Global Economic Outlook

January 2020

CNB CZECH NATIONAL BANK

Foreword

Dear Readers,

This year's first issue of Global Economic Outlook contains – for the first time in the CNB's history – an analysis using data obtained from satellites and processed by artificial intelligence.

Do not expect a revolution. The Monetary Department's monthly bulletin is still based on detailed analyses of the current and future developments using traditional macroeconomic data. That is still a fast and clear source of information about the external environment.

The innovative approach is applied in the Focus section, in which the authors concentrated on China. The traditional indicators such as GDP suggest a slowdown in the Chinese economic growth. A look from the perspective of an alternative index monitoring the activity in six thousand industrial areas via satellites shows that the Chinese economy is still in the expansionary phase, but it is slowing down. The conclusions should be treated with caution, as they are based on alternative indices. However, they are the first example of how new technologies can be used in the area of economics.

We hope that you will enjoy reading the January issue of Global economic outlook.

Aleš Michl, CNB Bank Board member

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Cut-off date for data
17 January 2020

CF survey date
13 January 2020

GEO publication date
24 January 2020

Notes to charts
ECB, Fed, BoE and BoJ: 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 Refinitiv 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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I. Introduction

Dear readers, you hold in your hands this year's first issue of the Global Economic Outlook published by the Monetary Department. This issue is published in a new graphical format, to which the CNB is switching in all its publications in 2020. We believe that you will continue to enjoy reading our publication and keep it as a useful guide to economic developments abroad.

January 2020 will enter modern history as the month when the UK, as the EU's third strongest economy, will leave this bloc after more than 47 years. The EU is thus losing an important part of its economy and only history will show how large a loss will this decision be for the two sides. Another important piece of this month's news is that the USA and China signed the long-awaited "phase one" trade agreement in Washington, D.C. on 15 January. The text of the deal contains, among other things, China's pledge to raise imports from the USA by USD 200 billion and give up the option to excessively weaken the renminbi. The tariffs placed earlier on imports to the USA remain in place as a guarantee that China will keep its promises. The lifting of the restrictions introduced earlier on mutual trade is to be part of a "phase two" trade deal.

January GDP and inflation outlooks for monitored countries, in %

GDP	EA	DE	US	UK	JP	CN	RU
2020	1.0 →	0.9 →	1.9 ↗	1.1 →	0.4 ↗	5.9 ↗	1.7 →
2021	1.2 *	1.0 *	1.9 *	1.4 *	0.8 *	5.7 *	1.8 *

Inflation	EA	DE	US	UK	JP	CN	RU
2020	1.3 ↗	1.5 ↗	2.1 ↗	1.7 ↘	0.6 →	3.1 ↗	3.8 →
2021	1.4 *	1.5 *	2.1 *	1.9 *	0.6 *	2.2 *	3.9 *

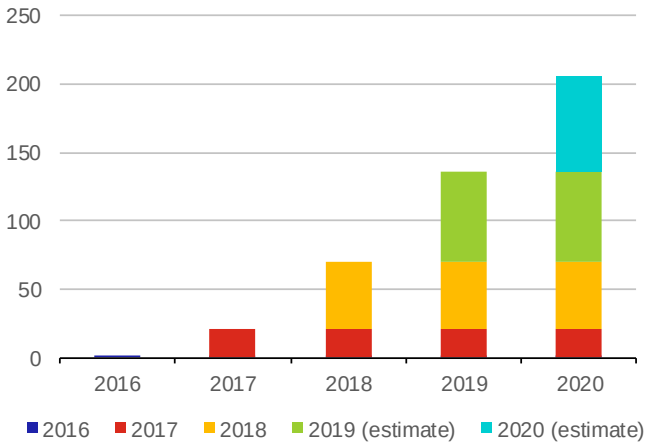
Source: Consensus Forecasts (CF)

Note: The arrows indicate the direction of revisions compared with the last GEO. The asterisks indicate new outlooks for an extended horizon.

The GDP growth outlooks show that the growth of the euro area economy will reach just 1% this year. The growth of Germany as its strongest part will be even slightly lower. Economic growth in the UK will be similar. However, a visible improvement is expected there next year despite Brexit. As usual, the economic growth in the USA is expected to be the highest and growth in Japan the lowest. The Chinese economy met the target with 6.1% growth. However, its performance is expected to fall below 6% this year. **The consumer inflation outlooks were raised for both the euro area and Germany.** This indicates a welcome direction of growth in inflation which is, however, still lagging visibly behind the 2% ideal. Consumer inflation in the USA should only slightly exceed the 2% level. Slight inflation growth is also expected in China. However, it can be assessed as moderate in terms of economic growth.

The dollar will weaken slightly against the euro, sterling and the yen at the one-year horizon, but will strengthen moderately against the renminbi and the rouble. The CF outlook for the Brent crude oil price at the end of 2020 is USD 62/bbl (highest estimate USD 75/bbl, lowest estimated USD 48/bbl). The geopolitical tensions in the Middle east in early January thus affected the price of oil only for a couple of days and the price is expected to fall gradually. The outlook for 3M USD LIBOR market rates is still falling slightly, while 3M EURIBOR rates remain negative over the entire outlook horizon.

Estimates of Brexit costs as a loss of GDP, in GBP billion



Source: Bloomberg Economics

Note: The estimate is calculated on the basis of the difference between the actual and hypothetical GDP growth over the given period.

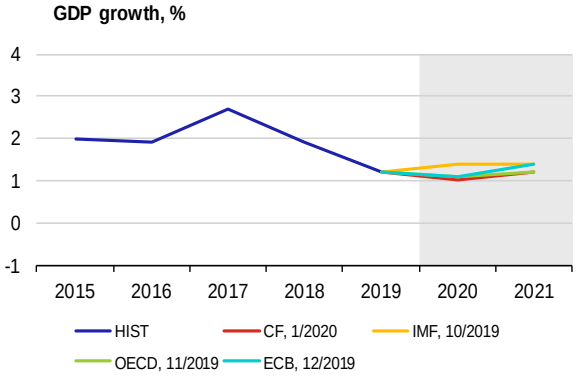
The chart in the January issue shows the estimated opportunity costs for the UK economy due to Brexit. The estimate is based on the current GDP growth and the hypothetical GDP growth that the UK economy would have achieved had it not opted for Brexit. If we convert such figures to nominal values, the Brexit bill will exceed GBP 200 billion at the end of this year and continue to rise (according to estimates by the UK NIESR, the UK will never make up the loss).

The current issue also contains an analysis: An alternative, satellite view of China. The article focuses on alternative indicators of economic activity based on satellite imagery, which is appropriate especially where figures from official sources are difficult to obtain or come in with a long delay.

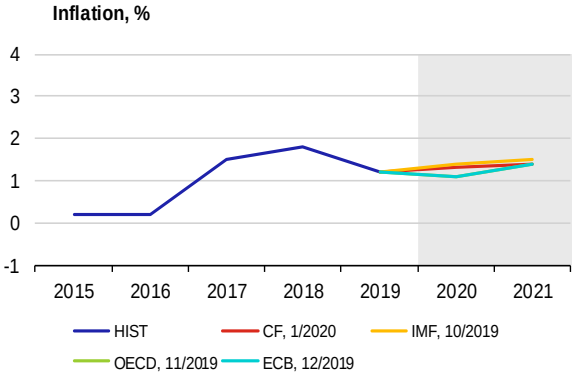
II.1 Euro area

The slowdown in euro area economic growth, observed since the start of 2018, has probably come to an end, but it is still uncertain whether a stronger recovery can be expected. The economy of the monetary union is mirroring in its main features the trend in Germany as its largest member state. However, growing differences can be observed when looking at the developments in individual euro area states. The situation in the German economy is deeply divided between the two key sectors. Industry is going through hard times, as production keeps falling year on year, although the situation in the sector has begun to stabilise in recent months. By contrast, the developments in services remain optimistic due to persisting consumer demand. The other large euro area economies, which are less dependent on foreign trade and industrial production, are following an entirely different pattern. France has surprised with resilience to the developments in its main neighbour, showing very stable economic growth. Besides a lower degree of openness, it is benefitfing from the previous fiscal stimuli made by President Macron in 2018, a year earlier than such steps were taken in most other European countries. A question mark currently hangs over the potential economic impacts of ongoing protests against the reform of the French pension system. However, the existing estimates suggest that these impacts may not be significant. Conversely, if the reform were to be implemented, it would have a distinctly positive effect on growth in the long run. Economic developments in Italy and Spain are also showing considerable stability despite dynamic political developments there, which however in the case of Italy means continued economic stagnation.

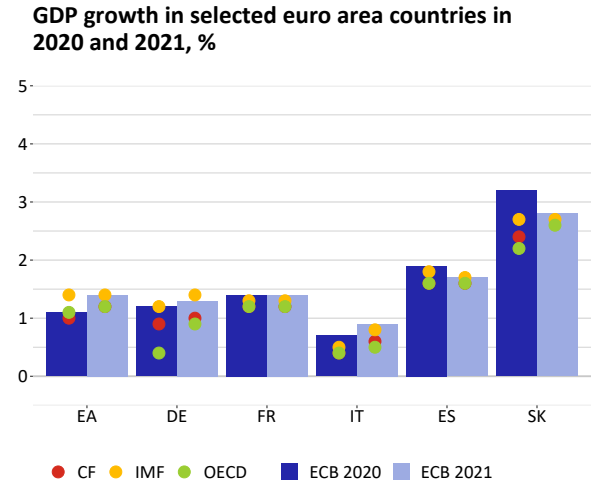
Available indicators suggest continued subdued quarterly growth of the euro area economy at the end of last year. Industrial production grew slightly in November. However, this followed a sharper fall in October. The new data on euro area international trade brought better news. The balance on goods surplus grew markedly in October and was only partly offset in November. The continuation of only subdued GDP growth is also indicated by the purchasing managers' index. The composite PMI increased in Q4, but remains only slightly above the 50-point level. The same cannot be said of the

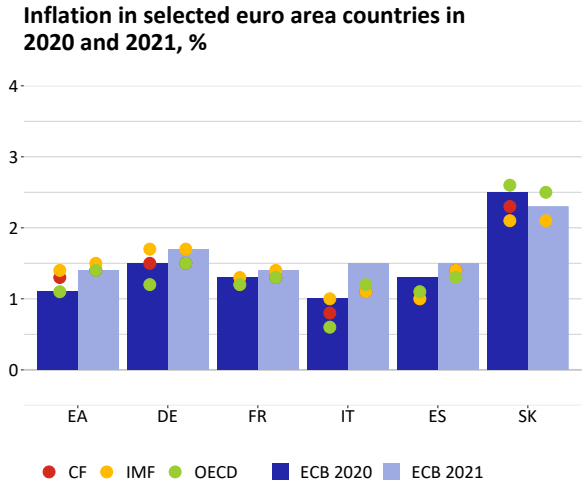


	CF	IMF	OECD	ECB
2020	1.0	1.4	1.1	1.1
2021	1.2	1.4	1.2	1.4



	CF	IMF	OECD	ECB
2020	1.3	1.4	1.1	1.1
2021	1.4	1.5	1.4	1.4





Note: Charts show institutions' latest available outlooks of for the given economy.

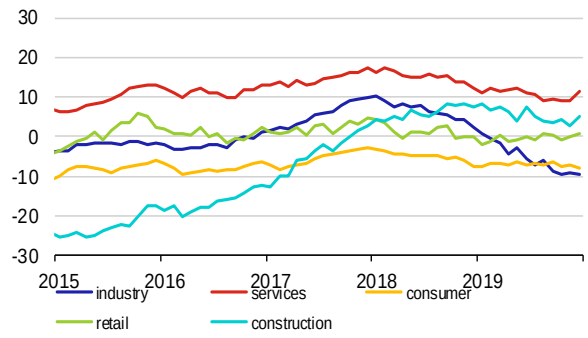
index for manufacturing, which dropped slightly in December and remains in the contraction band. By contrast, the index for services grew considerably in December, suggesting continuation of the dual nature of the euro area economy in the coming months. The European Commission's December data on economic sentiment (ESI) are similar. However, they simultaneously show that consumer confidence declined at the end of the year. Retail sales can thus be expected to record a slightly worse result in December after solid growth in November. Unemployment in the euro area maintains a downward tendency. The unemployment rate varies considerably across Member States. However, it continues to fall in countries where it is the highest (it dropped in Spain and France in November).

The full-year euro area GDP growth should slow this year due to a continued subdued trend, but the outlooks for next year expect its renewed pick-up. The January CF estimates the overall economic growth at 1% this year. The average of the respondents' forecasts for 2020 is 1.2%. The older outlooks of the other institutions are slightly higher for both years. Looking at the expected developments in individual euro area countries, the January CF did not revise any of the outlooks for large economies.

