Financial Stability Report

Spring 2023

Czech National Bank —— Financial Stability Report —— Spring 2023

CNB CZECH NATIONAL BANK

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The Financial Stability Report – Spring 2023 was discussed by the CNB Bank Board at its regular meeting on financial stability issues on 1 June 2023 and published on 19 June 2023. With a few exceptions, it contains information available as of 31 December 2022. It is available in electronic form on the CNB website, where the underlying data for the tables and charts used in this publication are also published.

The mandate of the CNB

Maintaining financial stability is defined as one of the CNB's main objectives in Act No. 6/1993 Coll., on the Czech National Bank, as amended:

Article 2

(2) The Czech National Bank shall perform the following tasks:

…

e) set macroprudential policy by identifying, monitoring and assessing risks jeopardising the stability of the financial system and, in order to prevent or mitigate these risks, contribute by means of its powers to the resilience of the financial system and the maintenance of financial stability; where necessary, it shall cooperate with the relevant state authorities in setting macroprudential policy,

…

The CNB defines financial stability as a situation where the financial system operates with no serious failures or undesirable impacts on the present and future development of the economy as a whole, while showing a high degree of resilience to shocks. The CNB's definition is based on the fact that financial stability may be disturbed both by processes inside the financial sector that lead to the emergence of weak spots, and by strong shocks, which may arise from the external environment, domestic macroeconomic developments, large debtors and creditors, economic policies or changes in the institutional environment. Any interaction between weak spots and shocks can result in the collapse of systemically important financial institutions and in disruption of the financial intermediation and payment functions of the financial system.

The CNB's aim with regard to financial stability is to ensure a degree of resilience of the system that minimises the risk of financial instability. To fulfil this aim, the CNB as the central bank and supervisory authority uses the instruments made available to it by the Act on the CNB, the Act on Banks and other applicable laws. Cooperation with other national and international institutions is also very important in this area. In order to maintain financial stability, the CNB focuses on prevention and broad communication with the public regarding the potential risks and factors posing a threat to financial stability. This Financial Stability Report is an integral part of such communication.

The global financial crisis led to a strengthening of the importance of the objective of financial stability in central banks. Macroprudential policy, which is intended to contribute to the maintenance of financial stability, was formally introduced in the Czech Republic in 2013 through an amendment of the Act on the CNB No. 227/2013 Coll. In line with the CNB's Strategy, the main aim of macroprudential policy is to mitigate systemic risk, i.e. the risk of instability of the financial system as a whole. A debate about the tools of macroprudential regulation, i.e. the set of pre-emptive measures intended to prevent financial instability, is going on at international level. The European Systemic Risk Board (ESRB) has been operating at the European level since the start of 2011. Together with three pan-European sectoral supervisory authorities (EBA, ESMA and EIOPA) it makes up the European System of Financial Supervision (ESFS). If it identifies increased risks of a systemic nature, the ESRB issues warnings and recommendations to mitigate those risks. CNB representatives are involved directly in the ESRB's work; the CNB Governor and another board member are members of the General Board of the ESRB, and CNB experts participate in its working groups. Since 2011, the CNB has also been represented in the Regional Consultative Group of the Financial Stability Board established by the G20.

The CNB regularly monitors and closely analyses developments in all areas relevant to financial stability. The members of the CNB Bank Board meet with experts from key sections at regular meetings on financial stability issues. A wide range of information on developments of risks in the domestic financial system and abroad is presented at these meetings. The position of the Czech economy in the financial cycle is assessed and – if any risks to financial stability are identified – discussions are held regarding the use of regulatory, supervisory and other economic policy tools to suppress such risks or their potential effects.

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Foreword

Dear Readers,

It is my pleasure to present the spring issue of the Financial Stability Report. This report serves as one of the main inputs to the Bank Board's assessment of risks in the domestic financial sector and its decisions on the configuration of the CNB's macroprudential policy instruments. At its June meeting on financial stability issues, the Bank Board decided to lower the countercyclical capital buffer rate, keep the upper limits on the LTV and DTI ratios unchanged and deactivate the upper limit on the DSTI ratio. The decisions taken were based on analyses of cyclical and structural risks in the domestic financial system and beyond, and reacted primarily to an easing of cyclical sources of risks. However, the macroprudential policy settings remain broadly tight, as uncertainties regarding future economic and geopolitical developments persist.

In an environment of tightened financial conditions, the Czech economy is now clearly past the peak of the financial cycle. Growth in both newly negotiated bank loans and outstanding loans to households and firms is very subdued and the debt ratios of these entities have also declined. Growth in residential property prices has slowed, with a drop in prices even having been recorded in some segments of the property market. According to the CNB's projections of macrofinancial variables, the situation will not change much at the horizon of our spring forecast. We therefore expect neither the share of highly risky loans in domestic banks' balance sheets, nor other systemic risks jeopardising the stability of the domestic financial sector to increase in the near future.

However, if we take into account the economic developments observed abroad, the risks of the baseline scenario of the CNB's spring macroeconomic forecast remain significant and going in both directions. Global financial conditions may continue to tighten amid concerns of an only gradual decrease in inflation, and global economic developments also remain uncertain. Households and firms in the Czech Republic have already been feeling the adverse effects of the higher inflation and weaker economic activity in their budgets. This is apparent from their deteriorating sentiment and from declining real household consumption. So far, the ability of firms and households to service their debts has deteriorated only marginally. However, the situation could change fairly quickly, as the persisting economic and geopolitical uncertainties may have some potential to cause a sudden adverse change in the economic situation.

You will read in this report that the domestic financial sector is very well prepared for potential adverse developments and is maintaining a strong capital and liquidity position even in the current difficult conditions. This is due in part to the timely and forward-looking use of macroprudential instruments by the CNB. These instruments help ensure that the financial sector stays sufficiently prudent through the financial cycle and also remains resilient, especially at times of heightened financial stress. The spring stress tests, which as usual covered all the key sectors of the domestic financial system, confirmed that the financial sector is highly resilient.

I would like to assure the public that the actions taken by the Bank Board are commensurate with the current economic situation and in line with the long-term objective to ensure that the domestic financial system is highly resilient, while respecting the principle of sustainable development of our country. The CNB will continue to carefully monitor and evaluate the impacts of the difficult economic and financial conditions on the various domestic sectors and on the stability of the financial system as a whole. The Bank Board also stands ready to respond immediately with macroprudential instruments to any risks that could jeopardise the resilience of the domestic financial sector.

On behalf of the Czech National Bank

Karina Kubelková
Bank Board member

I. DECISIONS AND ASSESSMENT OF RISKS TO FINANCIAL STABILITY

The CNB Bank Board decided at its meeting on financial stability issues on 1 June 2023 to lower the countercyclical capital buffer rate by 0.25 pp to 2.25% on the basis of an assessment of cyclical systemic risks. Further to an evaluation of systemic risks related to the provision of consumer loans secured by residential property and to the residential property market, the Bank Board also decided to leave the upper limit on the LTV ratio at 80% (90% for applicants under 36 years) and that on the DTI ratio at 8.5 (9.5) times net annual income and to deactivate the upper limit on the DSTI ratio. All the changes take effect on 1 July 2023.

Global and domestic economic growth slowed amid high inflation and rising interest rates. Many European economies have entered the contractionary phase of the financial cycle and are facing increased risks to price stability and economic growth. Tightening financial conditions have started to affect the private non-financial sector. Growth in debt servicing costs, together with rising input prices, have gradually put significant pressure on non-financial corporations in the EU, many of which are showing high levels of debt and some of them also deteriorating loan quality. Households, which substantially increased their indebtedness through debt financing of residential property in the previous environment of low interest rates, especially in countries where variable-rate loans predominate, may also be exposed to risks associated with growth in debt service. In the Czech Republic, where a preference for long fixed-rate periods has long prevailed in the case of loans to households, the default rate on loans to households remained at historical lows, despite growth in the cost of living and interest rates. As in the EU, the financial results of domestic non-financial companies remain highly heterogeneous across sectors. The combination of rising input prices and debt servicing costs has not significantly worsened the financial soundness of firms.

The Czech financial sector showed favourable trends in 2022. Most of its main segments saw growth in assets and profitability. The capital position of its key segment – the banking sector – remained robust, thanks in part to capital buffers and capital surpluses in excess of the regulatory requirements, and its profitability and liquidity also developed favourably. The banking sector's resilience to a crisis is being enhanced by gradual compliance with a minimum requirement for own funds and eligible liabilities (MREL). Loan portfolio quality, where signs of stabilisation can be seen after a prolonged period of gradual deterioration, remain a key risk going forward. For the time being, expectations of credit losses are not increasing either. The CNB therefore regards it as vital for banks to adopt a prudent approach to credit risk and to identify expected credit losses in a timely and conservative manner. Domestic non-bank financial institutions remain resilient at the aggregate level and are not a direct source of significant systemic risks.

