

July 2009 – July 2010 Validation of housing cooperative unit estimates, using the new model



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Norwegian Computing Center

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Title **July 2009 – July 2010**
Validation of housing cooperative unit estimates, using the new model

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Abstract

Eiendomsverdi is a company that estimates the value of properties in the Norwegian residential real estate market. This document is prepared by Norwegian Computing Center, as a third party, to document the quality of Eiendomsverdi's estimates.

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1 Introduction

Eiendomsverdi is a company that estimates the value of properties in the Norwegian residential real estate market. These automated value estimates are delivered to real estate agents and banks. Eiendomsverdi's model take into account several characteristics of the property in question, including the previous sales price, the size and type of the property and sales prices of surrounding properties.

Eiendomsverdi's original model estimates the market value by five methods. Then one estimate is chosen for each property according to a set of rules. To reduce the probability of overestimating individual properties, certain haircuts has been applied.

Norwegian Computing Center has been involved in order to improve Eiendomsverdi's model. In short, the five estimates of Eiendomsverdi are weighted together, and this estimate is again weighted together with the indexed previous sales price, depending on how long time it is since previous sale. A model of the uncertainty has also been developed. The purpose of this document is for us, as a third party, to document the quality of Eiendomsverdi's estimates using their improved model. In this report we only focus on housing cooperative units.

2 Data

We have used the new model of Eiendomsverdi to estimate sales prices on property sales in the period from July 9th 2009 to July 8th 2010.

The portfolio we have considered consists of 12 991 property sales, of which 10 963 are flats, 2 026 are terraced homes and 2 are semi-detached homes. Throughout this document we combine semi-detached and terraced homes into one category semi/terraced, which consists of 2 028 homes.

Table 1 shows the percentages of the property types in each county. The rightmost column gives the number of property sales in each county in per cent of the total number of transactions. The bottom row shows the distribution of the different property types as a total over all counties.

County	Flat	Semi/terraced	Total
Oslo	92.0 %	8.0 %	51.1 %
Akershus	65.4 %	34.6 %	7.3 %
Buskerud	71.0 %	29.0 %	6.8 %
Rogaland	66.4 %	33.6 %	6.3 %
Vestfold	89.5 %	10.5 %	4.6 %
Hordaland	88.1 %	11.9 %	3.6 %
Telemark	99.8 %	0.2 %	3.6 %
Østfold	82.2 %	17.8 %	3.5 %
Troms	70.3 %	29.7 %	3.3 %
Nordland	66.9 %	33.1 %	2.9 %
Vest-Agder	68.4 %	31.6 %	2.8 %
Møre og Romsdal	87.6 %	12.4 %	2.7 %
Hedmark	100.0 %	0.0 %	0.4 %
Oppland	100.0 %	0.0 %	0.4 %
Nord-Trøndelag	48.4 %	51.6 %	0.2 %
Sør-Trøndelag	80.8 %	19.2 %	0.2 %
Aust-Agder	80.0 %	20.0 %	0.0 %
Sogn og fjordane	0.0 %	100.0 %	0.0 %
Finnmark	0.0 %	100.0 %	0.0 %
Total	84.4 %	15.6 %	100.0 %

Table 1. Distribution of property types in each county.

3 Estimation results

This section describes to which degree Eiendomsverdi's estimated market values fit the real sales price. The estimates are categorized according to the deviation in per cent from the real sales price. Seven categories are used, the first interval, " $< -30\%$ ", contains estimates which are underestimated and deviates more than 30 % from the sales price. That is, reducing the sales price by 30 %, the estimates in interval " $< -30\%$ " are less than this value. The next interval contains all estimates less than the sales price which deviates 20-30 % from the sales price, and so on. The interval " $-10, 10$ " contains all estimates which deviates less than 10 % from the sales price in both positive and negative direction. The header of table 2 shows all error intervals.

