

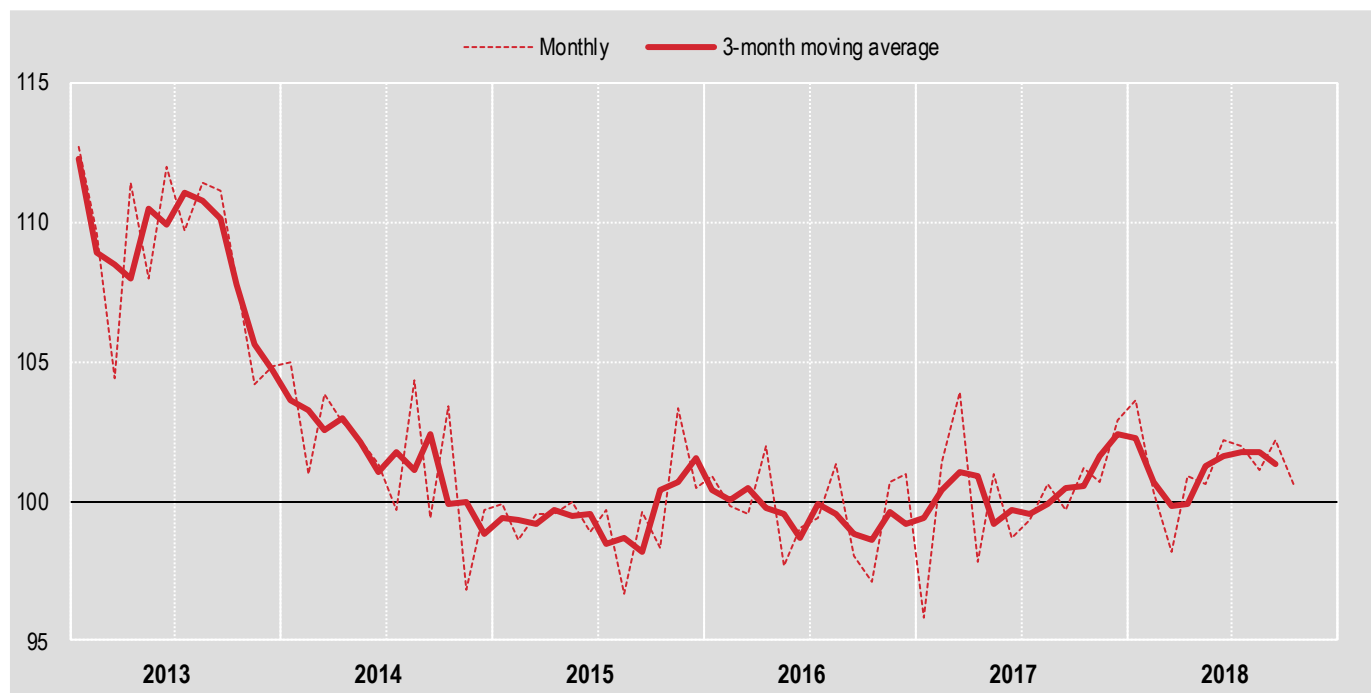
October 2018

PRODUCTION IN CONSTRUCTION

- In October 2018 the seasonally adjusted index of production in construction was estimated to have decreased by 1.6% compared to September 2018.
- Construction output also decreased in the three-month on three-month series, contracting by 0.3% in October 2018.
- Compared with October 2017, the production output fell by 0.5% after the adjustment for calendar effect differences, while the unadjusted index grew by 3.0%.
- When comparing the first 10 months of 2018 with the same months of the previous year, the construction output was up by 1.2% (calendar adjusted index).

