House Prices and Housing Wealth in Italy

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HOUSE PRICES AND HOUSING WEALTH IN ITALY

Luigi Cannari and Ivan Faiella

(Appendix by Antonio Bassanetti and Francesco Zollino)

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HOUSE PRICES AND HOUSING WEALTH IN ITALY

Luigi Cannari[*] *and Ivan Faiella*[*]

1. Introduction

Houses constitute a significant share of households' wealth and housing-related expenses are an important part of their expenditure. House-price dynamics are a key factor in the process of reallocation of household wealth (Davies and Shorrocks, 2000) interacting with financial asset prices (Sutton, 2002) and conditioning labour mobility (Cannari, Sestito and Nucci, 2000). This central role notwithstanding, in most industrialised countries statistics on house prices and housing wealth are not readily available (Kennedy and Andersen, 1994; Kneeshaw, 1995; Muzzicato, Sabbatini and Zollino, 2002).[1] This informative gap is especially annoying for countries, such as Italy, where households' preference for housing wealth is very strong (Brandolini *et al*., 2004; Faiella and Neri, 2004), partly owing to their the marked orientation towards owner-occupation (Paiella, 2001; Di Addario, 2002).

In Italy, official estimates are still not available at the macroeconomic level;[2] micro-level data on family holdings of tangible assets have been gathered since the 1960s in the Bank of Italy's Survey of Household Income and Wealth (SHIW) and constitute a substantial source of information on housing, although survey data are affected by under-reporting of dwellings (Cannari and D'Alessio, 1990). Some recent studies present estimates of Italian housing assets, combining this source of information with estimates from the National Accounts and other data (Brandolini *et al*., 2004; Cannari, D'Alessio and Paiella, 2006).

The present paper aims to estimate the value of dwellings at both micro and macro level in Italy in 2002, by geographical area. Estimates of the market value of house prices obtained from different sources are presented and compared with the implicit prices obtained from the SHIW. Subsequently, an appraisal of the total surface area derived from estimates based on the figures of the 2001 Italian Census are used to evaluate housing assets by geographical area, and these amounts are compared with the SHIW figures. Finally, the main conclusions are drawn. The Appendix (by A. Bassanetti and F. Zollino) I llustrates the method used to reconstruct the annual series of the housing wealth of Italian households, including census-based estimates now available for the years 1991 and 2001.

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[1] Nonetheless the importance of this information is widely recognised. In a recent speech delivered at the Second ECB Conference on Statistics, the President of the ECB remarked that "[…] the ECB attaches great importance to improving further the availability, timeliness and other qualities of the Principal European Economic Indicators and to receiving more elaborate and consistent euro area statistics for assessing and analysing productivity changes, for service activities and for housing, including house prices.", Trichet (2004).

[2] At the time of writing, the Italian National Statistical Office (Istat) is setting up the methodology to produce a national housing price index.

2. House prices

2.1 Estimates based on market transactions

In Italy, as in many other industrialised countries, there is no official source of macroeconomic information on house prices. Data are collected regularly by an agency of the Ministry of Finance (*Osservatorio Mercato Immobiliare dell'Agenzia del Territorio*) and by two private sources: *Nomisma* and *Il Consulente Immobiliare*. The *Osservatorio Mercato Immobiliare dell'Agenzia del Territorio* (OMI) is the most comprehensive source of information on house prices in Italy; it collects data for a very large number of transactions, more than 750,000 in 2002. *Nomisma*, an economic think-tank, publishes a semi-annual national index of house prices, based on data collected by real-estate agents; *Il Consulente Immobiliare* (CI), an industry-related review published by *Il Sole 24 Ore* media group, gathers information on actual sales of new and recently built houses (not older than 35 years) from real-estate agents in more than 1,000 Italian municipalities. While the Nomisma survey may be preferable for aggregate analysis, thanks to its more homogeneous methodology over time, the OMI and the CI have the advantage of deeper geographical coverage. Giving that the determinants of house prices mainly operate at local level (ECB, 2003), to estimate the benchmark of house prices we use the OMI and the CI.

Both have their pros and cons. The OMI has the advantage of wider geographical coverage, because it collects data for each Italian municipality, while the CI takes into consideration only a share of municipalities. On the other hand, CI data are likely to be of better quality: data on house prices are based on market transactions surveyed by real-estate agents only, while the OMI relies on information collected by real estate agents, on assessments carried out by technicians of the Ministry's local agencies and on information drawn from contracts of sale, where prices are usually under-reported in order to evade taxes.[3] We therefore resort to both sources to estimate our benchmark of house prices. First, we impute data for the missing municipalities in the CI data set. Second, using each of the two sources separately, we estimate an average house price for each municipality averaging the three prices[4] by location based on the share of households living in each one and classifying the municipalities in four classes according to the population (the shares of households are estimated resorting to the SHIW); finally we combine the filled CI data set and the OMI data set.

2.1.1 Filling the CI data set

In the second half of 2002, the CI collected data on house prices in 1,234 – out of 8,101 – Italian municipalities;[5] 56 per cent of Italian dwellings are located in the municipalities surveyed (Table 1). The CI survey is not based on a random sample. It collects data in the most important municipalities, while small ones are likely to be selected according to the thickness of the market for secondary dwellings (e.g. vacation homes).

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[3] Only a small share of information is collected through this channel and the data are somehow adjusted to correct for this under-reporting.

[4] These prices are the simple average of the minmum and maximu quotations. Averaging the minimum and maximum quotation in each area provides an estimator which is not representative of the distribution of house prices given its right-skewness (see Figure 1 in the text). Taking the median should solve this problem when this information is available in the future. According to SHIW 2004, the median value at nuts 1 level amounts to 90 per cent of the average value.

[5] The 103 provincial capitals are included in the CI sample.

Table 1

Coverage of the CI sample: municipality and total dwellings, 2002

Municipality size (inhabitants)	Covered by the CI sample		Not covered by the CI sample		Total	
	Dwellings (per cent)	Municipalities	Dwellings (per cent)	Municipalities	Dwellings (per cent)	Municipalities
Under 20,000	13	878	39	6,757	52	7,635
From 20,000 to 40,000.....	10	198	4	91	13	289
From 40,000 to 500,000...	22	152	2	19	23	171
More than 500,000.....	11	6	-	-	11	6
Total	**56**	**1,234**	**44**	**6,867**	**100**	**8,101**

Source: CI data. Data on dwellings are based on estimates of the 2001 Census.

For each municipality, the CI gathers information on the prices of dwellings sited in three locations: town centre, outskirts, between outskirts and town centre. For the provincial capitals the CI collects data on prices of new and recently built houses; for the other municipalities house prices are collected for new houses or completely renovated houses – a slightly different concept.

Using the coefficients provided by the CI, we compute the ratio of the average price of recently built houses to the average price of new and completely renovated houses, and use this ratio (equal to 0.87) to downscale house prices in towns that are not provincial capitals. [6]

Thus, all our estimates are based on the prices of recently built houses (i.e. not older than 35 years). We believe that these prices are good proxies for the average value of the whole stock of houses, because new houses represent only a minor share,[7] while houses older than 35 years are likely to have been renovated in subsequent years (and their prices will not differ very much from those of recently built houses).[8]

Finally, we impute the house prices for the 6,867 municipalities not covered by the CI survey, using the following regression model, estimated on the 1,234 CI survey units:

$$P_i = \alpha_p + \beta_1 DIM_i + \beta_2 TOU_i + \varepsilon_i, \qquad (1)$$

where P_i is the average house price for the *i-th* municipality, α_p is a fixed effect at the provincial level[9] and DIM_i and TOU_i are categorical variables at the municipality level, respectively containing information on the population size of the municipality and on the share of firms operating in the tourism industry; ε_i is an error term. Data are

[6] In detail, we computed the ratio of the average value per square metre of recently built houses to that of new houses – equal to 0.77 – and inflated it by 13 per cent, using a CI technical coefficient to account for the fact that in the towns not provincial capitals CI prices are collected for new or completely renovated houses (see the annex "Appendice per le stime", *Il consulente immobiliare*, spring 2003).

[7] According to the Census, in 1991 new dwellings (i.e. built in the last five years) were 4 per cent of the total and in 2001 dwellings built in the last ten years were 8 per cent.

[8] Pooling several waves of the SHIW, we verify that the average price of recently built houses is 99 per cent of the average price of the whole stock of houses.

