

# **Regional Disparities in the Physical Availability of Housing in Terms of Housing Construction**

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## **Introduction**

Housing plays an important social and economic role already in consequence of its existential nature. Housing can be considered an important factor that in conditions of fluent development (not step development) contributes to decrease disparities of the regional development. The questions of physical availability of housing constitute a new view of the extensive and complex issues of housing. This view was often implicitly contained in the Czech Republic in the existing analyses, however it was not succinctly and individually solved in order to be able to use the existing works methodologically without further steps. The physical availability can suitably be defined as a group of existing dwellings in relation to the population and households in delimited territory. In a certain meaning the physical availability of housing can be interpreted as equipment of the population with residential resources in a certain territory. The contribution presents the results of partial activity that focused on finding of regional differences or disparities in physical availability of housing in the Czech Republic after 2001 with use of detailed regional data about housing construction, modernization and development of the population and households between 2001 and 2006 and tried to outline the development of interregional differences also until the year 2010.

## **Methodology**

The depiction of the real world in the area of physical availability of habitation are especially the data files relating to the housing process, to its quantitative and qualitative attributes on the territory of the state and in the specified territorial units. The most complete quantitative and qualitative data about dwellings and habitation are provided by regular counting of population, houses and dwellings (census). The disadvantage of using censuses as the database for the analyses of regional differences in physical availability of housing is currently the fact that it is carried out in the Czech Republic in ten-year periods and the last one took place in 2001. The data about the development of the residential resources after 2001 including possible regional differences, it is therefore possible only to guess from the available statistic of the Czech Statistical Office about the housing construction; especially then from the number of completed dwellings decreased by the number of cancelled flats (decrement of the dwelling stock) in 2001 to 2007. The estimates of the development of regional differences in close future are assisted by the method of statistical mathematics – regressive modelling or extension of current trends to the future. The following statistical indicators were used for the

statistic analysis of regional differences (disparities): The standard deviation, variation coefficient, Gini's coefficient and  $\beta$ -convergence/divergence coefficient.

The estimate of the number of completed dwellings (increment of the dwelling stock) between 2001 and 2007 makes use of the data characterizing the tendency of the development in finishing and initiating of the housing construction after 2001 (the completed dwellings in the period from 2001 to 2007 and 2005 to 2007, started dwellings from 2004 to 2007). For the estimate of the development of the completed dwellings in the period from 2007 to 2010 we used the method of linear regression and number of completed dwellings from the period from 1985 to 2007. For the calculation of the number of so-called unoccupied dwellings in the period from 2001 to 2006 and 2001 to 2010 we chose a professional estimate in the amount of 10% of the total volume of unoccupied housing stock in 2001, which for the whole Czech Republic represents approximately 54 000 flats. For the calculation of regional distribution of thus estimated number we took for the basis the regional share of unoccupied dwellings in the period from 1991 to 2001 and we derived from the assumption that the proportional representation of the unoccupied dwellings would remain also in further period the same. The size of decrement of dwellings was estimated in variant manner – 0.5% and 0.4% from the original number of permanently unoccupied dwellings. The distribution within the regions was carried out with regard to cohort analysis according to the age of dwelling stock and probability of decrement in the given period according to the logistic curve.

### **Housing construction from 1997 to 2007**

The ongoing changes reflect in the intensity of the housing construction expressed by the number of completed, started and under-construction dwellings much faster than at the level of total dwelling stock. The housing construction on the other hand represents only a small part of the dwelling stock. The annual influence of the housing construction on the changes in number and structure of the occupied dwellings usually does not exceed 1 to 2 %. Regional differences in the extent of the housing construction are however substantial and can decrease or extent of the regional differences in the total dwelling stock in the long-term view. The table 1 shows intensity of the housing construction expressed by the indicators of the number of completed and started dwellings for the period from 1997 to 2007 and for the last three years individually (Czech Statistical Office, 1997-2007).

In the interregional comparison Prague and Central Bohemian Region rank permanently the first in the intensity of housing construction. Also Pilsen Region, The South Moravian Region, Zlín region, South Bohemia region and Vysocina Region range in the number of completed dwellings above the national average in the period from 1997 to 2007. Weaker position also in the last three years is occupied by the Usti Region, Karlovy Vary Region, The Pardubice region, The Olomouc Region, Vysocina Region and Moravian-Silesian Region. In the regional cities like Brno, Olomouc, Liberec, České Budějovice, Jihlava and Karlovy Vary the intensity of housing construction is higher than on regional average, in Ostrava, Ústí nad Labem, Plzeň, Hradec Králové, Pardubice and Zlín it is on the other hand lower. There is a certain manifested anomaly, which can of course be of temporary nature.