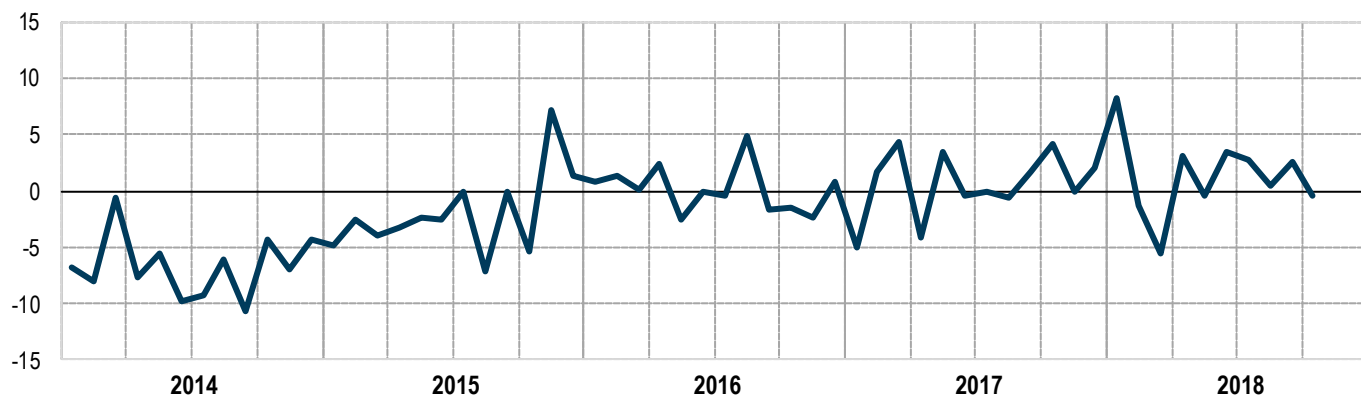
CHART 1. PRODUCTION IN CONSTRUCTION, SEASONALLY ADJUSTED INDEX AND THREE-MONTH MOVING AVERAGE

January 2013 – October 2018 (base year 2015=100)



**CHART 2. PRODUCTION IN CONSTRUCTION, MONTH ON SAME MONTH A YEAR AGO
PERCENT CHANGES**

January 2014 – October 2018, calendar adjusted data (index, 2015=100)



**TABLE 1. PRODUCTION IN CONSTRUCTION, MONTHS ON PREVIOUS MONTHS AND ON SAME MONTHS A YEAR AGO
PERCENT CHANGES**

October 2018 (a), seasonally adjusted, calendar adjusted and unadjusted data

| | Months on previous months | | Months on same months a year ago | |
|---------------------------------|------------------------------|--|----------------------------------|--------------------------------------|
| | <u>Oct18</u> <u>Set18</u> | <u>Ago18-Oct18</u> <u>May18-Jul18</u> | <u>Oct18</u> <u>Oct17</u> | <u>Jan-Oct18</u> <u>Jan-Oct17</u> |
| Production, seasonally adjusted | +1.6 | -0.3 | - | - |
| Production, calendar adjusted | - | - | -0.5 | +1.2 |
| Production, unadjusted | - | - | +3.0 | +1.8 |

(a) Data are provisional and subject to revisions.

Prior month data are subject to revisions. New observations can change the seasonal factors that are applied to the whole time series. This leads to an additional monthly revision for seasonally adjusted data.

Table 2 shows revisions between the first publication and the latest estimates published in this bulletin. Revisions to year-on-year growth rate refer to not adjusted data. Updated time series are available at I.Stat data warehouse.

TABLE 2. REVISIONS OF GROWTH RATE, PERCENTAGE POINTS

September 2018 (base 2015=100)

| | Month-on-month change | Year-on-year change |
|----------------------------|-----------------------|---------------------|
| | September 2018 | |
| Production in construction | -0.2 | 0.0 |

According with the revision policy, time series available in this press release are revised since January 2017. Table 3 compares the revised average annual percent changes (years 2016-2017) and the month on same month a year ago percent changes (January-September 2018) with those issued on the previous release.

TABLE 3. PRODUCTION IN CONSTRUCTION, UNADJUSTED INDICES: COMPARISON BETWEEN PREVIOUS AND CURRENT RELEASE. Average annual percent change and month on same month a year ago percent changes (base year 2015=100)

| | Previous release | Current release |
|-----------|------------------|-----------------|
| 2016 | -0.7 | -0.7 |
| 2017 | +0.1 | +0.1 |
| | 2018 | |
| January | +11.9 | +12.2 |
| February | -1.5 | -1.2 |
| March | -8.4 | -8.9 |
| April | +6.9 | +6.7 |
| May | -0.2 | -0.4 |
| June | +3.9 | +3.5 |
| July | +6.5 | +6.5 |
| August | +0.6 | +0.4 |
| September | -0.9 | -0.9 |

Working day adjusted data: working day adjusted data refer to the correction for calendar effect in a reference period (month or quarter) that may vary from year to year. This method allows a reconciliation of asymmetries for calendar differences such as the number of working days, the week days distribution in the reference period and the occurrence of public holidays (including moving holidays like Easter) and of a leap year. Working day adjusted data permit to better compare year-on-year growth rate and average annual growth rate.

