

Global Economic Outlook

March 2024



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Cut-off date for data

15 March 2024

CF survey date

11 March 2024

GEO publication date

22 March 2024

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 OE.

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

March brings – and not only due to the ongoing aggression by Russian Federation in Ukraine – a reminder of a quarter of a century since the NATO enlargement that included the first countries of the Eastern Bloc, i.e. the Czech Republic, Hungary and Poland. Sweden was admitted as the thirty-second member of NATO in March, and so the vast majority of European states are under the common defence umbrella. Key events in March include the adoption by the European Parliament of new rules on the functioning of artificial intelligence. The AI Act is the first of its kind in the world. It is intended to ensure that AI is trustworthy and safe, and that it fosters innovation while respecting fundamental EU rights and values.

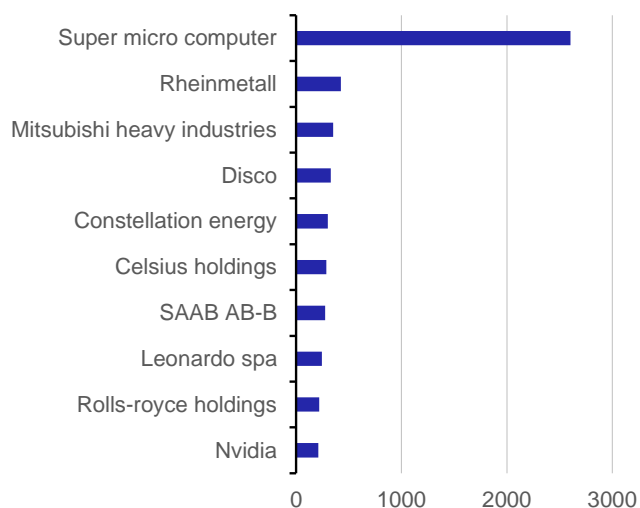
The monetary policy question of the spring: “When will the two strongest central banks cut their rates?”

According to indications from monetary policymakers, the ECB is probably closer to this than the US Fed, even though Jerome Powell said, during a hearing in the US Congress, that sufficient confidence for the first “cut” is not far off. The March meetings of the two key central banks did not bring about a change in rates, so we are still waiting to see when and how steeply rates will move towards the interest-rate lowlands. The June meetings could be dovish. Now that there is a chance to catch our breath, post-crisis, interest rate settings are being influenced by a discussion on whether the idea of neutral interest rates, referred to as “r*” in professional jargon, has changed not only under the influence of the dynamic events of recent years, but also of ongoing trends. It would rather appear that economists see this rate, which in layman’s terms should neither stimulate nor hinder the economy, at more than 3% in nominal terms.

The results of the changes to the ECB’s operational framework for implementing monetary policy were delivered. This is a common self-reflection process that takes place at many central banks on a regular or ad hoc basis. The one just carried out by the ECB resulted in one practical decision, namely to reduce the spread between the main refinancing operations rate and the deposit facility rate from the current 0.5 to 0.15 percentage point as of mid-September.

The **chart in the current issue shows** that although everyone is talking about the growth of technology stocks, especially the top seven US companies, a look at MSCI World shows that the leader, nVidia, which is riding the wave of AI, is only tenth in this view. The second in line is a German company that produces artillery ammunition. The top performer is SMCI, which has been skyrocketing since the beginning of 2024, the reason is once again reportedly advancements in artificial intelligence. This is also the subject of the **analysis in this issue entitled:** [“The rise of artificial intelligence: Does humanity have a revolutionary yet double-edged weapon?”](#) The article focuses not only on the economic perspective, which promises increased work efficiency and productivity, but also mentions the ethical, safety and social issues that the new technology brings.

The ten fastest-growing large companies in the world over the past two years, %



Source: Bloomberg
Note: Of the total of 1,465 companies included in the iShares Core MSCI World index.

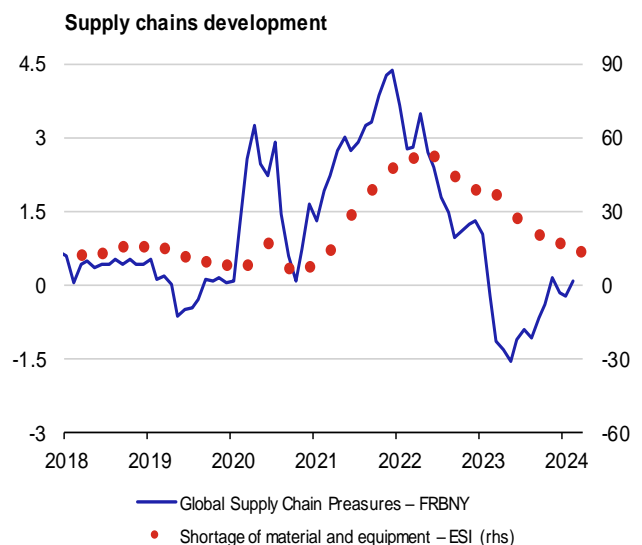
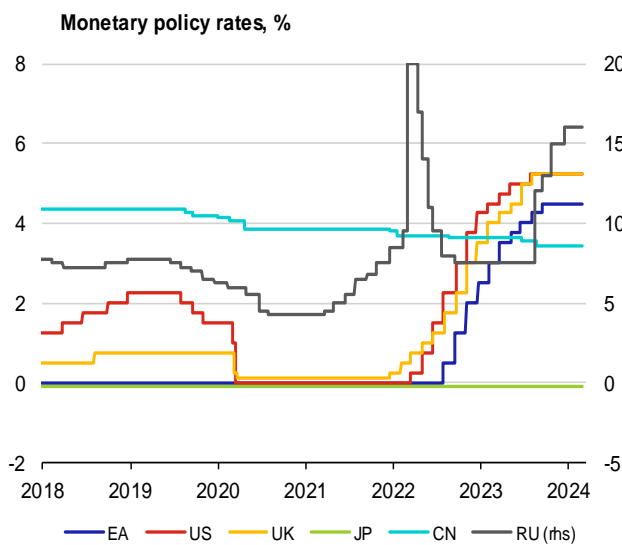
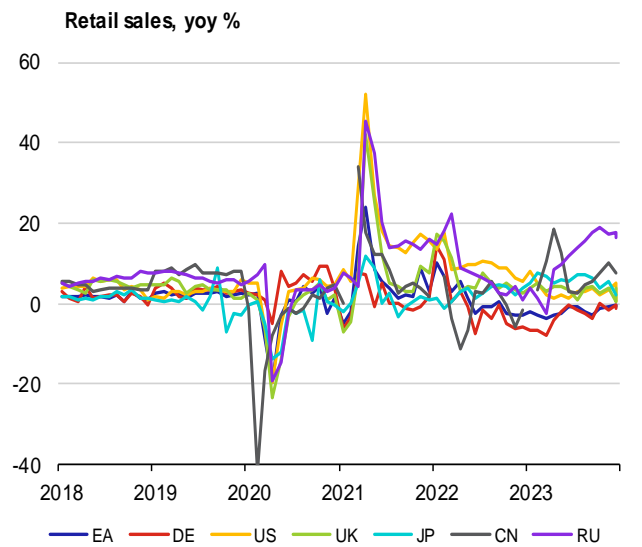
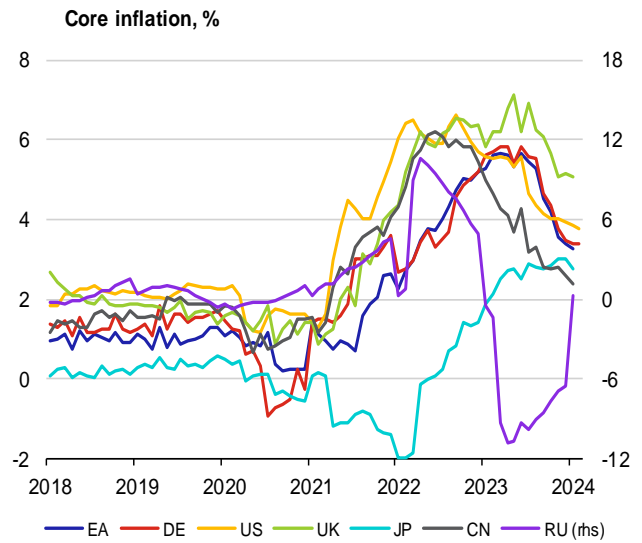
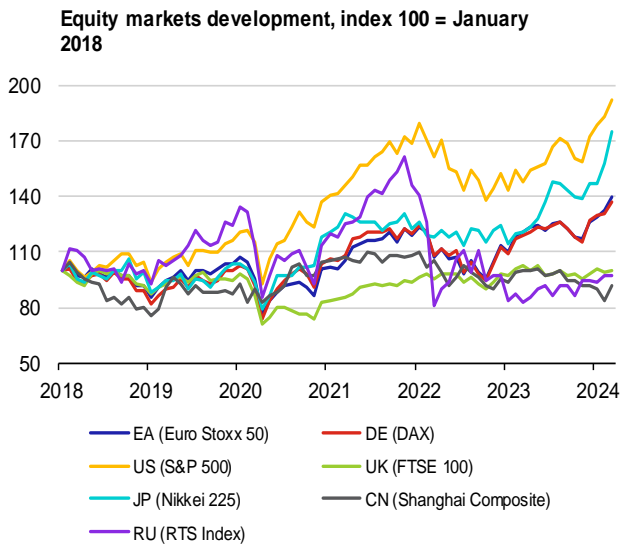
GEO barometer for selected countries

		EA	DE	US	UK	JP	CN	RU
GDP (%)	2024	0.5 →	0.1 →	2.2 →	0.2 →	0.6 →	4.7 →	2.0 →
	2025	1.3 →	1.1 →	1.6 →	1.1 →	1.1 →	4.4 →	1.3 →
Inflation (%)	2024	2.3 →	2.5 →	2.8 →	2.5 →	2.3 →	0.8 →	5.3 →
	2025	2.0 →	2.1 →	2.2 →	2.2 →	1.6 →	1.5 →	4.5 →
Unemployment (%)	2024	6.6 →	5.9 →	4.0 →	4.4 →	2.5 →	3.4 →	2.5 →
	2025	6.6 →	5.7 →	4.2 →	4.4 →	2.4 →	3.4 →	2.3 →
Exchange rate (against USD)	2024	1.11 →	1.11 →		1.27 →	136.3 →	7.05 →	96.7 →
	2025	1.14 →	1.14 →		1.30 →	127.1 →	6.83 →	95.0 →

Source: Consensus Forecasts, Oxford Economics

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

II. Macroeconomic barometer

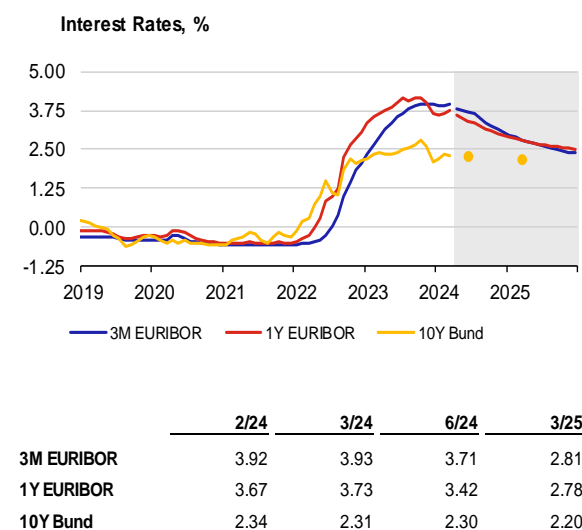
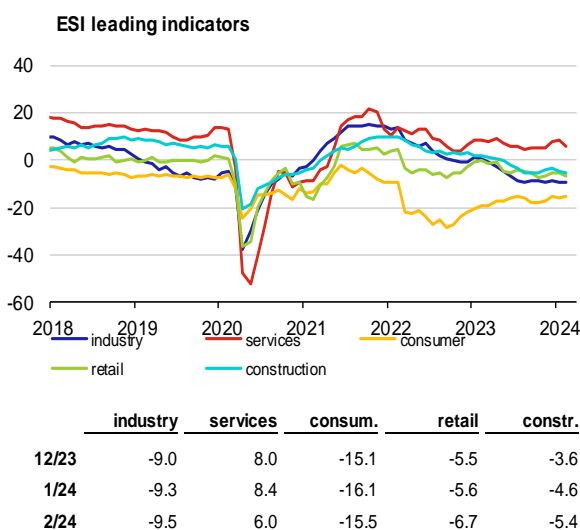
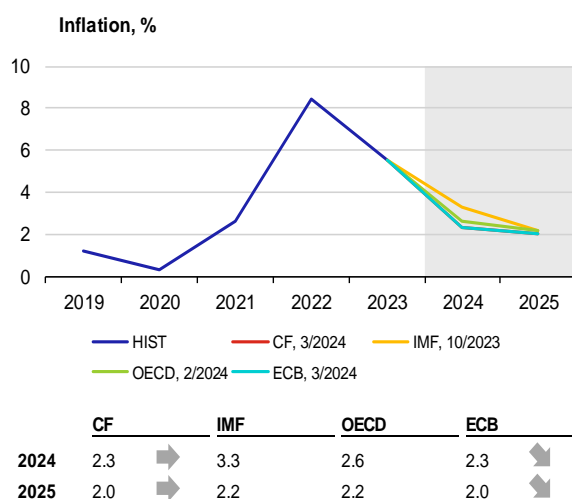
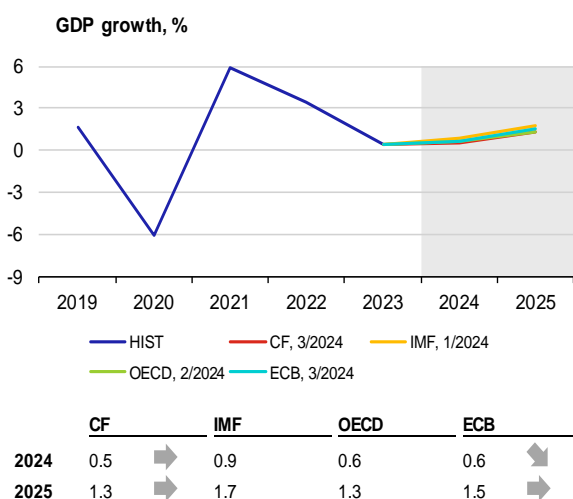


Source: Refinitiv Datastream, European Commission.

III.1 Euro area

Only very moderate economic growth is expected in the euro area this year, and that should actually take place only in the second half. The economy was flat at the end of last year. Household consumption increased only marginally compared to the previous quarter. Growth in public expenditure and in fixed investment contributed positively to GDP. However, all this was fully offset by the negative contributions of net exports and changes in inventories. From a sectoral perspective, the change in gross value added in the euro area at the end of last year was driven by public administration, education and healthcare. It is clear that fiscal policy was the crucial factor in helping the euro area avoid a technical recession at the end of the year. The contribution of industry was negative (like throughout last year), but trade, transport, hospitality and some other services were newly added to this. So far, the latest data are not showing any clear improvement in the situation. Nevertheless, January's sharp fall in industrial output was largely due to the base effect (the exceptionally high growth in December was related to a one-off increase in the production of capital goods in Ireland). The industrial PMI still fell in February (46.5), while the composite index came within sight of the 50-point mark thanks to the return of services to expansion. According to the European Commission, however, economic sentiment worsened in February. The economic recovery has thus been postponed again, perhaps until the second half of the year, with hopes placed primarily in consumers due to real growth in incomes. GDP is therefore expected to grow by only around 0.5% this year. Next year, however, the rate of growth is now viewed at around 1.5%.

The European Central Bank left its key interest rates unchanged again in March. The ongoing pace of disinflation (annual HICP growth slowed to 2.8% in February, underlying inflation fell to 3.1%) is not yet providing enough assurance for the ECB about a sustained return to price stability, especially in view of the persistence of domestic inflationary pressures stemming from the services sector. The inflation outlook has been revised downwards in the new ECB forecast, especially this year. Thus, the first ECB rate cut is not expected until the June meeting, partly in view of a statement by President Lagarde.

