United Nations ECE/CES/GE.22/2010/3

Economic and Social Council

Distr.: General
1 March 2010
English
Original: Russian

Economic Commission for Europe

Conference of European Statisticians

Group of Experts on Consumer Price Indices

Tenth meeting
Geneva, 10–12 May 2010
Item 5 of the provisional agenda
House price indices

Methodology for the statistical monitoring of price levels and movements on the Russian Federation housing market

Report submitted by the Federal State Statistics Service of the Russian Federation

Summary

This paper provides details of the methodology used to monitor price levels and movements on the Russian Federation housing market. It describes the steps used to calculate average house prices and compile house price indices at the regional and federal levels. Examples of price index calculations for different reference periods are also given.

GE.10-21009 (E) 230410 260410

I. Introduction

1. A housing market emerged in the Russian Federation in the early 1990s with the collapse of the system of compulsory State ownership of residential property that had existed previously. Reform of the housing sector led to legalization of activities in this sphere, paving the way for participation by institutions and individuals. The shift of the housing sector onto a market foundation made it necessary to devise appropriate statistical monitoring methods.

2. Statistical monitoring of average price levels and movements on the housing market is one component of the all-Russia price index system, which — most importantly — requires adherence to the common methodological principles underpinning the whole system of Russian Federation price indexing.

II. Steps used to calculate average house prices and compile house price indices

3. For the purpose of studying house price trends, we monitor average prices and price indices for housing on the market. The results of the monitoring take the form of average price datasets per square metre of living space on the primary and secondary housing markets, and their rates of change.

4. Average prices on the primary and secondary housing markets for the Russian Federation as a whole are calculated from the house price levels prevailing in the constituent entities of the Federation. Average house prices and house price indices are computed using a weighting system which remains constant over the year, making it possible to track movements in the price per square metre of living space and in price indices that are unaffected by fluctuations in the volume of sales of different types of dwelling.

5. The following steps are used to calculate average house prices and compile house price indices:

(a) Representative properties are selected for the purposes of calculating average prices and compiling price indices;

(b) Towns are selected for price monitoring; institutions engaged in residential property sales and brokering services are also selected;

(c) The procedure for price data registration and sampling is determined;

(d) Reference weights are established for the purposes of calculating average house prices and compiling house price indices at various aggregation levels;

(e) Average prices per square metre of living space are calculated;

(f) House price indices are compiled.

6. House prices are disaggregated by type, with prices tracked separately for new properties and for privately-owned housing already in use.

7. “Representative properties” whose prices on the housing market are recorded are understood to mean specific types of dwelling (whether “poor quality”, “average quality (standard)”, “improved design”, or “luxury”) intended for sale on the primary or secondary housing markets. Each type has a set number of rooms and is of a specific building

construction ("pre-fabricated large-panel/large-block", "brick" or "solid-cast/solid-cast and brick").

(a) For the purpose of monitoring prices on the primary and secondary housing markets, we sample a range of dwellings with different numbers of rooms in buildings of various construction types;

(b) Only the urban housing market is monitored;

(c) The market for cottages and timber dwellings is not monitored;

(d) Rural housing is also excluded.

8. For the purposes of calculating average prices and compiling price indices, administrative centres and individual towns in all the constituent entities of the Russian Federation track prices on the housing market by means of sampling. The selection of institutions at which to monitor price levels and movements on the urban housing market is made from the total set of institutions engaged in residential property sales. The price per square metre of living space is recorded on a special form. All indicators are calculated from sale results as at the twenty-fifth day of the last month in each accounting quarter, or the nearest date in the event that no sales have occurred by the twenty-fifth day.

9. Data required on the form includes the price per square metre of living space, specific housing characteristics — "quality", "number of rooms", "materials used in walls" — and the share of dwellings of that particular type in the total living space sold by the institution. Prices of dwellings are registered under various categories ("quality", "number of rooms", "materials used in walls", "level of refurbishment", etc.), separately for the primary and secondary housing markets.

10. The greatest difficulties arise when there is a temporary lack of sales of dwellings of a particular type, and a consequent shortfall of recorded price data. In each constituent entity, the number of towns and reporting institutions is supposed to remain constant throughout the accounting year.

11. In the event that one or more institutions fail to submit data on primary or secondary housing market price levels for one or more accounting quarters, the most common means of compensating for the shortfall in price indicators is to use imputed (estimated) values until actual price data is received.

12. Several basic methods exist for calculating imputed prices to ensure index series continuity:

(a) Using the relative change in prices for analogous dwellings registered at another institution;

(b) Using the average change in prices for other dwellings on a market where there is a temporary shortfall in sales data on one type of dwelling;

(c) Using the average change in prices for all dwelling types in the constituent entity in question.

