

# GLOBAL ECONOMIC OUTLOOK - OCTOBER

Monetary Department  
External Economic Relations Division

2016



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**Cut-off date for data**

14 October 2016

**CF survey date**

10 October 2016

**GEO publication date**

21 October 2016

**Notes to charts**

ECB and Fed: midpoint of the range of forecasts.

The arrows in the GDP and inflation outlooks indicate the direction of revisions compared to the last GEO. If no arrow is shown, no new forecast is available. Asterisks indicate first published forecasts for given year. Historical data are taken from CF.

Forecasts for EURIBOR and LIBOR rates are based on implied rates from interbank market yield curve (FRA rates are used from 4M to 15M and adjusted IRS rates for longer horizons). Forecasts for German and US government bond yields (10Y Bund and 10Y Treasury) are taken from CF.

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<b>Milan Klíma</b> milan.klima@cnb.cz II.3 Germany	<b>Filip Novotný</b> filip.novotny@cnb.cz III.1 China III.2 India	<b>Jan Hošek</b> jan2461.hosek@cnb.cz V. Commodity market developments		

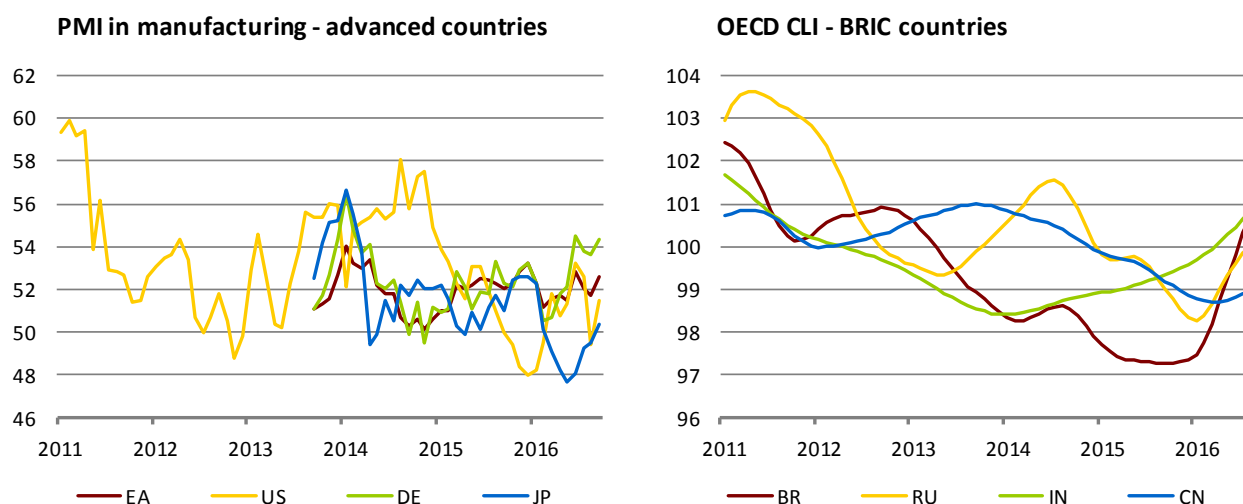
The October issue of Global Economic Outlook presents the regular monthly overview of recent and expected developments in selected territories, focusing on key economic variables: inflation, GDP growth, leading indicators, interest rates, exchange rates and commodity prices. In this issue, we focus in detail on the industrial producer price index (PPI), which, alongside the consumer price index (CPI), is a key indicator of inflation on the production side of the economy. We also explain the specifics of the PPI, especially in the EU, and present a model simulation indicating the sensitivity of the PPI to a change in oil prices.

The current annual economic growth outlooks for the euro area and Germany are showing a downward tendency until the end of 2017, to as low as 1.3% for both. By contrast, the world's strongest economy – the USA – is expected to accelerate and grow almost 1 pp faster than the euro area at the close of 2017. Comparisons with Japan reveal an even larger difference in forecasted growth. The inflation outlooks saw no major changes compared to the previous month. They were mostly confirmed, except for an upward revision for the US economy in 2017. The expected inflation figures for 2017 are close to the economic growth figures described above. The US economy thus remains one of the few advanced economies expected to achieve consumer inflation above the “magic” level of 2% next year.

As usual, the GDP growth outlooks for the BRIC countries were again heading in completely different directions in October. Compared to the previous month, they were virtually unrevised. On the one hand, the fast-growing Indian economy is expected to surge next year to almost 8% amid non-accelerating inflation. This positive development is complemented – despite all the well-known twists and turns – by still high economic growth in China, albeit with a weak downward tendency (to levels of just below 6.5%) and a declining outlook for inflation, which might drop below 2% for the first time in a long time. On the other hand, the economies of Russia and particularly Brazil, after overcoming this year's slumpflation (an economic slump accompanied by relatively high inflation), are expected to record almost identical macroeconomic parameters next year, albeit for different reasons. Their economic growth is expected to jump above 1% at inflation rates of just below 5.5%.

The outlooks for euro area interest rates remain very low, staying slightly negative at the shorter end of the yield curve and still showing no sign of growth until the end of 2017. For the time being, the intensity of unconventional monetary policy remains confirmed until the end of March 2017. A tapering of the stance, with gradually declining bond purchases, can be expected in the case of the ECB as well. As for the USA, the expected interest rate hike by the Fed is not likely to occur until the last meeting of the year. According to CF, the US dollar will appreciate with varying intensity against all the monitored currencies over the one-year horizon. The market outlook for the oil price points to a slight increase compared to the previous month, i.e. the oil price is expected to be around USD 55/bbl at the end of 2017. Natural gas prices based on long-term contracts, which are indexed to oil prices usually with a lag of 6 to 9 months, are expected to rise in the course of next year, reaching levels of just over USD 190/thousand m<sup>3</sup>. The outlooks for prices of food commodities and industrial metals for the end of 2017 increased compared to the previous month in almost all their components. This should increase the inflation pressures in the global economy.

## Leading indicators for countries monitored in the GEO

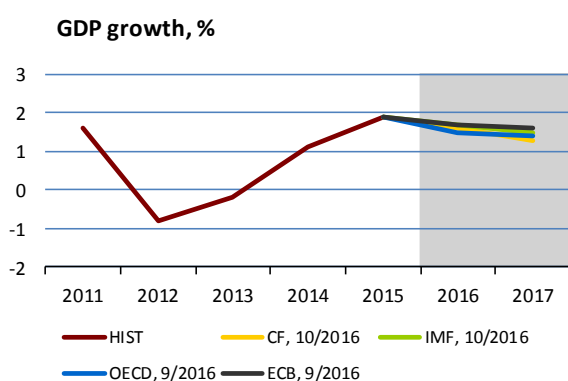


Source: Bloomberg, Datastream

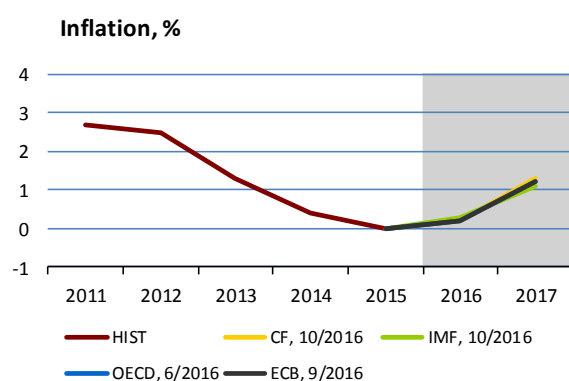
### II.1 Euro area

The economic sentiment and confidence indicators rose significantly across all categories in September. Expectations about new orders and final output improved. Industrial production increased year-on-year in August, with production of capital goods and energy rising again and production of durables surging compared to July. The PMI leading indicator in manufacturing rose to 52.6 points in September on the back of accelerating growth in new orders, new export contracts, jobs and output. Based on the developments in manufacturing, euro area GDP growth is expected to rise in 2016 Q4. Most economies are continuing to expand at a solid pace. Consumer confidence, which improved in September, reflected better prospects for savings and the overall economic situation. By contrast, negative expectations are still associated with the unemployment rate, which stood at 10.1% for the fifth consecutive month in August. This stagnation is due to mixed labour market situations across euro area countries. Annual retail sales growth fell sharply in August amid slowing growth in all components of sales and still subdued wage growth. The IMF increased its GDP growth forecast by 0.1 pp for both years under review, while the October CF raised its projection only for 2016. By contrast, the OECD lowered its outlooks by 0.1 and 0.3 pp respectively.

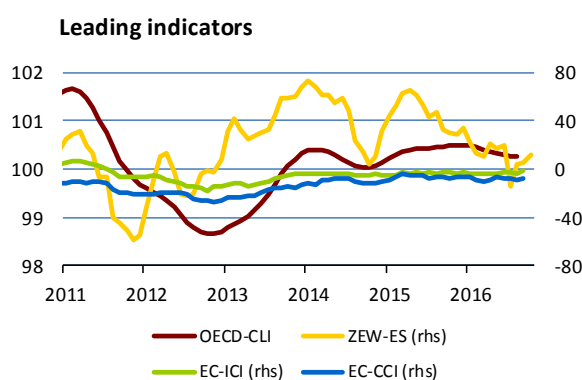
According to preliminary data, headline inflation rose in September to its highest level since October 2014 (0.4%). Prices of services and food rose significantly and the decline in energy prices shrank again. Core inflation stayed at 0.8%. According to the IMF, inflation will be slightly (0.1 pp) lower in 2016 compared to its April forecast. The October CF left its inflation outlooks unchanged. The year-on-year decline in the industrial producer price index slowed further in August (to 2.1%), but the month-on-month growth was slightly negative due to a decline in goods prices in the energy sector and flat prices of other types of goods. M3 growth rose to 5.1% in August. The 10Y Bund yield showed mixed trends compared to the previous month and was negative most of the time. Due to speculation about the ECB's monetary policy stance, the yield is currently positive again and is projected to remain so at the one-year horizon. The outlooks for short-term interest rates at the one-year horizon shifted upwards slightly, but remain negative.