[9] We used a regional fixed effect when the cell of donors contained less than 10 observations (40 out 103 provincial capitals). If the regional effect is used for those cells with less than 5 observations (7 out 103 provincial capitals), the results remain substantially unchanged.

weighted by the number of dwellings per municipality according to the 2001 Census (Table 2).[10]

Table 2

Estimates of the house prices (per square metre) in the CI database, 2002

	Parameter estimates (1)	Standard errors (2)	T Value	Pr > |t|
Intercept	2,738	321.81	8.51	<.0001
Share of units operating in the tourism industry				
Less than 5 per cent	-959	113.54	-8.45	<.0001
From 5 to 10 per cent	-838	112.55	-7.45	<.0001
From 10 to 20 per cent	-391	138.69	-2.82	0.006
More than 20 percent	*Base case*			
Size of the municipality (inhabitants)				
Less than 20,000	-1,093	298.14	-3.67	0.001
From 20,000 to 40,000	-913	297.08	-3.07	0.003
From 40,000 to 500,000	-681	283.10	-2.41	0.019
More than 500,000	*Base case*			

Number of observations	1,233(3)	Sum of weights	14,838,209
Adj. R-square	0.7202	Root MSE	367 (Denominator DF 76)

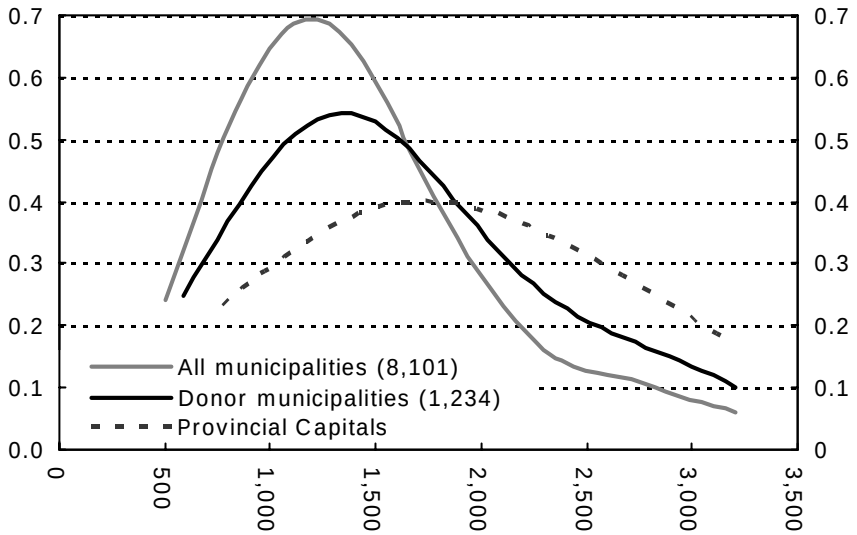
(1) Fixed effects at the province level not shown in the table. – (2) Robust standard errors clustered at the province level. – (3) One extreme observation was zero-weighted.

Source: Our calculations from the CI database.

Figure 1

Distribution of house prices: original and reconstructed values

(euros per square metre , 2002)(*)



(*) Non-parametric estimation techniques. A normal function is used as kernel and the bandwith is selected following a criterion that approximately minimises the asymptotic mean integrated square error (AMISE). See Pagan and Ullah (1999), pp. 49-54.

Source: Our calculations from the CI database.

[10] To test the out-of-sample predictive power of equation (1), a similar regression was estimated on SHIW data at municipality level. The SHIW regression presented the same covariates of equation (1) plus a dummy indicating the SHIW municipality was not covered by the CI (of the 344 SHIW municipalities surveyed in 2002, 112 were not covered by the CI). The coefficient of the dummy was not statistically different from zero (p-value=0.5128).

The distribution of house prices estimated through this equation exhibits a right skewness, with a modal value of around 1,200 euros per square metre. As shown in Figure 1, prices tend to be higher in towns that are provincial capitals than in the other municipalities surveyed. In addition, house prices tend to be lower in non-surveyed municipalities; this result is due to the bias in the CI sample, which under-represents small and non-tourist towns, where prices are lower. The average prices estimated from CI data for the full set of Italian municipalities are shown in Table 3.

Table 3

House prices at regional level

(Average price per square metre, recently built houses, 2002)

	Regions	Provincial capitals	Towns not provincial capitals	Regional capitals	
Piedmont	1,289	1,569	1,178	Turin	1,667
Valle D'Aosta	2,066	1,748	2,124	Aosta	1,748
Lombardy	1,755	2,651	1,484	Milan	3,210
Trentino A.A.	1,838	2,108	1,777	Trento	1,741
Veneto	1,583	1,893	1,494	Venice	2,455
Friuli	1,271	1,367	1,224	Trieste	1,515
Liguria	2,254	1,974	2,443	Genoa	2,043
Emilia Romagna	1,628	1,863	1,494	Bologna	2,319
Tuscany	1,593	1,799	1,493	Florence	2,409
Umbria	1,214	1,272	1,188	Perugia	1,376
Marche	1,365	1,667	1,299	Ancona	1,627
Lazio	1,971	2,577	1,315	Rome	2,712
Abruzzo	1,136	1,234	1,115	L'Aquila	1,184
Molise	891	1,105	851	Campobasso	1,212
Campania	1,275	1,911	1,095	Naples	2,058
Puglia	962	1,261	891	Bari	1,522
Basilicata	981	1,292	919	Potenza	1,211
Calabria	823	1,022	784	Catanzaro	1,073
Sicily	894	1,194	776	Palermo	1,438
Sardinia	994	1,136	962	Cagliari	1,276
Geographical area					
North-West	1,687	2,168	1,509		
North-East	1,588	1,820	1,495		
Centre	1,712	2,238	1,366		
South and Islands	1,014	1,358	919		
ITALY	**1,436**	**1,898**	**1,259**	**Total**	**2,259**

Source: Our calculations from the CI database.

2.1.2 OMI data and the combined OMI-CI estimates

House prices based on the OMI data set are displayed in Table 4. For regional and provincial capitals, the OMI average price is about 10 per cent lower than the CI average price; the difference between the two sources is greater when we take into consideration non-provincial capitals (-25 per cent). The discrepancy for non-provincial capitals is probably due in part to the criteria adopted by the CI when selecting the municipalities

surveyed and our adjustment method based on tourism vocation and demographic size of the municipalities is not powerful enough to remove entirely this upward bias; it is also plausible that OMI data are less reliable in small towns, where real-estate agents are fewer and the number of transactions is limited. Thus, we generate our benchmark by averaging the estimates from both sources. At national level we take the simple average from the two sources. At local level the two sources are assigned an equal initial weight. These weights are then modified to account for the relative market thickness using the so-called IMI% (the share of the total housing stock marketed in the year).[11] Where the regional IMI% is above the national measure the OMI relative weight is increased proportionally (and consequently the CI weight is decreased). The reverse happens when the regional IMI% is below the national value.

Table 4

House prices at regional level

(Average price per square metre, all houses, 2002)

	Regions	Provincial capitals	Towns not provincial capitals	Regional capitals	
Piedmont	1,100	1,469	952	Turin	1,653
Valle D'Aosta	1,340	1,547	1,302	Aosta	1,547
Lombardy	1,430	2,294	1,169	Milan	2,692
Trentino A.A.	1,791	2,647	1,597	Trento	1,707
Veneto	1,143	1,494	1,042	Venice	1,831
Friuli	977	1,238	848	Trieste	1,187
Liguria	1,524	1,443	1,578	Genoa	1,418
Emilia Romagna	1,401	1,822	1,161	Bologna	2,520
Tuscany	1,538	1,844	1,388	Florence	2,352
Umbria	1,025	1,110	987	Perugia	1,112
Marche	1,116	1,379	1,059	Ancona	1,423
Lazio	1,726	2,504	884	Rome	2,655
Abruzzo	777	1,077	710	L'Aquila	1,138
Molise	671	1,050	600	Campobasso	1,113
Campania	1,036	1,752	833	Naples	1,920
Puglia	674	830	637	Bari	964
Basilicata	543	991	454	Potenza	1,072
Calabria	479	701	436	Catanzaro	723
Sicily	695	953	594	Palermo	995
Sardinia	828	1,231	737	Cagliari	1,436
Geographical area					
North-West	1,343	1,859	1,152		
North-East	1,286	1,692	1,123		
Centre	1,533	2,179	1,107		
South and Islands	756	1,125	654		
ITALY	**1,161**	**1,712**	**950**	**Total**	**2,034**

Source: Our calculations from OMI data.

[11] For the computational details see *Agenzia del territorio* (2002).

The benchmark is displayed in Table 5. The territorial distribution of house prices confirms Italy's dualism: in seven out of eight southern Regions (Abruzzo, Molise, Campania, Puglia, Basilicata, Sicily and Sardinia), house prices are less than 80 per cent of the national average. Higher prices turn out to be correlated with the tourism inclination of regions and the presence of the largest Italian towns (Rome and Milan, above all).

Table 5

Benchmark for house prices at regional level
(Average price per square metre, 2002)

	Regions	Provincial capitals	Towns not provincial capitals	Regional capitals	
Piedmont	1,193	1,518	1,063	Turin	1,660
Valle D'Aosta	1,769	1,666	1,787	Aosta	1,666
Lombardy	1,549	2,425	1,284	Milan	2,882
Trentino A.A.	1,815	2,378	1,687	Trento	1,724
Veneto	1,311	1,646	1,215	Venice	2,069
Friuli	1,134	1,307	1,049	Trieste	1,362
Liguria	1,882	1,703	2,002	Genoa	1,724
Emilia Romagna	1,490	1,838	1,291	Bologna	2,441
Tuscany	1,561	1,825	1,432	Florence	2,376
Umbria	1,120	1,192	1,088	Perugia	1,245
Marche	1,234	1,516	1,173	Ancona	1,520
Lazio	1,837	2,537	1,079	Rome	2,681
Abruzzo	990	1,170	950	L'Aquila	1,165
Molise	813	1,085	762	Campobasso	1,177
Campania	1,192	1,855	1,003	Naples	2,010
Puglia	845	1,086	788	Bari	1,295
Basilicata	839	1,195	769	Potenza	1,166
Calabria	719	925	678	Catanzaro	967
Sicily	823	1,108	711	Palermo	1,280
Sardinia	921	1,178	864	Cagliari	1,346
Geographical area					
North-West	1,535	2,032	1,352		
North-East	1,407	1,743	1,272		
Centre	1,603	2,202	1,209		
South and Islands	912	1,266	814		
ITALY	**1,299**	**1,805**	**1,105**	**Total**	**2,147**

Source: Data obtained by averaging OMI and CI datasets.

