

# Global Economic Outlook

— April 2020



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Czech National Bank — Global Economic Outlook — April 2020

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## Cut-off date for data

17 April 2020

## CF survey date

6 April 2020

## GEO publication date

24 April 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

**COVID-19! The main news item in April, and probably the whole year, is again the coronavirus pandemic, whose epicentre moved from Europe to the USA in April.** The hibernation of the global economy caused by the measures taken to contain the pandemic entails astronomical costs. The question is when the trade-off between purely epidemiological health protection and the economic costs to society will have to shift in favour of the economy, as there is a need to minimise the economic losses in order to save resources and allow healthcare quality to be sustainable in the medium term. Governments and central banks – now especially those in Europe and the USA – are trying to keep their “patients” (economies) in an acceptable condition. This is shown by the drastic measures they have taken – to use a medical analogy, the patient is connected to a ventilator but hopefully is not yet on extracorporeal circulation. How did central banks up their

### April GDP growth and inflation outlooks for monitored countries, in %

GDP	EA	DE	US	UK	JP	CN	RU
2020	-5.7 ↘	-5.0 ↘	-4.0 ↘	-5.4 ↘	-3.3 ↘	2.0 ↘	-3.8 ↘
2021	5.4 ↗	4.5 ↗	3.9 ↗	4.7 ↗	2.1 ↗	7.8 ↗	3.0 ↗
Inflation	EA	DE	US	UK	JP	CN	RU
2020	0.4 ↘	0.7 ↘	0.8 ↘	1.0 ↘	-0.1 ↘	3.3 ↘	4.8 ↗
2021	1.3 ↘	1.4 ↘	1.8 ↘	1.6 ↘	0.2 ↘	2.1 ↘	3.7 ↘

Source: Consensus Forecasts (CF)

Note: The arrows indicate the direction of revisions compared with the last GEO.

“medical” support in April? The US Fed was very active. It first introduced a seventh programme of dollar liquidity support for foreign central banks (the FIMA repo facility), giving access to yet another source of dollars in exchange for US Treasuries. The Fed also made huge purchases of corporate bonds (totalling USD 2.3 trillion), which were investment grade in late March but have been downgraded to speculative due to the pandemic. Following the ECB’s March announcement of

massive support, in April the situation in Europe shifted towards the possible introduction of common European coronabonds. However, this currently lacks the necessary agreement among all the euro area members.

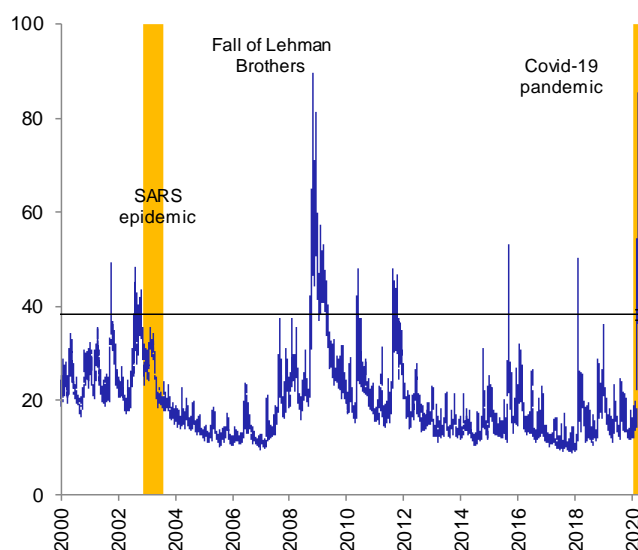
**The GDP growth outlooks** for this year for the countries we monitor have been lowered further, with China the only country expected to overcome the coronavirus crisis with positive GDP growth. Most economies will return to growth in 2021. The good news is that the estimates have shifted upwards compared with March. **Consumer inflation outlooks** are also lower than in March. This will push most economies further below the 2% “ideal”. The current crisis is unlikely to follow the stagflation scenario. Of the countries under review, Russia is at the biggest risk of seeing this scenario materialise.

**The dollar** will weaken slightly against the euro, sterling, the yen and the renminbi at the one-year horizon. This may be linked with the dollar’s previous appreciation trend and the current response of foreign exchange markets to the programmes announced by the Fed. The CF outlook for the **Brent crude oil price** at the one-year horizon is again markedly lower than in March, at USD 42.8/bbl (highest estimate USD 65/bbl, lowest estimate just USD 28.3/bbl). The outlook for **market rates** is falling for the 3M USD LIBOR, while the outlook for 3M EURIBOR rates remains negative over the entire outlook horizon, as has been the case for several years now.

**The chart in the current issue** shows the impacts of the coronavirus crisis from the perspective of financial market volatility as measured by the VIX index. The chart illustrates that the current pandemic caused the biggest panic in mid-March (when the index was close to the all-time high recorded in October 2008). On the other hand, this panic is subsiding (though the current level is still well above the long-term average) and the index has returned to its end-February level. This trend can be assessed as positive if we realise that the VIX primarily reflects volatility on financial markets in the USA, which is now the epicentre of the pandemic.

**The current issue also contains an analysis:** [Impacts of the COVID-19 pandemic on the world economy](#). The article contains a detailed model-based scenario analysis quantifying the economic impacts of the pandemic on China, the USA and the euro area.

### Financial market uncertainty measured by the VIX volatility index



Source: Yahoo Finance

Note: The blue line shows the differences between the maximum and minimum index values for each day. The black horizontal line shows the index value on 17 April 2020.

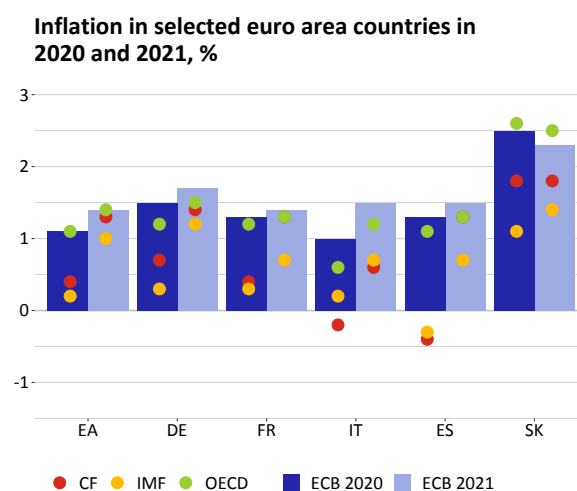
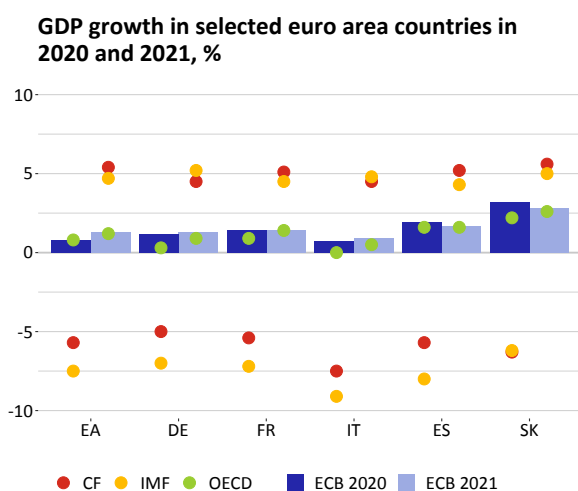
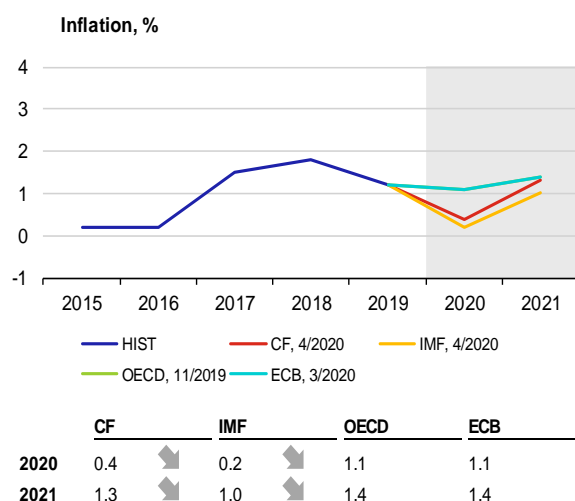
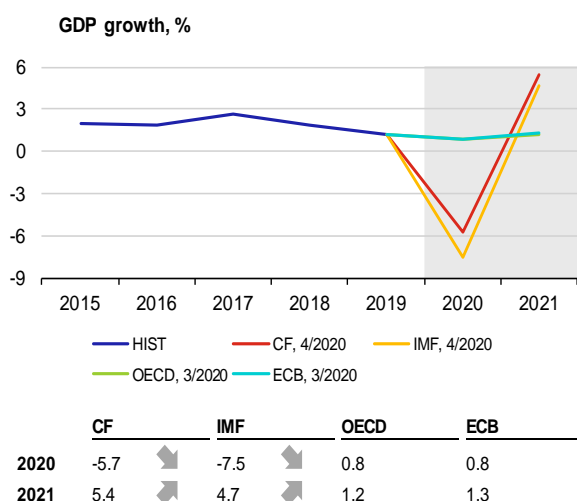
## II.1 Euro area

**Euro area economies are expected to contract sharply in 2020 H1 due to the coronavirus pandemic.** Government measures adopted to curb the spread of the disease have led to closures of numerous segments of services and industry since mid-March. A significant uncertainty is the further spread of the disease and the resulting duration of the restrictions imposed on economies. Supply chains may thus remain disrupted for longer, as the timing of the lifting of the restrictions may differ from country to country. As a result, the global economy will recover only gradually. On the other hand, the negative impacts of the crisis will be softened by fiscal stimuli introduced by individual governments.

**The impact of the coronavirus crisis is yet not fully reflected in the available hard data.** Industrial production fell only slightly month on month in February, i.e. one month before the full outbreak of the crisis in the euro area. Nevertheless, industrial growth in Germany remained robust. Industrial production in Italy and Spain dropped slightly following high growth in January. Germany recorded a month-on-month decline in both construction output (following a higher-than-usual increase in January) and industrial orders. Growth in retail sales in the euro area accelerated in February. In Italy, retail sales growth remained subdued (but was still slightly higher than in 2019 Q4). Unemployment in the euro area fell slightly in the same month.

**The negative impact of the coronavirus is already clearly visible in leading and financial indicators.** All the monitored leading indicators deteriorated markedly in March. Moreover, the composite PMI for the euro area fell to an all-time low as both services and industry declined. The IFO and ZEW indices for Germany also recorded significant drops. There is considerable uncertainty on financial markets, manifesting itself in increased volatility. Stock markets were characterised by sell-offs in March. By contrast, the price of gold increased considerably, as is usual during crises.

**The newly updated outlooks (CF, IMF) have revised GDP growth for this year down sharply.** CF has never before

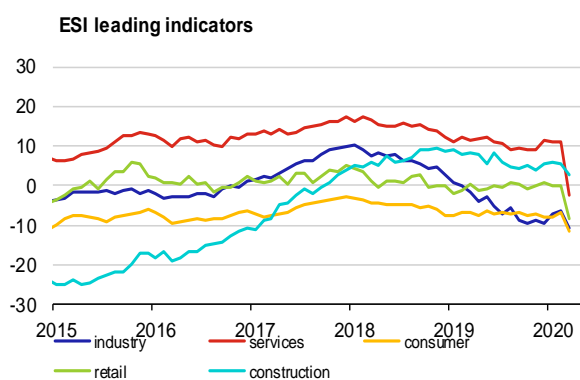


Note: Charts show institutions' latest available outlooks of for the given economy.

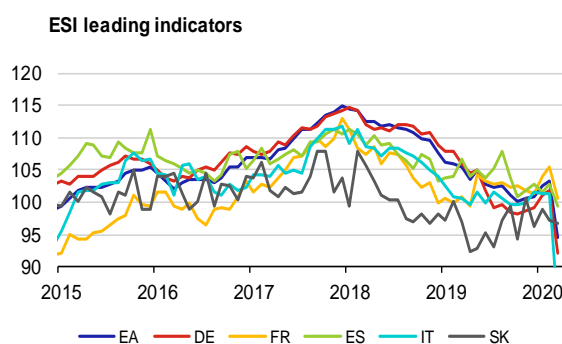
recorded such a strong one-off worsening of outlooks compared with the previous month. The GDP growth outlooks for next year are higher. This year's sharp drop in economic activity is thus expected to be offset somewhat. CF even expects economies to return to their pre-crisis levels (in volume terms) within two years. However, corporate investment is also likely to be affected negatively, which will lead to a fall in potential growth.

**The expected economic downturn is reflected in a lower consumer inflation outlook.** The revised outlooks (CF and IMF) expect a decline in headline inflation in the euro area both this year and the next. Inflation is expected to hover only slightly above zero this year. Headline inflation in the euro area fell to 0.7% in March. Inflation was driven most of all by prices of services, whereas a drop in energy prices had a downward effect. Consumer price inflation will thus diverge from the ECB's target again. Of the euro area countries, Slovakia recorded the highest inflation, while prices in Italy, Spain and Portugal were almost flat year on year. Core inflation also fell in March, to 1%.

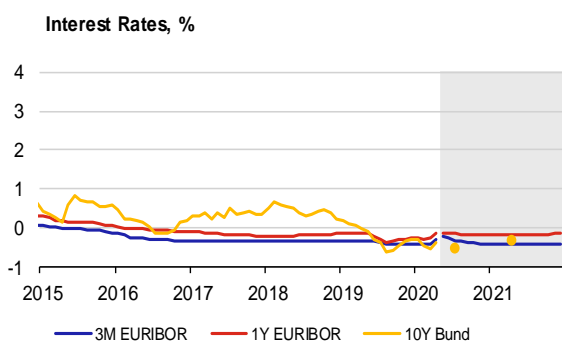
**The ECB did not lower the deposit rate in March, but did adopt some support measures, including larger securities purchases.** Under its new Pandemic Emergency Purchase Programme, the ECB expects to conduct securities purchases totalling EUR 750 billion until the end of 2020. The ECB is prepared to increase the size of its asset purchase programmes if necessary. It has also promised to offer euro swap lines to some European central banks outside the euro area. The spread between the government bond yields of euro area periphery countries and Germany has widened, dangerously resembling the situation during the debt crisis of 2010–2012. The German government bond yield is expected to decrease to -0.5% at the three-month horizon.



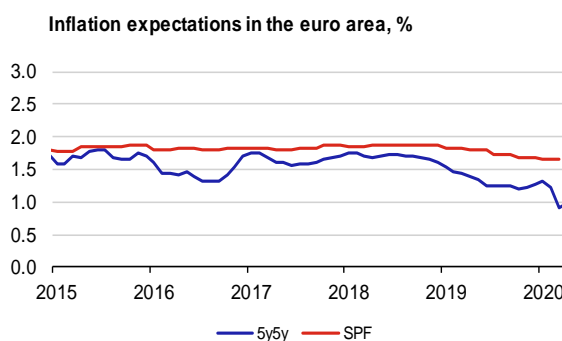
	industry	services	consum.	retail	constr.
1/20	-7.0	11.0	-8.1	-0.1	5.8
2/20	-6.2	11.1	-6.6	-0.2	5.4
3/20	-10.8	-2.2	-11.6	-8.3	2.7



	EA	DE	FR	ES	IT	SK
1/20	102.6	101.2	103.9	101.5	101.3	98.9
2/20	103.4	101.8	105.5	102.7	101.3	97.2
3/20	94.5	92.0	100.6	99.3	83.7	96.7



	3/20	4/20	7/20	4/21
3M EURIBOR	-0.42	-0.28	-0.32	-0.41
1Y EURIBOR	-0.27	-0.12	-0.15	-0.17
10Y Bund	-0.52	-0.39	-0.50	-0.30



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

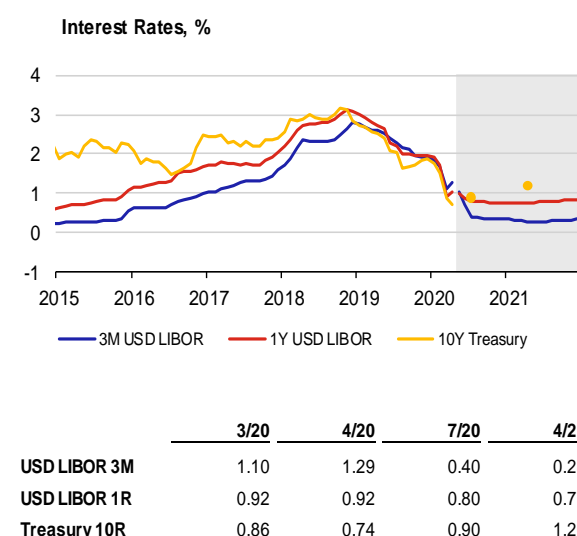
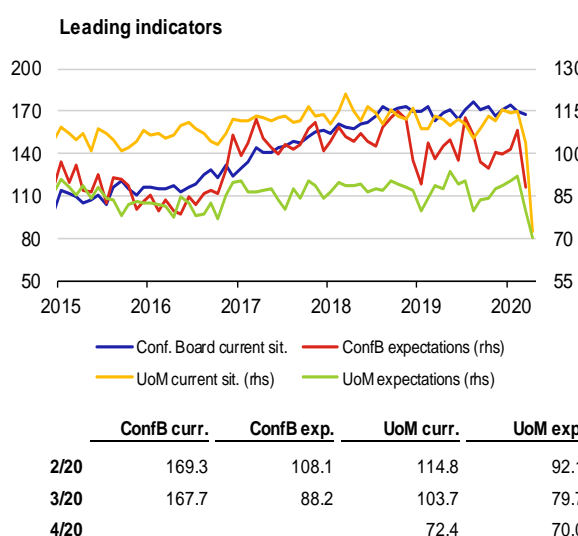
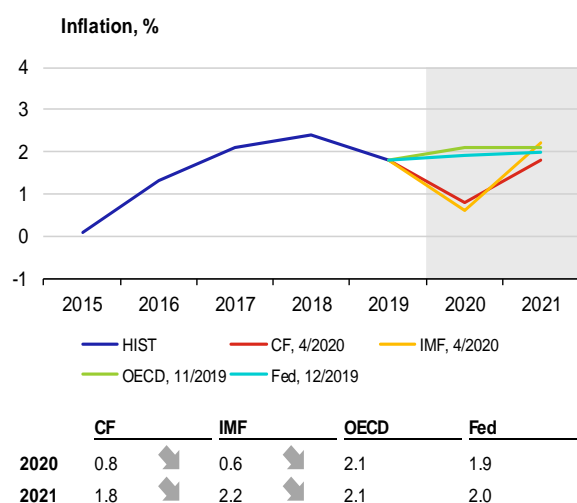
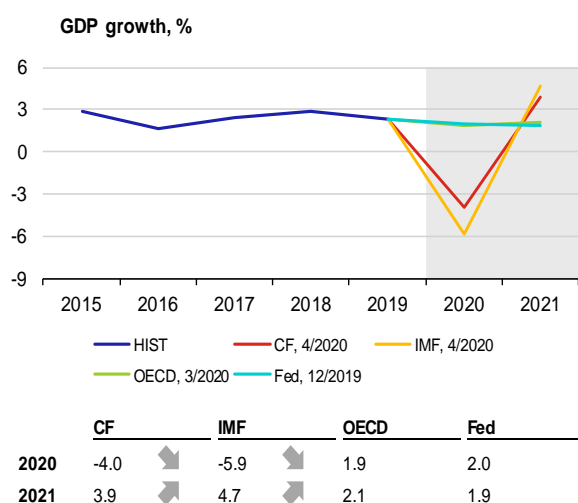
	5y5y	SPF
2/20	1.22	1.66
3/20	0.91	1.66
4/20	0.98	n.a.

