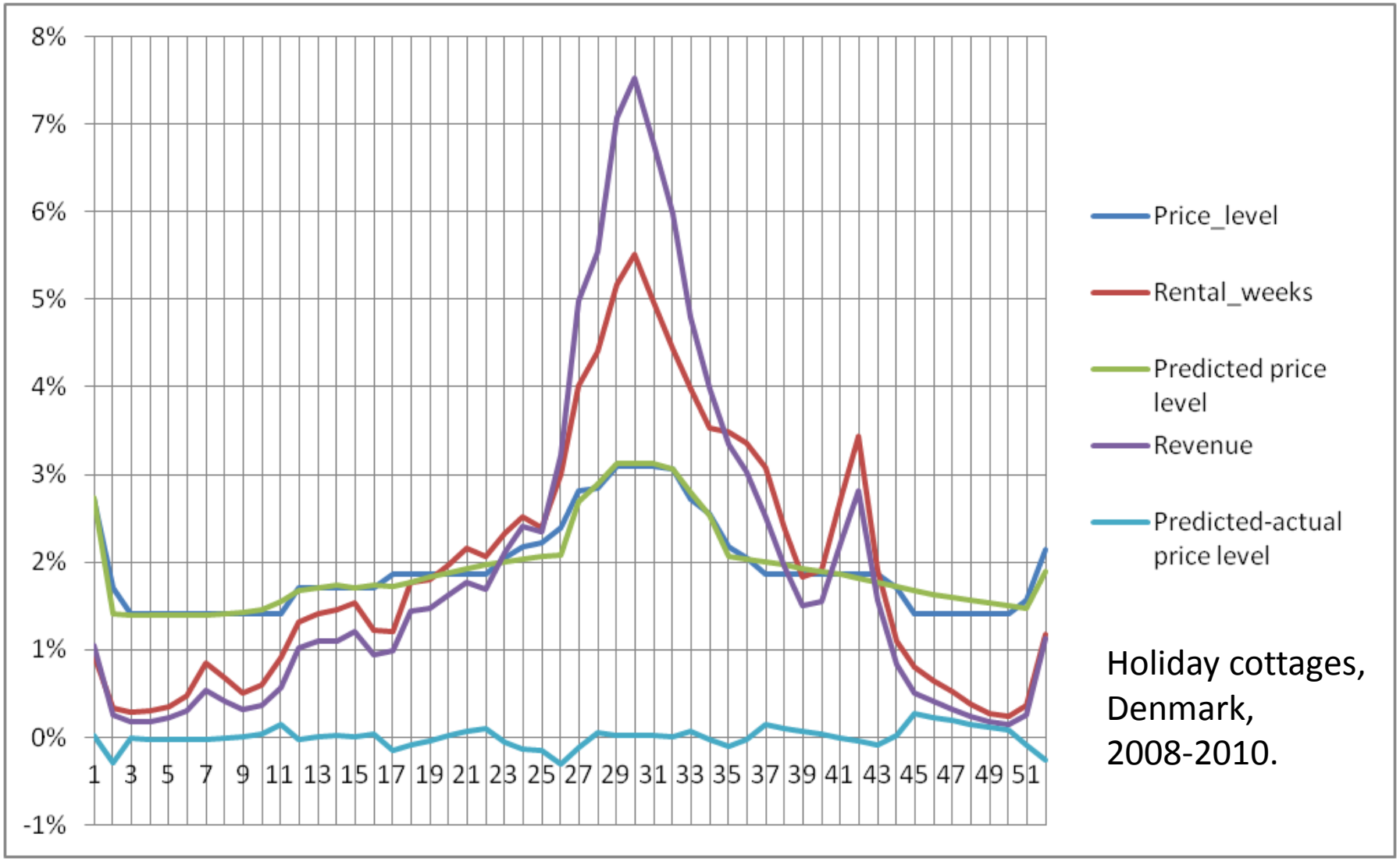
a. Dependent Variable: Price_level

Y=Price_level

Note: Excludes week 53.