3.1 Summary tables

Table 2 shows the percentage of the estimates which fall into the seven different error intervals for different property types. To the right, the estimated value and sales price of the total portfolio (in MNOK) for each property type are shown. Table 8 in section 3.4 summarizes the same quantities for the haircut portfolio.

Table 3 – 5 show the distribution of estimates in different error intervals for properties differentiated by size, market value and county, respectively.

Property type	< -30 %	-30 % -20 %	-20 % -10 %	-10 % 10 %	10 % 20 %	20 % 30 %	>30 %	Total number	Total (%)	Est. value (MNOK)	Sales price (MNOK)	Dev. (%)
Flat	1 %	3 %	10 %	67 %	11 %	4 %	4 %	10 963	84 %	19 455	19 451	0 %
Semi/terraced	1 %	5 %	16 %	57 %	12 %	5 %	5 %	2 028	16 %	4 270	4 318	-1 %
Total	1 %	3 %	11 %	65 %	11 %	4 %	4 %	12 991	100 %	23 725	23 769	0 %

Table 2. Deviation per property type: Percentages of estimates from different property types falling into the different error intervals.

Property type	BOA	< -30 %	-30 % -20 %	-20 % -10 %	-10 % 10 %	10 % 20 %	20 % 30 %	>30 %	Total	Est. value (MNOK)	Sales price (MNOK)	Dev. (%)
Flat	< 50 m ²	1 %	3 %	8 %	69 %	12 %	4 %	3 %	15 %	2 679	2 668	0 %
	50-70 m ²	1 %	2 %	10 %	69 %	10 %	3 %	5 %	35 %	7 778	7 768	0 %
	70-90 m ²	1 %	3 %	13 %	64 %	11 %	4 %	4 %	20 %	5 026	5 061	-1 %
	90-120 m ²	2 %	4 %	11 %	61 %	12 %	5 %	5 %	8 %	2 468	2 471	0 %
	> 120 m ²	8 %	7 %	7 %	27 %	28 %	10 %	13 %	0 %	172	172	0 %
	Total	1 %	3 %	10 %	67 %	11 %	4 %	4 %	79 %	18 124	18 139	0 %
Semi/terraced	< 70 m ²	0 %	4 %	12 %	53 %	14 %	8 %	8 %	3 %	695	685	2 %
	70-90 m ²	2 %	6 %	21 %	52 %	10 %	4 %	5 %	4 %	1 037	1 081	-4 %
	90-120 m ²	0 %	4 %	15 %	62 %	13 %	3 %	2 %	6 %	1 746	1 775	-2 %
	120-140 m ²	1 %	2 %	13 %	66 %	9 %	5 %	4 %	1 %	436	428	2 %
	> 140 m ²	0 %	5 %	12 %	52 %	21 %	5 %	5 %	0 %	128	124	3 %
	Total	1 %	5 %	16 %	57 %	12 %	5 %	5 %	14 %	4 042	4 093	-1 %
Total		1 %	3 %	11 %	65 %	11 %	4 %	4 %	100 %	22 166	22 233	0 %

Table 3. Deviation per property type and size.

Sales price	< -30 %	-30 % -20 %	-20 % -10 %	-10 % 10 %	10 % 20 %	20 % 30 %	>30 %	Total	Est. value (MNOK)	Sales price (MNOK)	Dev. (%)
< 1 MNOK	1 %	2 %	5 %	40 %	16 %	11 %	26 %	8 %	978	820	19 %
1-2 MNOK	0 %	2 %	8 %	70 %	13 %	4 %	3 %	61 %	12 725	12 404	3 %
2-3 MNOK	1 %	5 %	19 %	65 %	7 %	2 %	1 %	25 %	7 465	7 712	-3 %
3-4 MNOK	6 %	12 %	23 %	52 %	6 %	1 %	0 %	5 %	1 958	2 124	-8 %
4-5 MNOK	10 %	10 %	19 %	58 %	1 %	2 %	0 %	1 %	460	511	-10 %
> 5 MNOK	50 %	3 %	21 %	24 %	3 %	0 %	0 %	0 %	138	198	-30 %
Total	1 %	3 %	11 %	65 %	11 %	4 %	4 %	100 %	23 725	23 769	0 %

Table 4. Deviation per market value bracket.