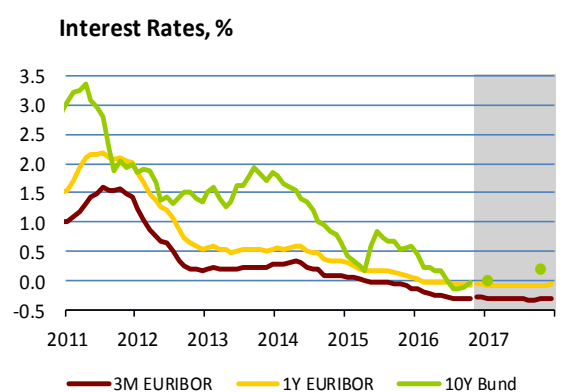
	CF	IMF	OECD	ECB
2016	1.6 ↗	1.7 ↗	1.5 ↘	1.7
2017	1.3 ↗	1.5 ↗	1.4 ↘	1.6



	CF	IMF	OECD	ECB
2016	0.2 ↗	0.3 ↘	0.2	0.2
2017	1.3 ↗	1.1 ↗	1.2	1.2



	OECD-CLI	ZEW-ES	EC-ICI	EC-CCI
7/16	100.3	-14.7	-2.6	-7.9
8/16	100.3	4.6	-4.3	-8.5
9/16		5.4	-1.7	-8.2



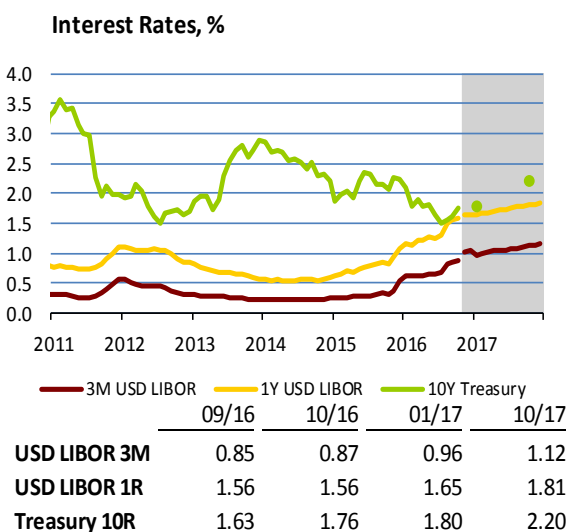
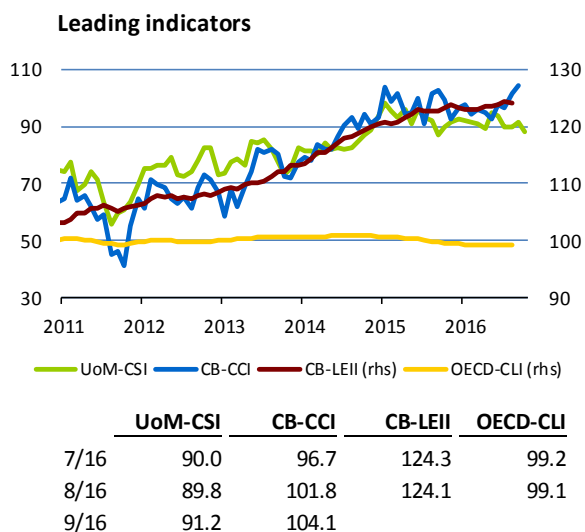
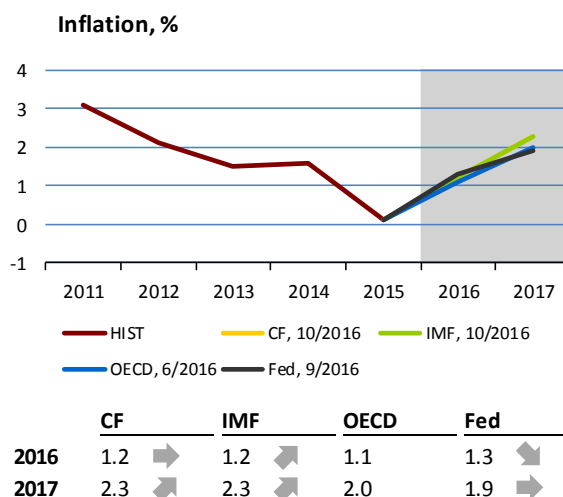
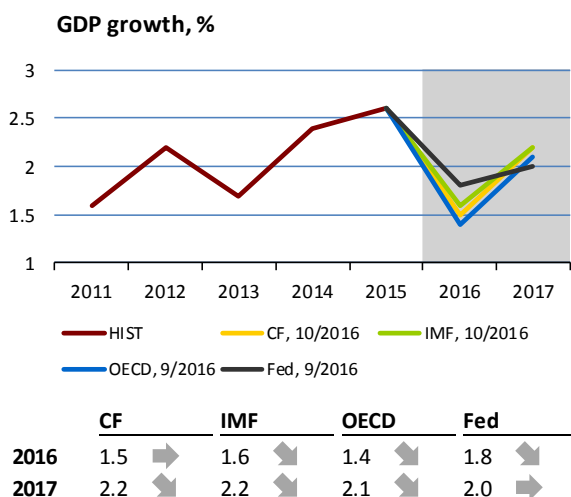
	09/16	10/16	01/17	10/17
3M EURIBOR	-0.30	-0.30	-0.30	-0.31
1Y EURIBOR	-0.06	-0.06	-0.07	-0.07
10Y Bund	-0.12	-0.03	0.00	0.20

## II.2 United States

The performance of the US economy in Q2 improved by more than indicated by previous estimates. The final GDP growth estimate (quarter-on-quarter, annualised) for Q2 resulted in an upward revision to 1.4%. The better results were driven by domestic consumption. In addition, export growth was stronger than import growth and corporate investment increased. The current Atlanta Fed models are indicating a smaller upswing in growth to 2.2% in Q3. The lower growth outlook reflects a whole range of less favourable news from the economy.

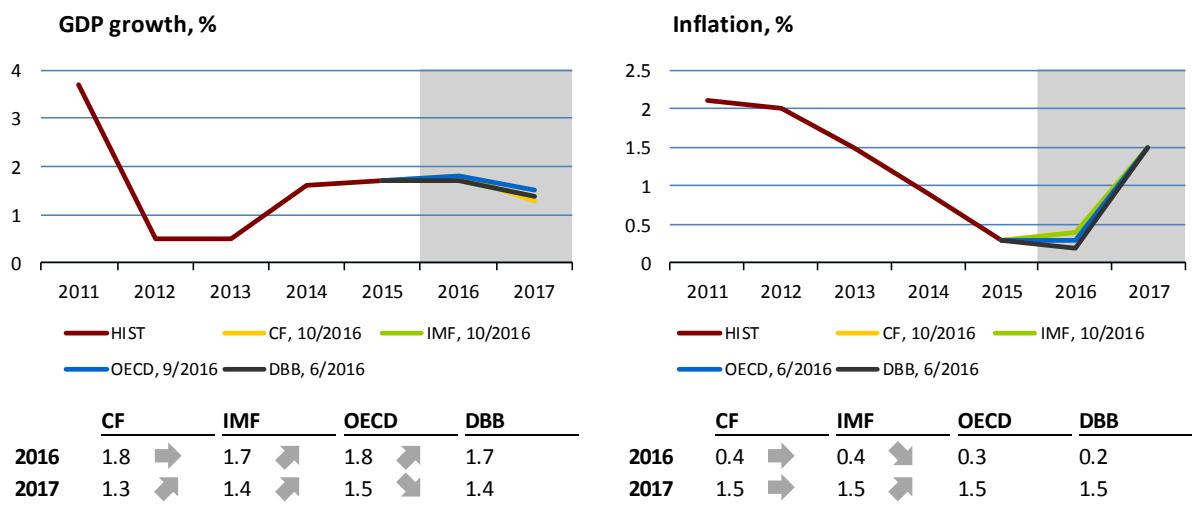
New labour market data failed to confirm expectations. Non-farm payrolls rose by 156,000 in September, as against an expected increase of 172,000. The unemployment rate and the participation rate both increased slightly (to 5% and 62.9% respectively). Annual retail sales growth surprisingly slowed (to 1.9%), mainly because of lower car sales. The year-on-year decline in industrial production increased (to 1.1%). However, households and corporations remain optimistic – according to the Conference Board survey, consumer confidence improved in September, as did the ISM leading indicator.

Annual consumer price inflation rose slightly again in August (1.1%), supported by a sharp increase in health care costs and to a lesser extent by rental prices. The mixed data from the economy suggest that interest rates will not be raised until the Fed's December meeting. According to the October CF survey, 89.2% of the panellists expect monetary policy to remain unchanged at the November meeting. Ten-year government bond yields rose last month, affected by the approaching further rate hike. The new CF brought changes only to the 2017 outlook (lower GDP growth and higher inflation). By contrast, the Fed revised its forecasts downwards for 2016 only. The IMF now expects lower GDP growth in both years (the same as the OECD), while its inflation outlook was revised upwards.



