

GLOBAL ECONOMIC OUTLOOK - FEBRUARY

Monetary Department
External Economic Relations Division

2019

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Cut-off date for data

15 February 2019

CF survey date

11 February 2019

GEO publication date

22 February 2019

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, with exception of MT and LU, for which they come from EIU.

Leading indicators are taken from Bloomberg and Datastream.

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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II.5 Japan III.2 Russia	V.1 Oil and natural gas V.2 Other commodities			

The current economic outlook is being affected by several major factors. The most important include the slowdown of the Chinese economy, the increased level of protectionism in global trade, the completion of the normalisation of interest rates by the Fed and the repeatedly postponed start to increases in the ECB's interest rates. However, the fast-approaching and unfortunately still unclear Brexit is without doubt the most resonant economic issue at present. A disorderly Brexit could have very tangible impacts on both the micro level (for individual firms) and the macro level (exchange rates, GDP, inflation).

The 2019 growth outlooks for the euro area, Germany, the UK and Japan were reduced compared with the previous month. The situation is similar for the inflation outlooks for this year, which were also lowered for all the above countries except the UK. The dollar will depreciate against the euro (to USD 1.15 to the euro at the three-month horizon and USD 1.19 to the euro at the one-year horizon) and also against sterling and the yen. Conversely, it will appreciate against the renminbi and the rouble. The outlook for the 3M Euribor was little changed from January. Lower growth is expected for 10Y government bond yields than in the previous month.

The February GDP growth and inflation outlooks for the monitored countries

GDP	EA	DE	US	UK	JP	CN	RU
2019	1.3 ↘	1.2 ↘	2.5 →	1.4 ↘	0.9 ↘	6.2 →	1.5 →
2020	1.4 →	1.5 ↘	1.9 ↘	1.5 ↘	0.4 →	6.1 →	1.8 →

Inflation	EA	DE	US	UK	JP	CN	RU
2019	1.4 ↘	1.7 ↘	1.9 →	2.0 →	0.8 ↘	2.2 →	4.7 ↘
2020	1.5 →	1.7 →	2.2 →	2.1 →	1.2 ↘	2.2 →	4.1 ↘

Source: Consensus Forecasts (CF)

Note: The arrows indicate the direction of the revisions of the newly published forecasts compared to the previous issue of GEO.

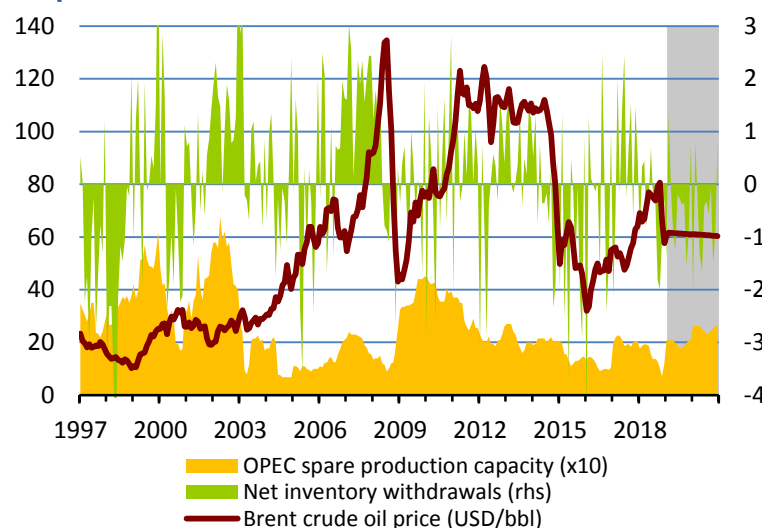
The Brent crude oil price outlook moved only slightly upwards and the uncertainty about its future path decreased again. The February CF expects the Brent price to rise to almost USD 66/bbl at the 12-month horizon.

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The chart in this issue shows aggregate crude oil supply and demand on the market (positive figures imply excess demand, i.e. inventory withdrawals, and negative figures excess supply) and the reaction of oil prices to those fundamentals. The oil price typically responds to excess demand by falling and to excess supply by rising, but global spare production capacity is also an important factor. The vast majority of that capacity is owned by OPEC countries, especially Saudi Arabia, and 2 million barrels a day is considered the sensitive level. If spare capacity is lower and net inventory withdrawals are occurring (i.e. there is an oil shortage on the market), the oil price will respond by rising sharply. If spare capacity is in the comfort zone, a shortage of oil on the market will not necessarily imply a surge in prices. Total global crude oil inventories are another key variable. They have been particularly high recently, thus compensating for the relatively low production capacity, so the response of oil prices to the shortage has been muted in this case as well.

The February issue also contains an analysis: [Euro area industrial producer prices from the perspective of the oil price](#). It contains a discussion of the level and speed of the pass-through of oil prices to the components of the producer price index (PPI). Oil is the commodity of commodities. Its prices affect many other commodity prices, which in turn affect euro area producer prices via import prices. However, different sectors of the national economy show different flexibility to oil price movements, so the components of the overall PPI can move in opposite directions. Those contrary movements are particularly pronounced if oil prices show major changes.

Oil prices in relation to fundamental factors



Source: EIA and Bloomberg

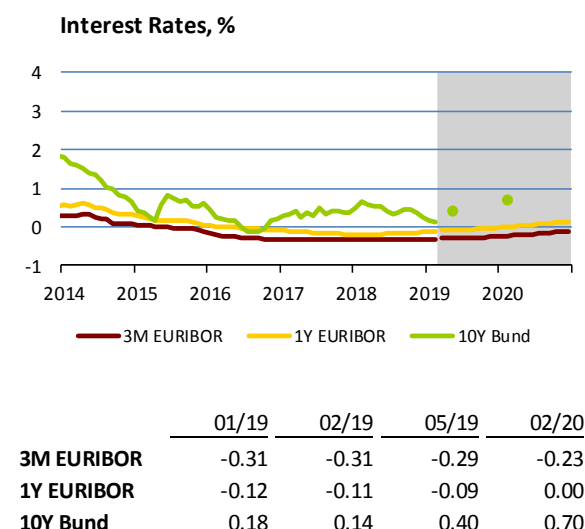
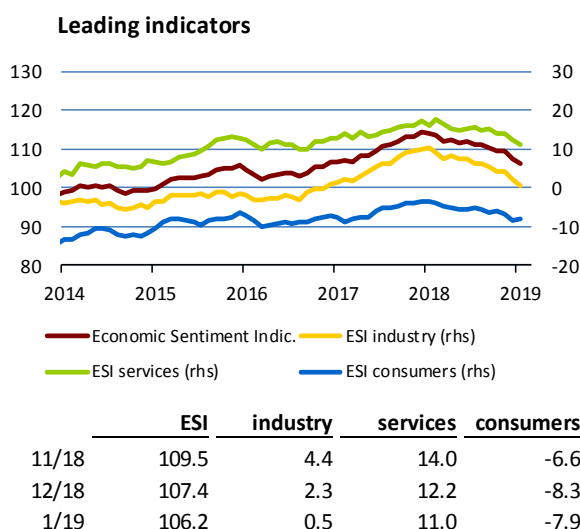
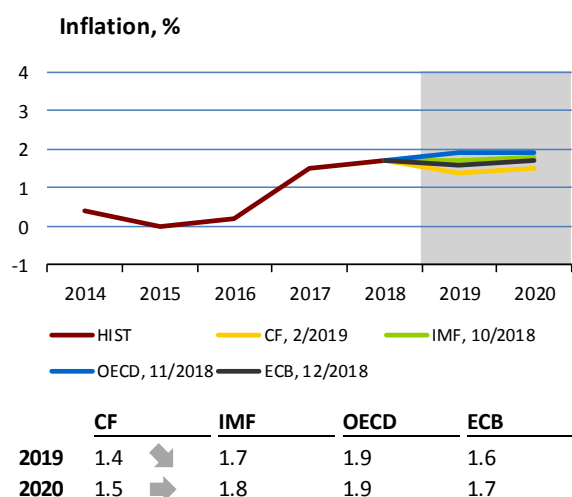
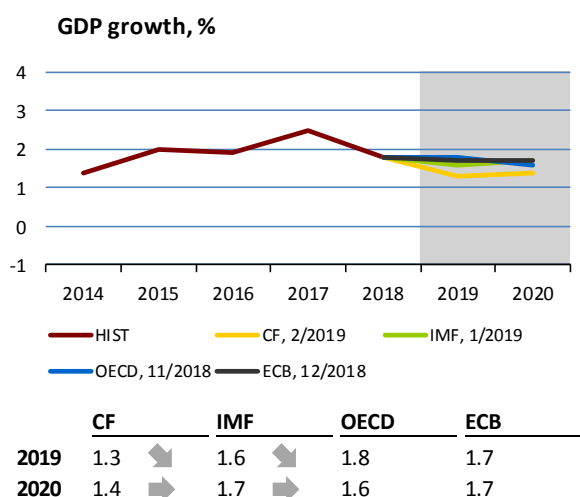
Note: Net inventory withdrawals are the difference between world consumption and world production of crude oil. Brent crude oil price in USD/bbl, other variables in millions of barrels a day. Spare production capacity is multiplied by ten for better visibility.

II.1 Euro area

The euro area economy expanded only modestly at the end of 2018. According to Eurostat’s flash estimate, quarterly GDP growth remained flat at 0.2% in Q4. The low growth rate mainly reflects a stagnation of the German economy and a contraction of the Italian economy, which entered a technical recession after shrinking for the second time in a row. On the other hand, growth in France remained at 0.3% despite problems linked with the yellow vest protests, and the Spanish economy even accelerated to 0.7%.

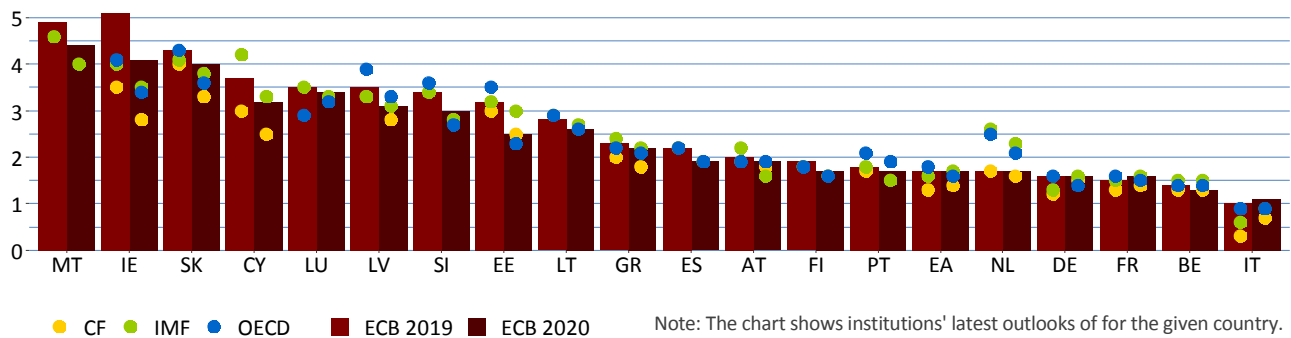
The year-end monthly indicators were not favourable. Industrial production fell in the last two months of 2018. In year-on-year terms, it decreased by 4.2% in December. Retail sales also fell month on month in December (and rose by only 0.8% year on year). The question is to what extent the slowdown is due to temporary factors, or whether the weak economic performance will continue into early 2019. The GDP growth outlooks for this year were revised down. The February CF lowered its outlook for 2019 to 1.3% and thus expects a relatively low growth rate compared with the other institutions (the IMF outlook was lowered to 1.6%, for example). The euro area economy is expected to pick up slightly next year.