Inflation in the euro area also remains subdued. Headline inflation grew to 1.3% in December, due mainly to a positive contribution of rising energy prices. Core inflation stayed at the November level (also 1.3%). The fastest growth was recorded for prices in Slovakia (of 3.2%) and the Netherlands (of 2.8%), and the slowest for prices in Portugal (of 0.4%) and Italy (of 0.5%). Inflation in Germany (1.5%) was above the level of the euro area as a whole,

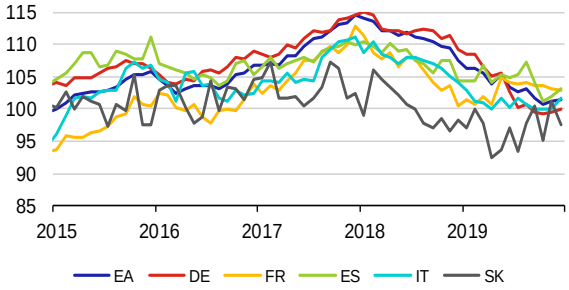
Inflation is expected to increase this year and continue rising in 2021. The January CF expects annual consumer price growth of 1.3% this year. It predicts an even higher, 0.1 pp, increase next year. Long-term inflation expectations in the euro area based on five-year swaps have slightly increased in recent months. However, they are still very low. The ECB's monetary policy will thus probably remain very accommodative. The outlooks for both short-term interest rates and long-term yields remain negative. According to the January CF, the 3M EURIBOR will be -0.4% over the entire one-year outlook horizon.

ESI leading indicators



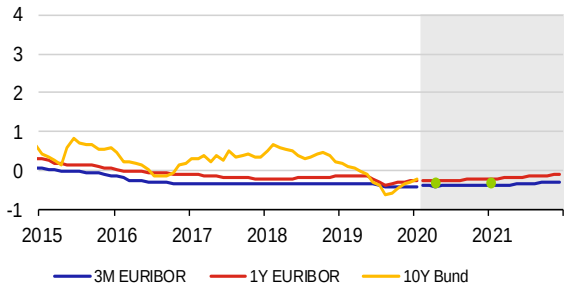
	industry	services	consum.	retail	constr.
10/19	-9.5	9.0	-7.6	-0.9	4.4
11/19	-9.1	9.2	-7.2	-0.2	2.8
12/19	-9.3	11.4	-8.1	0.8	5

ESI leading indicators



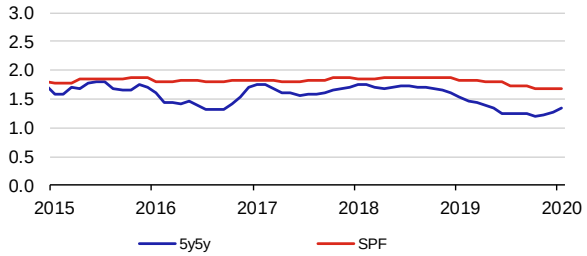
	EA	DE	FR	ES	IT	SK
10/19	100.8	99.2	103.5	101.2	100.0	95.1
11/19	101.2	99.6	103.2	101.9	99.9	101.1
12/19	101.5	100.0	103.0	103.2	101.6	97.6

Interest Rates, %



	12/19	1/20	4/20	1/21
3M EURIBOR	-0.40	-0.39	-0.39	-0.37
1Y EURIBOR	-0.26	-0.25	-0.24	-0.20
10Y Bund	-0.27	-0.22	-0.30	-0.30

Inflation expectations in the euro area, %



Note: Inflation expectations based on 5year inflation swap and SPF

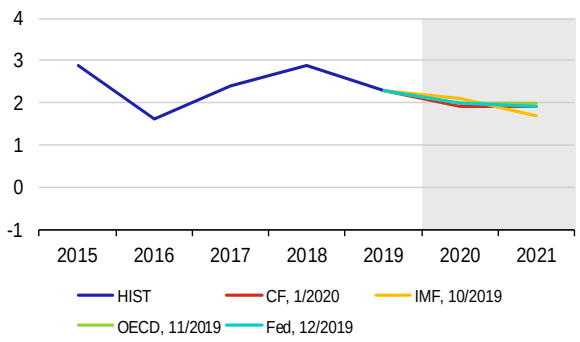
II.2 United States

The signing of the first phase of the trade agreement between the USA and China represents significant progress towards an end to a trade war lasting for 18 months now. China has pledged in the document to buy agricultural products and other types of goods worth at least USD 200 billion from the USA in the next two years. The USA will lower the tariffs (to 7.5%) which it placed on goods totalling USD 120 billion in September. The document, running into 86 pages, also mentions China's promise of greater protection of US firms' intellectual property and the pledge that the country will not manipulate its currency. However, the agreement does not cover the key, and therefore disputable, issues (commercial cyber services, industrial subsidies in China, etc.). Nevertheless, the USA will not lift the tariffs on Chinese goods until a phase two of the Chinese-US trade deal is completed.

Current data from the economy suggest slowing growth and a still robust labour market. According to the Atlanta Fed, the economy will grow by more than 2% in 2019 Q4. Besides strong private consumption, the result will reflect a sharp drop in imports, and hence a markedly lower US trade deficit. The deficit fell to the lowest level in three years (USD 43 billion) in November 2019, due mainly to the trend in foreign trade with China and the EU. Non-farm payrolls rose by just 145,000 in December and unemployment reaced 3.5%. Annual wage growth slowed below 3%. It can already be seen from the labour market data that the worse situation in industry causes lay-offs in some segments and regions. Industrial activity fell again year on year (by 0.8%) in November. According to the ISM, manufacturing remains in the contraction band.

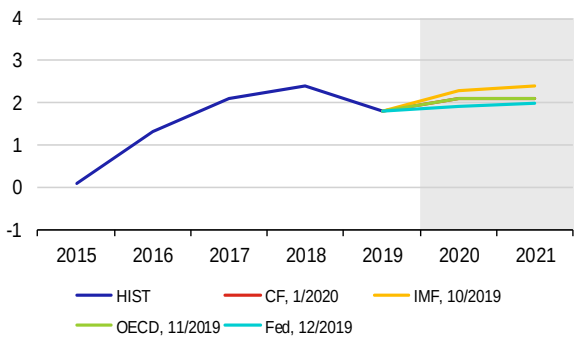
Fed representatives agreed on keeping monetary policy stable for a certain period of time and started discussing a review of the monetary policy framework. There is also the question of how the central bank will cope with the sudden demand for liquidity, which pushed the overnight rate to four times the Fed's lending rate in September. The Fed has been conducting daily liquidity operations since then. However, it is considering the introduction of a standing repo facility. The new CF raised both growth and inflation outlooks for 2020.

GDP growth, %



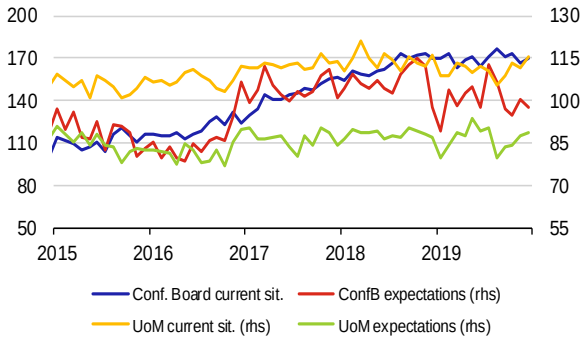
	CF	IMF	OECD	Fed
2020	1.9	2.1	2.0	2.0
2021	1.9	1.7	2.0	1.9

Inflation, %



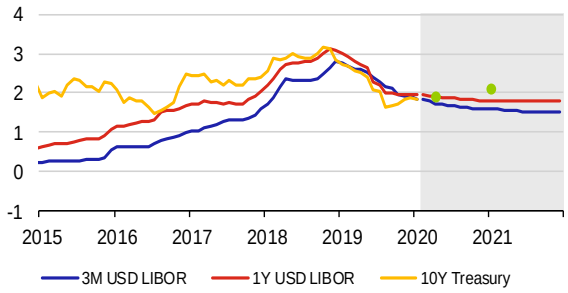
	CF	IMF	OECD	Fed
2020	2.1	2.3	2.1	1.9
2021	2.1	2.4	2.1	2.0

Leading indicators



	ConfB curr.	ConfB exp.	UoM curr.	UoM exp.
10/19	173.5	94.5	113.2	84.2
11/19	166.6	100.3	111.6	87.3
12/19	170.0	97.4	115.5	88.9

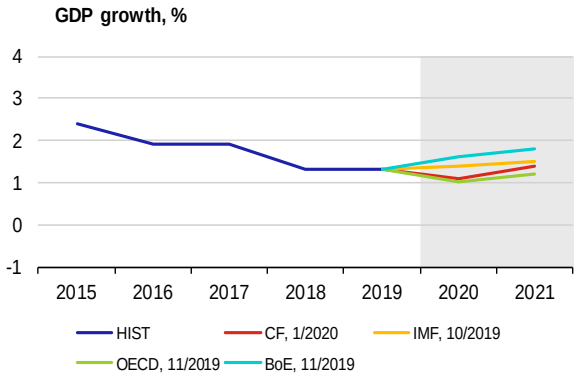
Interest Rates, %



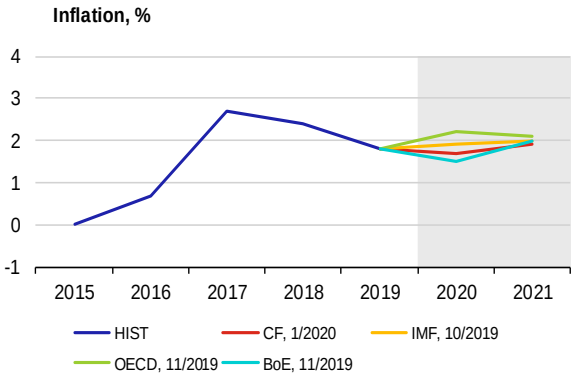
	12/19	1/20	4/20	1/21
USD LIBOR 3M	1.91	1.85	1.72	1.59
USD LIBOR 1R	1.97	1.97	1.90	1.80
Treasury 10R	1.86	1.85	1.90	2.10

II.3 United Kingdom

The UK economy probably stagnated in terms of GDP in Q4. According to the current January NIESR estimate, economic activity stagnated in quarter-on-quarter terms. In December, the NIESR expected growth of 0.1%. In 2019 as a whole, the UK economy probably grew by 1.4%. The NIESR expects a recovery in 2020 Q1 and regards the November downturn in services as only temporary. However, before the new GDP data were out, voices were heard from the BoE policy committee that the central bank was ready to cut its key interest rate (currently 0.75%) if there were more signals of a weakening economy. The composite PMI index fell again in December and remains in the contraction band. January 2020 is the last month when the UK is part of the EU. During a transition period lasting until the end of 2020, the UK and EU representatives will work on future rules while the current rules will still apply.



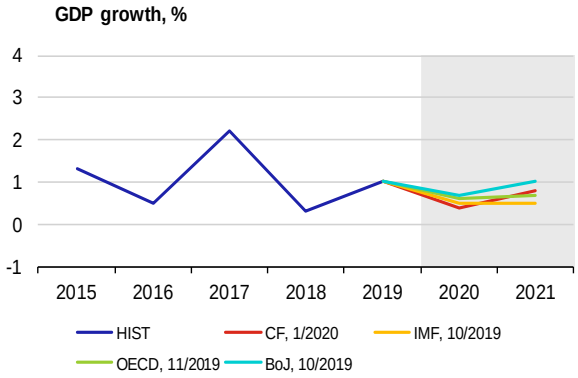
	CF	IMF	OECD	BoE
2020	1.1	1.4	1.0	1.6
2021	1.4	1.5	1.2	1.8



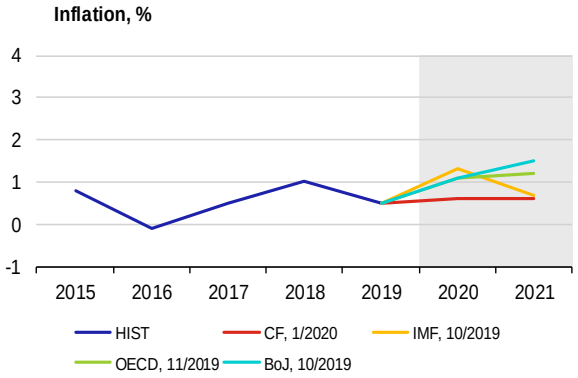
	CF	IMF	OECD	BoE
2020	1.7	1.9	2.2	1.5
2021	1.9	2.0	2.1	2.0

II.4 Japan

The latest data are not very encouraging. The December PMI deteriorated in both manufacturing, where it dropped further into the contraction band, and in services, where it was also below the 50-point level. Industrial production fell by 8.1% year on year in November. Retail sales also declined in year-on-year terms, falling for the second month in a row, although the decline slowed (to -2.1%) in November. In month-on-month terms, they even recorded a 4.5% rise. A package of government measures totalling JPY 13 trillion (USD 122 billion) should stimulate economic growth this year, thanks to which the Japanese government improved its GDP growth outlook for the next fiscal year to 1.4% in December. Inflation should reach 0.8%. The January CF is slightly more pessimistic in both cases. The Japanese currency is mostly weakening in January. It has lost about 2% since the start of the month.