**Table 1: The intensity of housing construction by regions 1997-2007**

Czech Republic, Region	Number of completed per 1 000 inhabitants					Number of started dwellings per 1 000 inhabitants				
	1997- 2007	2004	2005	2006	2007	1997- 2007	2004	2005	2006	2007
Prague	3,98	5,08	5,58	4,3	7,87	4,91	5,35	6,31	6,68	6,59
Central Bohemia Region	3,95	5,35	5,29	5,11	7,24	5,67	7,01	8,32	7,2	6,91
South Bohemia Region	2,69	3,51	3,12	3,04	3,31	4,02	4,1	3,76	4,28	4,07
Pilsen Region	3,00	3,7	3,53	3,74	3,42	3,68	3,63	3,09	4,07	3,80
Karlovy Vary Region	1,86	1,66	3,77	2,03	1,78	2,62	3,36	2,22	2,5	1,92
Usti Region	1,18	1,27	1,36	1,03	1,40	1,78	1,54	1,68	2,18	2,32
The Liberec Region	2,35	3,08	2,65	2,38	2,77	2,98	3,36	2,24	3,71	2,88
Hradec Králové Region	2,57	2,42	2,6	2,22	3,26	3,08	2,24	3,6	3,66	3,79
The Pardubice Region	2,76	3,13	2,77	2,33	3,67	3,57	3,72	3,38	4,46	4,91
Vysocina Region	2,66	3,06	3,08	2,92	3,28	3,45	3,69	3,2	3,37	3,26
The South Moravian Region	3,04	3,42	3,38	3,52	5,30	3,89	4,79	4,32	5,22	4,94
The Olomouc Region	2,33	2,3	1,75	2,04	2,76	3,15	2,85	2,75	2,8	3,38
Zlín Region	2,56	2,53	2,89	1,93	2,82	3,01	2,75	2,71	2,92	3,41
Moravian-Silesian Region	1,50	1,58	1,54	1,31	1,57	1,97	1,6	1,6	2,34	2,59
<b>Czech Republic</b>	<b>2,70</b>	<b>3,16</b>	<b>3,21</b>	<b>2,34</b>	<b>4,03</b>	<b>3,54</b>	<b>3,95</b>	<b>4,26</b>	<b>3,04</b>	<b>4,24</b>

Source: Czech Statistical Office, own calculation

Statistical analysis of regional differences at the levels of housing construction conducted on the variable of completed dwellings per 1.000 inhabitants showed that the variation coefficient in the years 1995 to 2002 stays at more or less constant level (between 21 and 26%), has been growing significantly since 2003 and in 2005 its value is already 40% (Table 2). The standard deviation however shows that already in the period from 1995 to 2002 the differences between the regions grew, but this fact is rather given by the growth of the housing construction; the variation coefficient that controls this influence better shows that the regional differences in the housing construction remained constant, after 2002 however the regional differences in the housing construction grew much faster than the housing construction itself. The values of  $\beta$ -convergence/divergence also imply that after 2001 with exception of some years the regional differences in the extent of the housing construction rather increase.

In the initiated housing construction the tendencies from the intensity expression in the finished construction are similar, only displayed at higher indicator level. In the regions with lower intensity of initiated housing construction the extent of the completed dwellings in the upcoming three years will be less favourably influenced than in the regions with relatively higher level of the initiated construction. In the longer term however the low housing construction almost always manifests in the physical availability of housing and can thus contribute also to the origination of especially strong regional disparity.

**Table 2: Statistics of regional differences in the range of housing construction - the number of dwellings completed per 1000 inhabitants**

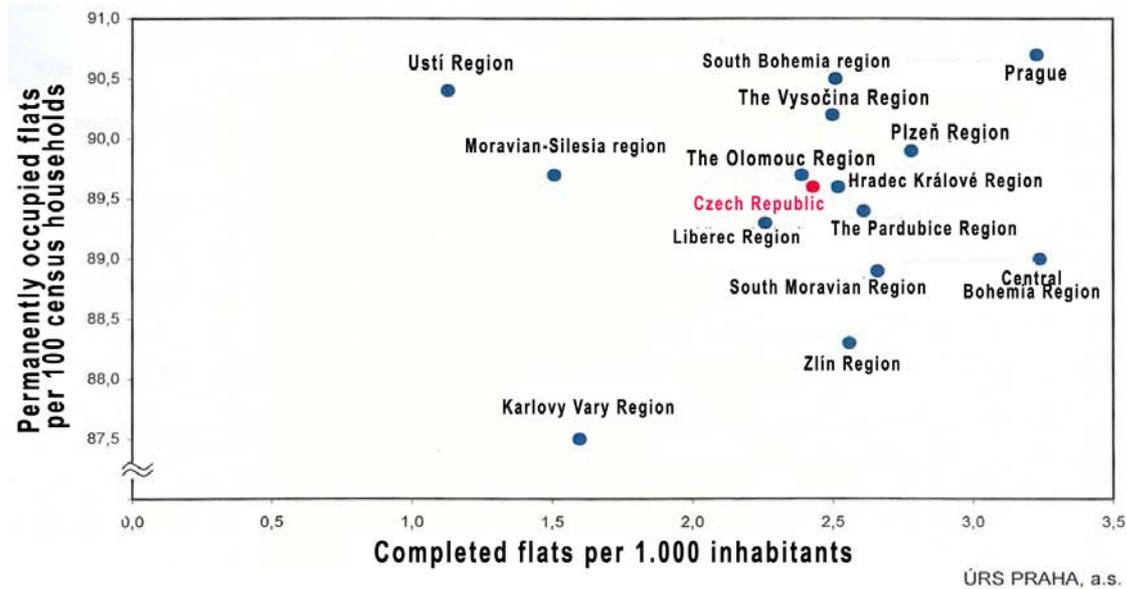
Year	Standard deviation	The coefficient of variation	$\beta$ -convergence/ divergence
1991	0,99	24,65	-0,44
1992	0,96	26,86	-0,54
1993	0,76	24,9	-0,61
1994	0,79	44,57	-0,29
1995	0,3	24,45	-0,96
1996	0,35	24,3	-0,36
1997	0,38	22,63	-0,37
1998	0,57	26,5	-0,28
1999	0,59	25,47	-0,21
2000	0,62	24,95	-0,26
2001	0,53	21,24	-0,55
2002	0,7	26,36	0,42
2003	0,8	30,37	-0,134
2004	1,26	40,18	0,824
2005	1,3	39,98	-0,19
2006	1,18	41,6	0,294
2007	2,06	53,3	0,69

