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**PRICE AND QUANTITY INDICES IN TRANSPORT**

**Transmitted by the Government of the Russian Federation**

**PRICE INDICES FOR TRANSPORT SERVICES**

Note: The present paper prepared by the State Statistics Committee of the Russian Federation is being circulated in view of the Committee's interest in further examining price indices in the transport sector.

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## 1. Summary

**This paper contains a general description of the process of monitoring prices for passenger and goods transport services and the calculation of price indices for the carriage of passengers and goods.**

**The general principles governing price monitoring in all sectors of the economy are reflected, as well as the main stages in the collection of price information and the construction of indices for passenger and goods transport services. The database which is used is also described.**

**The paper also contains a description of the manner in which prices for the carriage of passengers and goods are recorded, the methods used when prices are temporarily unavailable, the formulae used for calculating price indices and the types of price indices which are calculated.**

## 2. Introduction

2.1 In statistical practice in Russia the problem of measuring the movement of prices is addressed using a comprehensive approach. From the time when prices were liberalized in January 1992, the Russian State statistical office has been constructing step by step a logically coherent system of price indices in all sectors of the economy.

The main principles governing the construction of a system of price indices which reflect inflationary processes in the various economic sectors have been formulated as follows:

- Monitoring of prices in a selected set of reference organizations;
- Creation of a set of representative goods or services while harmonizing nomenclature items to the greatest extent possible (creation of an integrated nomenclature for all economic sectors);
- A single set of time parameters for recording of prices for goods and services (at the end of the reporting month);
- A single set of principles for the setting of weights, with annual review;
- A common calculation formula for the entire system of price indices.

This approach to the calculation of price indices makes it possible to compare price movements in all sectors of the economy.

2.2 The Russian State statistical system currently uses the following system of price indices:

*Consumer sector*

- Consumer price indices for goods and services;
- Indices of prices on the housing market;

*Productive sector*

- Indices of producer prices for industrial output;
- Indices of producer prices for agricultural production;
- Indices of producer prices in construction;
- Indices of prices for goods transport operations;
- Indices of prices for communication services for corporations;
- Indices of prices for the main types of fuel and energy resources purchased by industrial enterprises;
- Indices of prices for means of production and services purchased by agricultural undertakings;
- Indices of prices for the main materials, parts and structural items purchased by construction undertakings.

2.3 In view of the specific features of price monitoring in different economic sectors, price indices for transport services in the Russian Federation are calculated separately for passenger and goods transport.

Price indices for passenger and goods transport have been calculated using the current methodology since 1994.

### **3. Specific features of monitoring of prices for passenger transport**

3.1 Price indices for passenger transport are calculated on the basis of price monitoring carried out for purposes of construction of the consumer price index for goods and services.

In keeping with the federal structure of the Russian Federation, price changes are monitored both at the national level and at the level of each of the constituent parts of the Federation (republics, territories, oblasts and autonomous areas - a total of 89 units).

Price information is gathered in all the capitals of republics (within the Russian Federation), territories, oblasts and autonomous areas, and samples are taken in district centres selected as being representative in reflecting the socio-economic and geographical features of the regions and the supply of consumer goods and services - a total of 266 cities.

3.2 Price indices for passenger transport are calculated on the basis of information from two sources:

- Data on price changes based on monthly recording in the consumer market;
- Data on the structure of actual consumer expenditure by the population for the previous year, as calculated on the basis of indicators obtained from a sample survey of households.

3.3 Price monitoring concerns 13 types of passenger transport services:

*Road transport*

Journeys in municipal city buses

Journeys in commercial city buses

Journeys in collective taxis

Journeys in inter-urban buses

*Trams, trolleybuses and underground railways*

Journeys in trams

Journeys on trolleybuses

Journeys on underground railways

*Air transport*

Air journeys

*Rail transport*

Journeys in suburban trains

Journeys in compartment-type carriages on ordinary long-distance trains

Journeys in compartment-type carriages on superior long-distance trains

Journeys in open carriages on ordinary long-distance trains

Journeys in open carriages on superior long-distance trains

The price indices for passenger transport are calculated using a representative set of services most frequently used by the population, which is standard for all regions in the Russian Federation.

Items for price recording are selected on the basis of their ranking in consumption by the population, as well as their representativeness in reflecting the movement of prices for the group of services they represent within the basket of goods and services used for calculation of the consumer price index.

This basket is decided on at the federal level, and remains unchanged for a substantial period of time (generally not less than one year).

3.4 In each city, transport organizations which carry passengers are selected for the purpose of recording prices for passenger transport services.

The monitoring covers, in a representative manner, transport organizations exhibiting all forms of ownership, organization and legal structure (State-owned, municipal, private, joint, etc.).

