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Swiss Household Panel

Imputed rental value in the Swiss Household Panel

constructed variable for the Cross National Equivalent File

Technical report

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by
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The “imputed rent” (IR) variable in the Swiss Household Panel (SHP) is part of the Cross national Equivalent File (CNEF) which provides harmonised variables for various household panel surveys. Imputed rent has been calculated for household panels in the USA, Great Britain, Germany, South Korea, Australia, Canada and Switzerland.

Imputed rent refers to the income advantages of owner- occupiers or tenants who do not have to pay rent or whose rent is partly subsidized. Imputed rent is the amount these people would have to pay if they wanted to rent the same accommodation on the free market. The United Nations recommended the inclusion of income advantages from owner-occupied housing in national accounts in and issued guidelines in 1977 (see Frick and Grabka 2003 for a more detailed discussion). The Canberra Group on Household Income Measurement, which has defined international standards for the measurement of household income, recommends the inclusion of imputed rent as a component of disposable income (Canberra Group 2001). A uniform definition of household income is particularly desirable for cross-national comparative research (Smeeding and Weinberg 2001).

The inclusion of imputed as part of household income is not only relevant for the income level. It has also shown to influence the income distribution and poverty ratios. Various scholars find a levelling effect of imputed rent on income distribution (Smeeding et al. 1993, Yates 1994). Imputed rent also reduces poverty ratios (Eurostat 1998, Wolff 1990). These effects are strongest among the older population, but vary considerably between countries (Yates 1994).

In this report, we document the construction of imputed rent in the Swiss Household Panel for the Cross National Equivalent File (CNEF) using the opportunity cost approach. We also compare to approaches (the opportunity cost approach and the capital market approach) theoretically and empirically.

1. Concepts and approaches

Imputed rent refers to the income advantages of owner-occupiers, social housing tenants or households living rent-free. The United Nations has defined imputed rent as follows: “The total of owner-occupied dwellings which is to be included in gross output should, in principle, be valued at the rent on the market of the same facilities. It may be necessary to approximate the market rent by an estimate which should cover items such as operating, maintenance and repair outlays, water charges, insurance service charges, taxes, depreciation and mortgage interest in addition to interest on owner’s investment in the dwelling and other elements of net return” (UN, 1968; quoted in Yates, 1994, p. 44).

The income advantage can be interpreted and derived from two perspectives. Firstly, the imputed rent can be seen as a rent that does not have to be paid. Because owner-occupiers do not have to pay rent, they have more money at their disposal than tenants. Secondly, the

income advantage can be seen as a return on private investment in property rather than in the financial market. From this perspective, imputed rent is seen as an interest received on invested capital. These two different concepts of imputed rent correspond to different approaches or strategies for estimating the income advantage: The opportunity cost approach[1] and the capital market approach.

Therea are different methods to capture the income advantage of owner-occupiers or subsidized housing with the *opportunity cost approach.* In the frequently used regression approach (e.g Hill 2013), first, the rent actually paid by tenants is regressed on dwelling type, year of construction, flat size, housing equipment or regional information. Costs for heating, hot water, or parking garages are not included. Second, this regression model is used to predict hypothetical rents for owner-occupiers and subsidized tenants. Third, costs are deducted from this hypothetical rent. Costs include running and maintenance costs, insurances, mortgage payment and property taxes. Heating costs are not deducted.[2]

The *capital market approach* estimates the income as a return on the investment in housing. The investment is equal to the value of the property minus outstanding mortgages (V - M). The return should be comparable on returns on safe private market investments. Saunders et al. (1992: 11) used e.g. a two percent real return.

Each approach has its strengths and weaknesses (Frick and Grabka 2003, Alexeev 2020). The capital market approach is likely to overestimate imputed rent if a nominal rate is applied to equity (Frick and Grabka 2003).[3] Another source of error is the homeowner's own estimation of the value of their house. If owners have been living in their home for a long period and therefore base their estimate on the original house price, they are likely to underestimate its value. Problems of overestimation may also arise if depreciation as the house ages is not taken into account (Frick and Grabka 2003). Another drawback of the capital market approach is that it can only be applied to homeowners and not to tenants in subsidized or rent-free housing.