Headline HICP inflation fell again in January, to 1.4%, due mainly to a lower energy price contribution, while core inflation edged up to 1.1%. The CF revised its inflation outlook for 2019 down (to 1.4%) and expects inflation to edge up next year. Other institutions expect slightly higher consumer price inflation, but these outlooks probably do not fully reflect the oil price outturns and outlook at the start of this year. The subdued inflation and growth outlooks increase the uncertainty about the first rise in the ECB’s policy rates. The ECB confirmed in January that this will not occur before summer 2019. It also revised down the risks to the euro area growth outlook, mainly because of uncertainty stemming from external developments. The 3M Euribor market rate outlook remains negative until the end of 2020. The Eurosystem’s net asset purchase programme was ended at the end of 2018, but the principal payments from maturing securities will be reinvested for an extended period of time after the ECB raises its key rates.

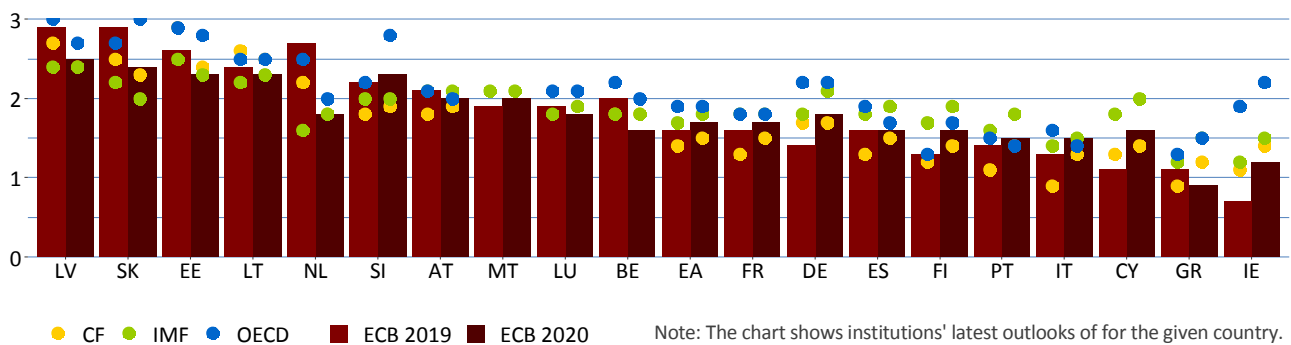


II. ECONOMIC OUTLOOK IN ADVANCED ECONOMIES

GDP growth outlooks in the euro area countries in 2019 and 2020, %

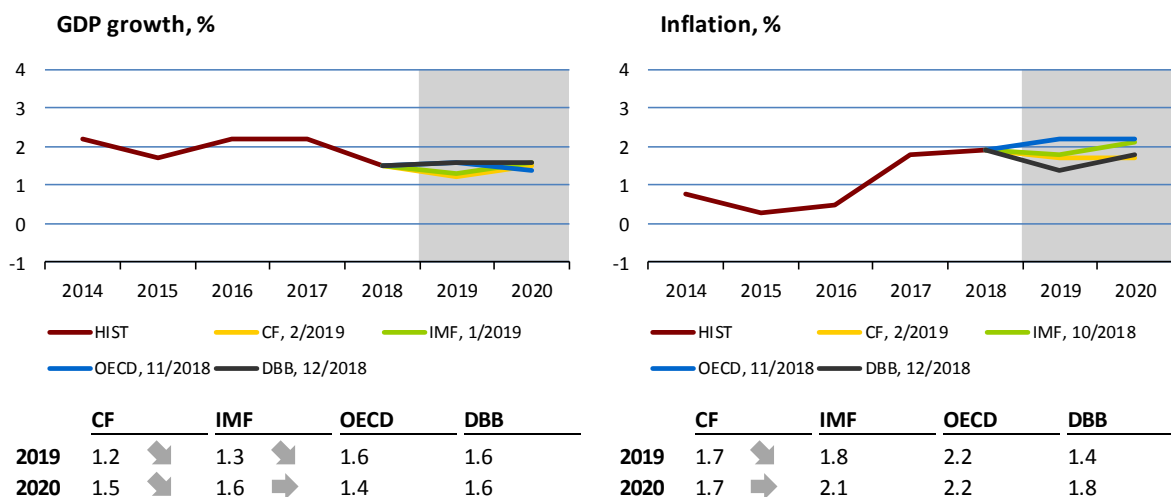


Inflation outlooks in the euro area countries in 2019 and 2020, %



II.2 Germany

The outlook for German economic growth was revised downwards (by both CF and the IMF). The outlooks of the individual CF respondents for this year now range from 0.7% to 1.8%. External developments are the main risk to growth (the demand slowdown in China and potential adverse Brexit impacts). GDP growth amounted to 1.5% in 2018 as a whole. Following a quarterly decline in GDP in Q3, the economy narrowly avoided recession at the end of the year, as GDP was flat in Q4. Industrial production recorded a slight recovery in December, while retail sales dropped sharply. The PMI in manufacturing fell to the stagnation territory in January. The Ifo index also declined. The inflation outlook for this year was lowered (CF). Inflation slowed in December, due mainly to a decline in the contribution of energy prices, and is expected to drop further in January. Core inflation remained stable in December.

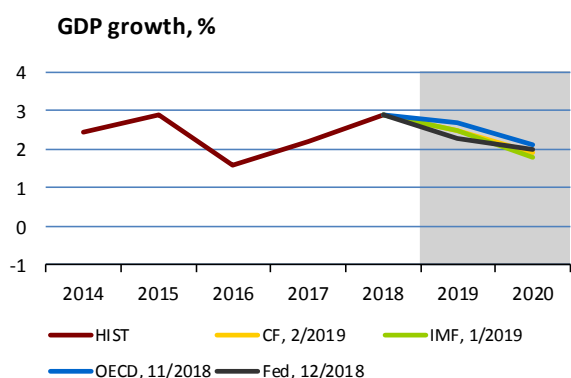


II.3 United States

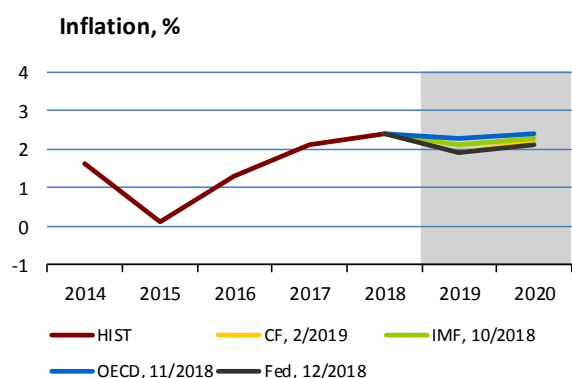
While the trade negotiations between the USA and China continue, the domestic economy is being significantly effected by political disputes regarding the public budget. The draft budget did not pass in the Senate, mainly due to differing views on the financing of a wall on the frontier with Mexico. The government shutdown halted not only wage payments to many federal employees, but also the functioning of some federal institutions. It also affected the publication of statistical data on the US economy. The first official GDP growth estimate for Q4 will thus be published at the end of February. The Atlanta Fed's current estimate is 2.7% (in quarter-on-quarter annualised terms).

Although new data from the economy do not indicate a major slowdown, risks relating to major trading partners (Brexit, the unresolved trade disputes with China, a decline in US exports) fostered a halt in the interest rate increase cycle in the USA. The Fed said in its statement that it would be "patient" as regards future adjustments to rates. Flexibility in reducing the size of the securities portfolio was also hinted at. According to Fed representatives, a plan to complete the normalisation of the Fed's balance sheet will be unveiled in a couple of months. Current inflation readings are reducing the pressure to tighten monetary policy further. Consumer prices rose by just 1.6% year on year in January, due mainly to lower energy prices. Core inflation was 2.2% in the same period. Wages are adding to the inflation pressures. The average hourly wage increased by 3.2% year on year in January, while non-farm payrolls rose by 304,000. The unemployment rate went up from 3.9% to 4.0%, thanks mainly to higher participation (63.2%). However, consumer confidence dropped sharply, especially in the expectations item, and a deterioration is also visible on the housing market. Leading and coincidence indicators are suggesting a decline in growth in industry in late 2018 and early 2019 as well.

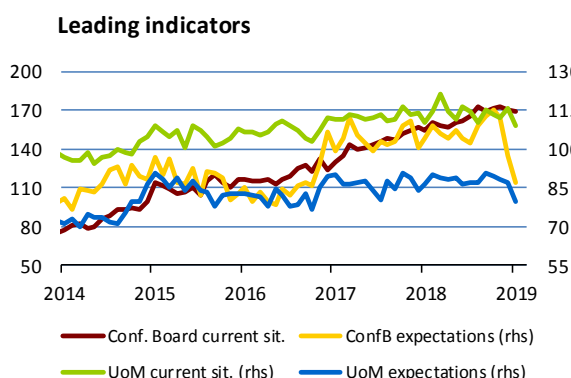
The analysts expect the US economy to slow, so the new CF brought only a slight upward revision to growth in 2020.



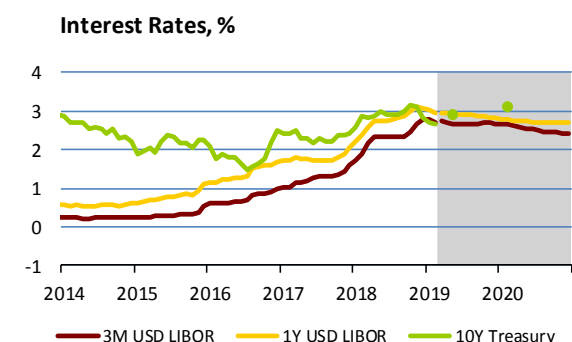
	CF	IMF	OECD	Fed
2019	2.5 →	2.5 →	2.7	2.3
2020	1.9 →	1.8 →	2.1	2.0



	CF	IMF	OECD	Fed
2019	1.9 →	2.1 →	2.3	1.9
2020	2.2 →	2.3 →	2.4	2.1



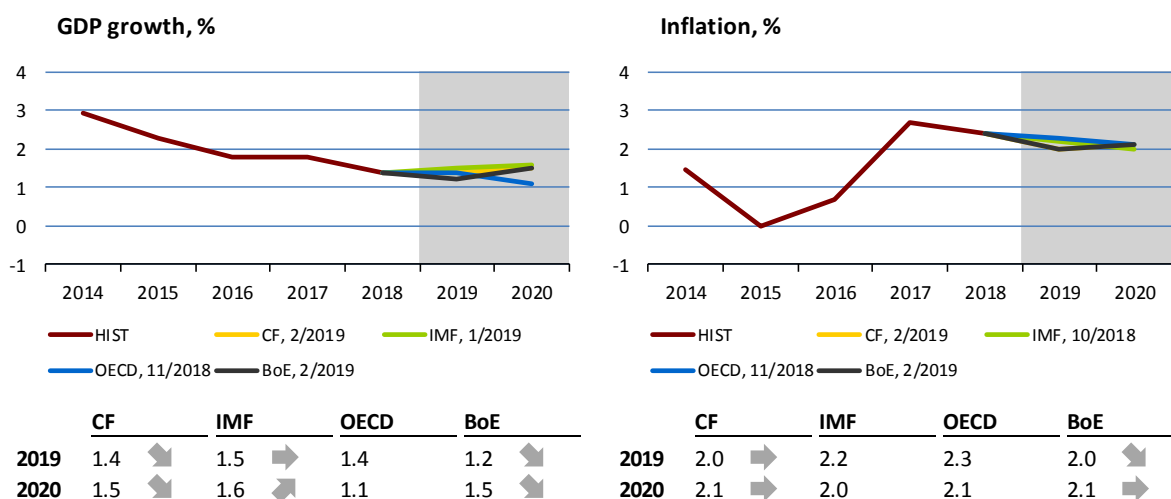
	ConfB curr.	ConfB exp.	UoM curr.	UoM exp.
11/18	172.7	112.3	112.3	88.1
12/18	169.9	97.7	116.1	87.0
1/19	169.6	87.3	108.8	79.9