3.5 On the basis of the information gathered on passenger transport prices, the average prices for specific types of services, and price indices, are calculated. Average consumer prices for the Russian Federation are defined as the weighted arithmetic means of the levels of prices for services in individual regions, while for individual regions the calculation is based on levels in individual cities. In order to calculate average prices for specific types of passenger transport services for each constituent element of the Russian Federation and for the Federation as a whole, use is made of information on the size of the population in specific cities and regions.

The average prices for individual services are the outcome of the influence of a large number of changes in the range of products offered, geographical changes, seasonal variations and other factors. In this way the change in average prices for services differs in economic terms from the price indices for these services, first and foremost in that it takes into account not only the price factor, i.e. the change in specific prices for specific services, but also shifts in structure and product range.

In this context, information on average prices cannot always be used to characterize price movements. Together with dynamic series of average prices, an important place in the analysis of price information is occupied by spatial series of prices, which are used as a basis to carry out

interregional comparisons of prices for identical goods. Information on average prices is used to define the cost of individual baskets of goods and services both in Russia as a whole and for each of its constituent elements, as well as for other purposes.

#### **4. The organization of statistical monitoring of goods transport prices**

4.1 Price indices for goods transport are intended for use in evaluating the rates of change in prices for the carriage of goods by various means of transport and route, and also in defining deflators for use in calculating the rates of growth or decline in gross domestic product at comparable prices and other macroeconomic indicators. They are used to characterize the price factor in changes in the incomes of transport organizations generated by the carriage of goods by various means of transport. Price indices for goods transport are used to perform a variety of economic calculations and for macro-level forecasting.

Price indices for goods transport make it possible to identify price changes during the reporting period without taking into account the change over the same period in the structure of the goods carried in terms of various criteria: type of cargo, size of shipment, speed of delivery, distance transported, area of transport operation, type of vehicle, degree of vehicle capacity utilization, etc.

Prices of goods transport services are monitored in all the capitals of the constituent elements of the Russian Federation (89 cities). Price indices are calculated both at the federal and at the regional level.

4.2 The composite index of prices for goods transport by all means of transport is defined on the basis of the indices of tariffs for goods transport by the following means:

Rail

Pipeline

Sea

Inland waterway

Road

Air

4.3 Prices for the carriage of goods by each means of transport are recorded for each route and representative service.

At the federal level a list of representative services is drawn up with a standardized description of the pricing parameters for each means of transport and route.

A list of the means of transport and routes in respect of which goods transport price monitoring is organized is given below:

*Rail transport*

International transport

Interregional transport

Intraregional (local) transport

*Pipeline transport*

Oil

Petroleum products

Gas

*Maritime transport*

International navigation

Coastal navigation on cargo vessels

Coastal navigation on service vessels

*Transport by inland waterway*

International

Domestic

*Road transport*

International

Inter-urban

Intra-urban and suburban

*Air transport*

International

Domestic

At the federal level a list of types of cargo for which transport prices must be recorded is drawn up for each rail transport route.

<i>Products of the fuel and energy industry</i>	Hard coal Crude petroleum Petrol Diesel fuel Fuel oil
<i>Metallic ores</i>	Iron ore Non-ferrous ores
<i>Products of the metallurgical industry</i>	Steel billets and ingots Scrap iron Non-ferrous metals and their alloys
<i>Products of the forestry, wood-processing and cellulose and paper industry</i>	Round timber, other than pit props
<i>Mineral raw materials, mineral construction materials and articles</i>	Soil, sand and clay for construction
<i>Abrasives</i>	Natural soil, sand, clay and stones - industrial raw materials Natural stones for construction and miscellaneous purposes, peat Ballast for railways Cement
<i>Products of the chemical industry</i>	Mined chemical raw materials for manufacture of fertilizers Nitrogenous fertilizers
<i>Agricultural produce</i>	Wheat

On the basis of the list of representative services drawn up at the federal level, selection of services with specific pricing parameters is carried out in the local statistical offices with the help of specialists from the transport organizations being monitored. The following is taken into account in selecting representative services for recording:

- The selected representative service must be provided by a transport organization continuously over a relatively long period of time;
- The representative service selected for monitoring must occupy a predominant position in the total volume of services provided by a specific means of transport on a specific route.



The following pricing parameters (specifications) are used in recording prices for goods transport using specific representative services:

Name or class of cargo

Distance carried

Size of single cargo shipment

Type and ownership of the vehicle, type of vessel or aircraft, type and make of goods motor vehicle

Type of consignee

Speed of delivery of cargo

Destination

Degree of vehicle capacity utilization

etc.

4.4 The transport organizations used as references in monitoring the level and change in prices for goods transport are selected at random from the total number of organizations, in two stages.