12. When inflation is high it is not advisable, in the event of a shortfall of actual price data from reference institutions, to make protracted use of data estimated from preceding periods without making adjustments.

13. The replacement, during the accounting year, of representative properties with specific characteristics that have been sampled for monitoring by alternative properties is not, as a rule, permitted. Only in exceptional cases, when sales by a reference institution of a particular type of sampled dwelling on a particular market are discontinued, may properties be substituted.

14. In order to ensure comparability of price index series, the price per square metre of housing newly added to the monitored stock should be obtained as long beforehand as possible. If in the early part of the year a reference institution closes down or sales of a property type halt completely, efforts are made to identify — within the same territory — an alternative, as yet unmonitored institution engaged in selling housing. If an appropriate institution is identified, it is substituted for the other institution, as are the analogous dwelling types. If an equivalent substitution is not possible, then the dwelling type or institution in question is excluded from monitoring, and the cumulative index series are consequently adjusted for the preceding periods.

15. To ensure enhanced accuracy when substituting for an excluded reference, the prices at analogous institutions of dwelling types displaying similar characteristics are also monitored. If the closure of an institution or halt in sales of a particular dwelling type occurs mid-year, then imputed (estimated) prices are established for the missing reference until the end of the accounting year, and a substitute institution not used until the following year.

III. Calculation of average prices and compilation of price indices at the regional and federal levels

16. Calculation of average prices and compilation of price indices occurs at both the regional and federal levels. For calculations at the level of a constituent entity of the Russian Federation, two types of base weights are employed:

- In order to calculate, separately for the primary and secondary urban housing markets, average prices per square metre of living space of housing sold in a constituent entity in a given accounting year, the mid-year shares of total sales during the preceding year occurring in each town are used as weights
- In order to calculate average prices and compile price indices for the accounting year for the primary and secondary housing markets in each constituent entity, the sizes at the beginning of the accounting year of the urban population in the towns sampled in each entity are used as weights

17. At the federal level, the following base weights are used to calculate average prices and compile price indices:

- For the primary housing market: data on the number of new properties entering the market in the preceding year
- For the secondary housing market: the size at the beginning of the accounting year of the urban population in the constituent entity

18. The reporting institution is itself responsible for calculating the average price per square metre of a dwelling with a given number of rooms, based on actual prices struck (per square metre of living space) in transactions finalized by the end of each quarter, and on the overall amount of living space it manages to sell. Such calculations are made separately for the primary and secondary housing markets. A particular dwelling type's share of total living space of housing sold is calculated as the quotient of the floor area of that dwelling type sold divided by the total floor area of all dwelling types sold.

19. The following two steps are followed when calculating average prices for a given constituent entity of the Russian Federation:

A. Step one

20. Step one involves calculating the average price per square metre of living space for each dwelling type — “average quality (standard)”, “improved design”, “luxury” or “poor quality” — and of dwellings with different numbers of rooms. This calculation is made for different types of building (“large-panel/large-block”, “brick”, “solid-cast/solid-cast and brick”), separately for the primary and secondary housing markets in each town sampled.

21. First, an average price is established per square metre of living space in dwellings with different numbers of rooms (“one room”, “two rooms”, “three rooms”, “four rooms or more”) in each dwelling type (“average quality (standard)”, “improved design”, “luxury” and “poor quality”). For each dwelling type, the price is defined as the simple unweighted arithmetic average of the prices reported by all institutions participating in the monitoring in a particular town.

22. Second, an average price is established per square metre for each dwelling type (“average quality (standard)”, “improved design”, “luxury” and “poor quality”) and all types of dwellings, and for dwellings with a specific number of rooms (“one room”, “two rooms”, “three rooms”, “four rooms or more”) in buildings of a specific type on the primary and secondary markets of each town monitored. This is defined as the weighted average of prices per square metre of dwellings with different numbers of rooms in buildings of each type and the share that they represent of all sales of the dwelling type concerned. The yearly average shares of living space sold the preceding year represented by each dwelling type are used as weights.

$$\overline{p}^{i} = \frac{\sum_{n=1}^{n} P_k^i S_k^i}{\sum_{n=1}^{n} S_k^i}$$

where:

$\overline{p}^{i}$	=	average price per square metre of living space in a given town established for housing of type i;
i	=	housing type identifier;
n	=	number of dwellings with different numbers of rooms in housing of type i;
k	=	category of dwelling with different numbers of rooms in housing of type i;
P_k^i	=	average price per square metre of category k dwellings with different numbers of rooms in housing of type i;
S_k^i	=	yearly average share of dwellings sold, as a proportion of total sales of space in category k dwellings with different numbers of rooms in housing of type i.

