

INDUSTRIAL PRODUCTION INDEX

INDUSTRIAL TURNOVER INDEX

1. Purpose, nature and use

The Industrial Production Index is a principal short-term economic business indicator, which aims to measure at a monthly frequency the ups and downs of industrial production during the long period of time. Monthly survey allows identifying the turning points in economic development at an early stage; also, the timely industrial production index is one of the most important measures of economic activity.

The Industrial Turnover Index is other important short-term indicator, which measure the development of the market of goods and services. Turnover index gives measure of the development of the receipts of sales including the sales of goods (merchantmen goods) and services provided to other parties.

2. Definition and sources of information

Industrial production index must reflect: (1) Variations in type and quality of the commodities and of the input materials; (2) Changes in stocks of finished goods and changes in work in progress; (3) Related services, such as assembling of production units, mounting, installation, repairs, planning, engineering. For compilation of Industrial production index NSI has accepted method of deflated value of production

The Turnover comprises the totals invoiced by the observation units during the reference period: receipts from sales of own products and services; a sale of goods resold in the same condition as received. It also includes all other charges (transport, packaging etc.) passed on to the customer, even if these charges are invoiced separately.

Industrial Production and Industrial Turnover Indexes measure changes in production and respectively in turnover between two different periods of time. **The survey do not attempt to measure the actual production level, it aims to measure the average change in value of production between two points of time.**

The indexes are based on monthly survey “Sales in industry, construction trade and services”.

For calculation the ‘industrial production’, NSI uses approximation to the ‘production value’ that is calculated as receipts from sales of finished products, goods and services minus value of goods purchased for resale in the same conditions as received, corrected

with changes in stocks of finished products. Turnover includes all receipts from sales (including sales of raw materials), excluding financial income and receipts from sales of fixed assets. Industrial production and turnover cover all activity of the enterprises, values of subsidiary, non-industrial activities of the enterprises are included.

3. Coverage, model and sample size

Industrial Production and Industrial Turnover Indexes are calculated by economic activities for Mining and quarrying industry, manufacturing industry and Electricity, gas, steam and air conditioning supply. Indexes are calculated by economic activities at division level (2-nd digit level of NACE.BG 2008), at section level, for Main Industrial Groupings (MIGs: Intermediate products, Investment products, Consumer durable products, Consumer non-durable products, Energy products) and for total 'Industry' level. Indexes are calculated at fixed base year, which according to requirements of Regulation 1158/2005 and amending Regulation 1168/98, concerning short-term statistics is changed every 5 years, ending by '5' or '0'¹.

The sampling population includes enterprises with more than 9 persons employed, which sampling population have nearly 98% share in the total turnover in industry. The sample method used is Stratified Random Sample. Criterion for stratification of the enterprises is 'number of persons employed'. First enterprises are stratified by groups (3-th digit level of NACE.BG 2008) and then in each group they are stratified by number of persons employed. Enterprises with 100 or more employees are surveyed exhaustively. Enterprises employing between 10 and 99 employees are randomly sampled, enterprises that have less than 9 employees are not observed monthly.

4. Calculation of Industrial Production and Industrial Turnover Indexes

The production value of industrial enterprises depends on quantities produced as well as depends on changes in prices. For Industrial production index compilation, the values are deflated with Producer price indexes in order to isolate the price (inflation) fluctuations and the real production developments to be presented.

Turnover indexes are calculated through direct comparison of the values of the turnover at current prices, turnover values are not corrected with the price changes. The Turnover indexes reflect the development of the value of sales as well as changes in prices.

4.1. Calculation of monthly base year Industrial production index (2015 =100)

The calculation of Industrial production index involves two stage calculation process:

- Calculation the index at lowest level - 3-th digit level of NACE.BG 2008
- Calculation the aggregated indexes at different aggregation levels.

¹ Since January 2018 Industrial production indexes and Turnover indexes are calculated at 2015 as a base year. Historical data are recalculated at the 2015 as a base year and they can be downloaded from INFOSTAT information system.

4.1.1. Calculation the Industrial production index at group level (3-th digit of NACE.BG 2008. At that stage index calculation is made on the bases of direct comparison of the data from the current month at constant prices and data on the average monthly production value in the base year. Production value is deflated at 3-th digit level of NACE.BG 2008 with the Total producer price index that is calculated as weighted average of producer price indexes on domestic market and producer price index on non-domestic market. ²

$$I_L^t = \frac{\sum \frac{W_L^t}{I_P^t}}{\sum W_L^0 / 12}$$

where:

I_L^t - Industrial production index for activity L

W_L^t, W_L^0 - Production value in the current period and in the base period respectively

$I_P^t ; I_P^0$ - Total producer price indexes in the current period at the base year

$\sum W_L^0 / 12$ - Average monthly production value in the base year

4.1.2. Calculation of Industrial production index at higher levels of aggregation. Industrial production indexes at higher level of aggregation – division (2-nd digit level), section, Main industrial groupings and total Industry level are calculated as base weighted (Laspeyres) indexes - that is to say they are weighted according to the value added at factor costs in the base year, currently 2015.

The source for activity weight -value added at factor costs is received from Structural Business Statistics survey that is based on annual enterprise's accounts and it is defined as the production value, reduced by the amount of the excise duties and operating expenses, excluding those for the personnel and for depreciation, and increased by the income from financing.

Industrial production indexes at higher levels of aggregation (2-nd digit level and higher) are calculated as weighted average - indexes at lower levels are weighted with the value added at factor cost structure.

$$I_P^t = \sum_{L=1}^n (I_L^t * v_L)$$

where:

I_P^t - Industrial production index in month 't'

I_L^t - Industrial production index for group (division) in month 't'

v_L^0 - Value added at factor cost structure in the base year.