For the opportunity cost approach, it is not a priori clear which costs should be deducted from the hypothetical rent, in particular how mortgage repayments should be taken into account. In addition, the opportunity cost requires a rather large rental market. This is not an issue for

[1] For national accounts, the opportunity cost approach without the deduction of owner-related costs is usually considered and known as Market-Value approach (Frick und Grabka 2003).

[2] An alternative method is to ask owners to estimate how much they would pay if they were renting their home. consists of two main steps. Owners tend to overestimate their property (Alexeev 2020; Fessler et al. 2016)

[3] Frick and Grabka argue that the overestimation of IR according to the capital market approach results from the application of a nominal interest rate (i) on the house value (V) minus the outstandtig mortgages (M), which is thus i*(V-M). They propose to apply instead a real interest rate (r) on the house value and a nominal rate on the outstanding mortgages. Because i>r, also i(V-m) > rV – iM, and imputed rent is thus lower with this second approach.

Switzerland, where the majority are tenants: in 2000 the share or owner-occupied dwellings amounted to 35%, in 2023 to 36% (SFSO 2025).[4] (in 2000 only 35 percent of the population were homeowners).

2. Imputed rent in other household panels

Imputed rent is a variable that is part of the Cross National Equivalent File (CNEF). The Anglo Saxon countries adapted a capital market approach to estimate imputed rent. The Australian Household, Income and Labour Dynamics in Australia (HILDA) relied on estimates of the house value (V) by the household head, from which outstanding mortgages (M) are deducted. If V–M is positive, imputed rent is 6 percent of that value, reflecting assumed interest rates. Until 2007 and 2009, the U.S. Panel Study of Income Dynamics (PSID) and British Household Panel Study (BHPS) provided similar measures, assuming an interest rate of 6 percent.

The SOEP follows an opportunity cost approach. At the basis of nonsubsidized tenants, rent per square meter is estimated. The regression model takes account of the condition of the building, the year of construction, size (in square meters), length of occupancy, community size and disposable income. Based on these estimates, IR is assigned to comparable owner-occupiers. All relevant costs (due to operation, maintenance and repair, and financing) apart from heating costs are deducted from imputed gross rents.

3. Opportunity cost approach in the SHP

For the SHP, we adopt the opportunity cost approach to simulate imputed rent. Firstly, there is no easily accessible data base to estimate house values for the market value approach. Secondly, the SHP contains information on outstanding mortgages only since 2016. Finally, the data of the SHP is well suited to estimate imputed rent according to the opportunity cost approach because of the large share of tenants in Switzerland.

Modelling rent

In a first step, we develop and estimate a model which predicts the amount of rent paid by tenants not living in subsidized dwellings (Variables h$$h29 and h$$h30 of the SHP). The question wording for the dependent variable (h$$h36) is: “What is the monthly rent, including service charges?” The logarithm of this variable is regressed on various characteristics of the dwelling, the household and on regional characteristics. This step is conducted separately for each survey wave /year. The variables are presented in more detail in Table 1.

[4] There were minor fluctuations over time, but also changes in methodological changes in the measures (in 2010, 2015 and 2018). Between 2018 and 2023, the share decreased slightly from 36.6% to 35.8%.

The predictors for the dwelling include the duration of residence, number of rooms, subjective assessment of condition (bad condition, in good condition but not recently renovated, new or recently renovated), equipment with a dishwasher, dummy variables whether the apartment is considered as too small, too large, badly heated, noisy or affected by pollution, or affected by vandalism. As household characteristics, we include disposable household income, whether children live in the household, whether household members are in retirement age and how the household assesses the expenses connected with the accommodation (very small, small, reasonable, a little too high, much too high).

We use various spatial information on the municipality and canton. Percentage of empty apartments in a municipality, tax rates in the municipality,[5] municipality type, and the share of residential area in the municipality. We also clustered cantons into groups according to the average rental values. Table 1 gives an overview of the variables.

Non-linear relationships are included for duration of residence and household income by adding quadratic terms. If values of predictors were missing, they have been imputed using previous values of the same household.