2.2 Estimates based on survey data

In Italy the main source of information on household housing wealth at the micro level is the Survey of Household Income and Wealth (SHIW) conducted by the Bank of

Italy since 1965.[12] The sample size is about 8,000 units per year. The basic survey unit is the *household*, defined as a group of individuals linked by ties of blood, marriage or affection, sharing the same dwelling and pooling all or part of their incomes. Institutional population is not included. Data are collected by means of personal interviews conducted by professionally interviewers.[13]

The SHIW data have the merit of being representative of the universe of Italian dwellings owned by households or rented to households (owing to the sampling nature of the survey); they include qualitative characteristics of dwellings (for instance, dwellings rated as luxury, upscale and so on, dwellings having two or more bathrooms, having an independent or centralised heating system)[14] and make it possible to link information on dwellings to the social and economic characteristics of households. On the other hand, the SHIW is affected by non-response and under-reporting; as in many other surveys, wealth is underestimated due to its high concentration and the low propensity of the wealthy to participate in the survey (Davies and Shorrocks, 2000; D'Alessio and Faiella, 2002). Therefore, the comparison between survey results and macroeconomic estimates can be useful to shed light on the quality of SHIW data.

We focused on the sub-sample of 5,679 households that own at least one dwelling (primary residence or not). Data on the value of rented houses are provided by the owners. Sampling weights were post-stratified according to the distribution of population by region, municipality size, sex and age of the household head (the main income-earner within the family).

In Figure 2 house prices per square metre resulting from the SHIW (with a 95 per cent confidence interval[15] and upper bound of the bias of the estimator, i.e. the coefficient of variation of the surface area estimates[16]) are compared with our OMI-CI benchmark.

Overall, survey-based estimates seems to conform very closely with OMI-CI prices. The price per square metre of the average Italian house in 2002 is 1,382 euros according to the SHIW and 1,299 euros according to OMI-CI-based estimates (-6 per cent). The coefficient of correlation between regional series is 0.82 and the root mean square error is 244 euros per square metre . Excluding four regions that present a limited sample size in the SHIW (for Valle d'Aosta, Basilicata, Molise and Trentino there are less than 90 households surveyed in each domain) the correlation coefficient rises to 0.93

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[12] Information is publicly available since 1977. The reference is to the year for which, not in which, the survey is conducted.

[13] Further methodological details on the SHIW are given in Banca d'Italia (2004a) and Brandolini (1999).

[14] In the SHIW, dwellings are subjectively evaluated by respondents. All interviewees are asked the following question: "In your opinion, what price could you ask for the dwelling in which you live (if sold unoccupied)? In other words, how much is it worth (including any cellar, garage or attic)? Please give your best estimate". For home-owners and tenants, the answer provides the value of their principal residence.

[15] In computing those intervals, the standard error of the ratio estimator was calculated according to the SHIW sampling design.

[16] When a ratio R of two unknown population totals is estimated by the corresponding sample totals ($r=\Sigma w_i v_i/\Sigma w_i s_i$), the resulting estimator is biased, but with an upper bound proportional to the relative variance of the estimator of the auxiliary variable (see section 5.6 of Särndal, Swensson and Wretman, 1992) computed as:

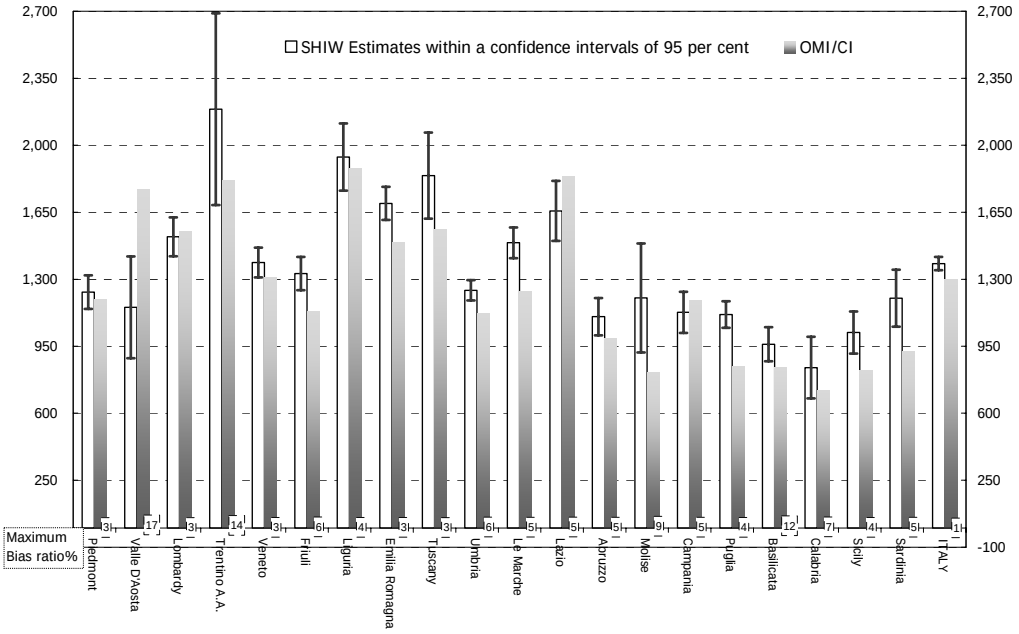
$$\frac{Bias(r)^2}{Var(r)} \leq \frac{Var\left(\sum_{i=1}^{n} w_i s_i\right)}{\left(\sum_{i=1}^{n} w_i s_i\right)^2}$$ the right-hand term tends to zero as sample size increases as will the left-hand term (the square of the bias ratio).

and the root mean square error falls to 178 euros per square metre.[17]

Figure 2

House prices: survey estimates and their sampling variability

(euros per square metre, 2002)



Source: Our calculations based on SHIW and OMI-CI database.

Table 6

House prices by location of the recently built dwellings

(euros, 2002)(*)

	Outskirts	Between outskirts and centre	Centre	Total
North				
OMI-CI	1,270	1,577	1,800	1,483
SHIW	*1,454*	*1,522*	*1,623*	*1,518*
-/+ 1.96 standard errors	*1,374 - 1,533*	*1,461 - 1,584*	*1,536 - 1,710*	*1,474 - 1,561*
Centre				
OMI-CI	1,298	1,815	2,117	1,603
SHIW	*1,476*	*1,704*	*1,853*	*1,646*
-/+ 1.96 standard errors	*1,383 - 1,569*	*1,593 - 1,815*	*1,648 - 2,058*	*1,564 - 1,727*
South				
OMI-CI	748	923	1,068	912
SHIW	*957*	*1,073*	*1,158*	*1,059*
-/+ 1.96 standard errors	*873 - 1,040*	*1,002 - 1,143*	*1,084 - 1,232*	*1,015 - 1,104*
Italy				
OMI-CI	1,088	1,376	1,599	1,299
SHIW	*1,305*	*1,396*	*1,474*	*1,382*
-/+ 1.96 standard errors	*1,253 - 1,357*	*1,352 - 1,441*	*1,411 - 1,537*	*1,351 - 1,412*

(*) Standard errors of ratios computed according to the sampling plan. The location of the dwelling in the SHIW refers to the principal residence.

Source: Our calculations based on SHIW and OMI-CI database.

[17] In those domains, the narrow size of the sample results in large confidence intervals; furthermore, a high bias ratio indicates that those intervals are not fully reliable.

The SHIW estimates appear to approximate OMI-CI prices well when the breakdown by location of the dwelling within the municipality is taken into consideration (Table 6).[18] The relative difference between SHIW point estimates and OMI-CI house prices is, on average, about +4 per cent, except for houses located in the centre where the SHIW underestimates OMI-CI prices and for dwellings sited in the outskirts or in southern part of Italy, where SHIW estimates are, on average, 15 per cent higher a OMI-CI values.

2.3 House-price dynamics

In the last decade there has been a sharp increase in house prices in the majority of developed economies. In the period 1995-2002, *The Economist* house-price index increased by 51 per cent in the US and by 35 per cent in the Euro area (corresponding changes in real terms were 27 and 19 per cent) (The Economist, 2003). What were the house-price dynamics in Italy? To answer this question we look again at the SHIW and other sources.

The first OMI data set on house prices was released in 2002 and therefore we cannot use this source before then. The CI has collected data on house prices in municipalities that are not provincial capitals since 2000. For the preceding years, data on house prices are available for provincial capitals only. The index estimated by Muzzicato, Sabbatini and Zollino (MSZ) and published by the Bank of Italy (Banca d'Italia, 2004b, p. 115) relies on these data; in particular, the MSZ index is based on the prices of new houses located in provincial capitals (for further details see Muzzicato, Sabbatini and Zollino, 2002).

As shown in Figure 3, according to the MSZ index, in the provincial capitals house prices (deflated by the consumer price index) increased by more than 60 per cent between 1987 and 1992; after a reduction, they exhibited little variation until mid-2000, when they reverted to a new phase of steep progression. The rise in house prices in the early years of the current decade has been fostered by several factors: the poor performance of share prices, which fell abruptly from 2000 to 2002, the low level of long-term interest rates, the tax credits for house renovation, the lengthening of the average duration of loan contracts, and the increase in financing as a proportion of the value of the property.[19]

Where regional differences are concerned, house prices exhibited stronger dynamics in the North and in the Centre than in the South and Islands. Although the pattern of house prices level is geographically differentiated, intra-regional differences tend to weaken. In 1992, when the real-estate market peaked, the variance of average house prices among the regions reached a maximum. In comparison with 1987, when house prices gained momentum, the coefficient of variation of prices had increased by more than a half. The dispersion among regional house prices tended to shrink thereafter; in 1996 the coefficient of variation returned to the 1987-88 values, showing moderate changes in the following years.[20]

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[18] Due to the small number of observations resulting from the combination of dwelling location and region, the analysis is limited to three macro-region.