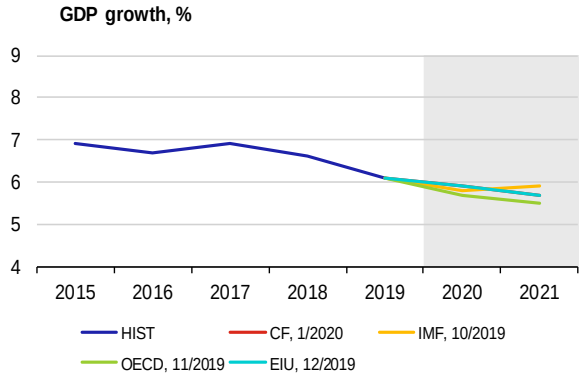
	CF	IMF	OECD	BoJ
2020	0.4	0.5	0.6	0.7
2021	0.8	0.5	0.7	1.0



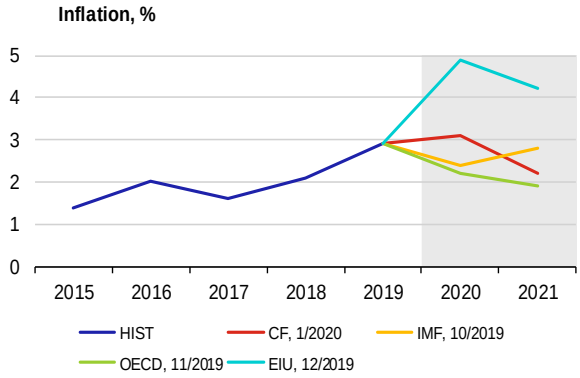
	CF	IMF	OECD	BoJ
2020	0.6	1.3	1.1	1.1
2021	0.6	0.7	1.2	1.5

II.5 China

At the end of 2019, the Chinese economy grew at the slowest pace in 29 years. Annual GDP growth reached just 6% in Q4. Nevertheless, the government managed to meet its overall growth target of 6%–6.5%, as the Chinese economy grew by 6.1% overall. The economic slowdown was expected by financial markets, as the effect of the tariff war with the USA lingers and domestic demand is weakening. A number of government measures to boost the economy (tax relief, higher infrastructure spending) has been adopted. However, these are having only a limited effect on domestic demand. In January, the central bank supported the banking sector by cutting the rate of minimum required reserves by 50 basis points. According to a Reuters poll, growth will slow further to 5.9% in 2020, which corresponds to the current outlook of both CF and the EIU. In 2021, the growth is estimated to reach 5.7%.



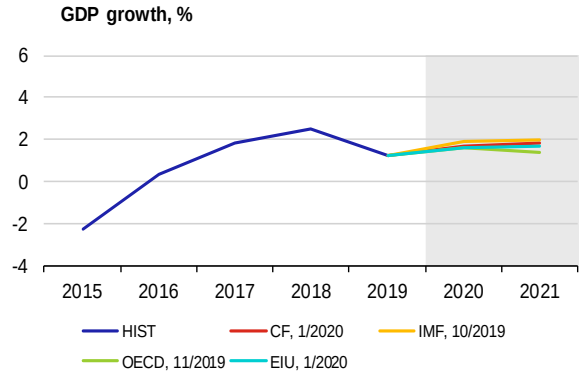
	CF	IMF	OECD	EIU
2020	5.9	5.8	5.7	5.9
2021	5.7	5.9	5.5	5.7



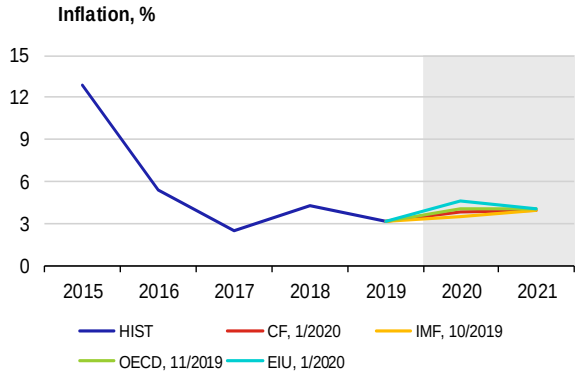
	CF	IMF	OECD	EIU
2020	3.1	2.4	2.2	4.9
2021	2.2	2.8	1.9	4.2

II.6 Russia

Short-term dynamics of the last quarter suggest a further slowdown after an acceleration in GDP growth in the previous quarter. Industrial production fell by 2.5% in November. Its annual growth slowed to 0.3% and was the weakest in almost two years. The PMI in manufacturing slightly improved, However, it remains in the contraction band. The Russian central bank cited increased risk to economic developments and persisting risk of a global slowdown as the reasons for a further cut in the key interest rate in mid-December (to 6.25%). Inflation is slowing, reaching 3% in December. Households' inflation expectations are also falling. The rouble has followed a slightly appreciating trend against the dollar in the past month (about RUB 62.5/USD in mid-January), showing no strong response to political events in Russia. CF expects a slight improvement in GDP growth this year; inflation started to approach the 4% target in December.



	CF	IMF	OECD	EIU
2020	1.7	1.9	1.6	1.6
2021	1.8	2.0	1.4	1.7



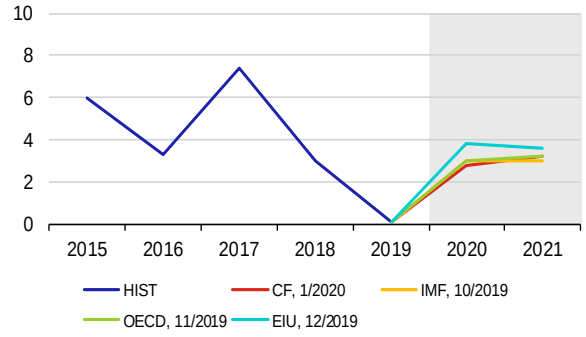
	CF	IMF	OECD	EIU
2020	3.8	3.5	4.0	4.6
2021	3.9	3.9	4.0	4.0

II.7 Developing countries in the spotlight

The Turkish economy is recovering from a recession and tackling high inflation. The Turskish economy grew by 0.1% last year. This year, it is expected to expand by about 3%, a figure agreed on by most institutions. On the other hand, Turkey is grappling with high inflation, although a gradual decline is expected. The central bank cut the repo rate by 0.75 pp to 11.25% at its first January meeting (the rate was 24% in mid-2019) and the real interest rate is thus negative. Unemployment on the labour market reaches more than 13%, the highest rate in past years. However, this figure should be interpreted along with the average unemployment in the last 15 years, which exceeds 10%. Employment is falling dramatically in construction while rising steadily in services. The Turkish lira weakened sharply due to an economic crisis in 2018 and then broadly stabilised. However, it is predicted to keep weakening slightly against both euro and dollar. Turkey managed to improve its trade balance, which is no longer so negative, and recorded current account surpluses.

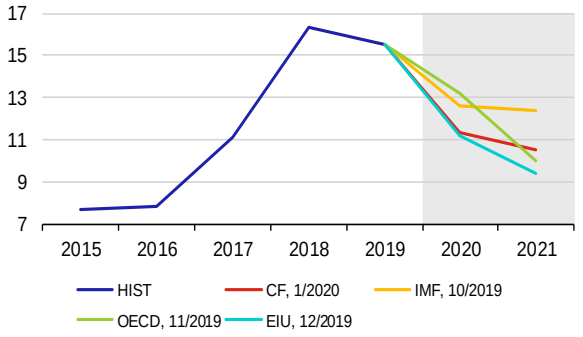
The geopolitical situation in the Middle East stays tense and further moves are uncertain. Turkey's military action against neighbouring Syria dealt investors another blow and raised uncertainty on the international scene. However, foreign capital is vital for Turkey's further growth. Although Turkey's debt-to-GDP ratio is relatively low, total external debt was almost USD 783 billion in 2019 Q3, a larger part of which is held by banks. The banking sector is being stailised with a capital injection from the state. The household debt-to-GDP ratio has been falling since January 2017 (although consumer credit reached an all-time high in December, rising by almost 20% in 2019). The loan-to-deposit ratio has been steadily falling since mid-2018. The country is also suffering from dolarisation – residents' foreign currency deposits rose by 28% year-on-year, signalling Turks' distrust of their currency. Consumer confidence was below the long-term average in 2019. However, retail sales have been growing since September, as has been the economic confidence index. The composite economic indicator was in the contraction band in 2019. However, industrial output started growing again in Q4.

GDP growth, %



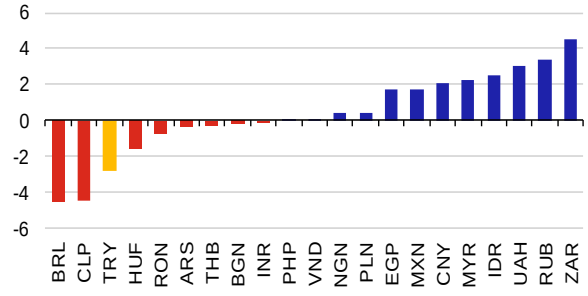
	CF	IMF	OECD	EIU
2020	2.8	3.0	3.0	3.8
2021	3.2	3.0	3.2	3.6

Inflation, %



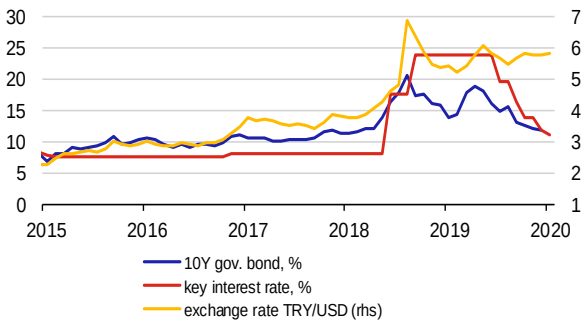
	CF	IMF	OECD	EIU
2020	11.3	12.6	13.2	11.2
2021	10.5	12.4	10.0	9.4

Currency performance vis-à-vis USD



% change over 1/11/2019 to 15/01/2020 period

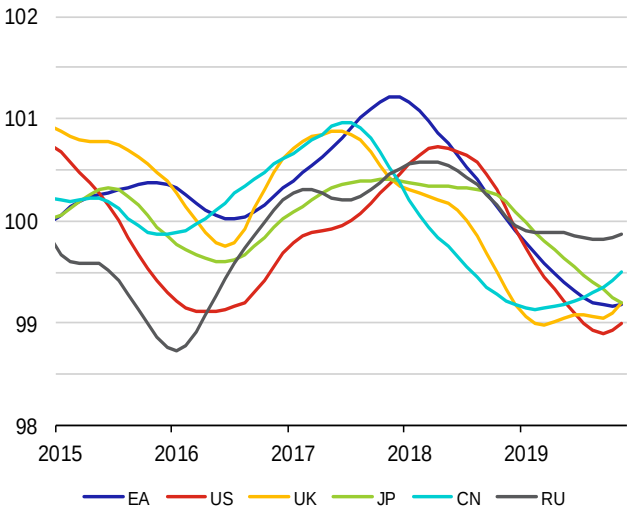
Selected indicators



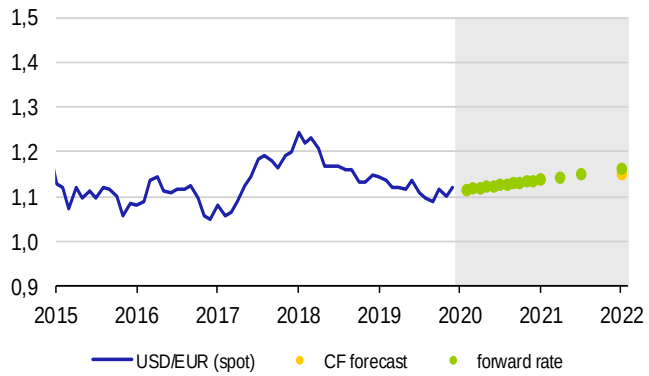
	10Y gov. bond, %	interest rate, %	TRY/USD
9/2019	13.20	16.50	5.67
10/2019	12.67	14.00	5.85
11/2019	12.18	14.00	5.76

III. Leading indicators and outlook of exchange rates

OECD Composite Leading Indicator

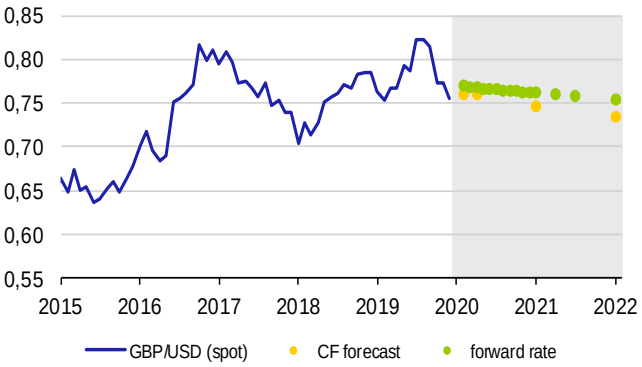


The US dollar (USD/EUR)



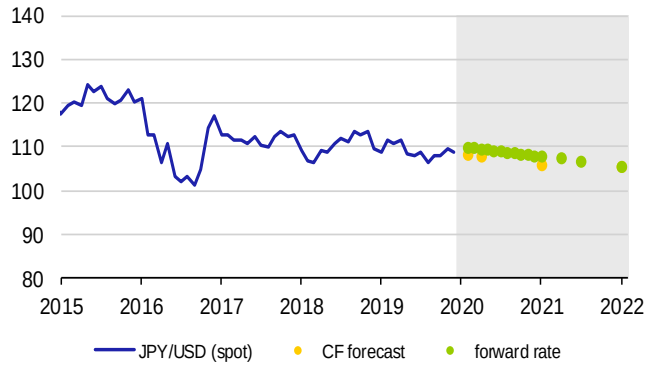
	13/1/20	2/20	4/20	1/21	1/22
spot rate	1.113				
CF forecast		1.114	1.117	1.137	1.152
forward rate		1.116	1.120	1.139	1.162

The British pound (GBP/USD)