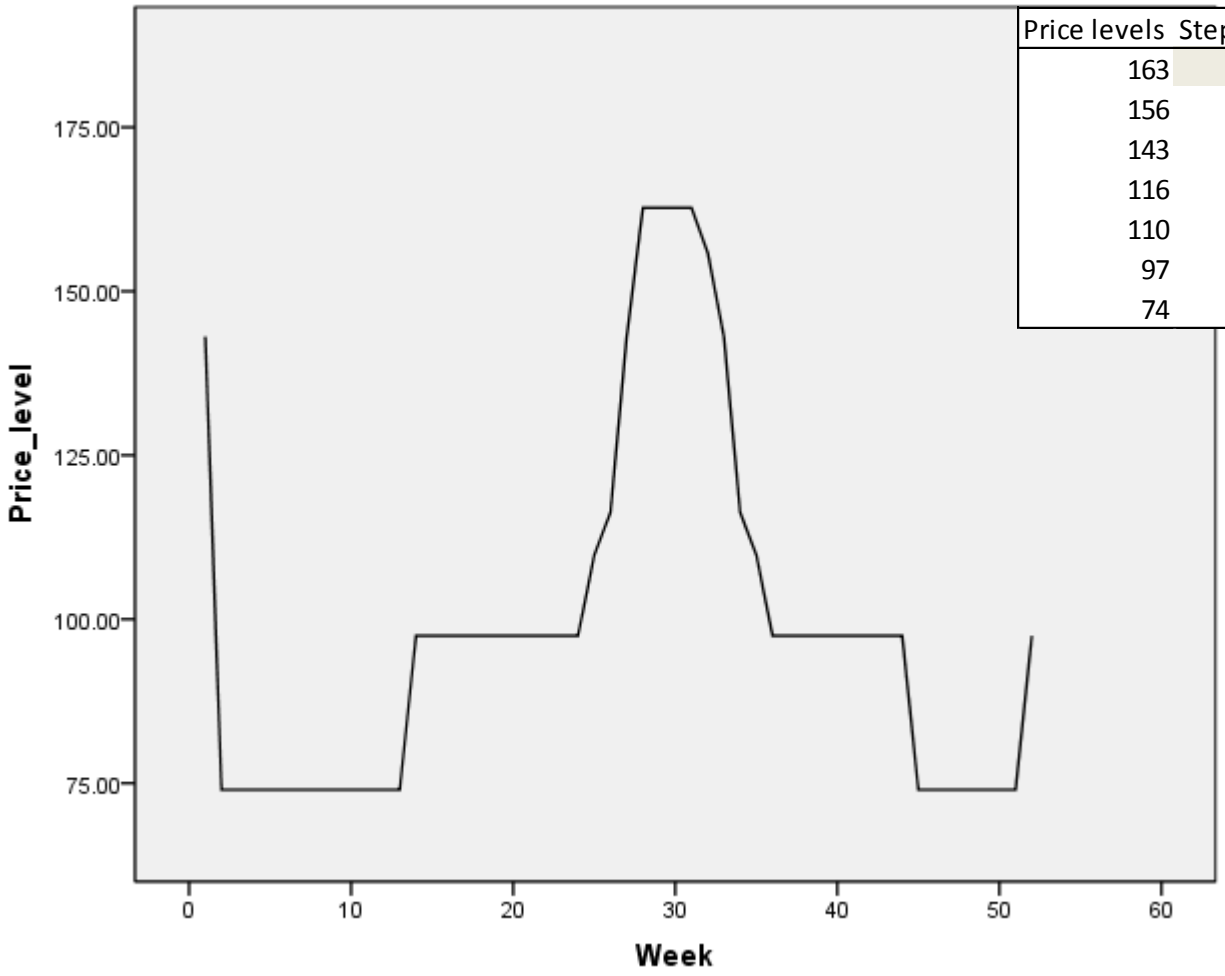
Eliminated in a stepwise multiple regression analysis:
Week_35, Week_36, Week_37, Week_41, Week_42, Week_43

Both seasonality in quantities demanded and in prices contribute to seasonality in revenue. Recommended prices can be predicted. Probably, the same could be done for other tourism services.