## II.2 United States

**The measures to curb the epidemic have hit the US economy hard and the number of unemployed is soaring.** More than three million US citizens registered for unemployment benefits in the last week of March, five times the number recorded during the financial crisis. In the weeks that followed, however, the number of newly unemployed persons grew even faster – by more than six million a week. According to the CF outlooks, unemployment will increase from the pre-crisis level of 3.5% to 8.4% by the end of the year. Non-farm payrolls fell by more than 700,000 in March and can be expected to decline further in April.

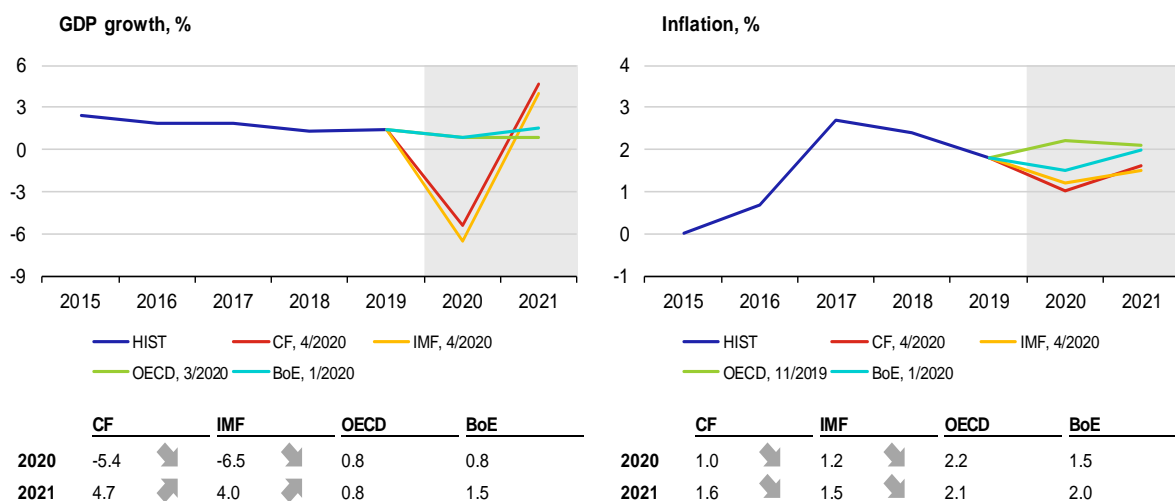
**GDP growth outlooks expect a short-lived sharp drop amid lower inflation.** According to the new CF outlook, the US economy will contract by 4% this year but return to growth and expand by 4% next year. In the following years, the growth will gradually slow to around 2% at the five-year horizon. The IMF expects a decline of almost 6% this year but predicts growth of almost 5% for next year. The world's strongest economy will not thus return to the pre-pandemic level in the next two years. Interestingly, inflation expectations have been revised down for both this year and the next. The analysts thus expect the drop in consumption to have a stronger effect on inflation than the drop in production, which has the opposite effect. Simultaneously, monetary policy easing and fiscal stimuli are not expected to result in inflation.

**The US central bank is continuing to buy assets and provide liquidity via direct lines to large central banks, while the government is adopting one measure after another.** As in some other countries, Donald Trump and his federal government are intervening in loan repayment and allowing postponements, primarily for student loans. The government has also offered tax deferrals of roughly three months and tax discounts. The Senate has approved support in excess of USD 2.3 trillion (more than 10% of GDP) under the CARES law, targeted at both firms and individuals. The USA is the country with the highest number of infected people, and this number keeps rising. Government spending will continue to mount, as two-week paid sick leave and emergency leave of up to three months have been introduced.



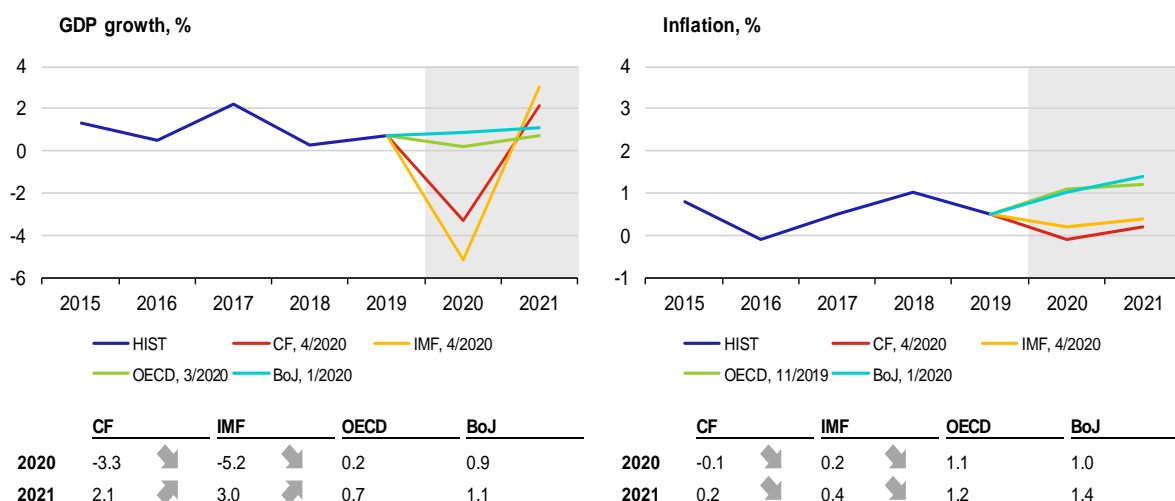
### II.3 United Kingdom

**Prime Minister Boris Johnson is being treated for Covid-19, the BoE has cut rates to 0.1% and the government is introducing further measures to boost the UK economy.** The UK's approach to the epidemic changed after the number of cases and deaths in crowded hospitals started rising sharply. As in other countries, strict measures to curb the spread of the virus were put in place in late March. The government is also offering aid to employees in the form of 80% of wages of up to GBP 2,500 and to the self-employed and other persons in the form of universal credit. The NIESR expects a quarter-on-quarter GDP contraction of 5% in Q1 and almost 25% in Q2. The CF forecast estimates this year's economic downturn at 5.4%, which is more than in 2008. On the other hand, it expects faster growth next year. The forward-looking composite PMI fell to 34.5 in March. The IMF's April outlook for the UK economy sees a 6.5% contraction this year.



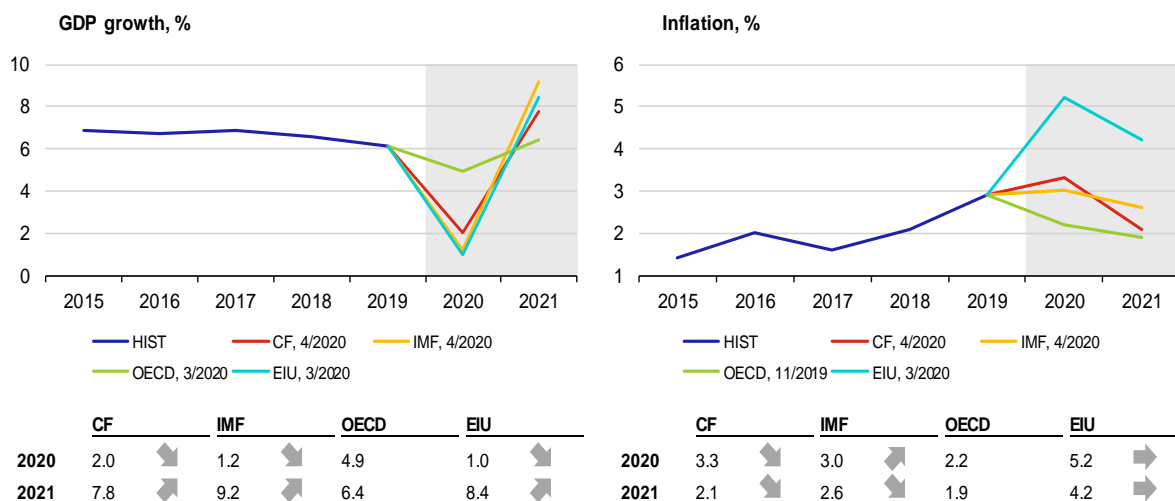
### II.4 Japan

**The Japanese government declared a state of emergency and approved a large stimulus package in April.** The financial aid, worth USD 1 trillion, or one-fifth of Japanese GDP, will soften the impacts of the coronavirus and the emergency measures. However, it is certain to increase the already high government debt (238% of GDP in 2018) and the risk to its sustainability. Firms are facing lower demand on both the home market and overseas, as well as cancelled or reduced new orders and supply chain disruptions. Toyota is planning to cut production of finished cars in Japan by 40% in May due to the drop in demand caused by the pandemic. Leading indicators fell sharply in March: The PMI in manufacturing fell to levels comparable to those recorded just after the 2011 tsunami, and the PMI in services dropped to its 2009 level. The Olympic Games have been postponed until 2021.



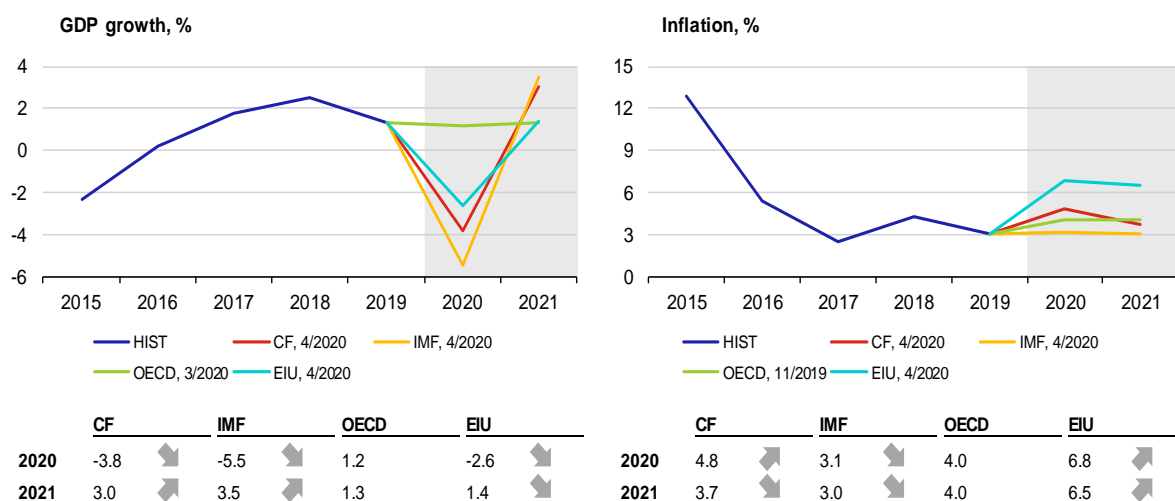
## II.5 China

**The main risk to the economic growth forecast in China is the future course of the pandemic.** Private consumption and investment are expected to have seen their biggest drop in 2020 Q1 due to the introduction of extensive and strict quarantine measures by the Chinese government. These have been gradually relaxed since the start of Q2. The negative shock has been dampened by support measures adopted by the Chinese government and central bank. However, the biggest decline in overall GDP growth is not expected to occur until 2020 Q2. It will reflect a sharp drop in economic activity in China's major trading partner countries. The April forecasts by CF and IMF analysts predict annual GDP growth of just 1%–2% this year and 8%–9% next year, assuming that the pandemic subsides in the second half of this year. The April CF outlook sees annual consumer price inflation of 3.3% this year, slowing to 2.1% in 2021.



## II.6 Russia

**The GDP contraction in Russia this year will be rather smaller than that in advanced economies.** As of 17 April, Russia ranked 13th in the world by confirmed Covid-19 cases, with a number of infections roughly comparable to Canada. The Urals oil price kept falling below USD 17/bbl even after the signing of the OPEC+ deal. Its growth may be very gradual due to the drop in demand caused by the pandemic. According to the CF and IMF April outlooks for this year, the GDP decline will be smaller in Russia than in advanced economies. Russia is cautious about revising its outlooks – the central bank has only commented on the direction of the change. The Ministry of Economic Development has put off the publication of the new forecast, initially scheduled for 9 April, due to the current situation. The March PMI in services was the most pessimistic in 11 years (down from 52.0 to 37.1). Manufacturing is faring much better, with the PMI down by just 0.7 to 47.5.



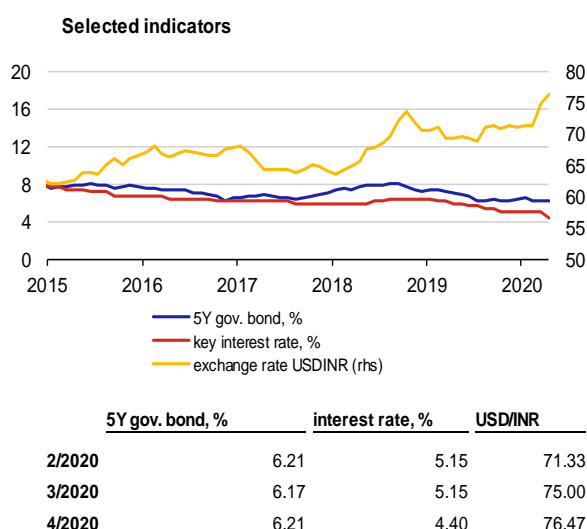
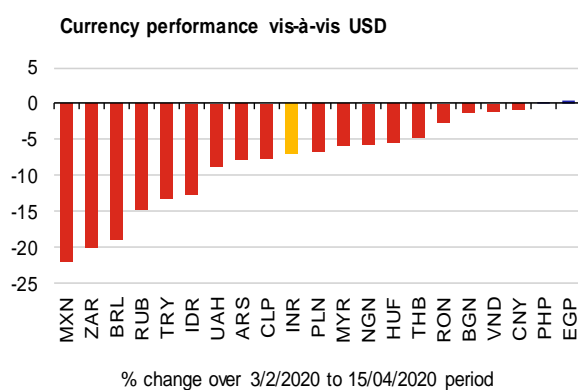
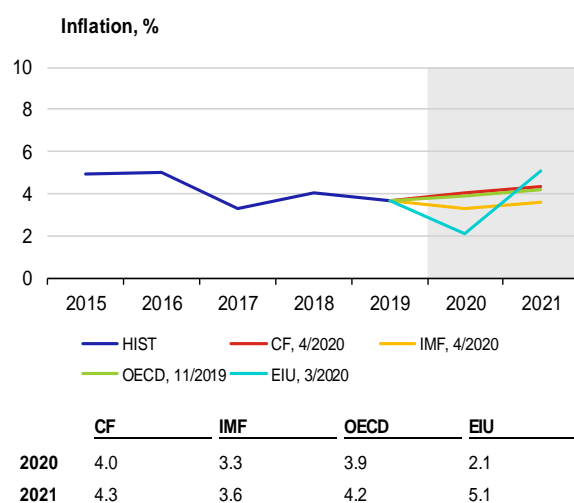
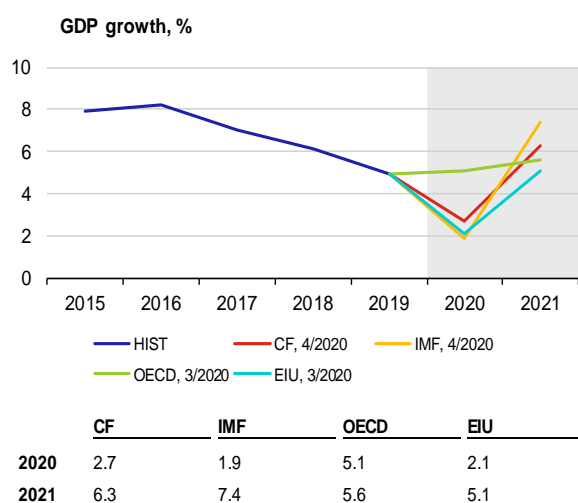


## II.7 Developing countries in the spotlight

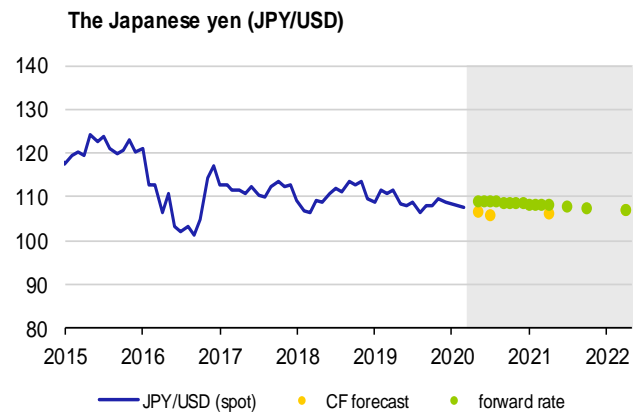
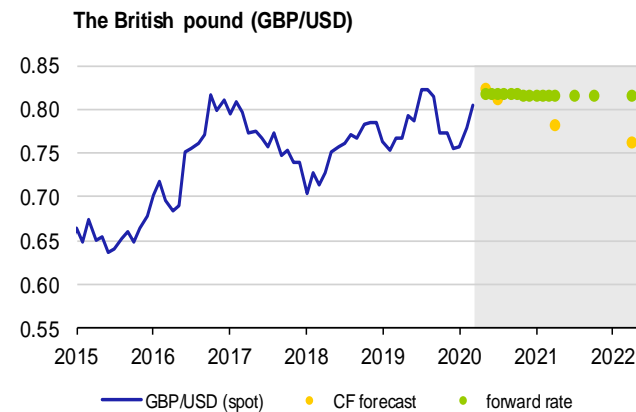
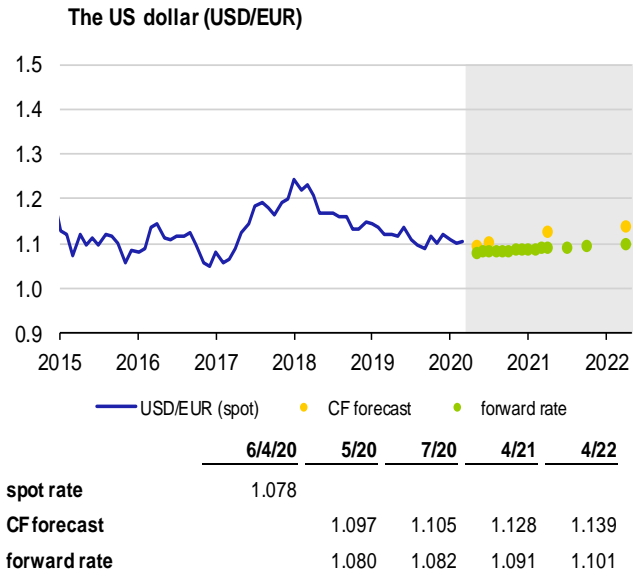
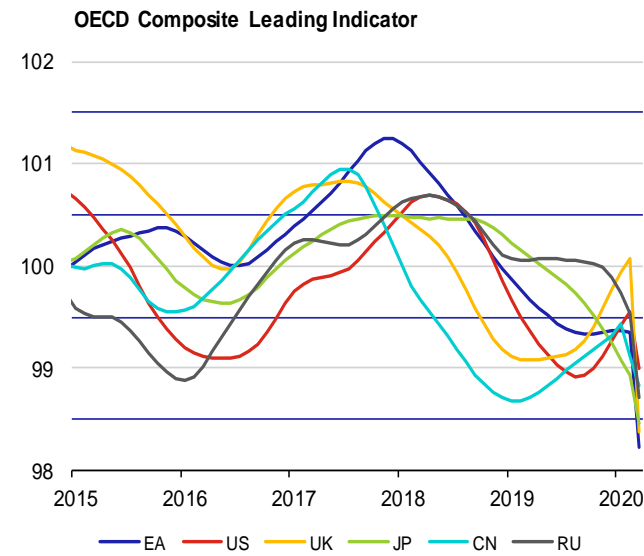
**The Indian economy grew by 4.9% last year, while consumer inflation stood at 3.7%.** India recorded its biggest quarter-on-quarter growth of 2019 in Q1. The driving force of the current growth is consumption, which is rising by more than 5% quarter on quarter. India's foreign trade is strongly affected by energy imports, and its current account deficit amounted to USD 30.3 billion last year. In 2019 Q4, exports fell by 5.5% and imports by more than 11%. Energy prices had a positive effect early this year, but the subsequent coronavirus pandemic has hit the economy hard. Unemployment in India is running at 7%–8%. The household debt-to-GDP ratio has been rising slowly and currently stands at 12%.