A macro stress of all the segments of the domestic financial sector confirmed its resilience in the *Baseline Scenario* and also in a hypothetical *Adverse Scenario* associated with higher-for-longer inflation and higher inflation rates. The key banking sector as a whole would comply with the regulatory limits on the capital and leverage ratios in both scenarios, and even the *Adverse Scenario* would not significantly reduce banks' capitalisation. However, persisting uncertainty above and beyond the *Adverse Scenario* continue to create potential for a sizeable drop in banks' profitability and require an increased degree of prudence in the management of banks' balance sheets, individual risks and capital, including dividend policy.

The risks associated with the concentration of domestic financial institutions' exposures in Czech government bonds remain low over the three-year outlook, although the general government structural deficit persists. Domestic general government ended 2022 in a structural deficit estimated by the CNB at 3.9% of GDP. That deficit decreases only gradually over the entire horizon of the *Baseline Scenario*. If the *Adverse Scenario* were to materialise, general government debt would surge to almost 63% of GDP, i.e. above the statutory debt brake. The CNB uses the *Adverse Scenario* to assess the risk of concentration of systemically important exposures to domestic general government in domestic banks' balance sheets. Despite the substantial deterioration in general government finances assumed in this scenario, the public finance stress test results do not indicate a need to require banks to create an additional capital requirement to cover the risk of concentration of these exposures (Pillar 2). This is due mainly to the country's still relatively low general government debt, relatively high rating and favourable general government debt maturity profile, supported by high demand for government bond issues.

The CNB Bank Board decided to lower the CCyB rate by 0.25 pp to 2.25% with effect from 1 July 2023. The level of the rate reflects the cyclical risks in the banking sector's balance sheet, which have been gradually fading since the economy started to decline from the local peak observed at the end of 2021. New cyclical risks are entering banks' balance sheets to a limited extent, mainly in the area of consumer loans secured by residential property. The CNB's estimates regarding future developments foresee a limited level of risk in the loans to non-financial corporations segment as well. If the cyclical risks continue to disappear naturally from loan portfolios, the CNB is ready to lower the CCyB rate gradually

further. Should the economic situation worsen substantially and significant unexpected credit losses form in the domestic banking sector, the CNB is ready to lower the CCyB rate significantly or release the buffer fully in order to support lending to the real economy without interruption.

Housing affordability stopped worsening due to a halt in residential property price growth and continued nominal income growth. Year-on-year growth in residential property prices in the Czech Republic halted or even turned negative in some segments in early 2023. The CNB estimates that the probability of average property prices falling sharply in the medium term has decreased and that these prices might recover slightly in 2024 after correcting partially in 2023. Simultaneously with the halt in the trend of worsening housing affordability, the estimated overvaluation of apartment prices also started to decline at the end of 2022. However, it remains elevated. Apartment prices for the median household buying owner-occupied housing were 57% higher in 2023 Q1 than the level consistent with its income and with market interest rates. The level of overvaluation for retail investors from the household sector was 23%.

Credit standards for housing loans tightened in 2022 as a result of adverse market expectations and the introduction of upper limits on credit ratios. Upper limits on the LTV ratio of 80% (90% for applicants under 36 years), on the DTI ratio of 8.5 (9.5) times net annual income and on the DSTI ratio of 45% (50%) of net monthly income have been applicable since spring 2022. Lenders have mostly abided by these limits. The introduction of the upper limits, and especially the relatively high interest rates, have helped significantly reduce the volume of loans secured by residential property and change their credit characteristics. In 2022, the median DSTI ratio rose from 34% to 38% and the volume of loans provided with DSTIs of over 45% dropped sharply. The DTI and LTV distributions of new loans show a decline both at the median level and in the volume of risky loans provided. The high interest rates naturally lifted the DSTI ratio but also reduced demand for loans and hence also the volume of loans with highly risky characteristics.

The systemic potential of the build-up of risks stemming from new housing loans in banks' portfolios should be fairly low. The CNB does not expect these risks to increase significantly over the two-year horizon. According to the CNB's projections, the volume of new housing loans will record a further year-on-year decline in 2023 and should not recover significantly even if the upper limits on credit ratios are abolished. A return to the long-term averages is expected at the end of 2024. Highly risky loans should thus account for a fairly low proportion of bank portfolios over these two years. However, the risks of the baseline scenario of the CNB's spring macroeconomic forecast are significant and going in both directions. Prices of residential property are still significantly overvalued and the related risk of a price correction persists. In this price environment, and with regard to the evolution of household income, there is still some risk of households becoming overindebted, as less than 10% of households can safely debt-finance an average-price apartment. For these reasons, the CNB Bank Board decided to leave the upper limit on the LTV ratio at 80% (90% for applicants under 36 years) and that on the DTI ratio at 8.5 (9.5) times net annual income. Given the high level of, and outlook for, interest rates at the forecast horizon, the CNB Bank Board decided to deactivate the upper limit on the DSTI ratio. However, the CNB recommends that lenders should provide consumer loans secured by residential property with DSTIs of over 40% with a high level of prudence.

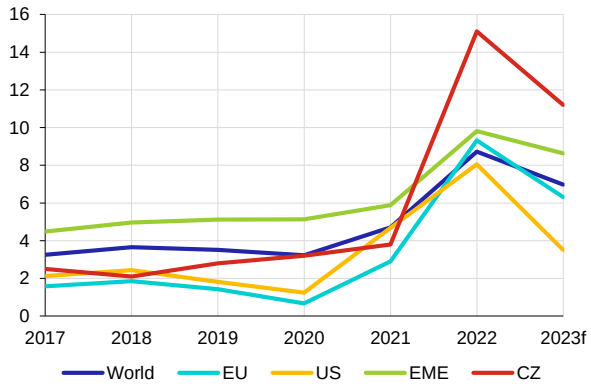
The CNB will publish additional detailed analyses of risks to financial stability and information about the macroprudential policy settings in December 2023 in its publication *Financial Stability Report – Autumn 2023,* which will be the reference document for the autumn Bank Board meeting on financial stability issues.

II. THE REAL ECONOMY AND FINANCIAL MARKETS

II.1 THE MACROECONOMIC AND FINANCIAL ENVIRONMENT

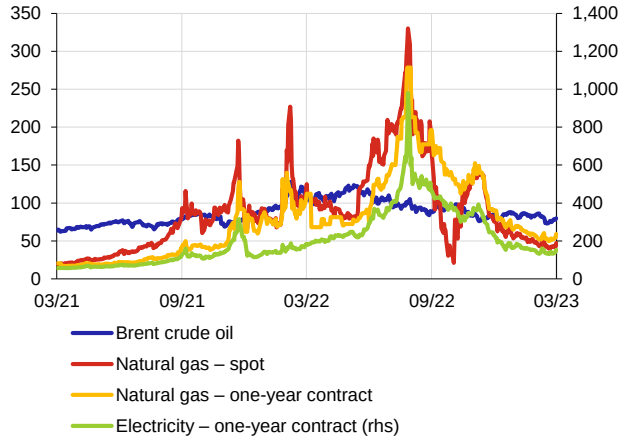
The global economy continues to face elevated inflation pressures amid subdued economic growth…
Although the inflation pressures have been fading gradually, inflation remains significantly elevated in major advanced global economies (see Chart II.1). Uncertainty about the availability and prices of energy, peaking inflation and rising interest rates were the main factors behind the slowing economic growth in European economies in late 2022 and early 2023 (see Chart II.1 CB). The supply-side inflation pressures in the global economy started to weaken gradually at the end of 2022 and in the first few months of 2023 as the situation in global supply chains normalised (see Chart II.2 CB). This was accompanied by a decline in energy commodity prices, especially in Central and Eastern European countries, owing to the previously successful substitution of supplies from Russia and Ukraine with other sources (see Chart II.2). The decline in commodity prices was also fostered by some calming of the situation relating to the war in Ukraine, as evidenced by a fall in the geopolitical risk index (see Chart II.3 CB). In many economies, the supply-side inflation factors were gradually replaced by demand pressures resulting from tight labour markets (see Chart II.4 CB) and the materialisation of consumption deferred during the pandemic. This is also largely a legacy of the relaxed fiscal policies and stabilisation and support measures implemented in response to the pandemic and the energy crisis.[1]

Chart II.1
Inflation in selected regions
(annual inflation rates in %)



Source: IMF, CNB
Note: f = forecast. The forecast for the Czech Republic is based on the CNB's spring forecast (MPR – Spring 2023). The forecasts for the other economies are based on the IMF's April forecast published in World Economic Outlook, April 2023.

