ufficio parlamentare di bilancio

Summary[*]

The slowdown in the world economy, which mainly involved exporting countries in 2018, is continuing and has spread to more economies. World trade is weakening, despite some easing of tensions over protectionist policies. Weaker global demand has prompted oil-producing countries to reduce production and oil prices have recovered.

In Italy, GDP growth slowed to 0.9 per cent last year (down from 1.7 per cent in 2017). According to the latest national accounts estimates, the slowdown originated with domestic demand and, to a lesser extent, net foreign demand. In the final part of 2018, GDP contracted slightly due to the negative contribution of inventories. By contrast, exports grew, especially sales to countries outside the European Union. Private consumption grew weakly, held back by the contraction in household purchasing power of. Investment spending has not recovered the sharp decline posted in the summer and the outlook has been clouded by the deterioration in business confidence and uncertainty. In the first two months of this year, industrial production recovered from the downturn registered in the autumn.

Employment growth slowed over the past six months, but the divergence between developments in fixed-term and permanent employment narrowed. Inflation remains below that of the euro area as a whole, and the wage acceleration seen in the first half of 2018 is dissipating.

The short-term models of the Parliamentary Budget Office (PBO) indicate that GDP began to expand again in the first quarter, compared with the previous period, albeit only slightly. The forecasts for the second quarter, which are affected by greater uncertainty, point to barely positive growth. The forecasts are exposed to various risks. The international environment could be affected by new trade restrictions, as well as specific risks in China and the United Kingdom. The Italian economy also remains exposed to the volatility of yields on government securities.

[*] *Prepared by the Macroeconomic Analysis Department. Information updated to 10 April 2019.*

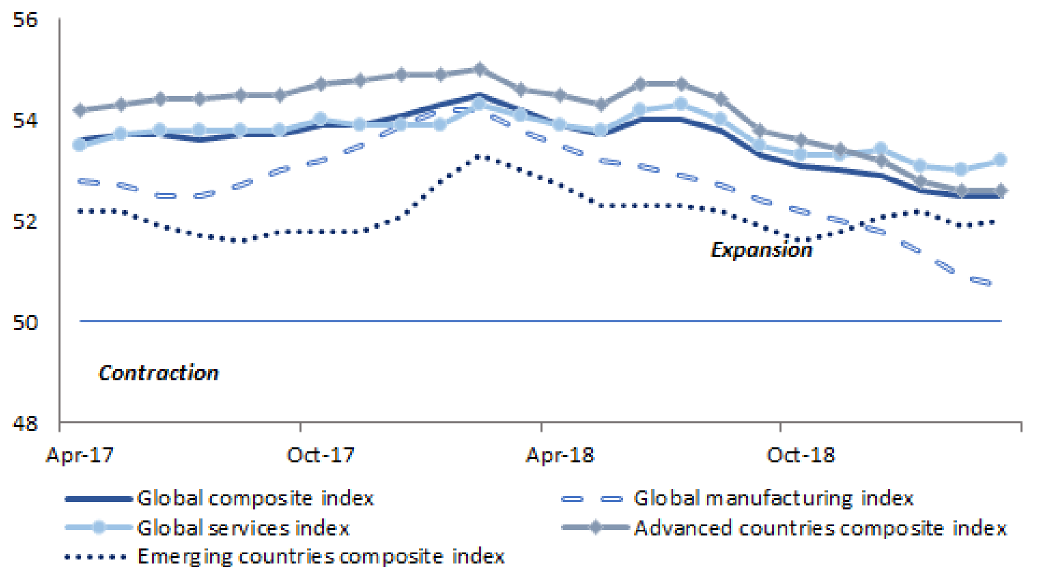
The international environment

The slowdown in global economic activity is spreading …

The deceleration in economic activity, which last year had manifested itself especially among the world's exporting countries, spread to the other major economies in the early months of 2019. Indices of the confidence of purchasing managers (Markit Purchasing Managers Index, or PMI) are showing a broad weakening, with their value approaching 50, i.e. the threshold dividing expansion from contraction (Figure 1). Since the middle of last year, all major international forecasters have repeatedly revised their growth estimates downwards, especially for 2019.

In the United States, GDP growth slowed to 2.2 per cent in the last part of the year (change on previous period in annualised terms), down from 3.4 per cent in summer. The government shutdown between the end of 2018 and the start of 2019 appears to have had only a moderate effect. Growth was driven by consumption and investment, while the contribution of net exports and government spending was slightly negative. However, the deceleration of output did not impact the labour market, with unemployment remaining below 4.0 per cent in the first few months of the year.

Figure 1 – JP Morgan Global PMI (1)
(three-month moving average)



Source: IHS Markit.
(1) Confidence indicators based on the assessments expressed by corporate purchasing managers. A value of more than 50 indicates an expansion.

In the euro area the cyclical weakening of last year was more evident, although the most recent data for gross domestic product showed a small recovery compared with the third quarter. In the summer, European economic conditions were heavily affected by the concomitant decrease in activity in Italy and in Germany, where GDP subsequently stabilised. According to some analysts, the slowdown in Germany was mainly caused by a sharp contraction in the automotive sector, as a result of the new more restrictive emission standards.

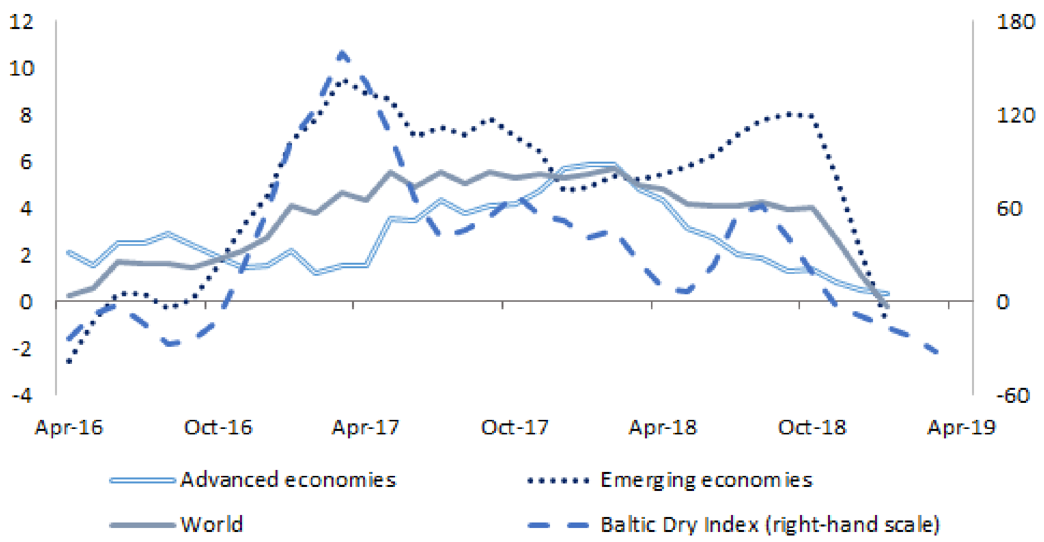
In Japan, fourth-quarter GDP returned to growth after the decline in the previous period. The recovery was driven by domestic demand, while net exports made a negative contribution.