**The coronavirus epidemic is hitting the highly populated India very hard, mainly due to a drop in trade.** The Indian central bank has cut rates by 75 bp to 4.4% in response to the Covid-19 pandemic. The government is planning fiscal measures to stimulate the economy worth USD 23 billion, which represents less than 1% of GDP. It locked the country down on 25 March in an effort to get the contagion under control.

**According to international organisations, Indian GDP growth this year will be much lower than last year, mainly because of the pandemic.** Before the outbreak of the epidemic, the March CF was predicting GDP growth of 5% in 2020 and 5.7% in 2021. The April revision foresees real growth of just 2.7% this year. Unlike in other countries, however, GDP is not expected to decline. Consumer price inflation is also expected to slow gradually, falling below the Indian central bank's target of 4% in 2020 as a whole. Before the pandemic, the inflation estimate for this year was 4.6%. CF estimates that the exchange rate will hold close to INR 75/USD and thus strengthen slightly compared with the current level. In the next two years, however, it will not erase the loss recorded early this year, when it was stronger than INR 70/USD. The forward-looking PMI rose at the end of last year but fell to 50.6 in March. It is expected to keep decreasing due to the current health situation. However, consumer confidence has been falling quarter after quarter. Given its strong effect on GDP, the key factor will be how much the Covid-19 pandemic paralyses the country.

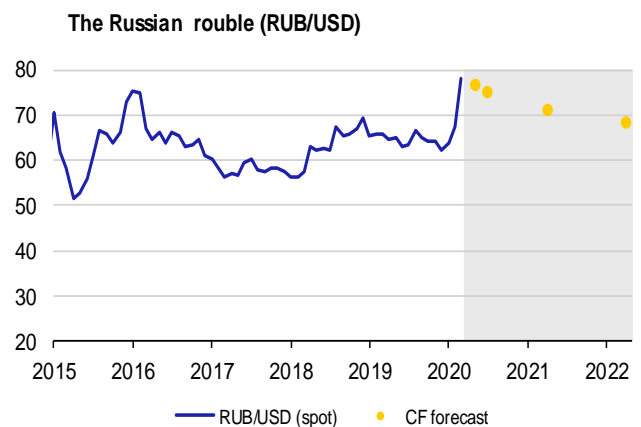
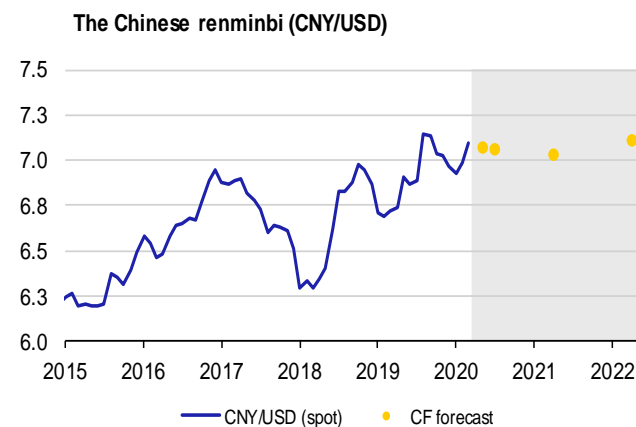


### III. Leading indicators and outlook of exchange rates



	6/4/20	5/20	7/20	4/21	4/22
spot rate	0.816				
CF forecast		0.824	0.811	0.782	0.762
forward rate		0.817	0.817	0.816	0.816

	6/4/20	5/20	7/20	4/21	4/22
spot rate	109.1				
CF forecast		106.5	105.9	106.2	107.1
forward rate		109.1	108.9	108.1	107.1



	6/4/20	5/20	7/20	4/21	4/22
spot rate	7.090				
CF forecast		7.067	7.062	7.033	7.110

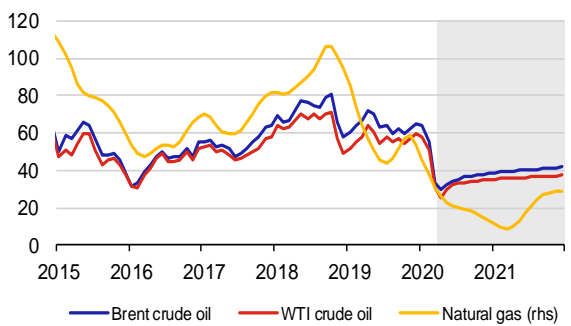
	6/4/20	5/20	7/20	4/21	4/22
spot rate	76.30				
CF forecast		76.56	75.13	71.21	68.26

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

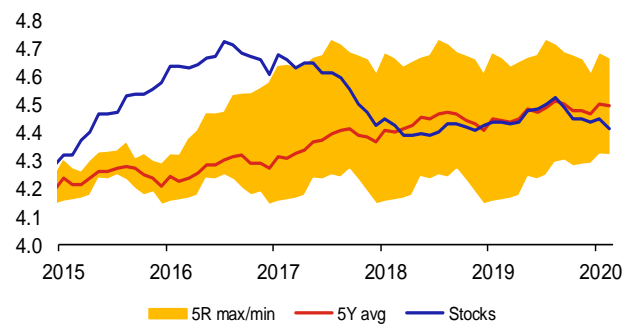
The decline in oil prices accelerated further following the failed OPEC+ talks in the first half of March, and the Brent crude oil price dropped below USD 23/bbl at the end of the month, its lowest level in 18 years. In addition to strong oil output growth (especially in Saudi Arabia and other OPEC members), the oil price was pushed down by a continued fall in global demand due to lockdown in the rising number of countries. Estimates of the year-on-year drop in demand range between 20 and 35 million barrels a day (up to one-third of the original consumption). In early April, the oil price rose temporarily due to stepped-up diplomatic activity between representatives of the USA, Saudi Arabia and Russia and to China's plan to increase purchases of oil into its strategic reserves. On 12 April, following complicated talks, OPEC+ reached a deal on renewed output cuts, which are unprecedented as to their extent. Other countries joined the plan to lower production at the related meeting of G20 energy ministers. However, they will rely mainly on a market drop in output caused by low prices and rapidly diminishing storage capacity. The IEA estimates the effective cut in OPEC+ output at 10.7 million barrels a day from May (output will then be raised several times according to a schedule). Non-OPEC countries will gradually cut their output by 5.2 million barrels a day at the end of this year. On the physical market, however, there is still a huge supply glut, which is intensified by storage capacity constraints and logistics problems with transporting oil to storage tanks. Spot market prices are thus much lower (well below USD 10/bbl in some fields in the USA and Canada). The IEA expects available storage capacity to be saturated roughly in mid-2020, which will increase the pressure to cut output. In 2020 H2, as demand recovers with some countries replenishing their strategic reserves, the market could move into deficit (the EIA expects this to occur in Q4). This should lead to a gradual oil price growth.

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

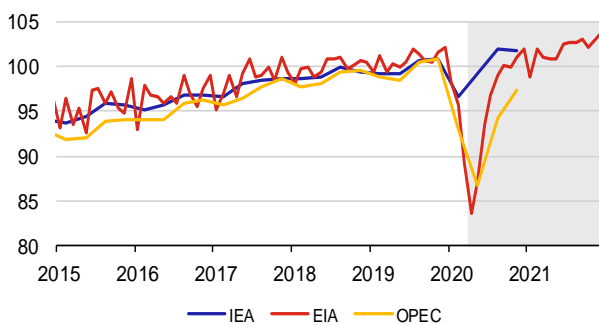


	Brent	WTI	Natural gas
2020	39.36	35.90	71.73
2021	40.35	36.39	57.35

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

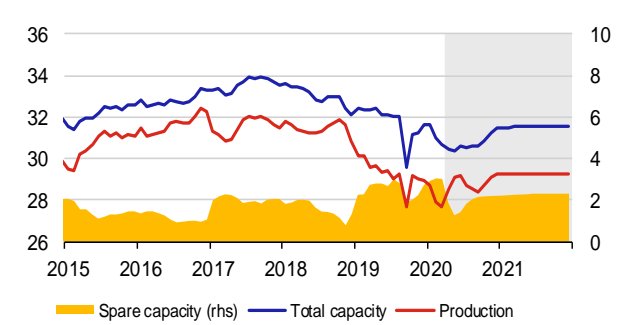


Global consumption of oil and oil products (mil. barrel / day)



	IEA	EIA	OPEC
2020	99.89	95.51	92.80
2021		101.94	

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



	Production	Total capacity	Spare capacity
2020	28.65	30.82	2.17
2021	29.27	31.54	2.28

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

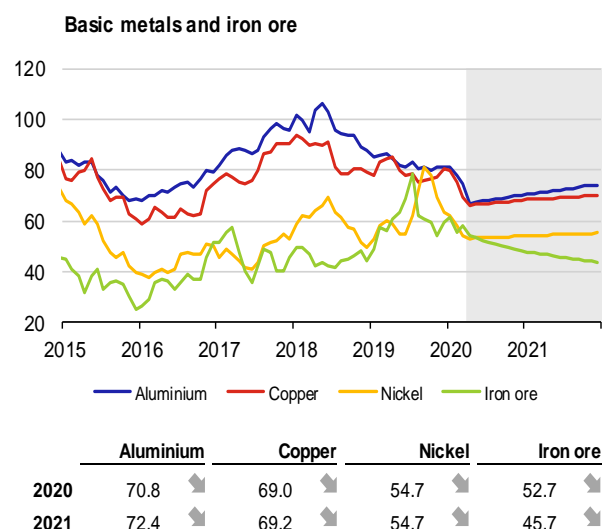
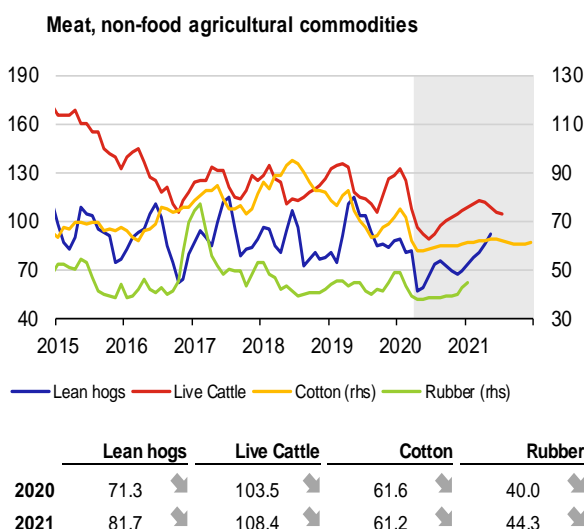
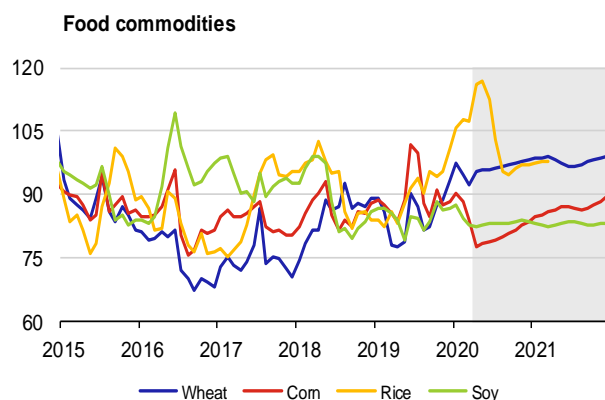
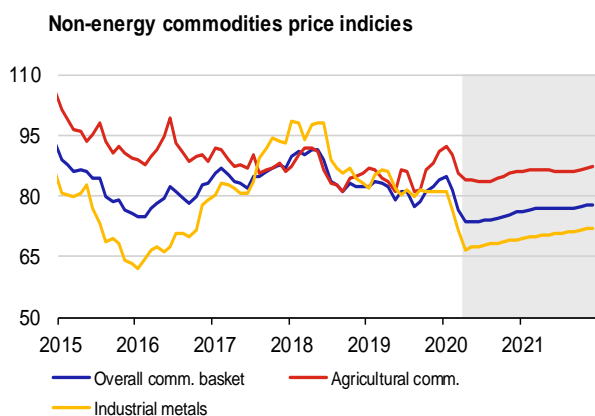
Note: Oil price at ICE, average gas price in Europe – World Bank data, smoothed by the HP filter. Future oil prices (grey area) are derived from futures and future gas prices are derived from oil prices using model. Total oil stocks (commercial and strategic) in OECD countries – IEA estimate. Production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

## IV.2 Other commodities

**World natural gas prices kept falling in March, as the current economic downturn is expected to boost the gas surplus in the market caused by this year's unusually warm winter.** Prices based on long-term contracts will be pushed down by the currently low oil prices. The restrictions on economic activity stemming from the measures to curb the spread of the coronavirus led to a drop in electricity consumption and a subsequent further decline in prices of thermal coal.

**The aggregate non-energy commodity price index fell sharply for the second consecutive month in March and showed the same dynamics in April amid similar trends in both its components.** Lower manufacturing activity led to a fall in basic metals prices across their index in March, although the timing and intensity of the fall differed. Prices of copper, nickel and other metals started to go down in early March but recovered at the end of the month. Some of the fall was linked to the sharp appreciation of the dollar in the first half of March, while the recovery was due to the restart of manufacturing in China. The price of aluminium started falling later, in mid-March, and did not stabilise until the first half of April. The iron ore price was supported by falling stocks in China and the Chinese government's stimulus measures. However, it also dipped briefly in late March.

**The trends in the food commodity price index were much more mixed.** The wheat price declined until mid-March but then rose sharply to its mid-January level. The corn price fell sharply to its lowest level since 2009 and the sugar price also hit a several-year low. The cocoa price dropped markedly as well. The soy price recovered some of its earlier losses, and rice and coffee prices even increased in March. Beef and pork prices also recorded strong declines at the end of March.



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.

## Impacts of the COVID-19 pandemic on the world economy<sup>1</sup>

The novel coronavirus causing COVID-19 has already far exceeded previously identified coronaviruses of a similar type in terms of the numbers of cases, deaths and affected areas. There is a great deal of uncertainty about how the situation may unfold, as the virus is far from being well enough researched. The global scale of the COVID-19 pandemic and the related drastic government measures being taken to eliminate it will exact very high economic costs. Significant disruption of the current, very strong, global economic interconnectedness will contribute to the resulting adverse impact on the world economy. The weak condition of the global economy, which was already going through a cyclical slowdown before the pandemic broke out, also poses a risk to a subsequent relatively rapid economic recovery. This article aims to describe the transmission channels and quantify the impact of the COVID-19 pandemic on the three largest territories of the world economy (the USA, China and the euro area).

### Introduction

The first confirmed case of the novel coronavirus causing COVID-19 was reported to the World Health Organization (WHO) on 31 December 2019 in the Chinese city of Wuhan, the capital of the Chinese province of Hubei, with a population of 11 million. From there, the virus spread very rapidly in its early stages, especially in China. This compelled the Chinese government to introduce strict and unprecedented quarantine measures affecting more than 50 million inhabitants in all the most affected areas.

In the analysis and subsequent quantification of the economic impacts of the current COVID-19 pandemic on the Chinese and world economy, certain parallels can be found in the spread of the SARS epidemic in the first half of 2003. SARS (Severe Acute Respiratory Syndrome) is a viral airway disease similar to COVID-19. A virus from the coronavirus family causing MERS (Middle East Respiratory Syndrome), manifesting as pneumonia accompanied by renal failure, was subsequently discovered in 2012. SARS, MERS and COVID-19 are respiratory illnesses caused by viruses from the large coronavirus family. Coronaviruses are in fact quite common causes of many of the colds people are exposed to every day. They are also commonly found in many animal species. In some cases, the virus can pass from an infected animal to a human and then spread rapidly among human populations. This is what happened with SARS, MERS and COVID-19. As with SARS and MERS, there is currently no drug or vaccine available for COVID-19. The only protection is thus the patient's own immune system. Table 1 compares the three coronavirus illnesses mentioned above.

In the case of COVID-19, a total of 2,314,621 cases had been diagnosed and 157,847 deaths reported worldwide as of 20 April 2020. The novel coronavirus far exceeds the other two in terms of the numbers of infections, deaths and areas affected. This is mainly due to its incubation period, which is approximately twice as long as that of SARS, allowing the infection to spread very rapidly. A COVID-19 patient is infectious for the entire period. This means there is a significant risk

**Table 1 – Characteristics and scale of the last three coronavirus epidemics**

Name of disease	Type of coronavirus	Origin	Contagion period	Incubation period (days)	Reproduction number (R0)	Confirmed cases (no. of persons)	Deaths (no. of persons)	Mortality rate (%)	No. of territories affected
COVID-19	SARS-CoV-2	China	12/2019 to present	2–14	2.5	2,314,621	157,847	6.8*	205
SARS	SARS-CoV	China	11/2002–7/2003	2–7	2.5	8,098	774	9.6	29
MERS	MERS-CoV	Saudi Arabia	04/2012 to present	2–14	0.5	2,521	866	34.4	27

Source: WHO, data as of 20 April 2020, CNB calculations.

Note:\* The death rate for COVID-19 will in all probability be more than twice as low, as a markedly higher number of infected but as yet unconfirmed (untested) individuals can be expected to exist in the population. In the case of common seasonal flu, the death rate is approximately 0.1% and the reproduction number (R<sub>0</sub>) is estimated to be 1.5.

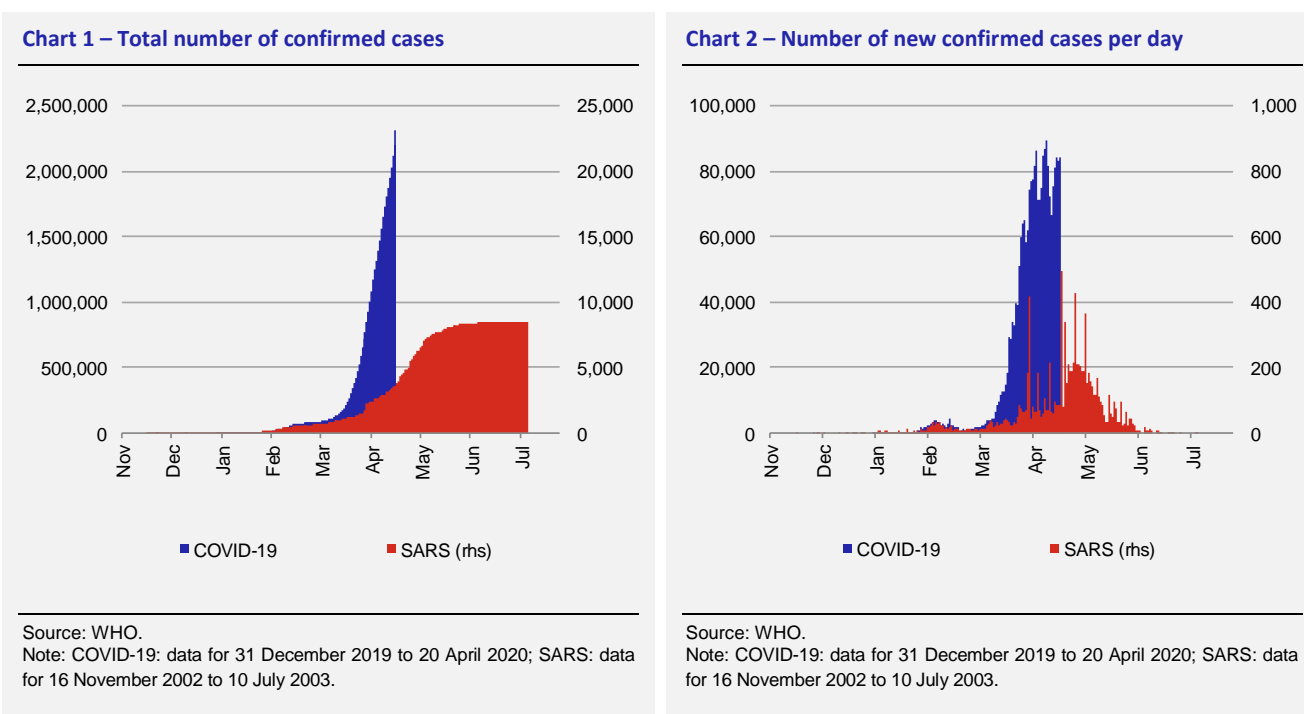
of a patient being infected and infectious but showing no symptoms. This is one reason why the measures that helped stop the spread of SARS in 2003 are highly problematic and reveal only a fraction of cases. While MERS had an incubation period similar to that of COVID-19, it is not easily communicable from person to person and spreads very slowly through the population, as evidenced by its very low reproduction number.<sup>2</sup> For this reason, despite the long contagion period of this

<sup>1</sup> Author: Martin Motl (Martin.Motl@cnb.cz). The views expressed in this article are those of the author and do not necessarily reflect the official position of the Czech National Bank. The author would like to thank Vít Bárta, Jan Brůha, Ian Hurst (NIESR), Luboš Komárek, Petr Polák and Jaromír Tonner for their comments.