Chart II.2
Selected commodity prices
(oil in USD/barrel; natural gas and electricity in EUR/MWh)

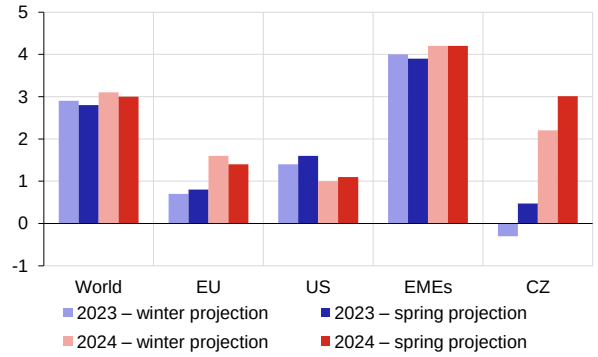


Source: Refinitiv

…forecasts expect them to fade gradually, but the risk of adverse economic developments remains high
The forecasts of analysts and international organisations expect inflation to slow significantly towards the end of 2023 (see Chart II.1). This will be due both to a high base for the calculation of consumer price indices amid decreasing supply pressures and to the gradual fading of demand-pull inflation pressures because of globally tightened monetary policy. Muted economic growth continues to be expected for 2023 (see Chart II.3), but the concerns of a global recession caused by tight monetary policies and commodity shocks have not been confirmed so far. The rate of growth of European economies is expected to return gradually to its potential level during 2024. Uncertainty regarding the persistence of inflation in key global economies and also in the Czech Republic – relating to ongoing labour market tightness and upward pressure on wages, a potential de-anchoring of inflation expectations and a decrease in the credibility of central banks – is a risk going forward (see Chart II.4). In order for inflation to return to the target and stay close to it in the long term, much more aggressive monetary policy would be necessary, with a potential strongly negative impact on the economy. A further increase in geopolitical tensions could also result in a renewed fall in consumer and business confidence and a persisting contraction in economic activity.

1 The contribution of relaxed fiscal policies to inflation is discussed in the Federal Reserve Bank of New York report *Quantifying the Inflationary Impact of Fiscal Stimulus under Supply Constraints*.

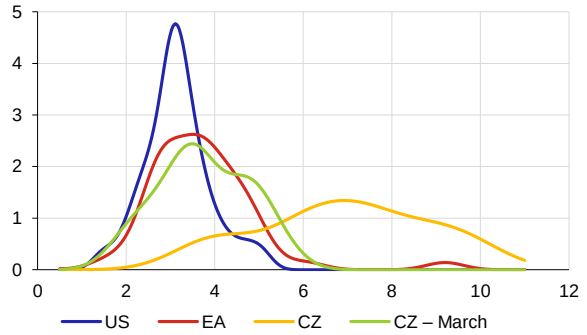
Chart II.3
Economic growth forecasts for selected regions
(annual real GDP growth in %)



Source: IMF, CNB

Note: The forecast for the Czech Republic is based on the CNB's winter and spring forecasts (MPR – Winter 2023 and MPR – Spring 2023). The forecasts for the other economies are based on the IMF's January and April forecasts published in World Economic Outlook, January 2023, and World Economic Outlook, April 2023.

Chart II.4
Analysts' inflation expectations in 2023 Q1
(x-axis: expected annual inflation rate in %; probability density)



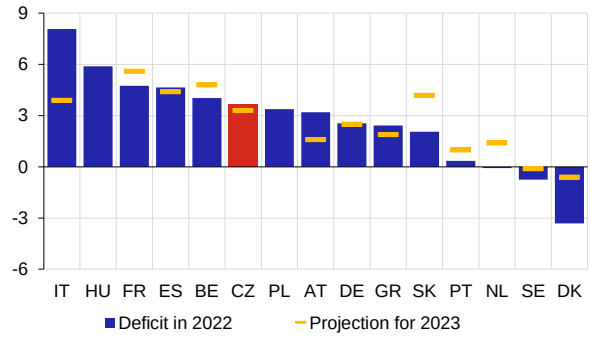
Source: CNB, ECB, Federal Reserve Bank of Philadelphia

Note: The chart shows the probability density of inflation expectations for the annual inflation rate. It was compiled from the individual analysts' point forecasts and adjusted by means of core smoothing. The data for the EU and the USA are taken from the surveys of analysts conducted in 2023 Q1. The data for the Czech Republic are taken from the December 2022 and March 2023 *Financial Market Inflation Expectations*. The chart shows inflation expectations for December 2023, except for CZ – March, which shows expectations for March 2024.

Relaxed fiscal discipline also contributed to growth in the price level

Government support programmes mitigating the impact of the coronavirus pandemic and the energy crisis[2] led to a relaxation of fiscal discipline in many European countries. Deficit financing (see Chart II.5) resulted in a surge in government debt in many economies (see Chart II.5 CB) and fostered additional demand-pull inflation pressures. They are leading to a need for tighter monetary policy and ultimately also tighter government financing conditions. The rising debt refinancing costs pose a challenge for the future course of fiscal policy, as a compromise will need to be found between continued supportive policies and public finance sustainability, especially in highly indebted countries (see Chart II.6).

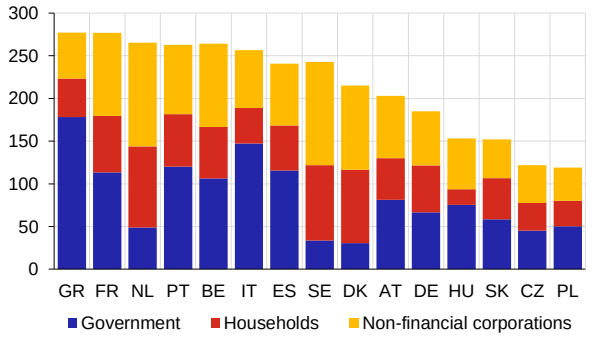
Chart II.5
General government deficits in selected EU countries
(% of GDP; data as of 31 December 2022)



Source: Eurostat, IMF

Note: The projections for 2023 are based on *Fiscal Monitor*, April 2023. Projections are not available for Hungary and Poland.

Chart II.6
Debt ratios of economic agents in selected EU countries
(% of GDP as of 31 December 2022)



Source: ECB

Note: Data as of 30 June 2022 for non-financial corporations in Italy and for households and non-financial corporations in Poland.

The domestic economy is also facing inflation pressures and muted economic growth

The situation in the domestic economy is similar to that in the global economy. The environment of elevated uncertainty was reflected in the sentiment of consumers and subsequently also the business sector (see Chart II.7). In addition to global factors, the onset of the receding of inflation pressures in the first few months of 2023 was due to the gradual depletion of pandemic savings (see Chart II.6 CB) and monetary policy tightening in the Czech Republic's largest trading partners (see Chart II.7 CB). A relatively strong exchange rate of the Czech koruna also fostered lower inflation in the domestic economy. According to the CNB's spring forecast, the shallow recession will fade out in the first half of 2023 and

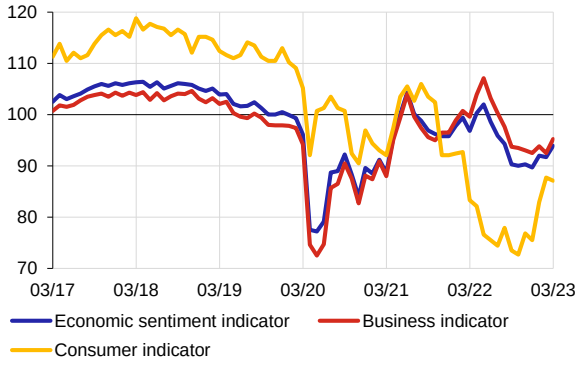
2 Stabilisation policies most often take the form of one-off contributions to households and firms or cuts in taxes and caps on energy commodity prices.

the negative output gap will then start closing and the economy will return to its potential in 2024. Consistent with the *Baseline Scenario* is a return of inflation to close to the CNB's 2% target in 2024 Q1. As in the case of the global economy, inflation persistence and a wage-price spiral remain risks to the forecast. The risks to GDP growth remain tilted to the downside, and a shift towards the *Adverse Scenario* would imply a sizeable drop in economic activity (see Chart II.8).