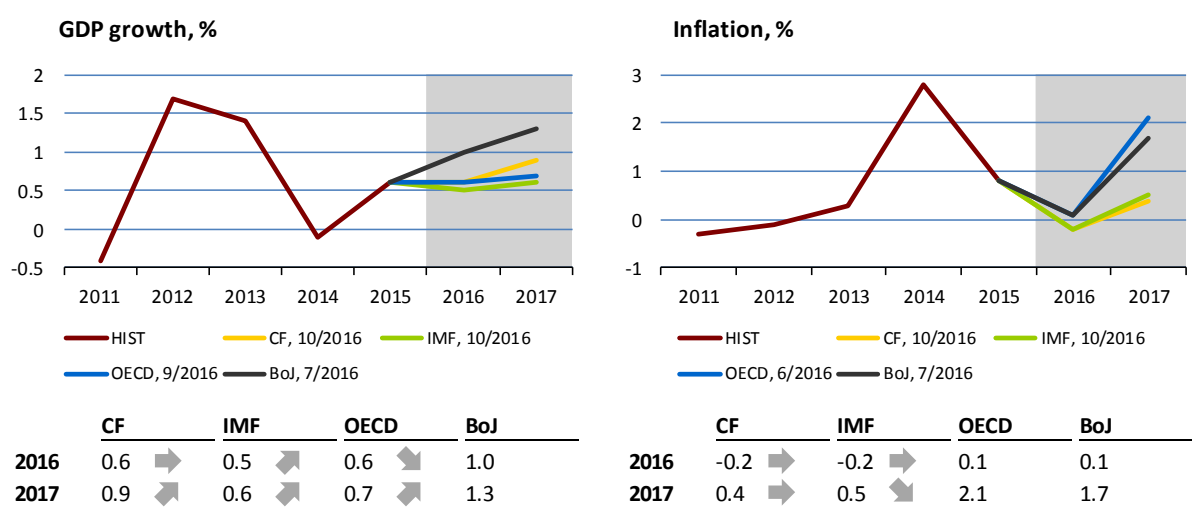
### II.3 Germany

The quarterly rate of growth of the German economy slowed from 0.7% to 0.4% in 2016 Q2. In addition, annual GDP growth fell by 0.1 pp to 1.7%, which still represents robust economic growth. This is being accompanied by a month-on-month and year-on-year decline in unemployment to 4.2% and by rising employment. Continued economic growth at broadly the same level as in the previous quarter can be expected for Q3. This is indicated by the average growth rates of industrial production and retail turnover for July and August, which remained approximately at the Q2 level, and by rising leading indicators (Ifo, ZEW and PMI). The October CF predicts that GDP growth will reach 1.8% for 2016 as a whole. Due to a smaller drop in energy prices and continuing growth in food and services prices, annual consumer price inflation went up by 0.3 pp to 0.7% in September. According to CF, inflation will reach 0.4% in 2016 as a whole and rise to 1.5% next year.



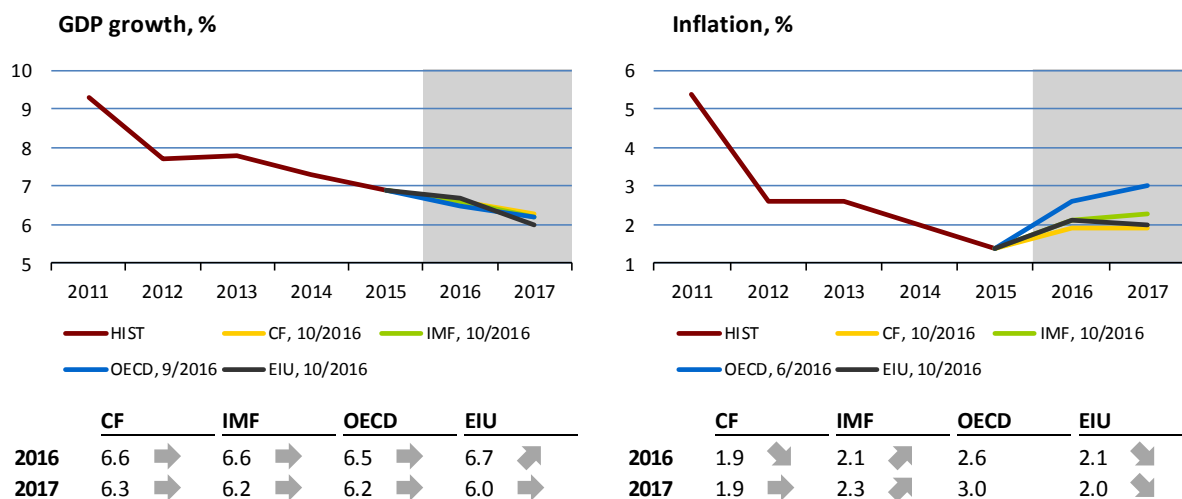
### II.4 Japan

Japanese monetary policy took a turn in September when the central bank decided to combat deflation by controlling the yield curve. The ten-year government bond yield was capped at 0%. The previous asset purchase target was abolished and the policy rate was left unchanged. According to the BoJ, the easy monetary policy will continue until core inflation stabilises above the 2% inflation target. However, new data do not indicate that this is to be achieved. Both headline inflation and core inflation (excluding food prices) were negative in both July and August (-0.5%). The inflation expectations of both households and firms (according to Tankan surveys) declined. There are therefore growing doubts among investors regarding the credibility of the commitment. The October CF brought only an upward revision of GDP growth for 2017. The new IMF and OECD economic growth forecasts for 2017 are substantially more pessimistic than those of CF. However, the new IMF inflation outlook is comparable with the CF forecast.



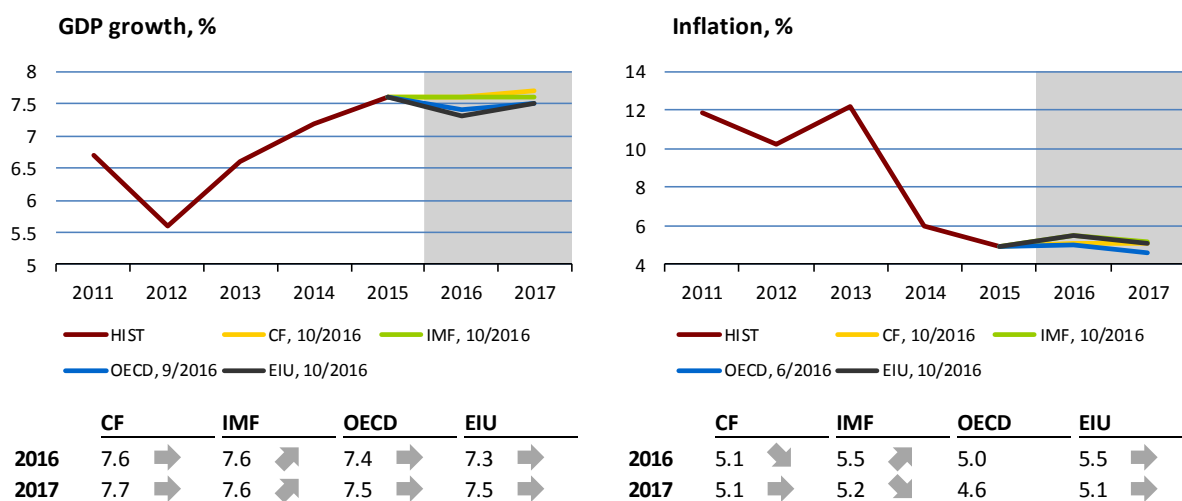
### III.1 China

The outlooks of the monitored institutions foresee a gradual slowdown of the Chinese economy. GDP growth was 6.7% in 2016 Q2 and the average estimate for 2016 as a whole is slightly lower than that. Key factors for the economy will include smooth progress with the ongoing deleveraging of Chinese businesses and the potential monetary policy tightening (normalisation) in developed countries, particularly the US, which would boost the outflow of capital from China and cause the renminbi to weaken. The Chinese currency has already depreciated by almost 5% year on year and is expected to weaken gradually further in the coming years. CPI inflation reached 1.9% in September. It is expected to exceed 2% in 2016 as a whole and continue to edge up thereafter.



### III.2 India

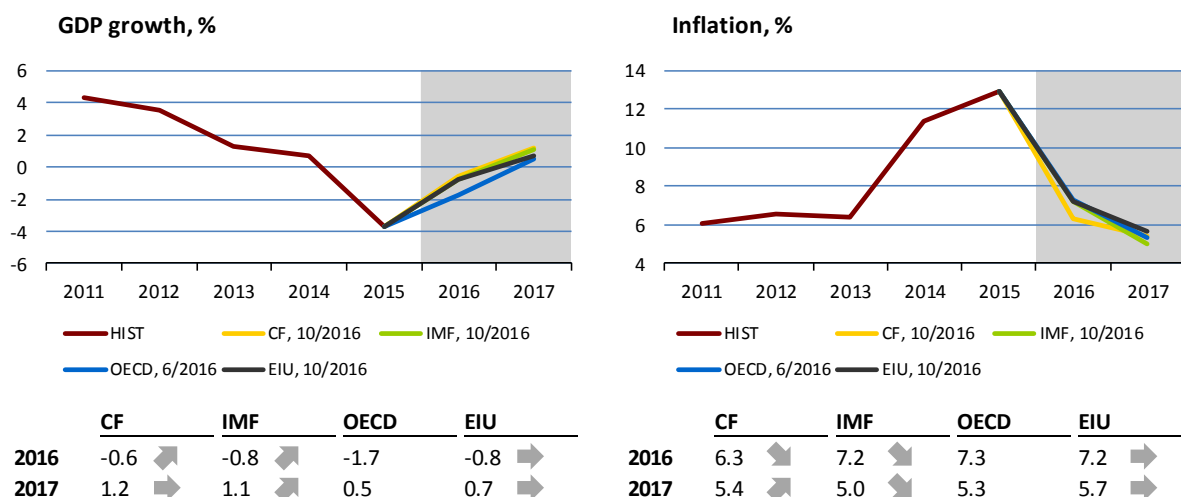
The monitored institutions still expect the strong economic growth recorded in India in 2015 to continue. This trend will not be halted even by the wobble recorded in 2016 Q2, when annual growth dipped slightly. The IMF even increased its previous estimates. The inflation outlook also remains stable at just over 5%, i.e. inside the central bank's target band. Moreover, agriculture – a key sector for the Indian economy – has been positively affected this year by good weather. Following a long period of gradual depreciation, the rupee has stabilised/appreciated slightly against the US dollar in recent months. Nevertheless, CF analysts expect a renewed slight depreciation of the rupee in the months ahead.