[5] We used the tax rate of a (hypothethical) single person (unmarried, no children) earning 100,000 CHF before deductions. Adding tax levels of other household types do not further increase model fit, and tax rates are highly correlated. For example, the correlation between the tax rate of an unmarried person earning 100,000 and a married couple earning 500,000 amounts to 0.87.

Duration of residence	Number of years already lived in dwelling, top coded at 60 years SHP variable hh06,
Nb of rooms	Number of rooms (dummies, top coded at 7) SHP variable hh20
Condition of the accommodation	1 in bad condition 2 in good condition but not recently renovated, no answer, does not know (reference category) 3 new or recently renovated SHP variable hh14
Appartm. too small	Assessment of reference person (No/ Yes) SHP variable hh23
Appartm. too large	Assessment of reference person (No/ Yes) SHP variable hh44
Badly heated	Assessment of reference person (No/ Yes) SHP variable hh25
Noisy or polluted	Assessment of reference person (No/ Yes) SHP variable hh26 and hh27 (separate questions)
Vandalism	Assessment of reference person (No/ Yes) SHP variable hh28
Income	Net household income (imputed values if income was missing) SHP variable ihtyni
Assessment of expenses	Assessment of expenses connected with accommodation 1 very small 2 small 3 reasonable 4 a little too high 5 much too high SHP variable hh38
Old person household	One person household of 65+ years or couple without children with at least one person aged 65 or more. SHP variable age, hldtyp
Household with children	Children live in the household SHP variable age
Community type, 4 groups	Groups according to average rent paid by tenants in each group. The attribution of cantons varies slightly over the years. SHP com1_$$
Tax level	Percentage of taxes from gross income of a single with 100'000 CHF income from employment. This share (for the same virtual person) varies between 5.8 and 20.9, depending on the municipality of residence. Source: Swiss Federal Tax Admin.
Type of surface	Percentage of municipality surface covered by residential area or agricultural area (2 dummy variables) Source: SFSO (available for 2000, 2009) [6]
Empty apartments	Percentage of empty apartments in a municipality Source: SFSO

[6] Swiss Federal Statistical Office

Property prices	5 categories according to hedonistic models Source: SFSO

Table 1: Variables used to estimate rent

The final model applied has a R^2 (explained variables) of over 0.5 in all years. The coefficients for 2018 to 2023 are shown in Table 2.