Chart II.7

Economic sentiment indicator for the Czech Republic

(base index relative to long-term average)

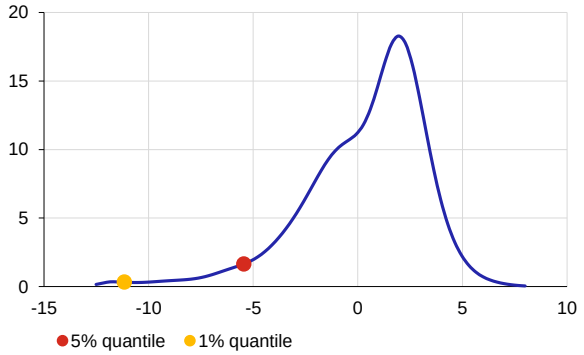


Source: CZSO

Chart II.8

Risk of adverse economic developments in the Czech Republic

(x-axis: year-on-year growth in % as of 31 December 2023; probability density)



Note: The chart shows the probability distribution of annual real GDP growth at the end of 2023.

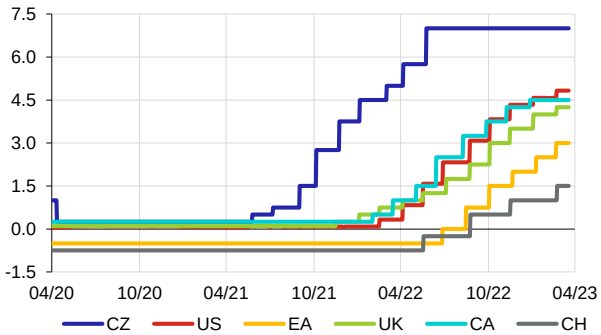
Monetary conditions were tightened significantly in major global economies in 2022 and 2023 Q1…

The policies of most central banks in key economies in 2022 were characterised by monetary policy rate increases in response to elevated inflation (see Chart II.9). This was accompanied by the termination, or at least tapering, of other unconventional monetary policy instruments (the end of new purchases under the PEPP and APP programmes and changes to TLTRO III in the case of the ECB, and a reduction of the Fed's balance sheet). The tightening process was slowed in 2023 Q1 by the difficulties experienced by financial institutions in March.[3] The problems in the US banking sector began as a result of a run on several medium-sized banks and their subsequent failure. The stress spilled over partly to Europe, resulting in the forced takeover and rescue of Credit Suisse. As a result of the increase in market stress, the Fed's terminal monetary policy rates were revised downwards, while the terminal ECB rates expected by the market returned to the levels observed before financial institutions ran into difficulties (see Chart II.10).

Chart II.9

Monetary policy rates of selected central banks

(%; latest observations as of 17 April 2023)



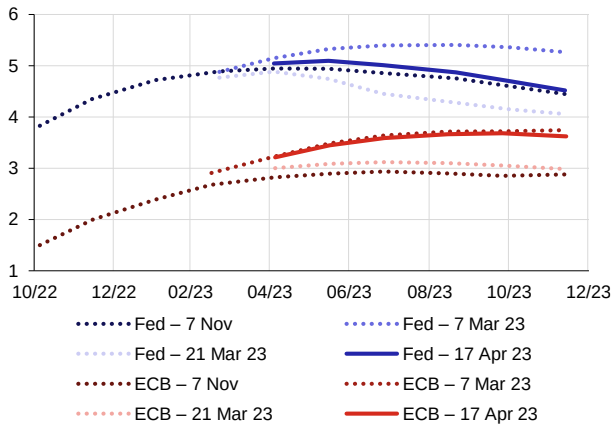
Source: Refinitiv

Note: In the case of EA, the chart shows the deposit rate. In the case of the US, it shows the centre of the range.

Chart II.10

Market-implied rate paths

(%)



Source: Refinitiv

3 Although the Fed raised its target range in March (the latest in a series of hikes), it did so by just 25 bp, as against original expectations of 50 bp. By contrast, the ECB raised the deposit rate by 50 bp at its March meeting. It intends to continue raising rates at subsequent meetings. Other major central banks also lifted rates at their latest meetings: UK, AU, CA and CH. The Fed funds rate was in the range of 4.75%–5% in April 2023 and the terminal rate as of 31 December 2023 is expected to be 4.5%. In the euro area, the discount rate was at 3% at the end of April and the expected rate as of 31 December 2023 is 3.6% (see Chart II.10).

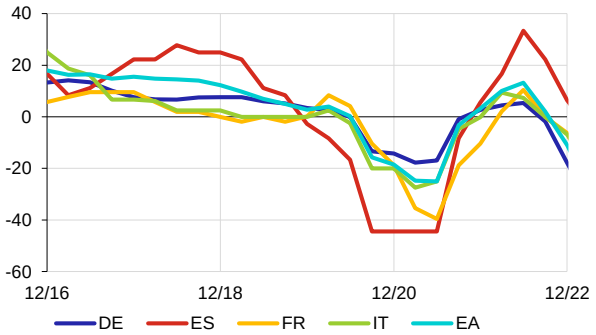
…which was reflected in a turn in the financial cycle in European economies…

The growth in monetary policy rates was reflected in interest rates on loans to households and non-financial corporations and generally in a tightening of credit standards across European countries (see Chart II.7 CB and Chart II.8 CB). The higher interest rates in turn fostered a major decline in demand for loans (see Chart II.11), especially loans for house purchase. A turn in the financial cycle in European economies is confirmed by developments on the property market. Prices of commercial property in European countries have generally been falling, although their year-on-year rates of decline differ according to different sources. Residential property prices are responding rather more slowly, yet even their growth rates have been gradually falling or are even negative in some countries (see Chart II.12).

Chart II.11

Demand for loans for house purchase in selected euro area countries

(net percentages; annual moving averages)



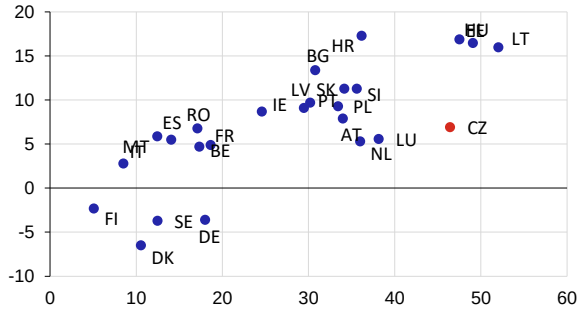
Source: ECB Bank Lending Survey, January 2023

Note: Results of the ECB's January 2023 Bank Lending Survey. The data represent the difference between the market share of banks that reported an increase in demand for loans for house purchase and banks that reported a decrease in demand in the given quarter. More information on the indicator methodology can be found on the ECB and CNB websites.

Chart II.12

Residential property price growth in selected EU countries

(%; x-axis: three-year growth; y-axis: one-year growth)



Source: Eurostat

Note: Data as of 31 December 2022. Due to different methodologies, the data for SK differ from those published by the NBS.

…a price correction on financial markets…

The monetary tightening and central banks' hawkish rhetoric led to an increase in yields along the entire yield curve. While the interest rate increases were reflected primarily in shorter-maturity yields, longer-maturity ones were driven mainly by a revision of financial market expectations regarding long-term risk-free rates and the end of the low-for-long environment.[4] In line with this, yields on government bonds of the most important global economies rose to their highest levels in many years in 2022 and stabilised there in the first few months of 2023 (see Chart II.13).[5] Ex ante real interest rates also turned positive again after several years due to the increase in yields and in 2023 also to a decline in inflation expectations (see Chart II.14). The increase in yields demanded by investors resulted in a price correction on bond and equity markets. Prices were thus mostly around 15%–20% lower in 2023 Q1 than a year earlier (see Chart II.9 CB). By contrast, corporate bond spreads and implied stock volatility indices differ little from the levels seen over the past ten years (see Chart II.10 CB and Chart II.15).[6] Likewise, the implied risk premium on equity markets suggests that risk perception[7] is at a ten-year low (see Chart II.11 CB). However, this contrasts sharply with the still high realised volatility observed on these markets (see Chart II.16 and Chart II.12 CB). An abrupt change in market sentiment could thus still prompt a large price correction.[8]

4 The low-for-long issue is discussed, for example, in the ESRB document *Lower for Longer – Macroprudential Policy Issues Arising from the Low Interest Rate Environment*.