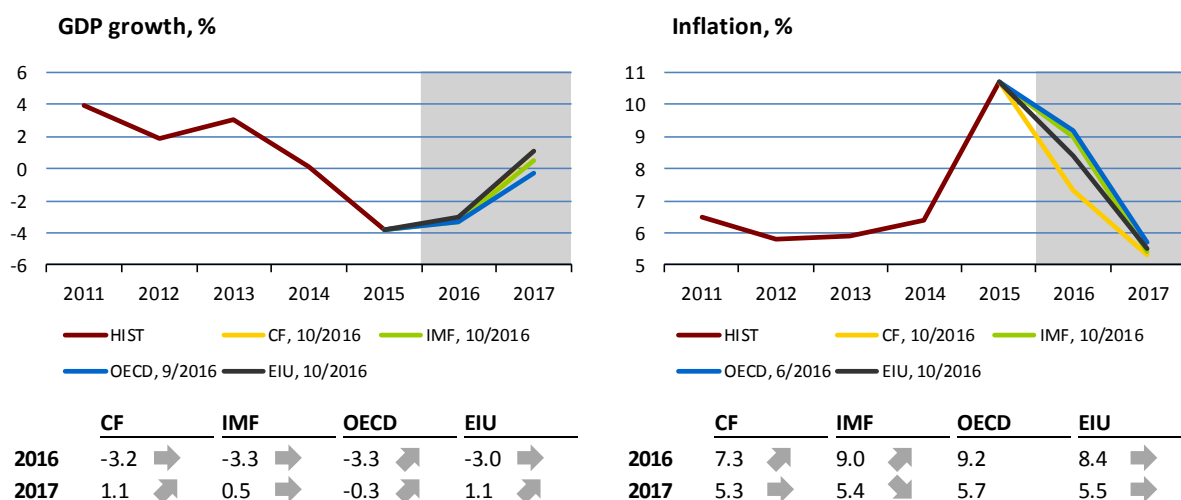
### III.3 Russia

The short-term indicators of economic activity in Russia in August brought mostly good news. Industrial production rose by 0.7% year on year. The unemployment rate dropped by 0.1 pp. The decline in the average real wage also slowed by 0.1 pp. However, real disposable income in August recorded its largest year-on-year decline since 2009, of 8.3%. The September Markit PMI in manufacturing suggests further economic recovery. The CBR continued to ease its monetary policy in September, cutting the policy rate by 0.5 pp to 10% in response to slowing inflation, falling inflation expectations and lacklustre economic activity. According to CBR estimates, the Russian economy will return to 1% growth next year and inflation will decline to 4% next December. A return to growth next year (0.7%–1.2%) and slowing inflation (5.0%–5.7% in December 2017) are also indicated by the new CF, IMF and EIU outlooks.



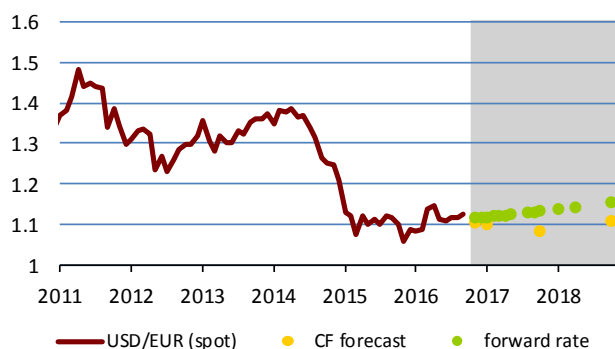
### III.4 Brazil

Short-term developments indicate a further (albeit uncertain) recovery of the Brazilian economy. The year-on-year decline in industrial production shrank to 5.2% in August. The PMIs in manufacturing and services increased slightly in September. However, unemployment continues to rise. Following a previous rise, foreign trade fell sharply year on year in September, with imports recording the biggest fall. The Brazilian real weakened slightly but has been following an appreciation trend since the beginning of the year due to renewed growth in commodity prices and improved financial market sentiment. After the effect of previous economic shocks unwinds, and due to a calming of the political situation, the Brazilian economy is expected to emerge from recession and recover next year. According to the new CF, EIU and IMF outlooks, after declining by 3.0%–3.3% this year, GDP will grow at a rate of 0.5%–1.1% next year. Inflation can also be expected to slow by about one-half compared to this year.



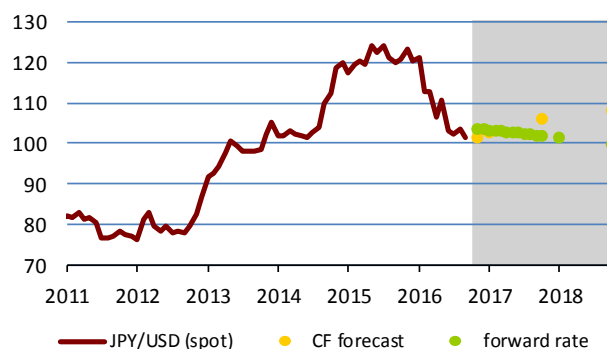
## IV. Outlook of exchange rates

The US dollar (USD/EUR)



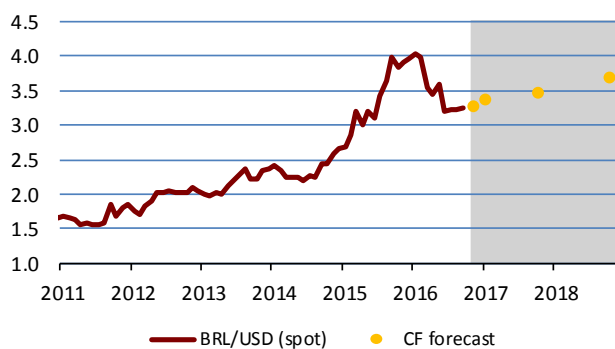
	10/10/16	11/16	01/17	10/17	10/18
spot rate	1.116				
CF forecast		1.106	1.100	1.085	1.109
forward rate		1.115	1.118	1.133	1.155

The Japanese yen (JPY/USD)



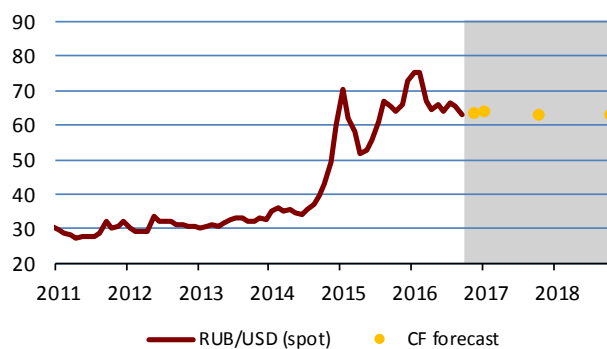
	10/10/16	11/16	01/17	10/17	10/18
spot rate	103.6				
CF forecast		101.6	102.5	105.9	108.1
forward rate		103.5	103.2	101.8	99.6

The Brazilian real (BRL/USD)



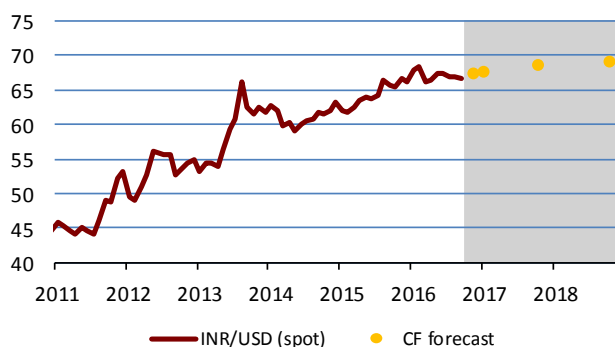
	10/10/16	11/16	01/17	10/17	10/18
spot rate	3.215				
CF forecast		3.278	3.362	3.475	3.687

The Russian rouble (RUB/USD)



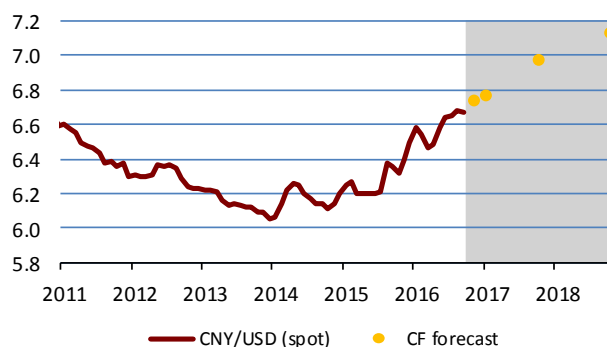
	10/10/16	11/16	01/17	10/17	10/18
spot rate	62.00				
CF forecast		63.72	63.83	63.17	62.95

The Indian rupee (INR/USD)



	10/10/16	11/16	01/17	10/17	10/18
spot rate	66.56				
CF forecast		67.28	67.67	68.67	69.06

The Chinese renminbi (CNY/USD)



	10/10/16	11/16	01/17	10/17	10/18
spot rate	6.703				
CF forecast		6.738	6.772	6.969	7.127

Exchange rates as of last day of month. Forward rate does not represent outlook; it is based on covered interest parity, i.e. currency of country with higher interest rate is depreciating. Forward rate represents current (as of cut-off date) possibility of hedging future exchange rate.

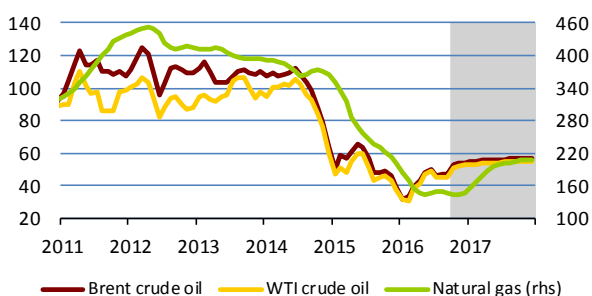
### V.1 Oil and natural gas

The Brent oil price dropped sharply at the end of August and fluctuated close to USD 45/bbl through most of September on concerns about a continued excess of crude oil and fuels on the market. This situation was changed by the outcome of informal talks held in Algeria, where OPEC representatives surprisingly agreed to cut daily output by around 700,000 barrels to 32.5–33.0 million barrels. Country quotas and other technical aspects will be set at the regular OPEC meeting in Vienna in late November. Brent prices have since risen by more than 15% in two weeks. The Russian president has also voiced support for the deal.