<sup>2</sup> The reproduction number (R), or rate of infection, measures the rate of spread of an infectious disease in a population. R expresses the expected number of persons who will catch the disease from one infected person. In general, the higher the R number, the faster the disease is spreading. If R is less than 1, the number of infected persons in the population is decreasing.

infection, it has the lowest number of confirmed cases but the highest percentage mortality among the three types of coronavirus. The rapid and very easy human-to-human transmission of COVID-19 increases the likelihood of mutations in this novel coronavirus, which in itself facilitates further transmission. Unlike with SARS and MERS, this significantly complicates the detection and control of the spread of this infection.

Given their same country of origin and similar disease type, SARS and COVID-19 can be compared in terms of their economic impact. In other respects, however, any further similarity ends there, especially in view of the global scale of the COVID-19 pandemic and the number of confirmed cases, which, after four months, is over 300 times higher than the total number of confirmed cases of SARS over a nine-month period (see Chart 1). Despite the exponential spread of COVID-19, however, an interesting similarity with SARS can be observed. Comparing the spread of COVID-19 and SARS, a very similar profile can be seen in the global number of new confirmed cases per day (see Chart 2). This is characterised by a gradual rise in the number of infected individuals starting with the first confirmed case in November/December, which reached a local peak in the first half of February. After that, the number of new confirmed cases began to fall. The trend changed at the end of February, when the number of new confirmed cases per day began to rise sharply.



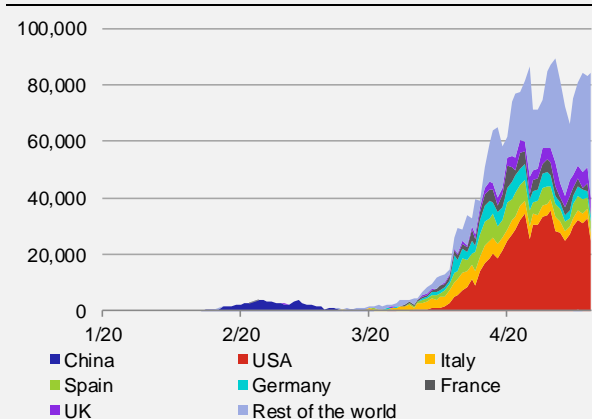
**In the case of SARS, the number of new confirmed cases worldwide peaked roughly at the end of April.** If the spread of COVID-19 continues to generally follow that of SARS, the number of new confirmed cases per day worldwide can be expected to peak roughly at the end of April 2020. The total number of new confirmed cases per day worldwide is many times higher in the case of COVID-19. On the other hand, there is still little information about the novel coronavirus, including a critical perspective on whether it is seasonal in nature like many other respiratory viruses, which usually disappear with the advent of warm weather. This assumption is uncertain in the case of COVID-19, as MERS, for example, is not seasonal.

**Even in the optimistic scenario of relatively rapid abatement of the virus at the end of the second quarter of this year, a subsequent period of “constant uncertainty” can be expected.** This period may last until a drug or vaccine has been developed. Until such time, the risk of renewed spread of the infection remains. This is confirmed by the current situation in China, where the peak in the number of new infections per day has been reached but the situation is still uncertain, as there is still a risk of various restrictions being introduced at any time in response to future adverse developments.

**Another phenomenon linked with the rapid rise in new confirmed cases of COVID-19 is the scale of the measures taken by governments to stop the infection spreading further, including unprecedented quarantines.** These initially applied to several tens of millions of people in the hardest hit Chinese provinces. The infection began to spread outside China at the end of February (see Chart 3), and more than a two billions people around the world are now subject to various mobility restrictions.

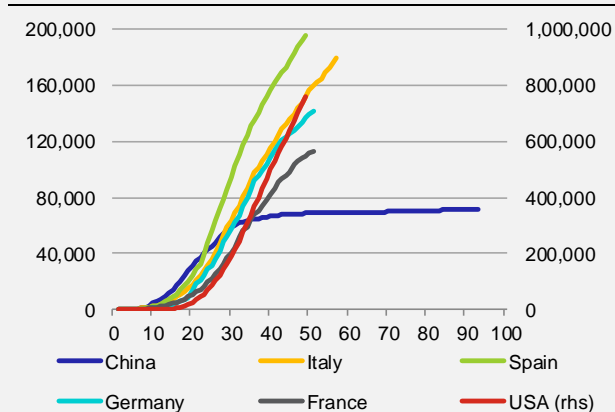
Given the number of countries affected and the speed of spread of the disease, the WHO officially reclassified the original COVID-19 epidemic as a global pandemic on 11 March 2020. Conversely, China – the original epicentre of the contagion – is gradually abolishing quarantines and resuming normal activities, as the number of new confirmed cases per day has stabilised at levels in the order of several dozen people (see Chart 4). The greatest risk at the moment is the very rapid spread of the virus around the world. It is currently spreading fastest in the USA.

**Chart 3 – Number of new confirmed cases per day by countries with the highest number of infected individuals**



Source: WHO.  
Note: Data as of 20 April 2020.

**Chart 4 – Total number of cases from the date of reaching 100 infected individuals**



Source: WHO.  
Note: Data as of 20 April 2020.

The very fast spread of the coronavirus was aided by underestimation of the situation by many governments, which hesitated to adopt quarantine and other measures to slow the contagion. On the contrary, these measures have been introduced with relatively large delays, in a situation where a large part of the population is already infected with the novel coronavirus. In Europe, the situation is currently worst in Italy and Spain, where local hospitals are collapsing under a large daily influx of newly infected people. The infection can be fatal, especially for the elderly and those with pre-existing conditions, as evidenced by the high numbers of deaths among those infected in these countries.

### Impacts of COVID-19 on China's economy

According to empirical studies<sup>3</sup> of the impacts of viral epidemics on the economies affected, there are generally changes in the behaviour of households and firms in the form of reduced consumption and investment (a negative demand shock). The available information indicates that economic agents have shown the same pattern of behaviour in the case of the novel coronavirus. In an effort to slow the spread of the virus, the authorities and large employers in China have advised – and in some cases ordered – people to stay at home. This has led to the depopulation of shopping centres, the closure of amusement parks, theatres and other social attractions, and restrictions on travel. The number of private Chinese firms that have cut their employees' salaries, postponed pay days or completely stopped paying wages to their staff has risen, because the spread of the virus and production stoppages have meant they are unable to cover their labour costs. Some firms have introduced unpaid leave.<sup>4</sup> This is having large negative impacts on consumption, especially among low-income groups of people, who will not be able to cover their expenses. The wage freezes and cuts are putting pressure on China's emerging private sector, which is the fastest growing part of the world's second-largest economy. Small firms with limited reserves, which form the foundation of the large Chinese private sector, are particularly at risk. Health risks may thus pass through very quickly to the financial level through redundancies and uncertain wage developments.

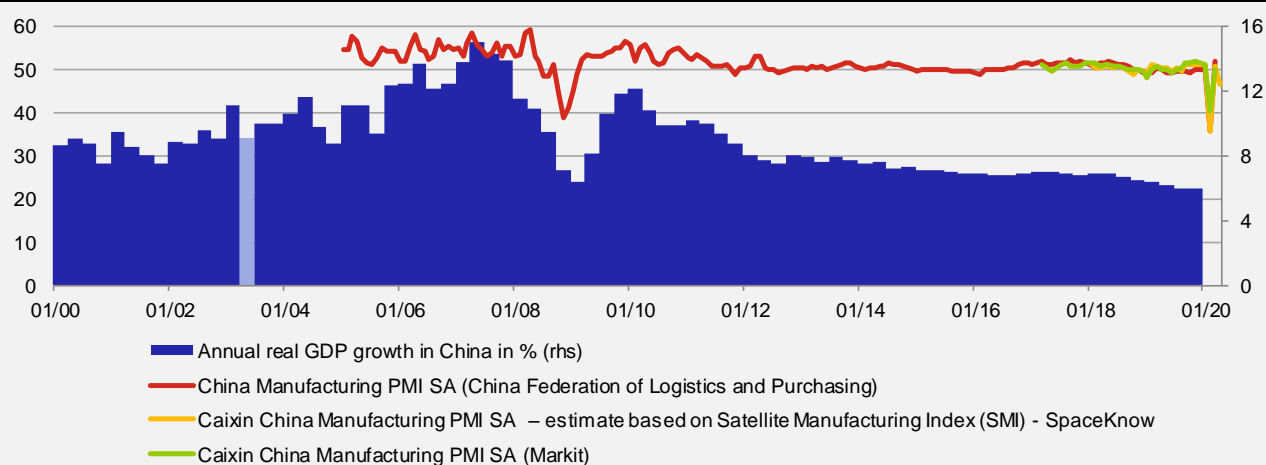
The announcement of strict quarantines restricting most economic activity has led to a fall in hours worked and productivity (a negative supply shock). According to commonly used leading indicators measuring industrial production in China (see Chart 5), a sharp drop in economic activity can be expected in the first quarter of this year, one comparable with the slump recorded in the 2009 global economic crisis. In February, these indicators dropped to historical lows, as did the SMI, which uses satellite imagery to measure the activity of Chinese industry in real time.<sup>5</sup>

<sup>3</sup> See, for example, Siu and Wong (2004) and Hai, Zhao, Wang and Hou (2004).

<sup>4</sup> This follows from a survey of more than 9,500 employees conducted by the Chinese recruitment web portal Zhaopin, in which more than a third of the respondents said they faced this possibility.

<sup>5</sup> The Chinese Satellite Manufacturing Index (SMI) is based on 2.2 billion satellite images collected from more than 6,600 industrial areas in China, covering an area of more than half a million square kilometres. Artificial intelligence is used to process such vast amounts of data (see Adam and Benecká, 2020).

Chart 5 – Leading indicators of industrial production in China



Note: The peak period for the spread of SARS in the second quarter of 2003 and its impact on Chinese economic growth is shown in orange. A Purchasing Managers' Index (PMI) of over 50 represents expansion compared with the previous month. A PMI below 50 represents contraction and a value of 50 indicates no change. The further the index is from 50, the greater the level of change.  
Source: Bloomberg, SpaceKnow, Authors' calculations.

**The rapidly spreading epidemic was very quickly met with a massive response by Chinese economic policy makers seeking to mitigate the negative economic impacts (a positive demand shock).** The total cost of the fiscal measures will be at least RMB 2.6 trillion, i.e. 2.5% of China's GDP. These measures include increased expenditure on epidemic prevention and control and the production of medical equipment. They also include accelerated disbursement of unemployment insurance, tax relief and waived social security contributions. The overall fiscal expansion is expected to be significantly higher, reflecting increased infrastructure investment and improvements of the national public health emergency management system.

**The Chinese central bank has supported the fiscal expansion by implementing financial stability measures as well as easing monetary policy.** In early February, China's central bank and regulatory authorities across the foreign exchange market, the securities market and the banking and insurance sectors announced more than 30 support measures to mitigate the negative economic impacts. These included liquidity injections into the banking system of RMB 3 trillion in the first half of February and another RMB 20 billion at the end of March. It was also decided to expand re-lending and re-discounting by RMB 1.8 trillion to support manufacturers of medical supplies and daily necessities, micro-, small and medium-sized firms and the agricultural sector, including credit extension to small enterprises of RMB 350 billion. This has been accompanied by a reduction of all key interest rates – the one-year main interest rate by 0.1 pp to 4.05% and the five-year rate by 0.05 pp to 4.75%. Steps have also been taken to limit tightening in financial conditions in order to provide financial relief to affected households, corporates and regions facing repayment difficulties. Key measures include delay of loan payments and other credit support measures for eligible SMEs and households, tolerance for higher non-performing loans in epidemic-hit sectors and SMEs, support for bond issuance by financial institutions to finance SME lending, additional financing support for corporates via increased bond issuance, increased fiscal support for credit guarantees, flexibility in the implementation of the asset management reform and easing of housing policies by local governments.

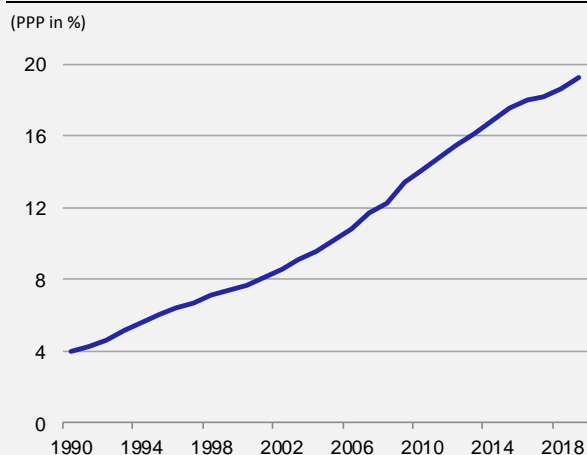
### Box 1 – Effects of SARS on China's economy

**When comparing the economic impacts of the spread of COVID-19 versus SARS, the scale, timing and time to the stop of the spread of the infection are key.** In the case of the impacts of SARS on China's GDP, the negative effect was most concentrated in the second quarter of 2003, when the number of new confirmed cases also peaked. This was reflected in the Chinese economy in reduced and deferred consumption. This negative demand shock to China's GDP resulted in a slowdown in economic growth of 2 pp to 9.1% in the second quarter (see Chart 5). This short-term drop in consumption was subsequently compensated for in the rest of 2003 thanks to the rapid disappearance of SARS amid rapidly rising growth of the Chinese economy.



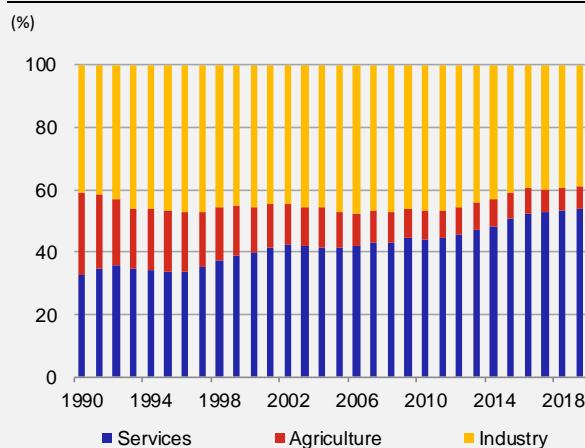
**It can be assumed that the impacts of the spread of COVID-19 will be far bigger than those of SARS, and not only in terms of the total number of confirmed cases.** One reason for this is the entirely different current position of the Chinese economy in the business cycle. In 2003, the Chinese economy was on a strong upward trend, benefiting among other things from having joined the WTO in 2001. Since 2010, conversely, the Chinese economy has been slowing cyclically. This is reflected in a growing level of debt. Simultaneously, China's importance in the world economy has increased significantly since 2003 owing to its greater involvement in international trade. China currently accounts for almost 20% of the world's GDP, compared with 9% in 2003 (see Chart 6). The fact that the Chinese economy is now less resilient to shocks also reflects the ongoing transformation of the Chinese economy towards a higher share of domestic consumption and services, which has grown from 42% in 2003 to 53% today (see Chart 7).

**Chart 6 – China's share in world GDP**



Source: The Economist Intelligence Unit, CNB calculations.

**Chart 7 – Structure of the Chinese economy**



Source: The Economist Intelligence Unit, CNB calculations.

**According to an estimate by Lee and McKibbin (2004), the global costs of the SARS epidemic were approximately USD 40 billion, which corresponds to a contraction in world GDP of 0.1%.** Together with Hai, Zhao, Wang and Hou (2004), this study estimates the impact of the SARS epidemic on China's GDP growth to have been 1–2 pp. Overall, therefore, SARS resulted in only a short-lived economic slump, which was very rapidly offset.

### Impacts of COVID-19 on other economies

**The halt in production in China and other economies is causing orders to pile up for firms worldwide, orders which they are unable to satisfy due to supply disruptions (a negative supply shock).** In the initial phase, this could manifest through limited supply with no drop in demand pressures, and thus be inflationary. For many Asian economies with strong trade and tourism ties to China, negative demand shocks (the decline in Chinese consumption) will prevail in the initial phase. In the event of a protracted reduction of activity in upstream countries, supplies may gradually begin to be replaced with deliveries from other countries. However, in light of specialisation, a rapid switch to other suppliers may be limited in many sectors because of higher additional costs.<sup>6</sup> Downstream firms are therefore often left with no alternative but to wait and see if production quickly restarts in the affected countries. However, inventories are falling fast. In some cases, supplies have already been produced but are waiting in ports for loading due to restricted shipping operations, with storage fees further increasing firms' costs. The negative impacts on other economies will thus depend on the duration of the viral pandemic. If the infection continues to spread in the coming months, significant disruptions to international trade will gradually develop on a global scale, multiplying the above-mentioned effects.

**A sharp drop in prices of industrial commodities ceteris paribus stimulates economic growth in countries that are net importers of those commodities (a positive supply shock).** Conversely, it has the opposite effect on countries that are significant exporters of these commodities, most notably Middle Eastern countries, which are highly dependent on exports of crude oil and natural gas. The situation on these commodity markets thus to some extent reflects the marked drop in economic activity in China in the first quarter of 2020.<sup>7</sup>

<sup>6</sup> These relatively rapid production transfers mainly concern less sophisticated industries (such as textiles), where, conversely, firms in surrounding Asian countries profited from the crisis in China in the first quarter of this year in the form of a sharp increase in orders.

<sup>7</sup> The significant drop in the price of oil and related products was amplified by the initially unsuccessful OPEC+ negotiations on reducing production.

**Given the very rapid spread of COVID-19 throughout the world, restrictive quarantine measures, which are having a negative impact on economic activity, are being introduced in other countries as well (a negative demand shock).**

Besides restricting mobility and business activities in most service industries, many countries are temporarily closing manufacturing firms. Beyond the negative impacts stemming initially from the economic downturn in China, most other economies are also beginning to experience direct negative impacts reflecting the restrictions in those economies. This can be seen, among other things, on world stock markets, which are undergoing sharp sell-offs. The US S&P 500 stock index fell by more than 30% in March, the fastest decline in its history. Financial markets are in panic mode, with huge uncertainty manifested in high volatility – the VIX volatility index based on futures prices reached a historical high in mid-March 2020.<sup>8</sup> Extremely high risk aversion is leading to outflows of funds, especially from emerging economies, with impacts on their exchange rates and asset prices. For some economies, the timing of the pandemic outbreak is all the more unpleasant because at the start of this year they were slowly recovering from last year's decline in industrial production and business and household confidence was still fragile. Leading indicators in industry and services fell to their lowest ever levels in many countries in March. Given the continuing spread of the pandemic, the largest negative impacts can be expected to occur in most economies in the second quarter of this year.