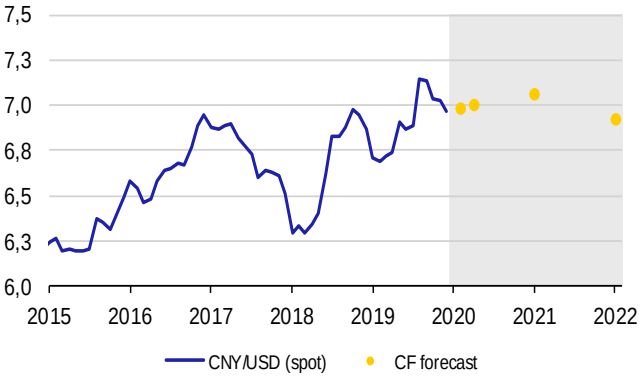
	13/1/20	2/20	4/20	1/21	1/22
spot rate	0.770				
CF forecast		0.760	0.759	0.746	0.734
forward rate		0.769	0.768	0.762	0.755

The Japanese yen (JPY/USD)



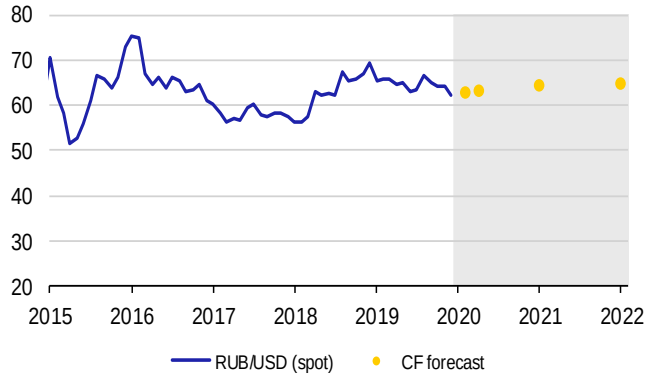
	13/1/20	2/20	4/20	1/21	1/22
spot rate	109.9				
CF forecast		108.2	107.7	105.7	105.3
forward rate		109.8	109.4	107.7	105.6

The Chinese renminbi (CNY/USD)



	13/1/20	2/20	4/20	1/21	1/22
spot rate	6.895				
CF forecast		6.980	7.005	7.063	6.921

The Russian rouble (RUB/USD)



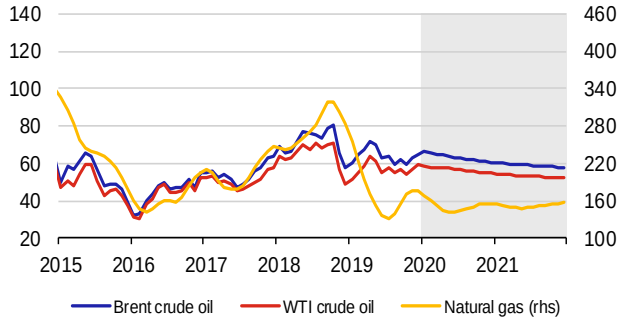
	13/1/20	2/20	4/20	1/21	1/22
spot rate	61.29				
CF forecast		62.99	63.13	64.23	64.94

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.1 Oil and natural gas

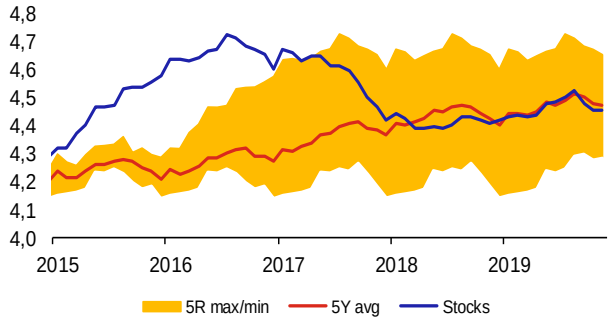
The Brent crude oil price kept rising until the end of 2019. However, it fell sharply in the first half of January. The main factors behind the continued price growth in December 2019 were the deal on a further cut in oil output struck by OPEC+ countries in early December and expectation of the signing of a "phase one" of the US-Chinese trade agreement. The upward price trend, observed since early October, peaked before the US attack on a top Iranian general and Iran's retaliatory missile strike on US bases in Iraq. These events boosted oil prices temporarily (and the Brent price was above USD 70/bbl for a short time in intraday trading). However, the prices started falling rapidly when it turned out that none of the sides was interested in further escalating the conflict. Physical oil supplies from the Persian Gulf have not been disrupted, although the risk of further retaliatory steps (especially by Iran) cannot be ruled out. However, the risk premium associated with such developments is dampened by fast growth in output in the USA. The EIA expects slight growth in global oil inventories (of about 0.3 million barrels a day) this year, which will be stronger in 2020 H1, after a relatively balanced supply and demand in 2019. This will be due to output growth outside OPEC countries (shale extraction in the USA and new projects in Brazil, Norway and Canada) coupled with a slight recovery in demand. The output growth should slow markedly in 2021, which will be reflected in a drop in global inventories of 0.2 million barrels a day. The EIA thus expects the Brent price to fall from USD 67/bbl in January to USD 62/bbl in May. Excess demand will then dissolve and the price will rebound to USD 69/bbl at the end of 2021. The geopolitical situation in the Middle East, OPEC's policy and US output remain a risk. Unlike the EIA's forecast, the market curve implies a gradual decline in the Brent price until the end of 2021 when the price should reach USD 58/bbl. The January CF forecasts a price of about USD 63/bbl in one year horizon.

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

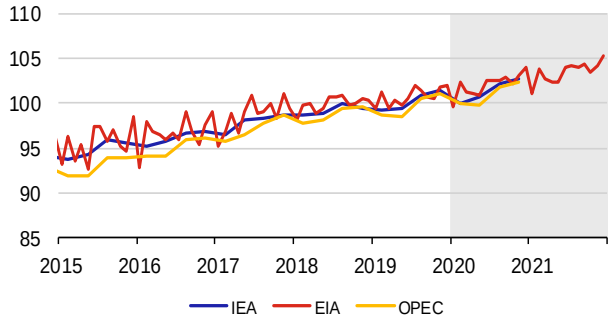


	Brent	WTI	Natural gas
2020	63.24	56.82	151.46
2021	59.09	53.27	152.28

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

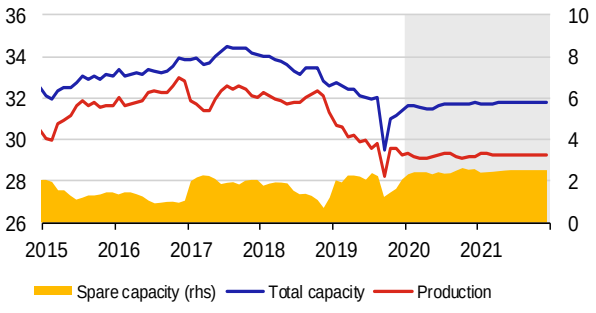


Global consumption of oil and oil products (mil. barrel / day)



	IEA	EIA	OPEC
2020	101.46	102.12	100.97
2021		103.49	

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



	Production	Total capacity	Spare capacity
2020	29.19	31.63	2.44
2021	29.28	31.77	2.49

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.

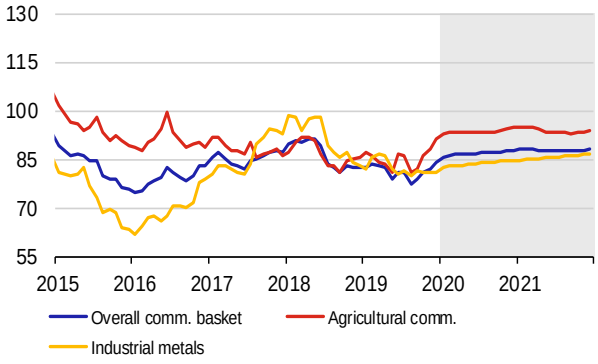
IV.2 Other commodities

The aggregate non-energy commodity price index continued to rise sharply in December and kept growing in the first half of January. The food commodity price sub-index showed a similar trend. The industrial metals price sub-index was flat, close to the September level for the third month in a row in December and also slightly grew in the first half of January. The outlook for the overall index remains slightly rising thanks to the expected growth of the metals index (aluminium), while the trend of the outlook for the food commodity index is horizontal.

Developments across the basic metals index were mixed. The price of copper recorded the highest growth in December, and the prices of tin and zinc also increased. Prices of nickel and lead stabilised in December after a previous fall. The price of iron ore also levelled out after a slight rise due to increased imports from China. Prices of industrial metals should be supported by an improvement in market sentiment, driven mainly by stronger annual growth in industrial production in China, which increased from 4.7% to 6.2% in November. The J.P.Morgan Global Manufacturing PMI slightly dropped in December. However, its value of 50.1 continues to signal very slight industrial growth. The "phase one" trade agreement between the USA and China also improved market sentiment. In fact, however, it removes only a very small proportion of the import tariffs imposed earlier.

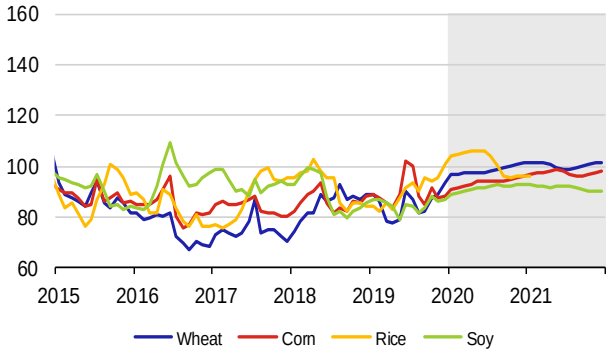
The strong growth in the food commodity index was due mainly to continued growth in prices of wheat and rice, which were the highest since 2014. Prices of corn and soy also recorded a slight rise, and the price of sugar also kept rising. The price of coffee peaked in mid-December and has lost most of its gains since then. Strong seasonal growth is expected for pork prices, while beef prices have already reached their seasonal high.

Non-energy commodities price indicies



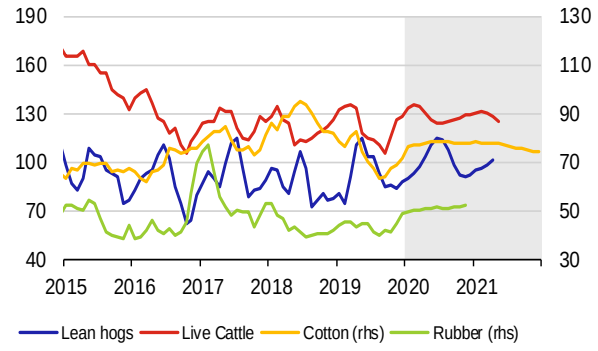
	Overall	Agricultural	Industrial
2020	86.8	93.6	83.6
2021	87.7	93.8	85.7

Food commodities



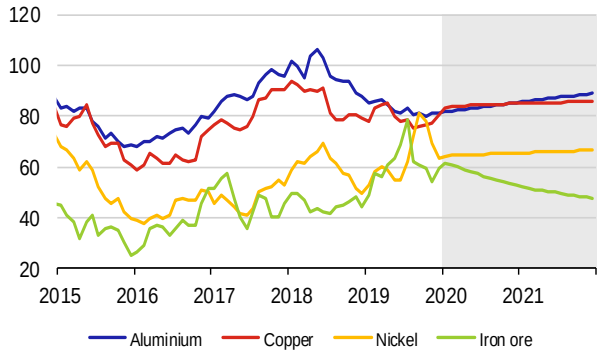
	Wheat	Corn	Rice	Soy
2020	98.5	93.9	101.7	91.5
2021	100.4	97.3	96.2	91.6

Meat, non-food agricultural commodities



	Lean hogs	Live Cattle	Cotton	Rubber
2020	100.0	128.4	77.7	50.7
2021	97.7	128.8	76.4	

Basic metals and iron ore



	Aluminium	Copper	Nickel	Iron ore
2020	83.5	84.3	64.9	56.9
2021	87.2	85.3	66.1	49.8

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.

An alternative, satellite view of China[1]

Doubts about the quality of China's official GDP figures persist and cannot be expected to fade soon, despite considerable efforts made by the Chinese authorities. This creates space for unconventional approaches to measuring economic activity. Alongside the main alternative approaches (based, for example, on electricity consumption and railway cargo traffic), satellite imaging indicators are increasingly being used. We will focus in greater detail on SpaceKnow's Chinese Satellite Manufacturing Index (SMI). This tracks industrial activity in the manufacturing sector based on satellite data analysis. Its significant advantage is the timeliness and quality of the data provided, which make it a valuable input for understanding Chinese economic growth. The SMI currently indicates a slight slowdown in Chinese manufacturing.

A question mark still hangs over the credibility of Chinese statistics

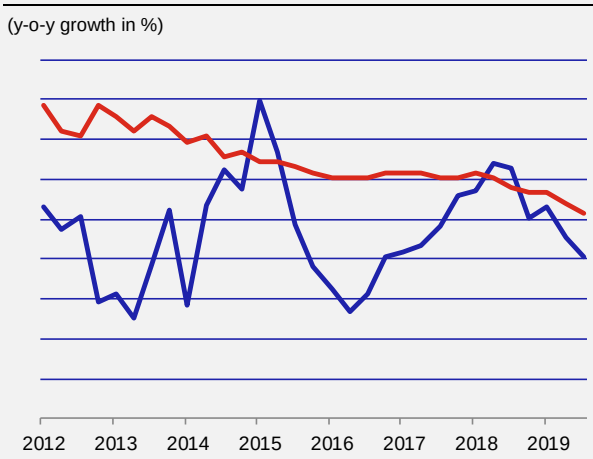
The official figures on economic activity in China give rise to doubts, especially in the case of repeated upward revisions. In late November 2019, the National Bureau of Statistics of China (NBS) revised up the country's estimated nominal GDP by 2.1% to RMB 91.93 billion.[2] The NBS said the revision was the result of the uncovering of previously unrecorded (economic) activity and would not significantly influence the calculation for the 2019 GDP growth rate. It is clear, however, that the revision will also help China meet its official growth targets, casting a shadow of doubt on the reliability of Chinese economic data. Revisions have also been made in the past, always in the upward direction. Without further data from the NBS, the effect of the revision on last year's real GDP growth rate cannot be estimated. According to analysts, however, the figure might be 8.9% instead of the original official reading of 6.6%.