The slowdown is also affecting the major emerging economies. In China, fourth-quarter growth was the slowest since the beginning of 2009. The Chinese government has already has expansionary fiscal measures ready, involving value added tax and support for lending. Their effectiveness is uncertain, however.

... as is the deceleration in international trade

Although trade tensions between the US administration and China have recently diminished, international trade remains weak. Trade last year was heavily impacted by the uncertainty over restrictive measures. The most recent indicators for maritime freight costs (Baltic Dry Index, Figure 2) show that the deceleration in international trade is still in progress.

Figure 2 – Growth rate of imports and index of maritime freight costs
(annual percentage change in 3-month moving average)



Source: based on CPB and Thomson Reuters Datastream data.

Table 1 – IMF forecasts
(percentage change and difference in percentage points)

	WEO April 2019		Difference with WEO update January 2019	
	2019	2020	2019	2020
World GDP	3.3	3.6	-0.2	0.0
Advanced economies	*1.8*	*1.7*	*-0.2*	*0.0*
United States	*2.3*	*1.9*	*-0.2*	*0.1*
Euro area	*1.3*	*1.5*	*-0.3*	*-0.2*
Emerging economies	*4.4*	*4.8*	*-0.1*	*-0.1*
World trade	3.4	3.8	-0.6	-0.2

Source: IMF, World Economic Outlook, April 2019.

IMF forecasts

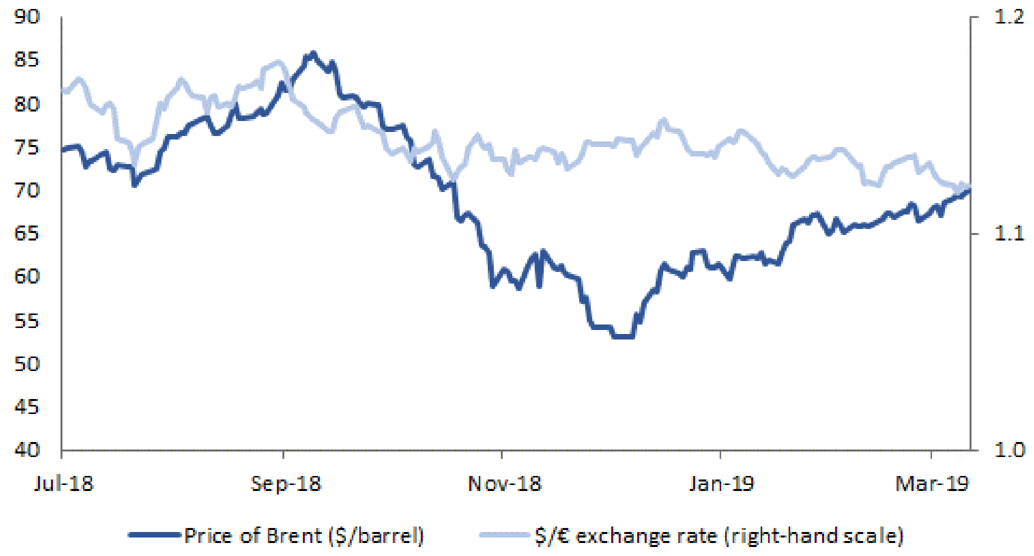
In its most recent World Economic Outlook, of April, the International Monetary Fund (IMF) again lowered its growth forecasts for 2019. This year, world GDP is expected to grow by 3.3 per cent (Table 1), a further downward revision of two-tenths of a percentage point compared with the January update. The largest revisions for 2019 regarded the advanced economies, while the growth forecast for the emerging economies was trimmed only slightly. The projection for international trade was cut most substantially, reflecting both slower growth and protectionist strains.

Oil prices recover due to supply restrictions

In the closing months of 2018 the price of oil fell sharply, reflecting both weakening demand and more abundant than expected shale oil production in the United States. Subsequently, the producing countries reacted by agreeing to voluntarily reduce output in order to support prices. These agreements led to a rise of $15 per barrel for Brent oil between the end of 2018 and the beginning of April, when the price returned to just under $70.

The dollar has been substantially stable since November. The exchange rate fluctuated in a narrow range between $1.12-1.15 per euro, but with the trend remaining flat in the absence of significant surprises on the part of the monetary authorities for their respective currencies (Figure 3).

Figure 3 – Oil prices and dollar/euro exchange rate



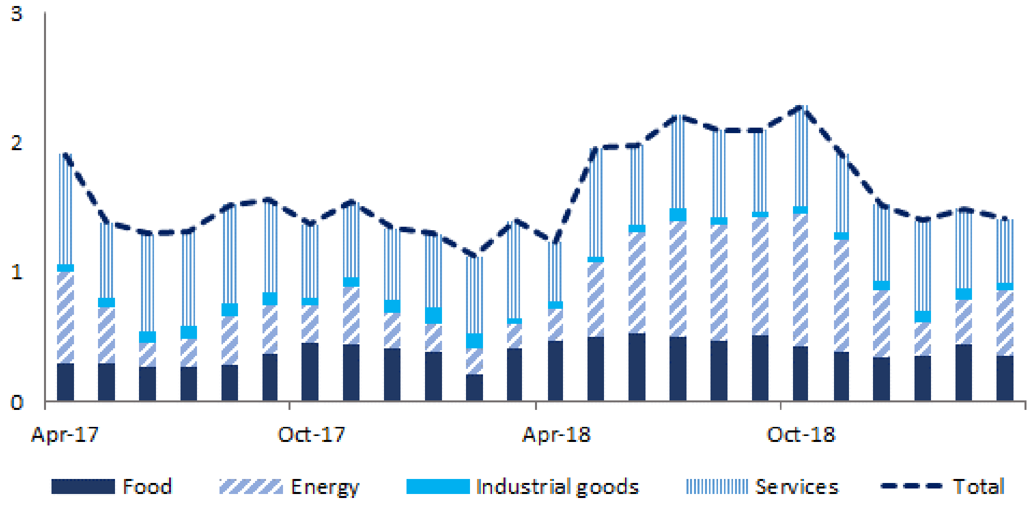
Source: Thomson Reuters Datastream.

Euro area inflation falls again

Supported by energy prices, euro-area inflation had returned to close to the European Central Bank's (ECB) target in the second half of 2018. The gradual weakening of demand-side pressures, together with the slump in oil prices, subsequently reduced consumer price inflation to 1.5 per cent (Figure 4). At the same time, inflation expectations also declined (Figure 5).