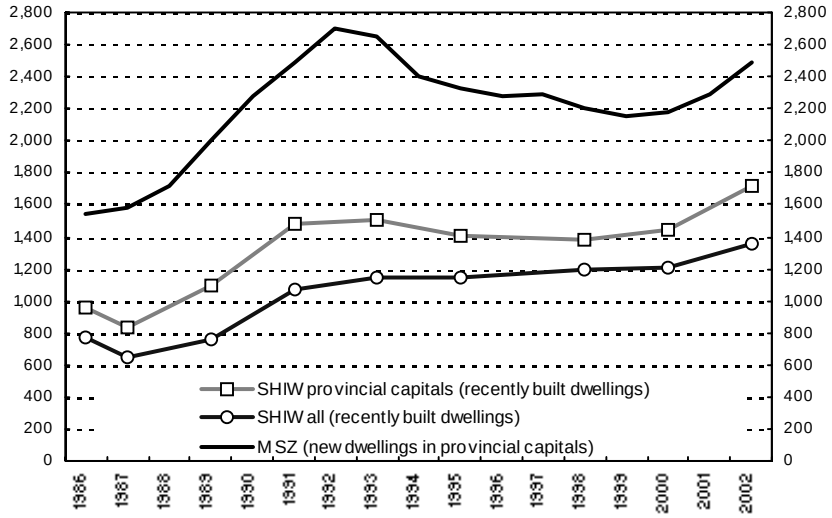
[19] For a general discussion on the main determinants of house prices see Fleming and Nellis (1990), Kennedy and Andersen (1994) and Tsatsaronis and Zhu (2004).

[20] Muzzicato, Sabbatini and Zollino (2002) point out that house price dispersion in the main towns tends to increase during market recessions; the phenomenon is evident particularly in the provincial capitals of the North and Centre of Italy. The authors focused on the variation between house price rates of change. Considering instead the variation between house price levels, the dispersion tended to diminish in the years following the 1992 peak.

Figure 3

House real prices in Italy, 1986-2002

(euros per square metre)



Source: Muzzicato, Sabbatini and Zollino (2002) and our calculations based on SHIW. Data are deflated using the CPI.

For provincial capitals, SHIW data (Figure 3) draw a picture that is close to that of the MSZ index. The level of house prices is lower – because the SHIW is representative of the whole stock of houses while the MSZ index is based on new houses only – but the patterns of the two series are very similar.

For the whole set of municipalities, on the other hand, the SHIW time series is smoother and there is no reduction after 1992. These results suggest that the time variability of house prices may be greater in the provincial capitals than in small municipalities. The house-price dynamics shown by the MSZ index, might therefore not be fully representative of the changes in the average house price.

Therefore, we propose a new index, based on our calculation from the 2002 OMI-CI dataset, MSZ index and SHIW data. In particular, we establish a benchmark for 2002 based on OMI-CI data: the level of house prices per square metre in 2002 for the provincial capitals is set equal to 1,805 euros; that of towns that are not provincial capitals is set to 1,105 euros (Table 7). The time series for the provincial capitals is estimated backward multiplying the level of house prices in 2002 by the MSZ index; the time series for towns that are not provincial capitals is estimated backwards by multiplying the level of house prices in 2002 by the respective SHIW index.[21] The resulting series is a weighted average of these two series, with the relative number of dwellings – according to 2001 census estimates – as weights. Results are shown in Table 7. As far as the time profile is concerned, house prices in real terms increased by almost 60 per cent between 1986 and 1992, when they reached their peak. Afterwards prices remained substantially stable until 2000, when they started to pick up once more.

[21] For intra-survey years an interpolation combining SHIW and MSZ dynamics was used.

Table 7

House prices: reconstructed series

(Average price per square metre, recently built houses, 1986-2002)

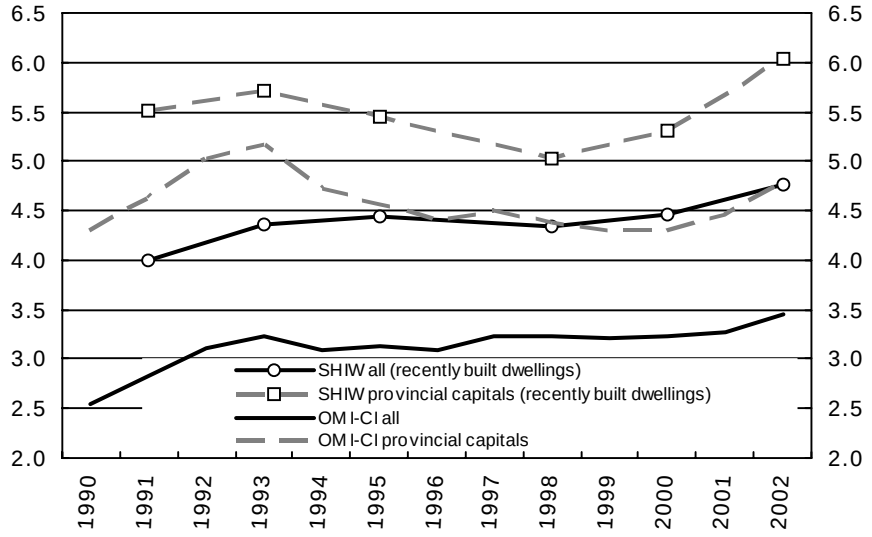
	Provincial capitals	Towns not provincial capitals	Total			
	Weights according to Census 2001 (27.8 per cent of dwellings)	(72.2 per cent of dwellings)	Nominal	Real	Nominal	Real
	euros per square metre				*percentage changes*	
1986	593	335	407	762	-	-
1987	635	295	389	696	-4.3	-8.7
1988	722	312	426	724	9.4	3.9
1989	896	361	509	814	19.6	12.5
1990	1,087	470	641	963	25.9	18.3
1991	1,262	586	774	1,094	20.7	13.6
1992	1,441	679	891	1,199	15.1	9.6
1993	1,476	707	920	1,188	3.3	-0.9
1994	1,394	723	909	1,127	-1.2	-5.1
1995	1,421	800	972	1,141	6.9	1.2
1996	1,447	849	1,015	1,155	4.4	1.2
1997	1,486	909	1,069	1,196	5.3	3.5
1998	1,454	927	1,073	1,181	0.4	-1.3
1999	1,444	935	1,076	1,161	0.3	-1.7
2000	1,500	987	1,129	1,187	4.9	2.2
2001	1,619	1,027	1,192	1,223	5.5	3.0
2002	1,805	1,105	1,299	1,299	9.0	6.3

Source: Our calculations based on SHIW and OMI-CI database.

Figure 4

Ratio of house prices to household disposable income, 1990-2002

(percentages)



Source: Our calculations based on SHIW and OMI-CI database. Disposable income per household at the macro level is estimated using National Accounts data, at micro level it is estimated using SHIW data.

In the provincial capitals the ratio of house prices to household disposable income, after declining from almost 6 in 1992-93 to 4.5 in 2000, then began to rise anew; in 2002 it was close (according to OMI-CI data) or above (according to the SHIW) to the level of the previous peak. For the whole set of municipalities the profile is smoother; even in this case, the house-price-to-income ratio in 2002 was higher than in the previous decade (Figure 4).

3. Housing wealth in Italy

We consider the price index presented in the previous section to be the best benchmark available to track house prices in Italy until 2002.[22] Therefore, in this section we use this series to obtain macro estimates of housing wealth, evaluating the total dwelling surface area owned by Italian households in 2002 and extending the results to the 1991-2002 period.

The macro estimates of the main components of housing wealth (prices, number of dwellings and average surface area) are compared with those derived from the SHIW, and subsequently the time pattern of housing wealth according to the two sources is presented.

At the end of this section the distribution of housing wealth is evaluated after adjusting for the under-reporting of secondary dwellings in the SHIW.

3.1 Estimates of dwelling surface area

In the previous sections we reached the conclusion that SHIW estimates of house prices compare very closely with those obtained from the OMI-CI database. In this section we look at the other two components of housing wealth: the average surface area of dwellings and the number of dwellings owned by households.

Information on the average surface area of occupied dwellings is provided by the 2001 Population Census.[23] According to the Census, the average surface area in square metres of occupied dwellings ranges from 82 in Val d'Aosta to 111 in Veneto, with a limited regional variance (the coefficient of variation is around 7 per cent). In comparison with census data, SHIW estimates tends to overestimate slightly the size of the occupied dwellings. While the Census presents an average surface area of 92 square metres (96 for occupied dwellings), the same measure according to the SHIW is about 13 per cent higher (12 per cent higher for occupied dwellings) (Table 8).[24] This outcome can be partly ascribed to the fact that dwellings occupied by persons other than the owner are more affected by under-reporting and, on average, are smaller than those that are owner-occupied.

In order to assess how SHIW data estimate the number of dwellings owned by households, we compare those figures with the numbers derived from the population

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[22] OMI data are available from 2002 onwards.

[23] OMI-CI prices correspond to the house value per Gross Internal Area (i.e. areas occupied by internal walls and partitions, columns, piers and other internal projections, internal balconies, stairwells, etc.), whereas we applied these prices to Census information (referring to Net Internal Area only). This method implies an underestimation of the total surface areas using Census information, the more reliable information that can be currently used as a benchmark.

[24] According to 2001 Census data, the average surface area of unoccupied dwellings corresponds to 80 per cent of the average surface area of occupied houses. The same ratio estimated on SHIW 2004 data is about 79 per cent.