	01/19	02/19	05/19	02/20
USD LIBOR 3M	2.78	2.71	2.65	2.65
USD LIBOR 1R	3.02	3.02	2.91	2.78
Treasury 10R	2.71	2.68	2.90	3.10

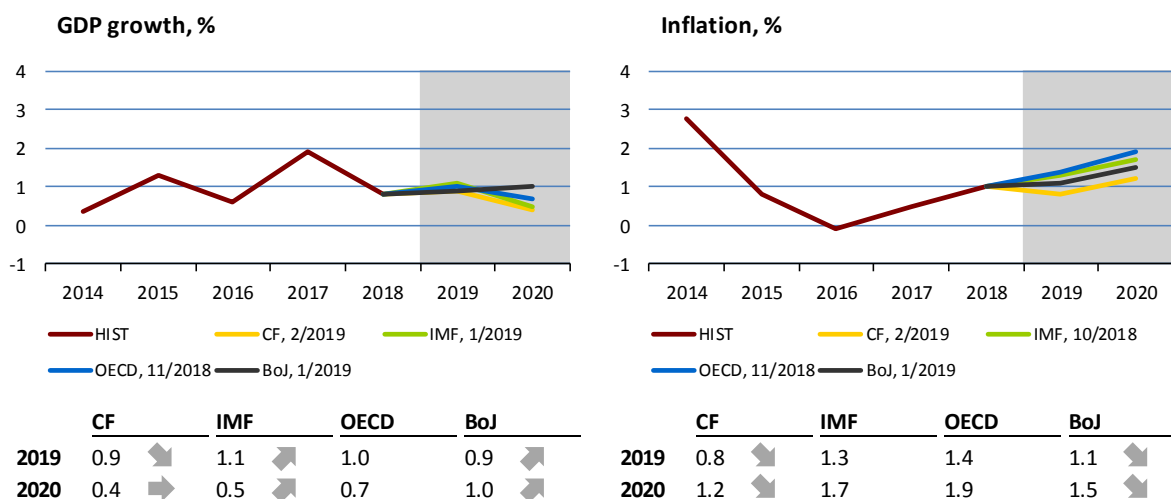
II.4 United Kingdom

The UK economy, which is being increasingly affected by persisting Brexit uncertainty, slowed sharply at the end of last year. GDP rose by just 0.2% in Q4. Growth was fostered by household and government consumption and counteracted by gross capital formation and net exports. In terms of production, economic growth was driven by the services sector, while industrial production recorded a large decrease (of 1.1%). Annual GDP growth slowed to 1.3%. The main issue is a decline in corporate investment, which has been observed for four consecutive quarters now and is gradually increasing. The UK economy grew by 1.4% in 2018 as a whole (the lowest figure since the crisis year of 2009). The BoE and CF outlooks published in February do not expect any improvement before next year. Inflation slowed to 1.8% in January due to lower fuel price growth. Core inflation stayed at 1.9%. The BoE's policy rate remained unchanged.



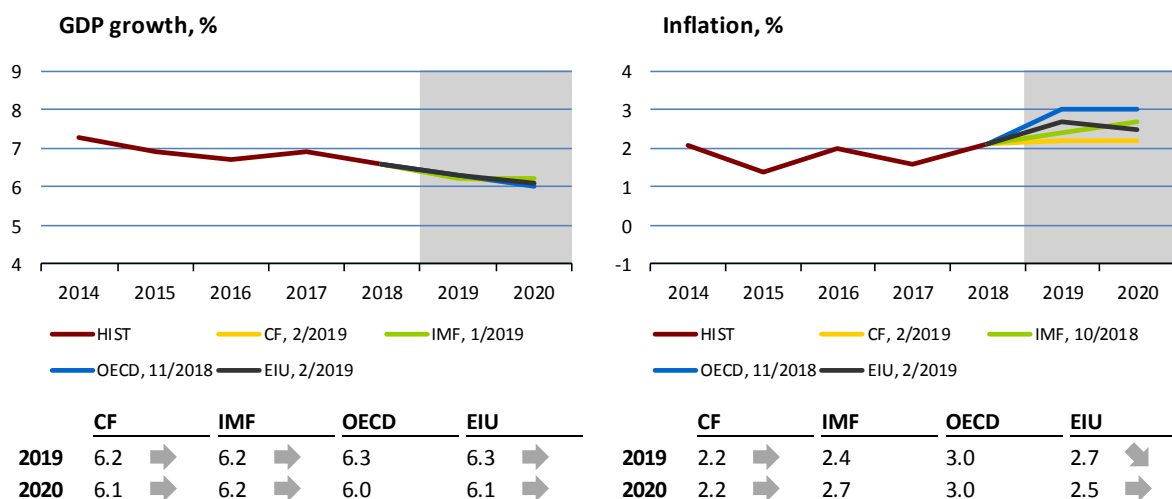
II.5 Japan

Quarterly GDP growth in Japan swung regularly between positive and negative last year. The first estimate for Q4 indicates a return of the economy to growth of 0.3% quarter on quarter (1.4% in annualised terms) after a 0.7% decline in the previous quarter (-2.6% in annualised terms) due to natural disasters. Growth was supported at the year-end by household consumption (growth of 0.6% following a decline of 0.2%) and by investment (growth of 2.4%, as against -2.7% the previous quarter). The new BoJ, CF and IMF outlooks expect GDP growth to pick up to 0.9%–1.1% this year. However, CF and the IMF expect it to slow considerably next year. The long-term CF outlook estimates growth of 0.5%–0.9% over the next decade. Inflation will stay below the central bank's 2% target over the two-year horizon. Moreover, the new CF and the BoJ forecast lowered their outlooks, probably after annual inflation slowed to 0.3% in December and monthly inflation stayed negative for the second time.



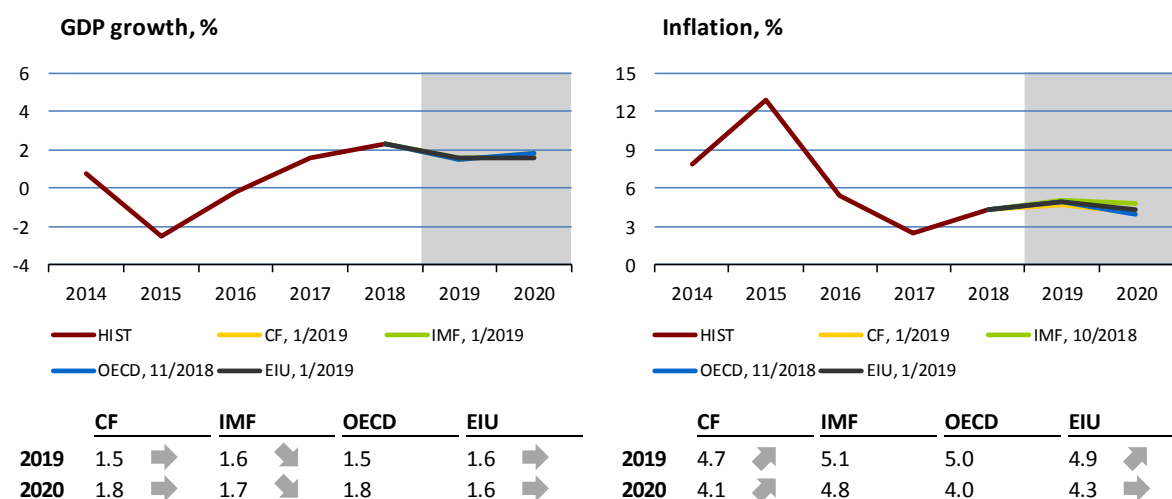
III.1 China

In line with expectations, the Chinese economy slowed to 6.4% year on year in 2018 Q4. Overall, GDP growth reached a 28-year low in 2018 (6.6%). The slowdown was due to weaker activity in agriculture and lower growth in services, which accounts for almost half of domestic production. All branches of the service sector, from real estate to technology industries, were hit by the weakening. Conversely, infrastructure projects supported construction and the financial sector benefited from a series of government measures to enhance liquidity. Government support programmes and a reduction in trade tensions with the USA may thus offset the effect of weakening external demand, so the further slowdown of the Chinese economy may be only gradual. CF, like other institutions, predicts growth of above 6% for 2019 and 2020. Inflation is expected to stay above 2%. The inflation outlook for this year was revised only slightly by the EIU.



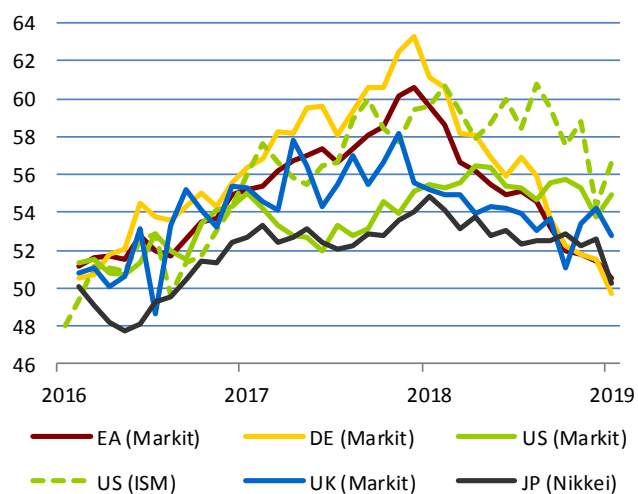
III.2 Russia

According to Rosstat’s flash estimate, the output of the Russian economy was 2.3% higher in 2018 compared with 2017. From the sectoral perspective, the best performers were finance and insurance and hotels and restaurants. Their growth exceeded 6% in both cases. On the other hand, agriculture, forestry, hunting and fishing, whose value added fell by 2%, posted the worst results. Mining rose by almost 4%. As regards the manner of use of GDP, foreign trade was the most dynamic sector last year. The contribution of net exports to GDP changed favourably by comparison with last year due to an upswing in exports (to 6.3%) along with a decline in import growth of almost one-half (to 3.8%). The GDP growth outlooks for this year and the next remain in the range of 1.5%–1.8%; inflation is not expected to exceed 5%.