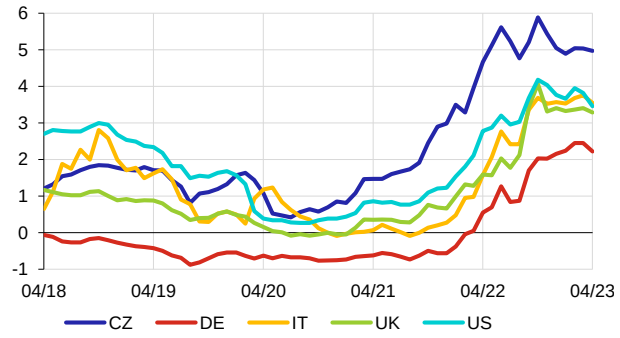
5 The increase in longer-maturity yields was reflected in the availability of debt financing (see Chart II.7 CB).

6 However, the level of the VIX index may have been affected by changes in the market microstructure, as there was a surge in trading in options with very short maturities, which do not enter the calculation of the VIX. The high implied volatility of the MOVE index mainly reflects uncertainty regarding the monetary policy stance.

7 The demanded risk premium, or the demanded additional yield on the risk undertaken. The risk premium was calculated using the dividend discount model. Dividend futures were used as a proxy for expected dividends. Discount factors are calculated using the swap curve. For details see Časta, M. (2022): *Deriving Equity Risk Premium using Dividend Futures*, North American Journal of Economics and Finance 60.

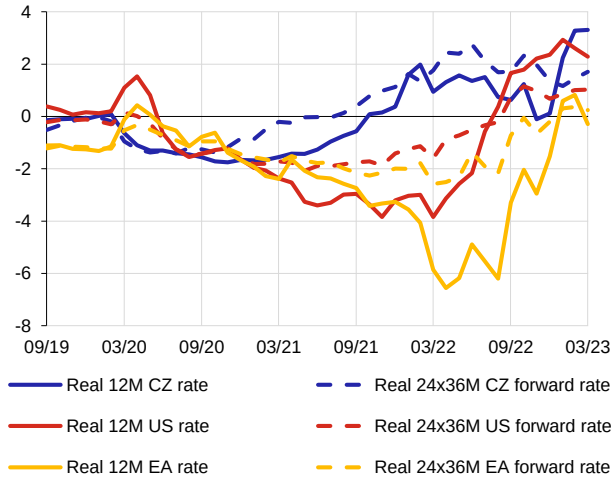
8 The low implied volatility and narrower spreads on corporate bonds and CDS contracts suggest generally positive market sentiment. However, the elevated levels of realised volatility suggest that there is still great uncertainty regarding future developments.

Chart II.13
Five-year government bond yields for selected countries
(%)



Source: Refinitiv

Chart II.14
Real rates in selected regions
(%)



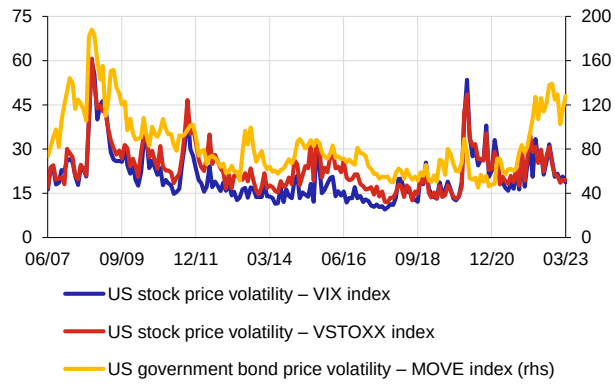
Source: Refinitiv

Note: For the Czech Republic, real rates are calculated as the difference between the interest rate swap rate and the financial market inflation expectations questionnaire rate for the given period. For the US and European markets, the difference between the interest rate swap rate and the inflation swap rate is used.

…and the potential for growth in credit risk increased in the private non-financial sector

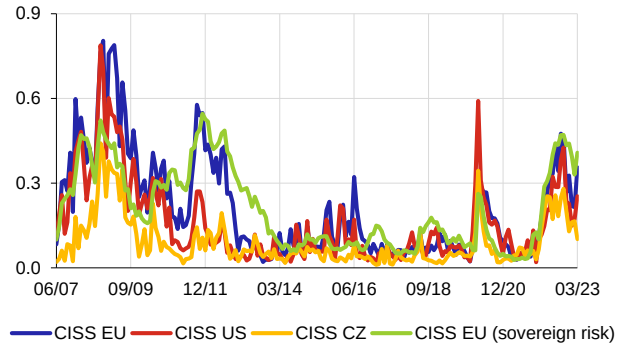
Central banks' tightened monetary policies are weakening the financial position of households, non-financial corporations and governments through an increased cost of funds. However, this has yet to be reflected fully in loan default rates. In some countries, though, credit risk in the area of consumer credit, loans to small and medium-sized corporations and loans secured by commercial property can be described as elevated (especially in the form of a higher proportion of loans in Stage 2[9]). In this respect, the impact of the current situation will be mixed across countries and sectors. The previously relatively low default rate among non-financial corporations is expected to rise but remain well below the levels seen during the Global Financial Crisis. In the case of households, in addition to unsecured consumer credit, loans secured by property in countries where variable rates predominate and potentially in countries seeing a major rise in the unemployment rate may be subject to increased credit risk. The size of the liquidity buffers accumulated by households and non-financial corporations during the pandemic is difficult to estimate in some cases, and the tapering of fiscal support may lead to rapid depletion of those buffers and an increased wave of defaults. Given the heterogeneity of these effects, default rates may go up in some countries or sectors even amid a future general slight economic recovery and falling inflation rates.

Chart II.15
Market uncertainty indicators
(points)



Source: Refinitiv

Chart II.16
Composite indicator of systemic stress in financial markets (CISS)
(index in points between 0 and 1)



Source: ECB, CNB, Refinitiv

9 In order to reflect current and future credit risks, banks have been required since 2018 to divide their exposures into three credit stages ordered by loan portfolio quality. Stage 2 contains exposures with increased credit risk (see section III.2.2).

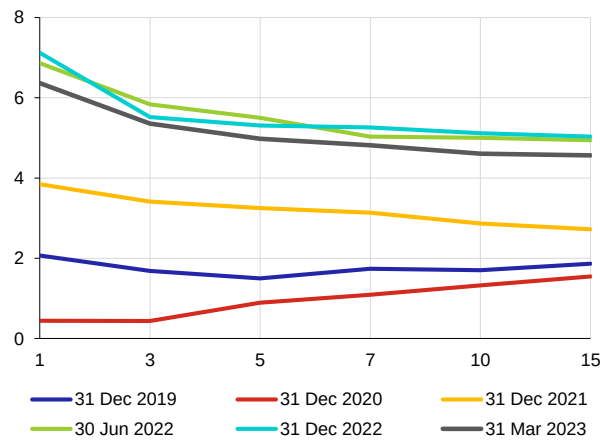
Monetary policy rates and long-term yields stabilised in the Czech Republic in the second half of 2022…

The entire yield curve stabilised in June 2022, when the CNB's key interest rate reached 7%. Short-term yields showed the highest volatility in the second half of 2022 and the first few months of 2023, reflecting market participants' uncertainty regarding the future course of monetary policy. The long end of the yield curve largely reflected movements in long-term yields on foreign markets and was affected primarily by a rise in risk-free yields in the first half of 2022 and their subsequent stabilisation (see Chart II.13 CB). The increase in Czech government bond yields to long-term highs is thus in line with the global trend and is not being affected for the time being by concerns about public debt sustainability. The risk premium demanded by investors remains relatively low.[10] The Czech government bond yield curve remained inverted, but the inversion was mainly at the short end and minimal at longer maturities (see Chart II.17). The increase in rates along the entire curve was reflected in debt financing and financial conditions in the real economy. Rates on corporate loans rose the most, due to the predominantly very short fixed-rate periods for such loans. In line with the average fixed-rate period, growth in rates on loans to households for house purchase copied that in five-year interest rate swap rates (see Chart II.14 CB). Deposit rates also responded to the growth in rates a while later. Partial migration of deposits from current accounts to time deposits is apparent (see section III.2.3, Chart III.15).