**Governments around the globe are responding to the projected sharp decline in economic activity in many economies by accelerating the approval of fiscal measures to mitigate the negative effects of the crisis (a positive demand shock).** Given that the present situation is currently not a financial crisis hitting only the demand side as in 2008/2009, but a biological crisis significantly disrupting also the supply side, the question is to what extent even very quickly applicable central bank instruments can be effective. It is therefore fiscal policy that will play the greater role. On the other hand, many countries have long been suffering from high levels of indebtedness and strained budget deficits, which could restrict their capacity to implement supportive fiscal measures. For now, though, it seems that even a high level of debt is not an insurmountable hurdle in the current crisis. The main objective is to prevent things from getting even worse, which, in the case of an insufficient fiscal response (in terms of both speed and scope), would further hamper economies for many years to come.

**Central banks all over the world have responded to the crisis by easing monetary policies and taking other steps to support liquidity and ensure financial stability.** It is clear from speed at which the COVID-19 pandemic is spreading around the globe that most countries will also suffer a significant negative anti-inflationary demand shock. It is therefore highly desirable to ease monetary policy quickly. This is happening on the one hand directly via interest rate cuts and, in many cases, the launch of massive asset purchase programmes (quantitative easing). If asset purchases include government bonds, the central bank directly supports fiscal policy by reducing the cost of government debt financing. The worldwide, almost coordinated, response of central banks that helped mitigate the effects of the previous financial and subsequent economic crisis is thus now being accompanied almost simultaneously by significant fiscal expansion supplemented with employment policy.

### **Model-based quantification of the impacts of the COVID-19 pandemic**

**This scenario quantifies the global impacts of the spread of the COVID-19 pandemic on the economies of China, the US and the euro area.** Modelled using the NiGEM<sup>9</sup> global econometric model, the scenario captures the economic interconnectedness of all economic territories in detail. The model-based simulation incorporates a forward-looking monetary policy responding to deviations of inflation and nominal GDP from the target. The endogenous monetary policy response is limited by the zero lower bound (ZLB) on interest rates.<sup>10</sup> Where the monetary policy rate is at the ZLB, the central bank does not react to partial inflationary negative supply shocks by tightening monetary policy. The simulation further assumes that the central bank, regardless of the current level of interest rates, does not react to the inflationary impacts of expansionary government fiscal policy, in order to avoid contradictory economic policymaking. At the ZLB, some central banks implement unconventional monetary policy by purchasing assets (quantitative easing). A large part of these assets are government bonds. The simulation therefore implicitly assumes that this kind of easing will manifest itself over the forecast horizon through expansionary fiscal policy, which is explicitly taken into account in the simulation.

**Given the contagion period of the COVID-19 pandemic, the shocks are timed for the second quarter of this year in most countries, the exception being China, where the intensity of the domestic shocks is greatest in the first quarter of this year.** For the other economies, one-sixth of the second-quarter shock was incorporated into the first quarter, as the pandemic hit some economies at the end of March. All the shocks imply very persistent impulse responses characterising the period of “constant uncertainty”, as they fade very gradually and to some degree extend into the first half of next year. This reflects an assumption of long-lasting changes in the global economic environment, which the COVID-19

<sup>8</sup> Motl (2019) examines the relationship between the yield curve and stock market volatility (VIX) in the context of identifying the phases of the business cycle, including the timing of the onset of a recession.

<sup>9</sup> The National Institute Global Econometric Model covers 60 countries and regions. More information on the NiGEM model and its structure is available at <https://nimodel.niesr.ac.uk/>.

<sup>10</sup> Where the central bank cannot ease monetary policy further by lowering interest rates (because rates are at the ZLB), this remaining undelivered easing beyond the endogenous reaction is fully offset by a shock to monetary policy in the opposite direction.

pandemic has severely disrupted (see, for example, the change in the consumption and investment behaviour of households and firms). The model-based forecast is deducted from a “counterfactual” scenario containing the observed situation and economic expectations at the end of last year and the start of this year, i.e. before the outbreak of the global pandemic.

**The negative demand shock is captured in the simulation through private consumption and investment.** The shock corresponds to a drop in private consumption and investment of 15%–25%. The size of the shock for each country depends on the structure of the economy, the scale of the infection and the related quarantine measures, which lead to a decrease in economic activity and inflation.

**The negative supply shock is captured in the simulation using productivity and the production function.** The shock to productivity assumes a reduction in supply reflecting fewer hours worked, with people unable to work either because of illness or because of the closure of firms or the cessation of service provision due to physical isolation. The shock to the production function reflects structural changes in the economic environment in the form of constraints on trade and the mobility of persons and capital. This “de-globalisation” is caused by the sustained period of uncertainty and the more or less expected recurrence of COVID-19 in the absence of an effective vaccine. This will generally lead to a lower pace of economic growth amid higher inflation. The shocks to productivity were set between -3.5% and -5.25% on the basis of the rate of infection and the assumed number of affected weeks in the year<sup>11</sup> for each country.

**The positive demand shock is captured in the simulation via a shock to government consumption with respect to the size of the approved fiscal stimuli.** Sixty per cent of the total amount approved is inputted into the quarter with the highest negative impact of the pandemic, and this shock then subsides until the start of next year. Given the uncertainty regarding the duration of the pandemic and the likely increase in these stimuli, the simulation assumes a slightly larger fiscal impulse for each country than the one currently approved. The simulation also assumes that the fiscal solvency rule is suspended for two years. This rule is applied to the effective income tax rate to ensure that the budget deficit returns to the target level relative to GDP in the long run. It can be assumed that governments will now prioritise supporting economic activity over adhering to fiscal discipline. This shock thus supports growth of economic activity and prices.

**The positive supply shock in the case of countries importing energy commodities is captured in the simulation via prices of crude oil, natural gas and industrial metals.** The size of the shock to the prices of these commodities reflects the observed evolution on commodity markets, which are generally very forward-looking. In the case of oil and gas prices, the simulation assumes a decline of 50% in the second quarter of this year and a subsequent gradual return, which reflects the current outlook for futures prices. In the case of industrial metals, the size of the shock corresponds to a decrease of 15% in the second quarter and a subsequent gradual rise reflecting the aggregate slope of the industrial metals futures curves. This shock will be felt in countries importing energy commodities through slightly higher growth in economic activity. The sizeable drop in energy commodity prices leads to a fall in prices. **The external factors contain a summation of the shocks to energy commodity prices and a subsequent overall simulation reflecting interactions based on developments in all other territories of the global economy.**

**In the case of the Chinese economy, the negative impact on consumption and investment is biggest in the first quarter of this year (see Chart 8 and Chart 9).** This negative shock to economic activity is dampened by fiscal expansion by the Chinese government totalling more than RMB 2.6 trillion. In the case of overall GDP growth, however, the largest decline occurs in the second quarter. This is a result of a sharp decline in economic activity in the global economy.

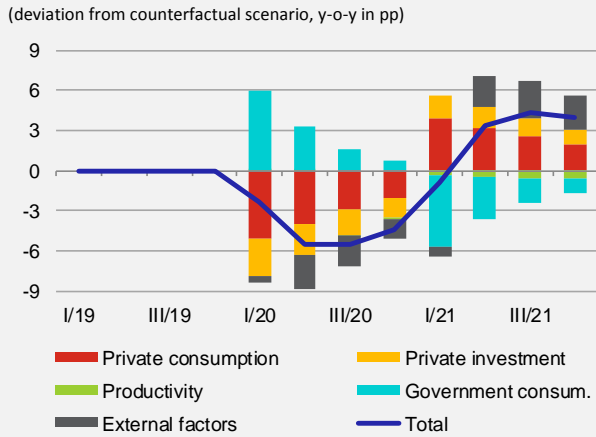
**The overall impact on consumer prices in China is downward. Inflationary supply factors are outweighed by anti-inflationary demand shocks coupled with anti-inflationary external factors (see Chart 10).** The Chinese central bank responds to the lower price pressures by significantly lowering interest rates. The response to external factors, i.e. the decline in global economic activity and energy commodity prices, represents the largest deviation (see Chart 11). Given that the monetary policy rates of the Chinese central bank stay positive, the simulation contains monetary policy tightening through the endogenous reaction of interest rates to the inflationary price pressures stemming from lower productivity.

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<sup>11</sup> This quantification is based on the estimated COVID-19 reproduction number, which is about 2.5. The reproduction number for seasonal flu is estimated to be about 1.5 with an infection rate of 9%. The infection rate for COVID-19 can thus be estimated at around 15%. Assuming that one entire quarter is affected (i.e. 12 weeks out of 52), the impact on productivity is thus 3.5%. For more details, see Liadze and Naisbitt (2020).

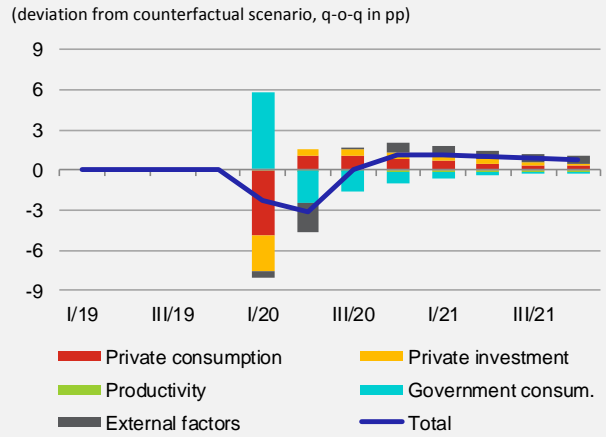
The Chinese economy will undergo a recession in the first half of this year, with annual real GDP growth slowing to 1.4% on average (see Chart 12). The economic recovery will start in the second half of this year and will continue into 2021, when the Chinese economy will grow by 8.4%. Consumer price inflation will slow only slightly this year in year-on-year comparison, to 2.8%. The fall in inflationary pressures will become most apparent next year, when prices will rise at a

**Chart 8 – Impact on Chinese GDP growth**



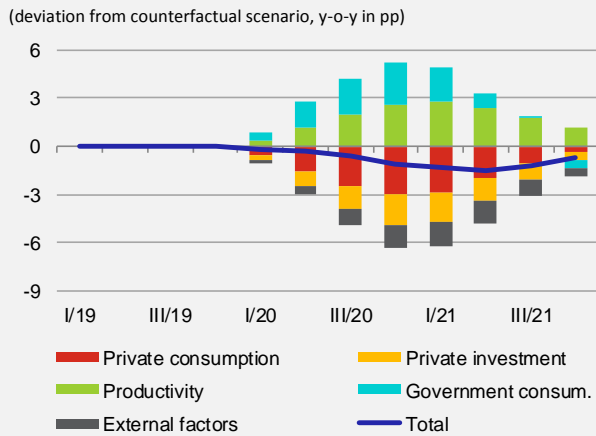
Source: Authors' calculations.

**Chart 9 – Impact on Chinese GDP growth**



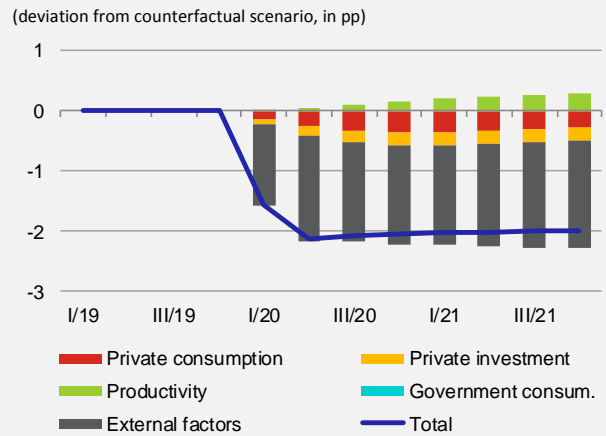
Source: Authors' calculations.

**Chart 10 – Impact on the Chinese CPI**



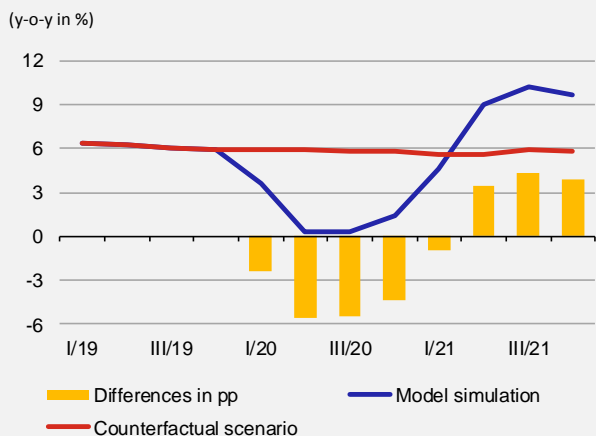
Source: Authors' calculations.

**Chart 11 – Impact on Chinese interest rates**



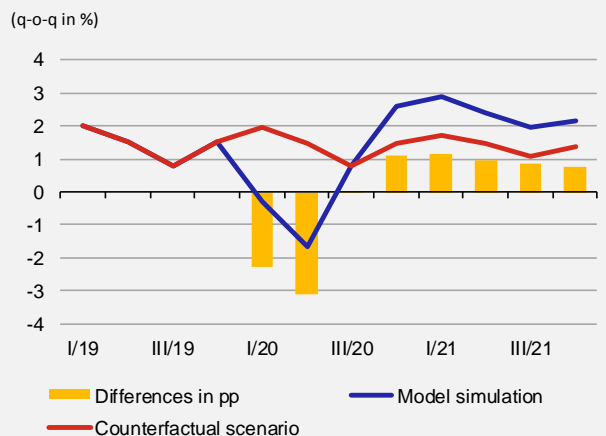
Source: Authors' calculations.

**Chart 12a – Economic forecast: Chinese GDP**



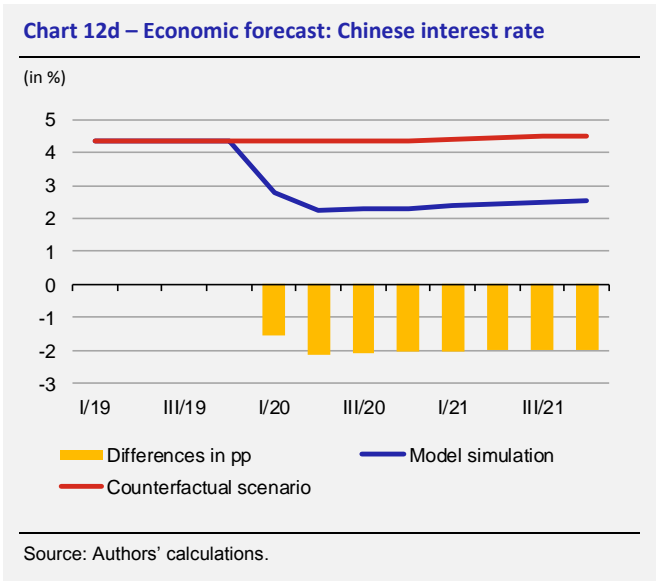
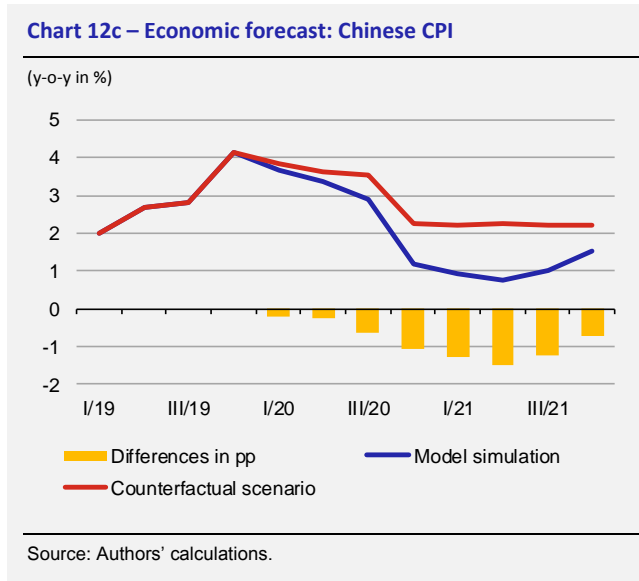
Source: Authors' calculations.

**Chart 12b – Economic forecast: Chinese GDP**

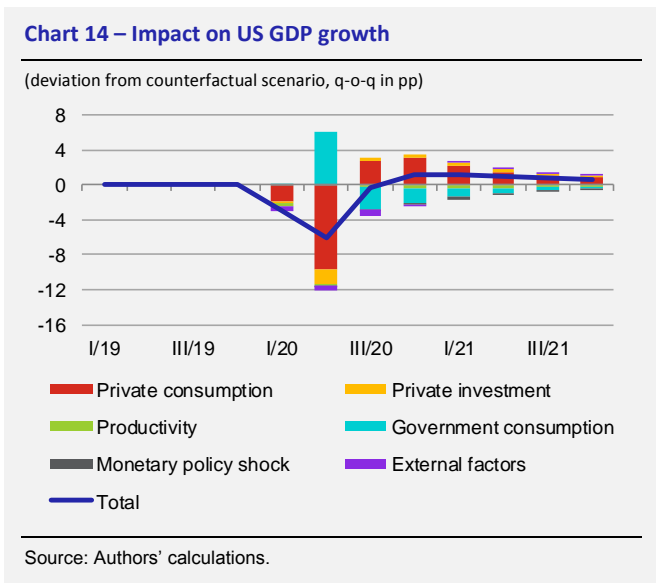
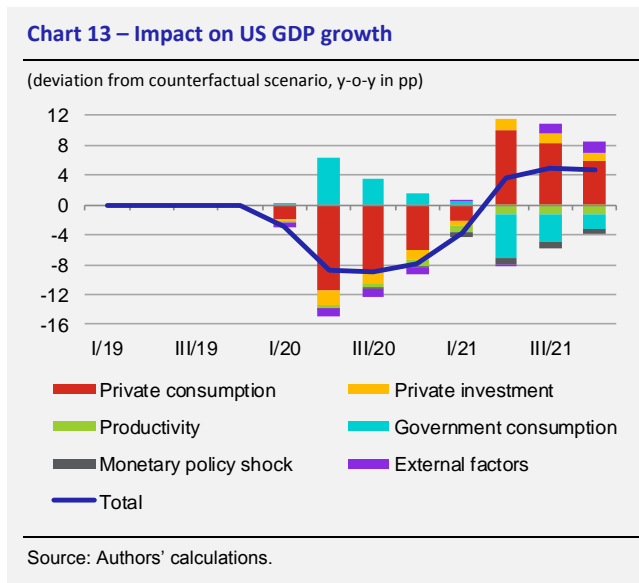


Source: Authors' calculations.

pace of 1.1%. The monetary policy of the Chinese central bank will remain accommodative over the entire forecast horizon, with the interest rate standing at 2.4%.



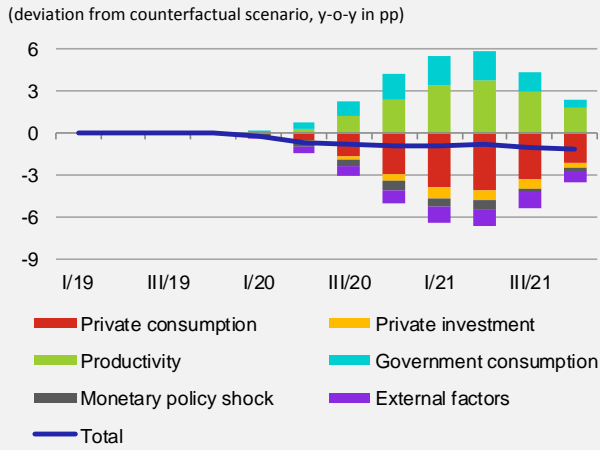
**In the case of the US economy, the greatest negative impact on consumption and investment will occur in the second quarter of this year (see Chart 13 and Chart 14).** This negative shock to economic activity is dampened by fiscal expansion by the US government totalling more than USD 2.3 trillion.