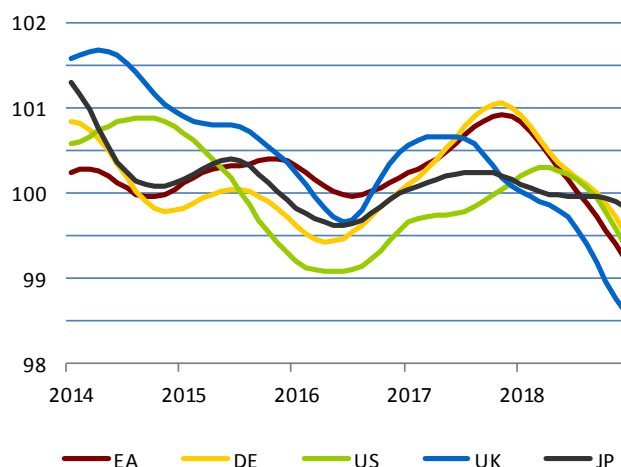


IV.1 Advanced economies

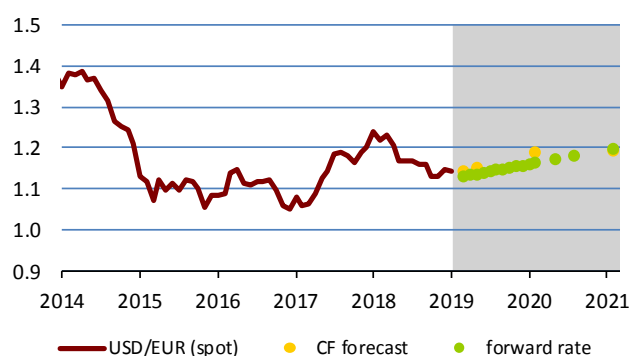
PMI in manufacturing



OECD Composite Leading Indicator

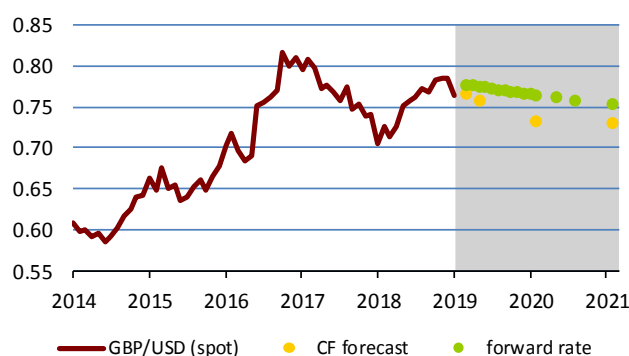


The US dollar (USD/EUR)



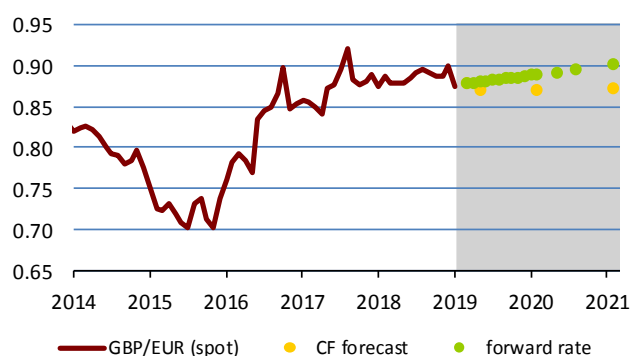
	11/2/19	03/19	05/19	02/20	02/21
spot rate	1.128				
CF forecast		1.145	1.151	1.187	1.195
forward rate		1.130	1.136	1.163	1.197

The British pound (GBP/USD)



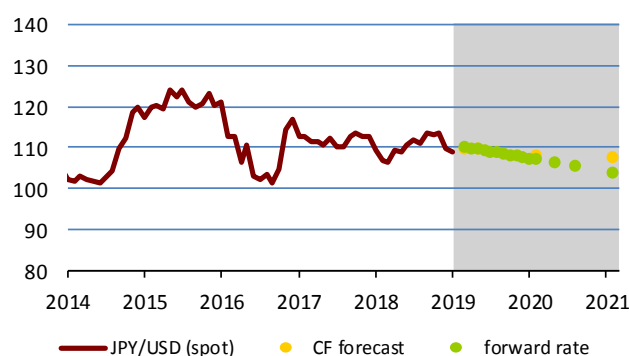
	11/2/19	03/19	05/19	02/20	02/21
spot rate	0.777				
CF forecast		0.766	0.756	0.733	0.729
forward rate		0.777	0.774	0.764	0.753

The British pound (GBP/EUR)



	11/2/19	03/19	05/19	02/20	02/21
spot rate	0.876				
CF forecast		0.877	0.871	0.870	0.872
forward rate		0.878	0.880	0.889	0.901

The Japanese yen (JPY/USD)

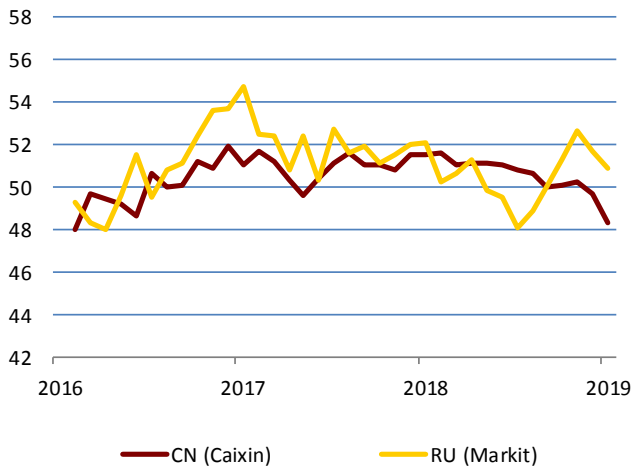


	11/2/19	03/19	05/19	02/20	02/21
spot rate	110.4				
CF forecast		109.9	109.9	108.2	107.5
forward rate		110.1	109.6	107.0	103.8

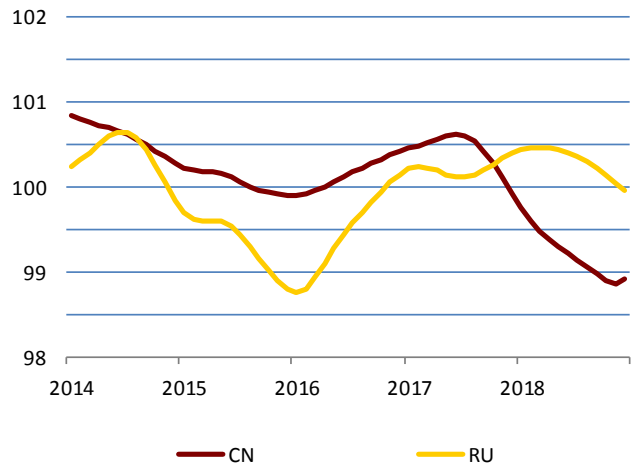
Note: Exchange rates as of last day of month. Forward rate does not represent outlook; it is based on covered interest parity, i.e. currency of country with higher interest rate is depreciating. Forward rate represents current (as of cut-off date) possibility of hedging future exchange rate.

IV.2 Developing countries

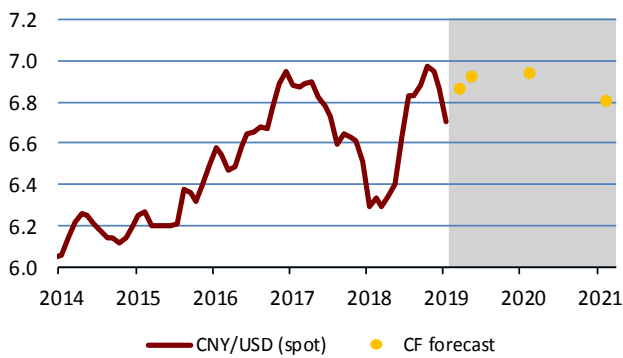
PMI in manufacturing



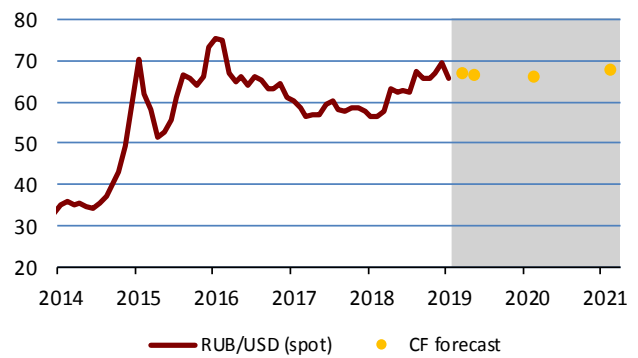
OECD Composite Leading Indicator



The Chinese renminbi (CNY/USD)



The Russian rouble (RUB/USD)



	11/2/19	03/19	05/19	02/20	02/21
spot rate	6.780				
CF forecast		6.865	6.920	6.938	6.801

	11/2/19	03/19	05/19	02/20	02/21
spot rate	65.85				
CF forecast		66.76	66.34	66.23	67.85

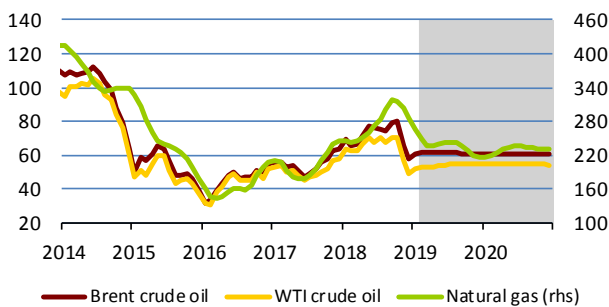
Note: Exchange rates as of last day of month.

V.1 Oil and natural gas

After rising sharply in early January, the Brent crude oil price stabilised close to USD 61.5/bbl. The partial correction of the oil price, which recorded a 17-month low of just above USD 50/bbl on 24 December, and the subsequent stabilisation were fostered mainly by a continued decline in OPEC production. It fell by another 800,000 barrels a day in January, with Saudi Arabia announcing a further drop in production and exports in February and March. Traders have thus switched focus from the supply side to expected demand for oil and are awaiting the outcome of the trade negotiations between the USA and China. Slight optimism prevailed after President Trump admitted he might delay the date for increasing tariffs on Chinese goods (originally set at 1 March 2019) if the talks were to head towards a positive outcome. Even so, the outlook for global economic growth, and hence also demand for oil, are worsening. The appreciating dollar and continuing growth in production in the USA are also counteracting growth in oil prices. The impact of US sanctions on Venezuelan and Iranian oil (after exemptions for its largest buyers expire) is unclear as yet. The situation in Libya has calmed slightly, but unplanned production outages could recur at any time.

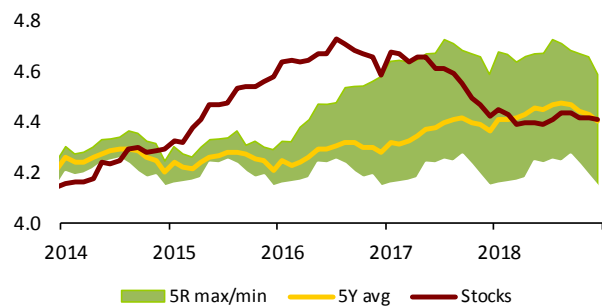
The market futures curve was broadly unchanged from the previous month. It is slightly declining, implying an average Brent crude oil price close to USD 61/bbl for this year and the next. This is virtually in line with the current EIA forecast, which, however, is slightly rising. The February CF expects stronger growth in the Brent price – to almost USD 66/bbl at the one-year horizon. Major growth in oil prices should be prevented by continued growth in world inventories, which will amount to 0.4 million and 0.6 million barrels a day this year and the next according to the EIA.