At the federal level, organizations engaged in the transport of goods by pipeline are selected, and a list is drawn up of railways on which prices for goods transport by rail will be recorded.

Local statistical offices select organizations (stations) for recording of prices for rail transport of cargo, and also organizations for recording of prices for the transport of cargo by sea, inland waterway, road and air.

The set of reference organizations is selected on the basis of the following criteria:

- The set of reference organizations must include the transport organizations selected at the federal level;
- The range of organizations surveyed includes organizations that are representative in reflecting the movement of prices for goods transport by all means of transport on all routes in the region;
- The set of reference organizations includes the most typical organizations for the specific type of transport of goods in the region for the purposes of forming the sample;

- Where necessary, small organizations may also be included in the set of reference organizations together with large organizations that play a major role in economic activity in the region.

## **5. Basic methodological principles for constructing price indices for passenger and goods transport**

5.1 Monitoring of prices for transport services and the calculation of price indices includes the following stages:

- Selection of representative services for monitoring of price levels;
- Selection of reference transport organizations in which price recording is to be carried out;
- Devising and application of the procedure for price recording;
- Development of the weighting structure for calculation of the composite price indices for transport services at various levels of aggregation;
- Selection of the formula for calculating price indices;
- Calculation of price indices for passenger and goods transport;
- Calculation of average prices for specific types of passenger transport services.

5.2 Monthly recording of prices for passenger transport services is carried out on the same dates as recording of prices for goods and services for the purposes of calculation of the consumer price index - at the end of the reporting month (between the 23rd and the 25th).

Prices for goods transport are recorded monthly at the levels prevailing on the 22nd of the reporting month on the basis of the information contained in the documents relating to payment for the transport operation. If at the time of recording the goods transport operation has not taken place, the figures recorded in the statistical forms will be the prices at which the carriage was carried out or will be carried out on the day nearest to the recording day during the reporting month. The prices to be recorded are the actual prices for the carriage of the goods, excluding value-added tax, excise duty and other taxes. Additional expenditure in excess of the actual prices, which may appear in the payment documents, is not included in the price. For example, expenses dictated by a change in the terms for the carriage of the goods (such as distance) must not be included. Recorded prices must satisfy the requirement of invariability of the service being monitored in terms of pricing parameters.

**5.2.1. The greatest difficulties arising during price recording are linked to temporary breaks in the provision of the transport services which are being monitored, particularly as regards goods transport. In addition, some of the types of transport services being monitored are seasonal in nature and are provided only during certain months of the year. This applies first and foremost to transport by inland waterway, since this type of service is provided only during the navigational season.**

As a rule, during the period when goods transport services are not provided, transport organizations do not reflect data on the prices of these services in the federal statistical office forms. However, it is necessary to continue to record the standard prices (prices for calculation purposes) of these types of services even when they are temporarily not being provided.

The most widespread method of dealing with the missing price indicators is to use the standard values (values for calculation purposes) until such time as data on actual prices are received.

There are several basic methods for calculating standard prices (prices for calculation purposes) so as to ensure that the time series of prices for the representative service is not interrupted:

- Use of the relative change in prices for a similar service for the carriage of goods in the transport organization concerned along the same or a different route;
- Use of the relative change in the price for a similar service for the carriage of goods in another transport organization selected for monitoring in the region along the same route;
- Use of the average change in prices for the representative service in all the transport organizations selected for monitoring which engage in the transport of goods in the region along the same or a different route using the same means of transport;
- Use of the average change in prices for a different means of transport or all means of transport in the region.

In a context of rapid change in prices for goods transport, it is not recommended, where the reference organizations do not supply actual prices, to use the prices for the preceding month for index calculations and fail to change them over a lengthy period of time. This method can be used only when price movements are relatively stable, and only for a month or two, in agreement with specialists in the transport organization participating in the monitoring, and in cases where expenditure on the provision of the service being monitored has remained unchanged during the period. In addition, the use of this method is permissible for those means of transport for which prices change in accordance with rules and regulations. Where services are seasonally not provided, the preceding month's prices may be used for the period covered by the rules and regulations.

The following guidance applies where the provision of the monitored types of representative service completely ceases, and also when the transport organization is closed or changes its area of activity. If the cancellation or complete cessation of the service occurs at the beginning of the year, the monitored organization is replaced by another and the monitored services by similar services. If there is no other organization in the region, the service is removed from the monitoring operation, and the composite series of indices are recalculated for the preceding months in the reporting year. Note that the series of indices are recalculated only in exceptional cases. In order to simplify the application of the procedure for the replacement of the service which has ceased in the absence of the representative service participating in the series of indices, the prices of similar types of service with similar characteristics are added to the monitoring operation.