**Headline consumer inflation in the USA is lower, as inflationary supply factors are outweighed by anti-inflationary demand shocks combined with anti-inflationary external factors (see Chart 15).** The US central bank responds to the lower price pressures by rapidly lowering interest rates to 0%, primarily in response to strong anti-inflationary pressures reflecting the marked decline in private consumption (see Chart 16). From the second quarter onwards, however, a further reduction in interest rates in response to the anti-inflationary effect of private investment, as implied by the endogenous reaction of interest rates, can no longer be delivered, as rates are at the ZLB. For this reason, in practice, this non-deliverable easing of monetary policy is fully offset in the simulation by a monetary policy shock in the opposite direction. The US central bank thus does not raise interest rates in reaction either to the inflationary impact of the fiscal impulse, or to the inflationary shock to productivity, as interest rates are at the ZLB. Given that the simulation assumes the ZLB but the US central bank responds to support the economy through unlimited purchases of assets, including government bonds (quantitative easing), this unconventional easing is delivered in a non-standard way implicitly included in the simulation as part of the fiscal impulse (government consumption).

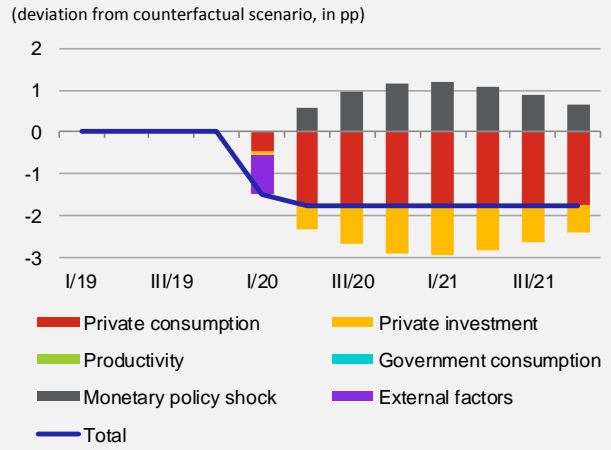
**The US economy will contract by 5.1% on average this year, reflecting the economic recession (see Chart 17). Next year, it will grow by 4.4%. Inflation will slow to 1.2% on average this year in year-on-year comparison and to 1.1% in 2021, respectively. The monetary policy of the US Fed will remain accommodative over the entire forecast horizon, with the interest rate at the ZLB.**

**Chart 15 – Impact on the US CPI**



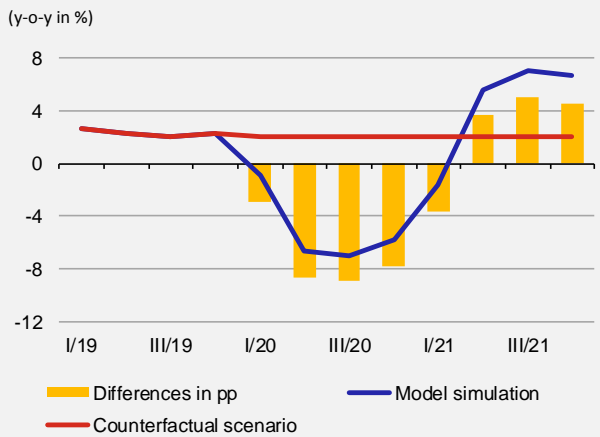
Source: Authors' calculations.

**Chart 16 – Impact on US interest rates**



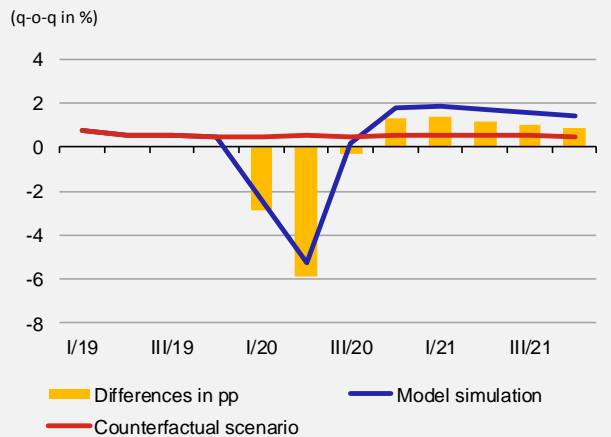
Source: Authors' calculations.

**Chart 17a – Economic forecast: US GDP growth**



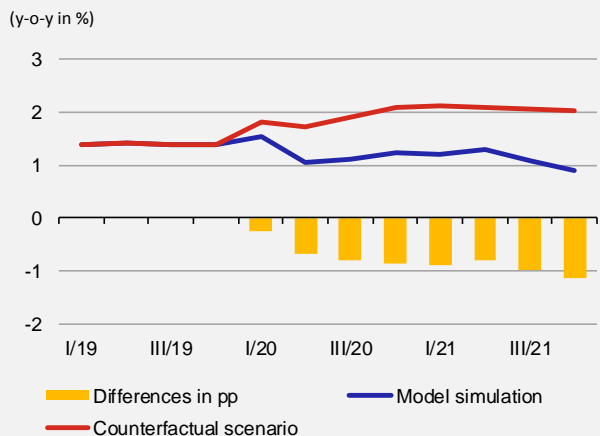
Source: Authors' calculations.

**Chart 17b – Economic forecast: US GDP growth**



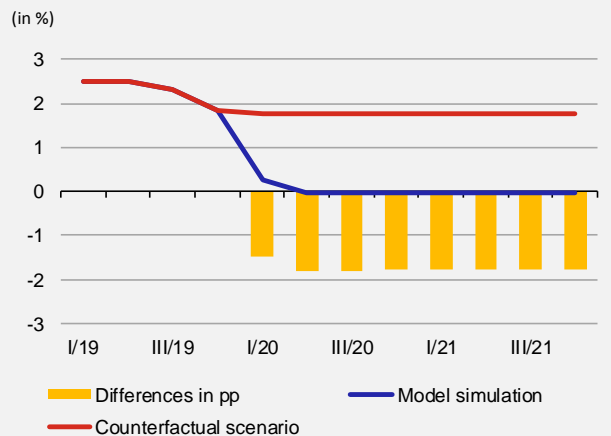
Source: Authors' calculations.

**Chart 17c – Economic forecast: US CPI**



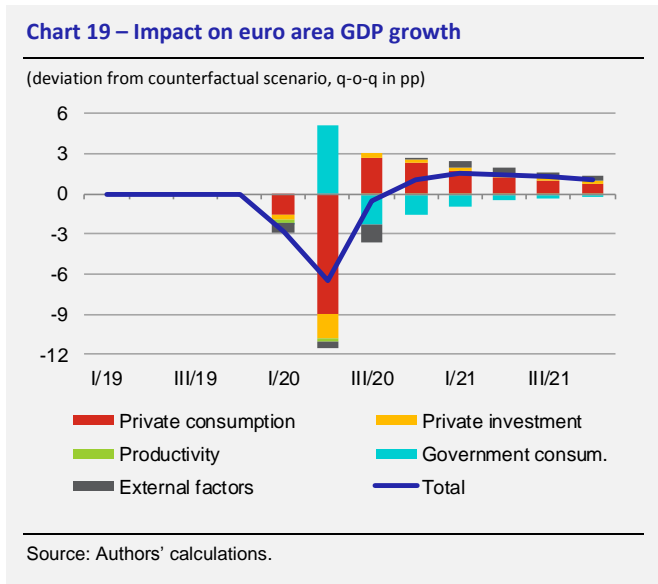
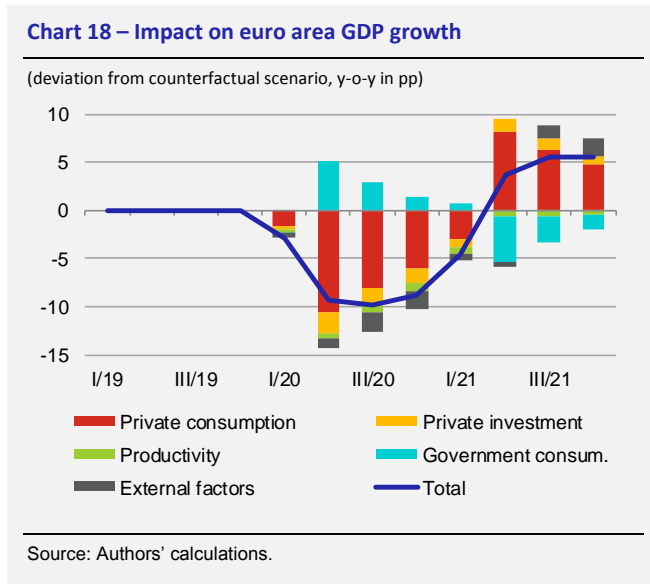
Source: Authors' calculations.

**Chart 17d – Economic forecast: US interest rate**

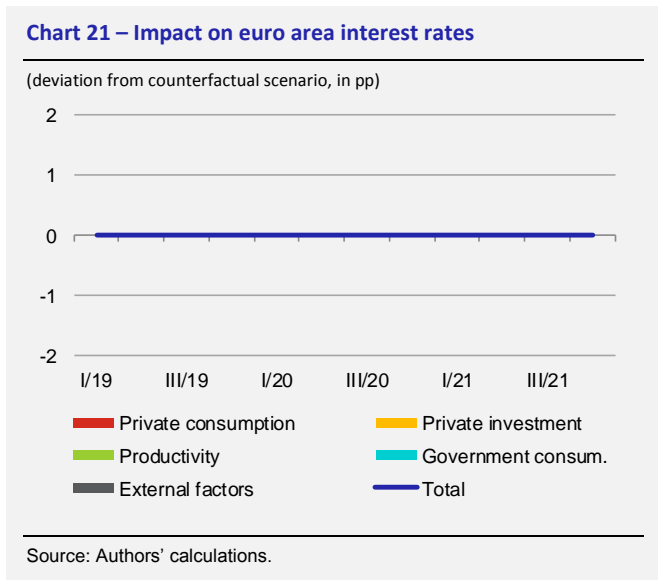
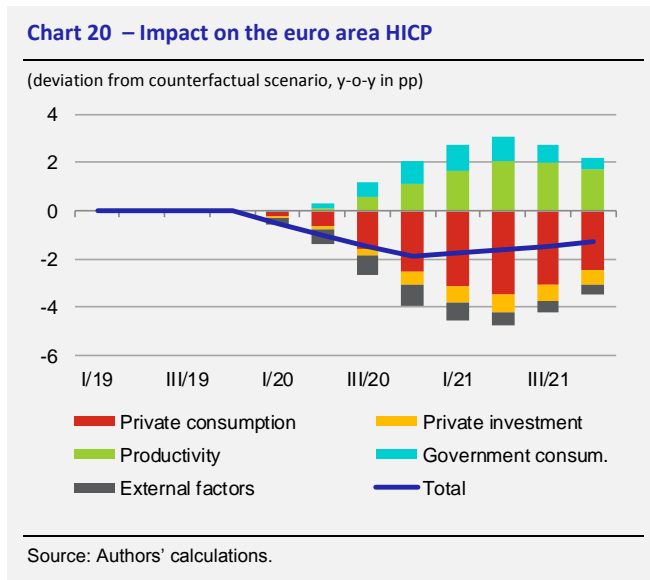


Source: Authors' calculations.

In the euro area, like the USA, the largest negative impact on consumption and investment will occur in the second quarter of this year (see Chart 18 and Chart 19). This negative shock to economic activity is partially dampened by fiscal expansion by the member states' governments totalling more than EUR 370 billion.



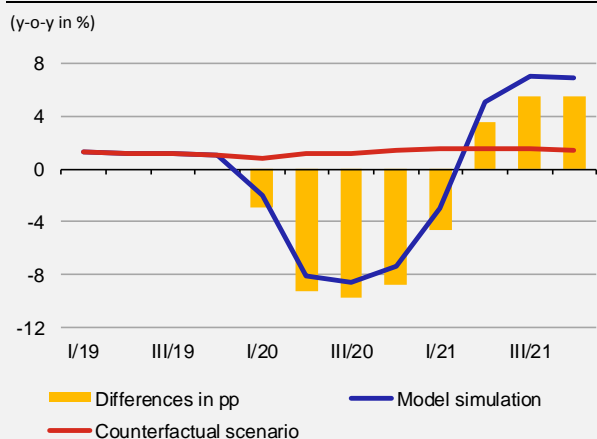
For headline consumer inflation in the euro area, the negative demand factors significantly outweigh the inflationary supply price pressures, mainly due to a sharp decline in household consumption (see Chart 20). The ECB cannot respond to these strongly anti-inflationary price pressures using its conventional instruments, as the monetary policy rate has long been at zero and will remain there over the entire forecast horizon (see Chart 21). In order to maintain the symmetry of the central bank's response, the simulation therefore assumes for the ECB a fixed level of interest rates at the current zero level over the entire forecast horizon, with the ECB for the same reason also not increasing interest rates in reaction either to the inflationary price pressures arising from the reduced productivity or to the positive inflationary demand shock reflecting the supportive fiscal measures of European governments. In practice, the massive purchases of assets, including government bonds, which the ECB has long been making and which it has recently increased,<sup>12</sup> are taken into account in the simulation as part of the fiscal impulse in the form of a shock to government consumption.



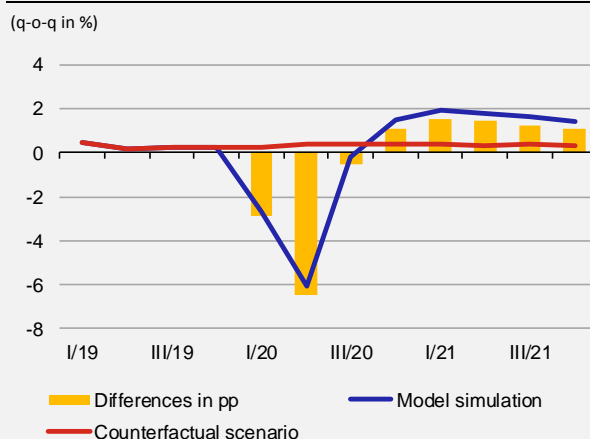
<sup>12</sup> In response to the adverse economic situation, the ECB has launched a new Pandemic Emergency Purchase Programme on top of its existing asset purchase programme. The ECB's total asset purchases could reach almost EUR 1.1 trillion (9% of euro area GDP) by the end of the year.

**An economic recession in the euro area this year leads to a drop in real GDP of 6.5% (see Chart 22).** Next year, the euro area economy will grow at a rate of 4% on average on the back of an economic recovery commencing at the end of this year. Consumer price inflation will slow to 0.3% on average in 2020 in year-on-year comparison, briefly turning negative at the year-end. Next year, inflation in the euro area will remain subdued, averaging 0.15%. The ECB is unable to respond conventionally to the very muted inflation by reducing interest rates, which remain at the ZLB over the entire forecast horizon.

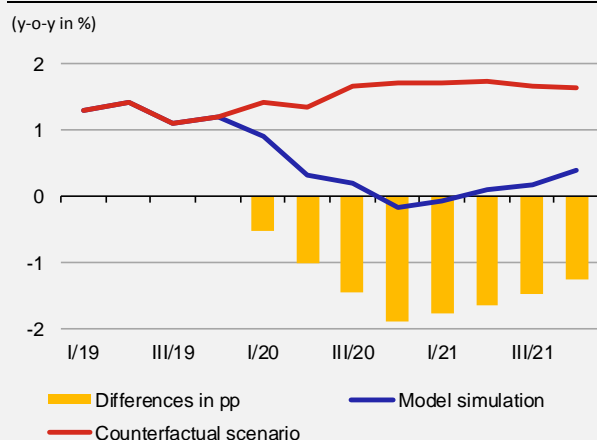
**Chart 22a – Economic forecast: Euro area GDP growth**



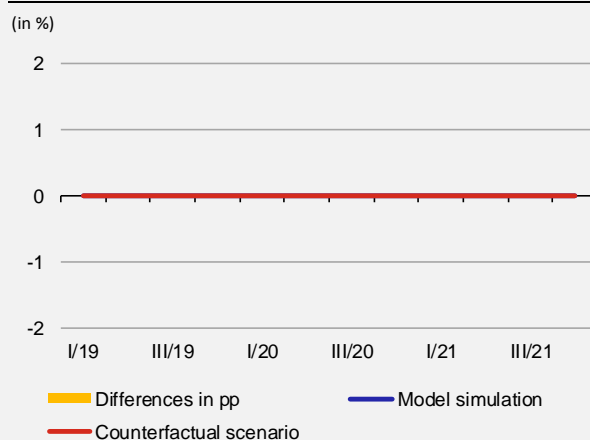
**Chart 22b – Economic forecast: Euro area GDP growth**



**Chart 22c – Economic forecast: Euro area CPI**



**Chart 22d – Economic forecast: Euro area interest rate**



## Conclusion

**The COVID-19 pandemic is currently spreading very rapidly across the world, whereas in China, where the infection originated, the number of new confirmed cases per day is now only in the dozens.** The virus is currently spreading fastest in the USA, which now has the highest number of infected people (more than 750,000), and in the largest economies in the euro area. Falling demand, coupled with supply disruptions, will lead to a significant decline in economic activity in most countries in the second quarter of this year. As well as sharp drops in monthly macroeconomic indicators, the effects of the spread of the virus have been visible for some time now in the stock markets and industrial commodity prices, which have fallen by tens of per cent. Even in the favourable scenario of COVID-19 fading away rapidly by the end of the second quarter, the overall economic costs are much higher than those of the SARS epidemic, which, unlike the COVID-19 pandemic, had only short-term, negligible adverse effects.

**A prolonged economic downturn could have a significant economic impact in the form of large-scale redundancies and bankruptcies and, in the event of a lengthy crisis, subsequent financial instability.** In addition to low-income households, the most vulnerable group is firms with low margins and high reliance on short-term funding, which may



become insolvent. On the other hand, the actions of economic policymakers, including central banks, in the form of fiscal and monetary stimuli, could at least mitigate these negative developments.

**The complex mix of supply and demand channels reflecting the impacts of the biological crisis requires a differentiated economic policy response.** Although monetary policy has a very limited effect in terms of mitigating supply chain disruptions, it could play an important role in preventing a significant tightening of financial conditions, which would further weaken economic activity.

**The overall economic impacts of the spread of COVID-19 on the world economy will thus depend on the ability of the governments of all affected countries to stop the spread of the virus, and on the effectiveness of the monetary and fiscal stimuli introduced to reduce the economic damage and the enormous associated unexpected costs, which unfortunately are inevitable if the spread of the pandemic is to be stopped.** The key factor going forward will thus be the duration of the spread of the illness, which will either recede quickly on its own (as in the case of SARS) or be eliminated by an effective vaccine or herd immunity. The resulting costs will depend on which scenario materialises, and over what time scale.

**While the 2008/2009 crisis mainly involved only a significant drop in demand with no further implications for natural mobility (internal economic crises and significant anti-inflationary effects), this biological crisis will, for the first time in modern history, result not only in a large fall in demand, but also in disruptions to global natural mobility and supply chains, generating significant inflationary pressures (a negative supply shock).** The current COVID-19 pandemic thus also differs greatly from previous biological crises, which were either short-lived or small in scale in terms of the number of territories affected, and therefore had minimal inflationary impacts. These relatively unprecedented strong inflationary supply factors, coupled with the traditional anti-inflationary negative demand effects seen in times of economic crisis, also represent one of the main challenges of the model-based simulation of the resulting effects on the economy.