Outlook for prices of oil (USD/barrel) and natural gas (USD / 1000 m³)

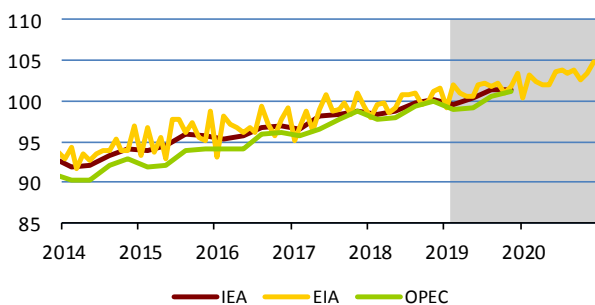


	Brent		WTI		Natural gas	
2019	61.24	↗	54.08	↗	237.77	↘
2020	60.72	↗	54.87	↗	230.07	↘

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

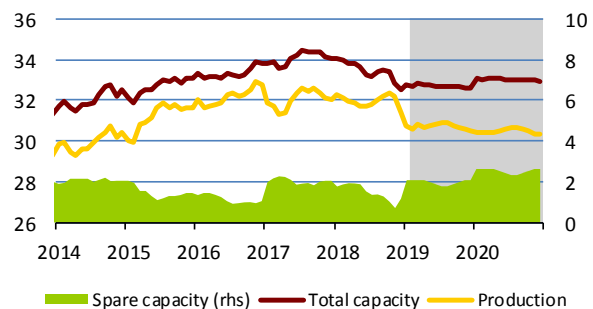


Global consumption of oil and oil products (mil. barrel / day)



	IEA	EIA	OPEC			
2019	100.64	↗	101.45	↘	99.99	↘
2020			102.93	↘		

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



	Production	Total capacity	Spare capacity			
2019	30.74	↘	32.71	↘	1.98	↗
2020	30.49	↘	33.02	↘	2.53	↗

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

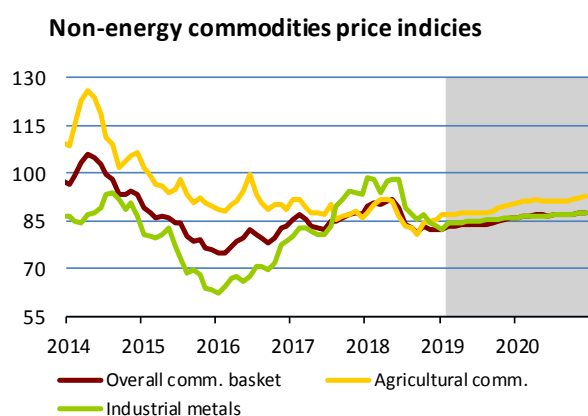
Note: Oil price at ICE, average gas price in Europe – World Bank data, smoothed by the HP filter. Future oil prices (grey area) are derived from futures and future gas prices are derived from oil prices using model. Total oil stocks (commercial and strategic) in OECD countries – IEA estimate. Production and extraction capacity of OPEC – EIA estimate.

V.2 Other commodities

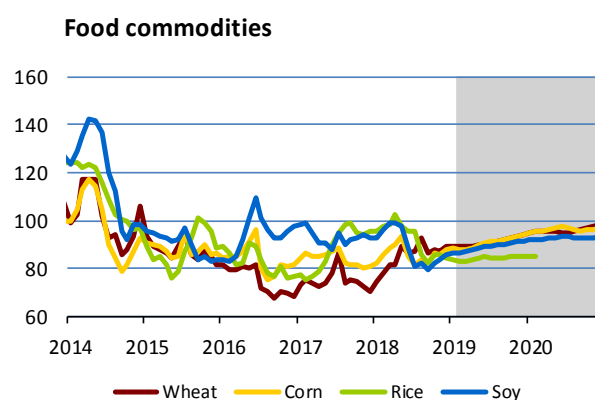
The non-energy commodity price index has shown no trend since mid-2018, with a decline in the base metals price index being offset by a rise in the food commodity price index. This changed in the first half of February, when the base metals price index halted the decline seen over the last several months and fostered a slight rise in the total index amid a flat food commodity price index. The outlook expects all three indices to go up slightly.

Base metal prices remain squeezed by the continued deterioration in global industry. The J.P.Morgan Global Manufacturing PMI fell further in January to a two and a half year low of 50.7. Its export component slid deeper into the contraction band (from 49.7 to 49.4). At 50.1, new orders also neared to this band. Leading indicators of Chinese manufacturing were below 50 for the second month in a row. However, prices of most base metals recovered in mid-January on the back of improved financial market sentiment, a weaker dollar and an expected stimulus by the Chinese government. Copper stocks on the LME remain low, but this has yet to cause copper prices to rise over the outlook horizon. Conversely, the aluminium price outlook is strongly rising despite continued growth in its stocks on the LME and the lifting of sanctions on Russian producer Rusal. The nickel price has risen strongly since the start of the year. The iron ore price also surged in February due to accidents in Australia and Brazil, which are holding up supplies of ore to the market.

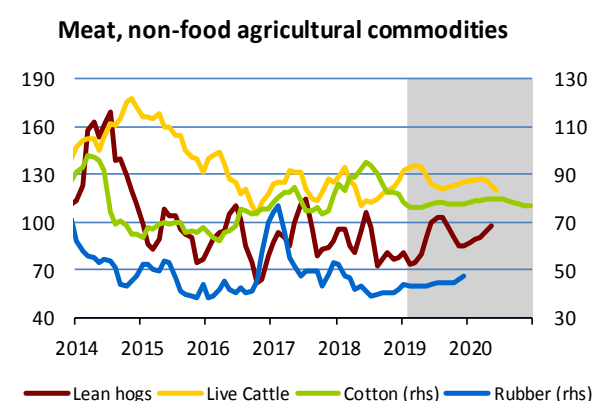
As for food commodities, only continued growth in beef prices (to a seasonal high) is worth mentioning. Prices of other agricultural commodities were broadly flat.



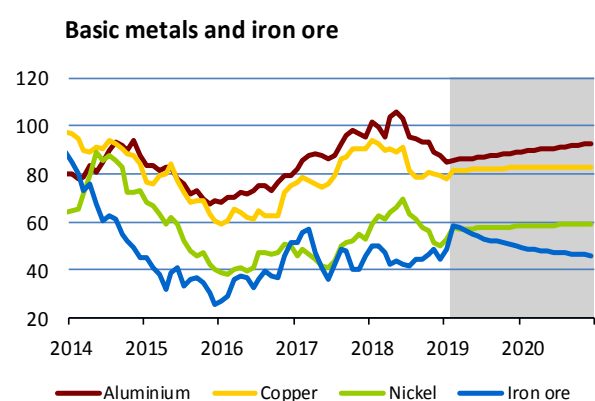
	Overall	Agricultural	Industrial
2019	84.0 ↗	87.9 ↘	84.9 ↗
2020	86.8 ↗	91.4 ↘	86.8 ↗



	Wheat	Corn	Rice	Soy
2019	91.0 ↘	90.7 ↘	84.2 ↘	89.1 ↗
2020	96.0 ↘	96.3 ↘	85.0 ↘	92.7 ↗



	Lean hogs	Live Cattle	Cotton	Rubber
2019	88.5 ↘	127.2 ↗	77.4 ↘	44.3 ↘
2020	91.6 ↘	124.6 ↗	78.6 ↘	



	Aluminium	Copper	Nickel	Iron ore
2019	87.1 ↗	81.8 ↗	57.2 ↗	53.1 ↗
2020	91.0 ↗	82.7 ↗	58.8 ↗	47.5 ↗

Source: Bloomberg, CNB calculations.

Note: Structure of non-energy commodity price indices corresponds to composition of The Economist commodity indices. Prices of individual commodities are expressed as indices 2010 = 100.

Euro area industrial producer prices from the perspective of the oil price¹

The Brent crude oil price is one of the key factors which, via import prices, affect producer price inflation in the euro area. However, the degree to which it feeds into the components of the producer price index (PPI) can vary. This article aims to provide a deeper insight into the PPI structure from the perspective of oil prices. To this end, we create alternative aggregates clustering industries that respond most strongly to changes in euro prices of oil. The literature indicates that pricing policies are most flexible in industries linked to the oil price (mining, chemicals and metals). Prices in most other industries change less, so oil price-induced changes in costs feed into them much later. The components of the overall PPI can thus move in opposite directions, especially if oil prices fall sharply after a previous rise. We therefore cannot expect to find a simple link between movements in oil prices and euro area industrial producer prices.

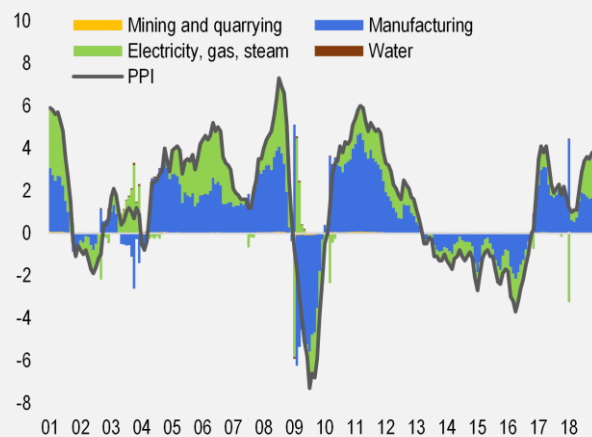
Industrial producer prices according to various classifications

While the last *Focus* examined inflation pressures in the euro area from the perspective of consumer prices, the following article will focus on the industrial producer price index (PPI). The PPI captures changes in the transaction prices of domestic producers.² It is therefore an output price index. In the case of the euro area, output for domestic markets is differentiated from that for other markets (other euro area countries and non-euro area countries). Here, we will focus solely on prices of production for domestic markets. The index comprises prices of orders (not actual deliveries) made in a given period. It is prepared for each country on a monthly basis according to the classification of economic activities (NACE).³ The prices exclude VAT and other taxes but can reflect subsidies to producers. Eurostat also compiles an independent index for the services sector (transportation, postal activities, IT and telecoms).

The PPI is characterised by larger year-on-year swings than the consumer price index, meaning that industrial producer prices are more flexible. The annual change in the euro area PPI has ranged between -8% and +8% since 2001 (see Chart 1), while consumer prices have fluctuated between -1% and +4% in the same period. Industrial prices recorded their highest growth in the pre-crisis period, while in 2013–2016 they steadily declined in year-on-year terms. The annual PPI changes over the past two years have been positive. The driving factor behind the growth in 2017 was manufacturing, whereas electricity, gas and steam supply gained in significance last year.

Chart 1 – Contributions of industrial groupings to annual PPI growth in the euro area according to NACE Rev. 2

(annual percentage changes; contributions in percentage points; monthly data)

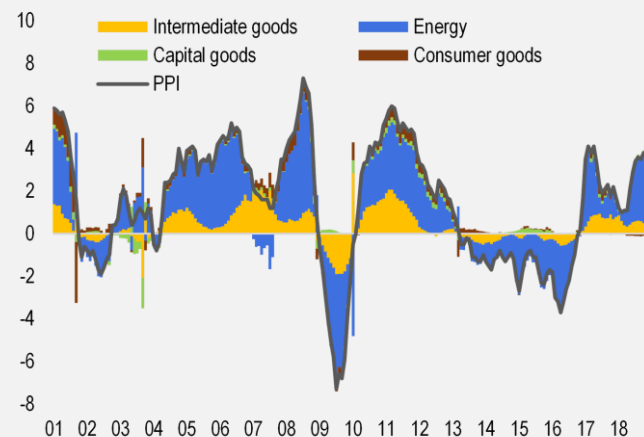


Source: Eurostat

Note: The slight differences shown are statistical discrepancies.

Chart 2 – Contributions of industrial groupings to annual PPI growth in the euro area according to MIGs

(annual percentage changes; contributions in percentage points; monthly data)



Source: Eurostat

Note: The slight differences shown are statistical discrepancies.