County	< - 30 %	-30 % -20 %	-20 % -10 %	-10 % 10 %	10 % 20 %	20 % 30 %	>30 %	Total (%)	Est.value (MNOK)	Sales price (MNOK)	Dev. (%)
Oslo	1 %	2 %	8 %	74 %	11 %	3 %	1 %	51 %	13 335	13 374	0 %
Akershus	1 %	4 %	12 %	64 %	11 %	5 %	4 %	7 %	1 811	1 807	0 %
Buskerud	0 %	3 %	18 %	52 %	11 %	6 %	10 %	7 %	1 222	1 196	2 %
Rogaland	2 %	7 %	21 %	60 %	6 %	1 %	1 %	6 %	1 809	1 931	-6 %
Vestfold	0 %	3 %	12 %	52 %	13 %	5 %	15 %	5 %	800	751	7 %
Hordaland	4 %	5 %	12 %	61 %	11 %	4 %	4 %	4 %	780	802	-3 %
Telemark	3 %	9 %	17 %	44 %	10 %	7 %	10 %	4 %	502	510	-2 %
Østfold	1 %	4 %	8 %	56 %	16 %	6 %	9 %	4 %	651	629	3 %
Troms	1 %	4 %	14 %	55 %	14 %	6 %	7 %	3 %	776	767	1 %
Nordland	1 %	3 %	9 %	49 %	18 %	10 %	10 %	3 %	635	613	4 %
Vest-Agder	1 %	2 %	13 %	63 %	16 %	3 %	2 %	3 %	646	645	0 %
Møre og Romsdal	2 %	2 %	10 %	49 %	19 %	7 %	12 %	3 %	516	501	3 %
Hedmark	11 %	6 %	13 %	46 %	11 %	11 %	2 %	0 %	55	58	-6 %
Oppland	0 %	2 %	15 %	62 %	9 %	6 %	6 %	0 %	87	85	2 %
Nord-Trøndelag	0 %	0 %	6 %	55 %	16 %	6 %	16 %	0 %	31	28	12 %
Sør-Trøndelag	0 %	8 %	4 %	73 %	12 %	4 %	0 %	0 %	43	43	0 %
Aust-Agder	0 %	0 %	20 %	80 %	0 %	0 %	0 %	0 %	6	7	-2 %
Sogn og fjordane	0 %	0 %	0 %	100 %	0 %	0 %	0 %	0 %	2	2	-9 %
Finnmark	0 %	100 %	0 %	0 %	0 %	0 %	0 %	0 %	2	3	-24 %
Total	1 %	3 %	11 %	65 %	11 %	4 %	4 %	100 %	23 725	23 769	0 %

Table 5. Deviation per county.

3.2 Different valuation methods

Table 6 shows the error intervals depending on the transition weight and how many of Eiendomsverdi's five estimation methods that are included in the weighted estimate.

