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CALCULATION OF A RENT INDEX: THE EXAMPLE OF SWITZERLAND

Transmitted by the Swiss Federal Statistical Office 1/

1. This paper deals with the Swiss rent index, the methodology for calculating it, and its movement in recent years.

I. Methodology

2. Switzerland's consumer price index (CPI), the present version of which was introduced in 1993, after a major overhaul, measures the movement of the prices of a basket of standard goods and services. As a common consumer service, rent accounts for approximately 22% of the basket. This weight being considerable, changes in rents have a significant effect on the CPI and are therefore particularly carefully monitored.

I.1 Surveys

3. The rent index shows rent variation for the country as a whole and has not been designed to provide information for more limited areas. The Federal Statistical Office, the body responsible for producing the index, performs its task by means of a quarterly survey, for which the base days are 1 March, 1 May, 1 August and 1 November respectively. The survey covers some 5,000 dwellings spread throughout the country. The sample comprises apartments and private houses that are rented out on a long-term basis for

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residential occupancy; it does not include apartments with more than five rooms, holiday flats rented out by the week or month or apartments used for non-residential purposes.

4. For dwellings meeting the criteria for inclusion in the sample, a number of variables is recorded, chief among them being the net rent (rent exclusive of service and heating charges). The other factors that influence the cost of housing, such as the prices of electricity and heating oil, etc., are reflected in the CPI under other headings and are therefore excluded from the rent index. Information collected in addition to the net rent includes the year of construction and type of the building, the number of rooms and surface area in square metres of the dwelling and, where appropriate, the date of the latest renovation. These supplementary details are collected on the one hand for the purposes of the calculations and on the other hand to be able to gauge the plausibility of the responses and analyse the results. The rent survey is conducted by means of a written questionnaire sent to landlords every quarter.

I.2 Structure and choice of the sample

5. To ensure the greatest possible representativeness, the dwellings are chosen at random in the national telephone directory. In addition, in order to take account of the changes in the rental stock (new construction, renovation, demolition, etc.), an eighth of the sample is replaced each quarter. The sample thus changes entirely over the space of two years. The procedure underlying this random selection is Bernoullian, thus guaranteeing an accurate reflection of the real situation: the various categories of dwelling are all covered and proper allowance is made for new construction.

6. The rents for the dwellings surveyed are displayed in an age/size matrix in 20 groups of maximum possible homogeneity. Placing similar dwellings together enables time comparisons to be made and an index to be computed. The weights for the 20 groups were determined from the structure of the country's housing stock as revealed by the 1990 federal housing survey. In view of the likelihood of change in the structure of the housing stock in the ten-year intervals between federal housing surveys, it has been decided that from time to time structural surveys should be made in parallel with the rent survey so as to have available information for updating of the weights when necessary. The first such structural survey was made in November 1996 and the results are expected in the course of 1997.

I.3 Method of calculation

7. The first step is to calculate a mean rent for each of the size/age categories. Each of these 20 rents is compared with its equivalent for the base period to give a set of indices. The individual indices are then aggregated through application of the matrix weights to give the national rent index.

8. After the extreme rents have been removed, the calculations are repeated on the sample by two different methods and the results are compared to test their stability.

I.4 Treatment of quality changes

9. As a general rule, the problems encountered in calculating an index include qualitative change in the observed variable. In the case of the housing stock, quality changes constantly: on the one hand, it declines because of ageing; on the other, it improves because of renovation, conversion and new construction. This makes measuring the movement of "pure" prices very difficult, since changes computed directly from rents always include a "quality" component (which may be positive or negative).