The provincial GDP data are not credible either. GDP calculated using data from the provinces does not match the overall figures at the national level. There are concerns that provincial officials are intentionally revising the data upwards, as they are rewarded for meeting growth and investment targets.[3] In 2018, for example, China's GDP calculated from regional statistics (31 provinces) was about RMB 205 billion higher than that at the national level. This discrepancy, equivalent to the GDP of New Zealand, arises mainly in the figures for industrial production and investment.

The state of the Chinese economy cannot be deciphered even using other indicators of economic activity. Metrics such as unemployment and labour costs are showing almost no growth. For example, the unemployment rate in China has been in the 3.5%–4.5% band for the past 15 years. The monetary policy settings often reflect the government's targets for the support of certain economic sectors.

Many studies confirm that China's GDP is lower and more volatile than the official statistics say. The stable growth around the target level (see Chart 1) is more than suspicious. This has led to the creation of a number of alternative indicators of economic activity in China. Chen et al. (2019), for example, attempted to re-estimate the output of industrial, wholesale and retail firms using data on VAT revenues. They also used local economic indicators that are less likely to be manipulated by local governments (such as railway cargo traffic and electricity consumption). Their estimated GDP growth was on average 1.7 pp lower than the official data from 2008 to 2016. The investment and savings rate was a full 7 pp lower. By contrast, Fernald et al. (2019) relied more on foreign trade statistics in their estimates. One interesting finding is that their alternative indicator of activity in China shows much greater volatility over time and better fits the dynamics of foreign trade.

Chart 1 – Guess the real GDP growth rate in China



Source: Refinitiv Datastream
Note: The red line expresses y-o-y real GDP growth in China and the blue line that in the USA, different scales.

Efforts to improve the quality of the official data continue but are likely to take several years to bear fruit. At the start of 2020, the NBS will unify the process of calculating growth in activity in the provinces. This will bring it into line with the single national accounting system prior to the publication of the final data. According to official sources, this should help to improve the data quality and credibility of government statistics. Nonetheless, the quality of the official data will remain a source of doubt. The collection of statistical data will still not be under the control of the NBS, which, moreover, has very limited political options for preventing overestimation by the provinces. However, it has launched a

[1] Authors: Tomáš Adam and Soňa Benecká. The views expressed in this article are those of the authors and do not necessarily reflect the official position of the Czech National Bank.

[2] https://www.reuters.com/article/us-china-economy-gdp/gdp-revisions-put-china-on-target-to-double-economy-but-data-doubts-remain-idUSKBN1XW04C

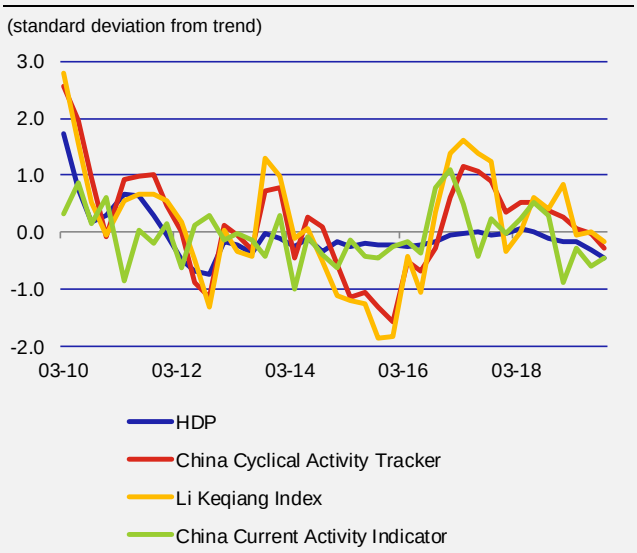
[3] See, for example, https://www.ft.com/content/fcf7e3a4-4f40-11e7-bfb8-997009366969

series of in-depth audits, which will continue until 2022. As with the need to get pollution in China more under control, a vigorous approach can be expected. However, revising the governance structure on the scale necessitated by the changes in statistical reporting may not be at all easy.

China in the spotlight

There are a whole range of alternative indicators of activity in China. Many of them attempt to glean information from secondary, hopefully more reliable sources commonly available from data providers (Bloomberg, Refinitiv, etc.). The problem with such indexes is that they can unnecessarily add weight to factors that do not have that great an impact on the real performance of the economy, or whose effect is complex. They may also not reflect all aspects of the changing structure of the economy, such as the waning influence of agriculture and growth in services. For comparison, we can mention, for example, ***China Activity Proxy*** (CAP, source: Capital Economics), which reflects information from alternative sources such as property construction, electricity consumption, freight and personal transport and port activity. The year-on-year growth in these indicators has been markedly lower than official GDP growth, especially in the past few years (see Chart 1).[4] The CAP also provides alternative explanations of developments in China. According to the CAP, the current slowdown in the Chinese economy is due mainly to domestic headwinds – especially credit conditions – rather than trade wars, because trade is still being buoyed by producers front running the introduction of tariffs. The above-mentioned paper by Fernald et al. (2019) introduces the ***China Cyclical Activity Tracker*** (CCAT, source: San Francisco Fed). Other indicators include the ***China Activity Tracker*** (CAT) from the Institute of International Finance (IIF) and the ***China Current Activity Indicator***, created by Goldman Sachs. The latter is constructed as the joint movement (first principal component) of various monthly indicators. Fulcrum uses a dynamic factor model to construct a GDP nowcast for China. However, the oldest indicator of this type is the ***Li Keqiang Index***, named after the Chinese Prime Minister, who himself preferred to use direct indicators of economic activity to assess growth (electricity consumption, rail cargo volume and bank loans).[5] Some of these indicators are listed for comparison in Chart 2 in the form of the standard deviation from the trend. All of them indicate substantially higher cyclical volatility for China than the official GDP data. However, they all agree that the Chinese economy is currently slowing.

Chart 2 – Alternative activity indicators for China



Source: Bloomberg, San Francisco Fed, CNB calculation

A new development in recent years is the use of satellite data, in particular night light data. Attempts to capture human activity using satellite imagery have a long tradition. For example, changes in night lights make it possible to capture growth in activity in countries undergoing rapid development. Countries in the early stages of development focus on building infrastructure (roads, towns, bridges, etc.), which give off light. On satellite images it looks like the country is lighting up. This is why even the first attempts to capture activity in China were based on night light quantification using satellites. This technique is more accurate than data collection and can be used going many years back. According to Henderson et al. (2012), for example, real activity in China went up by 57% between 1992 and 2006. The official data, however, imply growth of 122%, so real GDP in China may be overestimated by as much as 65 pp. This is a large discrepancy compared to the other countries in the sample of the cited study.

Other alternative indicators attempt to link activity in China with consumption and commodity inventories. One example is Quandl, which, according to the Financial Times, has data on aluminium inventories in China from satellite images. URSA[6] uses satellite radar scanning to monitor crude oil inventories at 23 sites in China with a capacity of 1.1 billion barrels. Radar scanning has the advantage of being weather-independent, so data delivery is guaranteed. Orbital Insight also tracks crude oil inventories in various countries, including China, using satellites.[7] Alternative indicators are offered to investors (large banks, hedge funds, etc.), who use them to formulate investment and other strategies.

[4] See https://www.capitaleconomics.com/blog/chinas-role-in-the-coming-global-slowdown/

[5] https://www.economist.com/asia/2010/12/09/keqiang-ker-ching

[6] https://www.ursaspace.com/china-macro

[7] https://orbitalinsight.com/products/go-energy/

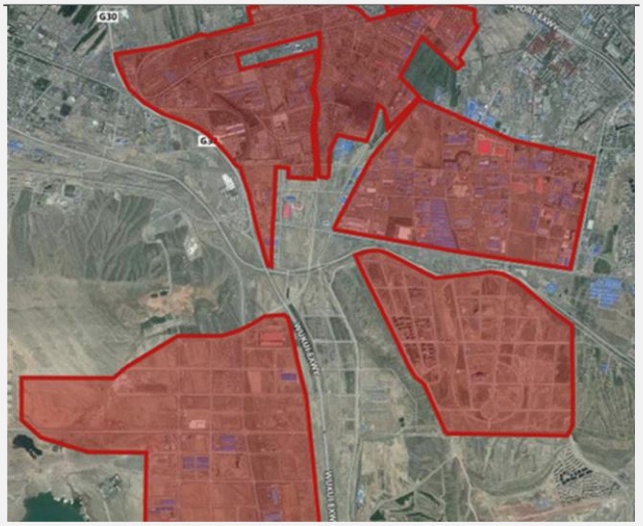
Box 1 – How do satellites help to identify industrial activity on the ground?

Satellites only provide images, of course. The history of satellite imaging stretches way back to the Cold War. According to information available, there are currently over 5,000 satellites orbiting the Earth. Only around 2,000 are functional, and some are only the size of a shoebox (CubeSat). For example, Landsat satellites, which can provide reasonable image quality, are used to track activity. They are also used to monitor water quality and agricultural product yields and to map land cover, among other things.

The area of interest must be defined on the images. One of the uses of satellites is the repeated capture of areas on marked sites. Sites are marked as areas of interest (see Figure 1) and then repeatedly scanned to see whether and how they are changing. This does not happen daily, because the satellites used are not geostationary, that is, they do not stay above the same place on earth from the observer's perspective. The scanning frequency is roughly every two weeks.

In an area of interest, we can define sites we want to observe repeatedly. These can be construction sites, roads, planes at airports and cars in carparks. This creates space for advanced analysis methods, especially artificial intelligence, which can learn to recognise defined objects in the images. Most of the work relating to monitoring activity on the ground actually therefore takes place on the ground. Cloud services such as those provided by Google or Amazon are indispensable for data processing. More sophisticated methods can even distinguish materials or changes in the volume of liquids in tanks in an area of interest. Night lights or even heat radiated from factories or power stations can also be identified.

Figure: 1 – Identified areas of interest



Source: SpaceKnow

Finally, information from different areas is aggregated into a single indicator. The time series created for individual areas of interest need to be aggregated into comprehensible data for investors and analysts. Some of these are available on company websites or from data providers such as Bloomberg.

Industry in China as seen by satellite

SpaceKnow offers an innovative approach using satellite data. Unlike the other techniques mentioned above, SpaceKnow focuses directly on industrial activity indicators based on the analysis of objects in satellite photographs. This approach is explained in Box 1. Since 2016, it has been compiling the ***Chinese Satellite Manufacturing Index (SMI)*** based on 2.2 billion satellite images collected from over 6,600 industrial areas in China spread over an area of more than half a million square kilometres. Artificial intelligence is used to process this massive amount of data. However, the company is capable of analysing any sector upon request (such as inventories, mines, and numbers of ships in ports or at sea).

The SMI is similar to leading indicators such as the Purchasing Manager's Index (PMI). The PMI determines purchasing managers' expectations and is considered an important coincident indicator of industrial production. It is given as an index value. A PMI of over 50 is a sign of expansion in manufacturing compared to the previous month, while a value below 50 is a sign of contraction. In China, two PMIs are regularly used to capture manufacturing activity. One is issued by the NBS, while the other is prepared by IHS in partnership with Caixin. Both are based on data on new orders and inventories from firms. The official PMI relies mainly on data from large and state-owned companies (up to 3,000 firms), while the Caixin PMI is based on data from private and small firms (430 firms).

The leading indicators all indicate a drop in the growth of Chinese manufacturing in 2018, but their assessment of the current situation differs slightly. As Chart 4 shows, both PMI indexes are currently around 50, while the Caixin PMI has been steadily improving since July. The official PMI data indicate a modest improvement in the situation in November. Though the SMI is also in the expansion band, it has been falling in month-on-month terms since the summer. The industrial production figures are very volatile this year, but a slowdown is apparent compared with 2017. For example, year-on-year growth in industrial production in manufacturing was 6.3% in November according to Reuters.

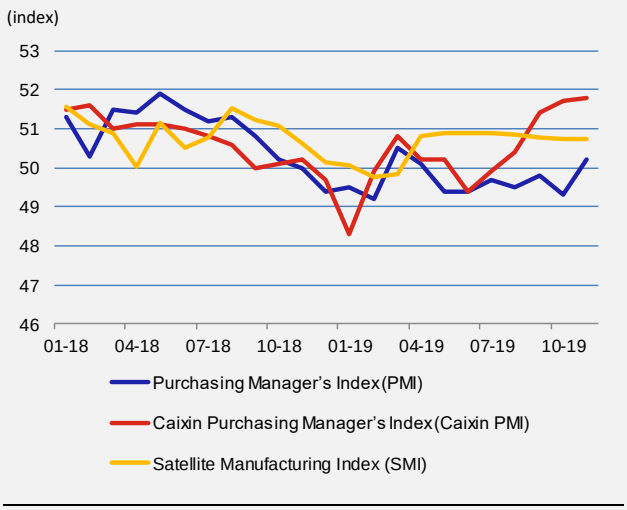
A clear advantage of the SMI is the quality and timeliness of the data it provides. Since the SMI is based on observed data, its credibility is high. Another important factor is timeliness and the ability to predict movements in the SMI and its sub-components in the short term. This gives the owners of such data an information lead, especially as far as financial market participants are concerned. The sub-components of the index make it possible to perform more detailed analyses and answer analytical questions such as whether the construction of new industrial zones is continuing or whether the use of power stations and hence expected electricity consumption are decreasing.