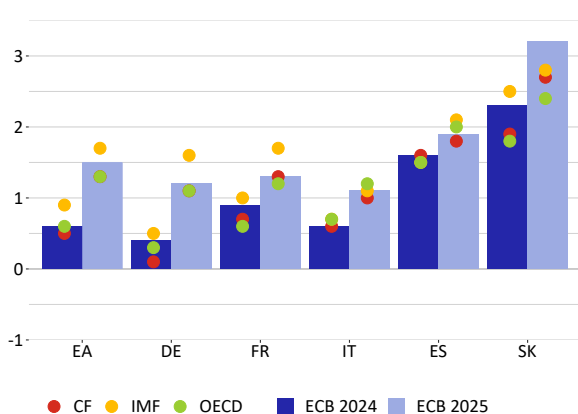


III.2 Germany

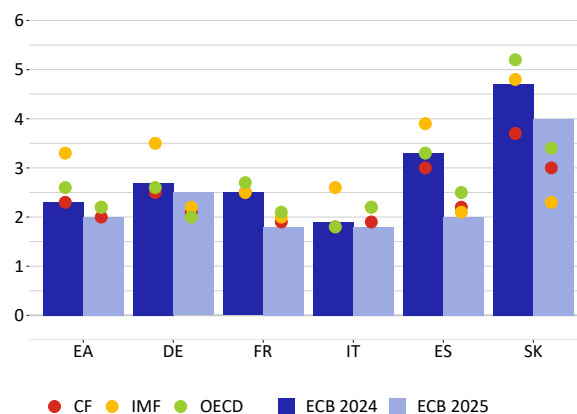
The central bank warns of a further contraction of the German economy. According to a Bundesbank forecast, the economy will continue to contract in the first three months of this year due to budget uncertainty, strikes and weak consumer and industrial demand. The possibility of a second consecutive decline in economic output is increasing the likelihood of a technical recession. Last year, the economy ended in the red, contracting by 0.3% in Q4 as a result of the dampening effect of declining investment, while consumption increased slightly. Although the start of this year provided few signs of recovery, a possible recession should not mean a significant and long-lasting decline, especially as household spending is likely to continue to improve against the backdrop of a stable labour market, soaring wages and falling inflation. The new CF forecast expects GDP growth of just above zero this year and above 1% next year. In February, the composite PMI indicator pointed to a further deepening of the fall in private sector activity (46.3 compared to 47.0 in January). The problem is an increasingly deep and sharp decline in the manufacturing sector (42.5), but also a continuing decline in activity in the services sector (48.3), which, however, has at least slowed and slightly stabilised. According to the Ifo and ZEW indices, there was some improvement in business sentiment, mainly due to expectations, yet the assessment of the current situation was not great. Consumer sentiment also stabilised slightly after the unpleasant deterioration at the beginning of the year, yet remained low.

Consumer price inflation continues to decelerate, partly on the back of moderate increases in food prices. In February, harmonised prices rose by 2.7% year on year (compared to 3.1% in January). Energy prices continued to fall, easing further despite the end of some measures from January 2024. Food price inflation slowed significantly again to fall below the headline inflation rate for the first time in more than two years. Core inflation adjusted for energy and food prices remained unchanged at 3.4%. CF continues to forecast that prices will rise by 2.5% this year and by 2.1% in 2025. Industrial producer prices continue to fall, yet the pace is more moderate. In January, prices fell by 4.4% year on year, this being the first result since the index was recalculated to the new base year of 2021.

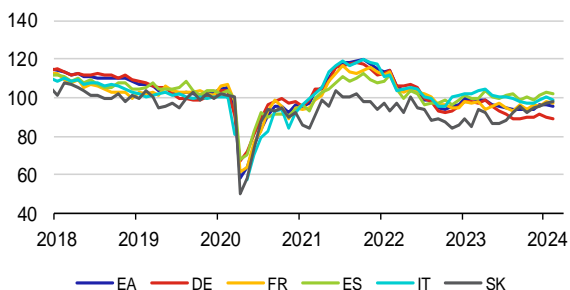
GDP growth in selected euro area countries in 2024 and 2025, %



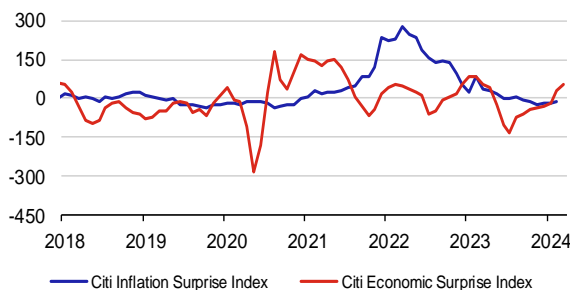
Inflation in selected euro area countries in 2024 and 2025, %



ESI leading indicators



Economic and inflation surprises in the euro area, %



	EA	DE	FR	ES	IT	SK
12/23	96.4	91.8	95.4	101.2	99.1	95.2
1/24	96.1	89.6	97.9	102.6	100.8	97.1
2/24	95.4	89.0	97.6	102.4	99.2	98.1

Inflation expectations based on 5year inflation swap and SPF

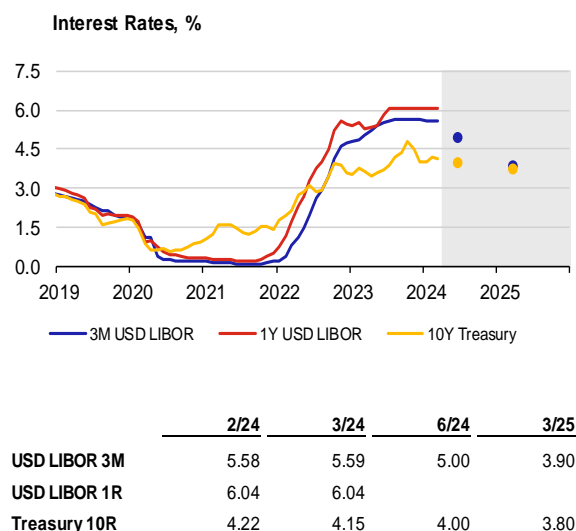
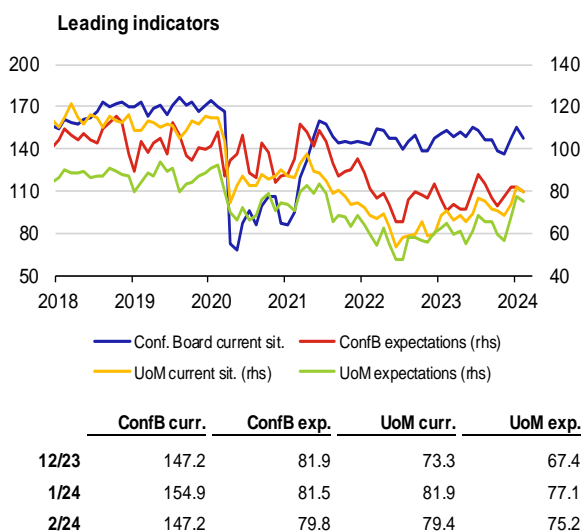
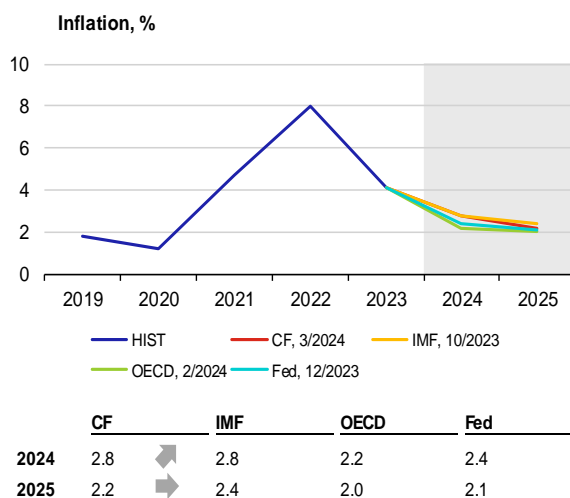
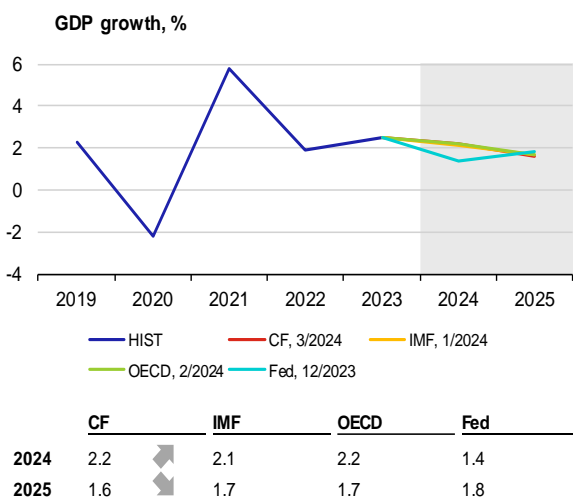
	5y5y	SPF
1/24	2.26	2.05
2/24	2.27	2.05
3/24	2.27	2.05

III.3 United States

The GDP growth outlook for the US economy has been revised upwards, but economic growth is not uniform across all sectors. Economic growth is mainly being supported by strong household consumption and also government consumption. In February, 275,000 new jobs were created in non-agricultural sectors, demand for workers has been declining very slowly since the beginning of 2022, and the number of total job vacancies fell to 8.86 million in January. So far, there have been no mass layoffs. Therefore, although the economy is growing, if we look at the manufacturing sector, we find that it has been stagnating for a long time. However, banks are gradually becoming more willing to finance this sector, and this could contribute to renewed growth after rates fall.

As expected by the markets, the US Fed will leave rates unchanged in March. Surveys among analysts at various institutions indicate that the first rate cut is most likely to take place at the June meeting. However, at the last meeting, Chairman Jerome Powell announced that there was no hurry to cut rates. After all, the US economy is growing more rapidly than the euro area, the labour market has not yet cooled significantly, and the higher rate environment is still only slightly testing the stability of the financial sector. With the election approaching, there is speculation in the market and among politicians as to whether the Fed's behaviour is being influenced by the election. However, Bloomberg's analysis refutes such theories and shows that the Fed's rate is in line with the monetary policy rule.

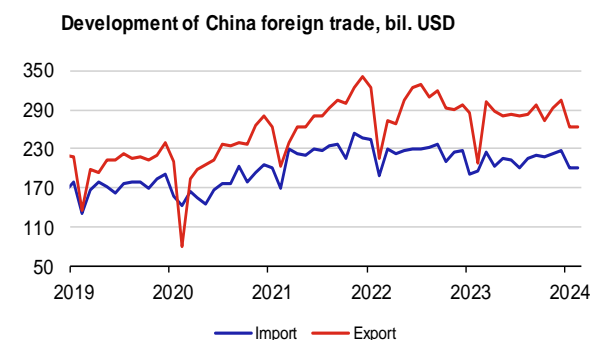
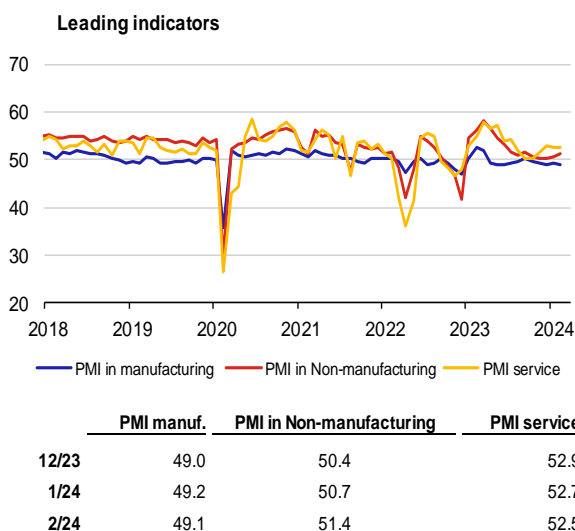
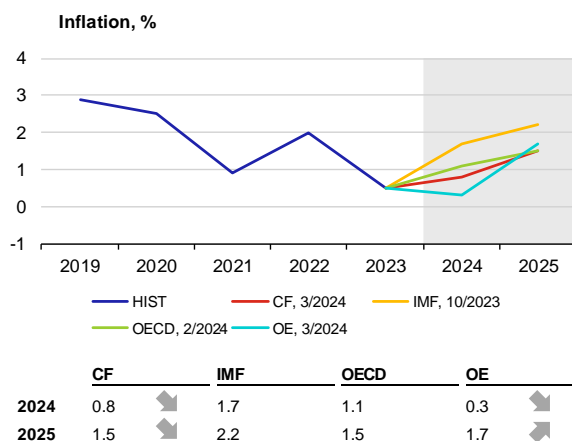
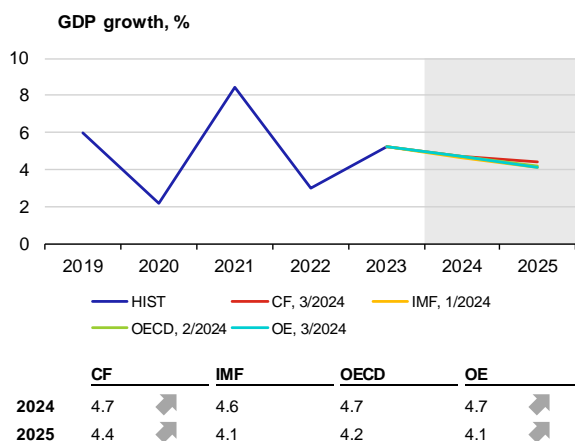
Year-on-year consumer price inflation reached 3.2% in February, while core inflation reached 3.8%. This was an increase compared to expectations as well as the 3.1% rate in January. Energy prices fell by 1.9% and used-car prices by 1.8%, and they are expected to fall further. The prices of food (2.2%), services (5.2%), housing costs (5.7%) and transport (9.9%) continue to rise. Industrial producer prices are flat (0.9% year-on-year). The new inflation outlook has moved upwards to 2.8% for this year, according to CF analysts, while a Bloomberg survey of analysts in February shows 2.7% for this year and 2.3% for next year.



III.4 China

At the beginning of March, the Chinese government set the same GDP growth target for this year as in 2023, at around 5%. While this target was actually slightly exceeded last year, in view of the current problems of the Chinese economy, which is losing momentum after the post-COVID recovery, meeting this goal will be a great challenge this year. This is also confirmed by the CF analysts' March outlooks – they expect the annual growth rate of the Chinese economy to be below 5% this year and next. Last year's uneven growth exposed China's deep structural imbalances, ranging from weak household consumption to a declining share of gross fixed investment, also reflecting problems on the property market. Weakness in the manufacturing sector, suffering mainly from subdued external demand, continues in particular. The Purchasing Managers' Index (PMI) in manufacturing dropped to 49.1 in February, meaning it has now been in the economic contraction band for the fifth consecutive month. All of this raises uncertainties about the sustainability of the current growth model. Chinese officials say that meeting the economy's growth target will also require proactive fiscal and monetary policies, including increasing employment and creating more than 12 million urban jobs and keeping the unemployment rate at around 5.5%.

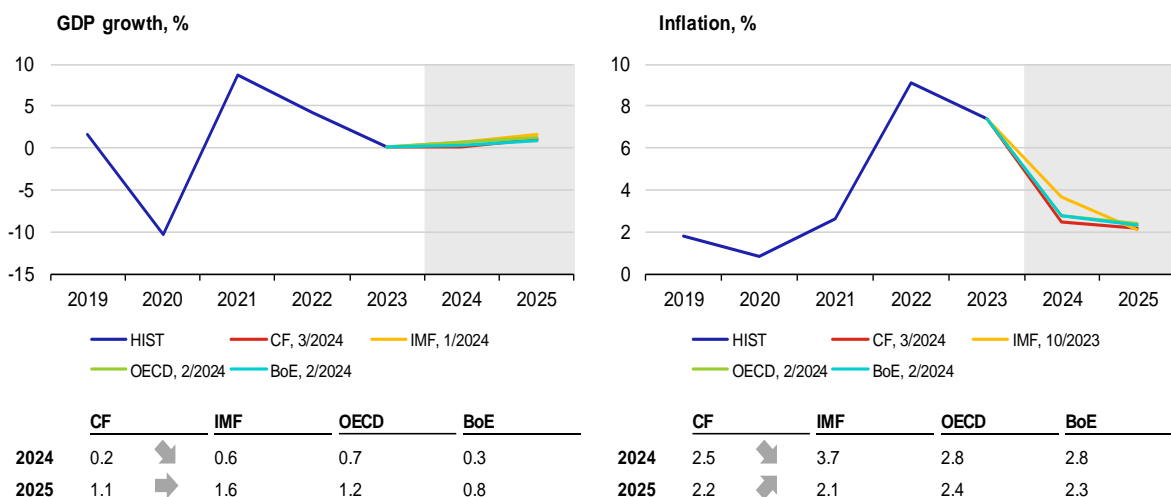
Consumer prices rose year on year in February for the first time in six months, while producer prices saw deepened deflation. The year-on-year growth in consumer prices of 0.7% was the highest since March last year, and contrasts with the 0.8% decline in January. This mainly reflected increased household spending associated with the Chinese New Year celebrations, which fell on 10 February this year. In addition to the lower comparison base, growth was mainly supported by higher prices of pork, vegetables and travel-related services. The definitive unwinding of deflation thus remains uncertain, as domestic demand remains weak. Likewise, it will be difficult to hit the annual consumer price inflation target of 3%, as it was the previous year. According to CF analysts' March outlook, consumer prices will rise by only 0.8% this year, while their growth rate will accelerate to 1.5% next year. Producer prices, which have long reflected low commodity prices and low manufacturing activity, fell further year on year from -2.5% in January to -2.7% in February.