A closer look using the MIG classification (see Chart 2) reveals that energy has a dominant effect. As the above four NACE categories are too broad, producer prices can be viewed in terms of main industrial groupings (MIGs). The MIGs divide industrial production into intermediate goods, capital goods, consumer goods and energy. The consumer goods sub-category can be further broken down to separate the

¹ Author: Soňa Benecká. The views expressed in this article are those of the author and do not necessarily reflect the official position of the Czech National Bank.

² This topic was dealt with in detail in an article by Iveta Polášková in the October 2016 issue of *Global Economic Outlook*.

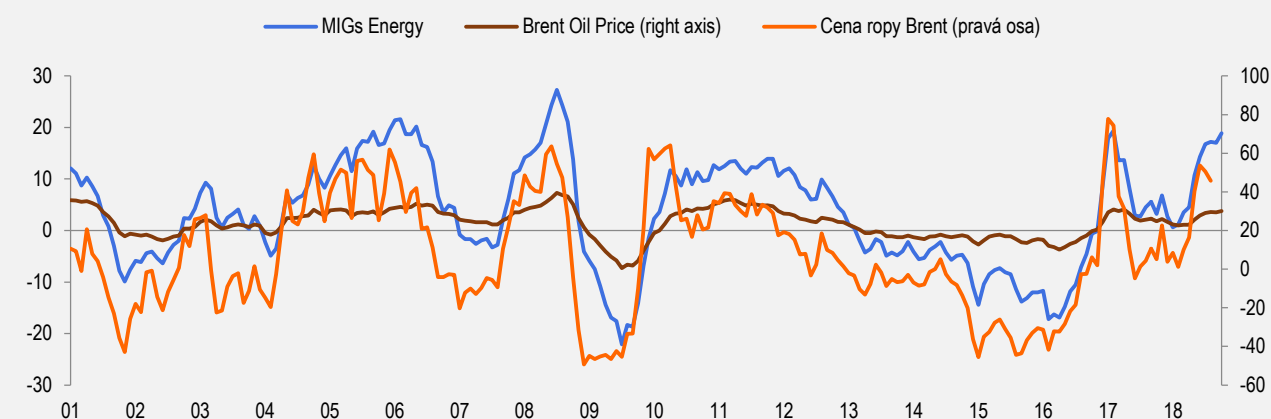
³ The Classification of Economic Activities Rev. 2 (NACE Rev. 2) is a four-level statistical classification of economic activities in the EU.

effect of food prices. The CNB regularly publishes data broken down according to this classification in its Inflation Report. As Chart 2 shows, the overall PPI is affected mainly by the contribution of energy.⁴ As for the other groupings, intermediate goods clearly contribute, while the effect of consumer goods is driven mainly by changes in the food category.

Energy is also the most volatile producer price component, mainly due to the effect of the oil price (see Chart 3). Euro prices of Brent crude oil are subject to sharp swings of between -50% and +80% year on year. The primary effect of dollar prices of oil can be amplified or reduced by the euro-dollar exchange rate. However, as the chart shows, the relationship between the energy component of the PPI and the Brent price is not a direct one. Oil prices pass through to energy prices with different lags in different periods, as the energy category is an aggregate of sub-categories in which changes in the Brent price have an immediate impact (extraction of crude oil and natural gas, for example) and sub-categories in which pricing policies can differ (water collection, treatment and supply).

Chart 3 – The euro price of Brent crude oil and the energy component of the PPI

(annual percentage changes; monthly data)



Source: Eurostat

The literature indicates that energy prices show the most frequent changes in the PPI, mainly due to changes in commodity prices. Vermeulen et al. (2007) describe price-setting processes in six euro area countries using microdata applied to construct PPIs. According to this study, prices change most often in the energy grouping, mainly because of the oil prices contained therein. On average, 72% of prices in this grouping change each month, as against 21% in the overall index. In the cases of intermediate goods and food, the percentage of prices changing each month ranges between 20% and 30%. Prices in the other groupings change very little. Although the percentages in individual countries vary, the ranking of categories by frequency of price changes remains the same. Among the selected countries, however, Italy has the greatest overall production price rigidity. The study also rejects the hypothesis of downward price rigidity: prices go down just as easily as they go up.

The rapid pass-through of commodity prices fosters quite similar energy price patterns across euro area countries. Chart 4 plots energy prices in the Czech Republic's five largest euro area trading partners. The energy sub-index followed the same downward year-on-year trend in all countries in 2011–2016. It did not turn positive again until the start of 2017. Chart 5 offers a comparison across all the euro area countries in 2018, showing the average year-on-year change in the energy sub-index between January and October. The figures range between +17% and -5%. Energy prices rose the most in the Netherlands and the least in Luxembourg. However, the core euro area countries recorded quite similar figures.

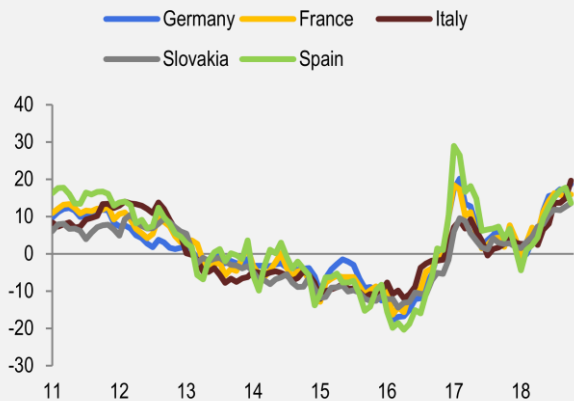
Alternative PPI decomposition taking into account sensitivity to the oil price

The price of oil is the main source of producer price changes in OECD countries, confirming its role as a global price factor. Chart 6 shows the range of the year-on-year changes in producer prices in OECD countries since 1997. Using principal component analysis (PCA), we extracted the first component from the individual indices. It explained almost 60% of the cross-country variability. This principal component captures the common part of the producer price movements in the sample of countries. Chart 7 then compares the principal component with the year-on-year growth in oil prices. Despite visible

⁴ This category comprises mining of coal and lignite, extraction of crude petroleum and natural gas, manufacture of coke and refined petroleum products, electricity, gas, steam and air conditioning supply and water collection, treatment and supply (NACE divisions 05, 06, 19, 35 and 36).

Chart 4 – Energy prices in selected euro area economies

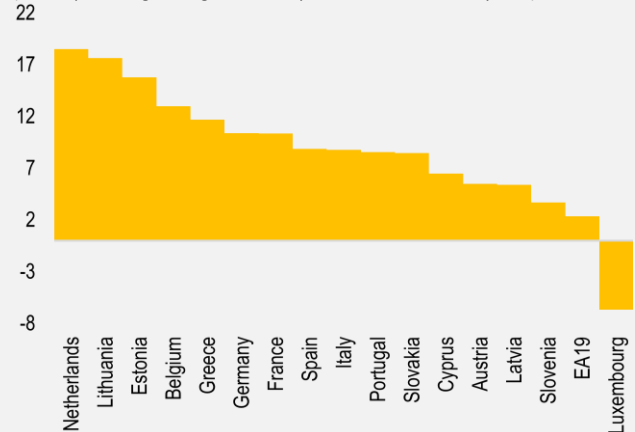
(annual percentage changes; monthly data)



Source: Eurostat

Chart 5 – Average year-on-year change in energy prices in euro area countries in 2018

(annual percentage changes in January–October 2018; monthly data)



Source: Eurostat

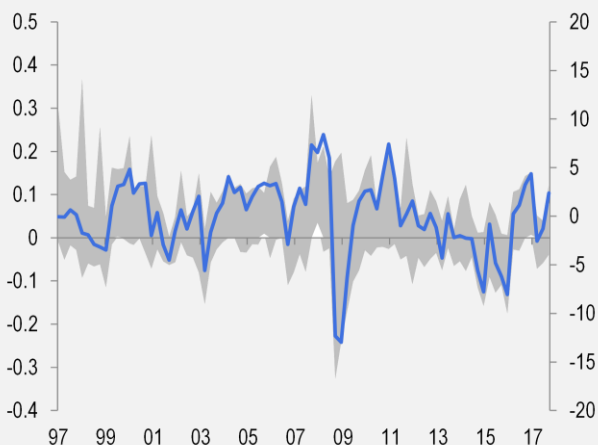
Note: Data for all countries are not available in the period under review.

differences, it is clear that the relatively similar producer price patterns in OECD countries can be ascribed primarily to the effect of oil prices.

Oil prices are reflected in producer and consumer prices primarily through import prices. Global demand, oil extraction innovations and agreements between oil-exporting countries all affect oil prices, which have a direct impact on euro area import prices. They in turn affect producers' costs and hence their output prices. Other price-setting factors include unit labour costs and producers' margins. Castro and Jiménez-Rodríguez (2016), for example, show the transmission of oil prices to euro area producer and consumer prices at the level of industry data. Their results document a partial oil price pass-through for companies with high oil consumption (mining, chemicals and metals). The impact on other industries, especially those oriented towards private consumption, is negligible, suggesting that producers can adapt their production to changes in costs. The transmission of the costs of oil price shocks to producer prices and the subdued effect on consumer prices can then also explain the empirically observed decline in industrial production during a positive oil shock.

Chart 6 – Industrial producer prices in OECD countries and the extracted principal component

(annual percentage changes; quarterly data)

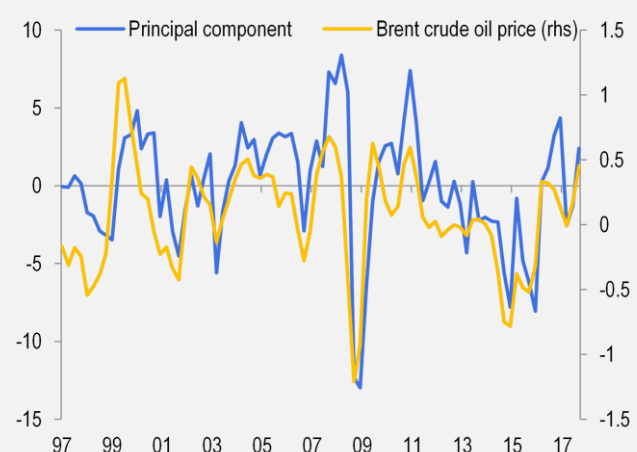


Source: OECD, author's calculations

Note: Grey shading indicates the minimum–maximum range for the year-on-year changes in 26 OECD countries

Chart 7 – Comparison of the principal component and the dollar price of Brent crude oil

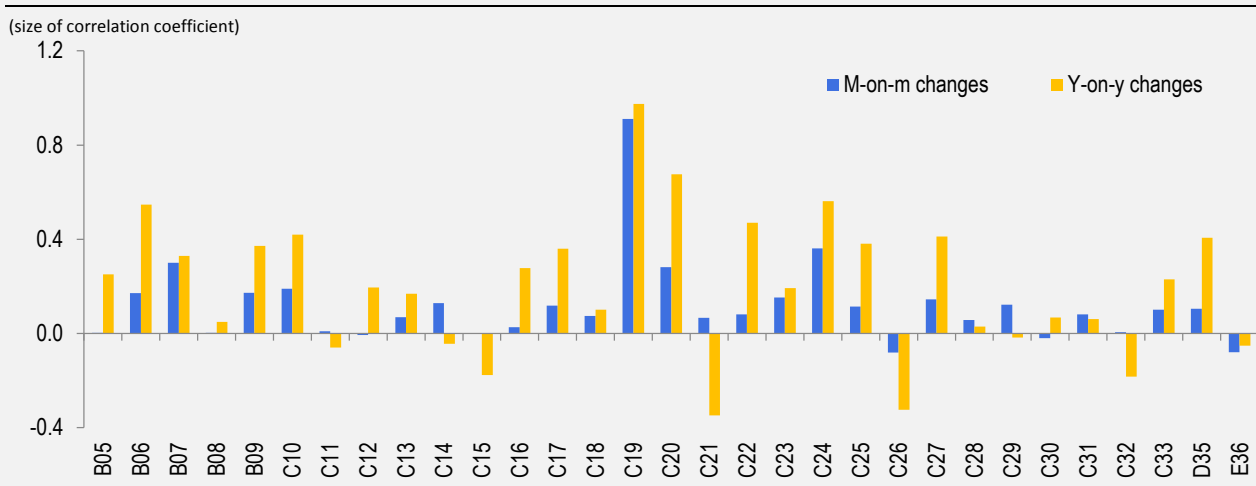
(annual percentage changes; quarterly data)