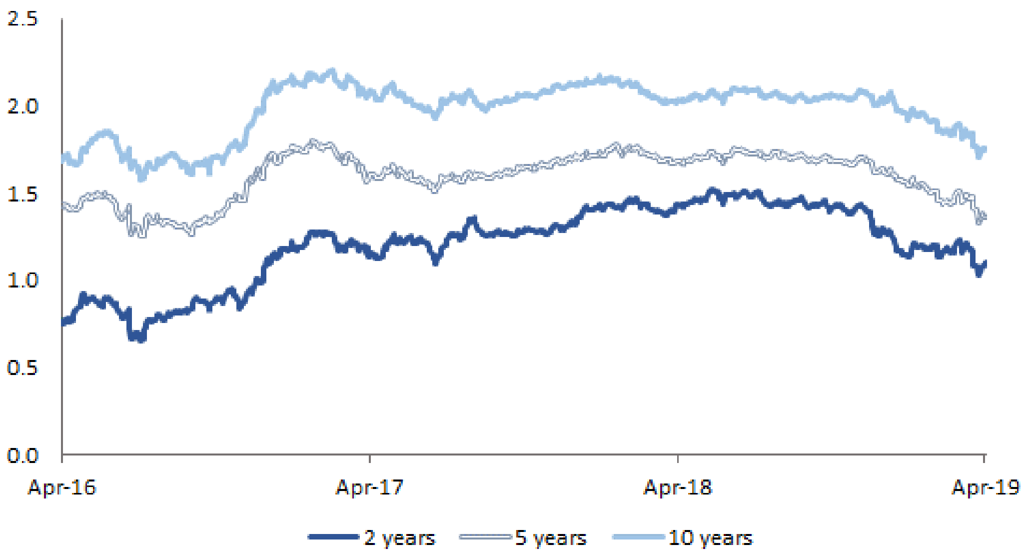
In an attempt to achieve its price stability target, at its last meeting the ECB announced that as from next September it will begin a new programme of longer-term refinancing operations (TLTRO-III) in order to preserve favourable conditions for bank lending and the orderly transmission of monetary policy, granting loans on attractive conditions in proportion to loans outstanding at the end of February this year. The measure is intended to ease bank lending to households and firms, thus providing support to the euro-area economy.

Figure 4 – Inflation in the euro area
(percentage change on year-earlier period and contributions)



Source: based on Eurostat data.

Figure 5 – Inflation expectations implicit in inflation swaps
(percentages)



Source: Thomson Reuters Datastream.

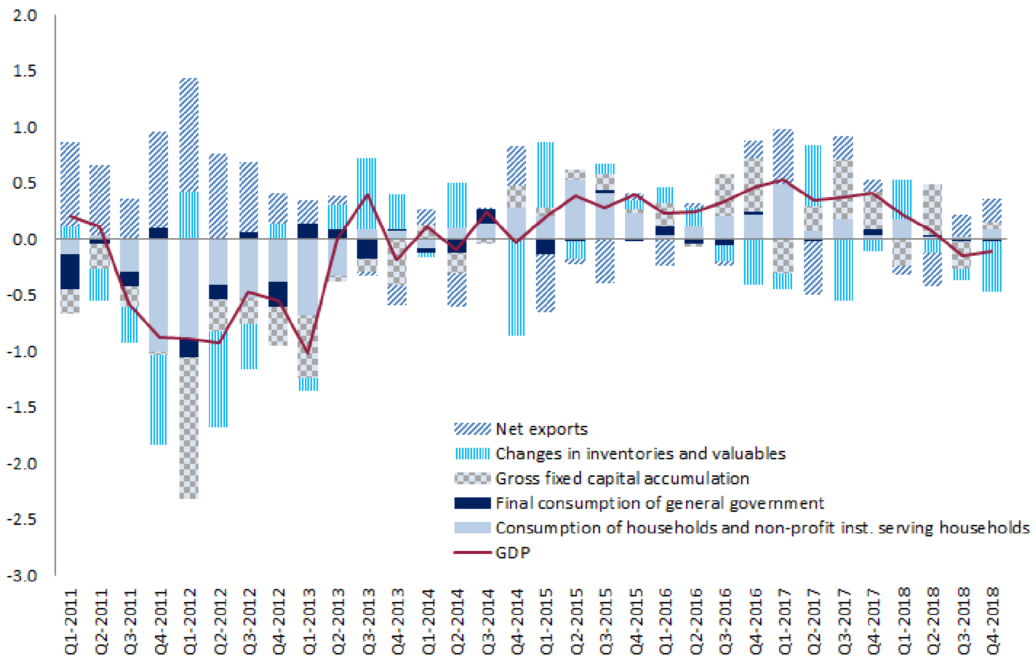
The Italian economy

Economic activity remains weak

Last year, Italian economic growth decelerated to 0.9 per cent, from 1.7 per cent in 2017. According to the updated annual accounts, released on 9 April, the role of domestic demand in the slowdown was slightly greater than that of net foreign demand. The pace of growth declined during the year, becoming slightly negative in the third and fourth quarters. For the latter period, the quarterly national accounts published on 5 March estimated a decrease of 0.1 per cent on the previous period (from the -0.2 per cent indicated in the preliminary estimate at the end of January).

Economic activity in the final part of 2018 was primarily slowed by inventory building, which subtracted 0.4 percentage points GDP growth (Figure 6). By contrast, slightly positive contributions came from domestic demand net of inventories (0.1 percentage points) and net foreign demand (0.2 percentage points). On the supply side, value added in agriculture and industry contracted with respect to the previous period (by -1.1 and -0.5 per cent respectively) and was barely positive for services.

Figure 6 – GDP growth and contributions of the components of demand
(percentage change on previous period and contribution in percentage points)



Source: based on Istat data.

Private consumption slowed by purchasing power ...

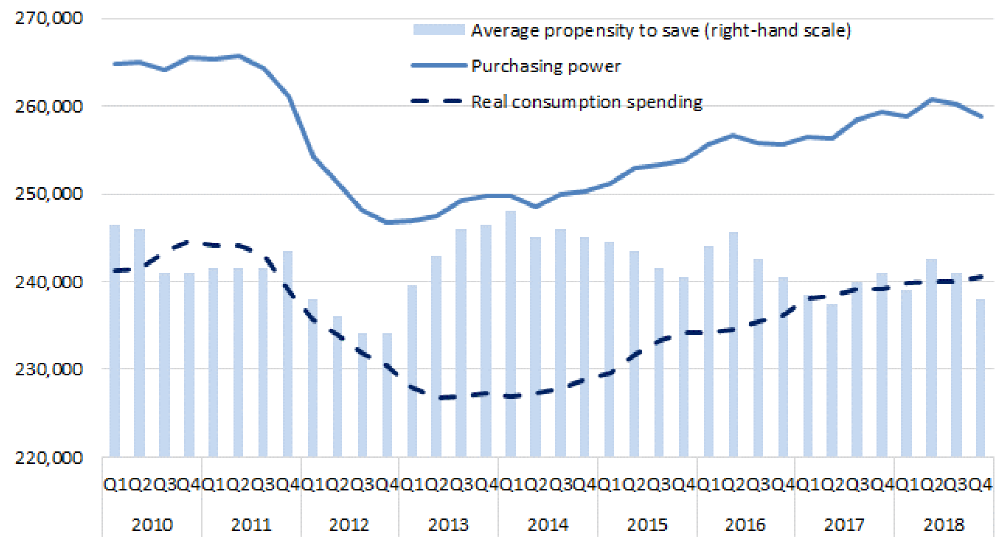
After two quarters of stagnation, household consumption recovered in the fourth quarter (an average of 0.2 per cent over the previous period), thanks to purchases of durable goods. The recovery in consumption occurred despite the reduction in household purchasing power, which led to a decline in the propensity to save to 7.6 per cent, about half a percentage point lower than the average for the last two years (Figure 7).

Consumer confidence, which had already shown signs of deterioration in the last few months of 2018, especially in consumer assessments of the general economic situation, also saw its other components worsen further last quarter. The less favourable climate of confidence, coupled with growing economic uncertainty, could negatively impact household purchases in the short term.