Seasonally adjusted data: seasonally adjusted data refer to the statistical technique designed to remove fluctuations related to seasonal factors (such as weather conditions, administrative measures, etc....) and calendar effects when relevant. Seasonal adjustment provides a clearer view for a trend analysis of a short-term index. Moreover, this method leads to a monthly revision of the previous years' series as updated time series components become available each month. Seasonal adjusted indices are therefore weighted in order to set the average of the reference year equal to 100; this method keeps the underlying pattern of the indices unchanged.

Calendar working days: days of the month other than Saturdays, Sundays and religious and secular public holidays.

Production in construction index: Production in construction index provides estimates of the construction output, measuring monthly changes in the sector. This indicator was introduced by Council Regulation (EC) No 1165/98, subsequently amended by Regulation (EC) no. 1158/2005.

Revisions: differences (in percentage points) between first publication and the latest estimates concerning the same reference period.

Short-term growth rate: short-term growth rate compares a period (typically a month or quarter) with the previous period, measuring the percentage change.

Year-on-year growth rate: Y-o-Y compares a period (typically a month or quarter) with the same period from the previous year, measuring the percentage change.

Introduction and regulatory framework

The monthly Index of Production in Construction (IPC) measures all construction activities, referring to both the production of new manufactured products and the maintenance of existing products (section F of the Nace Rev. 2 economic activity classification). The index is constructed on a fixed basis and uses 2015 as the reference year.

[Regulation \(EC\) no. 1165/2008 of the European Council](#), subsequently amended by [Regulation \(EC\) no. 1158/2005 of the European Parliament and of the Council](#), establishes the level of detail, the methodology and the frequency with which the IPC and the other short-term economic indicators must be produced and transmitted to Eurostat.

The processing of the index is also provided for by the current Italian National Statistical Programme.

Calculation source and methodology

The production function

IPC is calculated applying an indirect method: the trend of the output is estimated using indices of the productive inputs (hours worked, intermediate inputs and physical capital), aggregated through the coefficients of the production function of the sector, referenced to the base year and estimated using a constant return to scale Cobb-Douglas formula.

The estimate of the production function has been obtained using elementary business data, deriving from the annual SBS data, referring to year 2015. Estimates are based on the following variables: value of production, cost for purchasing intermediate inputs (raw, subsidiary and consumer materials), total hours worked and value of tangible fixed assets that represent a proxy of the physical capital. Referring to small and medium-sized companies, data on the fixed assets have been derived from the statutory financial statements of the construction sector companies, to integrate data on firms with less than 100 employees, whose balance sheets do not report this kind of information. The Cobb-Douglas specification, linearised through the logarithmic transformation, has led to the following estimated regression model:

$$\log Y = 0,454 \log L + 0,448 \log ACQ + 0,098 \log K$$

where, in aggregated terms, Y is the value of production, L indicates the amount of hours worked, ACQ is the value of intermediate goods purchases and K approximates the volume of the physical capital used.

The parameters have been estimated adopting the ordinary least squares method.

Monthly update of input variables

For each reference month, the level of the IPC is obtained by applying the coefficients of the production function (estimated for base year 2015) to the monthly indices relating to the input.

The monthly trend of the input variables is calculated using different information sources. Data on hours worked are provided by Building Institutes Building Workers Welfare Funds (BWVF), bodies in charge, at a territorial level, of the management of several contractual terms and the resulting data collection on the ordinary hours effectively worked by workers and apprentices. Through a census survey based on the 98 provincial BWVF, Istat monthly gathers information on hours worked, the amount of workers and business to which hours are referred. The collected data are subject to revision to strength consistency. In addition, comparisons with other Istat surveys have shown that data from the BWVF sufficiently approximate the trend of the labour input of the sector.