The market futures curve thus shifted significantly upwards compared to the previous month, implying an average Brent oil price of USD 53.8/bbl in the rest of the year. An average price of USD 56.7/bbl and USD 57.7/bbl is expected in 2017 and 2018 respectively. By contrast, the EIA revised its oil price forecast for 2017 down to an average of USD 51/bbl. The year-end forecast saw the biggest revision – from USD 58/bbl to USD 55/bbl. This is due to slower growth in expected demand and higher than previously expected growth (or a weaker decline) in output in Russia and the USA.

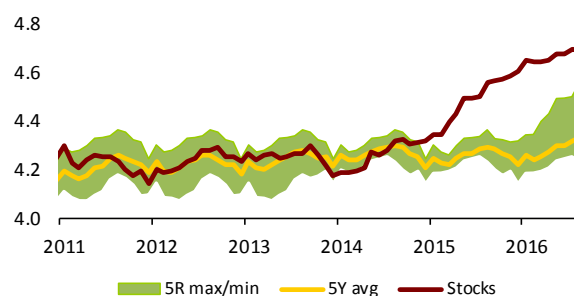
The natural gas price in the USA rose by 6.4% month on month due to falling output and rising demand. By contrast, the spot price of natural gas in Europe fell by 5.8%, with stocks in the EU standing at 91% of storage capacity in late September. Prices of coal have been on an upward trend since May, but recorded a further sharp rise in early October, with coal production in China down 10.2% year on year in the first eight months and imports up 48% year on year in September. In line with oil and coal prices, the electricity price rose sharply.

**Outlook for prices of oil (USD/barrel) and natural gas (USD / 1000 m<sup>3</sup>)**

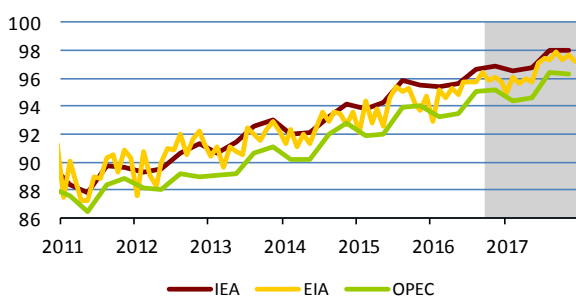


	Brent	WTI	Natural gas
2016	45.70 ↘	43.97 ↘	152.24 ↘
2017	56.11 ↗	54.26 ↗	192.51 ↗

**Total stocks of oil and oil products in OECD (bil. barrel)**

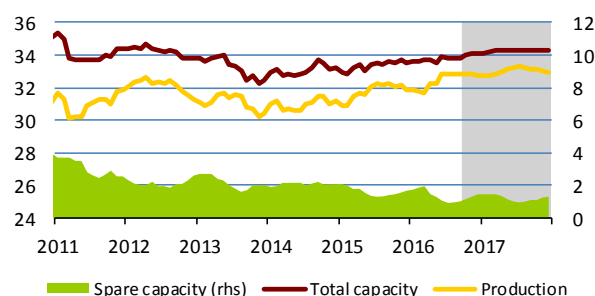


**Global consumption of oil and oil products (mil. barrel / day)**



	IEA	EIA	OPEC
2016	96.12 ↘	95.33 ↘	94.25 →
2017	97.31 ↘	96.67 ↘	

**Production, total and spare capacity in OPEC countries (mil. barrel / day)**



	Production	Total capacity	Spare capacity
2016	32.45 ↗	33.79 ↘	1.34 ↘
2017	33.03 ↗	34.24 ↘	1.21 ↘

Note: Oil price in USD/barrel, price of Russian natural gas at German border in USD / 1,000 m<sup>3</sup> (IMF data, smoothed by the HP filter). Future oil prices (grey area) are derived from futures and future gas prices are derived from oil prices using model. Total oil stocks (commercial and strategic) in OECD countries including average, maximum and minimum in past five years in billions of barrels. Global consumption of oil and oil products in millions of barrels a day. Production and extraction capacity of OPEC in million barrels a day (EIA estimate).

Source: Bloomberg, IEA, EIA, OPEC, CNB calculation

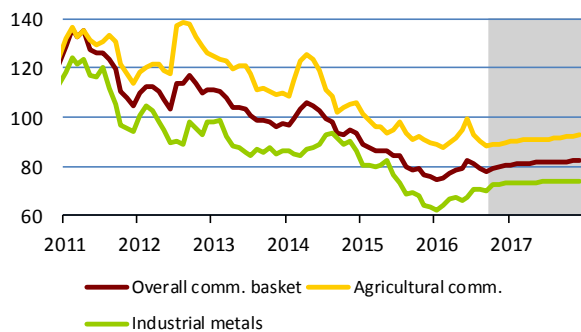
## V.2 Other commodities

The average monthly non-energy commodity price index recorded a third decline in a row in September, but rose slightly in the first half of October, as did its food commodity sub-index. The industrial metals index also declined in September, but rose in the first half of October, reaching its highest level since July 2015. The outlooks for all three indices continue to be only modestly rising.

Grain prices declined mainly in the second half of August due to good weather and high expected stocks. Prices returned to growth in September (with only soy prices stagnating), when the USDA slightly lowered its forecast for wheat and corn stocks and rains complicated the harvest in the main agricultural regions of the USA and Canada. Prices of sugar continued to rise, recording their highest level since 2012 due to lower-than-expected production in Brazil and lower production forecasts in India for the coming season. By contrast, prices of beef and pork continued to fall sharply, approaching a seasonal low for pork.

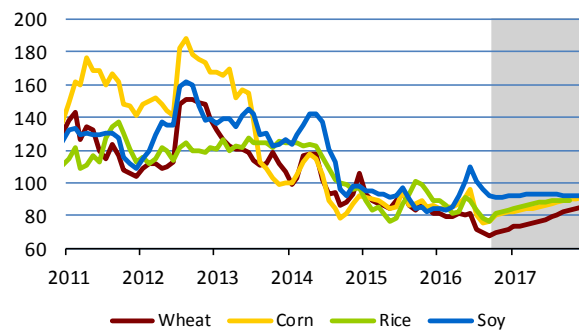
Prices of basic metals showed very mixed patterns. The price of aluminium followed a downward trend between mid-August and September owing to high production in China. Following a previous fall (as a result of strong growth in stocks at the LME), the price of copper was flat in the first half of September. Prices of most other metals followed an upward trend. Prices of metals were supported in the second half of September by news of rising industrial production in China, which accelerated from 6.0% to 6.3% in August. Rising prices of newly built houses in China were another favourable factor. Following a three-month rise, the price of iron ore declined in September in line with prices of steel, production of which rose by 1.6% year on year globally – and by 3% in China – in August.

### Non-energy commodities price indices



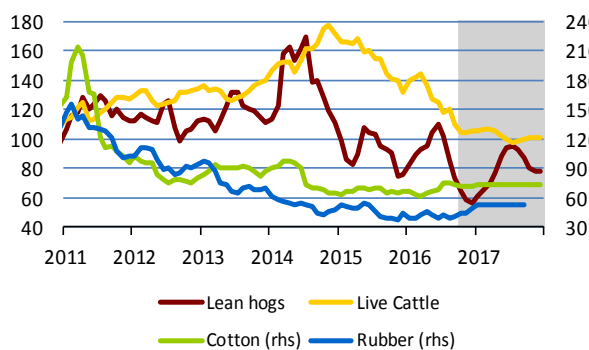
	Overall	Agricultural	Industrial
2016	78.7 ↘	91.0 ↘	68.6 ↘
2017	81.6 ↗	91.4 ↗	73.7 ↗

### Food commodities



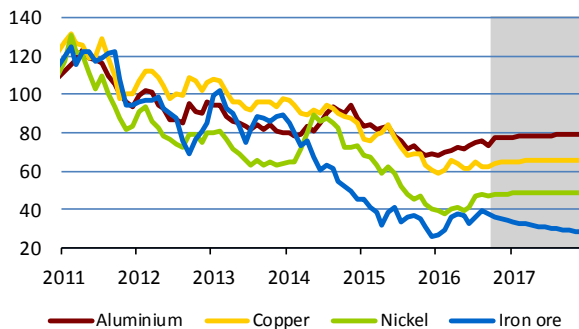
	Wheat	Corn	Rice	Soy
2016	75.5 ↘	83.8 ↘	83.9 ↘	93.3 ↘
2017	78.9 ↗	86.9 ↗	87.7 ↗	92.7 ↗

### Meat, non-food agricultural commodities



	Lean hogs	Live Cattle	Cotton	Rubber
2016	84.6 ↘	123.2 ↘	69.4 ↘	42.4 ↘
2017	80.8 ↘	102.2 ↘	73.0 ↗	52.9 ↗

### Basic metals and iron ore



	Aluminium	Copper	Nickel	Iron ore
2016	73.4 ↘	62.8 ↘	43.6 ↘	34.7 ↘
2017	78.5 ↗	65.4 ↗	48.6 ↗	30.6 ↘

Note: Structure of non-energy commodity price indices corresponds to composition of The Economist commodity indices. All prices are given as indices, 2010 = 100 (charts) and percentage changes (tables).

Source: Bloomberg, CNB calculations.