	2018	2019	2020	2021	2022	2023
Dwelling characteristics						
duration	-0.004**	-0.004**	-0.005**	-0.005**	-0.003**	-0.006**
	(-3.2)	(-3.1)	(-4.3)	(-4.3)	(-2.6)	(-3.9)
duration squard	0.000	0.000	0.000	0.000	0.000	0.000
	(1.1)	(0.6)	(1.8)	(2.0)	(0.7)	(1.9)
rooms						
rooms = 2	0.148**	0.095**	0.206**	0.153**	0.170**	0.158**
	(4.2)	(2.6)	(8.5)	(5.3)	(5.6)	(4.9)
rooms = 3	0.223**	0.152**	0.267**	0.236**	0.253**	0.237**
	(6.5)	(4.3)	(11.4)	(8.5)	(8.8)	(7.7)
rooms = 4	0.284**	0.218**	0.343**	0.294**	0.308**	0.304**
	(8.1)	(5.9)	(14.0)	(10.2)	(10.3)	(9.5)
rooms = 5	0.336**	0.260**	0.421**	0.366**	0.355**	0.366**
	(8.6)	(6.4)	(15.3)	(11.4)	(10.8)	(10.3)
rooms = 6	0.381**	0.290**	0.404**	0.368**	0.415**	0.365**
	(8.0)	(5.8)	(11.4)	(9.1)	(10.0)	(8.4)
rooms = 7	0.333**	0.296**	0.392**	0.406**	0.359**	0.401**
	(6.0)	(5.1)	(9.1)	(8.4)	(7.3)	(7.9)
bad condition	-0.079**	0.013	-0.025	-0.036	-0.032	-0.025
	(-3.0)	(0.4)	(-1.3)	(-1.6)	(-1.4)	(-1.0)
new or recently renovated	0.049**	0.063**	0.071**	0.081**	0.062**	0.024
	(3.5)	(4.1)	(6.7)	(6.4)	(4.8)	(1.7)
too small	-0.053**	-0.109**	-0.053**	-0.031*	-0.069**	-0.070**
	(-2.9)	(-5.3)	(-4.0)	(-2.0)	(-4.3)	(-4.0)
too large	0.065**	0.050*	0.021	0.049*	0.028	0.003
	(2.8)	(2.0)	(1.0)	(2.1)	(1.3)	(0.1)
badly heated	-0.007	0.032	-0.011	-0.047**	-0.012	-0.018
	(-0.4)	(1.4)	(-0.7)	(-2.8)	(-0.7)	(-1.0)
noisy, pollution	-0.026*	-0.033*	-0.018*	-0.025*	-0.013	-0.034**
	(-2.2)	(-2.6)	(-2.0)	(-2.4)	(-1.2)	(-2.9)
vandalism	0.008	-0.001	-0.038*	-0.021	-0.033	-0.032
	(0.4)	(-0.0)	(-2.4)	(-1.1)	(-1.7)	(-1.6)
dishwasher	0.148**	0.155**	0.167**	0.159**	0.159**	0.188**
	(10.1)	(9.6)	(13.8)	(11.4)	(10.9)	(11.4)
Household characteristics						
income	0.051**	0.052**	0.042**	0.041**	0.041**	0.000**
	(18.7)	(17.5)	(21.4)	(19.1)	(19.6)	(19.0)
income # income	-0.001**	-0.001**	-0.001**	-0.001**	-0.000**	-0.000**
	(-8.3)	(-8.4)	(-10.0)	(-8.6)	(-8.1)	(-9.4)
child	0.039**	0.033*	0.052**	0.076**	0.080**	0.078**
	(2.7)	(2.1)	(4.7)	(5.9)	(6.1)	(5.4)
old	0.052**	0.060**	0.028*	0.055**	0.040**	0.046**
	(3.5)	(3.8)	(2.4)	(4.3)	(3.1)	(3.3)
assessment expenses	0.144**	0.172**	0.153**	0.162**	0.154**	0.150**
	(18.3)	(20.4)	(27.4)	(24.2)	(22.2)	(20.8)

Municipality characteristics						
municipality type						
municipality type = 2	0.037*	0.062**	0.019	0.026	0.031*	0.058**
	(2.0)	(3.5)	(1.5)	(1.7)	(2.2)	(3.6)
municipality type = 3	0.077**	0.063**	0.033**	0.023	0.049**	0.084**
	(4.0)	(3.8)	(2.7)	(1.7)	(3.4)	(5.1)
municipality type = 4	0.073**	0.088**	0.058**	0.054**	0.067**	0.091**
	(3.5)	(4.5)	(4.5)	(4.1)	(4.7)	(5.0)
Surface : construction (%)	-0.003**	-0.005**	-0.004**	-0.004**	-0.004**	-0.003**
	(-4.1)	(-6.6)	(-8.8)	(-7.4)	(-7.7)	(-5.6)
Surface : agriculture (%)	0.001	0.001	0.001*	0.001	0.001*	0.000
	(1.5)	(1.5)	(2.3)	(1.9)	(2.0)	(0.3)
Empty appartments (%)	0.001	-0.006	-0.010*	-0.009	-0.014**	0.008
	(0.2)	(-0.9)	(-2.1)	(-1.8)	(-2.9)	(1.7)
Tax level	-0.019**	-0.012**	-0.016**	-0.015**	-0.015**	-0.017**
	(-8.2)	(-4.7)	(-8.2)	(-6.9)	(-7.2)	(-7.6)
Cantons						
canton type						
canton type = 2	0.000	-0.025	-0.029	-0.022	-0.005	-0.025
	(0.0)	(-1.0)	(-1.6)	(-1.1)	(-0.2)	(-1.0)
canton type = 3	-0.034	-0.088**	-0.063**	-0.053*	-0.017	-0.060*
	(-1.2)	(-2.9)	(-3.0)	(-2.3)	(-0.7)	(-2.2)
canton type =4	-0.047	-0.094**	-0.084**	-0.098**	-0.067**	-0.085**
	(-1.8)	(-3.3)	(-4.2)	(-4.4)	(-2.9)	(-3.3)
canton type = 5	-0.088**	-0.107**	-0.119**	-0.160**	-0.097**	-0.133**
	(-3.1)	(-3.5)	(-5.6)	(-6.5)	(-3.9)	(-4.9)
Intercept	6.410**	6.334**	6.425**	6.438**	6.406**	6.465**
	(101.5)	(94.4)	(140.0)	(122.5)	(120.9)	(113.7)
R-squared	0.56	0.53	0.56	0.52	0.55	0.51
Number of observations	2594	2516	4169	3520	3019	2906