The intermediate inputs are measured through an indicator constructed on data relating to monthly turnover of industrial products, deflated by the production price indices for the internal market. Starting from the national turnover indices at a group and class level (3 and 4 digits of the Ateco 2007 classification, derived from Nace rev.2), 7 types of economic activity have been selected, corresponding to the most used intermediate goods in the construction sector: production of cement, lime and plaster; manufacture of articles of concrete, cement and plaster; manufacture of clay building materials; manufacture of structural metal products; manufacture of builders carpentry and joinery; manufacture of builders' ware of plastic; cutting, shaping and finishing of stone. Calculating

the aggregate index of intermediate goods (or purchase index) results in implementing a two level weighting structure: the single elementary indices, corresponding to the previously mentioned economic activities, are multiplied by the weights of the turnover index and provide the branch indices; these latter are then aggregated with the coefficients derived from the intermediate cost matrix of the symmetrical table of the resources and uses of year 2014, the latest available among those produced by the National Accounting at the time of the 2015 rebasing.

With regard to the index referring to capital, the monthly estimate of the evolution of the capital stock is obtained from the annual estimates of National Accounting relating to the capital stock by ownership branch. Also taking into account the substantial inactivity of this aggregate, the monthly transformation of the annual data is performed hypothesizing uniform growth of the aggregate between one month and another, and then extrapolating the trend registered in the last year for which data are available. However, given the relatively reduced weight that the capital stock assumes in the production function, these approximations are expected to have a very limited influence on the estimation of the IPC pattern.

Seasonal adjustment

The Production in construction index is transmitted to Eurostat on a monthly basis, and it is issued in three versions: the “raw” index, which results from the calculation performed on original data, the calendar adjusted index and the seasonally adjusted index, both calculated through the TRAMO-SEATS software program.

In order to issue a set of indices with a common base and to allow Eurostat to carry out the necessary operations to construct the European aggregates more easily, the monthly indices, corrected for the calendar effect, are recalculated so as to take on a value of 100 in the base year and leave the series profile unaltered. The seasonal adjustment method used by TRAMO-SEATS is founded on the assumption that a monthly or quarterly time series may be represented as a combination (sum or product) of different, not directly observable components: a long term component, called ‘trend-cycle’, a seasonal component that captures periodic movements of the observed phenomenon, and an irregular component due to erratic factors. The IPC is seasonally adjusted using a multiplicative decomposition.

The seasonal adjustment parameters are reviewed annually and at the time of base recalculation, along with the annual IPC revision. The model currently in use provides for the presence of four outliers (three additive and one temporary change) and ‘leap year’ effect.

Finally, since the addition of new monthly information allows a better evaluation of the different components of the series, each month seasonally adjusted series are recalculated.

Timeliness

Istat processes a provisional estimate of the monthly value of the IPC 45 days past the end of the reference month and transmits it confidentially to Eurostat, which uses the indices for the calculation of the European aggregates. Provisional estimates are then issued at national level approximately 48-50 days past the end of the reference month and reviewed 30 days later.

Coverage and territorial detail

Data are available at national level only.

Revisions

The production of statistics related to the IPC must take into account the availability of sources used for the measurement of the inputs. In fact, the monthly turnover indices are available at approximately 40 days past the reference month (production prices approximately 30 days past the reference month), while the measure of the hours worked is updated monthly and made definitive only at the closure of the annual financial statement of the BWVF. Moreover, the National Accounting releases estimates of the gross fixed capital and the capital stock once a year, usually 10-12 months past the reference year.

In addition to the periodic update of the reference base, the value of the IPC is periodically reviewed to keep inputs measures updated. The first revision, carried out in the month following the month of first issue, incorporates the belatedly received information on hours worked. With the second revision, definitive information concerning hours worked, industrial turnover and producer price indices are acquired.

Dissemination

Indices on construction output are issued on a monthly basis through the “Production in construction” press releases, available on the Istat website at <http://www.istat.it/en>.

The series of the updated indices are published on the Istat data warehouse (<http://dati.istat.it/?lang=en>) within the theme of Industry and Construction - Production, sub-theme – Production in Construction Index.