Chart II.17

Czech government bond yield curve

(%; x-axis: residual maturity in years)

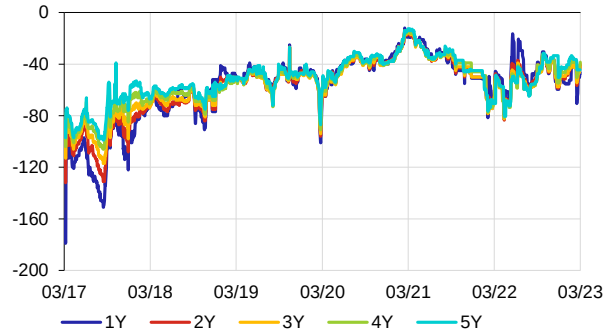


Source: Refinitiv, CNB

Chart II.18

Cross-currency basis spread – CZK/EUR

(bp)



Source: Refinitiv

Note: The chart shows the cross-currency basis spread for CZK/EUR currency swaps of various maturities. Currency swaps are derivatives contracts in which one party borrows a currency and simultaneously lends another currency to the counterparty. In the Czech Republic, FX swaps are a way of raising euro liquidity.

…the Czech koruna appreciated further

The Czech koruna mostly appreciated in 2022 and 2023. This continued to be aided by a positive interest rate differential against key global economies and the CNB's declared willingness to continue to prevent excessive fluctuations of the koruna exchange rate. According to BIS estimates[11] (*BIS Quarterly Review*, December 2022), though, about 80% of all koruna transactions take place abroad with no involvement of Czech entities, so, besides the interest rate differential, foreign entities' perception of the risk of the Czech koruna is also a factor. A currently favourable risk perception for the Czech Republic is suggested by cross-currency basis spreads[12] for CZK/EUR currency swaps (see Chart II.18), which remain narrow. This implies a relative availability of euro funding for the domestic banking sector. A combination of widening cross-currency basis spreads and worsening availability of foreign currency funding from parent companies would thus be a risk scenario. It could ultimately lead to markedly higher euro funding costs for non-financial corporations (see also section III.2.3).

New data confirm a general decline in residential property transaction prices…

Year-on-year growth in transaction prices of domestic residential property gradually slowed after reaching a cyclical peak between 2022 Q2 and Q3 (see Chart II.19). Transaction prices of lower-quality apartments were falling by the end of 2022, while prices of higher-quality apartments (in new developments or existing new buildings) were broadly flat. Available market data[13] suggest that apartment prices continued to drop in many regions in 2023 Q1 (see Chart II.15 CB). In

10 A description of the yield curve decomposition methodology is provided in Kučera, A., Szabo, M. (2019): *Estimating the Neutral Czech Government Bond Yield Curve*, Thematic Article on Financial Stability 3/2019.

11 The data are based on a three-year survey of central banks regarding activity on the foreign exchange and financial derivatives markets.

12 Cross-currency basis swaps are a sub-set of currency swaps with floating interest rates in both legs of the derivatives contract. The floating rates are determined on the basis of reference or swap rates. The price of the contract is expressed as a mark-up on the floating interest rate of the counter currency (PRIBOR for CZK/EUR contracts).

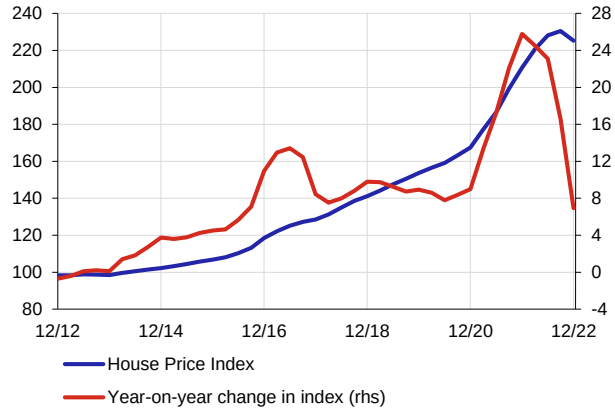
13 Dataligence data.

connection with its spring forecast, the CNB in its *Baseline Scenario* expects year-on-year growth in residential property transaction prices to turn slightly negative in mid-2023 and remain so for two quarters (see Chart II.20). However, the risk of a major price correction in the medium term has declined substantially (see Chart II.16 CB). Prices are expected to recover slightly at the end of 2023. In the *Baseline Scenario*, though, the growth will remain well below previous years' levels.

Chart II.19

Transaction prices of residential property in the Czech Republic

(2010 = 100; right-hand scale: %)

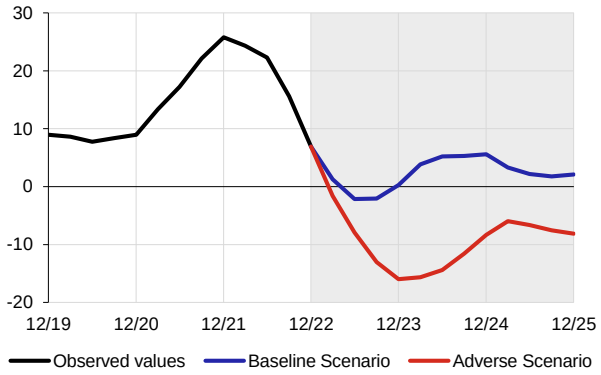


Source: CZSO

Chart II.20

Projections of property price growth in the Czech Republic

(year-on-year growth in %)



Note: The first two years of the *Baseline Scenario* projection are based on the CNB's spring forecast (MPR – Spring 2023).

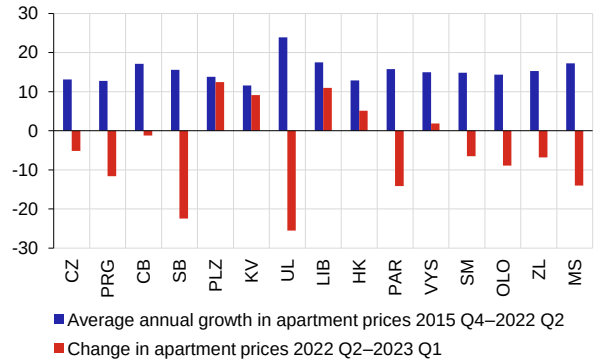
…older apartments in less lucrative localities may see a further price correction, but the risks to price stability remain contained for now

Apartments, houses and land recorded slower growth or even a decline in prices at the year-end (see Chart II.15 CB). To a large extent, however, the trends were mixed across regions (see Chart II.17 CB) and market segments, reflecting, among other things, the composition of the housing stock in each region. The largest price corrections were recorded by apartments in blocks of flats and lower-quality property and in regions that had recorded the strongest price growth in the previous period[14] (see Chart II.21). Recently, however, the share of house purchase loans granted in regions experiencing the biggest price drops has been relatively low, so the expected developments do not give rise to material risks to financial stability stemming from a potential decline in collateral prices (see Chart II.22). A tendency towards much slower price growth was also observed for apartment asking prices, although their rate of growth lagged slightly behind that of transaction prices (see Chart II.18 CB). The sluggish, albeit increasing, rate of construction and growth in the number of new apartments (see Chart II.19 CB) is being reflected in a fairly limited supply of new buildings. This reduces the risk of a major price decline in this segment in the period ahead. The risk of a decrease in prices of new apartments may also be lessened by the current environment of high inflation, which is directly increasing property development costs.

Chart II.21

Apartment price growth by region

(%)

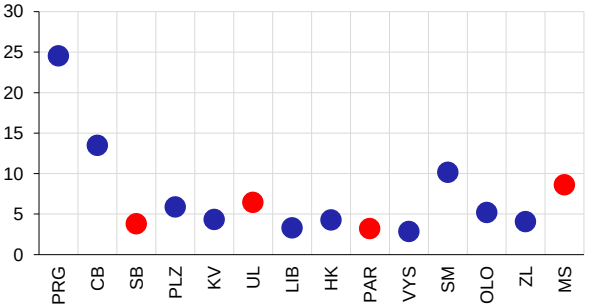


Source: COSMC, Dataligence

Chart II.22

Shares of regions in debt financing of property

(%; share of region in total number of pure new mortgage loans provided in 2020–2022)



Source: COSMC

Note: Red points denote regions with the largest decreases in property prices in 2022 Q2–2023 Q1.