Source: OECD, author's calculations

However, the degree to which Brent crude oil prices feed into the various components of producer prices can vary. As mentioned above, the energy index includes other effects than just oil prices and is thus less suitable for our analysis. We therefore calculated the correlations between the two-digit NACE sub-indices and changes in Brent prices in the domestic currency. For comparison, we provide

Chart 8 – Correlation of month-on-month and year-on-year changes in PPI sub-indices with the euro price of Brent crude oil



Source: Eurostat

the correlations for the month-on-month and year-on-year changes for each sub-index over the entire historical time series (see Chart 8). The results reveal differences. The groupings correlated with the Brent price in month-on-month terms are (with a few exceptions) not the same as those with year-on-year correlations. On a year-on-year basis, the correlations with the oil price are even negative in some cases (pharmaceuticals and computers). In month-on-month terms, changes in oil prices are most strongly correlated with the coke, metals, chemicals and food products sub-indices (NACE divisions B07, C10, C19, C24 and C20). Of these sub-items, food products have the greatest weight in the overall index, while the importance of the others is about half that of food at most. In year-on-year terms, oil price changes are correlated the most with the oil extraction, coke, metals, chemicals and plastics sub-indices (NACE divisions C19, C24, B06, C20 and C22). In terms of size, the components are more similar, with an average weight in the overall index of about 5%.

A detailed view thus shows that the effect of oil prices is not dominant in all components of the energy index. The correlation is positive, though not always the highest, for coal mining, oil extraction, coke manufacture and electricity supply (NACE divisions B05, B06, C19, D35). By contrast, the correlation for the last grouping of the energy sub-index (water collection, treatment and supply, E36) is negative in both month-on-month and year-on-year terms.

An alternative approach is to create aggregates that take into account the empirical relationship with the oil price and compare them with the energy index. For comparison, we chose three options, the compositions of which we give in Table 1: the aggregates of the five sub-indices correlated the most with oil on a month-on-month and year-on-year basis (Agg5mom and Agg5yoy respectively) and the aggregate of the eight sub-indices correlated the most with oil on a year-on-year basis (Agg8yoy). The energy aggregate is the same as in the original MIG classification. The weights of the selected aggregates range between 20% and 56% of the overall PPI. The aggregation is based on weighting the month-on-month increases using fixed weights. If we know how the aggregate changes, we can derive from the overall PPI the change in the other prices component, i.e. the change in all the other components of the PPI except those included in the aggregate.

Table 1 – Definitions of aggregates taking into account the correlation with Brent, in comparison with the energy index

Aggregate	NACE divisions	Weight in overall PPI
Agg5mom	B07, C10, C19, C24, C20	29%
Agg5yoy	C19, C24, B06, C20, C22	20%
Agg8yoy	C19, C24, B06, C20, C22, C10, C27, D35	56%
Energy	B05, B06, C19, D35, E36	28%

A comparison of the aggregates reveals that the pass-through of oil prices is faster in some of the new aggregates (see Chart 9). We succeeded in capturing a faster response to Brent crude oil prices in the Agg5mom and Agg5yoy aggregates, so these aggregates actually filter the primary effect of the oil price.⁵ Unfortunately, it is impossible to verify – using microeconomic data – whether producers in these industries do indeed change their prices immediately depending on the oil price.⁶ By contrast, the Agg8yoy

⁵ In this sense, the other prices components derived from the selected aggregates should contain industries that respond to oil price changes either later or never. A comparison of Charts 10 and 11 does indeed reveal a shift of about one quarter.

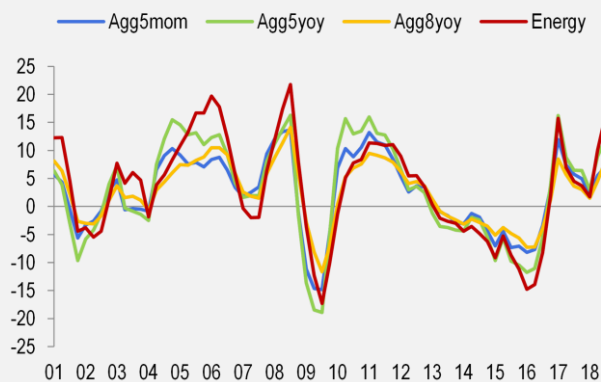
⁶ However, similar empirical relationships can be found for Czech industrial producer prices. We found them to have a strong relationship with the price of oil in the same industries. The results are consistent with the findings of Castro and Jiménez-Rodríguez (2016).

and energy aggregates change similarly over time, though on different scales. Their year-on-year dynamics change later than those of the Agg5mom and Agg5yoy aggregates, particularly in the period of 2004–2006.

Other prices derived from the individual aggregates show greater differences in their year-on-year dynamics (see Chart 10). Other prices under the different definitions even move in opposite directions in some periods (2005–2006, for example). The main source of the differences is the inclusion/non-inclusion in the energy aggregate of division D35 (electricity, gas, steam and air conditioning supply), which accounts for almost 20% of the overall PPI. D35 is part of the energy index but is not included in Agg5mom and Agg5yoy. If electricity and gas prices rise sharply, due, for example, to previous oil price growth, prices in the energy MIG may change differently to those in our new aggregates. Electricity prices also largely reflect the effect of oil prices, but with a sizeable lag. In addition, they are affected by other factors (such as emission allowances and the solar boom). We will discuss this issue in a future *Focus*.

Chart 9 – Aggregates taking into account correlations with Brent crude oil in comparison with the energy index

(annual percentage changes; quarterly data)

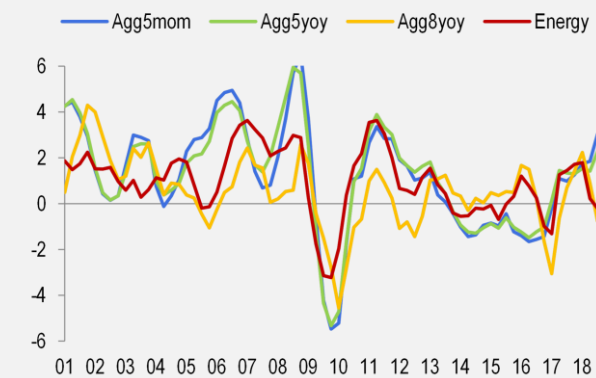


Source: Eurostat, author's calculations

Note: Agg5mom – the five most correlated sub-indices on a month-on-month basis, Agg5yoy – the five most correlated sub-indices on a year-on-year basis, Agg8yoy – the eight most correlated sub-indices on a year-on-year basis, Energy – the energy index according to the MIG classification

Chart 10 – The other prices component derived from the individual aggregates

(annual percentage changes; quarterly data)



Source: Eurostat, author's calculations

Note: Agg5mom – the five most correlated sub-indices on a month-on-month basis, Agg5yoy – the five most correlated sub-indices on a year-on-year basis, Agg8yoy – the eight most correlated sub-indices on a year-on-year basis, Energy – the energy index according to the MIG classification

Conclusion

The aim of this article was to demonstrate alternative ways of decomposing overall industrial producer price inflation in the euro area, taking into account producers' different pricing policies in relation to the Brent crude oil price. The Brent price is a dominant source of shocks to industrial producer price indices in OECD countries. It thus satisfies the definition of a genuinely global shock. Using the example of the euro area industrial producer price index, we illustrated that the sub-indices do not all respond to changes in oil prices in the same way. A correlation analysis then revealed which components are sensitive to such changes. Using the results of this analysis, we presented options for an alternative definition of the aggregate for the energy (oil) component of producer prices.

References

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- Castro, C. and Jiménez-Rodríguez, R. (2017): "Oil price pass-through along the price chain in the euro area". *Energy Economics*, Elsevier, vol. 64(C), pp. 24–30.