*Source: own calculation*

The interesting is the interconnection of housing construction and dwelling stock via comparison of intensity of housing construction with equipment of households with dwellings. The average annual intensity of 1997 – 2004 measured by equipment of households with permanently occupied dwellings as of 1<sup>st</sup> March 2001 from census is expressed with Figure 1.

The figure 1 shows well the position of regions according to the achieved equipment of households with dwellings compared with dynamizing factor of construction. Two regions (Moravian-Silesian Region and Usti Region) had in the period from 1997 – 2004 low intensity of housing construction, however relatively high equipment rate of households with flats created in the previous years. Location of Prague according to both indicators expresses clear-cut growth tendencies. Similar situation was observed in Pilsen Region and Vysocina Region. From other regions located towards higher construction intensity will according to the development of construction intensity reinforce also in the upcoming years the position of the Central Bohemia Region, in smaller rate also the South Moravian Region and of Zlín Region. Low equipment rate and low construction intensity remains in Karlovy Vary Region.

**Figure 1: Relationship between the intensity of housing construction and amenities**



Apparent conclusion is that the housing construction in a still increasing manner concentrates in the regions, where there already is the highest number of permanently occupied dwellings per 100 census households, which is connected with the fact that in many regions the difference between the costs of housing construction (given especially by the international prices of construction materials) and the price of older flats (given especially by local demand) is still too big. This fact can especially in connection with the above-proven growth of regional differences in the extent of regional construction lead in the longer time horizon to more significant inter-regional differences or even regional disparities. The more intensive it is, if these quantitative differences are completed also with differences in quality: in Moravian-Silesian Region, The Olomouc Region and in Vysocina Region for example in 2006 there was almost missing construction of studio apartments and big differences between the regions also appeared in the group of one-room dwellings (Table 3).

The quality differences between the regions however have in relation to regional disparities only complementing importance. Only the more significant increase of differences in the habitable area, number of the rooms, population of flats or equipment rate of the flats could warn of low quality of housing in the residential resources. The data show that such risk does not impend. The comparison between the regions however has its meaning in the fact that it brings impulses for improvement of the quality of housing in the individual regions and lower regional administration units.

**Table 3: Size of completed dwellings, living and useful space of the dwelling by the regions in year 2006**

Czech Republic, Region	The average living floor space in sq meters per dwellings		The average useful floor space in sq meters per dwellings		Dwellings by number of rooms					
	family houses	multi-dwelling buildings	family houses	multi-dwelling buildings	family houses		multi-dwelling houses			
					4	5 and more	studio	1	2	3
Prague	110	56,5	162,7	72,3	33,6	50,6	8,4	29,1	29,4	31,5
Central Bohemia Region	102,6	48,7	142,7	69,7	36,1	45,3	8	24,5	39,7	25,7
South Bohemia Region	96,6	48,4	141,5	66,1	36,1	39,9	8	24,4	41,6	20
Pilsen Region	94,1	47,3	133,4	63,1	38,2	38,3	11,5	17,6	43,2	21,5
Karlovy Vary Region	101,4	43,8	150,2	58,4	34,4	47,3	10	7,7	47,1	28,5
Usti Region	96,7	38,6	137,1	53,7	40,1	29,6	30,8	25,1	19,2	19,2
The Liberec Region	95	38,3	132,6	56,8	45,7	36,5	6,2	28,3	42,8	20
Hradec Králové Region	90,8	45,3	139,9	57,9	33	39,5	22,6	6,2	45,8	23,2
The Pardubice Region	96,3	44,5	144,8	60,9	42,2	39,7	5,7	18,2	51,6	21,7
Vysocina Region	91,6	49,5	136,9	64,7	38,3	38,7	0,9	16,2	45,3	31,2
The South Moravian Region	99,3	48,1	149,4	68,1	40,9	40,5	7,2	15,8	34,1	34,4
The Olomouc Region	93,6	44,6	136,6	74,6	42	33,5	1	19,6	49,1	23,1
Zlín Region	97,2	50	151,1	63,1	35,6	46,8	2,5	16,7	55,8	16,7
Moravian-Silesian Region	91,9	69,6	140,2	91,8	38,8	41,3	0	26,9	18,3	27,9
Czech Republic	97,9	50,2	142,8	68	37,9	41,5	8	20,7	36,5	27,7

