

Indices of industrial production in Russia

1. The index of industrial production¹ (IIP) is a short-term indicator of the economic cycle, which enables to answer the questions about a current development stage of the economy and whether it experiences a downturn or a growth or an inflection point. The IIP enables to estimate changes in the GDP in general and it ensures an advantage of timeliness the last one.

The aim of the IIP is to reflect the value added changes resulted from the economic activity. Regarding complexity of the value added calculation on a monthly basis, Russian statisticians use data on production output in terms of the national classification of products as an alternative index to measure industrial production. Those are primary products divided by properties and use wherever possible. They are mostly accounted in physical units.

In the transition economy statistical data in physical units are beneficial to cost evaluation because of the complexity to exclude inflationary component from the output volume under a high inflation and rapid structural changes. Quantitative output indicators may be used to measure homogeneous products only. They are difficult to calculate for high-tech miscellaneous products of rapidly changing property characteristics. For the latter data on the value output are collected and deflated by relevant price indices afterwards.

2. The IIP is compiled in stages according to the Russian methodology. In the first stage indices for elementary activities are calculated on the basis of market baskets by Laspeyres formula², whenever it is possible:

$$i_{t/b}^j = \frac{\sum_{n=1}^N q_t^n * p_b^n}{\sum_{n=1}^N q_b^n * p_b^n},$$

where: $i_{t/b}^j$: an index of kind of activity j for the reference month t in relation to the average for a month production of the base year;
 q_t^n, q_b^n : commodity production n in physical units (or in value deflated) for period t and the average for a month of the base year respectively;
 p_b^n : average annual price of a product unit n in the base year;
N: number of items by kind of activity chosen for the basket.

The index shows a change in gross output volume i.e. quantity of products by activities, which are estimated at the average price per unit of product in the base year. Strictly speaking, weights are shares of products in value terms, which make up the basket by activities for the base year.

It is quite reasonable to assume, that a share of items in the basket is proportionate to the volume of production and the value added by the activity, then the index numbers of gross output will be close to the index numbers of value added.

¹ *Methodology of short-term business statistic: Interpretation and guidelines*. Eurostat, 2002. The IIP is one of the indicators that countries, which have subscribed to SDDS (Special Data Dissemination Standard), must calculate and publish in accordance with international standards.

² The Laspeyres index is preferred due to feasibility of rapid provision of information, which is indispensable for calculation, good practice of calculation (weights change is not required for processing of a new period data) and ease of interpreting the result.

In later stages elementary activities indices are aggregated in accordance with their hierarchical structure in OKVED³, with indices of higher classification groups and the industrial index (C + D + E).

The value-added⁴ for the base year is used as weights for aggregation. The calculation is performed by the formula:

$$I_{t/b}^{vd} = \frac{\sum_{j=1}^m I_{t/b}^j * D_b^j}{\sum_{j=1}^m D_b^j},$$

where: $I_{t/b}^{vd}$: production indices for kind of activity m (by subgroup, group, etc.) in OKVED for t-period t are compared to the average for a month production of the base year;
 $I_{t/b}^j$: production indices by types of activities, obtained at previous stages of calculation, within a relevant OKVED group;
 D_b^j : value added by activities for the base year within a relevant OKVED group;
m - number of activities falling within a relevant OKVED group.

At each aggregation stage of an IIP, five base indices, fixed in relation to the average monthly output of the base year, are calculated respectively for:

- A reporting month;
- A period since the beginning of the year;
- A month prior to the reporting month;
- A corresponding month of the previous year;
- A corresponding period since the beginning of the previous year.
- Three derivative indices⁵:
- A month in relation to the previous month;
- A month in relation to the corresponding month of the last year;
- A period since the beginning of the reporting year to the corresponding period since the beginning of the last year.

Actually, this algorithm is implemented to compile indices, which Russian users accustomed to employ. However, informative capacity, which is inherent in the fixed base index, which provide maximum amount of information about movements of the economic cycle, it is designed to reflect, is lost when derivative indices are used.

