

Appendix 4 Calculation of the weights for imputed rent

1 Imputed rent used for the weight

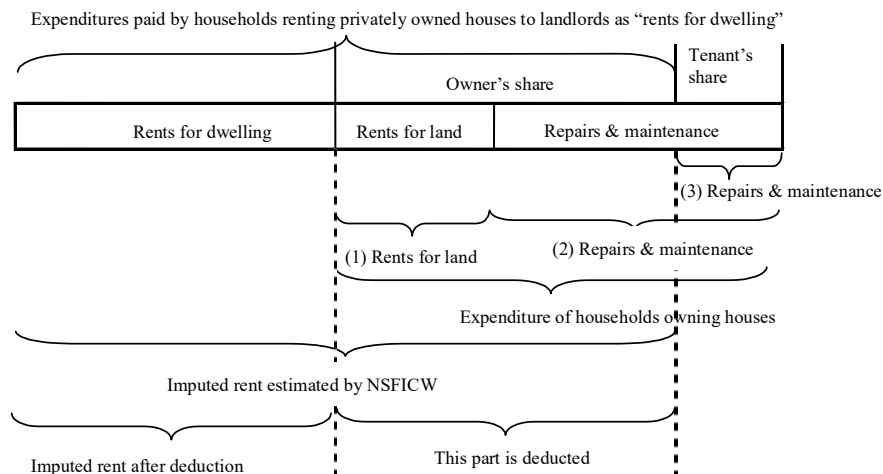
The imputed rent estimated⁵⁷ in the National Survey of Family Income, Consumption and Wealth (NSFICW), which is conducted every five years (one year before the base year), is used. By tabulating the results of the NSFICW in accordance with the stratum class of the Family Income and Expenditure Survey (FIES), it corresponds to the municipalities surveyed in the FIES.

2 Deduction of rents for land and costs of repairs and maintenance conceptually paid by landlords

The imputed rent in the NSFICW conceptually includes rents for land and costs of repairs and maintenance for facilities paid by landlords, but these expenses, which overlap with rents for land, etc. paid by households owning houses, are deducted.

The expenses to be deducted are calculated by districts as follows using the result of the NSFICW:

Imputed rent after deduction
 = Imputed rent of households owning houses estimated by NSFICW
 – (1) “Rents for land” paid by households owning houses in NSFICW
 – (2) “Repairs & maintenance” of households owning houses in NSFICW
 + (3) “Repairs & maintenance” of households renting privately owned houses in NSFICW⁵⁸



3 Level adjustment

(1) Adjustment to the FIES base

The FIES-based imputed rent from October to November 2019⁵⁹ is given by multiplying the adjustment rate obtained from the formula shown below by the NSFICW-based imputed rent after the deduction calculated in (2) above.

Adjustment rates are calculated by districts and applied to all municipalities in each district.

⁵⁷ For details, refer to “III Appendix 4 [Reference] Method of estimating the ‘Imputed rent of owned house’ in the 2019 NSFICW”.

⁵⁸ Minor repairs & maintenance which a household renting a privately owned house usually shares.

⁵⁹ Since the survey period of the 2019 NSFICW is from October to November 2019.

$$\text{Adjustment rate} = \frac{\text{Average living expenditure of FIES from October to November 2019}}{\text{Living expenditure of 2019 NSFICW}} \times 100$$

(2) Adjustment to 2020 average

The imputed rent calculated in (1), which is an estimated value from October to November 2019, is multiplied by the rate of change of the CPI (hereinafter referred to as “CPI rate of change”) given by the formula shown below. 2015-base indices for “imputed rent” are used for this calculation.

Indices used for calculating the CPI rate of change are those by district to which the municipalities belong.

$$\text{CPI rate of change} = \frac{\text{Index of 2020 average “imputed rent”}}{\text{Simple average of indices of “imputed rent” from October to November 2019}} \times 100$$

4 Computation of imputed rent per household

Imputed rent obtained in (3) above is rent per household owning a house. To obtain the imputed rent per household of all household including households renting houses, it is multiplied by the house ownership rate.

The house ownership rate is used by tabulating the results of the 2018 Housing and Land Survey (a fundamental statistical survey pursuant to the Statistics Act) in accordance with the classes in (1) above.

5 Division of imputed rent

As the “Imputed rent” index is calculated from four classes, “Small wooden house”, “Medium wooden house”, “Small non-wooden house”, and “Medium non-wooden house”, the imputed rent of owned house obtained in (4) above is divided into four classes using the rate of division for each municipality, calculated from the results of the Housing and Land Survey in accordance with the classes in (1) above, to find the weights by class.

The rate of division for Okinawa Prefecture is unified within the prefecture.

[Reference] Method of estimating the “Imputed rent of owned house” in the 2019 NSFICW

To estimate the imputed rent for owned houses, individual data for private rental houses (with exclusive use of facilities) were derived from the Housing and Land Survey conducted in October 2018, and Japan was divided into 4 blocks (districts for estimation). Then a regression equation was developed using structure of dwelling, year of construction, total floor space, district variables, etc. as explanatory variables for each district, and coefficients were determined using the least-squares method.