B. Step two

23. Step two involves establishing an average price in each constituent entity per square metre of living space in dwellings of all types (“average quality (standard)”, “improved design”, “luxury” and “poor quality”) and dwellings with different numbers of rooms (“one room”, “two rooms”, “three rooms”, “four rooms or more”) in buildings of specific type.

24. For a given constituent entity, average prices on the primary and secondary housing markets per square metre of living space in dwellings disaggregated by type ("average quality (standard)", "improved design", "luxury" and "poor quality"), and with different numbers of rooms ("one room", "two rooms", "three rooms", "four rooms or more") in buildings of a specific type are calculated from the prices per square metre of all housing in the towns sampled and from the size of the urban population in each town.

25. The formula for calculating average prices per square metre of living space in dwellings on the primary housing market for each dwelling type is as follows:

$$\overline{p}^{i} = \frac{\sum_{z=1}^{n} P_z^{i} S_z}{\sum_{z=1}^{n} S_z}$$

where:

$\overline{p}^{i}$	=	average price in a given constituent entity per square metre of living space in dwellings of type i;
i	=	dwelling type identifier;
z	=	identifier of town in constituent entity;
n	=	number of towns sampled in constituent entity;
P_z^{i}	=	average price per square metre of living space in dwellings of type i in town z of constituent entity;
S_z	=	resident urban population size of town z at beginning of accounting year.

26. Using an analogous method, using data on individual towns, average prices are established per square metre of living space on the secondary housing market.

27. For the Russian Federation as a whole and for individual federal districts, the average price on the primary housing market per square metre of living space of each dwelling type ("average quality (standard)", "improved design", "luxury"), and dwellings with different numbers of rooms ("one room", "two rooms", "three rooms", "four rooms or more") in buildings of a specific type ("large-panel/large-block", "brick, solid-cast/solid-cast and brick") is calculated from prices per square metre of living space prevailing in the constituent entities of the Russian Federation, and the quantity of new housing entering the market over the preceding year.

28. For the Russian Federation as a whole, the average price on the secondary housing market per square metre of living space of each dwelling type ("average quality (standard)", "improved design", "luxury", "poor quality"), and dwellings with different numbers of rooms ("one room", "two rooms", "three rooms", "four rooms or more") in buildings of a specific type, is calculated from prices per square metre of living space prevailing in the various constituent entities and from the size of the urban population (at the beginning of the accounting year).

29. Today, house price indices are calculated by the "chain" method. This involves compiling a price index for an accounting quarter by dividing the average price per square metre of living space at the end of the accounting quarter by the average price at the end of the preceding quarter. A chained index for a prolonged period is obtained by remultiplying quarterly price indices.

30. Individual price indices are calculated as the quotient from dividing average prices of sampled dwellings in the accounting and reference periods, as follows:

$$I^{i}_{t/t-1} = \frac{P^{i}_{t}}{P^{i}_{t-1}} \times 100$$

where:

$I^{i}_{t/t-1}$ = price index for dwellings of type i in the accounting quarter by reference to the preceding quarter;

P^{i}_{t} = price of dwellings of type i in the accounting quarter;

P^{i}_{t-1} = price of dwellings of type i in the preceding quarter;

t = accounting quarter;

t – 1 = preceding quarter.

31. Price indices relating prices for individual dwelling types from one accounting quarter to the preceding quarter are established by dividing the prices for the accounting quarter by those for the preceding quarter.

32. Broader house price indices are also compiled at various levels of aggregation:

- Constituent entities
- Federal districts
- The Russian Federation as a whole

33. Such indices are computed from average prices for the accounting quarter and preceding quarter. They are produced for the constituent entities, federal districts and the Russian Federation as a whole, covering each dwelling type (“average quality (standard)”, “improved design”, “luxury” or “poor quality”), and dwellings with a different numbers of rooms (“one room”, “two rooms”, “three rooms”, “four rooms or more”) in each specific type of building, and are based on prices for each dwelling type in the accounting and preceding quarter, and on reference weights. The following are used as reference weights: “resident urban population size” in calculations involving the constituent entities; and “total square metres of living space brought onto the market” and “resident urban population size” in calculations covering federal districts and the Russian Federation as a whole.

34. For the constituent entities and the Russian Federation as a whole, the Laspeyres formula is used to compile price indices that take the preceding quarter as reference period. The house price index for the primary housing market in a given federal district is expressed as follows:

$$I^{i}_{t/t-1} = \frac{\sum_{j=1}^{m} P^{i}_{j,t} q_{j}}{\sum_{j=1}^{m} P^{i}_{j,t-1} q_{j}} \times 100$$

where:

$I^{i}_{t/t-1}$ = price index for dwellings of type i in the federal district, relating the accounting quarter to the preceding quarter;

i	=	identifier for dwelling type with a specific number of rooms;
j	=	identifier for constituent entity of the Russian Federation forming part of federal district;
m	=	number of constituent entities within federal district;
$P^i_{j,t}$	=	average price in accounting quarter for dwellings of type i in constituent entity j;
$P^i_{j,t-1}$	=	average price in preceding quarter for dwellings of type i in constituent entity j;
q_j	=	total square metres of living space brought onto the market in constituent entity j.