3. The quality of the IIP is directly dependent on availability of data on production output to be received under time of four days.

This index is to reflect production by all economic units and Rosstat has to combine methods of full-scale observations and sample surveys to compile it.

Large and medium-sized enterprises report monthly, supplying short-term information on the production of goods and services. All these enterprises, regardless

³ The Russian Statistical Classification of Economic Activities (OKVED) and NACE Rev. 1 classifications are directly compatible at the 4-digit level.

⁴ The advantage of the value added is that it contains no double counting, does not depend on the organizational structure of enterprises and represents a real input by activity to cumulative production.

⁵ A comparison of production for period t with production for period t-1 (t-n) of time is not performed by direct comparison of their deviations from the average value of the base year.

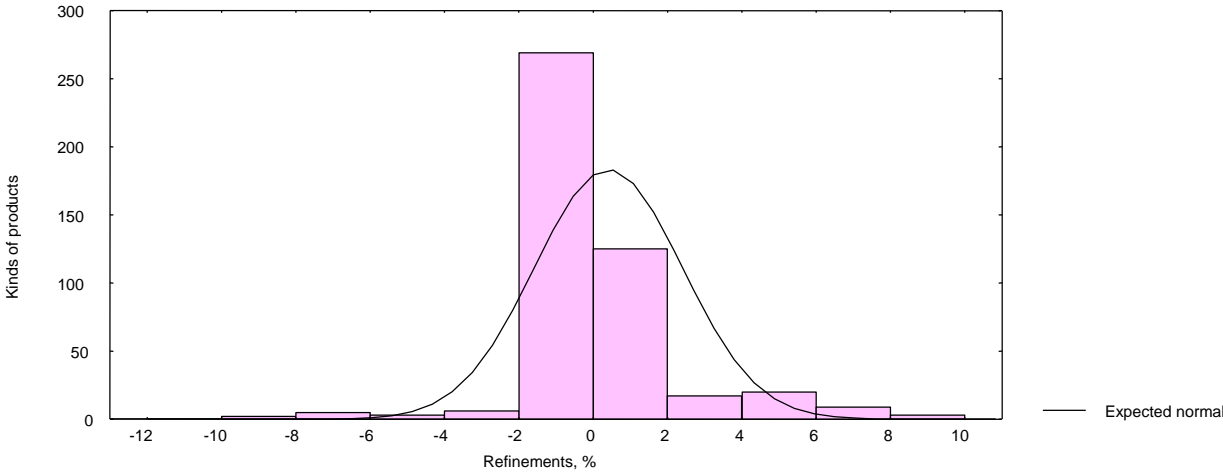
of their principal activity, supply data on actual production, in accordance with the list prescribed by the ONS.

Small businesses (legal entities and individual entrepreneurs) make a significant contribution to the production of many goods and services in the Russian economy. In respect of these economic entities inter-year sample surveys⁶ are conducted under the Russian legislation. The information acquired from these surveys enables to create a system of coefficients, which are used for monthly upward adjustments for commodities involved in compiling the IIP, in accordance with established methods and algorithms.

Timeless pressure (no later than the fourth day of a reference month) on data reporting for large and medium-sized enterprises reduces to a certain extent quality of information and causes further refinements from the respondents to be done in the previously submitted monthly data.

A scale of refinements with respect to the earlier monthly data on the production output in physical or in value terms are often statistically significant and unbalanced that can be seen in Chart 1 below.

Chart 1: Refinements value of data on the production output
(Refinements as % of production output in physical or in value terms)



Refinements alter the index, calculated in relation to the previous month, which, in turn, will impact on dynamics of the indicator for a longer period.

Some refinements on the production of goods and services, reported by respondents within a year, are taken into account, when current indices are compiled. Most of refinements are submitted to the ONS in annual reports, when respondents supply data on annual production of goods and services, specifying their output by months.