14 These are also the regions with the highest gross rental yields.

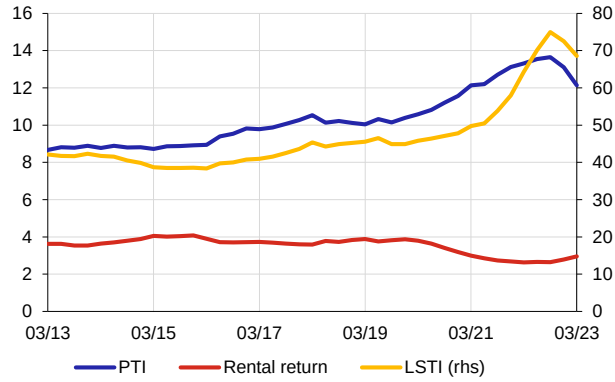
The decreasing overvaluation of prices has yet to make owner-occupied housing significantly more affordable

According to the relevant indicators, the affordability of housing started to show a change in trend at the end of 2022. Amid broadly flat mortgage rates and rising nominal household income, the property price developments seen in the second half of 2022 led to a slight improvement in the indicators monitored (see Chart II.23). The estimated degree of apartment price overvaluation also started to decline in 2022 Q4 for the first time in around six years. Under the macroprudential approach, apartment prices were overvalued by 57% on average for the median household purchasing owner-occupied housing at the end of 2023 Q1 (see Chart II.24). This means that, given the current level of income, mortgage rates and expected economic developments, the median household can afford to buy an average apartment with debt financing only if it accepts a sizeable risk of future default. So, apartments are current safely attainable only for a narrow set of high-income households (see Chart II.20 CB). The degree of overvaluation of buy-to-let investment apartments also decreased but was still above 23% at the end of 2023 Q1. The high degree of overvaluation under the investor (valuation) approach points to a higher willingness of households to accept low rental income or overly optimistic expectations regarding future growth in apartment prices and rents. Potential non-fulfilment of these expectations may put downward pressure on prices in the future. Despite the change in trend and partial improvement in all the indicators monitored, the price affordability of housing remains impaired and the risks associated with the property market persist in spite of having eased.

Chart II.23

Selected apartment affordability indicators

(PTI in years; yields in %; right-hand scale: %)



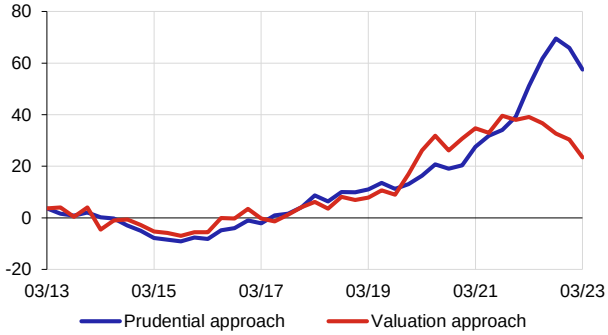
Source: CNB, CZSO, IRI, Společnost pro cenové mapy ČR, s.r.o.

Note: PTI is the price-to-income ratio and LSTI the loan service-to-income ratio. The apartment price is defined as the average price of a 68 m^2 apartment. Income is defined as the annual moving total of the average gross wage. A loan with an LTV of 80% and a repayment period of 25 years was considered for the LSTI calculation.

Chart II.24

Estimated overvaluation of apartment prices

(%)



Note: The methodology of the indicators is described in Plašil, M., Andrle, M. (2019): *Assessing House Price Sustainability*, Thematic Article on Financial Stability 1/2019, CNB. The overvaluation estimate is based on the CNB's spring forecast (MPR – Spring 2023).

Regions with higher shares of buy-to-let apartments may show increased price sensitivity to the business and financial cycle

The buoyant growth in residential property prices seen in previous years is often associated with the purchase of buy-to-let apartments, which tend to be more price-sensitive to changes in the business and financial cycle than owner-occupied apartments. Despite the uncertainty regarding the exact definition of buy-to-let apartments, their share and breakdown by region can be roughly estimated using data on ownership of multiple apartments by the same person. This form of ownership is not quantitatively negligible in the Czech Republic (see Chart II.25) and the share of buy-to-let apartments may thus be above 10% depending on the assumptions made.[15] The available data indicate that Prague, the Karlovy Vary Region, the Ústí nad Laben Region, the Liberec Region and the Moravian-Silesian Region have the highest shares of such apartments (see Chart II.26). Any further growth in the share of buy-to-let apartments may thus foster greater volatility of prices in certain regions across the cycle in the future.

Activity on the commercial property market decreased in the second half of 2022 and remains highly subdued by historical comparison

The Czech commercial property market saw a gradual increase in transactions in 2021 and the first half of 2022 (see Chart II.27). In the currently most attractive segment, namely industrial property, construction of new premises resumed following the pandemic. In the second half of 2022, transaction activity weakened markedly and new completed premises declined again (see Chart II.28). Market activity is thus significantly lower than before the pandemic. Activity in the second

15 For example, in the case of ownership of two apartments it is not clear whether both are occupied by the owner, whether the newer apartment has been bought in order to move in and the older one will then be sold, or whether the newer apartment is truly a buy-to-let investment apartment.

half of 2022 reflected uncertainty about the evolution of rents and rising property operating costs on the one hand and more expensive external funding and growth in construction work prices on the other. These factors will probably continue to affect market activity throughout 2023.

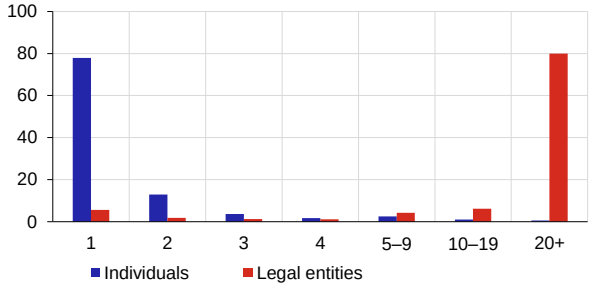
The commercial property market saw a correction in late 2022, reflected in both a rise in prime yields and a decline in prices

Yields on commercial property rose in late 2022 following a long period of decline (see Chart II.27) and prices in all commercial property segments thus began to fall. However, the correction lagged behind that in the euro area in both timing and extent. Given the rise in domestic and foreign long-term interest rates and the existing uncertainties, growth in domestic prime yields has been fairly moderate so far. The CNB thus assesses prime yields as still quite low relative to fundamentals (see Chart II.21 CB). This may give rise to concerns of further strong growth and hence a continued price correction. This would mean a further decrease in the value of collateral used to obtain bank funding (see section V.4.2), especially in the case of retail space and partly also office space. By contrast, given the current wave of interest in industrial property, as reflected in record-low vacancy rates (see Chart II.28), this segment seems the least susceptible to the risk of disorderly growth in prices in the near future.

Chart II.25

Ownership of multiple separate apartments

(% of all apartments in given category)



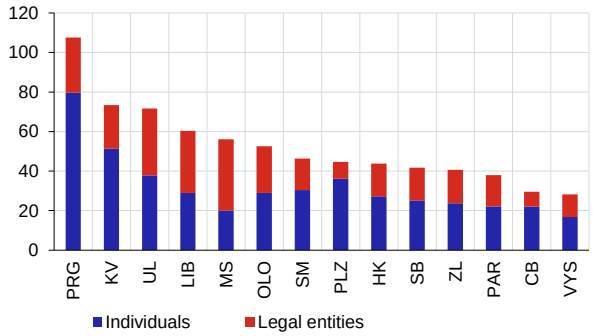
Source: Dataligence

Note: A separate apartment is registered as such in the cadastre and is a separate property. The individuals category includes joint ownership by spouses. The data on ownership of two or more apartments by the same person exclude cooperative apartments, state-owned apartments, the ownership of only a share in an apartment and so on. The share of apartments owned by persons owning only one apartment may thus be overestimated.

Chart II.26

Ownership of multiple separate apartments by region

(apartments per 1,000 inhabitants)



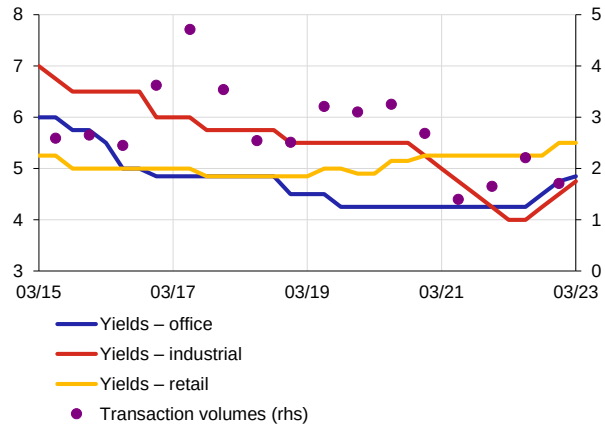
Source: Dataligence, CZSO

Note: Ownership of two or more apartments by the same person. A separate apartment is registered as such in the cadastre and is a separate property. The data exclude cooperative apartments, state-owned apartments, the ownership of only a share in an apartment, apartments in family houses and apartments in apartment blocks that are not registered as separate apartments in the cadastre. The individuals category includes include joint ownership by spouses.