## The industrial producer price index in the EU<sup>1</sup>

*The industrial producer price index (PPI) is a key indicator of inflation – alongside the consumer price index, which is of primary interest to the central banking community. The PPI focuses on prices on the production side of the economy. The production side responds much more strongly than the consumption side to movements in commodity prices (which most countries cannot influence), especially oil prices, whose recent dramatic fall was a major factor affecting prices at both the microeconomic and macroeconomic level. The following text explains the specifics of the industrial producer price index, especially in the EU, and presents a model simulation indicating the sensitivity of the PPI to a change in oil prices.*

### 1 Introduction

Price indices were first measured in very simplified form in the early 18th century but underwent significant development in the 19th century and again in the 1920s. At that time, the industrial producer price index (PPI) was used mainly to adjust long-term contracts of firms for material costs. The importance of the PPI as a measure of inflation increased hand in hand with interest in the consumer price index (CPI), which intensified with the introduction of inflation targeting<sup>2</sup> as a new monetary policy regime in the early 1990s. As the PPI was increasingly being used not only in the private sector, but also in the public sector, the task of reporting it was entrusted almost exclusively to statistical offices (IMF, 2004). It is currently used not only as a basis for indexing prices in contracts, but also as a deflator in many economic time series and as one of the main inputs in inflation forecasts. It thus serves as a resource for economic decision-making in the private sector and for monetary and fiscal policy formulation.

The industrial producer price index is generally one of the key measures of inflation – alongside the consumer price index, the GDP deflator and others. The PPI expresses the average prices of goods and services sold by domestic producers in the domestic market. It usually only covers industrial goods produced in the mining and manufacturing industries, but it can theoretically cover all economic activities on the output side (IMF, 2004). Besides the industrial producer price index, there are PPIs for services, construction and agriculture (Eurostat, 2016b). It can be difficult to compare industrial producer price indices across countries, as national PPIs differ in composition due to differences in industrial structure.<sup>3</sup>

### 2 The PPI in detail

The industrial producer price index is used as a short-term indicator of inflation trends, as a deflator of national accounts, for indexing contracts in both the private and public sectors (mostly for detailed components of the PPI), for simultaneous cost accounting, as a basis for creating other inflation measures (such as the final expenditure price index, FEPI) and as an analytical instrument for firms and analysts. PPI reporting is required by international organisations (Eurostat, OECD, IMF, ECB) for monitoring economic developments and comparing economies (IMF, 2004). However, not only is the PPI used for identifying inflation pressures that may later spill over to consumer prices, but it also reveals long-run price trends.

The PPI measures the gross monthly change in prices of industrial products and is presented as a base index<sup>4</sup> or as a monthly or annual growth rate. It is often referred to as an output price index, but it allows prices to be monitored at various stages of the production process (Eurostat, 2016b). As regards structure, the PPI covers production of intermediate goods and finished products, i.e. consumer and capital goods (OECD, 2016). It thus gives a comprehensive view of production prices, production consumption and international trade in goods and services. When measuring the index, all price-determining characteristics are taken into account, including quantity of units sold, transport provided, rebates, service conditions and guarantee conditions (Eurostat, 2012). Product characteristics – both technical (e.g. type, size and sort of raw materials) and economic (transaction specifications indicating the terms and conditions of sale, e.g. customers, contract terms, terms of delivery, terms of payment, price) – are also included. However, the PPI does not include taxes, transport costs and profit margins to be paid by the customers.

There are essentially two different industrial producer price index concepts. The first, and by far the most commonly mentioned, is the output PPI. It measures changes in the prices of output produced by domestic producers as the products leave the production process. It is measured at basic prices, i.e. the prices received by producers for their output. The output PPI therefore measures the average price change of all covered goods and services resulting from the activity of producers and sold on the domestic market and also on export markets. Conversely, the other type – the input PPI – tracks changes in the prices faced by

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<sup>2</sup> New Zealand became the first inflation-targeting country in 1990. The Czech Republic was the first transforming economy to introduce this monetary policy regime in January 1998. Inflation targeting is currently used in 36 countries.

<sup>3</sup> This contrasts with consumer price indices, for which a harmonised consumer price index (HICP) was created to facilitate cross-country comparisons.

<sup>4</sup> This is usually related to the selected base year, in which it takes a value of 100 (Eurostat, 2016b; IMF, 2004).

domestic producers when buying products needed for the production process. It is therefore given at purchase prices. The input price index thus measures the change in prices of intermediate inputs (both domestic and imported) used in production by a specified sector of the economy. However, it does not include primary inputs, i.e. usually labour, land, capital and production technology.<sup>5</sup> Because the input PPI does not cover primary costs, it represents only potential inflation for the output PPI. Producers face other cost pressures (such as wage and capital pressures), so not all input pressures pass through fully to the resulting (output) prices. The output PPI may therefore subsequently indicate potential inflation in further stages of production, for example at the wholesale or retail level. In reality, prices of imports and exports are usually monitored separately and not included in the PPI (input or output). The index is published in many different versions and may thus express more than just inputs and outputs. It is also assessed at net prices for industry, in different stages of the production cycle, or aggregately for regions (IMF, 2004).

The industrial producer price index is measured in a statistical survey on a selected sample of firms representing the entire economy.<sup>6</sup> The survey takes the form of postal questionnaires, telephone surveys and electronic surveys (Eurostat, 2016b). When measuring the PPI, it is important to distinguish between real price change and quality change; the latter depends on product evolution and often happens very quickly. Prices are aggregated into the index by means of weights determined on the basis of information about the structure of the economy. The weights are usually based on the structure of domestic sales in the given year. The weights and the base year tend to be revised every five years.<sup>7</sup> The current base year is 2010 (Eurostat, 2016b). In addition, there are two different PPI weighting concepts based on gross and net intersectoral sales. Net sales only cover the value of sales of goods to other sectors of the economy, whereas gross sales also include the value of parts of that are ultimately included in the value of the finished goods. It is desirable to use the approach based on net sales, i.e. to exclude sales of parts, as this prevents double counting of the same products at different stages of the production chain. This measure also better reflects the impact of inflation in a sector. However, the gross sales approach is useful for deflating total turnover, as it, too, is expressed on a gross basis (IMF, 2004).

### 3 The PPI in the European Union

The EU includes the industrial producer price index in its short-term statistics on production. Its monthly measurements generate important information on short-term and medium-term economic activity at national level and for the EU and euro area as a whole. Countries report the monthly development of transaction prices of economic activities, i.e. they focus on output prices. The required level of detail, the data collection frequency, the type of index and the deadline for publishing the PPI are determined for EU countries on the basis of EU regulations as elaborated in a handbook on industrial producer price indices. EU countries have to supply domestic, non-domestic and total PPIs and often have to add data broken down into trade inside and outside the euro area. Bigger countries usually provide more detailed indices than smaller ones.<sup>8</sup> However, many countries have been reporting PPIs for several decades now, and the indices form part of their national accounts and transactions. Consequently, statistical offices in smaller countries also often monitor PPIs in detail even though EU regulations do not require them to do so. Detailed reporting has its advantages and disadvantages. One advantage is that statistical offices have better control of the production process and simply collect actual prices. A major drawback is that it is difficult to collect such detailed data. In general the pros of detailed PPI reporting outweigh the cons due to its greater flexibility and other benefits (Eurostat, 2012).

As there is significant heterogeneity among EU countries in many areas, there are differences in the measurement of the industrial producer price index reflecting country specifics. Most EU countries (the exceptions being Luxembourg, the UK and Croatia<sup>9</sup>) report domestic, non-domestic and total PPIs based on set criteria. There are also differences in the data collection frequency used for the PPI calculation. Data are mostly collected on a monthly basis. Small enterprises are usually excluded from the survey (in three-quarters of countries) and there are also differences in the determination of the basket composition and weights. They are usually updated every five years or every year.<sup>10</sup> PPIs usually exclude taxes (VAT and

<sup>5</sup> Changes in oil prices, for example, thus have a stronger effect on the input PPI than the output PPI. In the former case, oil is one of the most important input commodities (together, for example, with agricultural production), whereas in the latter case the effect of the oil price on the index is largely only indirect (mainly through product prices in manufacturing), as oil (as a final product) accounts for only a small proportion of output in most EU countries.

<sup>6</sup> The first international standard for the industrial producer price index was created in 1979 by the United Nations (UN), which introduced it in a manual outlining practical aspects of collecting such data. In 2004, the IMF in collaboration with the UN, the International Labour Organisation (ILO), the OECD and other organisations produced a new PPI manual in parallel with a new CPI manual, the aim being to create manuals that were consistent with each other. The manual is available here: <http://www.imf.org/external/pubs/ft/ppi/2010/manual/ppi.pdf>.

<sup>7</sup> However, in Hungary, for example, the weights are changed every year.

<sup>8</sup> Member States are divided into three groups to determine the level of detail required.

<sup>9</sup> Luxembourg calculates the domestic PPI only as part of the total PPI and does not report it separately. The UK and Croatia do not compile a total index and only calculate parts of it.

<sup>10</sup> Other options applied in the EU include continuous updates (e.g. Denmark) and updates every two years (e.g. Belgium).

excise duties). One of the few areas where the Member States apply an identical approach is the exclusion of transport costs from prices for the PPI calculation. PPIs in the EU are calculated using the Laspeyres index (only Poland uses the Paasche index). Most countries publish the index after obtaining at least 90% of the data. Roughly half of countries do not revise their indices after publication. If revisions are made, the most common reasons are data correction or new data (Eurostat, 2012).