Source: Czech Statistical Office

## Modernization of residential resources in the regions of the Czech Republic

The important indicator of the physical availability, which is monitored in the standard statistics together with housing construction, is also the modernization of dwellings. The number of completed and modernized dwellings is however monitored individually. It is reasonably assumed that the extent of modernization of dwellings is still low, corresponding in the Czech Republic approximately to the half of the started dwellings in 2006. Table 4 shows the development of the number of the modernized dwellings according to the regions and intensity indicator for the decade.

The extent of modernization and reconstruction of the housing stock is naturally, in the regional classification, mostly influenced by regional differences in the age and material composition of the residential houses. The extent of modernization should thus be larger especially in those regions with higher representation of dwellings built even before 1945 and panel dwellings. Relatively high share of dwellings built before 1945 then appears apart from

Prague also in the Liberec Region and Karlovy Vary Region; in the Liberec Region, as it is shown in the table (Table 4), the intensity of modernization of dwelling stock is one of the lowest. Similar situation is that of the panel housing construction. According to some expert studies (Dupal, 2006; Dupal, 2007) the reconstruction works do not proceed in sufficient volume and dynamics. And it is exactly the slow reconstruction, especially of panel multi-dwelling buildings that can have a serious intrinsic risk, where the endangered regions in this case are the regions with high share of panel dwelling stock - Karlovy Vary Region, Usti Region, The Liberec region and Moravian-Silesian Region. These are also the regions characteristic with little extent of housing construction.

**Table 4: Modernization of housing stock in regions of Czech Republic 1997-2007**

Region	Number of completed dwelling's modernisation												Number of completed dwelling's modernisation per 1000 inhabitants of medium year's state
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	1997-2007	
Prague	383	680	1 172	1 486	3 013	3 650	3 188	3 879	4 755	4 985	4 161	31 352	2,42
Central Bohemia Region	367	929	625	1 086	1 522	1 006	1 725	1 740	2 632	1 977	1 685	15 294	1,23
South Bohemia Region	65	67	173	310	273	188	297	333	913	1 472	1 313	5 404	0,78
Pilsen Region	59	61	73	119	178	309	255	386	894	620	365	3 321	0,55
Karlovy Vary Region	246	247	1 540	1 662	411	559	514	369	656	618	423	7 245	2,16
Usti Region	259	180	193	237	259	289	342	380	765	460	392	3 756	0,41
The Liberec Region	195	20	120	41	136	31	62	79	261	243	190	1 378	0,29
Hradec Králové Region	389	280	317	412	589	563	546	455	848	641	647	5 687	0,94
The Pardubice Region	342	342	455	713	863	721	534	598	794	775	541	6 678	1,2
Vysocina Region	300	70	177	237	280	388	383	413	609	419	373	3 649	0,65
The South Moravian Region	363	626	769	1 120	2 500	1 724	1 972	2 286	3 415	3 558	4 066	22 399	1,79
The Olomouc Region	558	923	1 579	1 797	1 940	2 172	1 185	2 793	2 747	2 869	1 990	20 553	2,91
Zlín Region	116	442	172	203	337	506	347	431	685	713	739	4 691	0,72
Moravian-Silesian Region	1 003	1 211	1 390	1 302	1 134	1 493	1 411	1 327	1 922	1 792	1 873	15 858	1,14
<b>Czech Republic</b>	<b>4 645</b>	<b>6 078</b>	<b>8 755</b>	<b>10 725</b>	<b>13 435</b>	<b>13 599</b>	<b>12 761</b>	<b>15 469</b>	<b>21 896</b>	<b>21 142</b>	<b>18 758</b>	<b>147 265</b>	<b>1,31</b>

*Source: Czech Statistical Office*

### **Equipment rate of the population and households with dwellings in the regions of the Czech Republic from 2001 to 2006 and estimate until 2010 - 2015**

It was already mentioned that complete data regarding the structure of the dwelling stock are available only in the year of census (last year 2001). The insufficiency of data regarding current status of the dwelling stock in the Czech Republic and the regions thus had to be overcome for the needs of specification of possible regional differences, i.e. by statistical modelling, or, in some cases, by expert estimates on the basis of previous data from censuses of 1991 and 2001 and further information from partial continuous annual investigations of the statistical office – periodic investigations of the housing construction.