Notes: t-values in parenthesis. ** p<.01, * p<.05

Table 2: Regression model of rent

The regression model is applied to predict hypothetical rents for house owners and tenants in subsidized housing. Missing values in explanatory variables (of owners) have been imputed with values from previous years or, if this was not possible, with the mean of owner-occupiers or subsidized or non-paying tenants. The predicted rents are presented in Table 3. Not surprisingly, virtual rents of owner-occupiers are higher than rents of tenants. Estimated rent for respondents in subsidized housing is lower than rent of non-subsidized tenants. Predicted rents can also be interpreted as gross imputed rent.

type	mean	p50	sd	n
2021				
tenant	1632	1574	487	4327
owner-occupier	1803	1758	454	4928
non-paying or subsidised tenant	1364	1298	397	313
2023				
tenant	1704	1642	493	3000
owner-occupier	1847	1791	487	3620
non-paying or subsidised tenant	1430	1346	434	176

Table 3 : Summary statistics of predicted rents for tenants, owners and non-paying tenants (2021,2'23)

Costs

In the third step, we deduct costs from predicted rents in order to obtain net imputed rent. In the SHP, owners are asked about the costs connected with their accommodation, including interest, redemption and service charges (Variable h$$h33 in the SHP). These costs include charges for water, electricity, gas, heating, fire insurance, taxes related to housing and regular expenses of maintenance and repair. To obtain net imputed rent according to the opportunity cost approach, we simply deduct these costs from the predicted rent described above. However, for about half of owner-occupiers, costs turn out to be higher than estimated rent. Apart from the fact that predicted rents are rough estimations, there are also possible substantial explanations for the relatively high costs. Costs may include amortisation of the mortgages, or owners may include more charges in their costs as tenants when reporting their rent, for instance because they include more service charges. For households, where costs exceed predicted rents, imputed rent is set to 0 in order to prevent negative values of imputed rent.

Descriptive statistics

Table 4 presents descriptive statistics of imputed rent of owner-occupiers and tenants in subsidized dwellings. The variable reflects the income advantage of owners difference between gross imputed rent and cost, setting negative values to 0. The number of observations refers to households and not to individuals.

	% owners	% non-paying tenants	N	Average	sd	Median	75 % percentile	Max
1999	41.3%	0.6%	2079	2789	4458	0	4454	33164
2000	42.2%	0.6%	1912	2637	4253	0	4322	29592
2001	42.4%	0.6%	1828	2514	4067	0	4277	25148
2002	44.7%	0.8%	1658	2422	4042	0	3547	29303
2003	46.0%	0.9%	1516	2669	4130	0	4285	37811
2004	43.4%	0.7%	2436	2874	4291	0	4744	24137
2005	45.7%	0.6%	2022	3001	4438	186	5026	28530
2006	47.7%	0.7%	2071	3247	4578	546	5547	29574
2007	49.1%	0.8%	2183	3416	4662	931	5804	30105
2008	48.8%	0.9%	2187	3093	4483	137	5170	32448
2009	50.1%	1.0%	2314	3149	4492	410	5352	35472
2010	50.6%	1.1%	2376	3410	4739	702	5927	34282
2011	50.9%	1.2%	2365	3452	4683	960	6080	31197
2012	51.2%	1.3%	2375	3693	4855	1098	6604	30986
2013	49.9%	1.3%	4275	4422	5246	2583	7620	36380
2014	51.2%	1.0%	3863	4949	5584	3354	8193	34279
2015	52.3%	1.1%	3631	4987	5514	3429	8310	35463
2016	52.4%	1.1%	3372	4998	5621	3355	8330	37858
2017	51.4%	1.0%	3140	5375	5731	3950	9000	50209
2018	50.9%	1.2%	3100	5640	5635	4401	9444	32466
2019	50.6%	1.1%	2954	5245	5488	4037	8823	35152
2020	50.0%	1.0%	5025	6108	5716	5222	9907	30800
2021	51.6%	1.0%	4346	6480	6013	5688	10488	43490
2022	52.8%	1.0%	3923	7002	6381	6130	11035	39888
2023	52.3%	0.5%	3648	5992	5998	4769	9768	36370