10. In order to reduce the problems caused by the quality changes associated with age and renovation, the Federal Office considers that the rents to be recorded and compared do not have to be those of identical dwellings, but those of dwellings of comparable age, since age (at least partly) symbolizes quality. Thus, a dwelling that is ten years old in 1997 is assumed to be comparable to a dwelling that was ten years old in 1993. The dwellings included in the sample are divided into age groups (0-5 years, 6-10 years, 11-20 years and over 20 years; see table 1), so that the mean rents for each class are comparable in time. This approach also entails the constant inclusion of newly built dwellings (in the 0-5 years class). Dwellings are placed in the relevant groups in keeping with the constantly changing structure of the housing stock. When a dwelling becomes too old for one group, it is assigned to a higher age class; in visual terms, it moves further down its column in the matrix. For example, in 1997, a dwelling built in 1991 has to be transferred from the category of dwellings aged 0-5 years to that of the dwellings aged 6-10 years. In a period when prices generally are rising (as has been the case in the past few years), the effect of such reassignment is to draw mean rents upwards, as the more recent and generally more expensive dwellings move to a new category that simultaneously loses its cheapest dwellings upon their reclassification. This we term the ageing effect.

11. Dwellings may also be assigned to a new category because of renovation. If the renovation is substantial enough, a dwelling may be considered to have been "economically rejuvenated" and will therefore have to be placed in a new age class. Which class that is will depend on the position of the work on a scale that can be summarized as follows: light renovation, in the sense of repairs or maintenance, will not entail any change of category; renovation that significantly enhances the quality of the dwelling will entail upwards movement of a magnitude that will be decided on a case-by-case basis; heavy renovation including structural alterations to the dwelling or building will be considered the sign of a complete make-over with, as a corollary, the movement of the dwelling to the new-dwellings category. For assessing the extent of renovations there exists a list of standard types of work, with points assigned to each. How the dwelling moves within the matrix will depend on the points total for the renovation. Reclassification because of renovation generally exerts downward pressure on rents: the renovated dwellings are assigned to "younger" age groups and are usually less expensive than the dwellings already in them. We call this impact on mean rents the renovation effect.

12. In practice, few dwellings undergo renovation justifying a change of category during their time in the sample and reassignment in the course of that two-year period is, therefore, rare. Reclassification on initial inclusion in the sample is, however, common: if a dwelling has been

renovated, its age class will depend not on its actual date of construction but on its notional age as determined by the Federal Statistical Office.

13. The conclusion after the first four years of use of this procedure is that the ageing effect and the renovation effect partly cancel each other out.

14. However, further study is needed of the ways in which our criteria affect the measurement of rent trends. Judging how extensive renovation has been is, at least in part, a subjective exercise, and the definitions of the age classes and the time dwellings spend in the sample may also have a hidden impact on our results. Unfortunately, there are no benchmarks against which we could calibrate our method or quantify the influences.

II. Results

15. As graph 1 below shows (see also table 3), the trend of rents in Switzerland during the past fifteen years can be divided into three distinct periods. During the first phase (from 1983 to 1989), rents rose by an average of approximately 3% a year. During the second phase (late 1989 to early 1993), the annual rise was stronger (approximately 9%), due mainly to substantial increases in mortgage rates. The third period (May 1993 to May 1997) was one of relative stability, since the index only rose by an average of 0.8% a year. It should be noted that from 1982 to 1993 rent changes were measured by the old index, which was calculated in a very different way from the present one. Since the overhaul in 1993, the results have been determined by the new method. In graph 1, the curve for the old index is remarkable for its stepped form, attributable to the half-monthly sampling interval.

16. The flattening-out of the rent curve is linked primarily to the reductions in mortgage rates that began in the autumn of 1992 and were subsequently reflected in rents. Rent rises were also restrained by the slowing-down of the economy and the slight drop in housing construction costs in 1992/93.

17. To identify the true rent trend more precisely, the Federal Statistical Office also calculates a confidence interval. The confidence limit is 95%, meaning that the true value of the index falls within the calculated range 95 times out of 100. The larger the confidence interval, the greater the variability of the sample and the less precise the results; conversely, the smaller the confidence interval, the closer the value estimated from the sample to the true value.

18. The results show that the confidence interval is a range of $\pm 1.5\%$ around the variation of the index. It exhibits remarkable stability from quarter to quarter, as can be seen from graph 2 or table 4.

19. The sampling method can therefore be held to be reliable both as regards the matrix and as regards the periodic refreshing of the sample.