Alternative data sources, central banks and conclusion

New sources and data acquisition methods are expanding central banks' horizons. The new data sources neatly complement – or even make up for the lack of – more traditional statistics. China, where doubts regarding data quality persist, is a good example of this. Central banks are by no means limited to macroeconomic areas, and concepts such as big data and artificial intelligence (AI) are hot topics. For example, BIS (2019) summarises central bankers' experience with new technologies.

Central banks are not afraid of new data sources or new analytical techniques. The new data sources include internet prices and Twitter mood. There are studies on text mining and big data. In general, however, projects can be classified by their area of interest. In macroeconomic modelling, the new tools are used in nowcasting and monitoring on-line prices. Job vacancy data, for example, can also be downloaded. Other topics include analysis of sentiment from news articles or text mining and the interpretation of communication strategies. Other departments can base their analyses on big data sets from individual financial institutions or from financial markets.

Chart 4 – Leading indicators of industrial production in China



Source: SpaceKnow, Bloomberg

When official statistics lack credibility, space opens up for new data sources and techniques. China is an example of how new sources can be employed to reduce uncertainty about economic developments. The use of satellite data has proved very promising. This accurate and timely source of data is not subject to revisions and can enhance the macroeconomic debate about current developments in China.

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Keywords

Leading indicators, GDP, satellite images

JEL Classification

E27, F47, L16, O11

A1. Change in predictions for 2019

GDP growth, %

	CF		IMF		OECD		CB / EIU	
EA	0	2020/1 2019/12	-0.2	2019/10 2019/7	+0.1	2019/11 2019/9	-0.1	2019/12 2019/9
US	+0.1	2020/1 2019/12	+0.2	2019/10 2019/7	0	2019/11 2019/9	0	2019/12 2019/9
UK	0	2020/1 2019/12	0	2019/10 2019/7	+0.1	2019/11 2019/9	+0.3	2019/11 2019/8
JP	+0.1	2020/1 2019/12	+0.1	2019/10 2019/7	0	2019/11 2019/9	-0.2	2019/10 2019/7
CN	+0.1	2020/1 2019/12	-0.2	2019/10 2019/7	0	2019/11 2019/9	0	2019/12 2019/12
RU	0	2020/1 2019/12	0	2019/10 2019/7	0	2019/11 2019/9	0	2020/1 2019/12

Inflation, %

	CF		IMF		OECD		CB / EIU	
EA	+0.1	2020/1 2019/12	-0.2	2019/10 2019/4	-0.4	2019/11 2019/5	+0.1	2019/12 2019/9
US	+0.1	2020/1 2019/12	-0.4	2019/10 2019/4	0	2019/11 2019/5	0	2019/12 2019/9
UK	-0.1	2020/1 2019/12	-0.1	2019/10 2019/4	+0.3	2019/11 2019/5	-0.6	2019/11 2019/8
JP	0	2020/1 2019/12	-0.2	2019/10 2019/4	-0.4	2019/11 2019/5	-0.2	2019/10 2019/7
CN	+0.2	2020/1 2019/12	-0.1	2019/10 2019/4	+0.1	2019/11 2019/5	+1.6	2019/12 2019/12
RU	0	2020/1 2019/12	-1.0	2019/10 2019/4	0	2019/11 2019/5	0	2020/1 2019/12

A2. Change in predictions for 2020

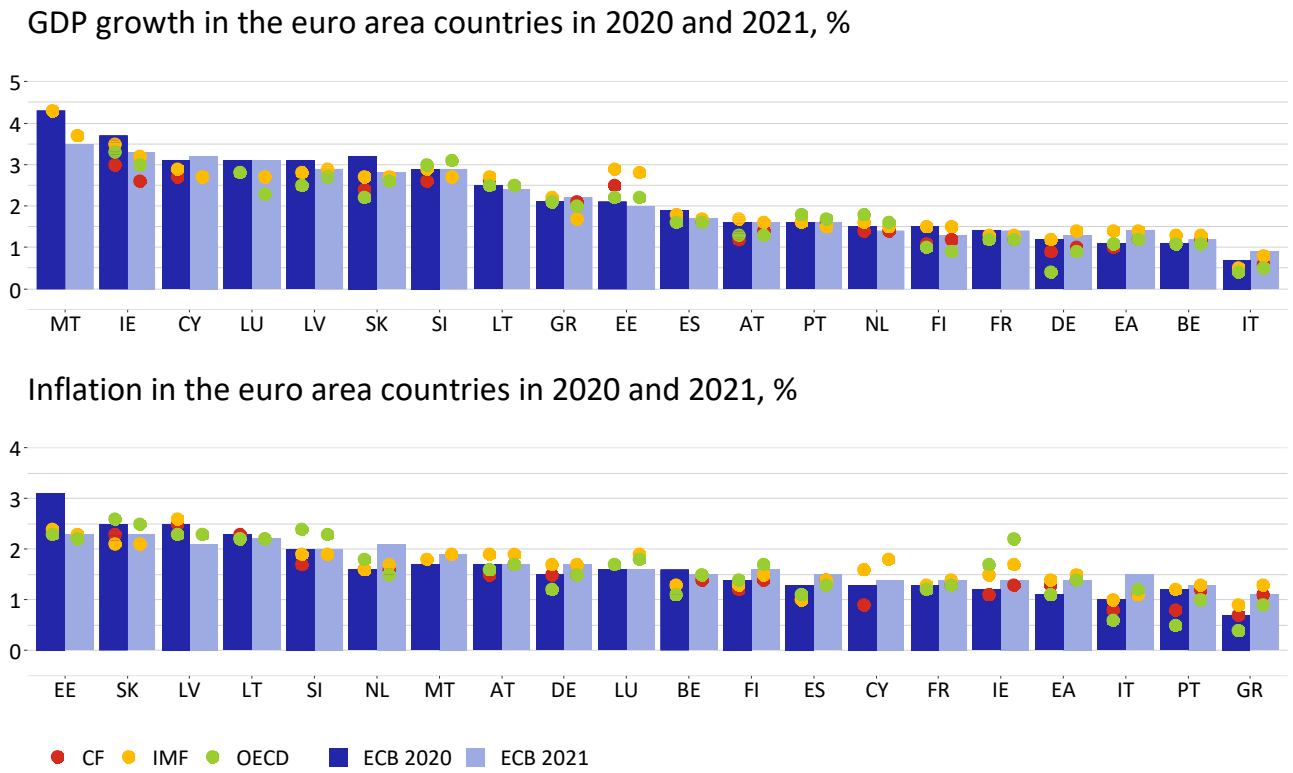
GDP growth, %

	CF		IMF		OECD		CB / EIU	
EA	0	2020/1 2019/12	-0.2	2019/10 2019/7	+0.1	2019/11 2019/9	-0.1	2019/12 2019/9
US	+0.1	2020/1 2019/12	+0.2	2019/10 2019/7	0	2019/11 2019/9	0	2019/12 2019/9
UK	0	2020/1 2019/12	0	2019/10 2019/7	+0.1	2019/11 2019/9	+0.3	2019/11 2019/8
JP	+0.1	2020/1 2019/12	+0.1	2019/10 2019/7	0	2019/11 2019/9	-0.2	2019/10 2019/7
CN	+0.1	2020/1 2019/12	-0.2	2019/10 2019/7	0	2019/11 2019/9	0	2019/12 2019/12
RU	0	2020/1 2019/12	0	2019/10 2019/7	0	2019/11 2019/9	0	2020/1 2019/12

Inflation, %

	CF		IMF		OECD		CB / EIU	
EA	+0.1	2020/1 2019/12	-0.2	2019/10 2019/4	-0.4	2019/11 2019/5	+0.1	2019/12 2019/9
US	+0.1	2020/1 2019/12	-0.4	2019/10 2019/4	0	2019/11 2019/5	0	2019/12 2019/9
UK	-0.1	2020/1 2019/12	-0.1	2019/10 2019/4	+0.3	2019/11 2019/5	-0.6	2019/11 2019/8
JP	0	2020/1 2019/12	-0.2	2019/10 2019/4	-0.4	2019/11 2019/5	-0.2	2019/10 2019/7
CN	+0.2	2020/1 2019/12	-0.1	2019/10 2019/4	+0.1	2019/11 2019/5	+1.6	2019/12 2019/12
RU	0	2020/1 2019/12	-1.0	2019/10 2019/4	0	2019/11 2019/5	0	2020/1 2019/12

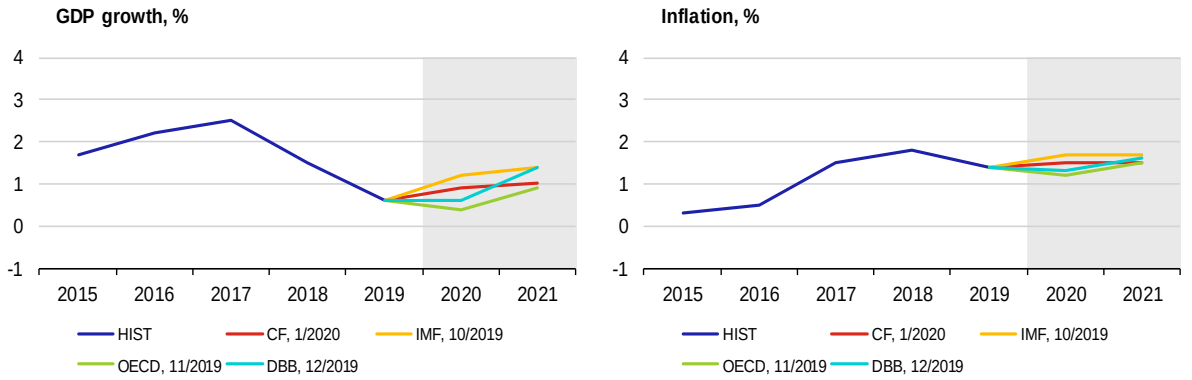
A3. GDP growth and inflation outlooks in the euro area countries



Note: Charts show institutions' latest available outlooks of for the given country.