**Table 5: Evolution of population in 1991-2015 by regions (1991-2007 fact, 2010 and 2015 projections)**

Czech Republic, Region	Population			Acquisitions (disposals) - base year = 100		Population		Acquisitions (disposals) - base year = 100	
	1991	2001	2007	1991	2001	2010	2015	2001	2001
				-2001	-2007			-2010	-2015
Prague	1 214 174	1 169 106	1 196 454	96,3	102,3	1 190 000	1 200 000	101,8	102,6
Central Bohemia Region	1 112 882	1 112 473	1 187 032	100,0	106,7	1 192 000	1 215 000	106,2	108,2
South Bohemia Region	622 889	625 267	631 387	100,4	101,0	631 000	6 333 000	100,9	101,3
Pilsen Region	558 307	550 688	557 313	98,6	101,2	555 000	558 000	100,8	101,3
Karlivy Vary Region	301 985	304 343	305 620	100,8	100,4	306 000	306 000	100,5	100,5
Usti Region	824 461	820 219	825 523	99,5	100,6	827 000	830 000	100,8	101,2
The Liberec Region	425 120	428 184	432 109	100,7	100,9	431 000	4 333 000	100,7	100,9
Hradec Králové Region	552 809	550 724	550 523	99,6	100,0	550 000	550 000	99,9	99,9
The Pardubice Region	508 718	508 281	508 921	99,9	100,1	506 000	504 000	99,5	99,2
Vysocina Region	513 740	512 143	512 555	99,7	100,1	509 000	506 000	99,4	98,8
The South Moravian Region	1 114 160	1 134 786	1 135 421	101,9	100,1	1 138 000	1 133 000	99,8	99,8
The Olomouc Region	647 341	643 817	640 508	99,5	99,5	638 000	636 000	99,1	98,8
Zlín Region	596 903	595 010	590 000	99,7	99,2	588 000	585 000	98,8	98,3
Moravian-Silesian Region	1 278 726	1 265 019	1 249 323	98,9	98,8	1 235 000	1 220 000	97,6	96,4
<b>Czech Republic</b>	<b>10 302 215</b>	<b>10 230 060</b>	<b>10 322 689</b>	<b>99,3</b>	<b>100,9</b>	<b>10 291 000</b>	<b>10 308 000</b>	<b>100,6</b>	<b>100,7</b>

Source: Czech Statistical Office, own calculation

### *Residential construction in the period from 2001 to 2007 and estimate until 2010*

To discover the status as of the year 2007 and to carry out a forecast until 2010 it was thus necessary to complement the regularly discovered data for housing construction and population migration also with the data regarding possible decrement of the dwelling stock and development of the number of so-called unoccupied dwellings (the analysis was conducted on the subset of permanently occupied dwellings and for the purpose of summarizing evidence then it had to be completed with an estimate of the number of unoccupied dwellings); for projection until 2010 also by the demographic prognosis of the development of the population and households and estimate of the development of housing construction until 2010. The development of the population including demographic prognosis of the development of the population until 2010 (or resp. 2015) from the resources of the Czech Statistical Office is specified by Table 5.

The factor in the projection of population that can be estimated only with difficulty is the balance of migration abroad. As it is currently showing, the migration will be more intense that was expected in the existing forecasts. Data for the period from 2001 to 2007 (actual) divide the regions into two numerically equal groups. The capital of Prague and Central Bohemia Region are growing in population faster and lower increase of population is apparent also in South Bohemia Region, Karlovy Vary Region, The Liberec Region; the decrement of population (1991 to 2001) “turns” into plus in Pilsen Region and Usti Region. Exactly as in the period from 1991 to 2001 the population was dropping in the Pardubice region, the

Olomouc Region, Zlín Region and Moravian-Silesian Region; Hradec Králové Region and the South Moravian Region are also losing population, but less compared to the period from 1991 to 2001. In the data from projection (2010 and 2015) the situation improves on the state scale, however in the regions with decrement of the population in the previous periods further drop of population is expected.

The housing process, even in the regional comparison, is influenced more than by the development of population by the development of the number of households. With regard to the splitting of the census households and decreasing average size the number of households in the CR in 2015 is supposed to achieve approximately 4 600 000 households. The growth of the number of households is apparent in all the regions, however with different dynamics; the most intensive increase is expected in the Central Bohemia Region and also in Prague. The increasing pressure on the offer of dwellings will manifest also in Usti Region, Karlovy Vary region, P region and the Liberec Region. Low growth of the number of households then will manifest more intensely in Zlín Region, the Olomouc region, in Vysocina region as well as in the Moravian-Silesian Region.

The following Table 6 shows the development of the housing construction in the period from 2001 to 2007 (actual) and prognosis of its development until 2010. The prognosis estimate of the number of completed dwellings by 2007 makes use of the data characterizing the tendency of the development in finishing and initiation of housing construction after 2001 and for the years 2008 to 2010 then the results of linear regression using the rank of completed dwellings of the period from 1985 to 2007; the year 2007 – data for the Czech Republic must be considered extraordinary, influenced by several steps in the housing policy and also by expectation of tax changes. It should be noted that the analysis was carried out at the time was unknown problem with the current economic crisis. This somewhat distort estimate of prognosis.