4.2. Calculation of monthly base year Industrial turnover index (2015 =100) .

² The Total producer price index at different level of aggregation is calculated from producer price indexes on domestic market and producer price index on non-domestic market, weighted with the sales structure on domestic market and on non-domestic market to the total sales at each level of aggregation.

Three Turnover indexes are calculated: Turnover indexes on domestic market, Turnover indexes on non-domestic market and Total turnover indexes.

First **Turnover indexes on domestic market and Turnover indexes on non domestic market** are calculated. At the lowest level of aggregation (3-th digit level of NACE.BG 2008) indexes calculation is made on the bases of direct comparison of the data from the current month and data on the average monthly turnover value in the base year.

$$I_k(t) = \frac{\sum_{h \in k} T_h(t)}{\sum_{h \in k} T_h(0)/12}$$

where:

- $I_k(t)$ - Industrial turnover index on domestic/ non-domestic market in period t
- $T_h(t)$ - Turnover value on domestic/ non-domestic market in period t
- $T_h(0)/12$ - Average monthly turnover value on domestic/ non-domestic market in the base year

At higher levels of aggregation Industrial turnover indexes on domestic and on non-domestic market are calculated as weighted average - indexes at lower levels are weighted with turnover structure in the base year following the structure of the NACE.BG 2008

Total Industrial turnover indexes are calculated from Turnover indexes on domestic market and Turnover indexes on non-domestic market weighted with the turnover structure on domestic and on non-domestic market to the total value of turnover at each level of aggregation.

$${}_T I_p^{t0} = \frac{{}_{DM} T_p^{t0} * v_{DM}^0 + {}_{NDM} T_p^{t0} * v_{NDM}^0}{v_{DM}^0 + v_{NDM}^0}$$

where:

- ${}_T I_p^{t0}$ - Total Industrial turnover index
- ${}_{DM} T_p^{t0}$ - Turnover index on domestic market
- ${}_{NDM} T_p^{t0}$ - Turnover index on non-domestic market
- v_{DM}^0 - Turnover value on domestic market in the base year
- v_{NDM}^0 - Turnover value on non-domestic market in the base year

4.3. Calculation of base year production indexes for different periods of time.

Indexes for different periods of time at 2015 as a base are calculated as a simple average of the monthly base year price indexes. For example the price index for the period from the beginning of the year can be calculated as a sum of the monthly base year indexes from the beginning of the year divided by the number of the months within that period.

$$I_p^{I-T} = \frac{\sum_{t=1}^n I_p^t}{n}$$

where:

I_p^{I-T} - Index for the period from the beginning of the year at 2015 as a base

I_p^t - Monthly index for month 't'

n - Number of the months within the period

4.4. Calculation of the monthly indexes and indexes for periods at different index base.

From calculated in such a way base year indexes might be calculated monthly indexes (example – index for the current month according to the previous month or to the corresponding month of the previous year) and indexes for periods of time (example – index for the period from the beginning of the year to the corresponding period of the previous year) at different index base.

$$I_{t/t-1} = \frac{I_t}{I_{t-1}} * 100; \quad I_{t/t-12} = \frac{I_t}{I_{t-12}} * 100$$

where:

$I_{t/t-1}$ - Index according to the previous month

$I_{t/t-12}$ - Index according to the same month of the previous year

I_t - Monthly base year index (for month t)

I_{t-1} - Monthly base year index for previous month (for month t-1)

I_{t-12} - Monthly base year index for the same month of the previous year (t-12)

5. Seasonal and working day adjustment of Industrial production index

In accordance with Regulations concerning STS only Industrial production indexes are seasonally adjusted (Index of turnover in industry are not seasonally adjusted, only original (not seasonally adjusted) data are published).

Working day adjustment is an adjustment for variations caused by calendar effects, different number of calendar and working days in the months, national holidays and outliers. In working day adjustment the time series are tested for calendar effect. Calendar effects typically include:

- the different number of working days in a specific month,
- the composition of working days,
- the leap year effect, moving holidays such as Easter.

Seasonal adjustment is a statistical method, which eliminates the seasonal component of time series and it is particularly suitable for long-term comparisons and analysis of the data.

In seasonal adjustment the following approach is applied:

- The series are checked for outliers of different types, with automatic procedure for detecting outliers;
- Complete automatic procedure for automatic selection within a large number of models, after checking for model adequacy using standard statistical tests (e.g. normality, heteroskedasticity, serial correlation, etc.);
- Automatic decomposition scheme selection using information criteria. The decomposition scheme specifies how the various components - trend-cycle, seasonal and calendar component and irregular – combine to form the original series. Usually, the default decomposition scheme is multiplicative, because in most economic time series, the magnitudes of the seasonal component vary proportionally to the level of the series;
- Direct seasonal adjustment is performed.

6. Publicity and transparency

The Industrial Production Indexes are firstly released 37-40 days after the end of the reference month. The announcement includes the base year seasonally and working day adjusted Industrial production indexes as well as indexes changes according to the previous month (calculated from seasonally adjusted data) and indexes changes according to the same month of the previous year (calculated from working day adjusted data) <http://www.nsi.bg/en/node/6800>; <http://www.nsi.bg/en/node/6826>

Industrial Production Indexes and Industrial Turnover Indexes (total on domestic market and on non-domestic market) time series (from January 2000) at 2-nd digit and higher level of aggregation of NACE.BG-2008 are available on the website of NSI – in the on-line database INFOSTAT: https://infostat.nsi.bg/infostat/pages/module.jsf?x_2=188