A4. GDP growth and inflation in the individual euro area countries

Germany

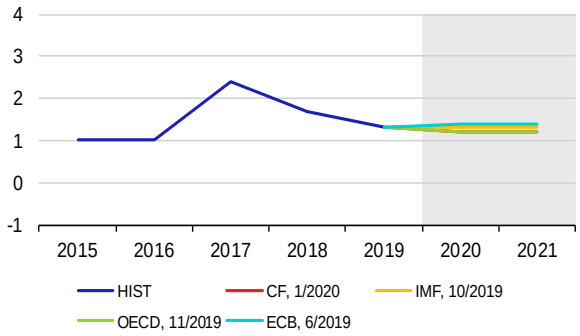


	CF	IMF	OECD	DBB
2020	0.9	1.2	0.4	0.6
2021	1.0	1.4	0.9	1.4

	CF	IMF	OECD	DBB
2020	1.5	1.7	1.2	1.3
2021	1.5	1.7	1.5	1.6

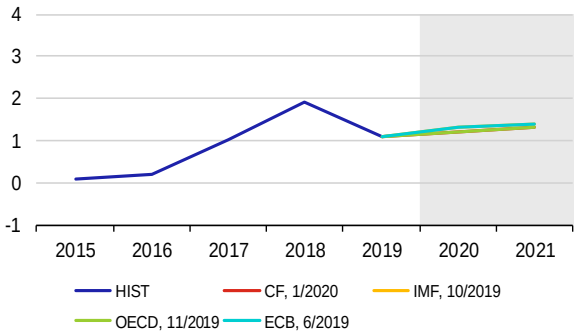
France

GDP growth, %



	CF	IMF	OECD	ECB
2020	1.2	1.3	1.2	1.4
2021	1.2	1.3	1.2	1.4

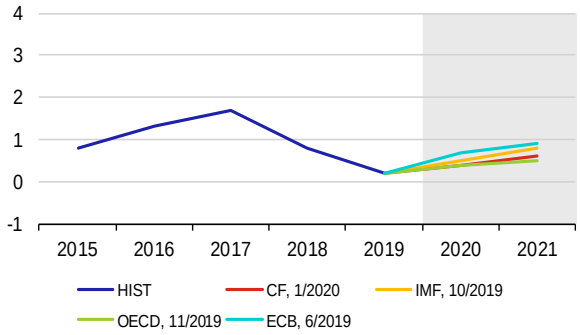
Inflation, %



	CF	IMF	OECD	ECB
2020	1.2	1.3	1.2	1.3
2021	1.3	1.4	1.3	1.4

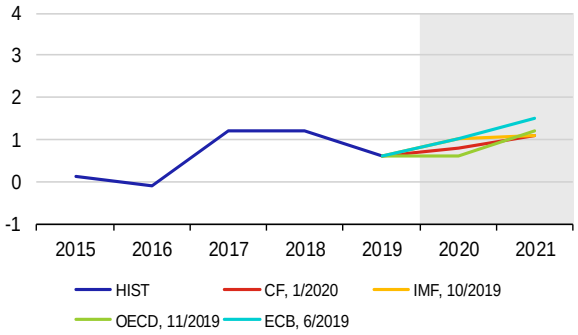
Italy

GDP growth, %



	CF	IMF	OECD	ECB
2020	0.4	0.5	0.4	0.7
2021	0.6	0.8	0.5	0.9

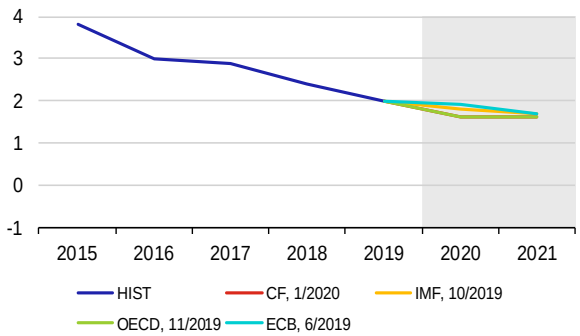
Inflation, %



	CF	IMF	OECD	ECB
2020	0.8	1.0	0.6	1.0
2021	1.1	1.1	1.2	1.5

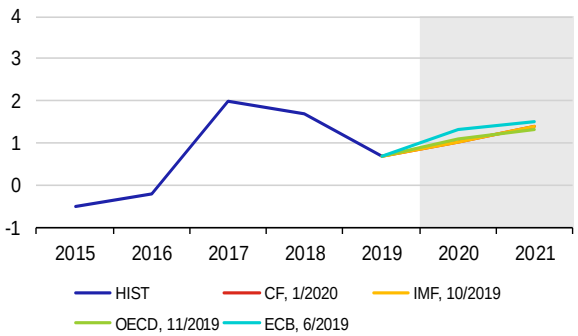
Spain

GDP growth, %



	CF	IMF	OECD	ECB
2020	1.6	1.8	1.6	1.9
2021	1.6	1.7	1.6	1.7

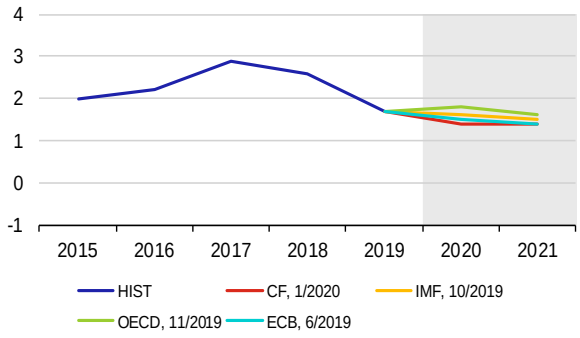
Inflation, %



	CF	IMF	OECD	ECB
2020	1.0	1.0	1.1	1.3
2021	1.4	1.4	1.3	1.5

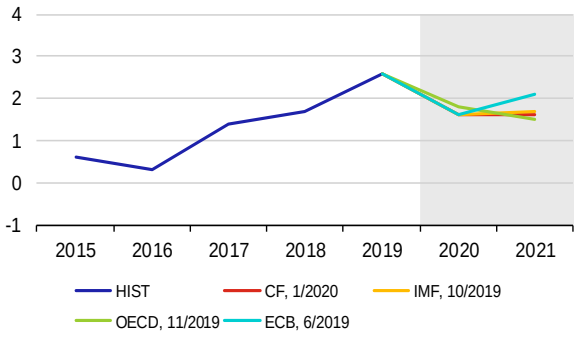
Netherlands

GDP growth, %



	CF	IMF	OECD	ECB
2020	1.4	1.6	1.8	1.5
2021	1.4	1.5	1.6	1.4

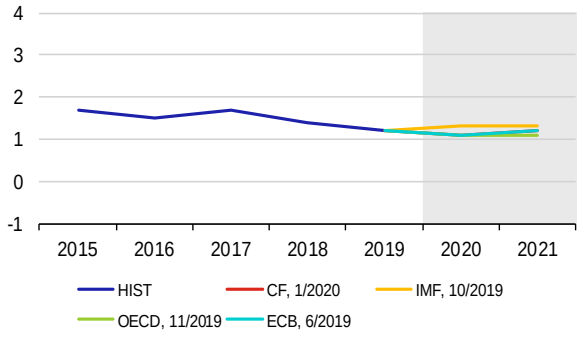
Inflation, %



	CF	IMF	OECD	ECB
2020	1.6	1.6	1.8	1.6
2021	1.6	1.7	1.5	2.1

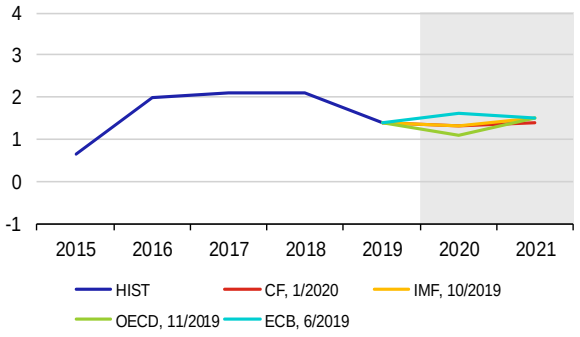
Belgium

GDP growth, %



	CF	IMF	OECD	ECB
2020	1.1	1.3	1.1	1.1
2021	1.2	1.3	1.1	1.2

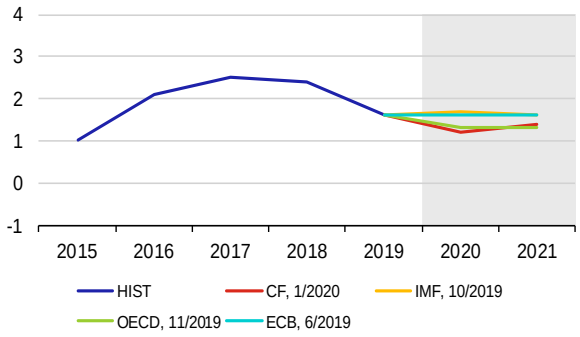
Inflation, %



	CF	IMF	OECD	ECB
2020	1.3	1.3	1.1	1.6
2021	1.4	1.5	1.5	1.5

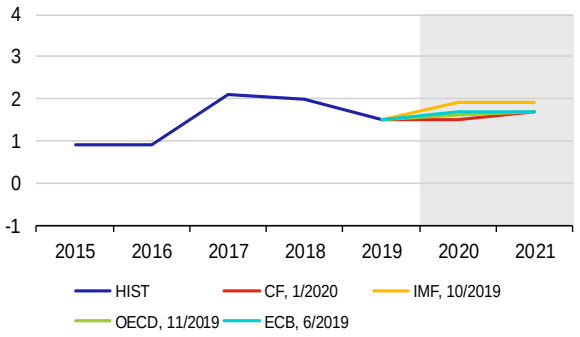
Austria

GDP growth, %



	CF	IMF	OECD	ECB
2020	1.2	1.7	1.3	1.6
2021	1.4	1.6	1.3	1.6

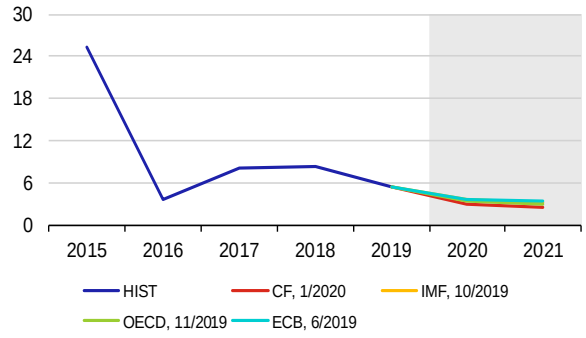
Inflation, %



	CF	IMF	OECD	ECB
2020	1.5	1.9	1.6	1.7
2021	1.7	1.9	1.7	1.7

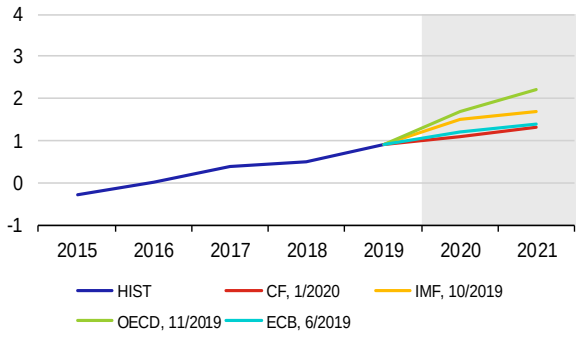
Ireland

GDP growth, %



	CF	IMF	OECD	ECB
2020	3.0	3.5	3.3	3.7
2021	2.6	3.2	3.0	3.3

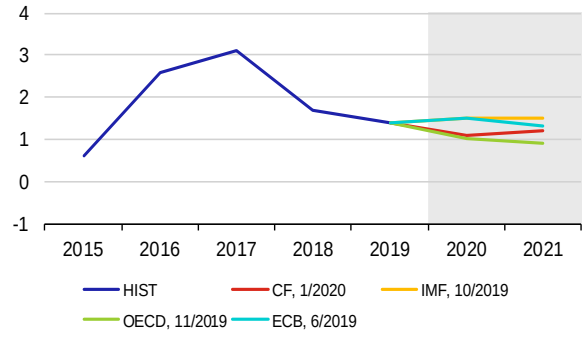
Inflation, %



	CF	IMF	OECD	ECB
2020	1.1	1.5	1.7	1.2
2021	1.3	1.7	2.2	1.4

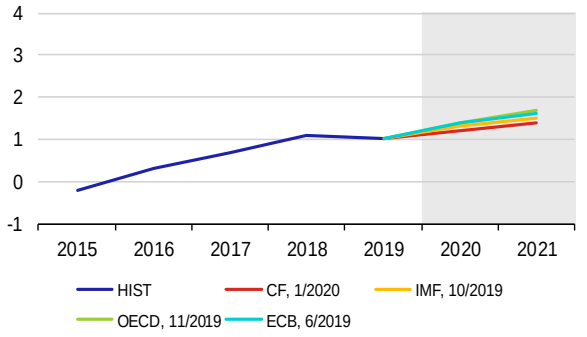
Finland

GDP growth, %



	CF	IMF	OECD	ECB
2020	1.1	1.5	1.0	1.5
2021	1.2	1.5	0.9	1.3

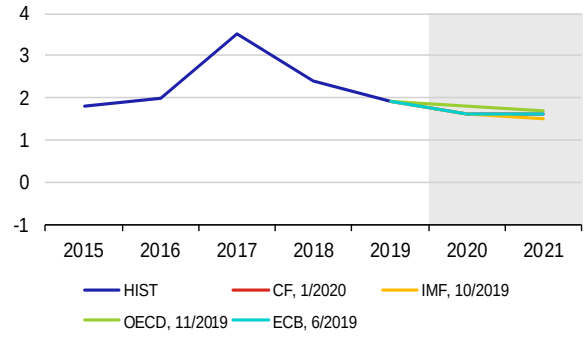
Inflation, %



	CF	IMF	OECD	ECB
2020	1.2	1.3	1.4	1.4
2021	1.4	1.5	1.7	1.6

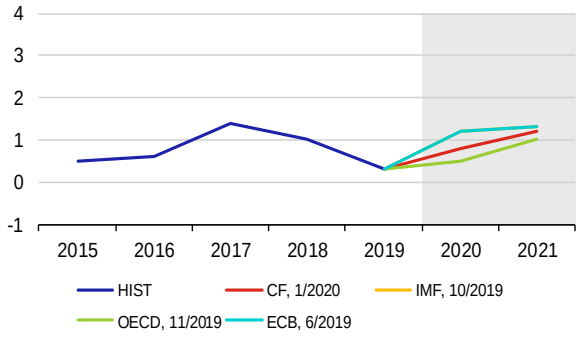
Portugal

GDP growth, %



	CF	IMF	OECD	ECB
2020	1.6	1.6	1.8	1.6
2021	1.6	1.5	1.7	1.6

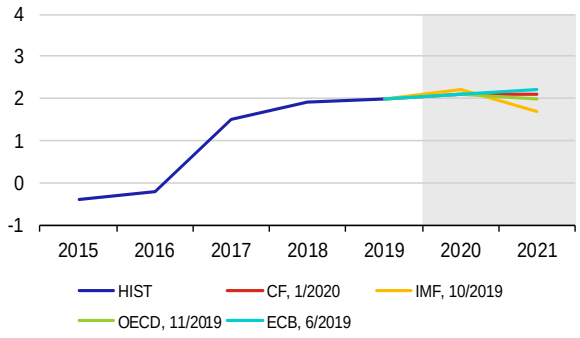
Inflation, %