#### 4 Differences in weighting

EU Member States are required to report data for this index using the classification of economic activities (NACE)<sup>11</sup> or the classification of products (CPA),<sup>12</sup> the latter being much more commonly used. However, the composition of the baskets used for calculating and expressing the industrial producer price index falls fully within the competence of each country. Countries usually determine their baskets based on the nature of their economies. If a particular type of product is not produced in a country or accounts for a very small proportion of turnover there, it is simply excluded from the basket. At the broadest level of classification, the composition of the baskets thus differs little across EU countries. Differences can be found mainly at a more detailed level.<sup>13</sup> For example, member countries often exclude processing of metal ores and manufacture of weapons and ammunition from the PPI calculation basket.<sup>14</sup> All in all, however, these are only nuances reflecting the different structure of industry in these countries. For most EU Member States, the specific weightings of the classification categories (according to the CPA) can be found on the websites of their statistical offices or on the OECD website (for OECD members). The category of manufactured products (section C) usually has the highest weight in the index, accounting for at least 80% of the total PPI. The category of mining and quarrying tends to be the smallest item. Table 1 summarises the weights in selected EU countries and the euro area as a whole.

	DE	FR	AT	CZ	HU	PL	SK	EA
<b>B</b> Mining and quarrying	1.2	0.9	2	3.6	0.9	2.1	1	1.3
<b>C</b> Manufactured products	85.2	87.4	87.6	84.5	85.5	80.3	80.5	84.5
<b>D</b> Electricity, gas, steam and air conditioning	13.6	11.7	10.4	11.9	13.6	17.6	18.5	14.2
<b>E</b> Water supply and sewerage services								

Table 1 Weights for the CPI calculation according to the CPA

Source: Statistical offices of selected countries; OECD (2016)

Note: DE – Germany, FR – France, AT – Austria, CZ – Czech Republic, HU – Hungary, PL – Poland, SK – Slovakia, EA – euro area

However, industrial goods can be broken down not only by sector of production, but also by use. In this regard, industrial production can be decomposed into intermediate goods, capital goods, consumer durables, consumer non-durables and energy (Eurostat, 2016b). The weights used in individual countries

	DE	FR	AT	CZ	HU	PL	SK	EA
<b>Intermediate goods</b>	30.5	27	34.2	25	20.1	27.6	24.7	29.3
<b>Capital goods</b>	24.1	23.1	12.8	22.9	14.7	12.5	17.8	20
<b>Durable goods</b>	2.3	1.7	4.1	1.6	2.4	2.9	1.1	2.3
<b>Non-durable goods</b>	15.9	25.1	16.7	12.1	15.5	23.2	12.5	20.3
<b>Energy</b>	27.2	23.1	32.2	38.4	47.4	33.9	43.8	27.9

Table 2 Weights for the CPI calculation according to use

Source: European Commission (2016).

Note: DE – Germany, FR – France, AT – Austria, CZ – Czech Republic, HU – Hungary, PL – Poland, SK – Slovakia, EA – euro area

<sup>11</sup> Sections C (Mining and quarrying), D (Manufacturing) and E (Electricity, gas and water supply) are used for the calculation of the PPI in the EU.

<sup>12</sup> Sections B (Mining and quarrying), C (Manufactured products), D (Electricity, gas, steam and air conditioning) and E (Water supply and sewerage services) are used for the PPI in the EU. Sections D and E are usually reported together, reflecting the corresponding structure of the NACE classification for the purposes of the industrial producer price index.

<sup>13</sup> Details can be found in the EU handbook (Eurostat, 2012). Information on the current composition for individual countries is available on the websites of statistical offices or the OECD (<http://stats.oecd.org/mei/default.asp?lang=e&subject=9>).

<sup>14</sup> For example, other porcelain and ceramic products, processed and preserved fish, crustaceans and molluscs and optical instruments and photographic equipment are not monitored in the Czech Republic (for details, see the methodological explanations issued by the Czech Statistical Office, which also summarise the CPI calculation in the Czech Republic: <https://www.czso.cz/documents/10180/34987812/0110441606m.pdf/710fc4de-f5db-4029-a49b-900d8b92d408?version=1.0>).

for the CPI calculation based on this breakdown are published by Eurostat.<sup>15</sup> Durables are usually the smallest item, while energy or intermediate goods are the largest items. Analogously to Table 1, Table 2 summarises the weights in this breakdown in selected EU countries and the euro area.

## 5 The PPI versus the CPI and its relationship to the price of oil

The overall industrial producer price index for the euro area is calculated using weighted values of the PPIs of the euro area member states. Germany, Italy and France have the largest shares.<sup>16</sup> Eurostat also publishes a figure for the EU as a whole, where the euro area accounts for 77.5%. The industrial producer price index trend is similar across EU countries, with only slight deviations. Charts 1 and 2 show the evolution of the PPIs in selected countries from 2005 to the present together with a projection up to the start of 2020. The PPIs in EU countries generally show a very similar pattern. The differences across the selected advanced countries are minimal. Slightly bigger divergences are seen when one compares the Visegrad Four countries. According to Oxford Economics projections,<sup>17</sup> annual PPI growth in the euro area and in all EU Member States should return to positive values in the years ahead, as in most countries the fall in the index has started to slow in recent months.

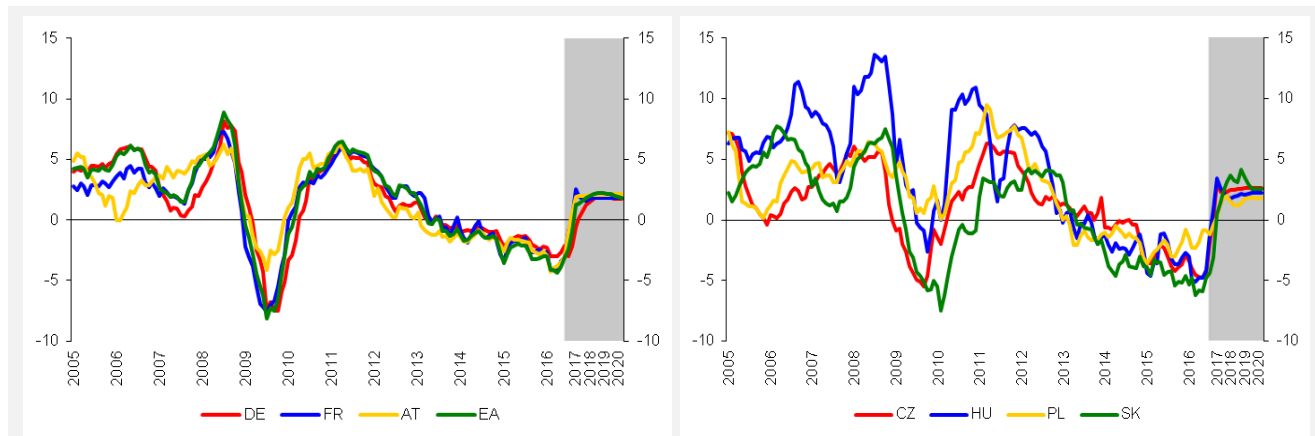


Chart 1 PPIs in advanced countries and the euro area (y-o-y, %)

Source: Eurostat (2016c); Datastream

Note: DE – Germany, FR – France, AT – Austria, EA – euro area

Chart 2 PPIs in Central European EU countries (y-o-y, %)

Source: Eurostat (2016c); Datastream

Note: CZ – Czech Republic, HU – Hungary, PL – Poland, SK – Slovakia

The evolution of the industrial producer price index is largely similar to that of the consumer price index. This is because both measure price change over time for a fixed basket. However, the PPI is used primarily to measure real output growth, while the CPI is used to evaluate changes in the cost of living. The different evolution is also due to differences in the composition of the set of commodities and services and in the definition of prices used in the calculation (Eurostat, 2016b). The PPI mostly takes the form of an output index and hence, unlike the CPI, does not include taxes. As shown in Chart 3, which summarises the PPI and CPI from 2005 to mid-2016 for the EU and the euro area, the PPI is usually visibly more volatile than the CPI. This is due to the much closer relationship between the PPI and the production side of the economies, which responds much more strongly to the business cycle and supply-side shocks. Nonetheless, they move in broadly the same directions. This is confirmed by a comparison of the PPI and CPI correlation coefficients. The coefficients exceed 90% for both the EU and the euro area, hence there is a very high positive linear relationship between the two indices.

Generally, industrial producer prices are affected among other things by supply-side shocks, exchange rate movements, real GDP growth and changes in prices of seasonal products and prices of energy and commodities (oil and coal in particular). These factors can also be used to forecast the PPI.

The following simulation illustrates the sensitivity of the PPI to a change in oil prices. It compares the baseline scenario for the PPI in the euro area (see Chart 4; the red curve) with the path the index would have followed if oil prices had shown a less pronounced fall than that which occurred in reality. The alternative scenario is defined as the situation in which the price of oil would have stayed at the end-2014 level, i.e. around USD 75 a barrel, for the rest of the period, assuming rational expectations of economic

<sup>15</sup> Weights in terms of use are available for all EU countries at: <https://circabc.europa.eu/w/browse/5e6d1e48-056c-4c6a-8278-3ab138bcf575>.

<sup>16</sup> For its own needs, by contrast, the CNB calculates and uses the effective euro area PPI, where a country's importance (weight) is determined by the volume of Czech exports to it, not by its euro production volume (for details see, for example, Inflation Report III/2016: [http://www.cnb.cz/miranda2/export/sites/www.cnb.cz/en/monetary\\_policy/inflation\\_reports/2016/2016\\_III/download/ir\\_III\\_2016.pdf](http://www.cnb.cz/miranda2/export/sites/www.cnb.cz/en/monetary_policy/inflation_reports/2016/2016_III/download/ir_III_2016.pdf)).