... and the investment outlook is not favourable

In the final part of 2018, the sharply erratic developments in investment eased, although it recovered only 0.3 per cent on the previous period (after the 1.3 per cent decline registered in the summer). The rise was driven by capital goods and transport equipment, while capital accumulation in residential construction continued the moderate growth that began in the second half of 2017. By contrast, expenditure on non-residential buildings contracted. The investment rate (i.e. the ratio of gross fixed capital accumulation to value added at basic prices) remained above the values preceding the global financial crisis. Profitability (measured as the ratio of gross operating profit to value added at basic prices) recovered only marginally from the low for the last three years, which was recorded in the summer.

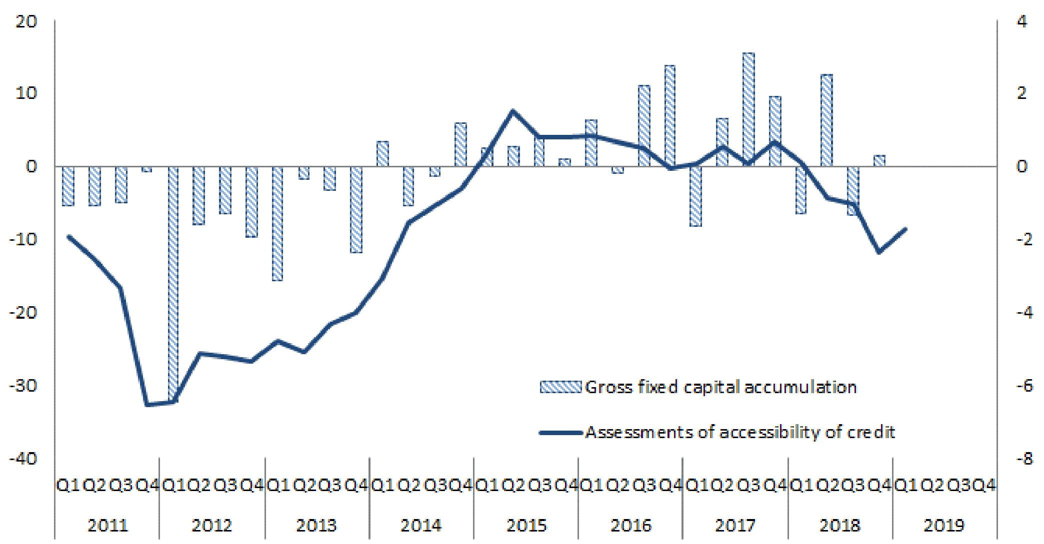
Figure 7 – Household income, consumption and saving
(millions of euros and percentage shares)



Source: based on Istat data.

Survey data point to a continuation of weak capital accumulation in the short term. The Istat business confidence survey conducted in March showed a further deterioration in balance of assessments of domestic orders for capital goods in the first three months of this year. Assessments of lending conditions also deteriorated progressively during the year (Figure 8), especially for small businesses.

Figure 8 – Gross fixed capital accumulation and assessments of credit conditions
(percentage change and percentage balance)



Source: based on Istat data.

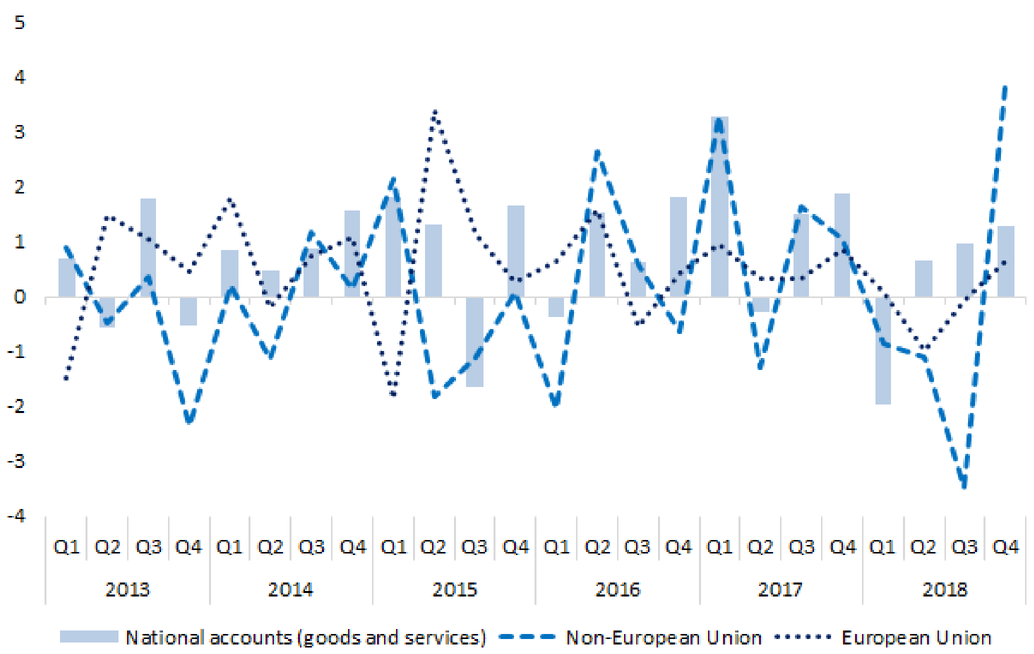
Foreign trade recovered in the autumn

In 2018, foreign sales were affected by the deceleration in international trade. However, the sharp decline in the first quarter (Figure 9) was followed by a period of progressively more robust expansion. The pace of growth in the final quarter was about 1.3 per cent compared with the previous period, exceeding the average for the euro area (0.9 per cent). With regard to export markets, monthly merchandise trade data show that sales outside the European Union were particularly volatile, falling sharply in the summer before rebounding strongly at the end of 2018. Sales within the European Union, while less erratic, also registered growth in the final part of last year.

Istat surveys among exporters of manufacturing goods provide mixed signals: March's readings for the first quarter show an improvement in expectations for turnover on international markets compared with the last quarter of 2018, while the assessments of foreign orders deteriorated for the sixth consecutive quarter.

The recovery of exports in the final part of 2018 was accompanied by smaller increases in the volume of total imports (0.7 per cent in October-December compared with the third quarter), probably reflecting the weakness of investment, which normally has a strong impact on purchases from abroad. Imports continued to grow less robustly than sales of goods and services abroad the first few months of this year as well.

Figure 9 – Exports (total and by geographical area) (1)
(percentage change on previous period)



Source: based on Istat data.
(1) The histograms represent changes on the previous period in the chain-linked values of total exports drawn from the national accounts. The lines show changes on the previous period in the volume of exports of internationally traded goods, seasonally adjusted by the PBO.

The latest economic indicators

Industrial production, which had declined steadily between September and December, posted two consecutive increases on the previous period in the first two months of the year, returning to a level close to that seen at the end of the summer. According to PBO estimates, output growth increased by about 1 percentage point compared with the October-December average. Analysing developments across the various sectors of economic activity, we find that the number of sectors experiencing a positive growth rate has increased slightly compared with the fourth quarter of 2018 (the PBO diffusion index is around 54 per cent). However, signs of a deterioration in the outlook for manufacturing are evident in qualitative indicators, including the PMI and the Istat index on manufacturing confidence.