Source: Bloomberg

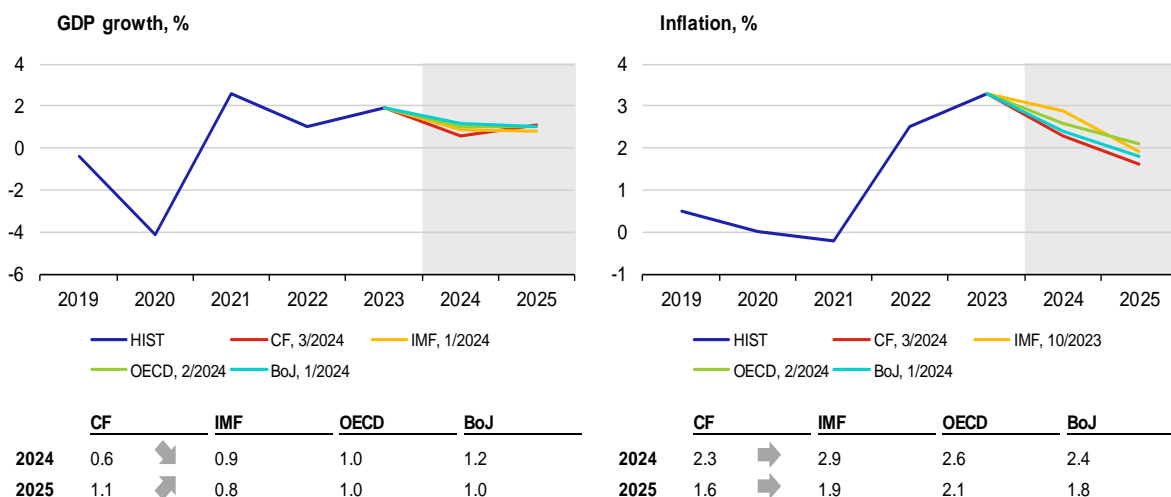
III.5 United Kingdom

Despite stagnating inflation at the start of the year (4%), there are encouraging signs of easing price pressures. The data show the greatest downward pressures on prices come from household goods and food, where price growth has reached a two-year low. A BoE survey shows there has also been a drop in wage expectations below 5%. These are a key indicator, the evolution of which increases the chance of an interest rate cut this year. Consumer sentiment deteriorated after three months of improvement, according to the GfK index. The UK economy also saw the introduction of a new government budget based on a reduction in national insurance contributions, with the costs partially offset through tax changes. The aim is to support long-term economic growth that is forecasted at 0.8% this year and 1.9% next year. The private sector grew for the fourth consecutive month in February (53.0), according to the composite PMI indicator, but the change compared to January was minimal. Activity in the services sector continues to grow, while the decline in the manufacturing sector has moderated.



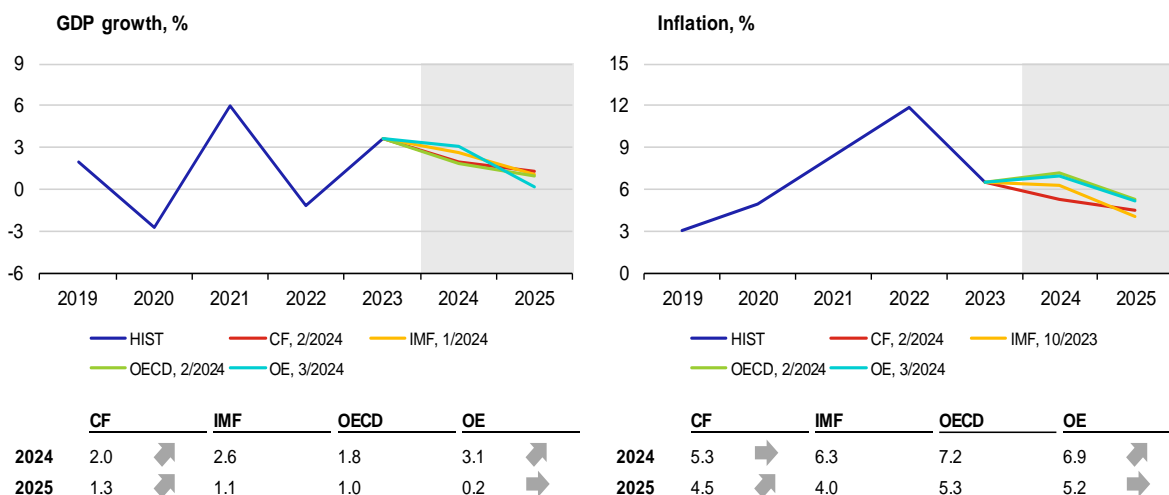
III.6 Japan

The conclusion of Japan’s experiment with negative interest rates is approaching, but the final level of rates may remain only slightly above zero. Financial markets already consider that there is a probability of over fifty percent that monetary conditions will be tightened at the BoJ meeting in March. Analysts also expect an end to negative rates in March or April, although inflation is already slowing – from last year’s average of 3.1% to 2% in January. In addition to the still elevated core inflation, information about the ongoing “shunto” wage bargaining, which is indicating the largest wage increases in large enterprises (over 5% on average) since 1991, is especially contributing to the hawkish arguments. A key challenge in the medium term will be to anchor inflation expectations at the BoJ’s 2% target, which may not be easy after three decades of low price growth. The normalisation of monetary policy is therefore likely to be very gradual, and the first rate hike since 2006 may also be the last for a long time. Concerns about the impact of monetary policy tightening on financial markets and cross-border capital movements will also encourage the BoJ to be cautious.



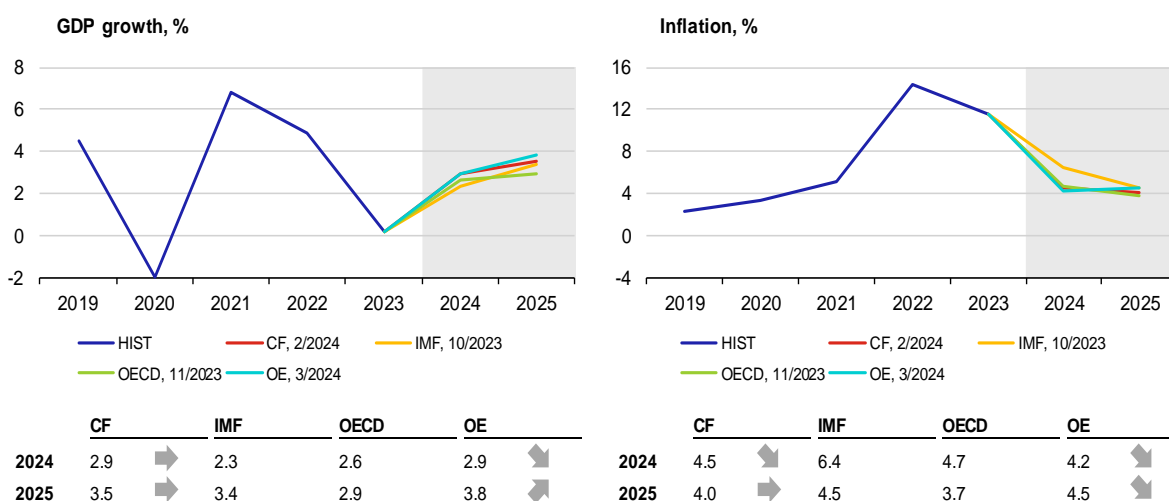
III.7 Russia

As expected, the current president, Vladimir Putin, won the presidential elections on 15–17 March, prolonging his time in power. The year-on-year inflation rate reached a 12-month high of 7.7% in February, with rising prices for services complemented by rising food prices being the main factors driving this inflation. The month-on-month inflation rate slowed from 0.9% to 0.7%. Real wage growth in the Russian Federation continues, with a year-on-year increase of 8.5% in December. This strong growth is supported by the ongoing crisis in the labour market, with the unemployment rate once again hitting an all-time low of 2.9% in January, with a total of 2.15 million people unemployed. Oil prices reached a four-month high in mid-March, due among other things to concerns about a possible disruption of supplies from the Russian Federation in response to the Ukrainian attacks on Russian refineries, damaging Rosneft’s biggest refinery. Nevertheless, the OPEC forecast for oil-demand growth for 2024 remains optimistic.



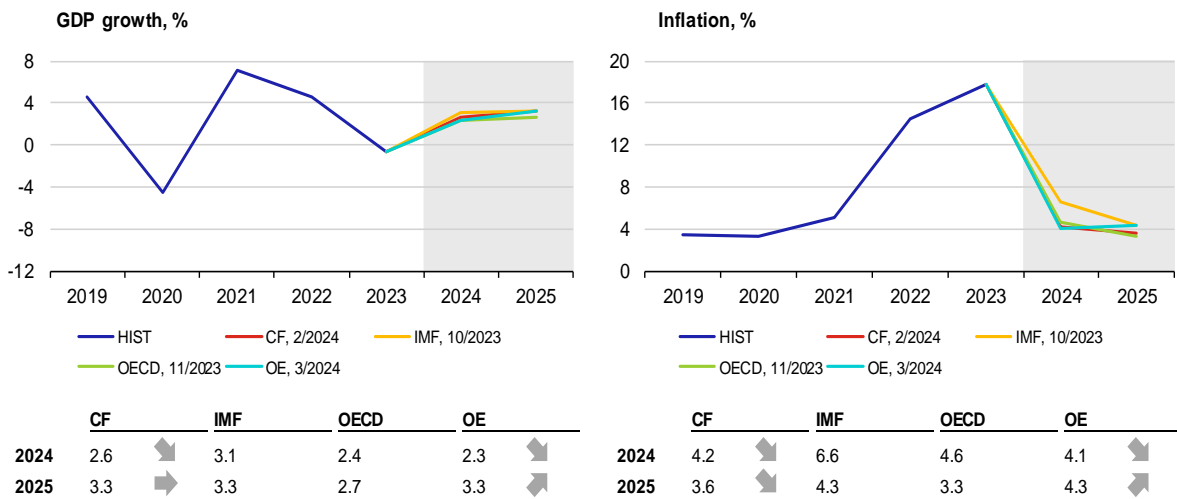
III.8 Poland

Inflation fell surprisingly strongly in Poland in February, reaching its lowest level since February 2021. Year-on-year inflation fell to 2.8% (from the revised 3.7% in January), entering the central bank’s target range. Consumer prices rose by 0.3% month-on-month. As expected, the central bank left its benchmark interest rate unchanged at 5.75% at its March meeting (before the publication of the February inflation figure). In its new forecast, it improved its outlook for both inflation and GDP growth, but remains cautious due to uncertainty over VAT on food and subsidised energy prices. Cost pressures are weakening and industrial producer prices are falling. Unemployment remains low, fostering strong year-on-year wage growth. The decline in inflation is also being fostered by an appreciating zloty exchange rate, thanks, among other things, to improved relations between the new government and the EU and faster drawdown of EU funds. However, inflation risks are on the upside due to uncertain fiscal policies. A further decline in core inflation, which is still elevated, will thus be important for the future development of interest rates. GDP growth was weaker than expected in the fourth quarter of 2023 due to stagnant demand. However, it should start to strengthen this year thanks to growth in real wages. The February CF expects GDP growth for this year and the next at 2.9% and 3.5%, and average inflation at 4.5% and 4.0%.



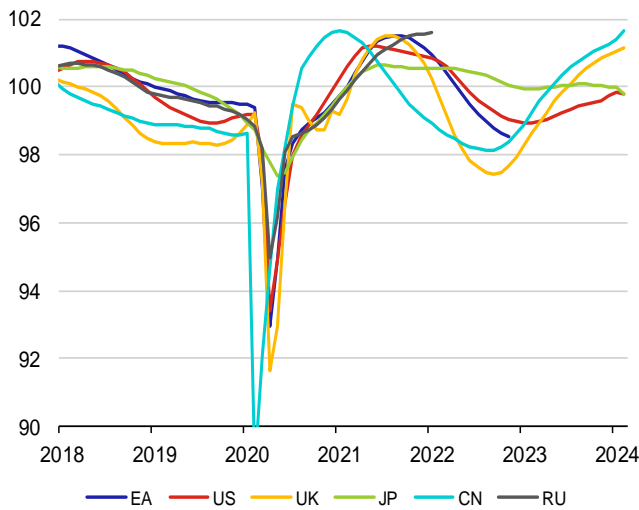
III.9 Hungary

The process of disinflation continued in Hungary at the beginning of this year, albeit at a slowing pace. Year-on-year inflation fell from 3.8% to 3.7% in February, while the CPI rose by 0.7% month on month. Core inflation slowed from 6.1% to 5.1%, with the highest price growth persisting in the services sector (10%). The central bank cut its key interest rate surprisingly sharply from 10% to 9% in February, and considers that the market expectations that the rate will be between 6% and 7% at the end of June are realistic. In the second half of this year, however, household consumption should start to recover and the favourable effects of last year's base should fade, leading to renewed inflationary pressures and thus to a more cautious easing of monetary policy. The central bank will also have to take into account the speed of rate cuts by the ECB. The forint depreciated at the start of the year partly due to the rapid fall in monetary policy rates and partly due to political disputes with the EU. However, the forint's depreciation is expected to slow in the coming months, partly thanks to a moderation in external imbalances. Real GDP fell by 0.9% last year as a whole. The negative development at the end of the year was mainly due to industry and construction, and also services to a lesser extent, while agricultural production grew strongly. On the demand side, GDP was reduced by household consumption and investment, while net exports rose, but only due to a sharp decline in imports. According to the February CF, however, the economy should record real growth of 2.6% and 3.3% respectively this year and the next. The CF estimate average consumer price growth at 4.2% this year and 3.6% next year

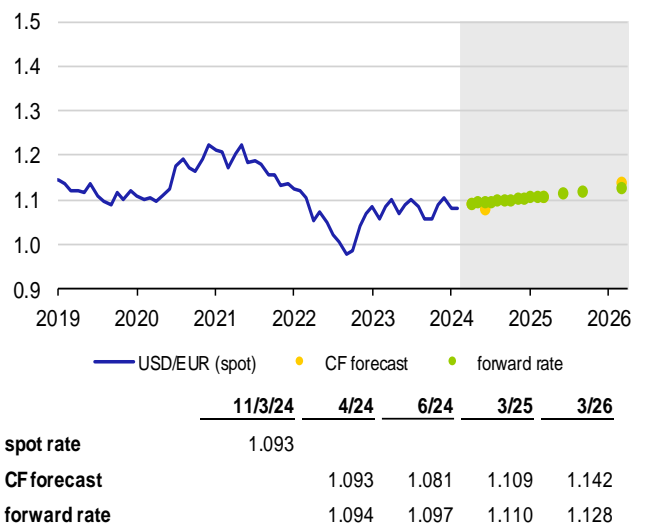


IV. Leading indicators and exchange rate outlooks

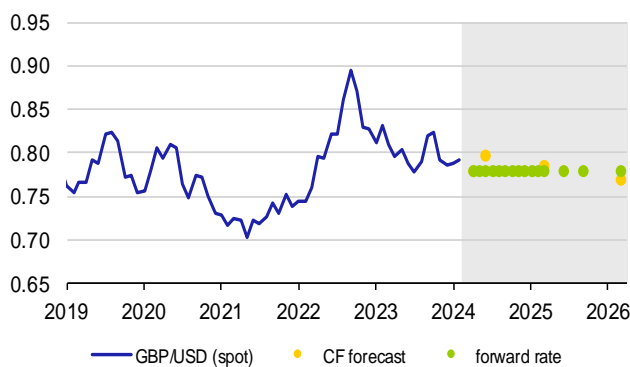
OECD Composite Leading Indicator



The US dollar (USD/EUR)

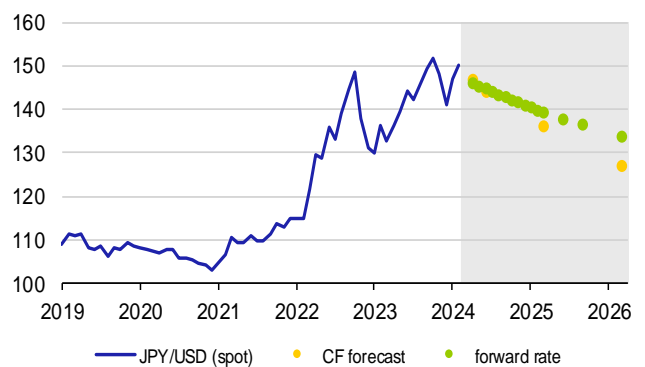


The British pound (GBP/USD)



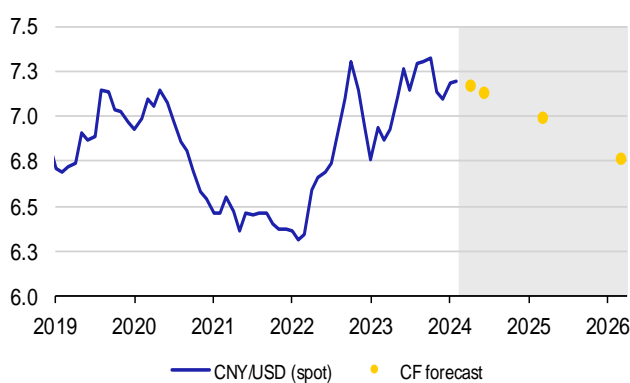
	11/3/24	4/24	6/24	3/25	3/26
spot rate	0.781				
CF forecast		0.781	0.798	0.787	0.770
forward rate		0.780	0.780	0.779	0.779

The Japanese yen (JPY/USD)