The estimate of the extent of the housing construction in the period from 2007 to 2010 especially implied that in the decade from 2001 to 2010 approximately 320 000 flats could be completed; the data in the table 6 however imply that it is necessary to count with the accentuation of the existing regional differences. Slower development is expected in the Olomouc Region, Zlín Region, Karlovy Vary Region, Hradec Králové Region and in Pilsen Region. In case of Prague, Central Bohemia Region and the South Moravian Region the housing construction in the period from 2008 to 2010 (in link to the year from 2001 to 2007) appears to be a factor reinforcing the position of these regions in the area of physical availability of housing. On the other hand it is necessary to state that the housing construction is not the only factor of the habitation level. Lower construction of dwellings in some region can be partly replaced with bigger decrease of decrements of the dwellings (faster development of the reconstruction of dwelling stock), relatively bigger transformation of a part of unoccupied dwellings to permanently occupied and other factors of making the housing process more efficient.

**Table 6: Housing construction in period 2001-2007 and prognosis to year 2010**

Czech Republic, Region	Dwellings completed on average per year				Dwellings started on average per year		Dwellings completed on average per year	
	2001-2007		2005-2007		2004-2007		2001-2010	
	absolut.	%	absolut.	%	absolut.	%	absolut.	%
Prague	5 524	17,9	7 057	20,2	7 712	18,5	5 400	17
Central Bohemia Region	5 473	17,7	6 880	19,7	8 538	20,5	5 635	17,7
South Bohemia Region	1 904	6,2	1 984	5,7	2 546	6,1	2 005	6,3
Pilsen Region	1 891	6,1	1 982	5,7	2 016	4,8	2 025	6,4
Karlovy Vary Region	624	2,0	777	2,2	761	1,8	685	2,1
Usti Region	1 037	3,4	1 105	3,2	1 590	3,8	1 115	3,5
The Liberec Region	1 095	3,5	1 118	3,2	1 309	3,1	1 170	3,7
Hradec Králové Region	1 446	4,7	1 479	4,2	1 824	4,4	1 490	4,7
The Pardubice Region	1 493	4,8	1 594	4,6	2 088	5,0	1 540	4,8
Vysočina Region	1 506	4,9	1 583	4,5	1 735	4,2	1 350	4,9
The South Moravian region	3 898	12,6	4 605	13,2	5 445	13,0	4 040	12,7
The Olomouc region	1 499	4,9	1 397	4,0	1 883	4,5	1 535	4,8
Zlín Region	1 503	4,9	1 502	4,3	1 751	4,2	1 520	4,8
Moravian-Silesian Region	1 984	6,4	1 838	5,3	2 544	6,1	2 140	6,7
<b>Czech Republic</b>	<b>30878</b>	<b>100,0</b>	<b>34901</b>	<b>100,0</b>	<b>41740</b>	<b>100</b>	<b>31 850</b>	<b>100</b>

<sup>\*)</sup> In 2007, completed 41 650 flats and the start of construction of 43 796 flats.

Source: Czech Statistical Office, own calculation

### *Decrements of flats in the period from 2001 to 2007 and forecast until 2010*

Calculation of decrements of dwellings in the period from 2001 to 2007 and from 2001 to 2010 in the individual regions leans especially against the discovered extent and development in the period from 1991 to 2001, against the assessment of the influence of the age and age composition of the dwelling stock and associated reconstruction of the dwelling stock as of 2005. We took into consideration the evidence of cancelled dwellings only in auxiliary manner<sup>1</sup>. The size of the decrement of dwellings was estimated variably - 0.5 and 0.4% of the default number of the permanently occupied dwellings. The distribution within the regions was carried out with regard to the cohort analysis according to the age of the dwelling stock and probability of decrement in the given period according to the logistic curve<sup>2</sup>. The estimate of regional relations was thus concurrently interconnected with the recalculation expressing the share of decrements on the number of completed dwellings. The dwellings however not only finish their life, but unite, remain temporarily unoccupied, they change their function; as

<sup>1</sup> Average recorded annual volume of cancelled dwellings ranges in the Czech Republic only between 1200 and 2200 dwellings, in the individual regions only tens or hundreds of dwellings are thus documented. The decrements in the census of the people, houses and dwellings are much higher.

<sup>2</sup> The dwellings leave the group of housing stock in different age and with different probability. The probability of decrement is minimum after completion of object, then it slightly rises and in the interval around the average life span of the object it rises in the fastest manner.

these states can not be assessed, approximately the same course was assumed in all the regions.

For the Czech Republic thus the decrements of dwellings as of 2007 represent 134 000 dwellings (0,5 %) or resp. 107 000 dwellings (0,4 %), analogically to the year 2010 191 400 dwellings, or resp. 152 000 dwellings (Table 7).