Table 4 : Descriptive statistics of imputed rent in the SHP based on the opportunity cost approach

Table 5 and 6 show the estimation of gross imputed rental values (estimated market rent before deduction of costs) and of reported costs by owners. For non-paying or subsidized tenants, the income advantage

	N	Average	sd	Median	75 % percentile	Max	Reference interest rate tenants
1999	2079	1540	490	1499	1838	3945	
2000	1895	1547	472	1520	1834	3451	
2001	1812	1543	474	1515	1844	3112	
2002	1633	1521	454	1500	1810	3218	
2003	1497	1519	468	1506	1832	3087	
2004	2411	1565	449	1528	1833	3161	
2005	2007	1539	426	1519	1795	3207	
2006	2047	1602	444	1561	1870	3438	
2007	2159	1630	445	1599	1896	3655	
2008	2152	1663	478	1625	1950	3804	3.5
2009	2279	1628	450	1598	1902	3477	3-3.5
2010	2340	1635	482	1584	1902	4034	3
2011	2324	1658	463	1618	1922	3811	2.75
2012	2324	1644	451	1598	1913	3459	2.25-2.5
2013	4203	1736	501	1677	2017	4310	2-2.25
2014	3807	1787	514	1734	2093	4122	2
2015	3564	1752	508	1688	2038	4467	1.75-2
2016	3319	1703	519	1634	1976	4189	1.75
2017	3090	1723	511	1651	2016	4242	1.5-1.75
2018	3036	1760	484	1696	2050	4222	1.5
2019	2902	1701	489	1639	1982	4263	1.5
2020	4940	1802	453	1757	2081	3702	1.25-1.5
2021	4281	1815	473	1746	2094	4230	1.25
2022	3870	1868	502	1804	2144	4336	1.25
2023	3620	1847	487	1791	2137	4241	1.25-1.5

Table 5 : Descriptive statistics of estimated monthly market rents (before cost deduction) in the SHP based on the opportunity cost approach

For the costs, the last column shows the average interest for mortgages in the calendar year according to the Federal Office.[7]

[7] The average interest rates are analyzed 4 times a year (at 31 March, 30 June, 30 September, 31 December) and published about 2 months later.
https://www.bwo.admin.ch/bwo/de/home/mietrecht/referenzzinssatz/entwicklung-referenzzinssatz-und-durchschnittszinssatz.html

	N	Average	75 % percentile	75 % percentile		Max	Interest rate
1999	2098	1662	1500	2000	1266	2098	
2000	1913	1688	1600	2000	1186	1913	
2001	1828	1738	1600	2000	1327	1828	
2002	1648	1710	1600	2000	1108	1648	
2003	1511	1631	1500	2000	969	1511	
2004	2434	1640	1500	2000	1064	2434	
2005	2025	1634	1500	2000	1866	2025	
2006	2065	1636	1500	2000	997	2065	
2007	2179	1740	1500	2000	3585	2179	3.40 %
2008	2173	1741	1600	2100	1151	2173	2.92 %
2009	2302	1697	1600	2000	1066	2302	2.67 %
2010	2363	1653	1500	2000	990	2363	2.53 %
2011	2346	1668	1500	2000	1054	2346	2.46 %
2012	2349	1598	1500	2000	933	2349	2.27 %
2013	4255	1612	1500	2000	1263	4255	2.08 %
2014	3843	1594	1500	2000	1212	3843	1.94 %
2015	3598	1587	1500	2000	1292	3598	1.81 %
2016	3350	1513	1400	2000	1181	3350	1.69%
2017	3122	1471	1300	2000	1036	3122	1.57%
2018	3064	1495	1333	2000	1096	3064	1.48 %
2019	2926	1484	1300	1900	1148	2926	1.40 %
2020	5010	1632	1300	1800	5832	5010	1.32 %
2021	4335	1437	1250	1800	1182	4335	1.22 %
2022	3870	1471	1250	1800	1300	3870	1.22%
2023	3620	1790	1400	2000	12519	3620	1.61%