If the closure of an organization or the cessation of the service occurs at the end of a year, standard prices (prices for calculation purposes) are calculated for the halted service up to the end of the reporting year.

5.2.2. An important principle when constructing price indices for goods transport is that for services provided to the same type of consignees, changes in prices should be monitored with other conditions of provision of the services constant. This makes it possible when calculating the indices to exclude the influence of any change in the type of consignee.

In a number of cases transport organizations carry the same type of cargo to different consignees at different prices. In this way, some types of goods may be transported by rail to industrial and agricultural consignees at different prices. Consequently it is recommended that the prices for the types of transport services being monitored should be recorded for one basic type of consignee. Substitution of the consignee may lead to a change in the price for the representative service, with no direct link with the price factor.

**5.3. In view of the particular way in which the Russian economy is developing, the lack of stability in the provision of transport services and the rapidly changing conditions in which such services are provided, price indices for passenger and goods transport are currently calculated by iteration.**

The monthly price index is obtained by comparing the price for the representative service in the reporting month with the price during the preceding month. The price index over a lengthy period is obtained by multiplying the monthly price indices.

5.3.1. The individual monthly price indices for passenger and goods transport are defined as the result of the division of prices for representative services for each specific means of transport over the reporting month and the preceding month using the following formula:

$$i_{j\ t/t-1} = \frac{p_{j\ t}}{p_{j\ t-1}} * 100\%, \text{ where}$$

$i_{j\ t/t-1}$  - price index for the  $j$ -th representative service in reporting month  $t$  compared with the preceding month  $t-1$ , as a percentage;

- $p_{jt}$  - price for the  $j$ -th representative service in reporting month  $t$ , in roubles;
- $p_{j,t-1}$  - price for the  $j$ -th representative service in the preceding month  $t-1$ , in roubles.

On the basis of the individual price indices calculated for specific representative services in the reporting month in relation to the preceding month, composite monthly indices of prices for passenger and goods transport are determined.

The composite monthly price indices for passenger and goods transport are calculated on the basis of the following statistical information:

- Individual monthly price indices for representative services being monitored;
- Data on consumer expenditure by the population over the base period (for calculation of the transport price indices);
- Data on income from the carriage of goods over the base period by route and means of transport (for calculation of the goods transport price indices).

To calculate the composite monthly price indices for passenger and goods transport services, Laspeyres' formula is used with a recursive system of calculation, as indicated below:

$$I_{t/t-1} = \frac{\sum_{j=1}^n p_{j0} q_{j0} * i_{j t/d}}{\sum_{j=1}^n p_{j0} q_{j0} * i_{j t-1/d}}, \text{ where}$$

- $I_{t/t-1}$  - Composite price index for passenger (or goods) transport services in the reporting month  $t$  in relation to the preceding month  $t-1$ , as a percentage;
- $p_{j0}$  - Consumer expenditure by the population (income from the carriage of goods) for the  $j$ -th representative service in the base period  $0$ , in thousands of roubles;
- $q_{j0}$
- $i_{j t/d}$  - Price index for the  $j$ -th representative service in the reporting month  $t$  in comparison with December of the preceding year  $d$ , as a percentage;
- $i_{j t-1/d}$  - Price index for the  $j$ -th representative service in the preceding month  $t-1$  in comparison with December of the preceding year  $d$ , as a percentage.

The formula given above is used to calculate the composite price indices for passenger and goods transport at different levels of aggregation.

**5.3.2. Price indices for the reporting year in relation to various base periods are calculated on the basis of monthly price indices for the entire period being monitored, expressed with reference to a single base and calculated using a single weighting structure. In this way, for comparison of the price indices for the reporting year in relation to the preceding year, use is made of a series of monthly price indices for two successive years, calculated using a single base (for example, December of the year before the preceding year) and recalculated using a single weighting structure.**

**Currently in Russian statistical practice price indices are calculated for passenger and goods transport each month in relation to the following periods:**

**Preceding month;**

**December of the preceding year;**

**The corresponding month of the preceding year;**

**The period from the beginning of the year in relation to the corresponding period of the preceding year.**

**In addition, for analytical purposes and for purposes of macroeconomic research, the following price indices are calculated every quarter:**

**Change since end of preceding quarter**

**Change since preceding quarter**

**Change since corresponding quarter of preceding year**

**Change since preceding year.**

In specific cases, in order to characterize macroeconomic processes, quarterly price indices are calculated during the reporting year in the relation to the reporting year.

## **6. Conclusion**

Work continues in Russia to upgrade the existing methodology for the collection of price information and the calculation of price indices for passenger and goods transport, as well as that for the entire system of price indices. The fundamental principle remains the holistic approach to the construction of price indices in all sectors of the economy.

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