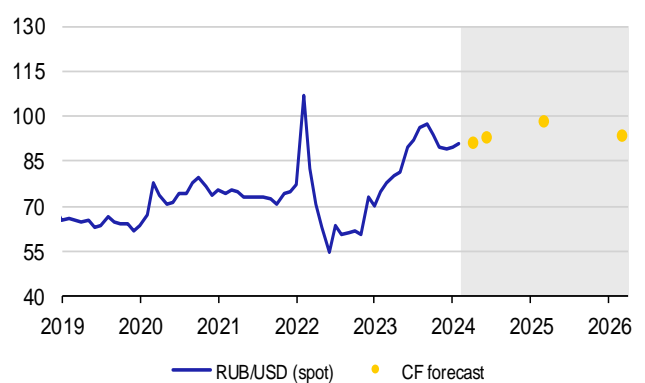
	11/3/24	4/24	6/24	3/25	3/26
spot rate	146.9				
CF forecast		146.9	144.3	136.3	127.1
forward rate		146.2	144.9	139.5	134.1

The Chinese renminbi (CNY/USD)



	11/3/24	4/24	6/24	3/25	3/26
spot rate	7.183				
CF forecast		7.174	7.136	6.999	6.769

The Russian rouble (RUB/USD)



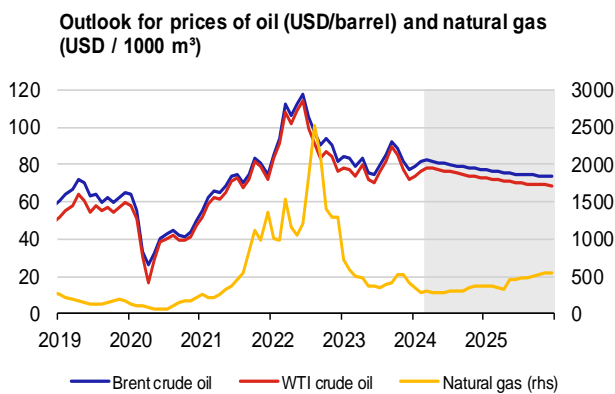
	11/3/24	4/24	6/24	3/25	3/26
spot rate	90.70				
CF forecast		91.52	93.55	98.33	93.94

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

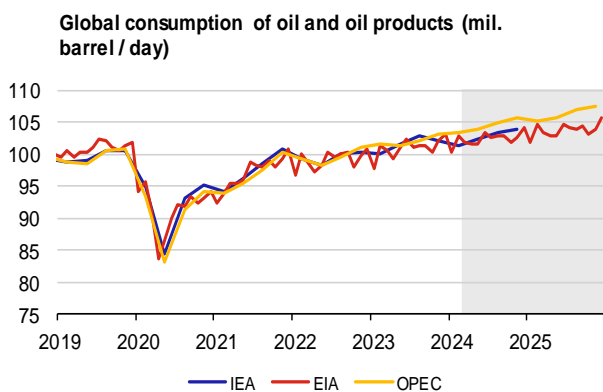
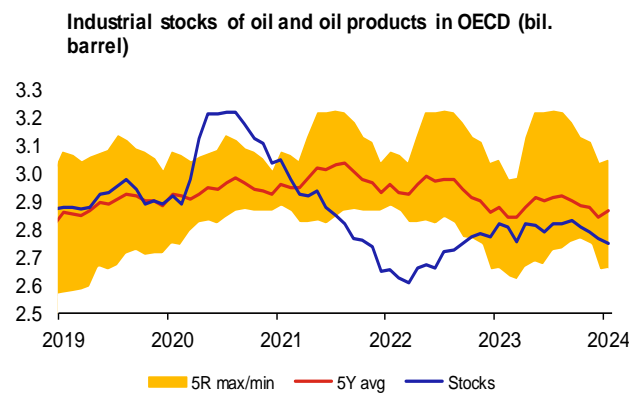
V.1 Oil

The Brent crude oil price stayed above USD 80/bbl from mid-February, then rose above USD 85/bbl in mid-March. It is being kept at quite a high level by OPEC+'s oil production cuts, which have been extended into 2024 Q2, and by ongoing geopolitical tensions in the Middle East, leading to higher transport prices and, due to longer routes, higher fuel consumption and an increase in offshore oil inventories. January oil production outages in the US and Libya also added to a rise in physical market tensions. Thus, money managers are increasing their net long positions on oil and closing speculative bets on an early fall in oil prices. A weakening dollar also added to higher oil prices since mid-February. However, the continued uncertain outlook for the Chinese economy and unexpectedly high production in non-OPEC+ countries are counteracting a significant oil price increase. Moreover, financial investors are concerned about weaker global economy growth due to the extended period of high interest rates and thus weaker growth in oil demand. In mid-March, oil prices reacted with a strong rise to news of the first decline in US crude oil inventories in seven weeks and a successful Ukrainian drone attack on one of Russia's largest refineries. Plus, the IEA raised its forecast for oil consumption growth this year due to stronger demand in the US and India.

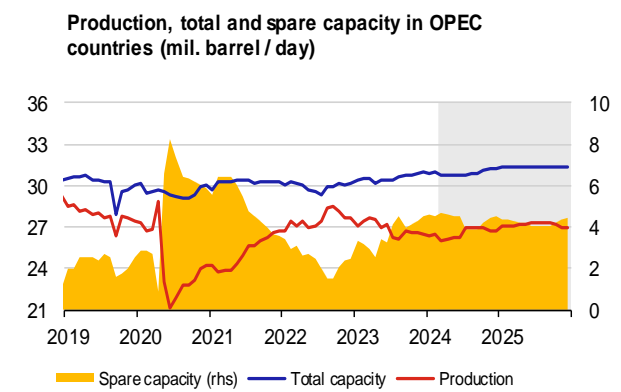
The EIA significantly raised its forecast for the Brent crude oil price in response to the OPEC+ alliance's decision to extend production cuts into Q2, which should maintain the market's oil supply deficit in this period. Global inventories should only start to rise slightly again in 2025. The Brent crude oil price is expected to rise gradually from its current level to USD 89/bbl in June and then start slowly falling in October to USD 82/bbl at the end of 2025. The market curve from mid-March remains falling and implies a Brent crude oil price of USD 77.3 and USD 73.7/bbl at the end of this year and the next, respectively. With a forecast of USD 81.2/bbl on the one-year horizon, the March CF fall roughly in the middle of these forecasts.



	Brent	WTI	Natural gas
2024	79.86 ↗	75.63 ↗	318.64 ↘
2025	75.02 ↗	70.43 ↗	454.89 ↘



	IEA	EIA	OPEC
2024	102.78 ↘	102.44 ↗	104.45 ↗
2025		103.82 ↗	106.30 ↗



	Production	Total capacity	Spare capacity
2024	26.55 ↘	30.90 ↘	4.35 ↘
2025	27.15 ↘	31.37 ↗	4.22 ↘

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

Note: Oil price at ICE, average natural gas price in Europe – World Bank data. Future oil and gas prices (grey area) are derived from futures. Industrial oil stocks in OECD countries – IEA estimate. Production and extraction capacity of OPEC – EIA estimate.

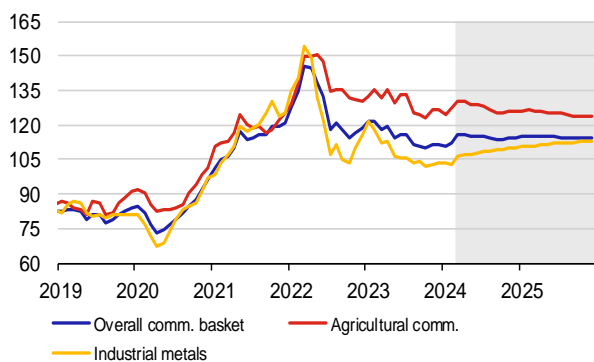
V.2 Other commodities

The price of natural gas in Europe bottomed out in the second half of February and then moved slightly upwards. This was due to the expected lower production of wind farms and concerns about LNG supply constraints due to growing demand from Asia and persistent technical problems at a key export terminal in the US (which also led to a lower gas price on the US market). By contrast, gas supplies from Norway remain stable. The several-month-long fall in the price of coal for the European market also halted in the second half of February. It then rose by around 15% by mid-March.

The industrial metals price index edged down in February, but rose in the first half of March to its highest level since May last year. Optimism was fostered by a further improvement in the global manufacturing PMI, which reached 50.3 in February. The prices of virtually all the index components except aluminium rose. Its growth was counteracted by the fact that Russian aluminium exports have not yet been included in the sanctions list. The price of nickel rose after nine months of falls due to production restrictions outside China because of low prices. On the other hand, the price of iron ore fell for the second consecutive month, as steel production in China remains weak.

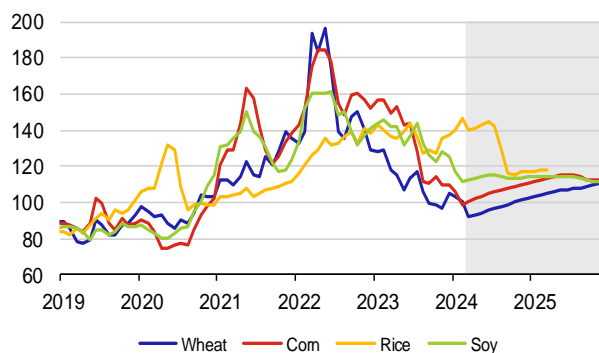
The food commodity price index rose for the second consecutive month, reaching its highest level since July last year in mid-March. Prices of both soy (due to bad weather in South America) and corn (due to lower harvests in South Africa, Ukraine and Mexico amid rising global demand) have risen from more than three-year lows. The price of sugar has also risen, and the price of cocoa is at a record level (due to poor harvests in Africa). By contrast, the price of wheat continued to fall strongly due to low imports to China and high expected global inventories. Coffee prices also fell significantly.

Non-energy commodities price indices



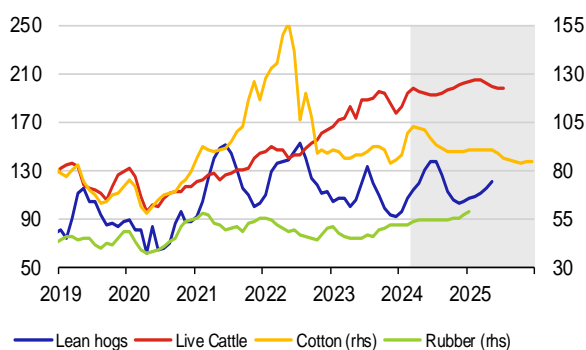
	Overall	Agricultural	Industrial
2024	114.3 ↗	127.3 ↗	107.6 ↗
2025	114.7 ↗	125.0 ↗	111.9 ↗

Food commodities



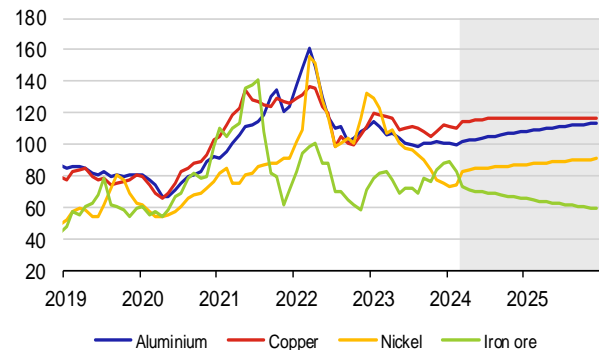
	Wheat	Corn	Rice	Soy
2024	98.1 ↘	105.5 ↗	132.6 ↘	114.0 ↗
2025	107.4 ↘	113.7 ↗	117.6 ↘	113.3 ↗

Meat, non-food agricultural commodities



	Lean hogs	Live Cattle	Cotton	Rubber
2024	115.8 ↗	194.9 ↗	94.2 ↘	54.0 ↗
2025	112.0 ↗	201.5 ↗	87.3 ↘	58.3 ★

Basic metals and iron ore



	Aluminium	Copper	Nickel	Iron ore
2024	104.4 ↗	115.1 ↗	83.8 ↘	72.2 ↘
2025	111.3 ↗	116.8 ↗	89.5 ↗	62.7 ↘

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.

The rise of artificial intelligence: Does humanity have a revolutionary yet double-edged weapon?¹

In today's world, in which artificial intelligence (AI) is making such rapid strides, we are seeing both promising opportunities and significant challenges. AI, which runs the gamut from basic reactive machine AI and sophisticated limited memory AI, to advanced generative models, is transforming both the industrial and social environments. While AI's economic impacts promise efficiency gains and the potential to solve complex global challenges, we must not overlook the ethical, security and social issues it brings. The growth of AI is giving rise to a debate about regulation, privacy protection and the impact on the labour market, where automation could lead to changes in the very nature of employment. In this context, it is essential that the development of AI be accompanied by carefully considered regulation and an ethical approach that strikes a balance between technological progress and the protection of fundamental human values.²

What exactly is artificial intelligence?

Ideas about what artificial intelligence (AI) exactly is vary among people. The spectrum of ideas is wide, from artificial intelligent beings like in the movie "Terminator" (1984) to software that can automatically drive a car. Yet the field of artificial intelligence began fascinating humanity much earlier than this. Consider Talos, a bronze automaton that protected the island of Crete in Greek mythology. If we were to look for a uniform and precise definition of artificial intelligence, we would not find one. This is understandable because the application of various forms of AI across human activities and disciplines is continuously diversifying. Nevertheless, some agreement can be found as regards an understanding of the meaning of the term. AI is understood to be "software" that simulates human thought and action. The term AI is typically used for machines and software exhibiting activities associated with intelligence,³ such as learning and problem-solving.

AI is already able to perform tasks that were unimaginable until recently. For example, it can conduct dogfights better than human pilots, can assess the risk of heart failure or identify an emerging cancerous tumour from an image faster than a doctor, enables the easy imitation of human voices and likenesses, and can detect lying and other emotions with the help of sensors.⁴ Yet we don't have to be limited to only "high-tech" ideas about its use. AI can also be used in creative activities and art, such as video and image creation (Figure). And yes, here we start seeing that its use also has its downside, i.e. risks, ethical problems, and negative and positive externalities, but we will get to those later.

AI works in many areas without us even knowing it. We have AI available to us through the modern technologies in our phones, newer car models, internet search engines, etc. AI's ability to process large volumes of data quickly means it can take on simpler tasks, which will have consequences for us and the limited time we all have. People will be able to devote more time to tasks that still require the human factor, but are also likely to have more free time.

The field of AI is developing "exponentially" and, despite some ambiguity, we can distinguish three main areas. These are (i) narrow AI, (ii) reactive machine AI, and (iii) limited memory AI. The first type of AI is very narrowly targeted and lacks the ability to learn. However, this is not strictly something negative – it is how it was created to

Figure – Generated by AI



Source: Gencraft.com; "Global economic outlook"

¹ Written by Luboš Komárek and Michaela Ryšavá, CNB analyst and postgraduate student at the Department of Economics at the Faculty of Economics of Prague University of Economics and Business. The views expressed in this article are those of the authors and do not necessarily reflect the official position of the Czech National Bank.

² The lead paragraph was generated with the help of AI (ChatGPT) on the basis of this article.

³ Intelligence (from the Latin words 'inter' and 'legere') denotes a disposition for thinking, learning and adaptation, and manifests itself in intellectual performance. There are several types of classifications of intelligence. Robert Sternberg, author of the Triangular Theory, distinguishes between analytical, creative and practical intelligence. Howard Gardner takes a different angle, defining linguistic, logical-mathematical, spatial, musical, bodily-kinesthetic, intrapersonal, naturalist and existential intelligence. David Perkins then defines neural, experiential and reflective intelligence. A detailed understanding of the nuances of the given classifications goes beyond the scope of this text, but it illustrates what can be understood by the term 'intelligence' and where artificial intelligence subsequently has a place.

⁴ See e.g. Dřímalka (2023).

do certain tasks. It is able, for example, to recognise and generate sounds or images. Most of us know it as Siri, Google Assistant or Alexa. The second type of AI is able to respond to human or other stimuli yet does not create a memory from which it would be able to learn. Once again, most of us have probably encountered it in the form of advertising on internet search engines that focus on our frequently searched products, backed by so-called recommendation systems. This category includes, for example, the various spam and anti-spam systems that we have had in our mailboxes for more than a decade. The third type of AI has the potential to learn from past observations, which it stores in memory. Such systems are, for example, suitable for forecasting in different areas.⁵ They are already used in highly developed weather forecasting systems, in autonomous driving of vehicles, investing in financial products, etc. However, there are also other alternative classifications of AI, namely (i) a narrower definition of AI, i.e. softwares that enable the imitation of human intellect and behaviour, (ii) machine learning, i.e. statistical algorithms enabling the implementation of artificial intelligence through data, (iii) deep learning, i.e. a subset of machine learning that uses neural networks, genetic algorithms, etc. These classifications are also evolving, and it is possible that over time we will look at such AI divisions a little differently.

So where does that leave the now much-discussed generative AI? This AI modifier is perhaps more used than the others today, and we refer to it several times in our article. Generative AI falls into a more narrowly defined concept of artificial intelligence, meaning it stands on the border between the first and second category mentioned above. Its applications are trained on huge data sets from past observations (i.e. it does not learn in real time), based on which it can recognise “behavioural patterns” and formulate conclusions. It can receive instructions and use machine learning to process them into new patterns of behaviour and content. The sub-applications that have emerged from generative AI have led to their categorisation into the areas of text, music and sound, image and video generation.