III. Conclusions

20. It is essential for measurement of an economic phenomenon to be unbiased both as regards the observed variable and as regards the method employed. That is why, in the case of the rent index, the Federal Statistical Office opted to use a random sample. The reclassification of dwellings on the grounds of age or renovation enables account to be taken of the constant changes in the quality of the housing stock.

21. The Swiss method does, however, have a number of features which could indirectly influence the measurement of rent movements and further study is needed to evaluate their impact.

Annex

Table 1: Age/size matrix of dwellings
(Percentages)

	1 room	2 rooms	3 rooms	4 rooms	5 rooms	Total
0-5 years	0.2949	0.9557	1.6867	2.5131	1.642	7.0924
6-10 years	0.3169	0.8852	1.6364	2.6298	1.7419	7.2102
11-20 years	1.7209	2.3767	4.4858	5.5899	3.145	17.3183
Over 20 years	5.121	11.039	23.7734	19.4087	9.037	68.3791
Total	7.4537	15.2566	31.5823	30.1415	15.5659	100%

Table 2: Age/size matrix for a sample of 5,000 ideally distributed dwellings
(Numbers of dwellings)

	1 room	2 rooms	3 rooms	4 rooms	5 rooms	Total
0-5 years	15	48	84	126	82	355
6-10 years	16	44	82	131	87	360
11-20 years	86	119	224	280	157	866
Over 20 years	256	552	1 189	970	452	3 419
Total	373	763	1 579	1 507	778	5 000

Table 3: Rent index (Base 1993 = 100)

Survey date	Rent index*	Survey date	Rent index*	Survey date	Rent index*
Dec 1982	60.6	Nov 1987	70.4	Nov 1992	97.5
Feb 1983	60.6	Feb 1988	70.4	Feb 1993	97.5
May 1983	61.5	May 1988	71.5	May 1993	100.0
Aug 1983	61.5	Aug 1988	71.5	Aug 1993	100.4
Nov 1983	62.2	Nov 1988	72.4	Nov 1993	99.7
Feb 1984	62.2	Feb 1989	72.4	Feb 1994	100.6
May 1984	63.0	May 1989	73.7	May 1994	99.3
Aug 1984	63.0	Aug 1989	73.7	Aug 1994	99.6
Nov 1984	63.9	Nov 1989	77.5	Nov 1994	99.8
Feb 1985	63.9	Feb 1990	77.5	Feb 1995	100.0
May 1985	65.1	May 1990	80.6	May 1995	100.9
Aug 1985	65.1	Aug 1990	80.6	Aug 1995	101.5
Nov 1985	66.3	Nov 1990	84.9	Nov 1995	101.8
Feb 1986	66.3	Feb 1991	84.9	Feb 1996	101.9
May 1986	67.5	May 1991	89.2	May 1996	102.1
Aug 1986	67.5	Aug 1991	89.2	Aug 1996	102.5
Nov 1986	68.5	Nov 1991	92.1	Nov 1996	102.7
Feb 1987	68.5	Feb 1992	92.1	Feb 1997	103.0
May 1987	69.5	May 1992	94.9	May 1997	102.6
Aug 1987	69.5	August 1992	94.9		

* Until May 1993 surveys were biannual.

Table 4: Rent index and 95% confidence interval

Survey date	Rent index (base 1993 = 100)	Confidence interval
May 1993	100.0	
Aug 1993	100.4	
Nov 1993	99.7	
Feb 1994	100.6	
May 1994	99.3	± 1.45%
Aug 1994	99.6	± 1.47%
Nov 1994	99.8	± 1.45%
Feb 1995	100.0	± 1.51%
Mar 1995	100.9	± 1.53%
Aug 1995	101.5	± 1.50%
Nov 1995	101.8	± 1.51%
Feb 1996	101.9	± 1.51%
May 1996	102.1	± 1.52%
Aug 1996	102.5	± 1.51%
Nov 1996	102.7	± 1.51%
Feb 1997	103.0	± 1.49%
May 1997	102.6	± 1.46%