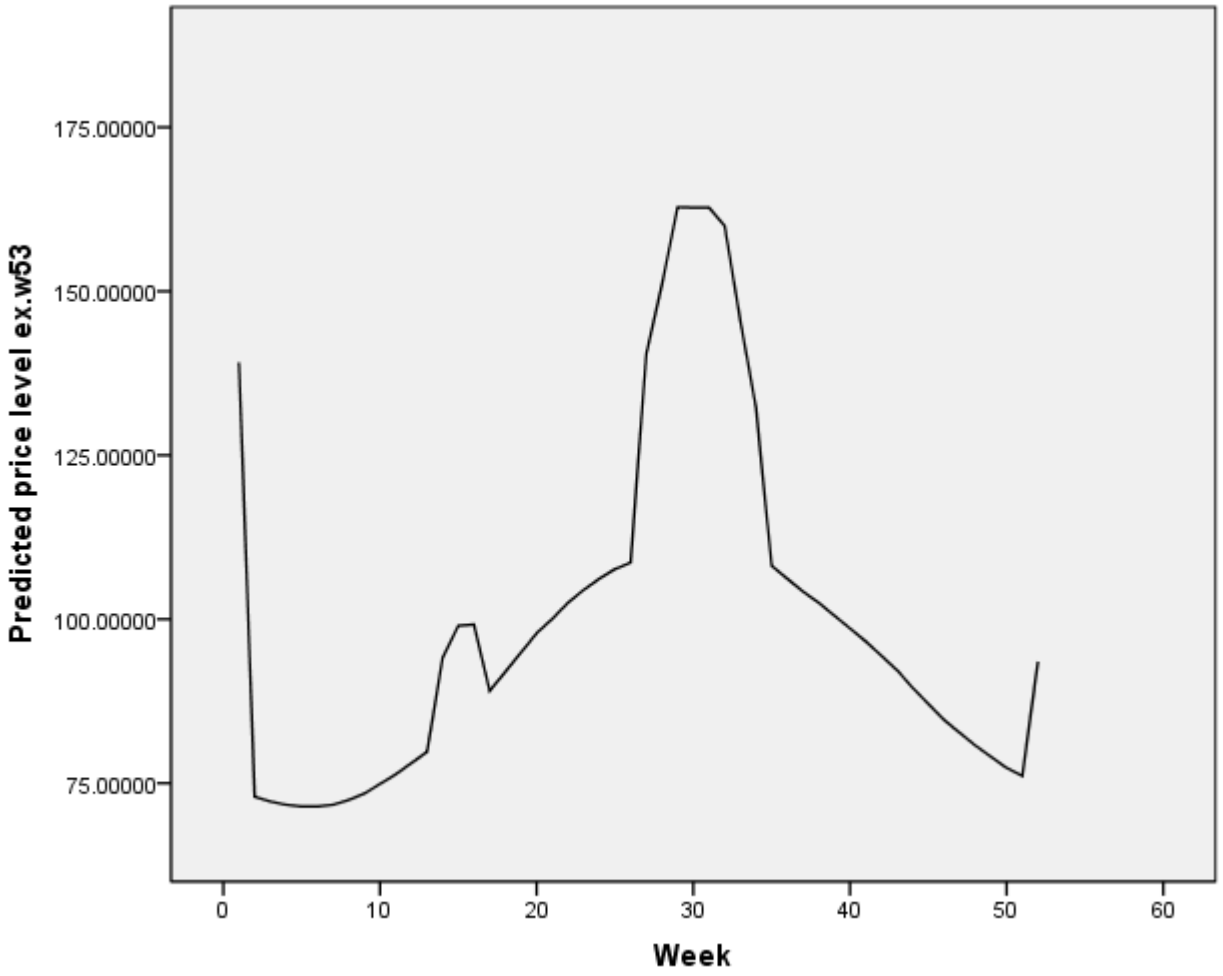
Holiday cottages, Denmark, 2008-2010.