The rise of artificial intelligence and its economic importance

Artificial intelligence is currently one of the fastest developing and disruptive technologies in the world. Research into and the use of AI are hardly in their infancy, as we have already mentioned, yet a number of applications and tools across industries are already commonly used, and are still being worked on intensively. Soon, there will probably be no industry in which AI does not have a visible say, or cannot have a say.

AI could become a key driver for economic development and for changing the way people live and work. Its spread and consequent impact will take place across industries and could help solve a number of existing problems. 2023 was a watershed year as it kicked off tremendous growth in generative artificial intelligence using large language models. AI has become an important topic (Chart 1) and has sparked a competitive battle, in which Microsoft, for example, has so far been successful in cooperation with OpenAI (in which Microsoft has invested heavily). The launch of OpenAI’s ChatGPT in November 2022 and Google’s Bard and their subsequent expansion were the breakthrough for ordinary consumers. These services are freely available, to a certain extent. All of this seems similar to the situation in the early 1990s, when the Internet was introduced to the general public. Today, we cannot imagine life without it. Another comparison could be that this is a new industrial revolution, as it is reasonable to believe that AI will penetrate all areas of human activity.

Chart 1 – Interest in artificial intelligence over time

(searches including the term AI, worldwide)

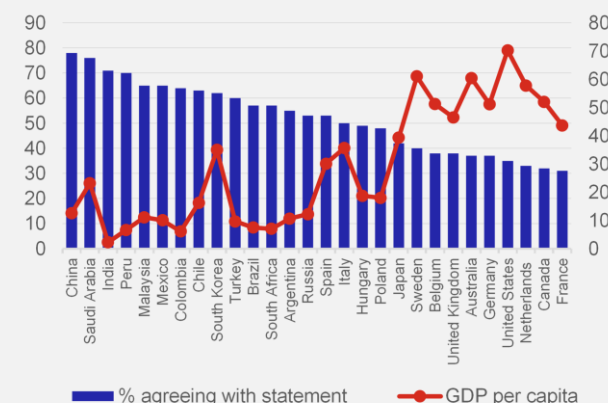


Source: Google Trends

Note: The numbers represent relative interest in searches, with a value of 100 representing the highest possible popularity of the term.

Chart 2 – Public sentiment towards artificial intelligence

(%; rhs in thousands of USD)



Source: Ipsos, World Bank

Note: Survey at the end of 2021. A statement that AI-powered products and services have more advantages than disadvantages.

⁵ In the authors’ opinion, it is not a question of whether, but how long it will be before AI begins to have a say in the preparation of macroeconomic forecasts, where dynamic stochastic equilibrium models (DSGEs) currently play a leading role. Indeed, AI could help with many problems in this area, from the linearity of the links in these models to their costly recalibrations. One of the first papers to address the application of AI in macroeconomic models was that by IMF economists, see Atashbar and Shi (2023).

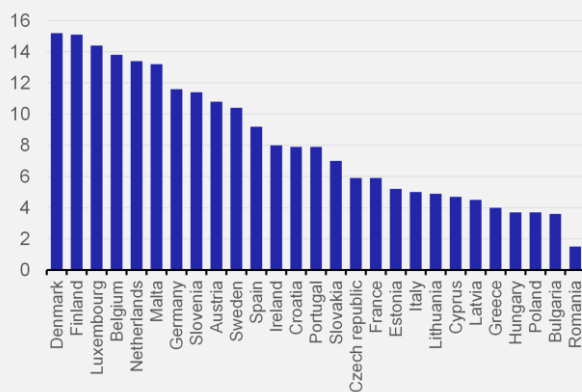
As AI has the potential to significantly impact society, it is important how the public perceives its arrival and usefulness. For example, an Ipsos survey at the end of 2021 showed that the attitude of around 20,000 adults to AI varies across 28 countries. Adding the GDP per capita indicator showed that people from richer economies are more reticent about AI products and services, whereas those from developing and emerging economies are more willing to accept AI (Chart 2). Looking, for example, at OECD data on the number of AI-related patents, the world leaders are the USA, Asia (especially Japan, South Korea and China), while the EU is not lagging behind either.

Investing in and implementing artificial intelligence

Artificial intelligence is penetrating more and more areas, and its use is crucial for future economic activity. A 2018 study by the McKinsey Global Institute predicted that roughly 70% of businesses could adopt at least one type of AI technology by 2030, with less than half are likely to use the full range of AI technologies. The deployment of AI tools is currently rapidly increasing and we are finding them in a wide range of areas. In the EU, for example, despite the high heterogeneity between the individual members, 8% of companies with at least ten employees used it last year. For the euro area, the figure is even just under 9%, with Chart 3 showing that Denmark (15.2%) reported the highest share of businesses using AI in 2023, followed closely by Finland (15.1%). A widespread use of AI is also evident in Luxembourg (14.4%), Belgium (13.8%), the Netherlands (13.4%) and Malta (13.2%). On the other hand, in most other countries, less than a tenth of enterprises used AI, with the lowest shares in Romania (1.5%), Bulgaria (3.6%), Poland (3.7%) and Hungary (3.7%).

Chart 3 – Deployment of artificial intelligence in the EU

(share of AI-using enterprises in 2023)

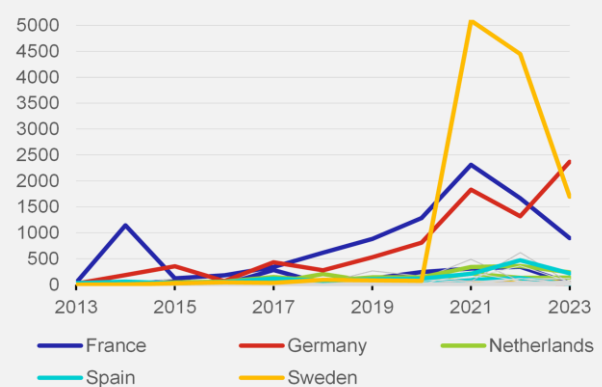


Source: Eurostat.

Note: Enterprises with at least 10 employees, excluding the financial sector.

Chart 4 – EU countries attracting most investment in AI

(reported incoming investments in USD millions)



Source: ETO Country Activity Tracker

Less than a year after the introduction of a number of AI tools, surveys also confirm their regular use by enterprises. One example is a 2023 survey by McKinsey & Company, indicating that one third of respondents answered that they regularly use at least one generative AI application. Roughly 40% of respondents also said they plan to increase investment in AI due to the overall progress in this area. Looking at the published value of incoming investment in AI using the example of the EU, the figures have been rising in recent years (Chart 4). The most significant investment inflows were seen mainly in Germany, Sweden, France, the Netherlands and Spain last year. However, these five EU member states have long had above-average levels compared to the rest. In 2023, for example, Malta, Latvia, Cyprus, Croatia and Bulgaria recorded more or less zero incoming investment. However, these states have not been attracting AI investors over the long term.

Specific examples

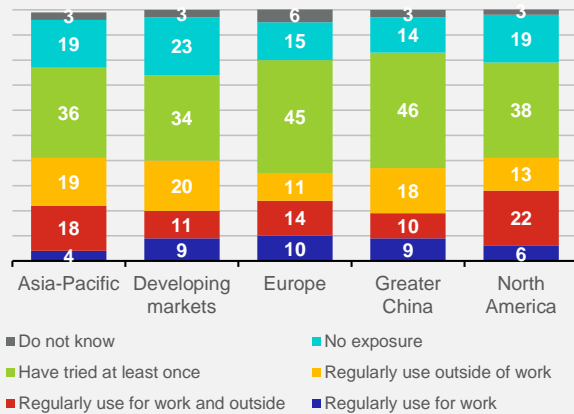
Although the AI boom is still in its early stages, its use is already quite widespread. The previously mentioned survey showed that publicly available AI tools are implemented across regions (Chart 5) and sectors (Chart 6) and also in various “forms”. Specifically, almost 80% of all respondents have encountered AI in some form (at or outside work), and over 20% regularly use it at work. In terms of region, regular AI use is highest in North America, while in terms of industry, technology, media and communications lead. The most commonly cited more specific uses of generative AI tools are in marketing and sales, product and service development, and service operations, with disruptive changes expected in the technology and financial services industries.

Concrete examples of the useful application of AI can be found across sectors. For example, in healthcare, AI has high potential through diagnostic support based on patient data or the actual evaluation of examinations. In the automotive industry, the application of autonomy, whether in car maintenance or driving itself. In transportation and logistics in general,

AI can effectively manage traffic to reduce congestion in the form of traffic jams while increasing safety. AI could help financial services through personalisation, greater automation of operations, and more efficient investing or personal finance management. Retail can also harness AI's potential through personalisation, design and manufacturing, as well as through anticipating customer demand. Media archiving, tailor-made content creation and personalised marketing and advertising will also play a role in technology, media and communication. In manufacturing, AI can potentially improve

Chart 5 – Exposure to generative AI tools by region

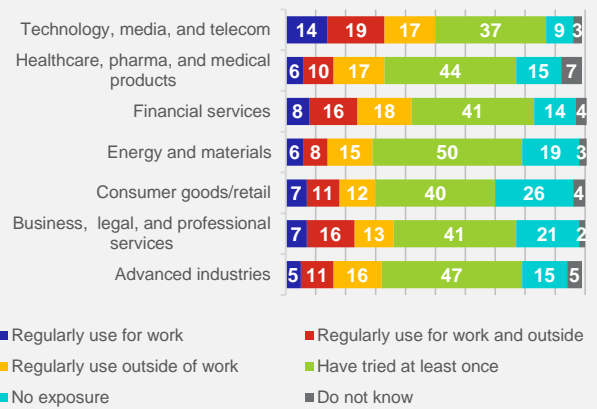
(% of respondents)



Source: McKinsey & Company
 Note: Due to rounding, the figures may not add up to 100%.

Chart 6 – Exposure to generative AI tools by industry

(% of respondents)



Source: McKinsey & Company
 Note: Due to rounding, the figures may not add up to 100%.

monitoring and automatic correction, and optimise supply-chain fluidity. However, AI also has potential in the energy sector, whether in the form of smart meters or more efficient grid operation and maintenance. Another topic is the impact of AI on education, where systemic changes will probably have to occur, for example in assessment. The classic writing of theses at universities is also likely to undergo changes. There will be truly revolutionary shifts in some fields. For example, the one taking place in the film industry is shocking, and it is already technically possible to make a film with a deceased actor. It will therefore be necessary to learn how to work with AI sensibly and effectively in general. (PwC, 2017)

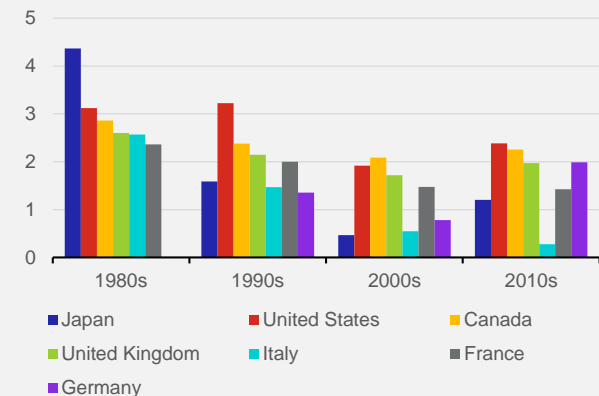
The impact of artificial intelligence on productivity and, by extension, economic growth

AI has great potential to reverse the decline in productivity growth and thus contribute to growth in global economic activity. Economic growth has stagnated or slowed in many major economies since the 1980s. Chart 7 illustrates this development using the example of the seven most developed countries in the world (the G7), where growth has fallen on average from 3% to about a weak half over the past few decades. According to an earlier study, “Sizing the prize” by PwC from 2017, AI could potentially contribute USD 15.7 billion to the global economy by 2030, corresponding to a 14% increase in global GDP. The greatest economic benefits from AI are likely to be felt in China (26% increase in GDP), but also in the US (14.5% increase), these two making up about 70% of the global economic impact. More than half of the economic benefits will be driven by increased productivity. However, AI-driven product improvements supporting consumer demand will also play a major role. As AI increases productivity, product value, and consumption in general, retail, financial services and healthcare will see the highest profits, according to the study. Yet the pace of AI adoption, as well as the global interconnectedness and the structure of the labour market in a given country, will affect the size of the impact.

New studies on the economic potential of AI point to a promising to overwhelming impact, mainly thanks to productivity gains. One example is a 2023 study by McKinsey & Company that estimated the contribution of generative AI through productivity to the global economy at up to USD 4 trillion per year. Just how massive the impact could be is highlighted by the fact that this is roughly comparable to the United Kingdom’s GDP. About three quarters of the potential added value comes from four

Chart 7 – Real GDP growth in recent decades

(annual GDP growth rates in the G7 group of economies)



Source: OECD.
 Note: This is the average of the values for a given decade. Data are only available for Germany since 1992.

areas: customer operations, marketing and sales, software engineering, and research and development. Generally speaking, all industries will feel the impact, but banking and retail, for example, could see an especially strong impact on revenues. The full use of AI could mean an additional USD 300 billion per year and up to USD 600 billion per year for retail. In general, therefore, AI can create both new products and services as well as entire industries, which would increase consumer demand and create new sources of income.

Potential problems and challenges associated with AI deployment

Reality or “fake news”? Voice, image and video generation will be a potentially big problem for the credibility of information sources. This might seem quite harmless, yet even now, according to various surveys, people are incorrectly attributing authorship, i.e. whether it is really reality or an image created by AI. Images generated with Midjourney (especially the new version 5)⁶ are captivating and flooding the world. Fake yet very realistically executed photos of Pope Francis in a luxurious white winter jacket and images of ex-US President Donald Trump being arrested are well known. And what if they were also fake, yet hardly differentiable from reality, videos with audio? The potential for abuse is therefore huge, especially for the dissemination of false or alarmist news, but also in the “unfair” influencing of public opinion. This will be an enormous challenge for our society, in which social media is at the forefront. Yet it may also be an opportunity for reputable media such as TV news, established dailies and magazines. These may be more sought-after as the threat from fake news increases, as the reader will not have a quick opportunity to verify whether the information received is reality, fiction or fraud.

The adoption of AI can be very energy-intensive and environmentally demanding. The massive adoption of AI may be slowed due to the energy consumption of some applications, e.g. image generation, which usually do not bring any “pure” added value. Devices that support AI are generally many times more energy-hungry than traditional information sets, and their cooling may require much more water. Yale University professor K. Crawford (2022), for example, states in her book that one GPT chatbot query can consume up to a thousand times more energy than a Google search query. She also states that a normal conversation with ChatGPT (20 to 50 questions) requires about half a litre of fresh water to cool servers in data centres. A study by Li et al. (2023) says, for example, that just the training of the GPT language model on GPT-3 consumed 700,000 litres of water. This is same quantity that would be sufficient for the average person in a Czech household for more than 20 years.

Although AI raises a lot of expectations and prospects for benefits, caution is important. There will certainly be barriers and costs in the transition to AI, and the adoption of AI could potentially exacerbate disparities between states, but also between companies and workers, as the benefits are likely to be uneven. Despite the previously mentioned position, the leaders in AI promotion are mostly developed states, which could thus increase their lead over developing states. They are being more or less forced to do so due to the slowing GDP growth, but there is also an incentive to replace humans with machines, as wages in these states tend to be high. China is an exception in this regard, investing massively in AI and implementing a national strategy to become a global supply-chain powerhouse (McKinsey Global Institute, 2018). A new IMF analysis (2024) from January this year even warns of worsening inequality and greater social tensions, as developing

Chart 8 – Risks related to artificial intelligence

(% of respondents)

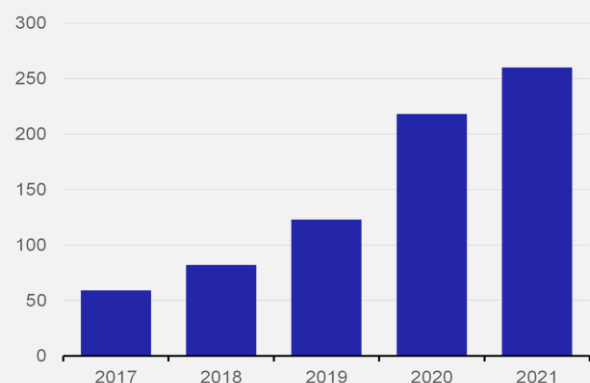


Source: McKinsey & Company

Note: Risks that organisations consider relevant and seek to mitigate.

Chart 9 – Incidents and controversies in artificial intelligence

(number of AI-related incidents and controversies)



Source: AIAAIC Repository

⁶ It is clear that new versions – and not only of Midjourney – will arrive and will be increasingly perfect. Some other competing products, such as ControlNet, DALL-E and Dream Studio, have some other improvements for image creation.

states will not be able to fully exploit the benefits of AI. From the workers' point of view, those with lower incomes and of higher age may be at a disadvantage compared to high-income and young employees, who are likely to become better off. How the impact of these processes on the convergence of emerging and developing states will manifest itself remains a question.