**Table 7: Estimated loss of dwellings during 2001-2007 and 2001-2010**

Czech Republic, Region	Number of permanently occupied dwellings on 1.3.2001	Loss of dwellings (estimation) 2001-2007		Loss of dwellings (estimation) 2001-2010		Percentage of reduction	
		var. 0,5%	var. 0,4%	var. 0,5%	var. 0,4%	var. 0,5%	var. 0,4%
Prague	496,9	16,3	12,9	23,5	18,4	0,47	0,37
Central Bohemia Region	413,1	17,4	14,5	25,0	20,6	0,6	0,5
South Bohemia Region	231,3	8,1	6,5	11,6	9,4	0,5	0,4
Pilsen Region	209,0	7,3	5,9	10,4	8,4	0,5	0,4
Karlovy Vary Region	115,9	3,2	2,4	4,6	3,5	0,4	0,3
Usti Region	321,9	9,0	6,8	12,9	9,7	0,4	0,3
Liberec Region	161,8	5,7	4,5	8,1	6,5	0,5	0,4
Hradec Králové Region	204,5	7,2	5,7	10,2	8,2	0,5	0,4
The Pardubice Region	182,9	7,7	6,4	11,1	9,1	0,6	0,5
Vysocina Region	179,8	7,6	6,3	10,8	9,0	0,6	0,5
The South Moravian Region	404,9	15,6	12,8	22,5	18,2	0,55	0,45
The Olomouc Region	230,6	8,1	6,5	11,6	9,2	0,5	0,4
Zlín Region	204,8	7,2	5,7	10,2	8,1	0,5	0,4
Moravia-Silesian Region	470,2	13,2	9,9	18,8	14,0	0,4	0,3
<b>Czech Republic</b>	<b>3 827,7</b>	<b>134,0</b>	<b>107,2</b>	<b>191,4</b>	<b>152,0</b>	<b>0,5</b>	<b>0,4</b>

*Source: Czech Statistical Office, own calculation*

### *Unoccupied dwellings in the regions of the Czech Republic in the period from 2001 to 2006 and prognosis until 2010 - 2015*

The number of so-called unoccupied dwellings<sup>3</sup> in 2001 (Census 2001) was very high – 538 600 dwellings. As the investigation of the reasons for uninhabitedness implied, most of them were factually inhabited, even though only temporarily. Therefore in order to be able to make

<sup>3</sup> Methodological explanatory notes according to the Czech Statistical Office [2001]: Unoccupied dwelling is a dwelling, where no person was registered to permanent residence. Unoccupied dwelling – occupied temporarily is a dwelling without permanently reported people, but used for temporary habitation; it is usually a dwelling, in which temporarily present person (persons) were reported.

an estimate of the development of the physical availability of housing for the total dwelling stock, it was necessary to include also unoccupied dwellings into the analyses.

For the calculation of the number of so-called unoccupied dwellings in the period from 2001 to 2006 and 2001 to 2010 we chose an expert estimate in the amount of 10% of the total volume of unoccupied dwelling stock in 2001, which for the whole of the Czech Republic represents approximately 54 000 flats. For the recalculations of the regional distribution of thus estimated number the considered basis was the regional share of unoccupied dwellings in the period from 1991 to 2001 and we derived from the assumption that the proportional representation of the unoccupied dwellings would remain the same also in further period (Table 8).

**Table 8: The distribution of the so-called unoccupied dwellings by regions during 2001-2006 and 2001-2010 (in thousands)**

Czech Republic, Region	Number of permanently occupied dwellings on 1.3.2001	Number of unoccupied dwellings		Increasing the number of permanently occupied dwellings	
		2001-2006	2001-2010	2001-2006	2001-2010
Prague	496,9	3,3	6	500,2	502,9
Central Bohemia Region	413,1	5,3	9,5	418,4	422,6
South Bohemia Region	231,3	2,4	4,2	233,7	235,5
Pilsen Region	209	2	3,6	211	212,6
Karlovy Vary Region	115,9	0,5	0,8	116,4	116,7
Usti Region	321,9	1,7	3	323,6	324,9
Liberec Region	161,8	1,5	2,7	163,3	164,7
Hradec Králové Region	204,5	2,1	3,8	206,6	208,3
The Pardubice Region	182,9	1,6	2,9	184,5	185,8
Vysocina Region	179,8	1,8	3,2	181,6	183
The South Moravian Region	404,9	2,8	5	407,7	409,9
The Olomouc Region	230,6	1,5	2,7	232,1	233,3
Zlín Region	204,8	1,5	2,7	206,3	207,5
Moravian-Silesian Region	470,2	2,1	3,9	472,3	474,1
<b>Czech Republic</b>	<b>3 827,70</b>	<b>30</b>	<b>54</b>	<b>3 857,70</b>	<b>3 881,70</b>

Source: Czech Statistical Office, own calculation

### Summary of results

With adding the gross increments of dwellings (completed dwellings from the new housing construction) and after detraction of the decrements of dwellings to the initial status of permanently occupied dwellings as of 1<sup>st</sup> March 2001 it is possible to model the number of permanently occupied dwellings as of 2006 and 2010. By means of the same steps it is possible to outline also the resulting total number of dwellings, i.e. after addition of the so-called unoccupied dwellings. The results for the permanently occupied dwellings are shown in Table 9. According to the model calculations and expert estimate the number of permanently occupied dwellings and total dwellings per 1.000 inhabitants or per 100 census households will differ in the period from 2001 to 2006 and 2001 to 2010 in a still increasing manner between the individual regions, or resp. the regional differences will be more substantial than in the previous decade. The focal point of dynamics of the development will settle in Prague

and Central Bohemia Region. If the existing processes of growing regional differentiation in the area of housing construction keep continue, the regions with formerly backwarded housing development will make this backwardness even more profound. Small growth of the permanently inhabited flats that was in Moravian-Silesian Region caused in 2001-2006 especially by very low extent of housing construction can change only by increase of the demand for dwellings based on the increase of job positions, decrease of unemployment and also reduction of immigration.