Planned price-level for 2012

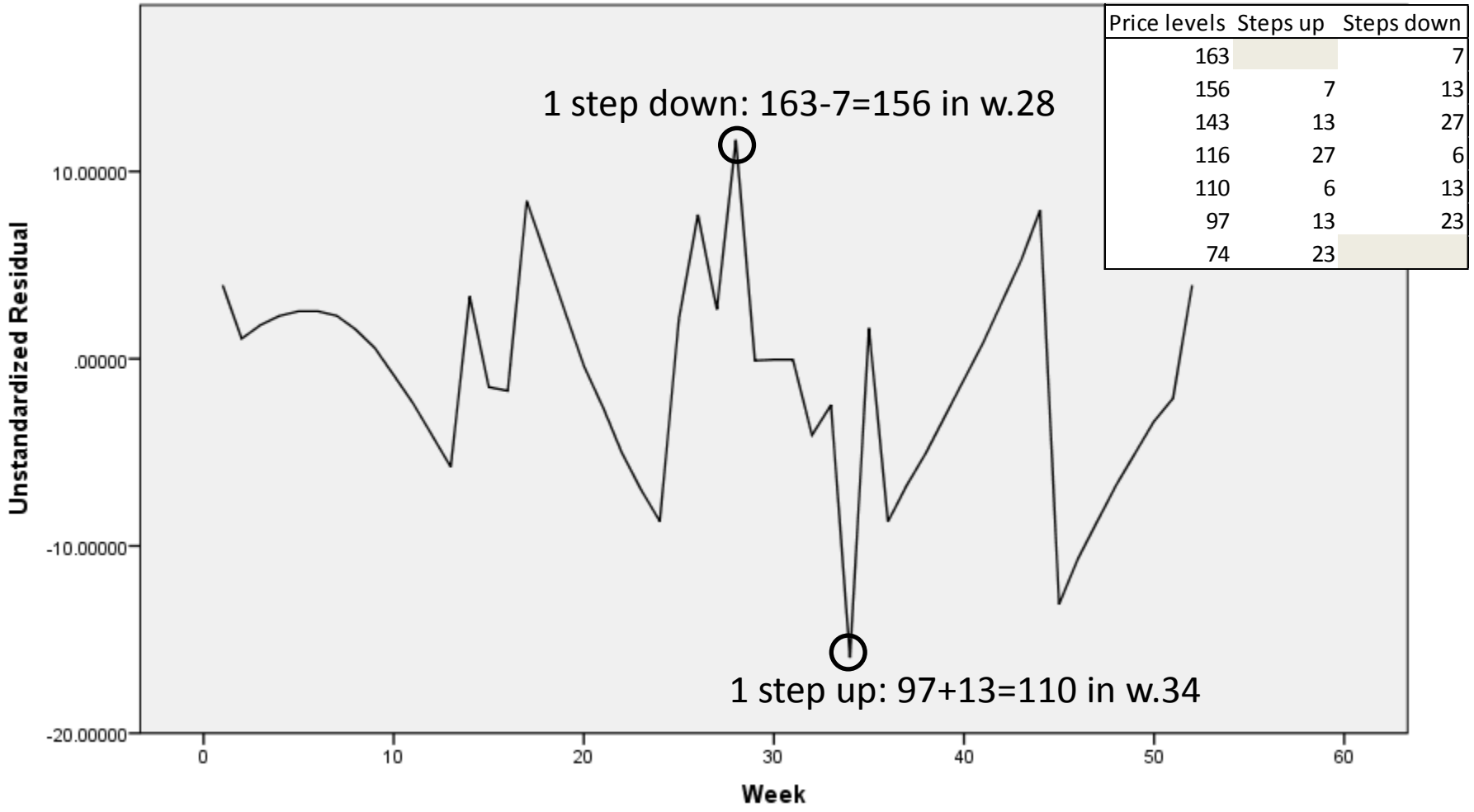


Price levels	Steps up	Steps down
163		7
156	7	13
143	13	27
116	27	6
110	6	13
97	13	23
74	23	

Predicted = suggested price level 2012



Deviations (un.std.) between published planned price-level versus predicted price - 2012



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Conclusions / Summary

- It is possible to predict the future distribution of cottage renting weeks, and other lodging services, with known normal temperatures, calendar and moving holidays.
- Application of a model as a decision support tool for pricing: 1. Explain seasonal demand. – 2. Explain price. 3. Predict (recommend) price, given calendar etc.. 4. ...
- Temperature is a key driver for demand in leisure tourism.
- Consider taking the holiday periods, and any known changed in these of main markets, into account when setting seasonal prices or predicting seasonal demand.