In relation to the above, monthly compiled and published indexes are not usually reviewed quickly.

⁶ Censuses of small businesses are conducted periodically, to clarify the parameters of their activities, obtained on the basis of sample surveys.

Revision and re-publication of monthly indexes are carried out by the end of the annual IIP compilation⁷.

A major effort in adjustment of monthly and annual IIPs is made to avoid discrepancies between monthly and annual data calculation results, without short-term industrial development trends numbers being deformed, and to make a complete use of the information contained in the annual data. The adjustment algorithm of monthly and annual data calculation deliveries should be the one to result in monthly data determine short-term trends numbers of a summarized index and annual data determine long-term trends numbers of this index. Data adjustment is mostly performed at the level of products.

After analyses of discrepancies, which may be caused by solely refinements in some earlier provided monthly changes data or were also attributable to inclusion of additional products for calculation or resulted from disaggregation of product group by composition⁸, Rosstat applies the following methods of index adjustment:

update of monthly data, produced under annual development, are used to recalculate short-term indices of products selected for in-line accounting processing; adjustment coefficients⁹, which define an impact of these products on changes by kind of activity, are used in relation to selected products accounted for once a year and/or composition of product group.

4. Beside annual updates of the IIP, Rosstat exercises revision of the indices in connection with changing the base year for calculations. Technological and organizational structures of production are constantly upgraded in transition economies, a ratio of prices for products and, consequently, the value added structure of actual activities, a change of the base year can significantly affect an IIP numbers.

The weighting base is updated in dependence on the extent of structural changes in production. The more rapid these changes, the more often the weighting base has to be updated. Annual update of the weighting base is laborious, because it increases significantly calculations caused by constant adjustment of long-term time-series of monthly indices.

When making a decision on a base year, it is taken into account, that it should be representative in terms of production structure, technology and organization of production.

Actually, over the period from 1990 to 1995, when structural changes were very rapid, Russia changed a base year annually. For the period from 1997 to 2000 the base year was 1995. The economic crisis in 1998 led to significant structural shifts in the industry. In January 2001 the year 1999 was taken as a base year and weights were calculated for "homogeneous" industries opposite to "mixed" industries

⁷ The annual IIP is compiled with data on production of 3.5 thousand product groups and in monthly calculation about 750 product groups are used.

⁸ When refinement is substantial, as an exception, additions are made to the monthly index calculation "basket" and retrospective re-calculation of the index is made. For example, Aluminium windows and doors were not included the "basket" of the 1999 reference year. Considering, that these products have occupied a substantial share of the production, a decision was made to include them into account until moving to a new base year.

⁹ The coefficient is produced from a comparison of annual indices, calculated on the basis of the products, which are included in the annual index "basket", and on the basis of products involved in short-term calculations, in which refinements of previously provided monthly dynamics are used.

like it had been before. In 2005, when national statistical classification of economic activities (OKVED), comparable at the 4-digit level of NACE, was adopted, the year 2002 was chosen as a base year.

5. Time-series are of interest for economic analysis, and enable to define economic cycles and their turning points. Some baseline data reflect main trends of production development as well as impact of the calendar, seasonal and irregular factors. Seasonal adjustment ensures time comparability within a year, providing a more accurate short-term production changes tracking and forecast of its short-term development.

Rosstat employs the "X-12-ARIMA" program for identification and estimation of main trends of production development, seasonal adjustment and control of irregular components of time-series.

Need for rapid compilation of seasonally adjusted indicators of production changes, forces to carry out seasonal adjustment at a sufficiently high level of OKVED (section or subsection).

Accounting for a high economic growth and rapid structural changes in the Russian economy, time-series for seasonal adjustment are built for a sufficiently long period of time, covering at least five years, and they are actually a range of fixed base indices.

Seasonal adjustment of the IIP is carried out monthly. The series of seasonally adjusted indices are presented to users in graphic form.