Census.[25]

As shown in Table 9, the SHIW estimates are affected by a severe underestimation of secondary dwellings, as pointed out by Cannari and D'Alessio (1990) and Brandolini *et al.* (2004), who indicate that the total number of dwellings reported in the SHIW were about 75 per cent of census estimates (both referring to 1991). For 2002 this ratio is substantially unchanged. The figure is an average of the lower under-reporting (about 20 per cent) of occupied dwellings and the severe under-reporting (about 60 per cent) of dwellings that are not occupied.

Table 8

Average dwelling surface estimate
(square metres, percentages)

Geographical areas	SHIW 1991			SHIW 2002			Occupied			
	Occupied	Not occupied	Total	Occupied	Not occupied	Total	Census 1991	Census 2001	SHIW coverage 1991	SHIW coverage 2002
	square metres						*square metres*		*Percentages*	
North-West	99.8	80.9	95.9	102.5	78.0	100.1	90.1	91.9	110.8	111.5
North-East	113.6	90.3	111.0	117.1	79.7	112.9	102.2	103.9	111.2	112.7
Centre	99.4	75.7	96.0	100.9	78.9	98.1	93.9	95.2	105.9	106.0
South and Islands	109.3	87.9	107.6	108.3	87.7	105.8	93.0	95.4	117.5	113.5
Italy	105.6	82.6	102.4	107.1	82.1	104.2	94.1	96.0	112.2	111.6

Source: Estimates based on SHIW 1991, 2002 and Census 1991, 2001.

Table 9

SHIW coverage of dwelling units
(thousands of units and percentages)

Condition of dwellings	Census 1991	Census 2001	SHIW 1991		SHIW 2002	
	Dwelling units	Dwelling units	Dwelling units	Reporting rate	Dwelling units	Reporting rate
Occupied	18,104	19,863	15,171	83.8	16,001	80.6
of which: by the owner	*13,798*	*15,454*	*13,745*	*99.6*	*14,636*	*94.7*
Not occupied	4,855	5,172	1,776	36.6	2,080	40.2
Total	22,959	25,035	16,947	73.8	18,081	72.2

Source: Estimates based on SHIW 1991, 2002 and 1991, 2001 Census data.

3.2 Housing wealth decomposition: macro versus survey data

An estimate of gross housing wealth (HW) can be obtained by multiplying the average house price (P) by the average surface area (S) and the number of dwellings (N).[26] This calculation has been carried out for 2002 on OMI-CI and Census data (macroeconomic estimates) and SHIW data (microeconomic estimates).

[25] The number of non-occupied dwellings owned by households was estimated by applying at regional level the 1991 proportion to the total number of non-occupied dwellings in 2001.

[26] Housing wealth is corrected so as to include the sales of Government-owned housing to the household sector.

The discrepancy between the two sources can be broken down into its components, considering that the log of the ratio of SHIW to macroeconomic estimates can be expressed as:

$$(hw)^{micro}\text{-}(hw)^{macro}=(p^{micro}\text{-}p^{macro})+(s^{micro}\text{-}s^{macro})+(n^{micro}\text{-}n^{macro}) \qquad (2)$$

where $hw=log(HW)$, $p=log(P)$, $s=log(S)$ and $n=log(N)$.

The results of this breakdown show that SHIW data are unable to properly estimate the number of dwelling units, while average surface area is overestimated and prices are close to market values (Table 10). As the coverage for occupied dwellings is satisfactory, the weakness of the SHIW is concentrated in the under-reporting and non-reporting of secondary dwellings.

Table 10

Decomposition of the discrepancies between micro and macro estimates of housing wealth, 2002
(percentages)

	Average surface	Number of dwellings	House prices	Total difference	Total difference (percentage changes)
	(log-difference)				
North-West	12.3	-39.2	-4.1	-31.0	-26.7
North-East	12.8	-27.2	10.4	-4.1	-4.0
Centre	6.2	-30.2	3.4	-20.6	-18.6
South and Islands	14.7	-32.9	16.0	-2.2	-2.2
Italy	12.6	-33.0	6.2	-14.2	-13.0

Source: Estimates based on SHIW 2002, 2001 Census data, CRESME and OMI-CI database.

3.3 Housing wealth in 1991-2002

The value of dwellings for the years 1991-2002 is estimated as follows. To the 1991 Census-based stock we add an estimate of the newly built dwellings in each year. [27] The resulting stock is then multiplied by the average surface of dwellings and finally appraised using our house price index.

According to macro estimates, in 2002 housing wealth amounted to about 3 trillion euros (an average value of around 143,000 euros per household), 3.6 times households' disposable income. This value, based on a better price estimate, is 23 per cent lower than the one estimated by Brandolini *et al.* (2004).[28]

As indicated by the SHIW, housing wealth was equal to 2.6 trillion euros, 14 per cent lower than the corresponding macro estimate (table 11). Over the years, the ratio of SHIW estimates to macroeconomic figures has increased from 78 per cent (in 1991) to

[27] The number of newly built dwellings is based on estimates from CRESME, an Italian non-profit association for studies on construction industry. This number is multiplied by the share of dwellings owned by natural persons according to 2001 Census data (91.7 per cent of the total) and should include an estimate of illicitly built dwellings. For details see Annex A.

[28] This difference can be accounted for if we consider that in Brandolini *et al.* (2004) 1) the authors used a set of housing price estimates based on a sample of provincial capitals (the original MSZ series corrected with the SHIW ratio of the average value per square metre for all houses to the corresponding value for recently built houses) and 2) instead of the 2001 Census data, they used estimates of the surface areas and number of dwellings based on extrapolation of the 1991 Census.

more than 90 per cent (in 2000). This result is partly due to the decrease in the ratio of secondary dwellings – severely under-reported in the SHIW – to the total number of dwellings.

Table 11

Housing wealth in Italy, 1991-2002
(billions of euros, percentages)

	Housing wealth (macro estimates) (a)	Housing wealth (micro estimates) (b)	Ratio (b)/(a) * 100
1991	1,598	1,251	78.3
1992	1,865		
1993	1,950	1,515	77.7
1994	1,952		
1995	2,113	1,819	86.1
1996	2,232		
1997	2,375		
1998	2,407	2,023	84.0
1999	2,436		
2000	2,580	2,395	92.8
2001	2,753		
2002	3,033	2,604	85.9

Source: Estimates based on the SHIW, OMI-CI database, Istat (Census 1991, 2001) and CRESME. SHIW estimates for the period 1991-2002 are derived from the Historical Archive, vers 4.0.

3.4 Housing wealth distribution

In the previous section we have shown that the main shortcoming of the SHIW is the underestimation of secondary dwellings. In this section we evaluate how this under-representation can influence the distribution of housing wealth. To shed light on this issue we compare the survey estimate with adjusted estimates.

Following the adjustment method discussed by Cannari and D'Alessio (1990) and recently applied by Brandolini *et al.* (2004), we correct for the under-reporting of dwellings caused by non-sampling errors. The empirical distribution of the number of houses recorded in the SHIW, excluding those where the household lives, is well approximated by a discrete Poisson distribution, identified by the parameter $\lambda_d(x)$, where x is a vector of household characteristics (including sex, age and squared age of the household head, income, squared income, place of residence, municipality size, household size, home-ownership, annual dummy). Lacking more precise information, we assume that all dwellings not used as principal residence are equally likely to be declared by the owners. The probability that one of these dwellings is declared in the SHIW can then be described by the binomial distribution:

$$\Pr(D = d \mid S = s) = \binom{s}{d} p^d (1-p)^{(s-d)}, \qquad (3)$$

where s is the number of dwellings owned (excluding the household's residence), $d \leq s$ is the number of those declared and p is the proportion of these dwellings recorded in the SHIW. Equation (3) implies that the probability distribution of houses actually owned (excluding the household's residence) is the same as that of declared houses or, more precisely, it is a Poisson distribution with parameter $\lambda_s(x) = \lambda_d(x)/p$. By

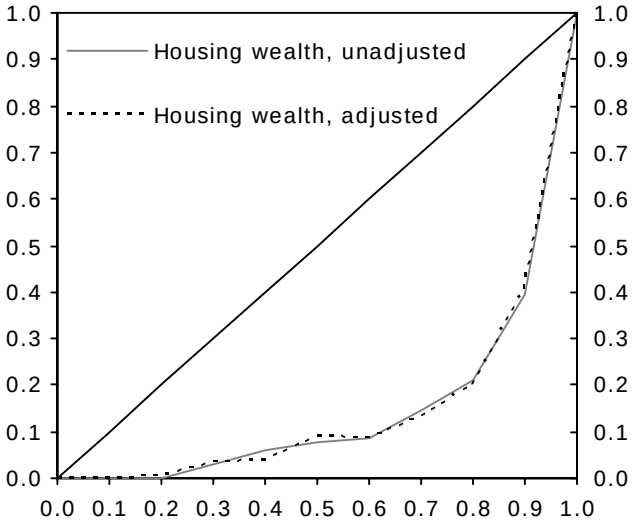
computing $\Pr(S = s \mid D = d)$, it is then possible to impute the ownership of non-reported dwellings. Characteristics and value are assigned by a hot deck method controlling for geographical area and income brackets. For each year, the proportion *p* is computed as the ratio of the number of dwellings owned by the households (excluding the household's residence) recorded in the SHIW, after adjustment for non-response, to the corresponding true figure derived from the Census for 2001.