Property type	Transition weight	Methods used	Includes static IX	< -30 %	-30 % -20 %	-20 % -10 %	-10 % 0 %	0 % 10 %	10 % 20 %	20 % 30 %	>30 %	Total number	Total (%)	Est. value (MNOK)	Sales price (MNOK)	Dev. (%)
	1	1	Yes	0 %	2 %	8 %	25 %	22 %	12 %	31 %	31 %	51	0 %	98	84	17 %
	1	1	No	2 %	3 %	11 %	58 %	15 %	6 %	6 %	6 %	5 578	43 %	9 909	9 831	1 %
	1	2-5	Yes	0 %	2 %	12 %	70 %	10 %	3 %	2 %	2 %	2 759	21 %	4 850	4 884	-1 %
Flat	1	2-5	No	-	-	-	-	-	-	-	-	-	-	-	-	-
	0-1	1	-	0 %	3 %	10 %	64 %	17 %	5 %	0 %	0 %	58	0 %	105	104	1 %
	0-1	2-5	-	1 %	2 %	12 %	75 %	8 %	2 %	1 %	1 %	1 453	11 %	2 460	2 504	-2 %
	0	-	-	1 %	2 %	2 %	92 %	2 %	0 %	1 %	1 %	1 064	8 %	2 033	2 043	0 %
	1	1	Yes	12 %	12 %	6 %	19 %	6 %	6 %	38 %	38 %	16	0 %	25	21	19 %
	1	1	No	1 %	6 %	16 %	49 %	15 %	6 %	6 %	6 %	1 124	9 %	2 406	2 428	-1 %
Semi/terraced	1	2-5	Yes	0 %	3 %	17 %	63 %	10 %	4 %	3 %	3 %	427	3 %	908	916	-1 %
	1	2-5	No	-	-	-	-	-	-	-	-	-	-	-	-	-
	0-1	1	-	0 %	5 %	23 %	50 %	9 %	9 %	5 %	5 %	22	0 %	33	33	0 %
	0-1	2-5	-	0 %	4 %	20 %	66 %	8 %	0 %	0 %	0 %	285	2 %	547	569	-4 %
	0	-	-	1 %	1 %	5 %	88 %	4 %	1 %	0 %	0 %	154	1 %	350	351	0 %

Table 6. Deviation per property type and estimation method.

3.3 Accuracy levels

The present method has seven accuracy levels in which the properties are divided into. Table 7 shows the deviation for each accuracy level and property type. Table 9 in section 3.4 summarizes the same quantities for the haircut portfolio.

Accuracy level	Property type	< - 30 %	-30 % -20 %	-20 % -10 %	-10 % 10 %	10 % 20 %	20 % 30 %	>30 %	Total	Est.value (MNOK)	Sales price (MNOK)	Dev. (%)
1	Flat	0 %	1 %	3 %	84 %	7 %	2 %	1 %	4 %	706	703	0 %
	Semi/terraced	0 %	1 %	14 %	77 %	8 %	1 %	0 %	5 %	240	242	-1 %
2	Flat	1 %	1 %	8 %	79 %	9 %	2 %	1 %	43 %	8 530	8 561	0 %
	Semi/terraced	0 %	3 %	16 %	65 %	10 %	4 %	2 %	41 %	1 794	1 828	-2 %
3	Flat	1 %	3 %	13 %	61 %	14 %	5 %	4 %	35 %	6 772	6 734	1 %
	Semi/terraced	1 %	4 %	15 %	55 %	14 %	6 %	5 %	35 %	1 532	1 544	-1 %
4	Flat	3 %	6 %	13 %	46 %	14 %	8 %	10 %	14 %	2 656	2 658	0 %
	Semi/terraced	2 %	10 %	19 %	40 %	15 %	6 %	8 %	12 %	494	502	-2 %
5	Flat	3 %	6 %	15 %	43 %	14 %	7 %	12 %	4 %	743	746	0 %
	Semi/terraced	3 %	10 %	13 %	31 %	15 %	8 %	19 %	5 %	182	175	4 %
6	Flat	9 %	7 %	9 %	57 %	2 %	5 %	11 %	0 %	45	45	-1 %
	Semi/terraced	8 %	4 %	20 %	40 %	4 %	4 %	20 %	1 %	28	27	2 %
7	Flat	60 %	0 %	0 %	40 %	0 %	0 %	0 %	0 %	3	4	-24 %
	Semi/terraced	-	-	-	-	-	-	-	-	-	-	-

Table 7. Deviation according to accuracy level and property type.

3.4 Haircut portfolio

In order to minimize the probability of overestimating individual properties, Eien-
domsverdi has applied haircuts according to specific rules. This results in a down-
grading of some of the estimates. This section describes the deviation after apply-
ing these haircuts. Table 8 – 9 show deviations differentiated by property type and
accuracy level, respectively.