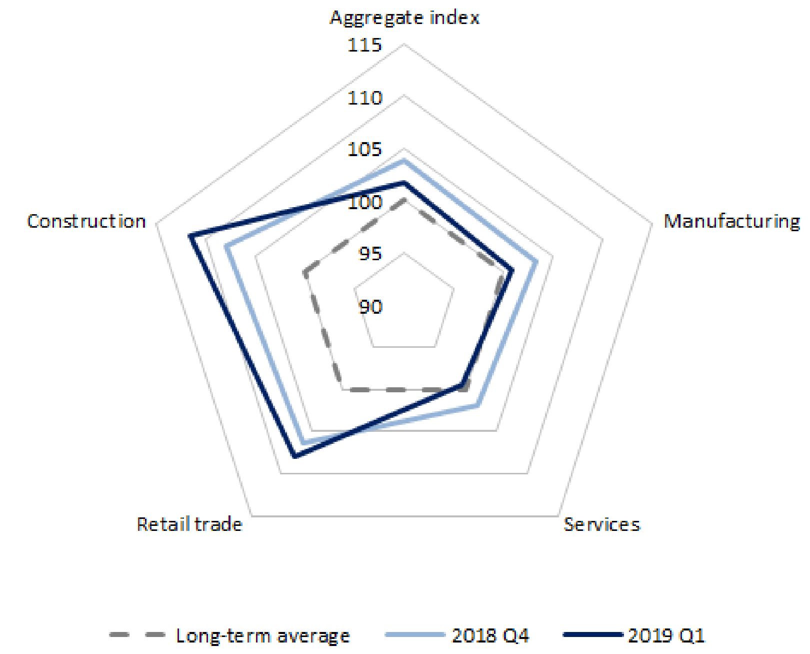
After having weakened in the summer, output in construction is recovering at a moderate pace. The increase in January (0.6 per cent on the previous period) returned it to the level registered last September. Value added in services increased moderately in the fourth quarter of last year, after having stagnated in the previous period. Turnover in services also increased in the fourth quarter compared with the previous period (0.4 per cent), thanks to widespread and larger increases for travel agencies and business services, transportation and storage services, and accommodation and catering services, as well as professional, scientific and technical activities. However, the most recent qualitative indicators provide mixed signals about the outlook: the PMI for services jumped in March, interrupting the progressive decline that characterised 2018. The Istat confidence index for the market services sector registered its fifth consecutive average decline in the first quarter, despite a slight recovery in March.

For all sectors, the composite index of business confidence, obtained as the weighted average of sectoral indices, decreased last quarter. The increases reported in construction and retail trade were more than offset by the downturns in industry and services (Figure 10).

Household and business uncertainty continues to rise. Although still below the highs registered in 2013-2014, the PBO uncertainty indicator began to deteriorate from the end of 2018 (Figure 11), mainly driven by the construction and manufacturing sectors.

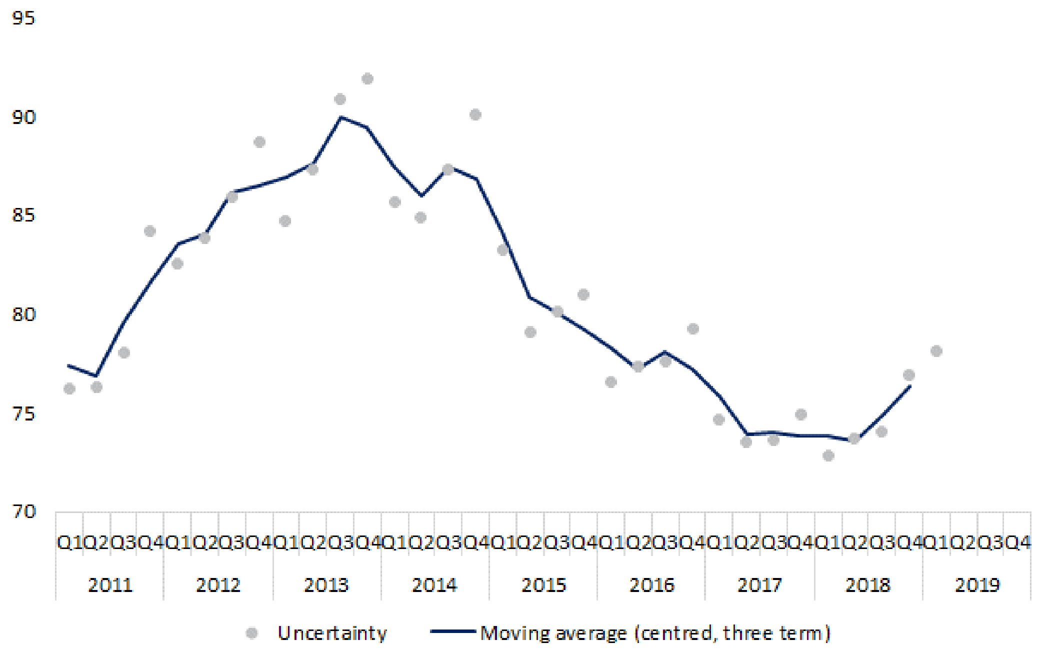
The composite economic indicators published by various institutions are consistent in signalling a decline in economic activity. In March, the Bank of Italy's coincident indicator, ITA-coin, recorded its seventh consecutive decline on the previous period. In the same month, the Istat leading indicator continued its downward trend, which has been under way since the end of 2017.

Figure 10 – Confidence in productive sectors (1)
(index; average January 1998 – March 2019=100)



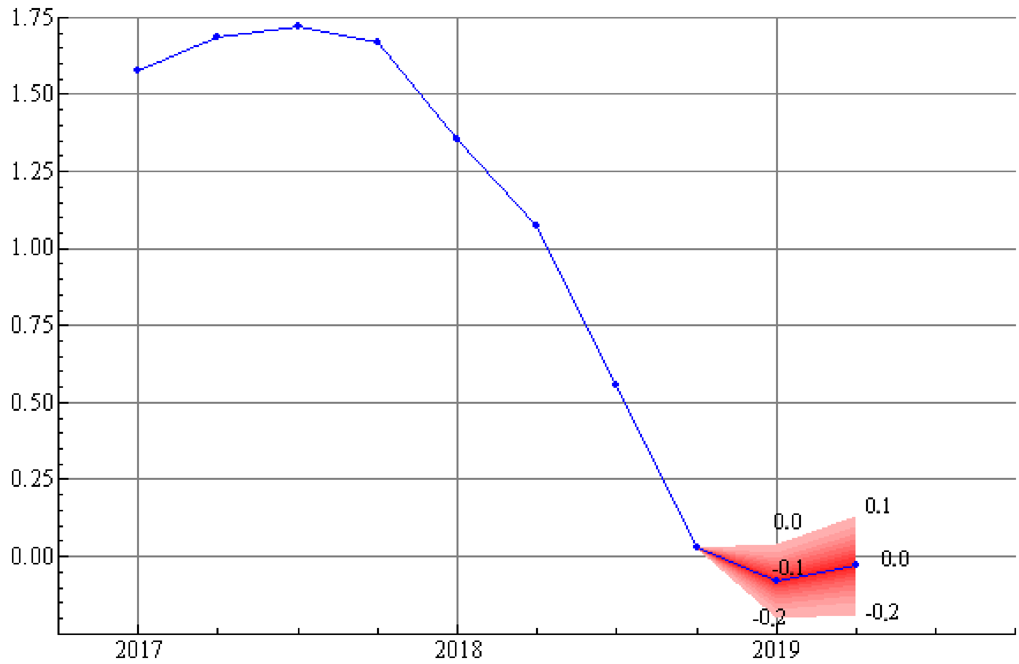
Source: based on European Commission and Istat data.
(1) The aggregate confidence indicator is constructed by applying the weights used by Istat to produce the Istat Economic Sentiment Indicator (IESI) to the time series (standardised) of sectoral confidence indicators of the European Commission.