Ethical issues, for example, are an important topic related in AI use. As AI technology is somehow developed and trained, efforts must be taken to keep it neutral, in other words, impartial. Training it in a responsible manner is therefore essential for its subsequent functioning. Given the significant quantities of data fed into AI platforms, the safe use of these data must also be ensured, as they will be used to improve and further train AI. Users should be cautious and should not enter data that they do not want to publish, or that are secret or sensitive in any way.

The challenge of regulating the adoption and use of AI must also not be neglected. There is a general effort to properly configure AI, yet the lack of precedent means the regulatory environment regarding AI is undeveloped, and there are no binding global standards. However, the first step towards defining boundaries has been taken by the European Union through new legislation in the form of the Artificial Intelligence Act. Negotiations on this regulation culminated at the end of last year, while the Act is not expected to enter into force until 2025 at the earliest. The aim of the regulation is to ensure the safety of AI systems deployed in the EU (especially high-risk ones such as for critical infrastructure or the judiciary) while respecting the EU's fundamental rights and values. The Act should also support investment and innovation in AI in Europe.

However, many companies are not yet addressing the potential challenges associated with greater AI adoption. In fact, the recent McKinsey & Company survey already mentioned several times revealed that only about 20% of respondents (employers) regulate AI use by employees in some way. The three most relevant risks when implementing generative AI they stated were: inaccuracy, cybersecurity, and intellectual property infringement (Chart 8). However, the survey also showed that few companies are actually trying to mitigate the most frequently cited risk: inaccuracy. Yet the numbers of incidents and controversies surrounding AI are growing every year, as awareness of the misuse of this technology is also growing (Chart 9), and the topic should therefore not be overlooked in the future.

Artificial intelligence and the labour market

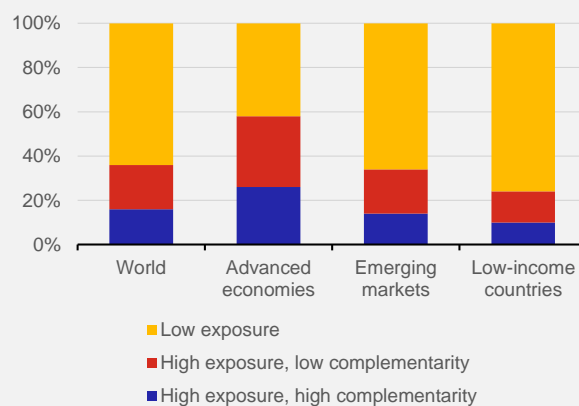
The labour market and the ability of AI to “replace” employees is one of the concerns for the future. It can reasonably be assumed that many jobs will be threatened or replaced, especially those with a large proportion of activities that are routine or can be automated. In many cases, however, AI is rather more likely to complement human work and improve performance. There will be dynamic changes on the labour market (e.g. greater employee turnover), but it will be important for companies to invest in improving employee qualifications or giving them the necessary retraining. Moreover, the demand for AI tools will grow in many industries, and therefore more experts will be needed not only to develop them, but also to maintain them, creating new jobs.

Generative AI has the potential to significantly change the work environment and the nature of work. The automation of work activities that take up to 70% of employees' time will be crucial. According to recent estimates, AI should be able to automate up to half of work activities between 2030 and 2060. Such advances mean that labour productivity could grow across the economy. Labour productivity could grow by 0.1% to 0.6% per year to 2040, depending on the scale and scope of AI adoption. However, it will also be important to invest in workers and support them when learning new skills or completely changing careers. If these risks are reduced to a minimum, AI could make a significant contribution to global economic growth. (McKinsey & Company, 2023a)

However, expert opinion on the specific impact of AI on the global labour market is not unanimous. The only consensus is that there will be significant labour movements. In the short to medium term, there are likely to be structural job shifts but also reductions in the numbers of workers in areas where the human factor is no longer needed, while job creation is more likely to prevail in the long term (European Parliament, 2019). As AI will affect labour productivity, it may also have an impact on the demand for labour and therefore wages. A recent analysis by the IMF indicated that AI will affect about 40% of all jobs worldwide, while in advanced economies it may be as high as 60% (greater risks but also opportunities), while in low-income countries only about 26%, with emerging markets also recording a smaller share (Chart 10). On the other hand, large-scale retraining and job creation should take place thanks to the AI value chain itself and also

Chart 10 – The impact of artificial intelligence on jobs

(employment shares by exposure to AI and complementarity)



Source: ILO, IMF

Note: The share of employment within each group of states is calculated as a weighted average of the working-age population.

thanks to changes in productivity and consumer demand (McKinsey & Company, 2023b). Not only will new “creatives” be needed to further develop AI, but also a group to maintain, operate, and regulate the technology. In general, a careful balance of policies will be needed to properly harness the potential of AI. States will need to create environments and retraining programmes for vulnerable workers to make the transition to AI more inclusive and limit any worsening of overall inequality (IMF, 2024). Moreover, AI cannot, at least for now, replace all human skills.

Conclusion

Artificial intelligence is making its way into virtually all areas of our lives, thus starting a new era. The advent of this technology has attracted worldwide attention and generated huge enthusiasm, as the first pilot projects (such as ChatGPT and Bard) are so far convincing. On the other hand, there is also a certain amount of concern and timidity. While AI could potentially boost global economic growth by boosting labour productivity, it could also replace many jobs, exacerbate inequality, and raise ethical issues. If we were asked to state our own position on whether humanity has a revolutionary yet double-edged weapon in its hands, we are inclined to think that it does. So, there will be specific areas where AI will need to be supervised. On the other hand, in a number of areas, AI will bring revolutionary changes that simply belong to the 21st century. The introduction of AI seems rather similar to the early days of the internet. As we all know, today we basically could not imagine life without it.

However, time is needed to fully appreciate the benefits and risks. The net effect of AI’s potential impact on the global economy is difficult to predict. We can see that a set of regulatory and other policies will need to be presented to harness the enormous potential of AI for the benefit of all and to face up to the significant challenges (ethical, privacy, legal, criminal, etc.). The further development of AI will also depend on whether its use will be charged (lower versions of the software) or not.⁷ We will continue to focus on AI from the perspective of economists in future issues of GEO.

Sources

Adobe Firefly (2024): *Generativní umělá inteligence vs. Jiné typy umělé inteligence*, 2024, <https://www.adobe.com/cz/products/firefly/discover/generative-ai-vs-other-ai.html>

Atashbar, T. – Shi, R. A. (2023): *AI and Macroeconomic Modeling: Deep Reinforcement Learning in an RBC model* in: IMF Working Papers, Volume 2023, Issue 040. <https://www.elibrary.imf.org/view/journals/001/2023/040/article-A001-en.xml>

Crawford, K. (2022): *The atlas of AI. Power, Politics, and the Planetary Costs of Artificial Intelligence*, Yale University Press, 2022. ISBN: 0300264631

Dřímalka, F. (2023). *Budoucnost nepráce. [The no-work future]* 1st issue, ISBN 978-80-11-03771-0

Li, P., Yang, J., Islam, M. A., & Ren, S. (2023): *Making AI Less “Thirsty”: Uncovering and Addressing the Secret Water Footprint of AI Models*, Cornell University

European Parliament (2019): *Economic impacts of artificial intelligence (AI)*, July, 2019, [https://www.europarl.europa.eu/RegData/etudes/BRIE/2019/637967/EPRS_BRI\(2019\)637967_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2019/637967/EPRS_BRI(2019)637967_EN.pdf)

McKinsey & Company (2023a): *The economic potential of generative AI: The next productivity frontier*, June, 2023, <https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/the-economic-potential-of-generative-ai-the-next-productivity-frontier#introduction>

McKinsey & Company (2023b): *The state of AI in 2023: Generative AI’s breakout year*, August, 2023, <https://www.mckinsey.com/capabilities/quantumblack/our-insights/the-state-of-ai-in-2023-generative-ais-breakout-year>

McKinsey Global Institute (2018): *Modeling the impact of AI on the world economy*, September, 2018, <https://www.mckinsey.com/featured-insights/artificial-intelligence/notes-from-the-ai-frontier-modeling-the-impact-of-ai-on-the-world-economy>

MMF (2023): *Artificial Intelligence. What AI means for economics*, December, 2023, <https://www.imf.org/en/Publications/fandd/issues#1e7ad5c45f7145edac4368379d57f7ab>

MMF (2024): *Gen-AI: Artificial Intelligence and the Future of Work*, January, 2024, <https://www.imf.org/en/Publications/Staff-Discussion-Notes/Issues/2024/01/14/Gen-AI-Artificial-Intelligence-and-the-Future-of-Work-542379>

PwC (2017): *Sizing the prize*, June, 2017, <https://www.pwc.com/gx/en/issues/analytics/assets/pwc-ai-analysis-sizing-the-prize-report.pdf>

Keywords

artificial intelligence, productivity, economic growth, labour market

JEL classification

E24, O33, O40

⁷ If lower versions are always made available to the general public free of charge, the massive use of AI would be greatly stimulated.

A1. Change in predictions for 2024

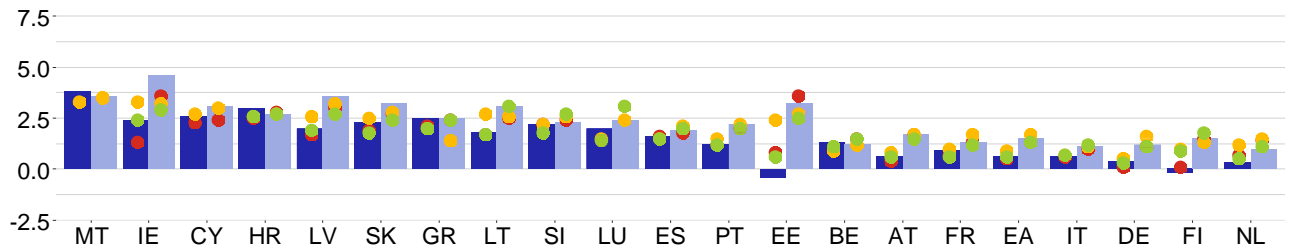
	GDP growth, %				Inflation, %											
	CF	IMF	OECD	CB / OE	CF	IMF	OECD	CB / OE								
EA	0	2024/3	-0,3	2024/1	-0,3	2024/2	-0,2	2024/3	0	2024/3	+0,4	2023/10	-0,3	2024/2	-0,4	2024/3
		2024/2		2023/10		2023/11		2023/12		2024/2		2023/4		2023/11		2023/12
US	+0,1	2024/3	+0,6	2024/1	+0,7	2024/2	-0,1	2023/12	+0,2	2024/3	+0,5	2023/10	-0,6	2024/2	-0,1	2023/12
		2024/2		2023/10		2023/11		2023/9		2024/2		2023/4		2023/11		2023/9
UK	-0,1	2024/3	0	2024/1	0	2024/2	+0,3	2024/2	-0,1	2024/3	+0,7	2023/10	-0,1	2024/2	-0,5	2024/2
		2024/2		2023/10		2023/11		2023/11		2024/2		2023/4		2023/11		2023/11
JP	-0,1	2024/3	-0,1	2024/1	0	2024/2	+0,2	2024/1	0	2024/3	+0,7	2023/10	0	2024/2	-0,4	2024/1
		2024/2		2023/10		2023/11		2023/10		2024/2		2023/4		2023/11		2023/10
CN	+0,1	2024/3	+0,4	2024/1	0	2024/2	+0,3	2024/3	-0,1	2024/3	-0,5	2023/10	+0,1	2024/2	-0,4	2024/3
		2024/2		2023/10		2023/11		2024/2		2024/2		2023/4		2023/11		2024/2
RU	+0,3	2024/2	+1,5	2024/1	+0,7	2024/2	+0,7	2024/3	0	2024/2	+1,7	2023/10	0	2024/2	+0,6	2024/3
		2024/1		2023/10		2023/11		2024/2		2024/1		2023/4		2023/11		2024/2

A2. Change in predictions for 2025

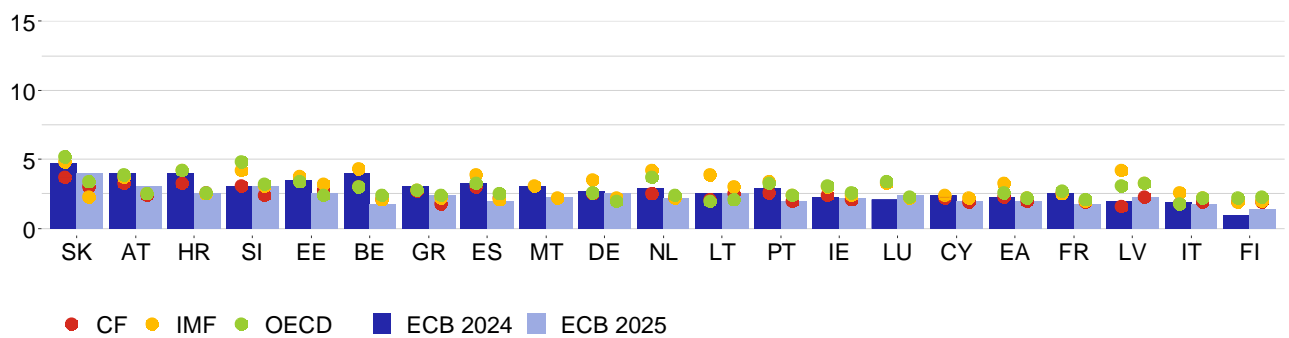
	GDP growth, %				Inflation, %											
	CF	IMF	OECD	CB / OE	CF	IMF	OECD	CB / OE								
EA	0	2024/3	-0,1	2024/1	-0,2	2024/2	0	2024/3	0	2024/3	0	2023/10	-0,1	2024/2	-0,1	2024/3
		2024/2		2023/10		2023/11		2023/12		2024/2		2023/4		2023/11		2023/12
US	-0,1	2024/3	-0,1	2024/1	0	2024/2	0	2023/12	0	2024/3	+0,3	2023/10	-0,2	2024/2	-0,1	2023/12
		2024/2		2023/10		2023/11		2023/9		2024/2		2023/4		2023/11		2023/9
UK	0	2024/3	-0,4	2024/1	0	2024/2	+0,5	2024/2	+0,1	2024/3	+0,3	2023/10	-0,1	2024/2	+0,3	2024/2
		2024/2		2023/10		2023/11		2023/11		2024/2		2023/4		2023/11		2023/11
JP	+0,1	2024/3	+0,1	2024/1	-0,2	2024/2	0	2024/1	0	2024/3	+0,3	2023/10	+0,1	2024/2	+0,1	2024/1
		2024/2		2023/10		2023/11		2023/10		2024/2		2023/4		2023/11		2023/10
CN	+0,1	2024/3	0	2024/1	0	2024/2	+0,1	2024/3	-0,1	2024/3	0	2023/10	0	2024/2	+0,1	2024/3
		2024/2		2023/10		2023/11		2024/2		2024/2		2023/4		2023/11		2024/2
RU	+0,2	2024/2	+0,1	2024/1	0	2024/2	0	2024/3	+0,1	2024/2	0	2023/10	0	2024/2	0	2024/3
		2024/1		2023/10		2023/11		2024/2		2024/1		2023/4		2023/11		2024/2

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

GDP growth in the euro area countries in 2024 and 2025, %



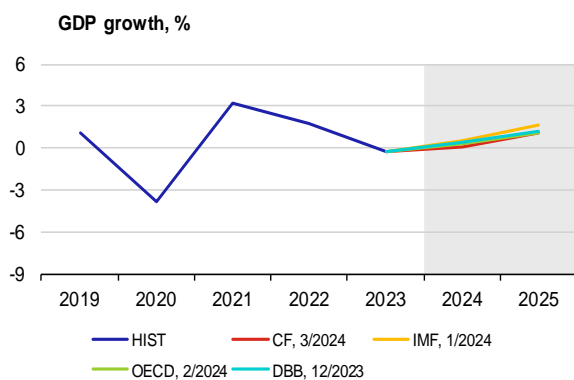
Inflation in the euro area countries in 2024 and 2025, %



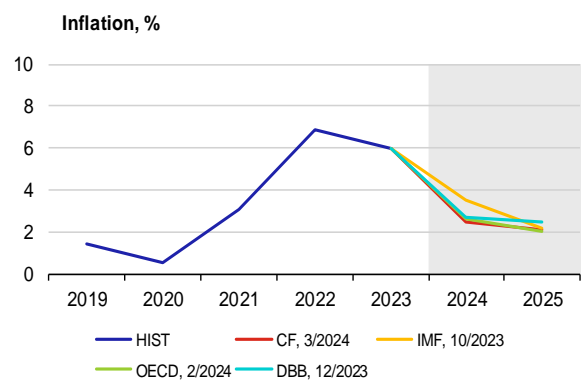
Note: Charts show institutions' latest available outlooks of for the given country.