Property type	-30 %	-20 %	-10 %	10 %	20 %			Total number	Total (%)	Est.value (MNOK)	Sales price (MNOK)	Dev. (%)
	< -30 %	-20 %	-10 %	10 %	20 %	30 %	>30 %					
Flat	1 %	3 %	11 %	67 %	11 %	3 %	4 %	10 963	84 %	19 323	19 451	-1 %
Semi/terraced	1 %	5 %	16 %	57 %	11 %	4 %	4 %	2 028	16 %	4 242	4 318	-2 %
Total	1 %	4 %	12 %	65 %	11 %	4 %	4 %	12 991	100 %	23 565	23 769	-1 %

Table 8. Deviation per property type after haircuts: Percentages of estimates from different property types falling into the different error intervals in the haircut portfolio.

Accuracy level	Property type	-30 %	-20 %	-10 %	10 %	20 %			Total	Est.value (MNOK)	Sales price (MNOK)	Dev. (%)
		< -30 %	-20 %	-10 %	10 %	20 %	30 %	>30 %				
1	Flat	0 %	1 %	3 %	84 %	7 %	2 %	1 %	4 %	706	703	0 %
	Semi/terraced	0 %	1 %	14 %	77 %	8 %	1 %	0 %	5 %	240	242	-1 %
2	Flat	1 %	1 %	8 %	79 %	9 %	2 %	1 %	43 %	8 530	8 561	0 %
	Semi/terraced	0 %	3 %	16 %	65 %	10 %	4 %	2 %	41 %	1 794	1 828	-2 %
3	Flat	1 %	3 %	13 %	61 %	14 %	5 %	4 %	35 %	6 772	6 734	1 %
	Semi/terraced	1 %	4 %	15 %	55 %	14 %	6 %	5 %	35 %	1 532	1 544	-1 %
4	Flat	4 %	9 %	17 %	45 %	13 %	6 %	7 %	14 %	2 561	2 658	-4 %
	Semi/terraced	4 %	13 %	22 %	41 %	11 %	4 %	6 %	12 %	477	502	-5 %
5	Flat	4 %	9 %	18 %	43 %	11 %	6 %	9 %	4 %	710	746	-5 %
	Semi/terraced	5 %	12 %	15 %	34 %	11 %	4 %	18 %	5 %	174	175	0 %
6	Flat	9 %	16 %	23 %	36 %	5 %	5 %	7 %	0 %	41	45	-9 %
	Semi/terraced	8 %	16 %	36 %	20 %	0 %	0 %	20 %	1 %	26	27	-6 %
7	Flat	60 %	20 %	20 %	0 %	0 %	0 %	0 %	0 %	2	4	-37 %
	Semi/terraced	-	-	-	-	-	-	-	-	-	-	-

Table 9. Deviation according to accuracy level and property type in the haircut portfolio.

A Appendix

We would like to check if the uncertainty distribution captures the observed uncertainty in different subsets of the data set. Tables A.1 and A.2 show the percentage of observed sales prices that are below different quantiles in the estimated price distributions, for different subsets of the available flats and terraced homes, respectively.

In these tables, we consider different subsets of the data; those sales with previous sale less than a year ago, 1-2 years ago, 2-3 years ago, 1-3 years ago, and more than three years ago. Further, Eiendomsverdi classifies each sale with risk score "Red", "Yellow" or "Green", and each of these subsets are considered. Also, we focus on subsets with estimates which include at least method 1 of Eiendomsverdi, method 2 of Eiendomsverdi and so on, and then estimates which only include method 1 of Eiendomsverdi, method 2 of Eiendomsverdi and so on. Finally, each county in Norway is considered.