	CF	IMF	OECD	ECB
2020	0.8	1.2	0.5	1.2
2021	1.2	1.3	1.0	1.3

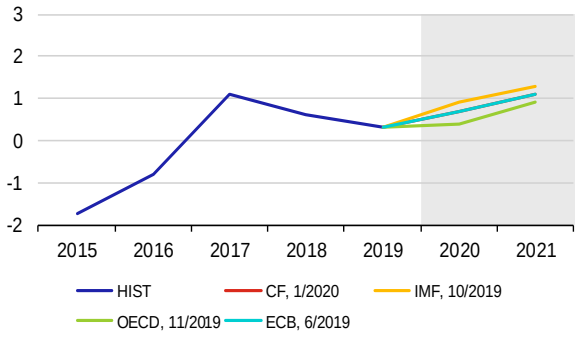
Greece

GDP growth, %



	CF	IMF	OECD	ECB
2020	2.1	2.2	2.1	2.1
2021	2.1	1.7	2.0	2.2

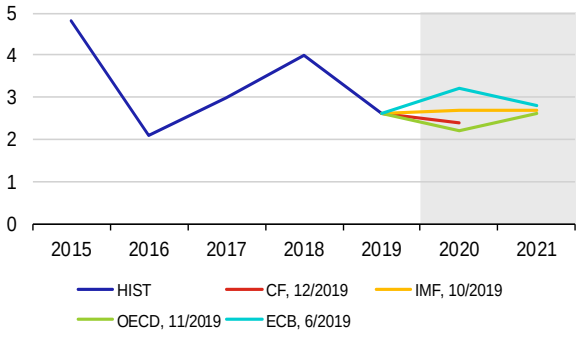
Inflation, %



	CF	IMF	OECD	ECB
2020	0.7	0.9	0.4	0.7
2021	1.1	1.3	0.9	1.1

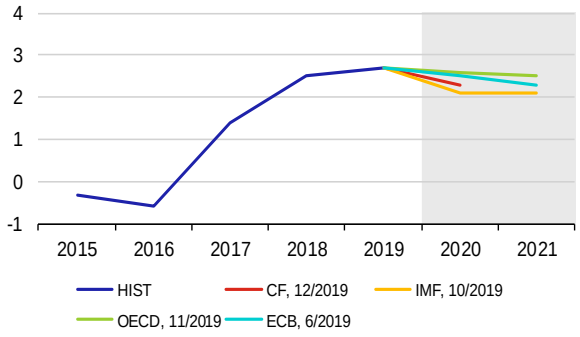
Slovakia

GDP growth, %



	CF	IMF	OECD	ECB
2020	2.4	2.7	2.2	3.2
2021	n.a	2.7	2.6	2.8

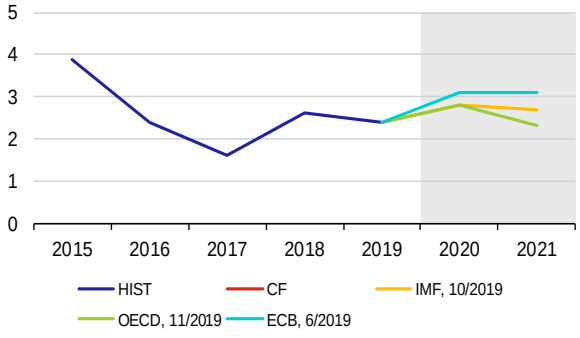
Inflation, %



	CF	IMF	OECD	ECB
2020	2.3	2.1	2.6	2.5
2021	n.a	2.1	2.5	2.3

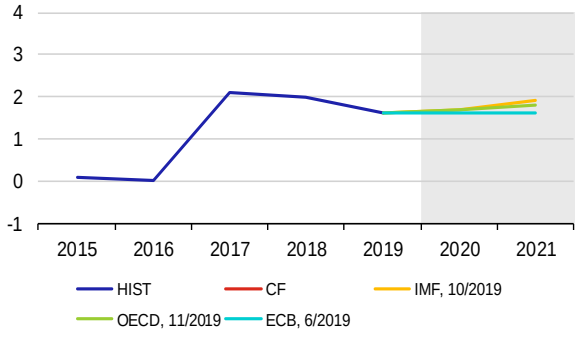
Luxembourg

GDP growth, %



	CF	IMF	OECD	ECB
2020	n. a.	2.8	2.8	3.1
2021	n. a.	2.7	2.3	3.1

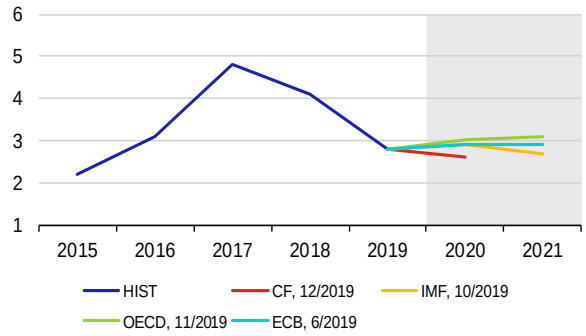
Inflation, %



	CF	IMF	OECD	ECB
2020	n. a.	1.7	1.7	1.6
2021	n. a.	1.9	1.8	1.6

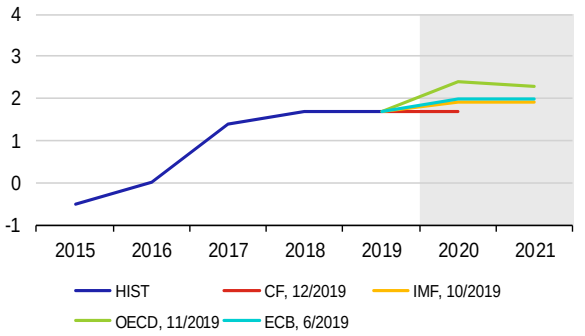
Slovenia

GDP growth, %



	CF	IMF	OECD	ECB
2020	2.6	2.9	3.0	2.9
2021	n.a	2.7	3.1	2.9

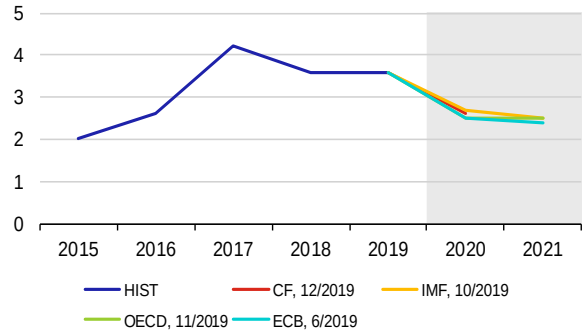
Inflation, %



	CF	IMF	OECD	ECB
2020	1.7	1.9	2.4	2.0
2021	n.a	1.9	2.3	2.0

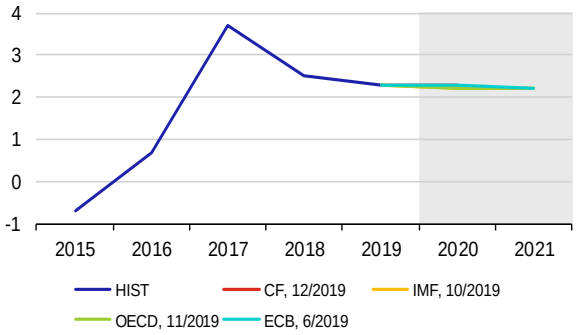
Lithuania

GDP growth, %



	CF	IMF	OECD	ECB
2020	2.6	2.7	2.5	2.5
2021	n.a	2.5	2.5	2.4

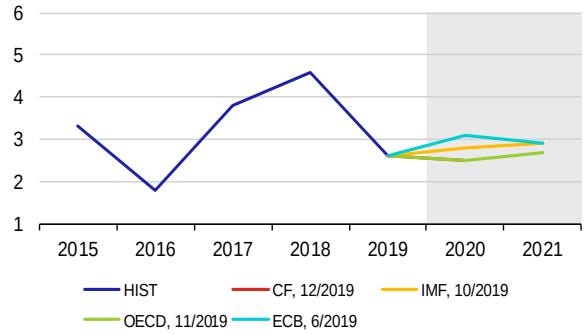
Inflation, %



	CF	IMF	OECD	ECB
2020	2.3	2.2	2.2	2.3
2021	n.a	2.2	2.2	2.2

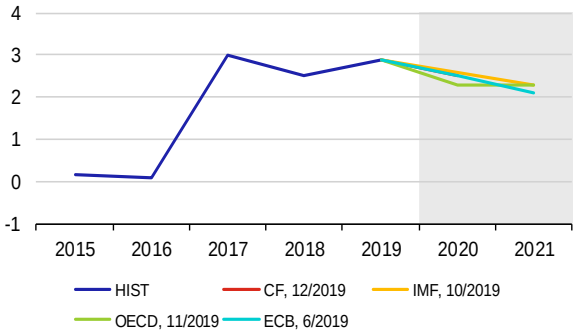
Latvia

GDP growth, %



	CF	IMF	OECD	ECB
2020	2.5	2.8	2.5	3.1
2021	n.a	2.9	2.7	2.9

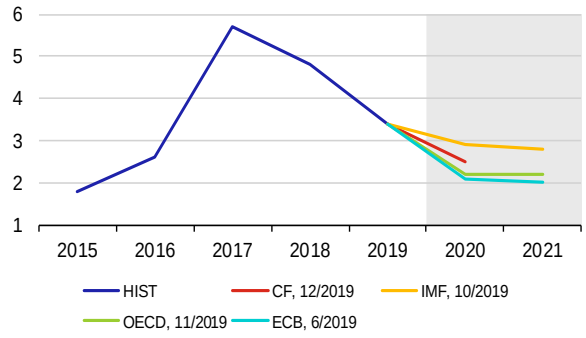
Inflation, %



	CF	IMF	OECD	ECB
2020	2.5	2.6	2.3	2.5
2021	n.a	2.3	2.3	2.1

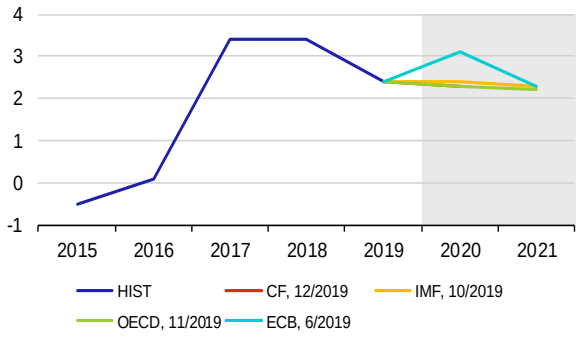
Estonia

GDP growth, %



	CF	IMF	OECD	ECB
2020	2.5	2.9	2.2	2.1
2021	n.a	2.8	2.2	2.0

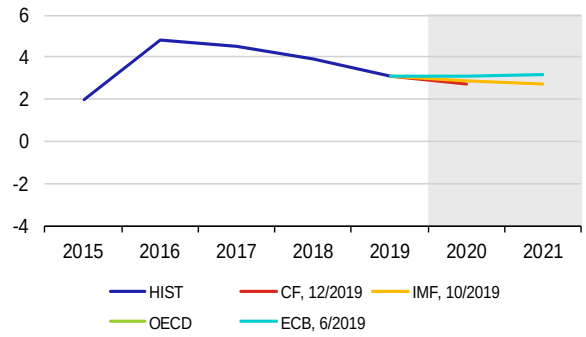
Inflation, %



	CF	IMF	OECD	ECB
2020	2.3	2.4	2.3	3.1
2021	n.a	2.3	2.2	2.3

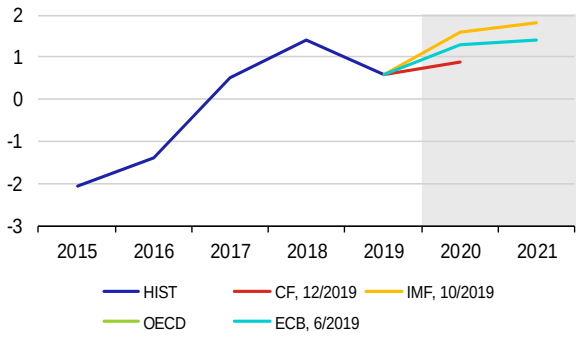
Cyprus

GDP growth, %



	CF	IMF	OECD	ECB
2020	2.7	2.9	n. a.	3.1
2021	n.a	2.7	n. a.	3.2

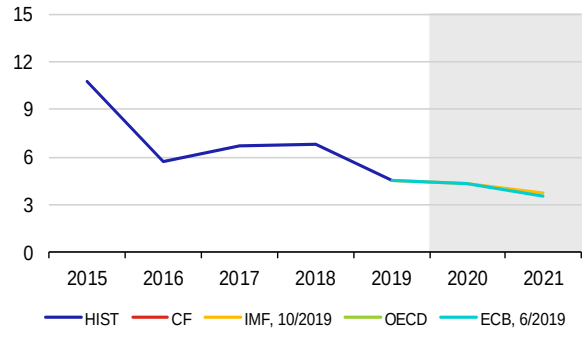
Inflation, %



	CF	IMF	OECD	ECB
2020	0.9	1.6	n. a.	1.3
2021	n.a	1.8	n. a.	1.4

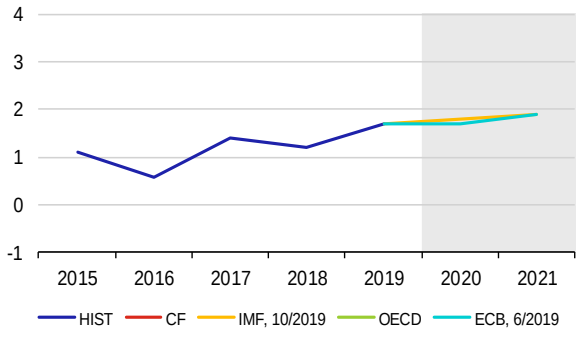
Malta

GDP growth, %



	CF	IMF	OECD	ECB
2020	n. a.	4.3	n. a.	4.3
2021	n. a.	3.7	n. a.	3.5

Inflation, %



	CF	IMF	OECD	ECB
2020	n. a.	1.8	n. a.	1.7
2021	n. a.	1.9	n. a.	1.9

A5. List of abbreviations

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

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