Table 6 : Descriptive statistics of costs for owners in the SHP based on the opportunity cost approach

4. Capital market approach

In 2009, 2012 and 2016 household reference persons from the SHP II sample (drawn in 2004) have been asked to estimate the value of their house without including outstanding mortgages. In 2020 and 2023 house owners were asked separate questions about their estimated market value and mortgages. 1It is thus possible to estimate imputed rent also according to the capital market approach for those households. Homeowners may underestimate the value of their home, if the value has increased since they have purchased the home. House owners may underestimate the result if they do not account for the depreciation due to the age of the house. Further complications are the rather high share of missing information (23 percent) regarding the house value, because households did not know the value of their house or did not want to answer.

Despite these problems, we calculate imputed rent according to the capital market approach for those households where this is possible (557 households). This serves to compare the results of the opportunity cost approach with those of the capital market approach.

Simulation

For the capital market approach, a small percentage of the investment in the occupied real-estate is calculated. In 2009, reference persons of the SHP II sample (594 households) have been asked to estimate the value of their house after deducting outstanding mortgages (V– M). The value of houses has been measured in 11 categories. To estimate imputed rent according to the capital market approach, we considered the medium point within a category as the starting point (e.g. a value of 70’000 CHF for the category from 50’000 to 90’000 CHF).

To estimate imputed rent, we assume a return for investment of 3 percent. This is a realistic estimation, because it compares well with returns for 10 year Swiss Confederation bonds whose interest rates amounted to 2.2 percent in 2009 and 2.9 percent in 2008 (data from Swiss National Bank). Like real estate investments, these bonds represent a secure investment with long-term equal return.

Comparing the opportunity cost and capital market approach

Table 5 presents descriptive statistics of imputed rent for the capital market approach in comparison to the opportunity cost approach. In line with data collection on house values, we only consider the sample of home-owners in the SHP II sample in 2009.

	N	% with 0 IR	Average (CHF)	std	Median	75 % percentile	Max
Capital	557	2.2	10’564	10642	8100	13500	60’000

market							
Opportunity cost	737	49.8	3576	5276	97	6052	30’836

Table 5: Descriptive statistics of imputed rent in the SHP based on the capital market approach

The estimates for the capital market approach are much higher than estimates of the opportunity cost approach. This is in line with CNEF data, where countries relying on the capital market approach have higher values than the SOEP, which relies on the opportunity cost approach. Saunders et al. (1992) and Frick and Grabka (2003) argue that the capital market approach bears the risk of overestimating imputed rent. Another reason for the large difference is more conceptual: while the opportunity cost approach takes account of house-related costs, the capital approach does not consider such costs.

The higher values of IR if estimated by the market value approach is reflected in the share of total net household income that is attributed to imputed rent. For the opportunity cost approach, 4 percent of the household income can be attributed to imputed rent (in 2009). For the capital market approach, imputed rent amounts to 10 percent of the household income. The estimates of the capital market approach and the opportunity cost approach are positively correlated with correlation coefficients of 0.27.

5. Conclusion

In this paper, we presented the approach in the Swiss Household Panel to simulate imputed rent. As for the German Socio Economic Panel, the opportunity cost approach was chosen over the capital market approach. As a consequence of the rather high costs reported by households, about half of owner-occupiers have an estimated imputed rent of 0. The regression model used to estimate rents fits the data well and provides stable and plausible results both cross-sectionally and over time.

A comparison with the capital market approach and the opportunity cost approach for a sample of households in 2009 showed considerable differences. Imputed rents estimated with the capital market approach exceed the values of imputed rent estimated with the opportunity cost approach.

6. Literature

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