For each subset, we check if the percentage of the observed sales prices that are below the quantiles are close to (10%, 25%, 50%, 75%, 90%). The column *Phat* in each table shows the percentage of the observed sales prices that are below the point estimates. The column *80CI* in each table shows the percentage of the observed sales prices that are within the 80% confidence interval. The rightmost column in each table shows the number of observations in each subset.

	10%	25%	50%	75%	90%	Phat	80CI	N
All	13.0%	28.2%	56.8%	77.2%	89.9%	52.6%	76.9%	10 963
<1 year since prev. sale	1.3%	4.9%	89.4%	94.8%	96.3%	50.0%	95.0%	1 064
1-2 years since prev. sale	2.6%	18.6%	52.2%	80.6%	93.4%	47.0%	90.9%	624
2-3 years since prev. sale	6.7%	22.9%	48.1%	76.6%	92.0%	44.4%	85.3%	887
1-3 years since prev. sale	5.0%	21.1%	49.8%	78.2%	92.6%	45.5%	87.6%	1 511
>3 years since prev. sale	16.0%	32.5%	53.9%	74.8%	88.6%	54.3%	72.7%	8 388
Risk score Red	0.0%	0.0%	0.0%	0.0%	28.6%	0.0%	28.6%	7
Risk score Yellow	47.2%	58.3%	69.4%	88.9%	91.7%	66.7%	44.4%	36
Risk score Green	12.9%	28.2%	56.8%	77.3%	90.0%	52.6%	77.0%	10 920
P_1	7.4%	21.8%	45.9%	72.7%	89.1%	44.7%	81.7%	3 034
P_2	6.6%	19.6%	56.4%	78.5%	91.2%	47.6%	84.6%	5 385
P_3	7.1%	22.1%	47.0%	73.5%	89.5%	45.7%	82.4%	3 428
P_4	13.4%	28.5%	55.8%	76.5%	89.6%	52.2%	76.1%	10 277
P_5	–	–	–	–	–	–	–	–
Only P_1	–	–	–	–	–	–	–	–
Only P_2	9.0%	18.6%	84.4%	92.4%	96.7%	57.5%	87.7%	301
Only P_3	–	–	–	–	–	–	–	–
Only P_4	19.2%	36.6%	57.2%	76.0%	88.7%	57.5%	69.5%	5 578
Only P_5	–	–	–	–	–	–	–	–
County 1	25.1%	39.3%	63.9%	80.7%	91.4%	61.0%	66.3%	374
County 2	13.8%	30.9%	54.8%	76.3%	88.3%	52.9%	74.5%	624
County 3	8.7%	24.7%	59.5%	80.4%	92.4%	53.0%	83.8%	6 111
County 4	20.4%	31.5%	53.7%	68.5%	77.8%	53.7%	57.4%	54
County 5	15.1%	28.3%	60.4%	75.5%	90.6%	60.4%	75.5%	53
County 6	18.2%	29.8%	48.5%	71.8%	88.6%	47.7%	70.4%	631
County 7	27.6%	43.8%	65.0%	81.9%	91.1%	63.9%	63.5%	537
County 8	19.1%	29.1%	46.8%	66.6%	81.9%	45.3%	62.8%	470
County 9	0.0%	25.0%	75.0%	100.0%	100.0%	75.0%	100.0%	4
County 10	17.8%	30.8%	51.8%	74.7%	91.7%	50.2%	73.9%	253
County 11	5.5%	18.7%	34.6%	53.8%	71.2%	33.6%	65.6%	541
County 12	12.0%	25.0%	47.4%	71.4%	85.3%	45.2%	73.3%	416
County 14	–	–	–	–	–	–	–	–
County 15	26.1%	41.6%	65.3%	82.8%	92.4%	65.3%	66.3%	303
County 16	19.0%	33.3%	52.4%	81.0%	95.2%	47.6%	76.2%	21
County 17	6.7%	40.0%	80.0%	100.0%	100.0%	73.3%	93.3%	15
County 18	31.3%	49.8%	67.9%	83.1%	91.6%	67.9%	60.2%	249
County 19	19.7%	35.7%	55.7%	75.0%	91.0%	55.7%	71.3%	300
County 20	–	–	–	–	–	–	–	–

Table A.1. Flats: For different subsets of the data, the percentage of observed sales prices that are below different quantiles in the estimated price distributions are shown.