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## Keywords

pandemic, coronavirus, economic crisis

## JEL Classification

C63, E27, F47

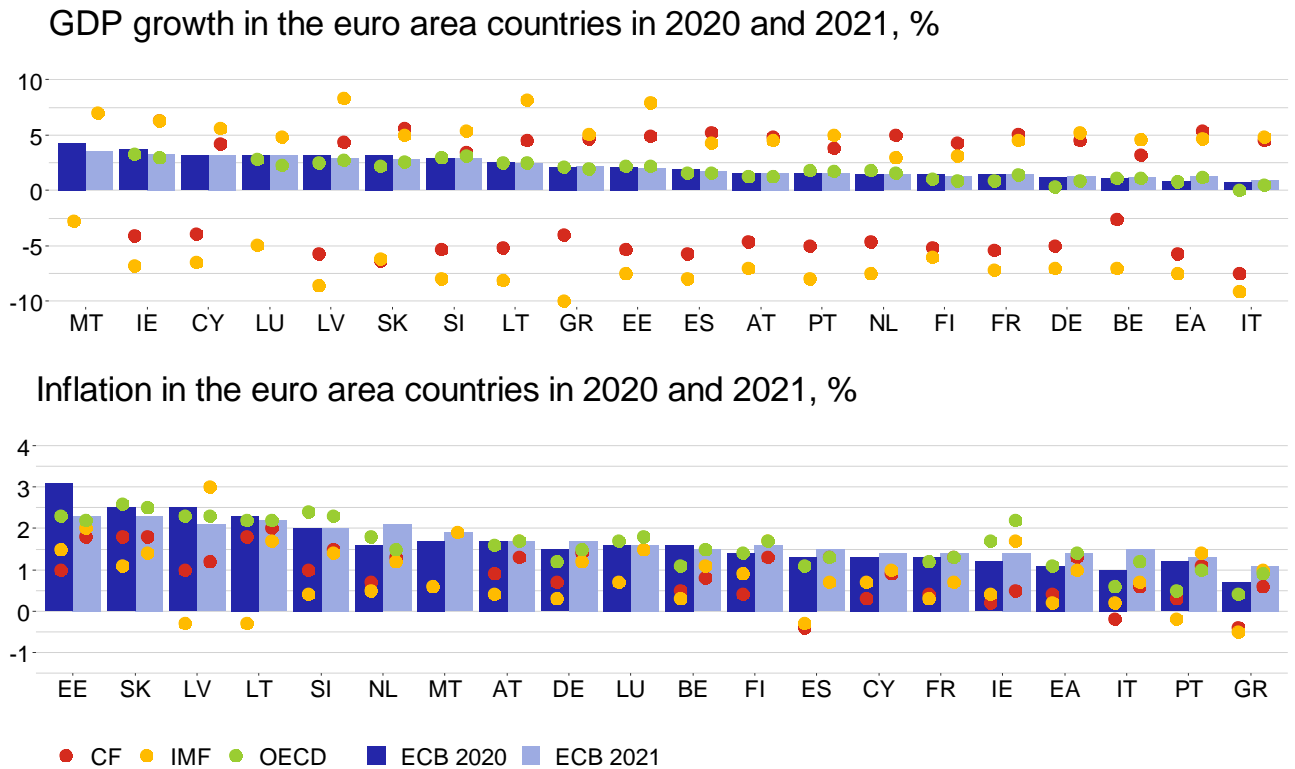
## A1. Change in predictions for 2019

	GDP growth, %				Inflation, %			
	CF	IMF	OECD	CB / EIU	CF	IMF	OECD	CB / EIU
EA	-6.3	-8.8	-0.3	-0.3	-0.7	-1.2	-0.4	0
	2020/4	2020/4	2020/3	2020/3	2020/4	2020/4	2019/11	2020/3
	2020/3	2020/1	2019/11	2019/12	2020/3	2019/10	2019/5	2019/12
US	-5.6	-7.9	-0.1	0	-1.0	-1.7	0	0
	2020/4	2020/4	2020/3	2019/12	2020/4	2020/4	2019/11	2019/12
	2020/3	2020/1	2019/11	2019/9	2020/3	2019/10	2019/5	2019/9
UK	-6.2	-7.9	-0.2	-0.5	-0.5	-0.7	+0.3	0
	2020/4	2020/4	2020/3	2020/1	2020/4	2020/4	2019/11	2020/1
	2020/3	2020/1	2019/11	2019/11	2020/3	2019/10	2019/5	2019/11
JP	-2.6	-5.9	-0.4	+0.2	-0.5	-1.1	-0.4	-0.1
	2020/4	2020/4	2020/3	2020/1	2020/4	2020/4	2019/11	2020/1
	2020/3	2020/1	2019/11	2019/10	2020/3	2019/10	2019/5	2019/10
CN	-3.2	-4.8	-0.8	-4.4	-0.1	+0.6	+0.1	0
	2020/4	2020/4	2020/3	2020/3	2020/4	2020/4	2019/11	2020/3
	2020/3	2020/1	2019/11	2020/2	2020/3	2019/10	2019/5	2020/2
RU	-4.8	-7.4	-0.4	-4.3	+0.7	-0.4	0	+2.8
	2020/4	2020/4	2020/3	2020/4	2020/4	2020/4	2019/11	2020/4
	2020/3	2020/1	2019/11	2020/3	2020/3	2019/10	2019/5	2020/3

## A2. Change in predictions for 2020

	GDP growth, %				Inflation, %			
	CF	IMF	OECD	CB / EIU	CF	IMF	OECD	CB / EIU
EA	-6.3	-8.8	-0.3	-0.3	-0.7	-1.2	-0.4	0
	2020/4	2020/4	2020/3	2020/3	2020/4	2020/4	2019/11	2020/3
	2020/3	2020/1	2019/11	2019/12	2020/3	2019/10	2019/5	2019/12
US	-5.6	-7.9	-0.1	0	-1.0	-1.7	0	0
	2020/4	2020/4	2020/3	2019/12	2020/4	2020/4	2019/11	2019/12
	2020/3	2020/1	2019/11	2019/9	2020/3	2019/10	2019/5	2019/9
UK	-6.2	-7.9	-0.2	-0.5	-0.5	-0.7	+0.3	0
	2020/4	2020/4	2020/3	2020/1	2020/4	2020/4	2019/11	2020/1
	2020/3	2020/1	2019/11	2019/11	2020/3	2019/10	2019/5	2019/11
JP	-2.6	-5.9	-0.4	+0.2	-0.5	-1.1	-0.4	-0.1
	2020/4	2020/4	2020/3	2020/1	2020/4	2020/4	2019/11	2020/1
	2020/3	2020/1	2019/11	2019/10	2020/3	2019/10	2019/5	2019/10
CN	-3.2	-4.8	-0.8	-4.4	-0.1	+0.6	+0.1	0
	2020/4	2020/4	2020/3	2020/3	2020/4	2020/4	2019/11	2020/3
	2020/3	2020/1	2019/11	2020/2	2020/3	2019/10	2019/5	2020/2
RU	-4.8	-7.4	-0.4	-4.3	+0.7	-0.4	0	+2.8
	2020/4	2020/4	2020/3	2020/4	2020/4	2020/4	2019/11	2020/4
	2020/3	2020/1	2019/11	2020/3	2020/3	2019/10	2019/5	2020/3

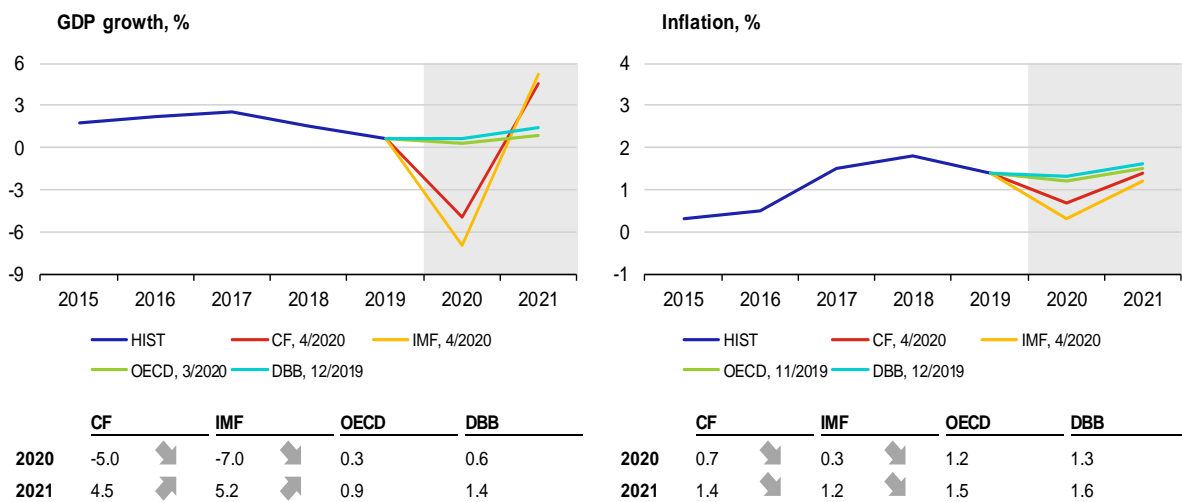
### A3. GDP growth and inflation outlooks in the euro area countries



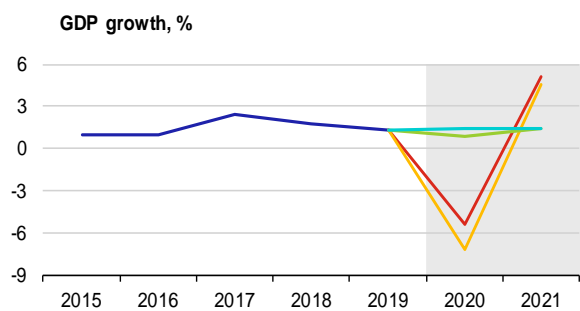
Note: Charts show institutions' latest available outlooks of for the given country.