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

Germany

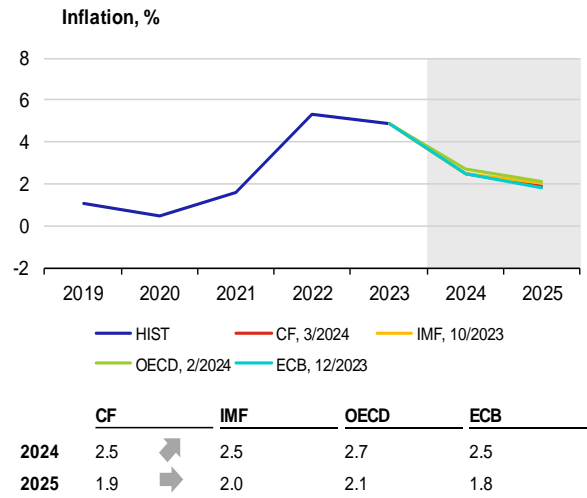
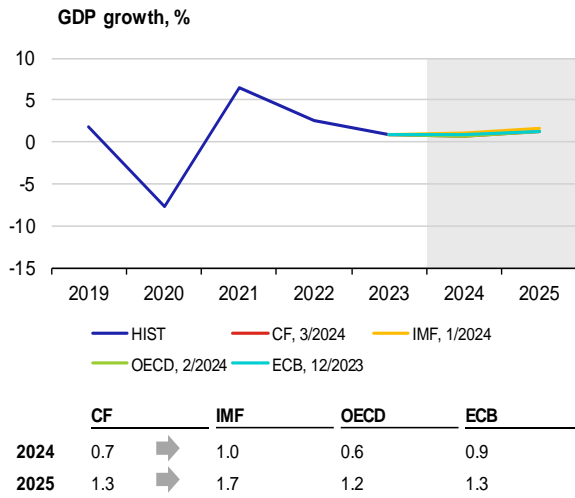


	CF	IMF	OECD	DBB
2024	0.1	0.5	0.3	0.4
2025	1.1	1.6	1.1	1.2

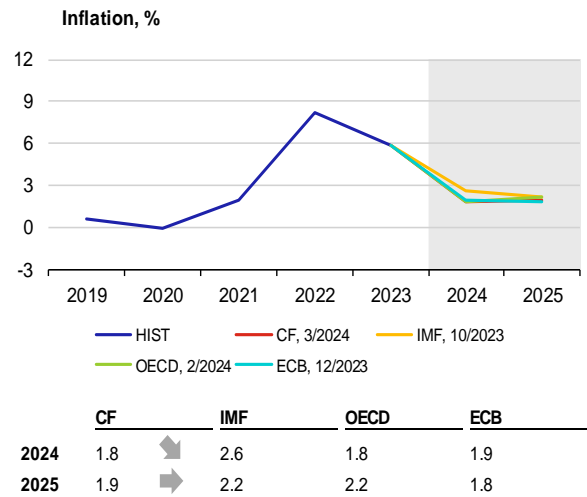
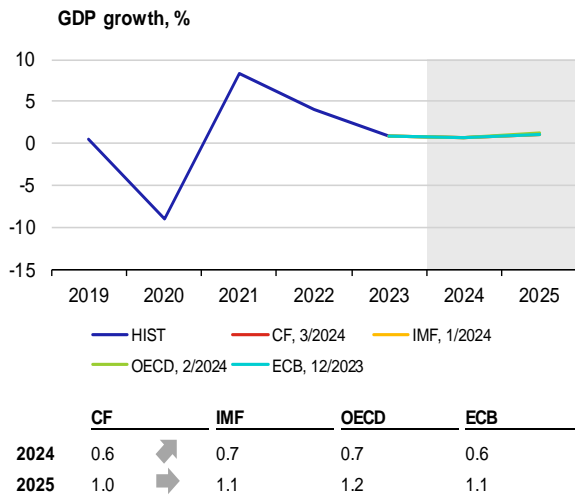


	CF	IMF	OECD	DBB
2024	2.5	3.5	2.6	2.7
2025	2.1	2.2	2.0	2.5

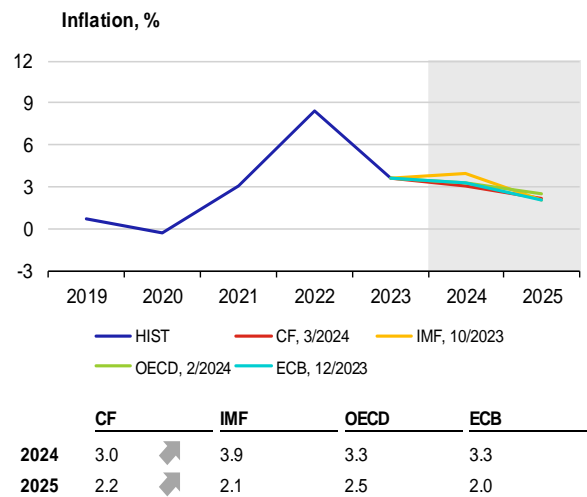
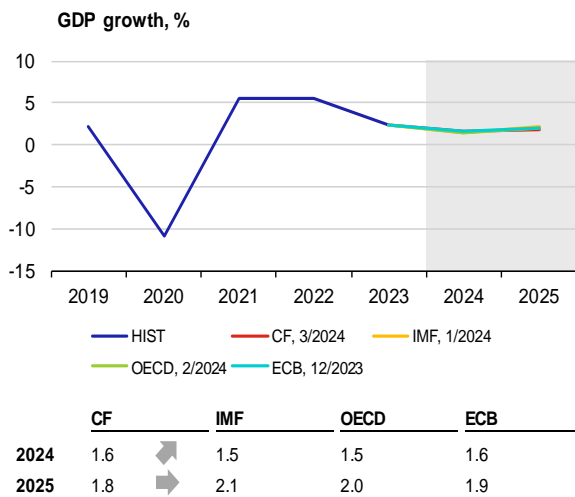
France



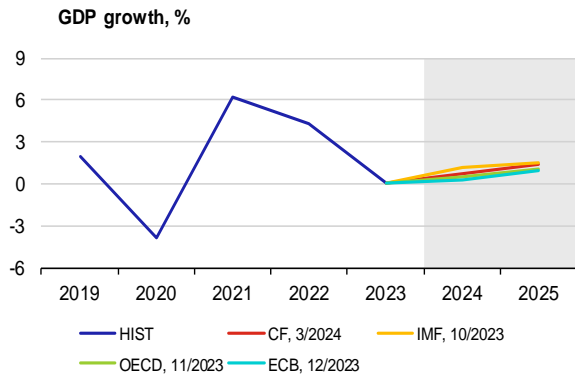
Italy



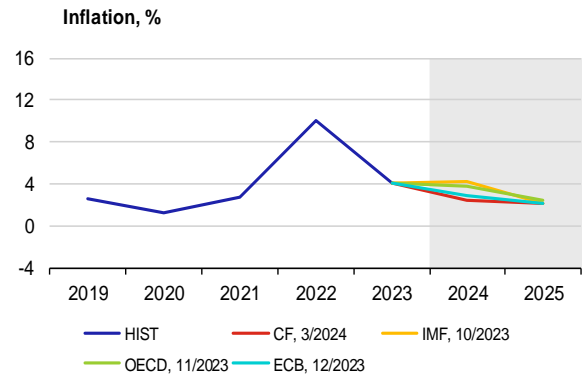
Spain



Netherlands

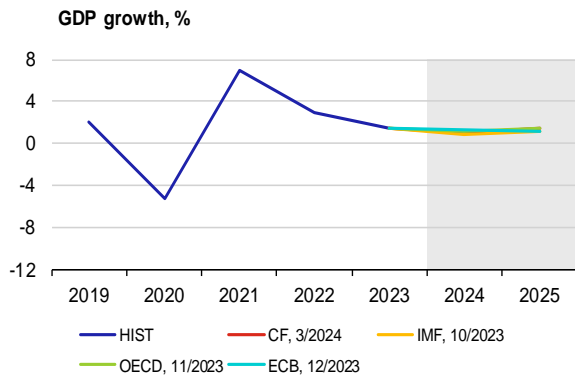


	CF	IMF	OECD	ECB
2024	0.7	1.2	0.5	0.3
2025	1.4	1.5	1.1	1.0

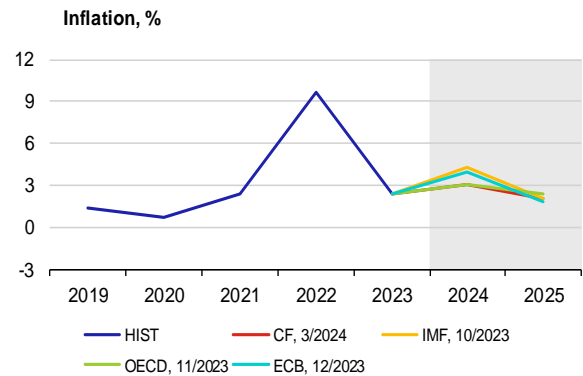


	CF	IMF	OECD	ECB
2024	2.5	4.2	3.7	2.9
2025	2.2	2.2	2.4	2.2

Belgium

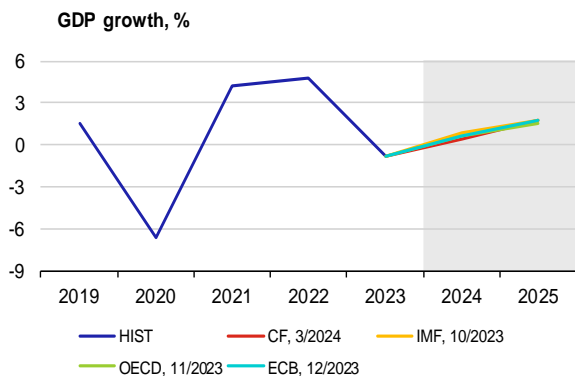


	CF	IMF	OECD	ECB
2024	1.0	0.9	1.1	1.3
2025	1.5	1.2	1.5	1.2

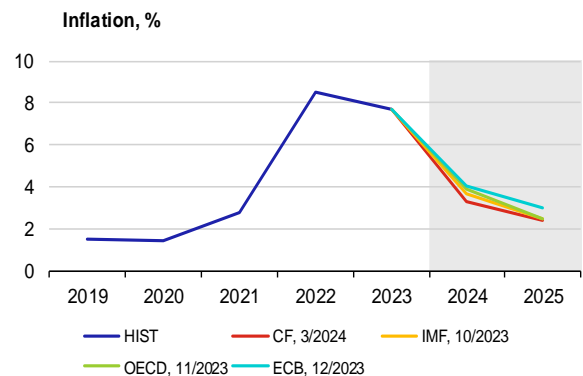


	CF	IMF	OECD	ECB
2024	3.0	4.3	3.0	4.0
2025	2.1	2.1	2.4	1.8

Austria

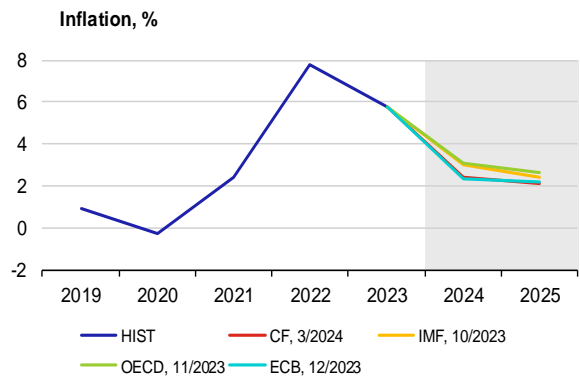
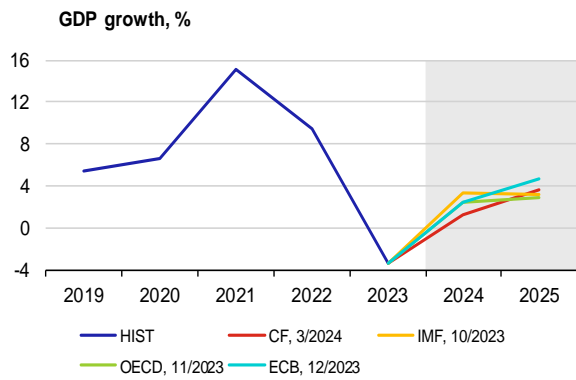


	CF	IMF	OECD	ECB
2024	0.4	0.8	0.6	0.6
2025	1.7	1.7	1.5	1.7



	CF	IMF	OECD	ECB
2024	3.3	3.7	3.9	4.0
2025	2.4	2.5	2.5	3.0

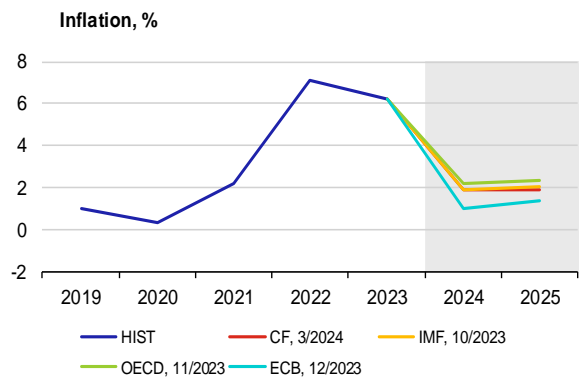
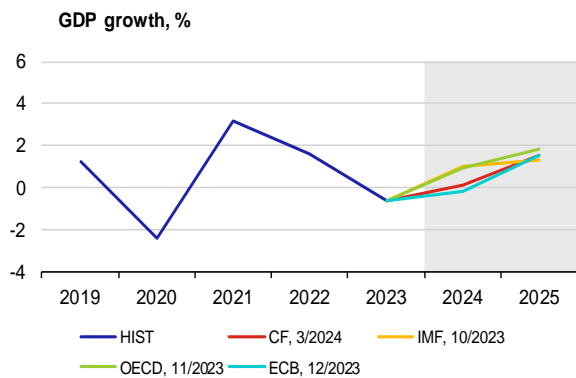
Ireland



	CF	IMF	OECD	ECB
2024	1.3	3.3	2.4	2.4
2025	3.6	3.2	2.9	4.6

	CF	IMF	OECD	ECB
2024	2.4	3.0	3.1	2.3
2025	2.1	2.4	2.6	2.2

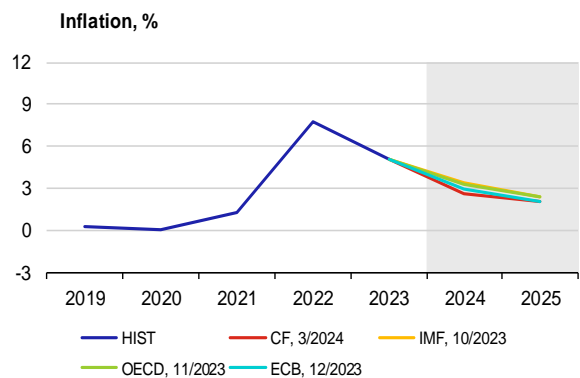
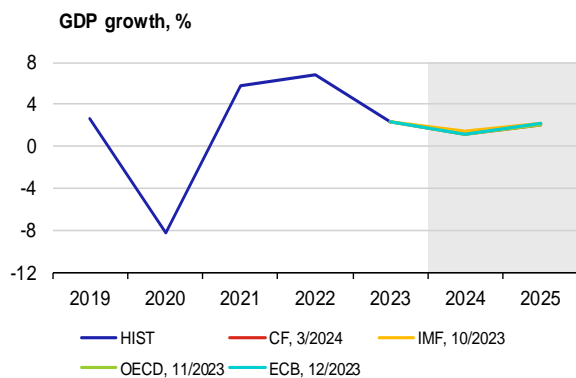
Finland



	CF	IMF	OECD	ECB
2024	0.1	1.0	0.9	-0.2
2025	1.5	1.3	1.8	1.5

	CF	IMF	OECD	ECB
2024	1.9	1.9	2.2	1.0
2025	1.9	2.0	2.3	1.4

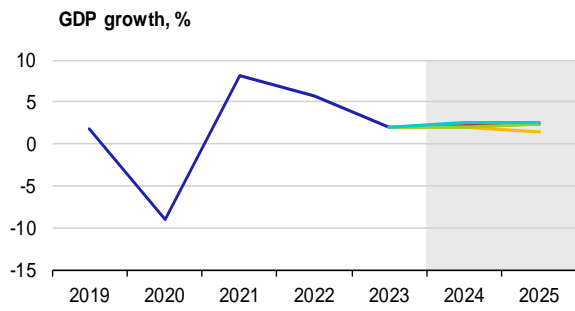
Portugal



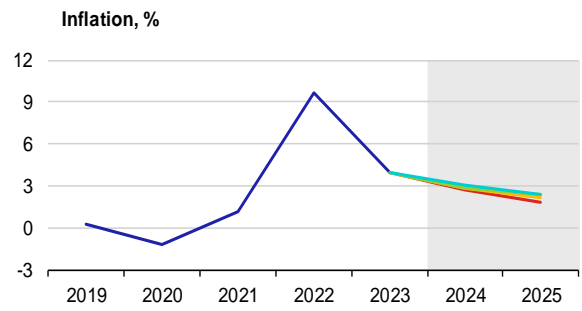
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2024	1.2	1.5	1.2	1.2
2025	2.0	2.2	2.0	2.2

	CF	IMF	OECD	ECB
2024	2.6	3.4	3.3	2.9
2025	2.0	2.4	2.4	2.0

Greece

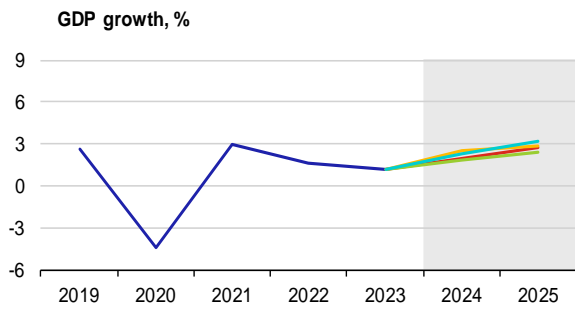


	CF	IMF	OECD	ECB
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2025	2.4	1.4	2.4	2.5