Since in the SHIW respondents are requested to complete a separate sheet for each dwelling they own, failing to report certain assets is a way of reducing the questionnaire burden. The method described above – which can be seen as the equivalent of a proportional adjustment rule for a discrete variable – can account for such non-reporting behaviour, but relies on the crucial assumption that the degree of reticence of respondents is constant across socio-economic characteristics and, in particular, wealth classes. Some indirect evidence that the adjustment works satisfactorily is provided by the similarity of the distributions of rental incomes in the adjusted SHIW data and in tax returns, although it may still slightly underestimate the under-reporting of the richest households.

According to unadjusted data, the Gini index for housing wealth is equal to 0.594, indicating a lower degree of concentration compared with financial assets and total net wealth (that exhibit a Gini index respectively of 0.800 and 0.619). The share of housing wealth held by the top 10 per cent of households is 39.3 per cent. After adjusting data, the Gini index increases to 0.599 (statistically not different from 0.594) and the share of housing wealth held by the top 10 per cent is 40.8: thus the adjustment process leaves the housing wealth distribution basically unchanged (Figure 5).

Figure 5

Housing wealth concentration: original and adjusted data, 2002
(percentages)

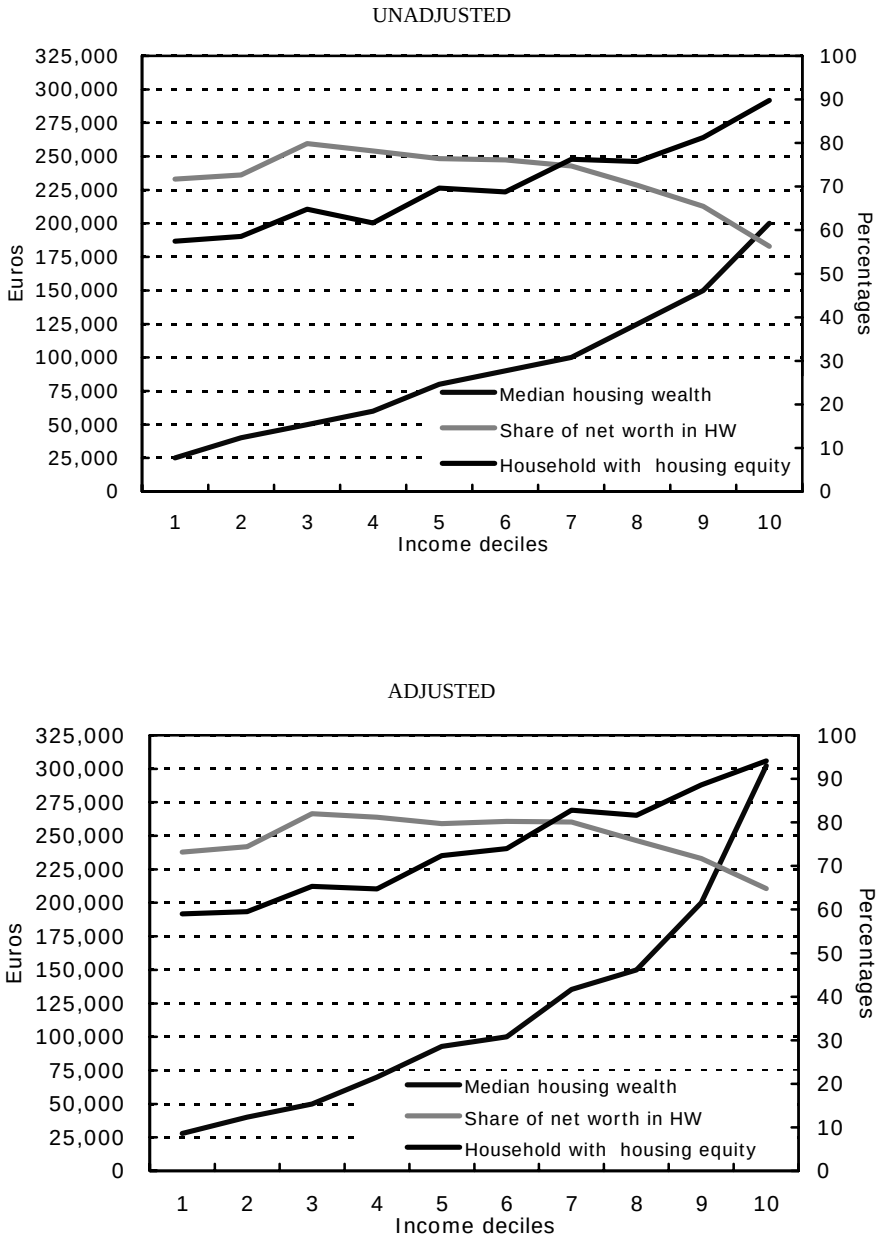


Source: Our calculations based on SHIW.

Looking at the breakdown by income deciles, we see that the share of home-owners increases rapidly with income, while the ratio of housing wealth to total net worth gradually declines after reaching a maximum in the third decile of households. After adjustment, the share of housing wealth and that of home-owners increase, but the profile by income deciles shows minor changes (Figure 6).

Figure 6

Housing wealth by income decile(*) original and adjusted data, 2002
(euros, percentages)



(*) Income from dwellings is excluded.
Source: Our calculations based on SHIW.

4. Conclusions

In Italy there is no official source of information on house prices. Data on this issue are collected by several sources, each of them with its own advantages and disadvantages. Data for a representative but small sample of households are collected by the Bank of Italy's Survey of Household Income and Wealth.

In this paper we present a method for estimating the price per square metre of the average Italian house – resorting to OMI and CI data – and compare the results with the SHIW estimates. According to our findings, the SHIW estimates for 2002 turn out to be very close to market values.

For provincial capitals, the SHIW and CI time series on house prices show a similar pattern. For towns that are not provincial capitals, CI data are not available; SHIW data show a time dynamic that is smoother than the one for provincial capitals, suggesting that house-price dynamics may differ across municipalities of different size. Using the 2002 OMI-CI estimates as a benchmark, the MSZ index for the provincial capitals and SHIW data for towns that are not provincial capitals we compute a new house-price index, more relevant to the estimation of Italian households' housing wealth.

We then compare the SHIW estimates with census data, showing that the survey overestimates the average surface area of houses while it strongly underestimates the number of secondary dwellings. Overall, in 2002 SHIW-based housing wealth was about 14 per cent lower than macroeconomic estimates. The adjustment for under-reporting and non-reporting of dwellings brings about changes in the share of home-owners and the ratio of housing wealth to total net worth; from a qualitative point of view, the profiles of these shares by income deciles show minor changes after adjustment. The Gini index of housing wealth remains almost unchanged.

APPENDIX

MEASURING THE ANNUAL HOUSING WEALTH OF ITALIAN HOUSEHOLDS

Antonio Bassanetti[*] *and Francesco Zollino*[*]

1. Introduction

This section illustrates the method used to reconstruct the annual series of the housing wealth of Italian households, including census-based estimates now available for the years 1991 and 2001. Following a comparison of the results of some possible options, it emerges that using the annual flow of new houses onto the market gives the best estimate based on the following criteria:

- compliance with the double bind imposed by the two census-based estimates for the years 1991 and 2001, while maintaining the cyclical variability signalled by other housing market indicators, such as residential investment and house prices;
- consistency between the methods for inter-census interpolation and for projecting all the years after 2001 (until the new census estimates for 2011 are available) with negligible discontinuities for the imputed rates of change in the 1990s and the current decade;
- transparency and ease of access to the basic data.

2. Comparison of alternative methods

Method A, the procedure adopted, is compared with Method B, based on the net stock of residential capital in the national accounts, and with Method C, based on the housing stock recently published by the *Osservatorio del Mercato Immobiliare* (OMI).[29]

2.1 Method A

The annual change in housing wealth is estimated on the basis of the flow of new houses onto the market. More specifically, we use the series calculated by CRESME,[30] publicly available from 1982 and coinciding, from 2005 onwards, with the official series the OMI started to publish.

The method proceeds in two distinct stages, namely interpolation and projection:

1) *Interpolation between 1991 and 2001*: taking the census estimate of the dwelling surface area in square metres for 1991, the figure for each successive year is obtained as follows: [31]

$$\text{dwelling surface area}_{(t)} = \\ = (\text{dwelling unit stock}_{(t-1)} + \text{new houses}_{(t)}) \cdot \text{average size}_{(t)} \qquad (1)$$

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[*] Bank of Italy.

[29] The *Osservatorio* is part of the *Agenzia del Territorio* (the Land Agency).

[30] *Centro Ricerche Economiche Sociali di Mercato per l'Edilizia e il territorio*; column A, Table 1.

[31] In equation (1) the estimate of average size is the same as that indicated in the paper (column B, Table 1).

The resulting annual estimates produce a value for 2001 that is 3 per cent higher than the census-based value (see columns D and E, Table 1). To maintain exact equality with the census-based value, we adjusted the estimated annual rates of change according to (1) subtracting the adjustment parameter $x_{i,}$ or the gap between the average annual changes of the compared series, calculated as follows:

$$x_i = \left(\frac{K_{i,2001}}{K_{i,1991}} \right)^{1/10} - \left(\frac{K_{census,2001}}{K_{census,1991}} \right)^{1/10} \qquad (2)$$

The result is the series given in the first column of Table 2.