District variables: Natural logarithms of the official land price (residential area only) by municipality are used as continuous variables, and the municipalities with no record of the official land price are supplemented by the prefectural land price survey⁶⁰.

<Regression equation>

$$\ln y_k = a + \sum_j b_j x_{j,k} + c \ln S_k + \varepsilon_k$$

k : Households
 y_k : Rent for 1 month (yen)
 $x_{j,k}$: Housing attributes (structure of dwelling, etc.) and district variables
 S_k : Total floor space (m²)
 a, b_j, c : Coefficients
 ε_k : Residual error

* District for estimation
1 Tokyo-to
2 Three prefectures in Kanto (Saitama-ken, Chiba-ken, Kanagawa-ken)
3 Three prefectures in Kinki (Kyoto-fu, Osaka-fu, Hyogo-ken)
4 Other prefectures

Next, a household owning a house was taken from the households surveyed in the National Survey of Family Income, Consumption and Wealth (NSFICW). Housing characteristics of such household were fitted into the above regression equation to obtain the estimated amount of rent. This value, multiplied by the ratio of the 2015-base CPI of “House rent, private” for Japan in October 2019 (conduct of NSFICW) and that in October 2018, was taken as the imputed rent of that household.

Appendix shows the dummy variables and partial regression coefficients used in the estimation.

⁶⁰ It is surveyed and published by each prefectural governor concerning the price per square meter of the reference land on July 1 every year based on the Order for Enforcement of the National Land Use Planning Act. Along with the announcement by prefectural governments, the Ministry of Land, Infrastructure, Transport and Tourism compiles and publishes the situation of Japan. It has a mutually complementary relationship between the public announcement of land price (survey as of January 1 every year) by the Ministry of Land, Infrastructure, Transport and Tourism (Land Appraisal Committee) in terms of the survey period and survey points. The results of 2018 are used for the prefectural land price survey and the official land price mentioned here.

Table Partial regression coefficients for dummy variables
by districts for estimation in 2019 NSFICW

Variable			District class/partial regression coefficient				
				Tokyo-to	Three prefectures in Kanto	Three prefectures in Kinki	Other prefectures
Intercept			a	5.94830	6.51361	7.32155	8.00821
Logarithm of the total floor space			c	0.47553	0.39795	0.42300	0.36370
Construction material × architecture (base: wooden construction × detached house)	x_1	Wooden construction × apartment house	b_1	-0.10267	-0.03703	0.00712	0.05358
	x_2	Wooden construction × other architectures	b_2	0.00482	0.03088	-0.00837	-0.01253
	x_3	Fire-proofed wooden construction × detached house	b_3	0.11767	0.07923	0.11606	0.09825
	x_4	Fire-proofed wooden construction × apartment house	b_4	-0.03611	-0.02766	0.10411	0.09996
	x_5	Fire-proofed wooden construction × other architectures	b_5	0.11978	0.07759	0.09975	0.13225
	x_6	Ferro-/steel framed concrete or steel construction × detached house	b_6	0.14270	0.13444	0.14488	0.12198
	x_7	Ferro-/steel framed concrete or steel construction × apartment house	b_7	0.07664	0.05030	0.15303	0.12531
	x_8	Ferro-/steel framed concrete or steel construction × other architectures	b_8	0.11784	0.06414	0.16690	0.14476
	x_9	Other constructions × detached house	b_9	0.56437	0.20396	0.03701	0.02763
	x_{10}	Other constructions × apartment house	b_{10}	-0.08171	-0.00348	0.09426	0.08937
	x_{11}	Other constructions × other architectures	b_{11}	-0.03667	-0.02459	0.24288	-0.05023
Year of construction (base: 2016-)	x_{12}	2011-2015	b_{12}	-0.02997	-0.01490	-0.02538	-0.02512
	x_{13}	2006-2010	b_{13}	-0.02909	-0.05075	-0.05131	-0.06367
	x_{14}	2001-2005	b_{14}	-0.06259	-0.06922	-0.09790	-0.09798
	x_{15}	1996-2000	b_{15}	-0.09428	-0.10046	-0.14257	-0.15353
	x_{16}	1991-1995	b_{16}	-0.14987	-0.16281	-0.22087	-0.21023
	x_{17}	1981-1990	b_{17}	-0.19076	-0.21391	-0.25598	-0.28478
	x_{18}	1971-1980	b_{18}	-0.23271	-0.27202	-0.32553	-0.35854
	x_{19}	-1970	b_{19}	-0.31982	-0.33572	-0.44999	-0.47313
Official land price (logarithm)	x_{20}	Official land price by municipality (logarithm) (= x_{20})	b_{20}	0.28958	0.26848	0.18061	0.13739

* The coefficients of the base of “construction material × architecture” (: wooden construction × detached house) and the base of “year of construction” (: 2016-) are 0.

* For the official land prices (logarithms) by municipalities corresponding to x_{20} , the 2018 results of the prefectural land price survey, and the official land prices published by the Ministry of Land, Infrastructure, Transport and Tourism are used.