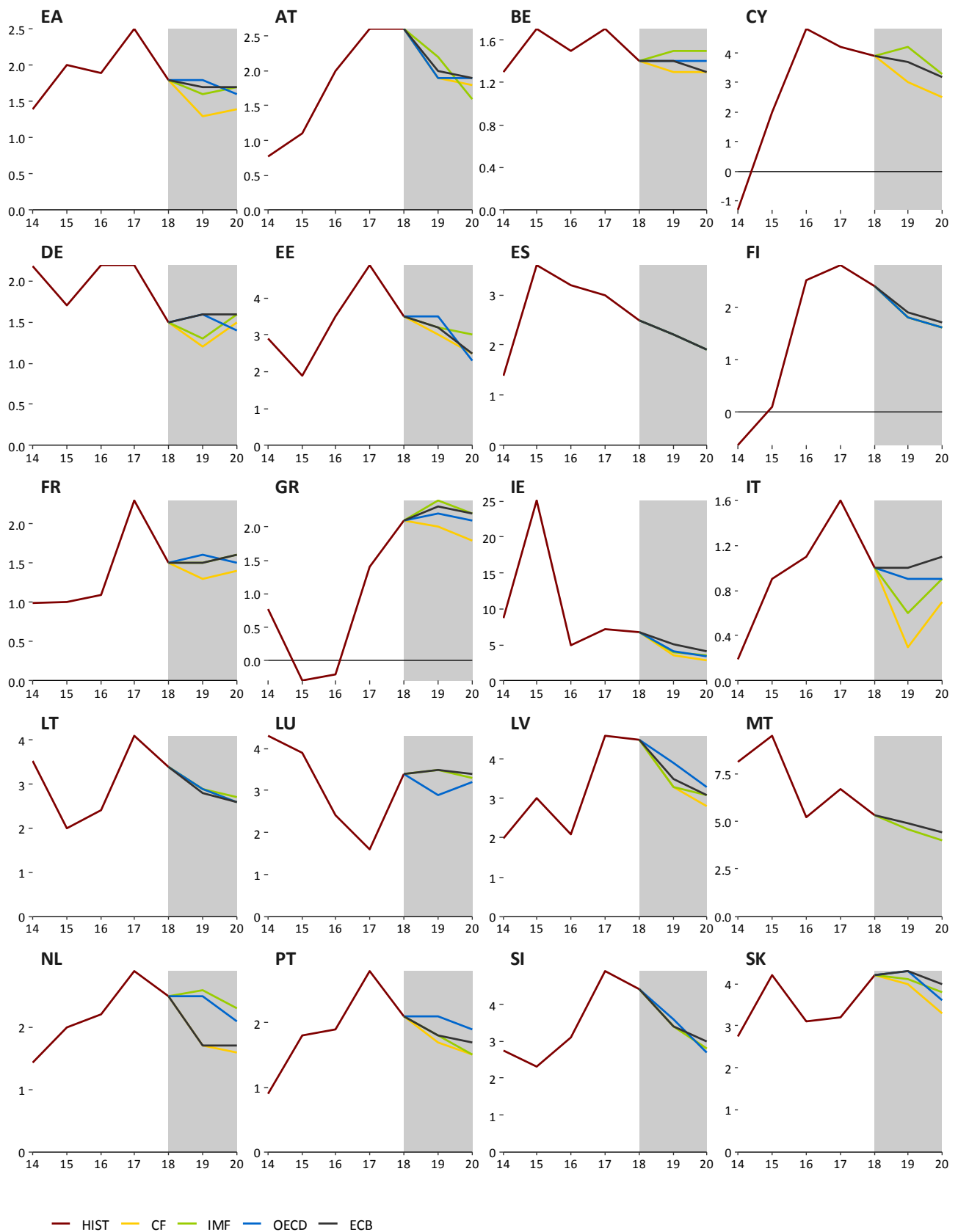
A1. Change in predictions for 2019

	GDP growth, %				Inflation, %											
	CF	IMF	OECD	CB / EIU	CF	IMF	OECD	CB / EIU								
EA	-0.2	2019/2	-0.3	2019/1	-0.1	2018/11	-0.1	2018/12	-0.1	2019/2	+0.1	2018/10	+0.1	2018/11	-0.1	2018/12
		2019/1		2018/10		2018/9		2018/9		2019/1		2018/4		2018/5		2018/9
DE	-0.2	2019/2	-0.6	2019/1	-0.2	2018/11	-0.3	2018/12	-0.1	2019/2	+0.1	2018/10	+0.2	2018/11	-0.3	2018/12
		2019/1		2018/10		2018/9		2018/6		2019/1		2018/4		2018/5		2018/6
US	0	2019/2	0	2019/1	0	2018/11	-0.2	2018/12	0	2019/2	-0.3	2018/10	0	2018/11	-0.1	2018/12
		2019/1		2018/10		2018/9		2018/9		2019/1		2018/4		2018/5		2018/9
UK	-0.1	2019/2	0	2019/1	+0.2	2018/11	-0.5	2019/2	0	2019/2	0	2018/10	+0.1	2018/11	-0.1	2019/2
		2019/1		2018/10		2018/9		2018/11		2019/1		2018/4		2018/5		2018/11
JP	-0.1	2019/2	+0.2	2019/1	-0.2	2018/11	+0.1	2019/1	-0.1	2019/2	+0.2	2018/10	-0.1	2018/11	-0.8	2019/1
		2019/1		2018/10		2018/9		2018/10		2019/1		2018/4		2018/5		2018/10
CN	0	2019/2	0	2019/1	-0.1	2018/11	0	2019/2	0	2019/2	-0.2	2018/10	+1.0	2018/11	-0.1	2019/2
		2019/1		2018/10		2018/9		2018/12		2019/1		2018/4		2018/5		2018/12
RU	0	2019/1	-0.2	2019/1	0	2018/11	0	2019/1	+0.1	2019/1	+1.3	2018/10	+1.0	2018/11	+0.4	2019/1
		2018/12		2018/10		2018/9		2018/12		2018/12		2018/4		2018/5		2018/12

A2. Change in predictions for 2020

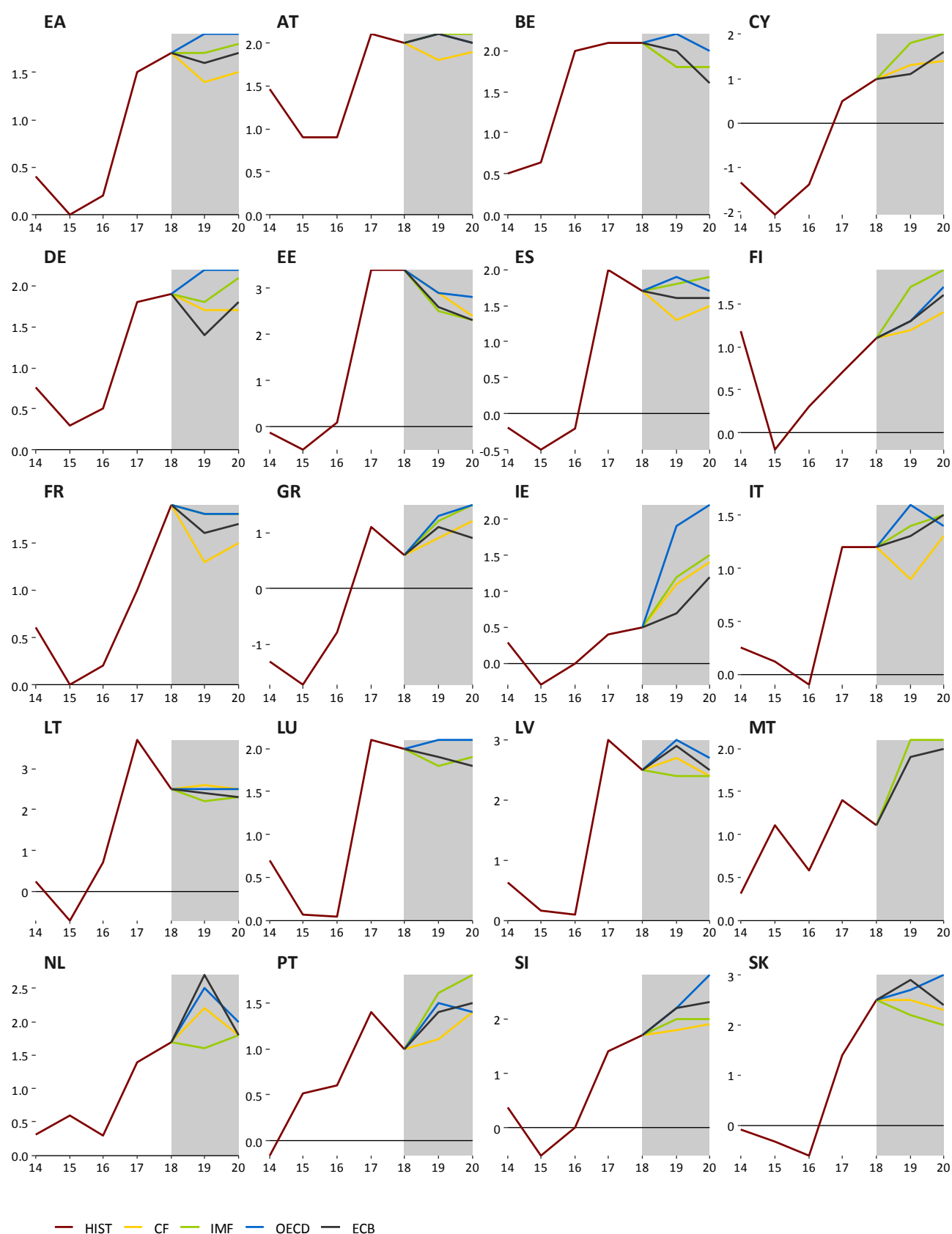
	GDP growth, %				Inflation, %											
	CF	IMF	OECD	CB / EIU	CF	IMF	OECD	CB / EIU								
EA	0	2019/2	0	2019/1	---	2018/11	0	2018/12	0	2019/2	0	2018/10	---	2018/11	0	2018/12
		2019/1		2018/10		---		2018/9		2019/1		2018/4		---		2018/9
DE	-0.1	2019/2	0	2019/1	---	2018/11	0	2018/12	0	2019/2	0	2018/10	---	2018/11	0	2018/12
		2019/1		2018/10		---		2018/6		2019/1		2018/4		---		2018/6
US	+0.1	2019/2	0	2019/1	---	2018/11	0	2018/12	0	2019/2	+0.2	2018/10	---	2018/11	0	2018/12
		2019/1		2018/10		---		2018/9		2019/1		2018/4		---		2018/9
UK	-0.1	2019/2	+0.1	2019/1	---	2018/11	-0.2	2019/2	0	2019/2	0	2018/10	---	2018/11	0	2019/2
		2019/1		2018/10		---		2018/11		2019/1		2018/4		---		2018/11
JP	0	2019/2	+0.2	2019/1	---	2018/11	+0.2	2019/1	-0.1	2019/2	0	2018/10	---	2018/11	-0.5	2019/1
		2019/1		2018/10		---		2018/10		2019/1		2018/4		---		2018/10
CN	0	2019/2	0	2019/1	---	2018/11	0	2019/2	0	2019/2	0	2018/10	---	2018/11	0	2019/2
		2019/1		2018/10		---		2018/12		2019/1		2018/4		---		2018/12
RU	0	2019/1	-0.1	2019/1	---	2018/11	0	2019/1	+0.1	2019/1	+0.8	2018/10	---	2018/11	0	2019/1
		2019/1		2018/10		---		2018/12		2019/1		2018/4		---		2018/12

A3. GDP growth in the euro area countries



Note: The chart shows institutions' latest available outlooks of for the given country (in %).

A4. Inflation in the euro area countries



Note: The chart shows institutions' latest available outlooks of for the given country (in %).

A5. List of abbreviations

AT	Austria	IFO	Leibniz Institute for Economic Research at the University of Munich
bbl	barrel	IMF	International Monetary Fund
BE	Belgium	IRS	Interest Rate swap
BoE	Bank of England (the UK central bank)	ISM	Institute for Supply Management
BoJ	Bank of Japan (the central bank of Japan)	IT	Italy
bp	basis point (one hundredth of a percentage point)	JP	Japan
CB	central bank	JPY	Japanese yen
CBR	Central Bank of Russia	LIBOR	London Interbank Offered Rate
CF	Consensus Forecasts	LME	London Metal Exchange
CN	China	LT	Lithuania
CNB	Czech National Bank	LU	Luxembourg
CNY	Chinese renminbi	LV	Latvia
ConfB	Conference Board Consumer Confidence Index	MKT	Markit
CXN	Caixin	MT	Malta
CY	Cyprus	NIESR	National Institute of Economic and Social Research (UK)
DBB	Deutsche Bundesbank (the central bank of Germany)	NKI	Nikkei
DE	Germany	NL	Netherlands
EA	euro area	OECD	Organisation for Economic Co-operation and Development
ECB	European Central Bank	OECD-CLI	OECD Composite Leading Indicator
EE	Estonia	OPEC+	member countries of OPEC oil cartel and 10 other oil-exporting countries (the most important of which are Russia, Mexico and Kazakhstan)
EIA	Energy Information Administration	PMI	Purchasing Managers' Index
EIU	Economist Intelligence Unit	pp	percentage point
ES	Spain	PT	Portugal
ESI	Economic Sentiment Indicator of the European Commission	QE	quantitative easing
EU	European Union	RU	Russia
EUR	euro	RUB	Russian rouble
EURIBOR	Euro Interbank Offered Rate	SI	Slovenia
Fed	Federal Reserve System (the US central bank)	SK	Slovakia
FI	Finland	UK	United Kingdom
FOMC	Federal Open Market Committee	UoM	University of Michigan Consumer Sentiment Index - present situation
FR	France	US	United States
FRA	forward rate agreement	USD	US dollar
FY	fiscal year	USDA	United States Department of Agriculture
GBP	pound sterling	WEO	World Economic Outlook
GDP	gross domestic product	WTI	West Texas Intermediate (crude oil used as a benchmark in oil pricing)
GR	Greece	ZEW	Centre for European Economic Research
ICE	Intercontinental Exchange		
IE	Ireland		
IEA	International Energy Agency		