Table 1

Dwelling surface area according to flows of new houses

Year	No. of houses put on the market	Average surface sq. m.	Dwelling surface area (thousand sq. m.)		
			Variation	CR_stock	Pre_stock
	(A)	(B)	(C)	(D)	(E)
1991	251,000	93.30	23,419	**2142155**	**2142155**
1992	278,000	93.09	25,879	2168034	2156547
1993	270,536	92.87	25,124	2193159	2171036
1994	281,317	92.65	26,063	2219222	2185623
1995	265,394	92.43	24,529	2243751	2200307
1996	245,727	92.21	22,657	2266409	2215090
1997	222,012	91.99	20,422	2286831	2229972
1998	200,499	91.77	18,399	2305230	2244954
1999	192,848	91.55	17,655	2322885	2260037
2000	198,458	91.33	18,125	2341010	2275221
2001	222,463	91.11	20,269	2361279	**2290508**
			Percentage change 1991-2001	**10.23**	**6.92**
			Adjustment parameter (*)	**0.31**	
2001	222,463	91.11	20,269	**2290508**	**2290508**
2002	242,677	90.89	22,058	2312566	2312906
2003	251,807	90.68	22,833	2335399	2336001
2004	277,815	90.46	25,132	2360530	2359855
2005	296,201	90.25	26,731	2387261	2386695
2006	317,391	90.03	28,575	2415836	2415694
			Percentage change 2001-2006	**5.47**	**5.47**

(A) Gross flows of new houses going onto the market; CRESME; since 2005, OMI. (B) Estimates given in the paper. (C) Product (A)*(B). (D) Upper panel: for each year t different from 1991, sum of (D) at time t-1 and (C) at time t; for 1991 census estimate. Lower panel: as for upper panel for t different from 2001; for 2001, census estimate. (E) Area in sq. m. implicit in the housing wealth estimates provided in the paper, obtained by assuming an annual rate of change equal to the average annual rate between 1991 and 2001; after 2001 equal to the change in the net stock of residential capital in the national accounts. (*) Identifies the annual adjustment of the rate of change in CR_Stock ensuring equality with the accumulated change between the two census estimates for 1991 and 2001.

Table 2

Dwelling surface area stock

	Adjusted CR_ Stock *		Pre_Stock **	
	Level	Percentage change	Level	Percentage change
1991	**2142155**	-	**2142155**	-
1992	2161462	0.90	2156547	0.67
1993	2179879	0.85	2171036	0.67
1994	2199096	0.88	2185623	0.67
1995	2216656	0.80	2200307	0.67
1996	2232239	0.70	2215090	0.67
1997	2245504	0.59	2229972	0.67
1998	2256681	0.50	2244954	0.67
1999	2267041	0.46	2260037	0.67
2000	2277774	0.47	2275221	0.67
2001	**2290508**	0.56	**2290508**	0.67
Var. 1991-2001		6.93	-	6.93
2001	**2290508**	-	**2290508**	-
2002	2305538	0.66	2312906	0.98
2003	2321228	0.68	2336001	1.00
2004	2339086	0.77	2359855	1.02
2005	2358397	0.83	2386695	1.14
2006	2379391	0.89	2415694	1.22
Var. 2001-2006		3.88	-	5.47

* Estimates adjusted by the parameters used in Table 1. ** See column E in Table 1.

2) *Projecting for the years after 2001*: taking the census estimate for 2001, the process is the same as 1) above, applying the same adjustment parameter calculated for the period 1991-2001 even for the most recent years, in the absence of any evidence of changes in the previously recorded distortion.[32]

The time series obtained in this way shows that in the mid-1990s there was a temporary slowing down in the accumulation of dwelling surface area, included between the lagged effects of the cyclical peak preceding the 1992 crisis and the beginning of the new expansionary phase towards the end of the decade.

Compared with the linear trend that can be taken as a first attempt at interpolating between the two census estimates over the 1990s the series based on flows of new houses has the advantage, for example, of enhancing the informative content of the wealth estimate in interpreting households' consumption behaviour.

[32] Estimates obtained in this way show a lower rate of change than that calculated on the basis of the stock of residential capital in the national accounts (Table 1, lower panel).

2.2 Method B

The annual variation in dwelling surface area is taken as equal to the change in the net stock of residential capital estimated in the national accounts, duly deflated. The choice of deflator is important given that the deflator for chain-linked prices of residential investments, according to the national accounts, follows a different trend from that of the market prices for houses.[33]

Table 3

Dwelling surface area according to the national accounts stock of residential capital

	Residential capital stock and house prices (percentage change)				Dwelling surface stock (level in thousand sq. m.)				Adjusted dwelling surface stock (level in thousand sq. m.)		
	stock at substitution prices	Istat	C-F	MSZ	based on				based on		
		deflator	prices	prices	(A) / (B)	(A) / (C)	(A) / (D)	Pre_Stock	(A) / (B)	(A) / (C)	(A) / (D)
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(L)	(M)
1991...	10.27	8.18	20.75	13.86	**2142155**	**2142155**	**2142155**	**2142155**	**2142155**	**2142155**	**2142155**
1992...	7.00	5.00	15.12	19.63	2182930	1991091	1915989	2156547	2165391	2006626	1894537
1993...	4.53	2.73	3.25	2.45	2221080	2015619	1954751	2171036	2185506	2045898	1913894
1994...	5.21	3.55	-1.20	-7.20	2256813	2146326	2216284	2185623	2202773	2193406	2150794
1995...	3.56	1.97	6.93	2.07	2292090	2078667	2248688	2200307	2219171	2140169	2160703
1996...	3.99	2.51	4.42	-0.27	2325182	2070072	2344812	2215090	2233041	2146841	2231428
1997...	3.79	2.46	5.32	2.44	2355399	2040026	2375777	2229972	2243778	2131250	2238550
1998...	2.70	1.47	0.37	-2.05	2384027	2087383	2491150	2244954	2252678	2196181	2324842
1999...	2.89	1.67	0.28	-1.00	2412708	2141742	2589042	2260037	2261335	2269300	2392918
2000...	5.95	4.63	4.93	6.08	2443231	2162655	2585976	2275221	2271429	2307916	2366121
2001...	3.60	2.32	5.58	6.37	2473767	2122051	2518672	**2290508**	**2290508**	**2290508**	**2290508**
		Percentage. change 2001-1991			15.48	-0.94	17.58	**6.92**	**6.92**	**6.92**	**6.92**
		Adjustment parameter *			0.82	-0.72	1.01				
2001...	3.60	2.32	5.58	6.37	**2290508**	**2290508**	**2290508**	**2290508**	**2290508**	**2290508**	**2290508**
2002...	5.35	4.08	8.98	13.67	2309035	2205264	2114258	2312906	2290358	2221808	2091414
2003...	4.19	2.92	8.54	13.01	2337665	2116973	1949212	2336001	2300005	2148968	1907208
2004...	5.52	4.20	6.26	11.89	2367182	2102320	1838273	2359855	2310215	2149678	1779560
2005...	5.47	4.04	7.28	8.04	2399827	2066928	1794490	2386695	2323160	2129078	1719355
2006...	4.62	3.12	6.54	7.90	2434793	2030474	1740003	2415694	2337988	2106969	1649932
		Percentage. change 2006-2001			6.30	-11.35	-24.03	5.47	2.07	-8.01	-27.97

(A) Net stock of residential capital at substitution prices in the national accounts. (B) Chain-linked prices in the national accounts. (C) House prices given in the paper. (D) House prices in Muzzicato, Sabbatini and Zollino (2002). (E) For each year different from 1991 in the upper panel and each year different from 2001 in the lower panel, estimates based on the variation in net stock of residential capital deflated with chain-linked prices in the national accounts; census estimates for 1991 in the first panel and for 2001 in the second. (F) and (G) as in column (E), using the prices given in the paper and those given by Muzzicato, Sabbatini and Zollino (2002) respectively as the deflator. (H) See column E in Table 1. (I), (L) and (M) adjusted estimates of the stock given in (E), (F) and (G), respectively, on the basis of the corresponding adjustment parameter. (*): calculated according to formula (2) in the text.

[33] The size of the gap varies with the state of the housing cycle (columns B-D, Table 3).

Also in this case, a two-stage procedure is considered:

1) *interpolation between 1991 and 2001*: taking the 1991 census-based estimate of dwelling surface area, for the following years we apply a rate of change equal to that for the net stock of residential capital published by Istat, deflated using three different prices (columns E-G, Table 3): i) the official deflator at chain-linked prices as in the national accounts; ii) the house prices covering the whole country presented in the paper; iii) house prices covering only the provincial capitals given in Muzzicato, Sabbatini and Zollino (MSZ; 2002).[34]

Whichever alternative is chosen for the deflator, the overall variation between 1991 and 2001 in total dwelling surface area, estimated in this way, is significantly different from the value inferred from the census data. For this reason, as in Method A, it is necessary to apply an adjustment parameter calculated according to (2), which for any of the three options under consideration here will be relatively high in terms of absolute values. The corresponding adjusted series show, in some years, negative changes where the Istat deflator is not applied (see columns L and M, Table 3). Since the result does not seem consistent with the trend for new housing, it is reasonable to reject both options based on market prices.[35]

2) *Projecting for the years after 2001:* for consistency with the indications given in the previous stage, a rate of change equal to that of the net stock in the national accounts at chain-linked prices is imputed, to which the usual adjustment coefficient is then applied.

The series obtained in this way is more variable than that given by Method A, probably in line with the marked amplitude of the cycle indicated by the house prices and by residential investment. However, against the choice of this method, significant adjustment must be made in order to respect the double bind coming from the two census-based estimates, with the indirect effect of depressing the rate of increase over the current decade, if compared with the results of Method A.

2.3 Method C

The OMI annual report gives an estimate of the stock of dwelling units based on the electronic database of the land registry. This database, which has only been updated since 2000, contains information on: i) the flow of new buildings; ii) changes in the subdivision and use of existing buildings; iii) new entries following the conversion of the backlog of data still recorded in paper files. In terms of method, the OMI series evaluates the stock of dwelling units at the end of every first semester and the corresponding flow includes all the changes that have taken place in the twelve months up to June in the reference year. Given the short time coverage, for our purposes the use of these data can only be evaluated in terms of projecting the census estimates for the years after 2001.