<sup>17</sup> The same trend in the PPIs in EU countries is also suggested by the EIU forecasts for this index.



agents.<sup>18</sup> The simulation result suggests that under these conditions, the euro area PPI would not have recorded such a strong decline as that seen in 2015 and early 2016. According to the simulation, it would return to positive annual growth in 2016 Q4, whereas the current forecasts indicate the start of 2017. Estimates of the euro area effective PPI model confirm that oil prices have a major effect on the industrial producer price index.<sup>19</sup>

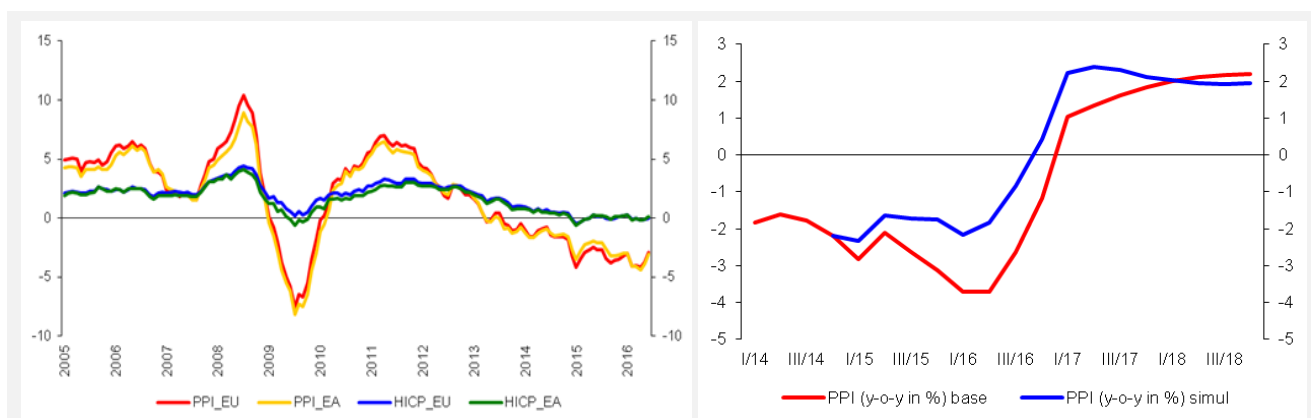


Chart 3 Consumer price and industrial producer price indices (y-o-y, %)

Source: Eurostat (2016a); Eurostat (2016c)

Chart 4 Simulation of the euro area PPI for a more moderate fall in oil prices than that actually recorded

Source: Eurostat (2016c); Datastream; NiGEM

Note: base – baseline scenario, simul – simulation (oil price constant at USD 75/bbl since April 2014)

## 6 Conclusion

The industrial producer price index is one of the traditional economic indicators watched by international institutions, countries and private entities. PPI reporting and compilation is currently based on international standards created in order to unify the PPI and CPI manuals by several international institutions under the auspices of the IMF. EU countries are additionally subject to EU regulations, which set forth details for the measurement and reporting of industrial producer price indices. This notwithstanding, there are many cross-country differences in the measurement of the PPI, although these mainly reflect national differences in industrial structure. The remaining differences are nuances and do not preclude international comparisons, which reveal that the PPIs in EU countries follow a similar pattern. The movements of the PPI and CPI are also usually similar, as confirmed by a high coefficient of correlation between the two. However, the PPI is much more volatile than the CPI. Given the recent slowdown in the annual decline of the PPI, the index is expected to return to growth in the years ahead. This is mainly due to the gradual disappearance of the effects on the PPI of the fall in oil prices recorded in 2014 and 2015.

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<sup>18</sup> The simulation was conducted using the NiGEM model.

<sup>19</sup> The model of the effective euro area PPI was described in Box 1 in Inflation Report III/2016.

## A1. Change in GDP predictions for 2016

	CF		IMF		OECD		CB / EIU	
EA	<b>+0.1</b>	2016/10	<b>+0.1</b>	2016/10	<b>-0.1</b>	2016/9	<b>+0.1</b>	2016/9
		2016/9		2016/7		2016/6		2016/6
US	<b>0</b>	2016/10	<b>-0.6</b>	2016/10	<b>-0.4</b>	2016/9	<b>-0.2</b>	2016/9
		2016/9		2016/7		2016/6		2016/6
DE	<b>0</b>	2016/10	<b>+0.1</b>	2016/10	<b>+0.2</b>	2016/9	<b>-0.1</b>	2016/6
		2016/9		2016/7		2016/6		2015/12
JP	<b>0</b>	2016/10	<b>+0.2</b>	2016/10	<b>-0.1</b>	2016/9	<b>-0.2</b>	2016/7
		2016/9		2016/7		2016/6		2016/4
BR	<b>0</b>	2016/10	<b>0</b>	2016/10	<b>+1.0</b>	2016/9	<b>0</b>	2016/10
		2016/9		2016/7		2016/6		2016/9
RU	<b>+0.2</b>	2016/10	<b>+0.4</b>	2016/10	<b>-1.3</b>	2016/6	<b>0</b>	2016/10
		2016/9		2016/7		2015/11		2016/9
IN	<b>0</b>	2016/10	<b>+0.2</b>	2016/10	<b>0</b>	2016/9	<b>0</b>	2016/10
		2016/9		2016/7		2016/6		2016/9
CN	<b>0</b>	2016/10	<b>0</b>	2016/10	<b>0</b>	2016/9	<b>+0.1</b>	2016/10
		2016/9		2016/7		2016/6		2016/9

## A2. Change in inflation predictions for 2016

	CF		IMF		OECD		CB / EIU	
EA	<b>0</b>	2016/10	<b>-0.1</b>	2016/10	<b>-0.7</b>	2016/6	<b>0</b>	2016/9
		2016/9		2016/4		2015/11		2016/6
US	<b>0</b>	2016/10	<b>+0.4</b>	2016/10	<b>+0.1</b>	2016/6	<b>-0.1</b>	2016/9
		2016/9		2016/4		2015/11		2016/6
DE	<b>0</b>	2016/10	<b>-0.1</b>	2016/10	<b>-0.7</b>	2016/6	<b>-0.9</b>	2016/6
		2016/9		2016/4		2015/11		2015/12
JP	<b>0</b>	2016/10	<b>0</b>	2016/10	<b>-0.6</b>	2016/6	<b>-0.4</b>	2016/7
		2016/9		2016/4		2015/11		2016/4
BR	<b>+0.1</b>	2016/10	<b>+0.3</b>	2016/10	<b>+3.4</b>	2016/6	<b>0</b>	2016/10
		2016/9		2016/4		2015/11		2016/9
RU	<b>-0.1</b>	2016/10	<b>-1.2</b>	2016/10	<b>-2.2</b>	2016/6	<b>0</b>	2016/10
		2016/9		2016/4		2015/11		2016/9
IN	<b>-0.1</b>	2016/10	<b>+0.2</b>	2016/10	<b>+0.1</b>	2016/6	<b>0</b>	2016/10
		2016/9		2016/4		2015/11		2016/9
CN	<b>-0.1</b>	2016/10	<b>+0.3</b>	2016/10	<b>+0.1</b>	2016/6	<b>-0.2</b>	2016/10
		2016/9		2016/4		2015/11		2016/9

### A3. List of abbreviations

<b>ABS</b>	asset-backed securities	<b>HICP</b>	harmonised index of consumer prices
<b>bbl</b>	barrel	<b>CHF</b>	Swiss franc
<b>BoJ</b>	Bank of Japan	<b>ICE</b>	Intercontinental Exchange
<b>BR</b>	Brazil	<b>IEA</b>	International Energy Agency
<b>BRIC</b>	countries of Brazil, Russia, India and China	<b>IFO</b>	Institute for Economic Research
<b>BRL</b>	Brazilian real	<b>IFO-BE</b>	IFO Business Expectations
<b>CB</b>	central bank	<b>IMF</b>	International Monetary Fund
<b>CB-CCI</b>	Conference Board Consumer Confidence Index	<b>IN</b>	India
<b>CB-LEII</b>	Conference Board Leading Economic Indicator Index	<b>INR</b>	Indian rupee
<b>CBOT</b>	Chicago Board of Trade	<b>IRS</b>	Interest Rate swap
<b>CBR</b>	Central Bank of Russia	<b>ISM</b>	Institute for Supply Management
<b>CF</b>	Consensus Forecasts	<b>JP</b>	Japan
<b>CN</b>	China	<b>JPY</b>	Japanese yen
<b>CNB</b>	Czech National Bank	<b>LI</b>	leading indicators
<b>CNY</b>	Chinese renminbi	<b>LIBOR</b>	London Interbank Offered Rate
<b>DBB</b>	Deutsche Bundesbank	<b>LME</b>	London Metal Exchange
<b>DE</b>	Germany	<b>MER</b>	Ministry of Economic Development (of Russia)
<b>EA</b>	euro area	<b>MMBtu</b>	million of British Thermal Units
<b>EBRD</b>	European Bank for Reconstruction and Development	<b>OECD</b>	Organisation for Economic Co-operation and Development
<b>EC</b>	European Commission	<b>OECD-CLI</b>	OECD Composite Leading Indicator
<b>ECB</b>	European Central Bank	<b>PMI</b>	Purchasing Managers' Index
<b>EC-CCI</b>	European Commission Consumer Confidence Indicator	<b>PPI</b>	producer price index
<b>EC-ICI</b>	European Commission Industrial Confidence Indicator	<b>QE</b>	quantitative easing
<b>EIA</b>	Energy Information Administration	<b>RU</b>	Russia
<b>EIU</b>	Economist Intelligence Unit	<b>RUB</b>	Russian rouble
<b>EU</b>	European Union	<b>TLTRO</b>	targeted longer-term refinancing operations
<b>EUR</b>	euro	<b>UoM</b>	University of Michigan
<b>EURIBOR</b>	Euro Interbank Offered Rate	<b>UoM-CSI</b>	University of Michigan Consumer Sentiment Index
<b>Fed</b>	Federal Reserve System (the US central bank)	<b>US</b>	United States
<b>FOMC</b>	Federal Open Market Committee	<b>USD</b>	US dollar
<b>FRA</b>	forward rate agreement	<b>USDA</b>	United States Department of Agriculture
<b>FY</b>	fiscal year	<b>WEO</b>	World Economic Outlook
<b>GBP</b>	pound sterling	<b>WTI</b>	West Texas Intermediate (crude oil used as a benchmark in oil pricing)
<b>GDP</b>	gross domestic product	<b>ZEW-ES</b>	ZEW Economic Sentiment

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