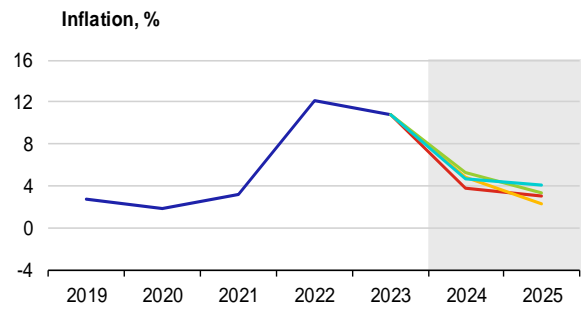


	CF	IMF	OECD	ECB
2024	2.7	2.8	2.8	3.0
2025	1.8	2.2	2.4	2.4

Slovakia

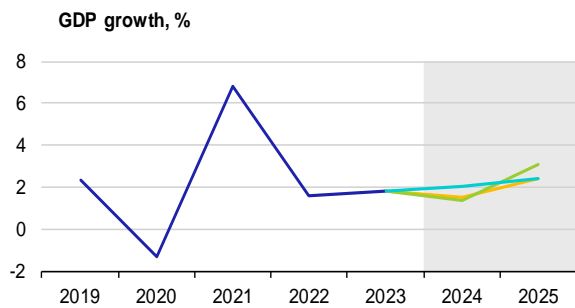


	CF	IMF	OECD	ECB
2024	1.9	2.5	1.8	2.3
2025	2.7	2.8	2.4	3.2

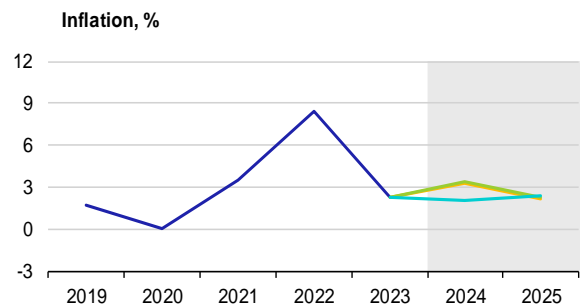


	CF	IMF	OECD	ECB
2024	3.7	4.8	5.2	4.7
2025	3.0	2.3	3.4	4.0

Luxembourg

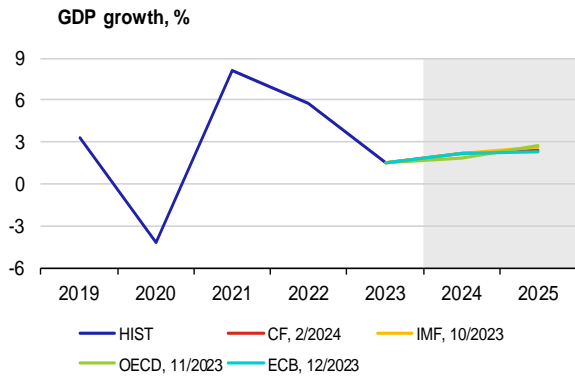


	CF	IMF	OECD	ECB
2024	n. a.	1.5	1.4	2.0
2025	n. a.	2.4	3.1	2.4

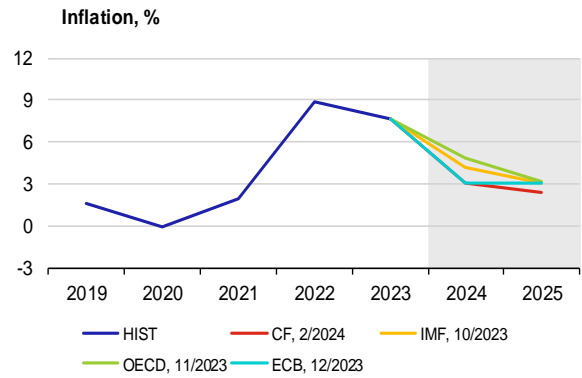


	CF	IMF	OECD	ECB
2024	n. a.	3.3	3.4	2.1
2025	n. a.	2.2	2.3	2.4

Slovenia

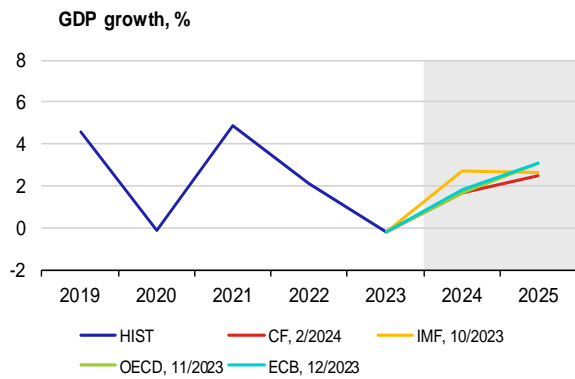


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2025	2.4	2.6	2.7	2.3

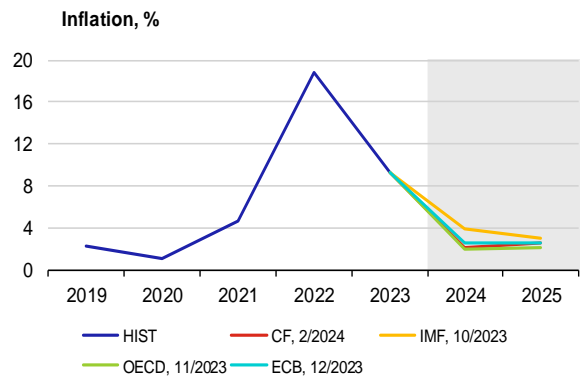


	CF	IMF	OECD	ECB
2024	3.1	4.2	4.8	3.0
2025	2.4	3.1	3.2	3.1

Lithuania

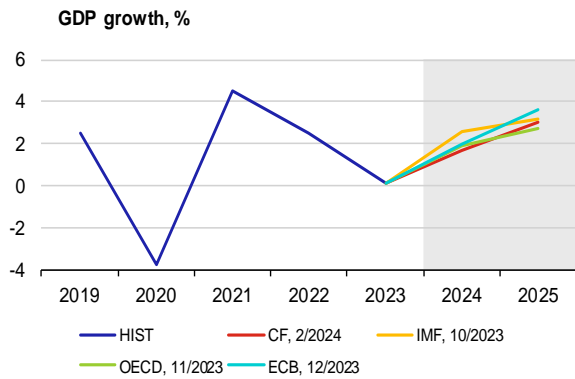


	CF	IMF	OECD	ECB
2024	1.7	2.7	1.7	1.8
2025	2.5	2.6	3.1	3.1

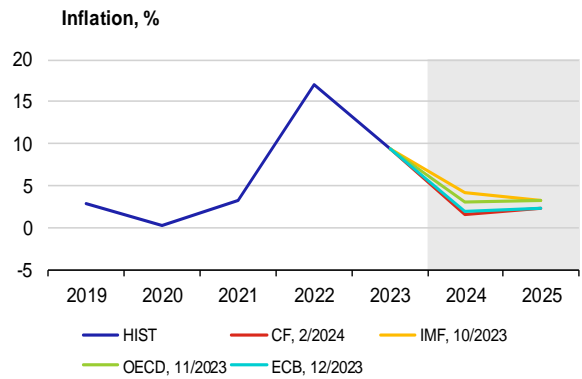


	CF	IMF	OECD	ECB
2024	2.1	3.9	2.0	2.5
2025	2.5	3.0	2.1	2.5

Latvia

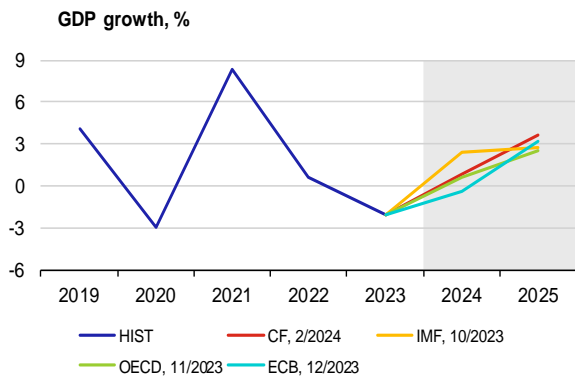


	CF	IMF	OECD	ECB
2024	1.7	2.6	1.9	2.0
2025	3.0	3.2	2.7	3.6

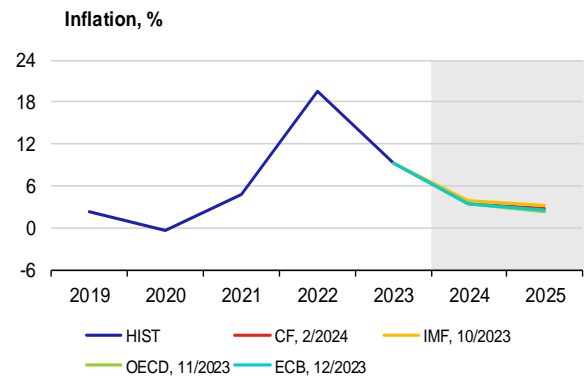


	CF	IMF	OECD	ECB
2024	1.6	4.2	3.1	2.0
2025	2.3	3.3	3.3	2.3

Estonia

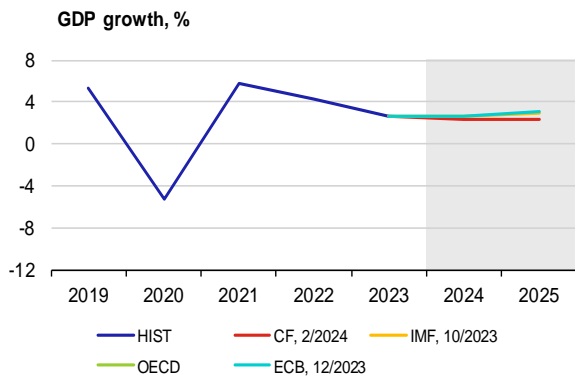


	CF	IMF	OECD	ECB
2024	0.8	2.4	0.6	-0.4
2025	3.6	2.7	2.5	3.2

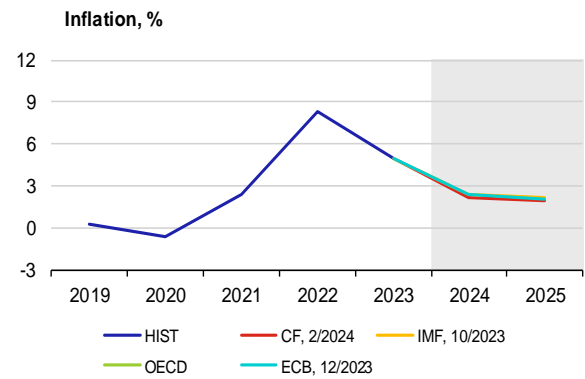


	CF	IMF	OECD	ECB
2024	3.4	3.8	3.4	3.5
2025	2.8	3.2	2.4	2.5

Cyprus

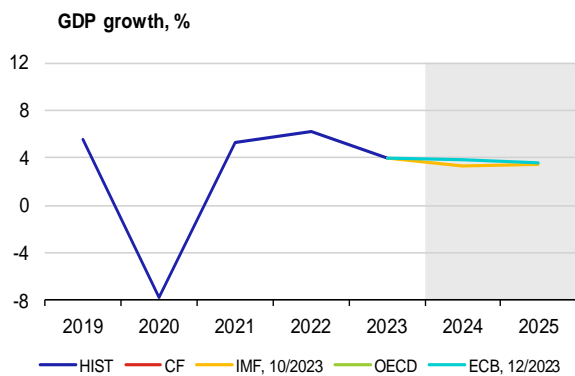


	CF	IMF	OECD	ECB
2024	2.3	2.7	n. a.	2.6
2025	2.4	3.0	n. a.	3.1

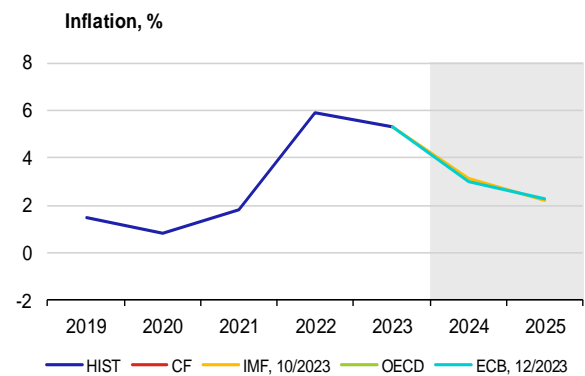


	CF	IMF	OECD	ECB
2024	2.2	2.4	n. a.	2.4
2025	1.9	2.2	n. a.	2.0

Malta



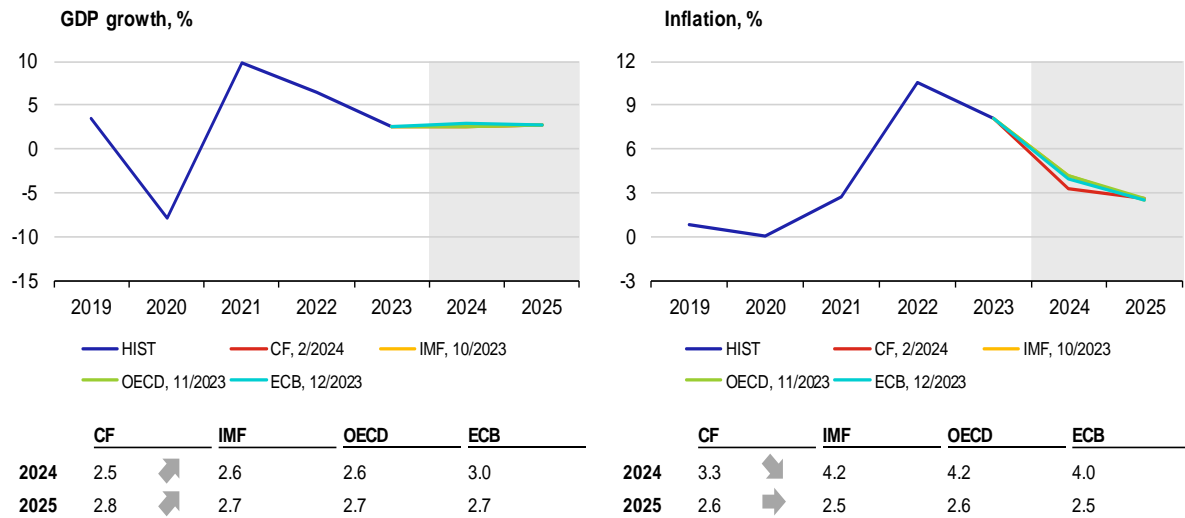
	CF	IMF	OECD	ECB
2024	n. a.	3.3	n. a.	3.8
2025	n. a.	3.5	n. a.	3.6



	CF	IMF	OECD	ECB
2024	n. a.	3.1	n. a.	3.0
2025	n. a.	2.2	n. a.	2.3

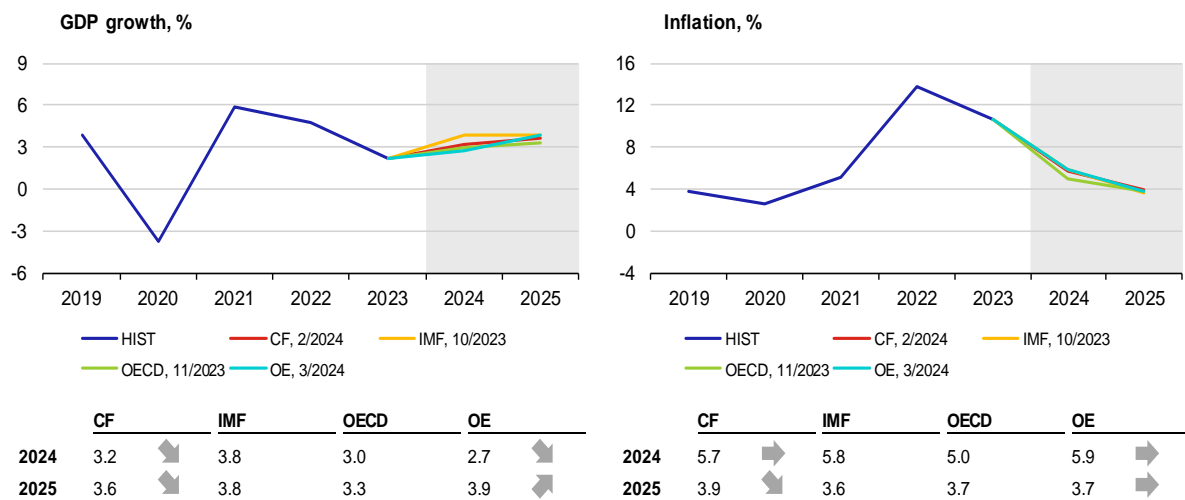
Ddd

Croatia



A5. GDP growth and inflation in other selected countries

Romania



A6. List of abbreviations

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

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