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[34] Muzzicato S., Sabbatini R. e Zollino F. (2002) *I prezzi delle abitazioni in Italia: una rassegna dei temi metodologici e la costruzione di un nuovo indice*, mimeo, Banca d'Italia.

[35] The inconsistency is due to the double bind of the census estimates for 1991 and 2001; in the old wealth estimates calculated by the Bank of Italy only one benchmark was adopted and the use of market prices did not produce anomalous results.

From an operational point of view, the series of the stock of dwelling units is first reduced by the share of property owned in sectors other than households (column A, Table 4), and then expressed in square metres on the basis of the average size used in Method A. This produces a series of the dwelling surface area which is greater, and increasingly so over time, than that inferred from the rate of change in the stock of residential capital in the national accounts. Equalizing the two series in 2001, for the following years the estimated values according to OMI data are greater, by almost 2 per cent in 2006 (columns B and D, Table 4).

Table 4

Dwelling surface area according to OMI stock of dwelling units

	No. of dwelling units (OMI)	Dwelling surface stock			
		OMI		Pre_Stock	
		thousand sq. m.	var.	thousand sq. m.	var.
	(A)	(B)	(C)	(D)	(E)
2001	25551300	**2290508**	-	**2290508**	-
2002	25977519	2323162	1.43	2312906	0.98
2003	26421604	2357242	1.47	2336001	1.00
2004	26857660	2390432	1.41	2359855	1.02
2005	27300171	2424023	1.41	2386695	1.14
2006	27840317	2466088	1.74	2415694	1.22
Var. 2006-2001		7.67		5.47	

(A) Number of residential buildings owned by households (91.7% of the total). (B) Product of (A) and the average size in sq. m., linked to the census surface area estimate for 2001. (D) See column E, Table 1.

The series reconstructed using Method C has the advantage of regularly incorporating land registry data and it is accessible to the public. On the other hand, it has the drawback of recording very broad annual variations, on average equal to almost double the flow of new buildings. According to the available information, about 2 per cent of the extra changes is on average due to a backlog in converting data still in paper files, while the rest is largely attributable to the subdivision of existing units.

Besides any doubts concerning the quality of the land registration data at the present state of the electronic database, it is probable that such an intensive process of subdivision will lead to a reduction in the actual size of dwelling units in relation to the estimates available from the different sources (see data given in the paper and by Cresme). In the absence of information allowing us to update this data correctly, it is likely that Method C will overestimate dwelling surface area.

3. The choice of method

After comparing the various options it was decided to use Method A. Apart from the advantages described earlier, the resulting yearly rate of increase in dwelling units is very close to that of residential investment in the national accounts, net of the expenditure on extraordinary maintenance (which does not basically alter the dwelling stock; Figure 1).

Figure 1

Residential investment and new houses put on the market

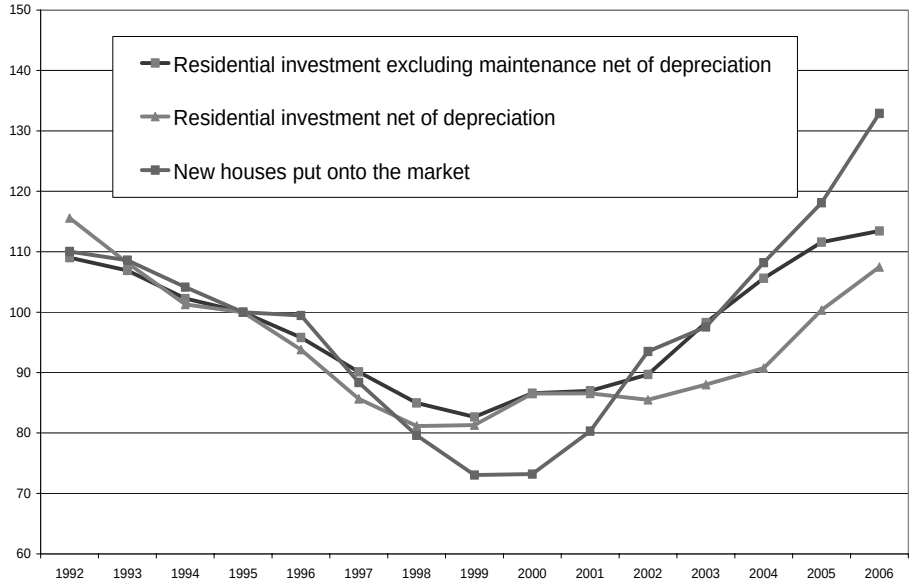
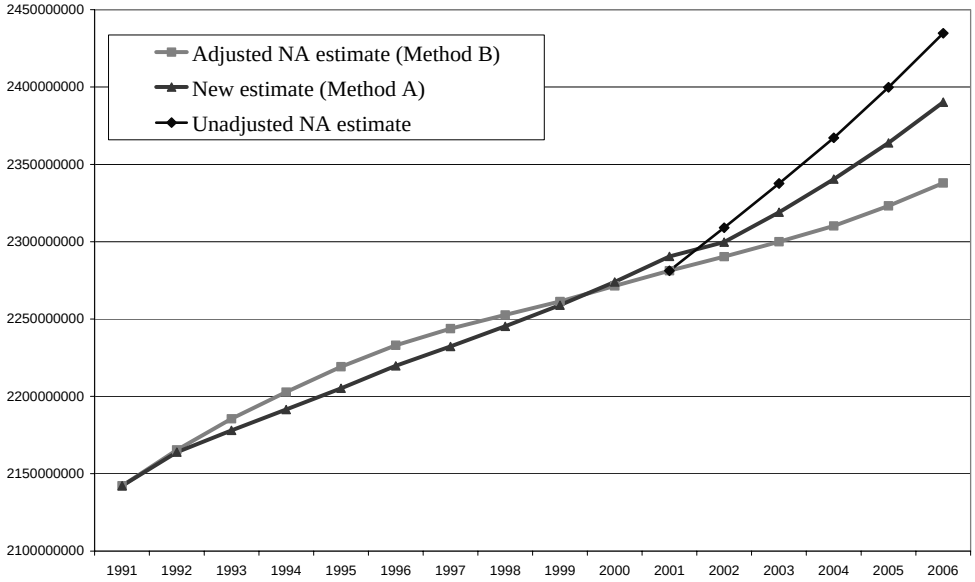


Figure 2

Dwelling surface area in square metres



As for the dwelling surface area for the current decade, our estimate offers the closest approximation, in terms of level and change, to the estimate based on the rate of increase in the net stock of residential capital in the national accounts, and plausibly adjusts for the expected overestimation implicit in the latter.[36]

The method adopted does not produce large discontinuities between the rate of change in the current decade and the rate imputed throughout the 1990s in compliance with the requirement of a 6.9 per cent cumulative increase measured on the basis of the two census estimates (see Figure 2).

A further advantage is the simplicity of calculation and ease of access to the information used. The annual estimates of dwelling surface area remain virtually unchanged if, instead of using the adjustment parameter proposed here in order to compare the methods, the flow of new housing is reduced by the share of property owned by sectors other than households (equal to 8.3 per cent in the 2001 Census). This variant of Method A is used in the estimates presented in the paper in order to improve the transparency of the methodology and of the data employed.

A last point to be made concerns the comparison with the estimates of housing wealth previously computed by the Economic Research Department of the Bank of Italy, which have been used sometimes in the updates to the Annual Report and which have been sent to the OECD since 1998. They were obtained using the permanent inventory method based on changes in the net stock of residential capital, deflated by house prices in the provincial capitals (MSZ) and anchored to a benchmark calculated for *one year only* (1991 in the latest figures).

Table 5

Consumer households - Link between the old and new estimates of housing wealth

	Old Series (OS) (A)	OS at new prices (B)	OS at new prices and benchmark (C)	OS at new prices benchmark and rate of change (D)
2001.....	3771723	2594883	2730285	2730285
2002.....	4140151	2730809	2873305	2994558
2003.....	4428713	2805429	2951817	3272070
2004.....	5161085	3104775	3266784	3502993
2005.....	5370074	3207554	3374926	3788209
	(D)-(A)	(B)-(A)	(C)-(B)	(D)-(C)
2005*.....	-1581865	-2162520	167372	413283
2005**.....	100	-136.7	10.6	26.1

* Differences in levels. ** Percentage of total difference between old series (A) and new series (D).

[36] In the national accounts the stock of housing wealth is estimated using the permanent inventory method based on the flow of residential investment, half of which consists of extraordinary maintenance. However, this should affect only market evaluations, and not dwelling surface area. Moreover, the deflator used in the national accounts is based on production costs, which have risen at a much slower pace than the market house prices in the recent expansionary phase.

Estimating dwelling surface area by Method A and applying the new price measures referred to in the paper produces an annual series of housing wealth that is substantially lower in the more recent period (columns A and D of Table 5).[37] In particular, in 2005 the new measure was almost 30 per cent lower than the previous one, simply because house prices throughout the country were much lower than those in just the provincial capitals (by about €1000 per square metre).

As a ratio of consumer households' disposable income, the new value of housing wealth was 3.9 per cent in 2005, some 1.6 percentage points lower than with the old method. As the paper demonstrates for total households, also for consumer households the decline in the housing component of wealth is the main determinant of the downward revision in total wealth in the new estimates.

[37] The series in column D is the one presented in the paper.

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