	10%	25%	50%	75%	90%	Phat	80CI	N
All	14.1%	25.3%	44.3%	71.3%	84.9%	48.9%	70.8%	2 026
<1 year since prev. sale	0.0%	3.9%	28.6%	92.2%	96.1%	53.2%	96.1%	154
1-2 years since prev. sale	1.5%	8.9%	31.9%	76.3%	91.1%	37.0%	89.6%	135
2-3 years since prev. sale	4.7%	15.1%	36.6%	75.6%	88.4%	41.3%	83.7%	172
1-3 years since prev. sale	3.3%	12.4%	34.5%	75.9%	89.6%	39.4%	86.3%	307
>3 years since prev. sale	17.6%	30.0%	47.7%	68.4%	82.9%	50.3%	65.3%	1 565
Risk score Red	–	–	–	–	–	–	–	–
Risk score Yellow	16.7%	20.8%	33.3%	62.5%	79.2%	41.7%	62.5%	24
Risk score Green	14.1%	25.4%	44.4%	71.4%	85.0%	49.0%	70.9%	2 002
P_1	7.5%	18.7%	40.3%	68.3%	84.9%	43.8%	77.4%	523
P_2	6.6%	16.6%	38.5%	75.2%	88.5%	46.0%	81.9%	904
P_3	6.9%	17.6%	39.5%	68.7%	85.5%	43.4%	78.7%	595
P_4	14.7%	26.1%	44.6%	70.3%	84.1%	48.7%	69.4%	1 867
P_5	–	–	–	–	–	–	–	–
Only P_1	–	–	–	–	–	–	–	–
Only P_2	9.6%	19.2%	38.4%	80.8%	91.8%	53.4%	82.2%	73
Only P_3	–	–	–	–	–	–	–	–
Only P_4	20.1%	32.4%	48.9%	68.2%	82.1%	51.2%	61.9%	1 122
Only P_5	–	–	–	–	–	–	–	–
County 1	4.9%	14.8%	42.0%	72.8%	91.4%	53.1%	86.4%	81
County 2	13.0%	24.2%	45.2%	71.5%	81.5%	50.6%	68.5%	330
County 3	13.0%	24.5%	44.6%	73.6%	85.3%	51.4%	72.3%	531
County 4	–	–	–	–	–	–	–	–
County 5	–	–	–	–	–	–	–	–
County 6	24.4%	36.4%	51.2%	74.0%	87.2%	53.9%	62.8%	258
County 7	7.9%	22.2%	50.8%	76.2%	90.5%	54.0%	82.5%	63
County 8	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1
County 9	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%	1
County 10	13.7%	23.9%	39.3%	68.4%	82.1%	42.7%	68.4%	117
County 11	4.4%	10.9%	25.2%	55.8%	78.8%	28.5%	74.5%	274
County 12	20.0%	34.5%	47.3%	67.3%	80.0%	49.1%	60.0%	55
County 14	–	–	–	–	–	–	–	–
County 15	34.9%	51.2%	69.8%	83.7%	95.3%	69.8%	60.5%	43
County 16	0.0%	0.0%	20.0%	60.0%	80.0%	40.0%	80.0%	5
County 17	31.2%	31.2%	62.5%	100.0%	100.0%	62.5%	68.8%	16
County 18	22.8%	42.3%	68.3%	82.1%	91.9%	69.9%	69.1%	123
County 19	11.8%	21.3%	37.0%	74.0%	88.2%	40.2%	76.4%	127
County 20	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1

Table A.2. Terraced homes: For different subsets of the data, the percentage of observed sales prices that are below different quantiles in the estimated price distributions are shown.