Figure 11 – Indicator of uncertainty
(index, 1993 Q1=100)



Source: based on Istat data.

Figure 12 – Forecasts for year-on-year GDP growth (1)



(1) The error bands regard a confidence interval of 90 per cent around the central scenario.

Short-term forecasts

The current weakness of economic activity is also reflected in short-term forecasts, which show activity recovering slightly in the early months of the year. In the first quarter, GDP is expected to have expanded by 0.1 per cent (within a symmetrical confidence band between 0.0 and 0.2 per cent. The corresponding year-on-year change is slightly negative; Figure 12), boosted mainly by the revival of manufacturing. In the current quarter, GDP is forecast to expand at a similar pace to the previous three months (with a slight improvement year-on-year), but with a greater degree of uncertainty.

Employment growth slows

In the second half of 2018 the labour market was adversely impacted by the slowdown. Labour input, measured by hours worked in the national accounts, decelerated in the third quarter compared with the previous period (0.3 per cent, from 0.7 per cent in the second), followed by a contraction in the fourth (-0.3 per cent). Labour demand, measured in terms of payroll jobs (on the basis of existing employment contracts), stagnated in the second half of the year, with the decline in employment in services being partially offset by a recovery in manufacturing and construction.

According the Labour Force Survey, the number of persons employed decreased in both the third and fourth quarter (-0.2 per cent in both periods) due to the fall in both payroll employment and self-employment.

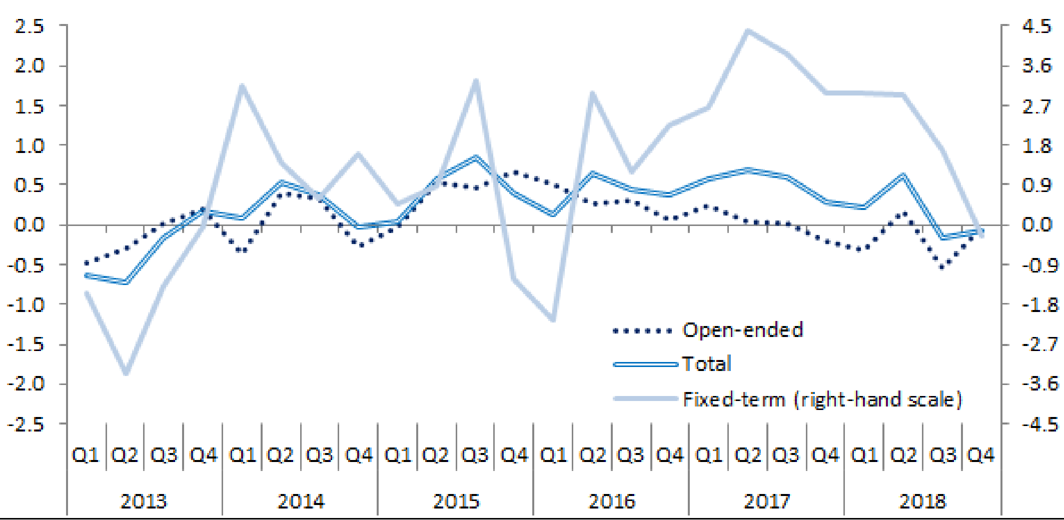
The reduction in the number of payroll workers in the third quarter was due both to the decline in the number of workers on permanent contracts (-0.5 per cent on the previous period, from 0.2 per cent in the second quarter) and the slowdown in fixed-term employment, which subsequently contracted (-0.3 per cent in the fourth quarter) for the first time since the beginning of 2016 (Figure 13).

Employment growth at the start of this year remained weak. Preliminary data for the period January-February show a slight expansion (0.1 per cent compared with the fourth quarter of 2018), driven by open-ended employment (0.3 per cent), while fixed-term employment contracted in the same period (-0.7 per cent).

According to INPS administrative data, the slowdown in fixed-term employment under way since the summer mainly reflects the considerable growth in transformations of temporary positions to open-ended contracts. This trend is estimated to have intensified in the final months of 2018 and in January of this year.

The number of persons seeking employment, which decreased until the third quarter of 2018, increased again in the autumn. The unemployment rate displayed a similar pattern, increasing by 0.3 percentage points in the fourth quarter (to 10.6 per cent). In the early months of this year, the unemployment and inactivity rates were substantially unchanged.

Figure 13 – Change in payroll employment
(percentage change on the previous period)



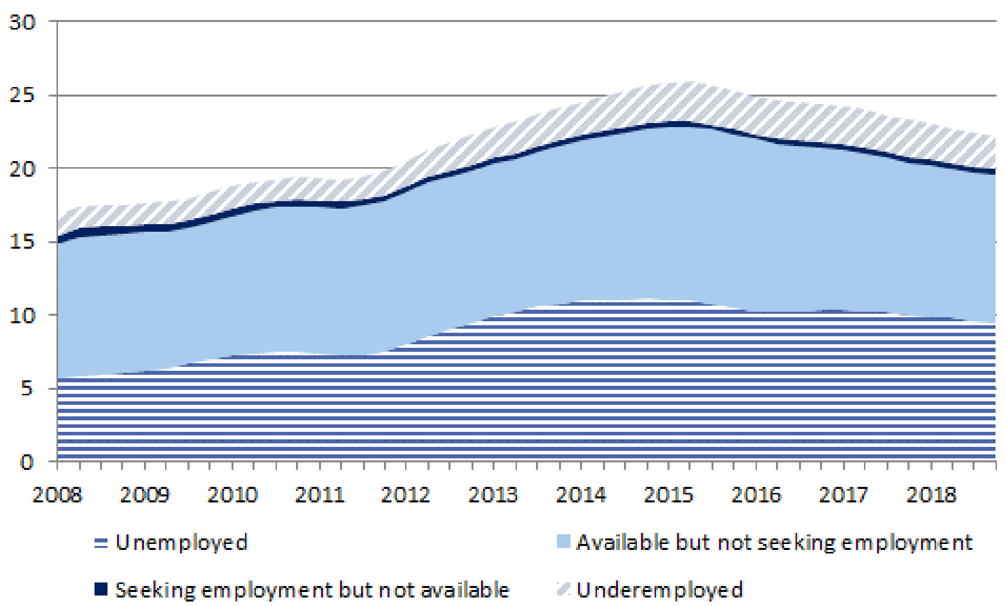
Source: based on Istat data.

The underutilisation of labour remains extensive, although it has gradually diminished by comparison with recent years. The labour slack indicator measures excess supply in the labour market, which in addition to the unemployed and the potential additional labour force includes those who would be willing to work more hours (the underemployed). On the basis of this information, in the fourth quarter of 2018 underemployment was equal to about 22.0 per cent of the potential labour force (Figure 14), still quite distant from the official unemployment rate.