**Table 9: Facilities of inhabitants and household of permanently occupied dwellings in years 2001, 2006 and 2010 according to regions**

Czech Republic, Region	Number of permanently occupied dwellings per 1000 inhabitants			Number of permanently occupied dwellings per 100 hoseholds		
	2001	2006	2010	2001	2006	2010
Prague	425,1	436,4	452,5	90,7	91,2	91,9
Central Bohemia Region	368	370,7	384,5	89	90,3	89,3
South Bohemia Region	369,9	379,8	390	90,5	90,6	91,1
Pilsen Region	379,5	391,9	404,3	89,9	90,3	91,1
Karlovy Vary Region	380,9	387,7	392,5	87,5	85,9	85,2
Usti Region	392,5	393,4	394,6	90,4	88,4	87,4
The Liberec Region	377,9	385,1	393,7	89,3	88,1	87,9
Hradec Králové Region	371,4	379,8	390,9	89,6	89,2	89,5
The Pardubice Region	359,9	369,4	379,6	89,4	88,8	89,2
Vysocina Region	346,3	361,5	372,3	89	87,6	92,9
The South Moravian Region	359	369,2	379,4	89,4	88,8	90
The Olomouc Region	360,6	368,4	375,2	89,7	88,9	89
Zlín Region	344,1	356,5	365	88,9	89	89,8
Moravian-Silesian Region	370,4	380,8	389,9	89,4	89,4	93,3
<b>Czech Republic</b>	<b>374,2</b>	<b>383,0</b>	<b>395</b>	<b>89,6</b>	<b>89,5</b>	<b>90</b>

Source: Czech Statistical Office, own calculation

## Conclusion

The world crisis (2008-2009 reflected) rapidly changed global trends in housing. Project modeling and prognostic tools has become incorrect in many causes. New data are released with yearlong delay and every impartial modeling system does not afford certain results. It is necessary to set up a breakpoint to all prognostic methods.

Final data regarding the equipment rate of the population and households with dwellings in the period from 2001 to 2007 (or resp. 2010) found on the basis of the aforesaid methodology combining the existing data sources with prognostic techniques can be interpreted as more summarizing expression of the interregional differences that vary in some of the regions, or

try to transform into interregional disparities. In this regard it is necessary to point out especially the situation in Zlin Region, Usti Region and Karlovy Vary Region.

In total the data about physical availability of housing do not point out the extreme regional differences, so overall in the area of physical availability of housing the situation is not worrying. It is also documented by other facts. It is also confirmed by the situation that in spite of the high number of unoccupied dwellings or despite high share of the block-of-flats-type dwellings the acute lack of dwellings in physical expression or more massive dereliction of the block-of-flats-type units. The analyses of regional differences in the area of housing construction (i.e. actual increment of dwellings) however imply significant regional differences, which in estimation of continuation of the existing trends could lead, as the above prognosis showed, also to the origination of significant regional differences in the physical availability of housing; differences that we might consider disparities. The regions that already in 1991 showed low level of housing compared to the average of the Czech Republic keep this relatively worse position also in the period from 2001 to 2010 in spite of the fact that some of them achieve decent intensity of the housing construction. The professional estimate of the number of completed dwellings until 2010 implies that it is necessary to count with deepening of the existing differences between the regions. Slower development is will be characteristic especially for the Olomouc Region, Zlín Region, Karlovy Vary Region, Hradec Králové Region and the Pilsen Region.

In the regions with lower intensity of the started housing construction the extent of the completed dwellings in the upcoming years will be influenced less favourably than in case of the regions with relatively higher level of initiated construction. This influence could be weakened only some larger transformation of unoccupied dwellings to occupied ones, decrease of the decrements of dwellings or better usage of living floor area and especially also the drawing from the resources of dwellings under-construction. In the longer term however the low housing construction almost always reflects in low physical availability of housing and thus can contribute to the origination of especially strong regional disparity.

## References

Dupal, j., Rozpracování závěrů o rozsahu rekonstrukce panelových domů a výhledů do roku 2015, ÚRS PRAHA, a.s., Praha, 2006.

Firbach, D., et al., Analýza bytové výstavby v územích ČR, 1997-2006, ÚRS PRAHA, a.s., Praha, 2007.

ČSÚ – statistika bytové výstavby veřejná databáze ČSÚ – Průmysl stavebnictví – dokončené byty <http://vdb.czso.cz/vdbvo>.

Dupal, J., Rozsah rekonstrukce bytových domů z panelů v hodnocených městech, krajích a ČR z roku 2001 a výhled do roku 2015, Rozvoj bydlení V., Sborník ČSRB, Praha, 2007.

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