35. Primary housing market price indices for the Russian Federation as a whole are compiled similarly, using federal district data. Price indices for the secondary housing market are also computed by this method, but with the urban population sizes of the constituent entities being used as weights.

36. Price indices for the constituent entities of the Russian Federation are calculated using similar formulae and average prices for the towns monitored, with the population sizes of those towns serving as weights in the calculations relating to the primary and secondary housing markets.

37. The basket of weights used to calculate average house prices and compile house price indices is updated annually.

38. A price index relating the accounting quarter to the fourth quarter of the preceding year is calculated by devising a price index relating the previous quarter to the fourth quarter of the preceding year, and an index relating the accounting quarter to the preceding quarter, i.e.:

$$I^i_{KT/IVK(T-1)} = I^i_{(K-1)T/IVK(T-1)} \times I^i_{KT/(K-1)T} \ / 100$$

where:

K	=	accounting quarter;
K–1	=	preceding quarter;
T	=	accounting year;
T–1	=	preceding year;
$I^i_{(K-1)T/IVK(T-1)}$	=	index relating prices for dwellings of type i in a federal district in the accounting quarter to the fourth quarter of preceding year;
$I^i_{(K-1)T/IVK(T-1)}$	=	index relating prices for dwellings of type i in a federal district in the previous quarter to the fourth quarter of the preceding year;
$I^i_{KT/(K-1)T}$	=	index relating prices ... district in the accounting quarter to the previous quarter.

IV. Compilation of indices relating prices to different reference periods

39. Indices relating prices in the accounting year to different reference periods are compiled from quarterly price indices for the entire period under consideration, reduced to a common reference basis and calculated using a single basket of weights. In order to compare price indices for a given accounting year with those from the preceding year, it is necessary to have a series of quarterly price indices for two adjacent years, computed from a common reference point (such as the fourth quarter of the year previous to the preceding year, which is taken to be 100) and recalculated using a single basket of weights (as a rule, the weights adopted for the accounting year).

40. It should be borne in mind here that any newly computed price indices for the preceding year are used for reference purposes only. Price indices for the preceding year that were calculated during that year remain authoritative.

A. Calculation of indices relating prices to the corresponding quarter of the preceding year

41. Price indices for an accounting quarter are related to the corresponding quarter of the preceding year by the following formula:

$$I_{KT/K(T-1)} = \frac{I_{IVK(T-1)/IVK(T-2)} \times I_{KT/IVK(T-1)}}{I_{K(T-1)/IVK(T-2)}}$$

where:

$I_{KT/K(T-1)}$ = index relating prices for the accounting quarter of the current year (T) to the corresponding quarter of the preceding year (T–1)

$I_{IVK(T-1)/IVK(T-2)}$ = index relating prices for the fourth quarter of the preceding year (T–1) to the fourth quarter of the year previous to the preceding year (T–2)

$I_{KT/IVK(T-1)}$ = index relating prices for the accounting quarter of the current year (T) to the fourth quarter of the preceding year (T–1)

$I_{K(T-1)/IVK(T-2)}$ = index relating prices for the corresponding quarter of the preceding year (T–1) to the fourth quarter of the year previous to the preceding year (T–2)

42. Indices relating prices for the accounting quarter to the corresponding quarter of the preceding year may also be obtained by the chain method, which involves sequential remultiplying of the four quarterly price indices for the period in question, using a single basket of weights.

43. When compiling indices relating prices for the accounting quarter of the current year to the corresponding quarter of the preceding year, the following points should be borne in mind:

- Calculation accuracy depends on the quality of the quarterly price indices used, including the index relating the “fourth quarter of the accounting year to the fourth quarter of the preceding year”, which is obtained by remultiplying the quarterly indices (using the chain method).

- Particular difficulties arise when sampled dwelling types are replaced by others. If prices recorded in an accounting year cover dwelling types not sampled in the preceding year, then in order to ensure comparability between the set of dwelling types and prices for them in two adjacent periods, imputed prices must be used to compensate for any shortfalls in the reference data from the preceding year.

44. A crucial means of determining the accuracy of price indices aggregated by grouped entries and calculated by the chain method or the algorithm given is to compare directly the prices per square metre of living space in specific grouped dwelling types during the accounting quarter with the prices for the corresponding quarter of the preceding year.