Wage growth has gradually diminished after the temporary increase in the first half of 2018. In the fourth quarter, the variation in hourly contractual earnings for the entire economy (1.8 per cent year-on-year) was slightly lower than the previous three months. On average this year, the growth of this aggregate was outpaced by the rise in actual earnings.

In the fourth quarter, hourly productivity recovered slightly (0.2 per cent compared with the previous period), as value added declined by less than the hours worked. The recovery in productivity was driven by the services sector, while the decline in manufacturing and construction continued, albeit more moderately. Labour costs have slowed significantly since the third quarter and unit labour costs have consequently decelerated, due in part to the contribution of productivity.

Figure 14 – Unemployment, potential additional labour force and underemployment (1)
(4-period moving average; percentage shares)



Source: based on Istat data.
(1) Persons aged 15-74.

Consumer price inflation remains weak and lower than that for the euro area

Consumer price inflation in Italy in the early months of the year was slightly lower than the average for 2018 (1.1 per cent), both for the general index for the entire population and for core inflation. The weak inflationary pressures also reflect an attenuation of the pass-through of cost increases to prices, with a compression of profit margins.

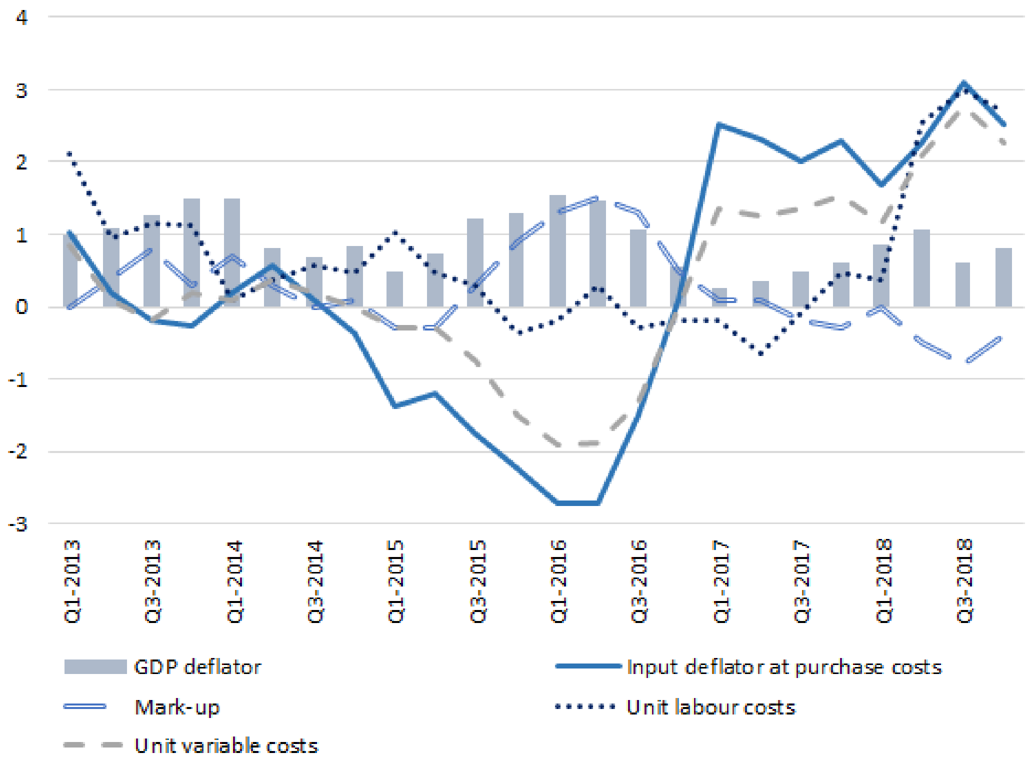
According to provisional Istat data, consumer price inflation in March (national consumer price index) remained stable at the previous month's level (1.0 per cent year-on-year), while core inflation, which excludes the prices of energy and unprocessed food, increased marginally (to 0.5 per cent), remaining below the 2018 average (0.7 per cent). In March, the year-on-year rate of inflation was slightly higher in the goods sector (1.5 per cent, from 1.3 per cent in February) and to a more marked extent for unregulated energy products (3.3 per cent, compared with 0.8 per cent). Conversely, the rate of increase declined for food products (1.4 per cent in March, from 1.7 per cent the previous month) and tobacco products (down five-tenths of a point from February). By contrast, price developments were stable or slightly negative in all segments of services, with the exception of recreational, cultural and personal care services (which accelerated by a tenth of a point compared with February).

Inflation is still not very widespread among the components of the index. In the first two months of the year, 88 per cent of the items in the harmonised consumer price index showed price increases of less than 2 per cent (compared with 82 per cent in the fourth quarter of last year); the share of items still experiencing deflation (26 per cent) remains significant.

The recent slowdown in import prices (0.4 per cent year-on-year in January, down from an average of 3.0 per cent in 2018) is reflected in the producer prices of industrial goods (3.1 per cent in February, compared with 4.5 per cent in the previous six months), mainly due to the deceleration of the energy component. Prices decelerated on the domestic market (3.9 per cent, from 4.4 per cent in January), continuing the trend that began last autumn. The slowdown was abrupt in the construction sector, where in February the prices of residential buildings returned to their level a year earlier. On the other hand, the rise observed in the last two years in the producer prices of services continued, increasing by 2.2 per cent in the fourth quarter of 2018.

The GDP deflator (Figure 15) remains around 1 per cent year-on-year. In 2018 the rise in the input deflator at purchaser prices and unit variable costs increased, but at the same time profit margins were squeezed even further.

Figure 15 – GDP deflator, production costs and margins
(percentage change on year-earlier period)



Source: Istat.

The inflation expectations of businesses and households as measured by Istat's confidence surveys remain cautious. In the first three months of the year, more than half of households expect stable prices and only 13.8 per cent forecast price increases in the following 12 months. Business expectations for sale prices also remain moderate, having already been revised downwards since the autumn. In the first quarter, compared with the previous three months, the balance between those who expect prices to increase and those expecting a decrease was virtually unchanged at a low level by comparison with the previous three years.

Box – The short-term forecasts of the PBO and the new indicators

The official data on the state of the economy are disseminated by the National Statistics Institute with a delay, due to the time needed to gather information and process it. In particular, the timing of the release of GDP data was recently set at the EU level at about 30 days after the end of the quarter for the first estimate and 60 days for the second release, which also includes the variables of the resources and uses account and supply-side components.

Therefore, when drafting budget documents, or when a macroeconomic scenario is being constructed to assess current and future developments in economic and public finance variables, only partial information is available on the current state of the economy. Specifically, the macroeconomic estimates in the Economic and Financial Document (EFD) formulated in the spring are based on GDP data and components for the year just ended. Similarly in September, in preparing the Update to the EFD, the quarterly national accounts are updated only up to the second quarter. The medium-term forecasts in the budget documents are therefore constructed with the help of short-term projections of the data, which are useful for calculating both the annual growth mechanically achieved for the current year (in the spring) and the statistical carry-over effect for the following year (in the autumn).[2] It is therefore crucial for a fiscal council to also have tools to develop short-term macroeconomic forecasts for the time interval preceding the publication of official data.