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

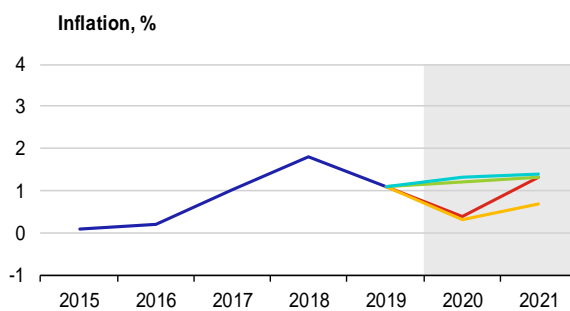
#### Germany



## France

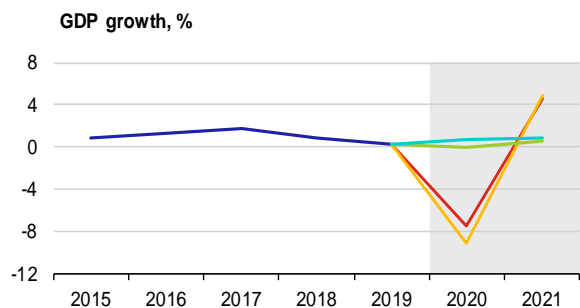


	CF	IMF	OECD	ECB
2020	-5.4	-7.2	0.9	1.4
2021	5.1	4.5	1.4	1.4

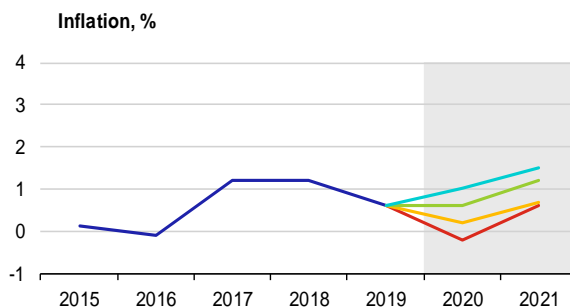


	CF	IMF	OECD	ECB
2020	0.4	0.3	1.2	1.3
2021	1.3	0.7	1.3	1.4

## Italy

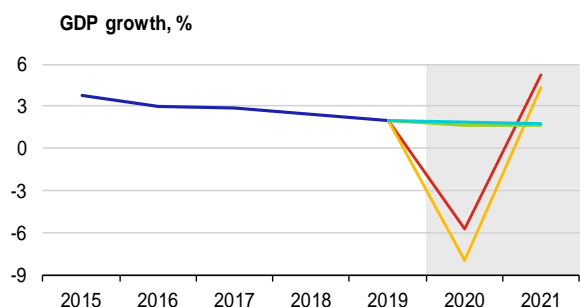


	CF	IMF	OECD	ECB
2020	-7.5	-9.1	0.0	0.7
2021	4.5	4.8	0.5	0.9

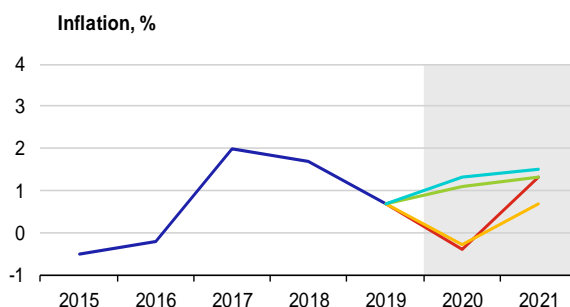


	CF	IMF	OECD	ECB
2020	-0.2	0.2	0.6	1.0
2021	0.6	0.7	1.2	1.5

## Spain

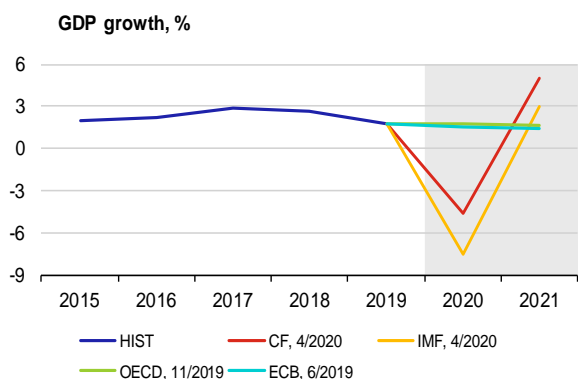


	CF	IMF	OECD	ECB
2020	-5.7	-8.0	1.6	1.9
2021	5.2	4.3	1.6	1.7

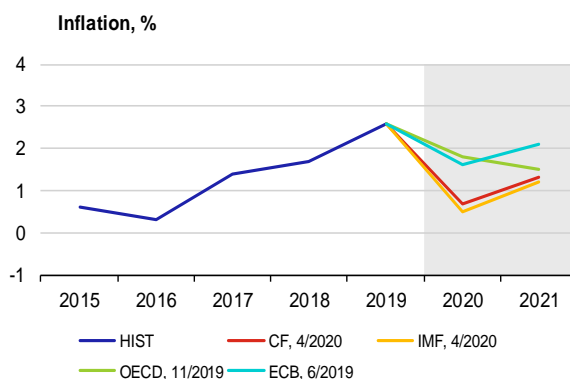


	CF	IMF	OECD	ECB
2020	-0.4	-0.3	1.1	1.3
2021	1.3	0.7	1.3	1.5

## Netherlands

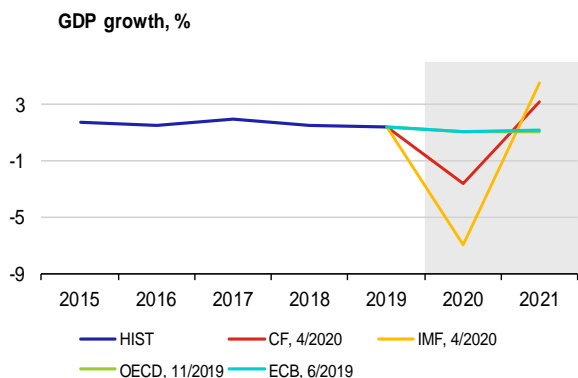


	CF	IMF	OECD	ECB
2020	-4.6	-7.5	1.8	1.5
2021	5.0	3.0	1.6	1.4

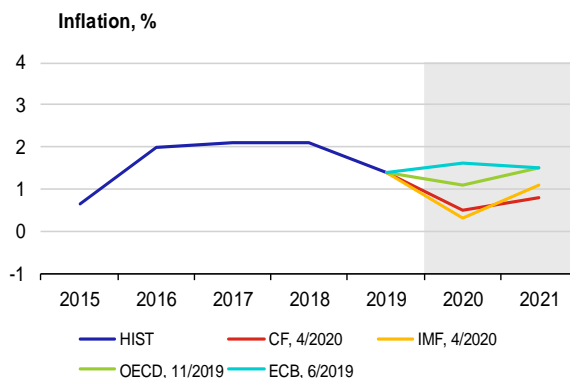


	CF	IMF	OECD	ECB
2020	0.7	0.5	1.8	1.6
2021	1.3	1.2	1.5	2.1

## Belgium

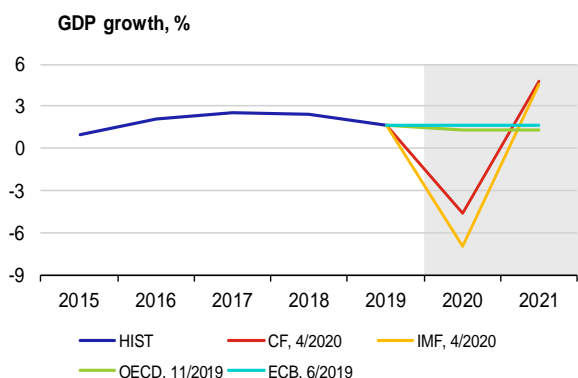


	CF	IMF	OECD	ECB
2020	-2.6	-7.0	1.1	1.1
2021	3.2	4.6	1.1	1.2

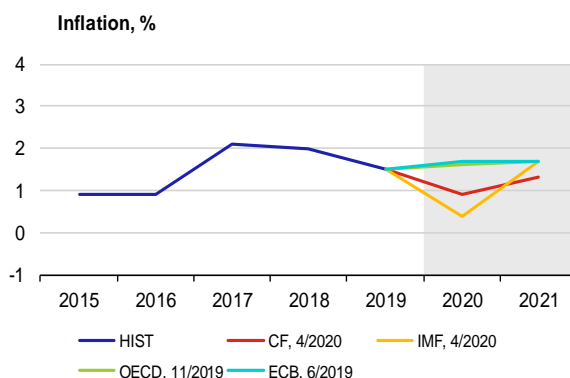


	CF	IMF	OECD	ECB
2020	0.5	0.3	1.1	1.6
2021	0.8	1.1	1.5	1.5

## Austria

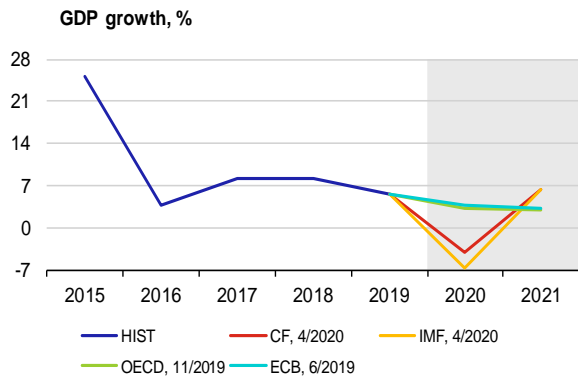


	CF	IMF	OECD	ECB
2020	-4.6	-7.0	1.3	1.6
2021	4.8	4.5	1.3	1.6

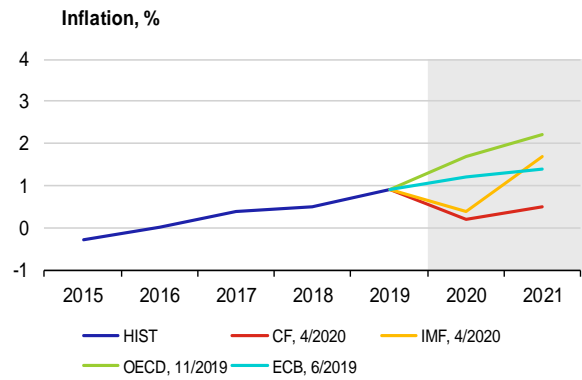


	CF	IMF	OECD	ECB
2020	0.9	0.4	1.6	1.7
2021	1.3	1.7	1.7	1.7

## Ireland

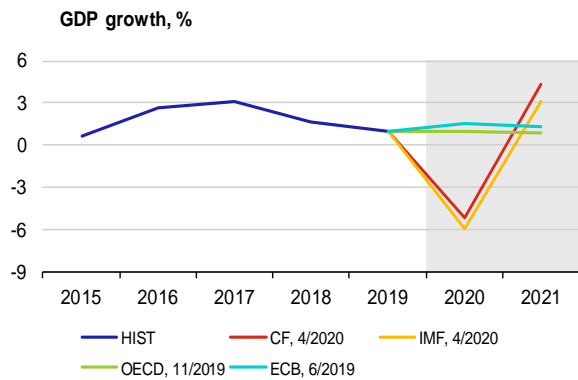


	CF	IMF	OECD	ECB
2020	-4.1	-6.8	3.3	3.7
2021	6.3	6.3	3.0	3.3

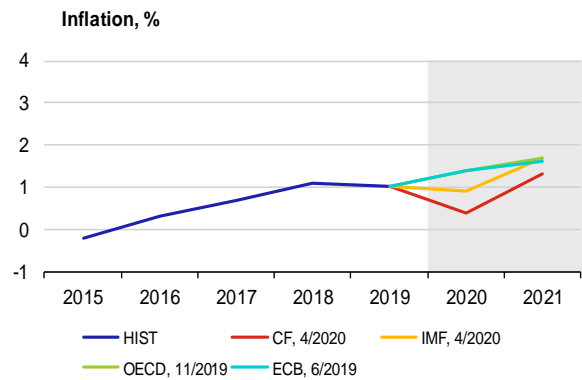


	CF	IMF	OECD	ECB
2020	0.2	0.4	1.7	1.2
2021	0.5	1.7	2.2	1.4

## Finland

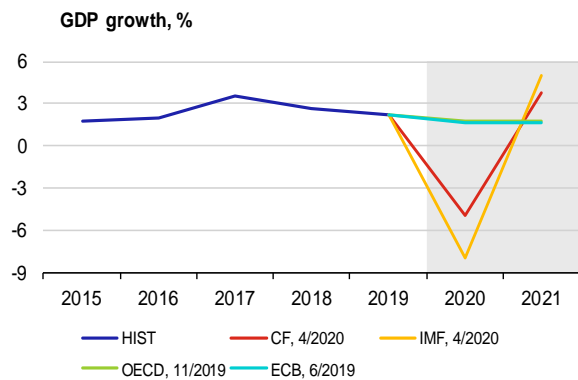


	CF	IMF	OECD	ECB
2020	-5.2	-6.0	1.0	1.5
2021	4.3	3.1	0.9	1.3

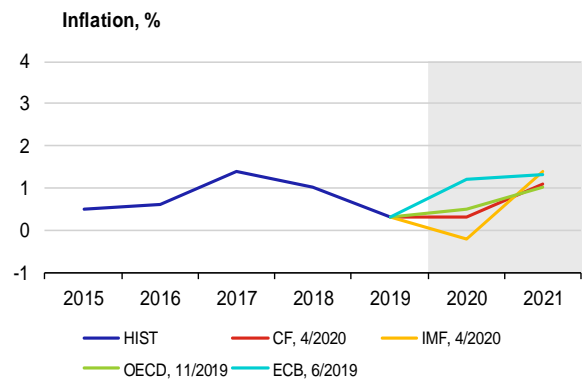


	CF	IMF	OECD	ECB
2020	0.4	0.9	1.4	1.4
2021	1.3	1.7	1.7	1.6

## Portugal

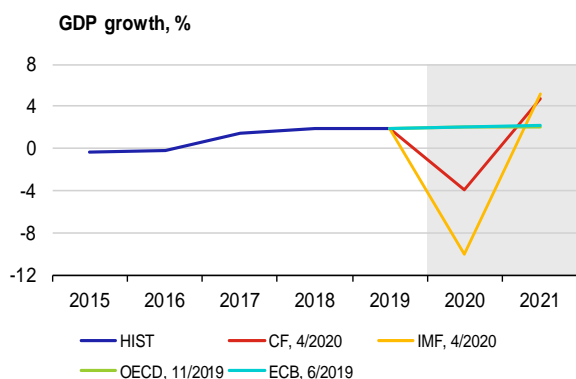


	CF	IMF	OECD	ECB
2020	-5.0	-8.0	1.8	1.6
2021	3.8	5.0	1.7	1.6

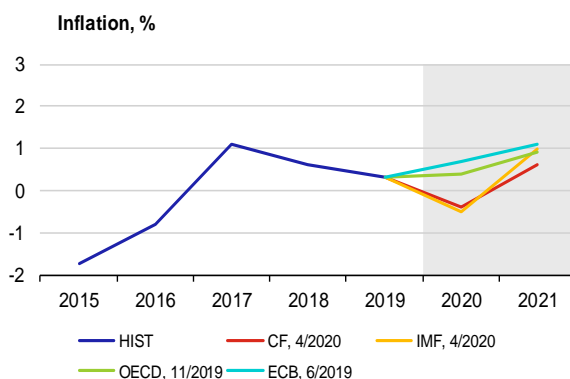


	CF	IMF	OECD	ECB
2020	0.3	-0.2	0.5	1.2
2021	1.1	1.4	1.0	1.3

### Greece

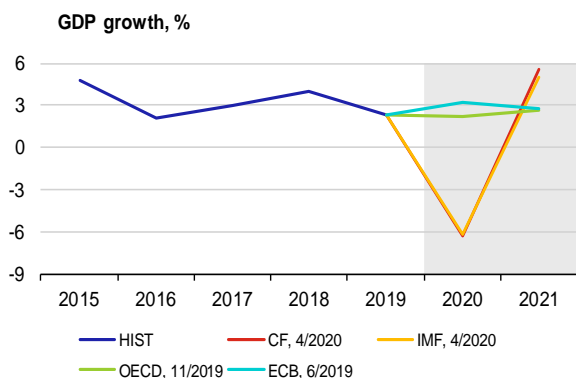


	CF	IMF	OECD	ECB
2020	-4.0	-10.0	2.1	2.1
2021	4.7	5.1	2.0	2.2

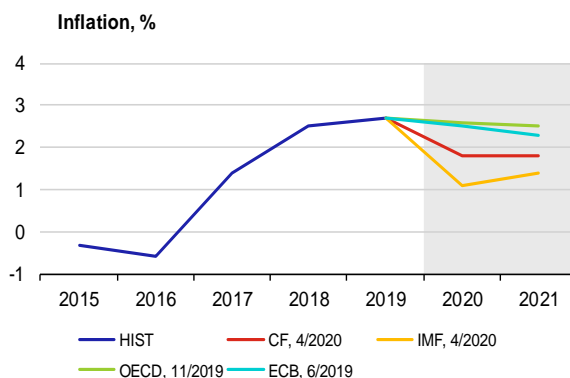


	CF	IMF	OECD	ECB
2020	-0.4	-0.5	0.4	0.7
2021	0.6	1.0	0.9	1.1

### Slovakia

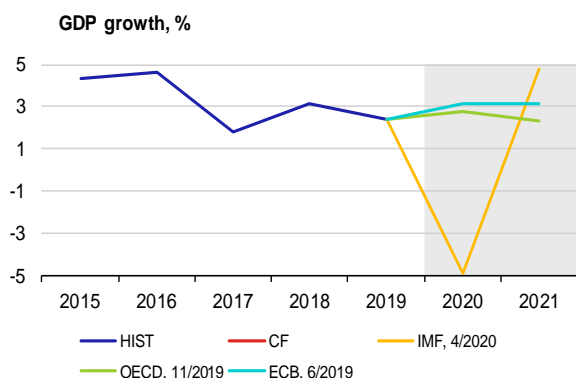


	CF	IMF	OECD	ECB
2020	-6.3	-6.2	2.2	3.2
2021	5.6	5.0	2.6	2.8

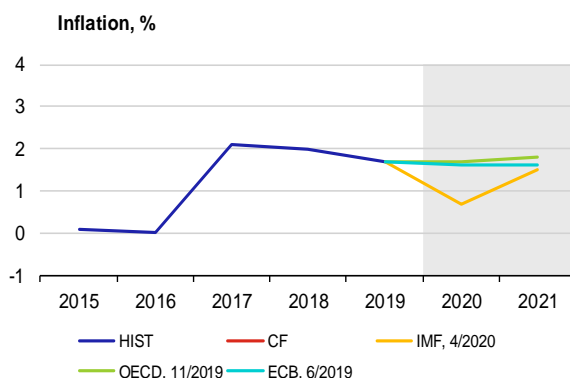


	CF	IMF	OECD	ECB
2020	1.8	1.1	2.6	2.5
2021	1.8	1.4	2.5	2.3

### Luxembourg

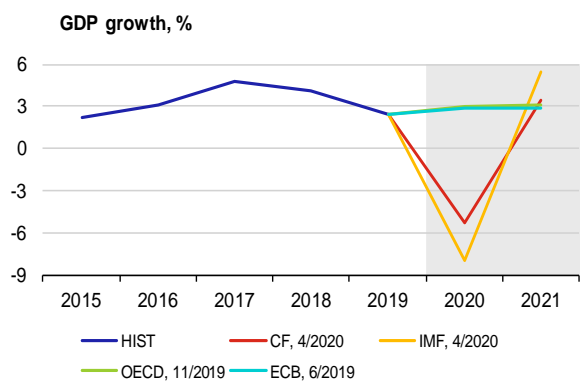


	CF	IMF	OECD	ECB
2020	n. a.	-4.9	2.8	3.1
2021	n. a.	4.8	2.3	3.1

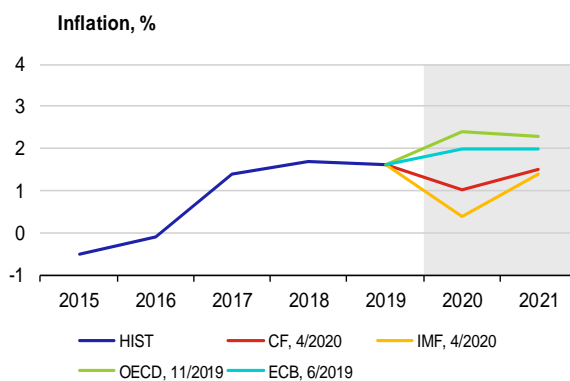


	CF	IMF	OECD	ECB
2020	n. a.	0.7	1.7	1.6
2021	n. a.	1.5	1.8	1.6

## Slovenia

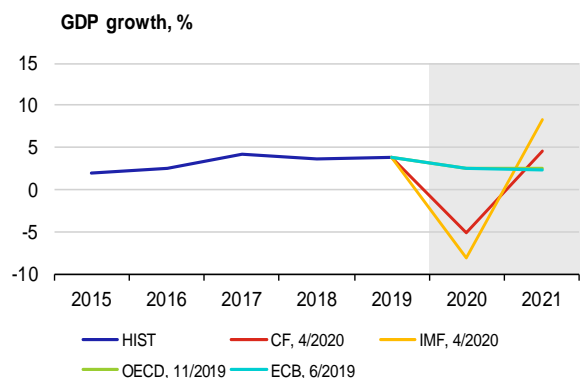


	CF	IMF	OECD	ECB
2020	-5.3	-8.0	3.0	2.9
2021	3.4	5.4	3.1	2.9

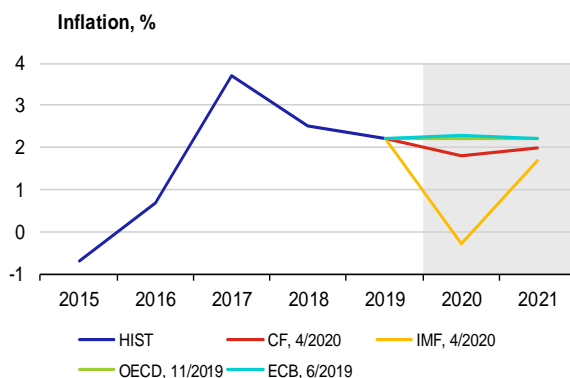


	CF	IMF	OECD	ECB
2020	1.0	0.4	2.4	2.0
2021	1.5	1.4	2.3	2.0

## Lithuania

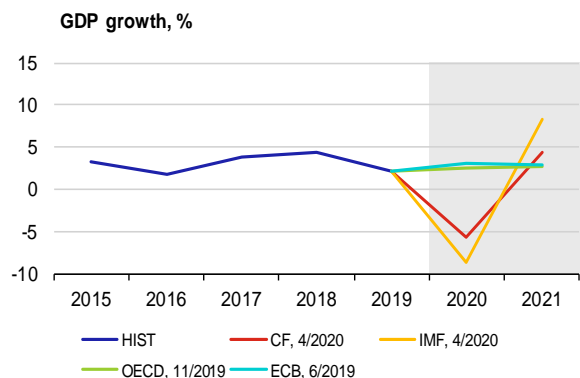


	CF	IMF	OECD	ECB
2020	-5.2	-8.1	2.5	2.5
2021	4.5	8.2	2.5	2.4

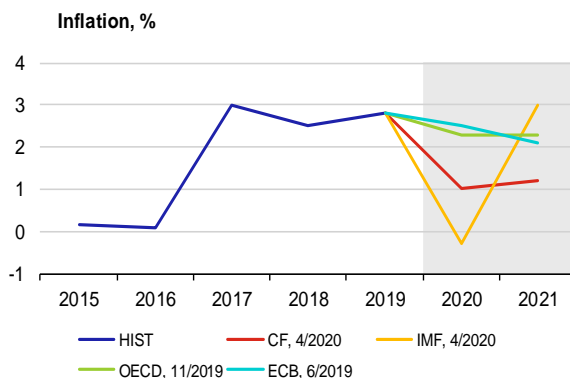


	CF	IMF	OECD	ECB
2020	1.8	-0.3	2.2	2.3
2021	2.0	1.7	2.2	2.2

## Latvia



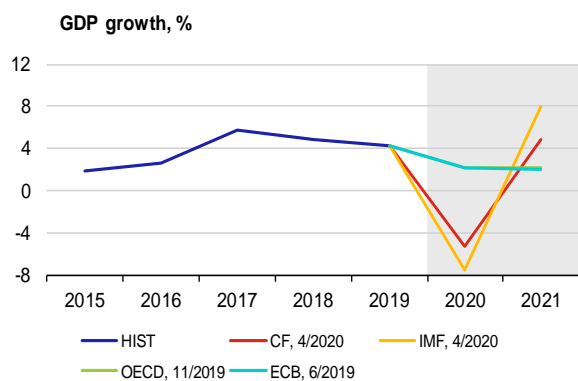
	CF	IMF	OECD	ECB
2020	-5.7	-8.6	2.5	3.1
2021	4.4	8.3	2.7	2.9



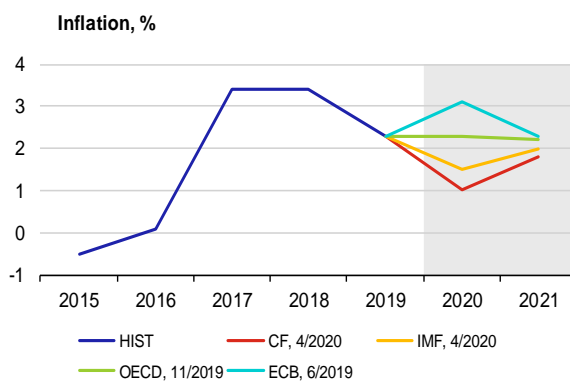
	CF	IMF	OECD	ECB
2020	1.0	-0.3	2.3	2.5
2021	1.2	3.0	2.3	2.1



## Estonia

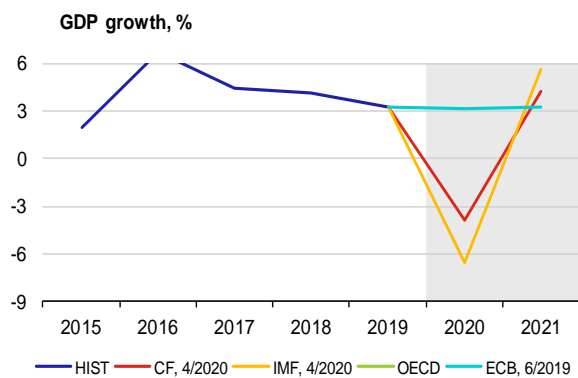


	CF	IMF	OECD	ECB
2020	-5.3	-7.5	2.2	2.1
2021	4.9	7.9	2.2	2.0

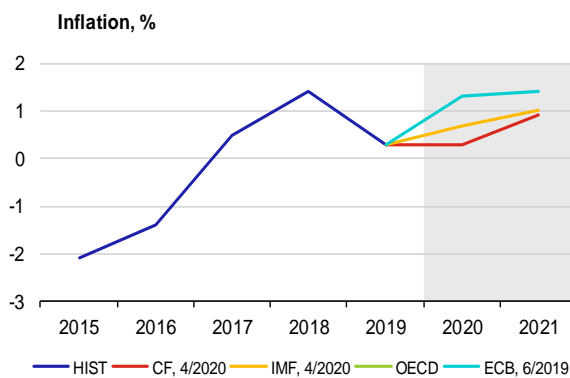


	CF	IMF	OECD	ECB
2020	1.0	1.5	2.3	3.1
2021	1.8	2.0	2.2	2.3

## Cyprus

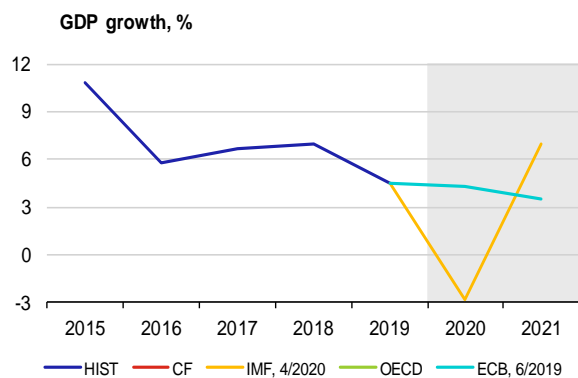


	CF	IMF	OECD	ECB
2020	-3.9	-6.5	n. a.	3.1
2021	4.2	5.6	n. a.	3.2

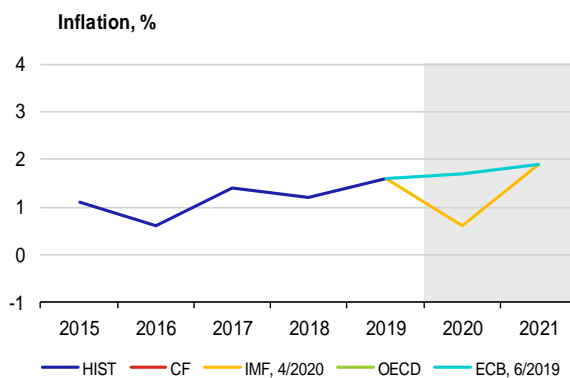


	CF	IMF	OECD	ECB
2020	0.3	0.7	n. a.	1.3
2021	0.9	1.0	n. a.	1.4

## Malta



	CF	IMF	OECD	ECB
2020	n. a.	-2.8	n. a.	4.3
2021	n. a.	7.0	n. a.	3.5



	CF	IMF	OECD	ECB
2020	n. a.	0.6	n. a.	1.7
2021	n. a.	1.9	n. a.	1.9

## A5. List of abbreviations

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



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