There is a vast literature on forecasting economic variables in the current period, a practice called nowcasting to distinguish it from the forecasting of the future values of the variables of interest. Since its establishment, the PBO has equipped itself with a range of tools associated with the most consolidated strands of the literature (bridge models, mixed frequency models, factor models and MIDAS models).[3] Some tools estimate GDP directly, while others obtain it by aggregating components on both the demand and supply-side. In all cases, timely and high-frequency economic indicators are used (usually monthly). The information set is sometimes represented by a small number of very informative variables; in other cases a large dataset is used and statistical procedures are employed to select the most useful indicators for the forecast. The models are evaluated in terms of the statistical significance of the estimated parameters and of the forecast error. The estimates are then supplemented with appropriate confidence bands, which describe the uncertainty of the forecasts. The results of these calculations, point estimates and confidence bands are regularly published in the "Report on recent economic developments" produced every three months by the PBO (see the section "Short-term forecasts").

In the first three years of its existence, the PBO produced short-term GDP forecasts with a very small error with respect to both the preliminary estimate of the official figures and the final figures three years after publication (Table B1). As often happens in the literature, the forecasts are conservative with respect to business cycle developments and therefore the greatest error is generated at the times the economic cycle is reversing. Nevertheless, considering the forecasts produced since 2015, overestimations and underestimations of GDP have tended to balance each other out, so much so that the distortion of the forecast is virtually nil, especially for the definitive Istat figures.

[2] The annual change (between T and T-1) in GDP, a flow variable, is a function of the short-term changes (with respect to the previous period) for the seven quarters between the second in year T-1 and the fourth in year T. It is possible to measure how much of the annual growth has been achieved before data for all seven quarters are available, assuming that in the missing quarters GDP remains unchanged. We therefore obtain a measure of the annual growth that has already been "achieved" as of a given quarter (both in T-1 and in T). When calculated on the basis of quarters in T-1, the achieved change in annual growth for T is also referred to as the statistical carry-over effect.

[3] For more details, see UPB (2018), "The PBO's macroeconomic forecasting tools".

Table B1 – Forecast error of PBO’s short-term GDP models (1)

	Preliminary figure	Final figure (2)
Mean error	0.03	-0.01
Mean absolute error	0.12	0.12
Mean squared error	0.16	0.15

(1) The error is calculated on the basis of GDP growth rates on previous period (between 2015 and 2018), estimated immediately after the issue of the preliminary estimate for the previous quarter. – (2) “Final figure” is the most recent publication of data, released by Istat on 5 March 2019.

Recently the short-term forecasts have become relevant owing to the special cyclical conditions of the Italian economy, since economic data, and therefore the medium-term forecasts, have been deteriorating steadily since last summer. In February, the European Commission revised its forecasts downwards for Italy’s GDP growth in 2019 to 0.2 per cent, from the 1.2 per cent indicated in the autumn. In the April EFD, the Government lowered its policy forecast for growth in 2019 to 0.2 per cent from 1.5 per cent in October. The availability of up-to-date and reliable information on the state of the economy therefore becomes crucial at this stage, when one is trying to determine whether the slowdown is temporary or instead the sign of a broader recession.

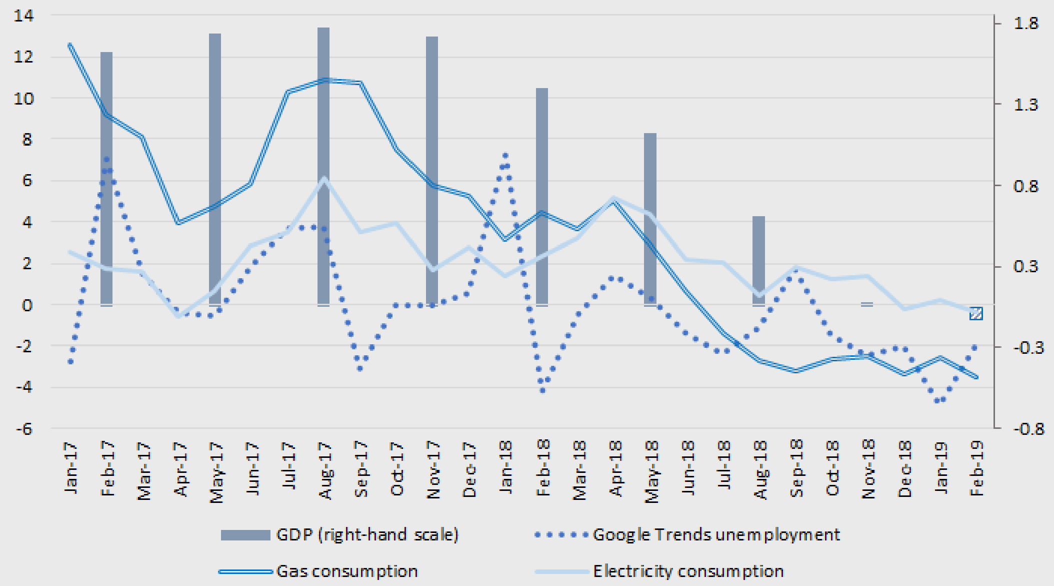
As part of the periodic review of its short-term forecasting models, the PBO has reconsidered the indicators used in its models, identifying new timely-available and informative variables. More specifically, the following indicators were selected: rail freight transport, gas consumption in industry, electricity consumption and the frequency the word “unemployment” appears in searches on Google Trends. These series are particularly timely, with gas consumption and Google Trends data available almost in real time. Analysing trends in the series, we can observe a common deterioration starting from the summer of last year (Figure B1), which continues in the early months of 2019. This trend is reflected in the short-term forecasts for GDP, which point to weak growth in economic activity for the first quarter of this year (see the section “Short-term forecasts”).

An evaluation of the predictive capacity of the models using historical data[4] suggests that the introduction of new indicators reduces the forecast error on average, especially in the first month of the quarter, i.e. when there is less information on the state of the economy (Table B2).

Ultimately, the evaluation of short-term developments play a crucial role in the assessment of the budget documents, so the PBO is continuing to develop the modelling for quarterly short-term forecasts. The performance of the models used by the PBO has been satisfactory in recent years, but the introduction of new short-term indicators could improve it even further.

[4] The exercise consists in forecasting GDP for a given period in the past, and then comparing the forecast value with GDP actual developments. Account was taken of the lag with which economic indicators are published but not of data revisions.

Figure B1 – Indicators of economic activity and GDP growth
(percentage change on year-earlier period)



Source: for indicators: based on Terna, Snam and Google data; for GDP: Istat. The series for rail freight transport has not been published for confidentiality reasons.

Table B2 – Estimated contribution of new indicators to GDP forecast error (1)

	First month of the quarter	Second month of the quarter	Third month of the quarter	Average
1 quarter ahead	0.91	1.01	0.89	0.94
2 quarters ahead	0.91	1.08	0.79	0.93
Average	0.91	1.05	0.84	0.93

(1) The table reports the ratio between the mean squared error of the GDP forecasting model that includes the new indicators and that for the model that does not include them. Values of less than one indicate greater precision in the extended model. The simulation exercise was conducted using a recursive procedure over the 2013 Q1-2018 Q4 period. The dataset is that available as at 30 March 2019.