Chart II.27

Yields on commercial property and transaction volumes in the Czech Republic

(%; right-hand scale: EUR billions)



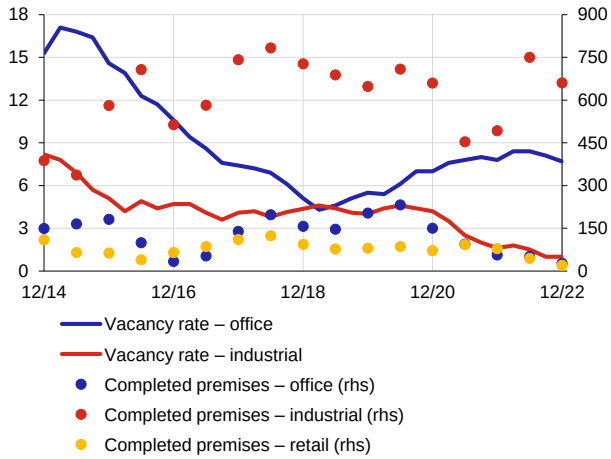
Source: Jones Lang LaSalle

Note: Prime yields. Transaction volumes are reported as annual moving totals at semi-annual frequency.

Chart II.28

Vacancy rates and completed premises for commercial property

(vacancy rates in %; right-hand scale: space in thousands of m^2)



Source: Jones Lang LaSalle

Note: Stocks of completed premises are reported as annual moving totals at semi-annual frequency.

II.2 THE NON-FINANCIAL SECTOR

II.2.1 General government

General government finances will continue to record deficits…

General government finances ended 2022 in a deficit of 3.6% of GDP (see Chart II.29). In the *Baseline Scenario*, the deficit increases further to 3.9% of GDP in 2023. Besides continued growth in expenditure on social benefits, this is also due to energy crisis-related expenditure. For the following year, the scenario assumes that the temporary crisis-related support measures are phased out and the deficit drops to 2.5% of GDP. The deficit will be reflected in nominal growth in general government debt, but the ratio of debt to projected GDP (see Chart II.GDP) will remain close to its current level of around 44% of GDP in both years (see Chart II.30).

Chart II.29
General government balance
(% of GDP)

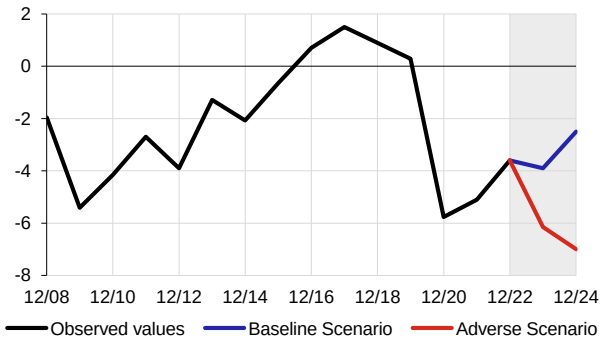
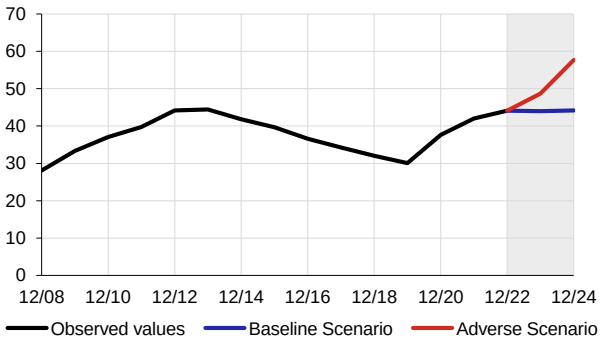


Chart II.30
General government debt
(% of GDP)



…while remaining structurally imbalanced

The structural balance[16] estimated by the CNB recorded a sizeable deficit (3.9% of GDP) in 2022. On the expenditure side, social benefits increased significantly (by 9% year on year; an increase of 42% over the last five years). Another sharply rising mandatory expenditure was interest paid (year-on-year growth of 70%). Structural problems may continue to weigh on fiscal policy in the years ahead. In the *Baseline Scenario*, the structural deficit is similar (3.7% of GDP) in 2023 and remains well above the medium-term budgetary objective (set at 0.75% of GDP) in 2024 (see Chart II.31).[17]

Chart II.31
General government structural balance
(% of GDP)

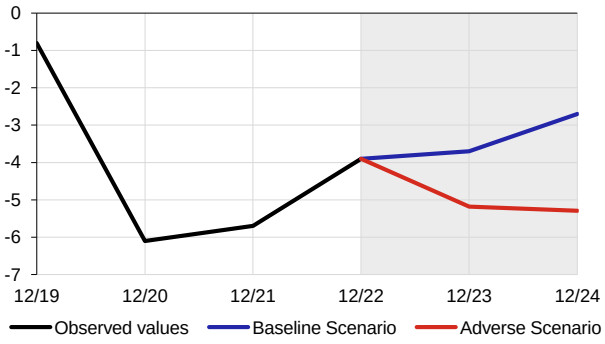
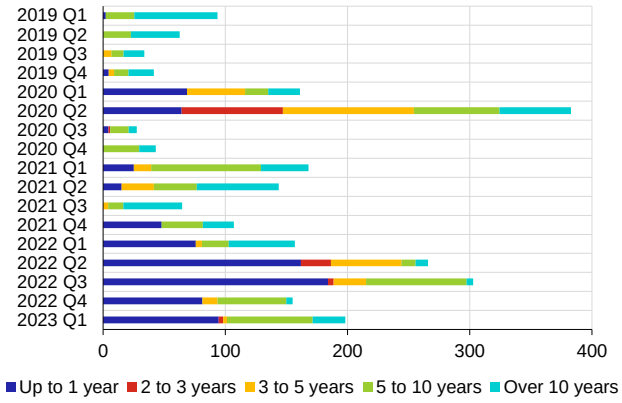


Chart II.32
New koruna-denominated Czech government bond issue volumes by maturity basket
(CZK billions)



16 The structural balance is the general government balance corrected for the economic cycle and extraordinary one-off measures.

17 The projections do not take into account the government consolidation package presented on 11 May 2023.

The direct interconnectedness of general government and the banking sector is growing

The high issuing activity on the primary government bond market (see Chart II.32), caused by the increased government borrowing needs so far in 2023 and in previous years (see Chart II.22 CB), met with strong demand.[18] The demand came mainly from domestic banks (see Chart II.33). According to Ministry of Finance data, banks' share in Czech government bond holdings was around 40% at the end of 2022. Taking into account government bonds pledged by banks in secured operations, the share was 48%. Domestic banks thus remain the main direct creditor[19] (see Chart II.23 CB). This further increases the potential risks to financial stability in the sense of mutual transmission of an adverse shock between the banking sector and general government (see section IV.5). The relatively high concentration of demand for government bonds might pose a risk to the capacity to absorb the supply of government bonds. According to the Czech Finance Ministry's strategy, this supply will remain elevated in the years ahead (see Chart II.22 CB). According to data obtained from domestic banks, eight out of the 15 domestic banks questioned apply an internal limit on exposures to Czech central government. These eight banks hold 83% of domestic banks' total exposures to Czech central government. Their spare unused limit in January 2023 was CZK 350 billion. The planned state budget deficit for 2023 and 2024 is CZK 575 billion in total.

The structure of non-residents' exposures to Czech government bonds has been changing since 2022

The share of non-residents in Czech government bond holdings stopped falling from the second half of 2022 onwards, standing at 27% at the end of 2022 (see Chart II.34). Non-residents are gradually focusing more on holding government bonds in the form of collateral accepted (for example in repo operations with domestic banks) instead of direct balance sheet exposures. For direct holdings, non-residents prefer short-term bonds. The variability in non-residents' behaviour caused by sudden changes in returns on alternative assets and by risk aversion is relatively high, so their share in domestic government bond holdings can also vary considerably. Growth in foreign investor risk aversion could thus result in a fall in the shares of non-residents due to the gradual maturity of direct holdings and the non-renewal of collateralised koruna deposits. The risk of sudden growth in risk aversion on the Czech government bond market stemming from potential concerns about the Czech Republic's refinancing and liquidity position is reduced by the relatively long average time to maturity of government debt, which stood at 6.2 years at the end of 2022.[20] Also, the Czech Republic's ratings from four rating agencies remain unchanged with a negative outlook (see Table II.1 CB).

Chart II.33

Share of general government debt securities on the balance sheets of domestic banks

(%)

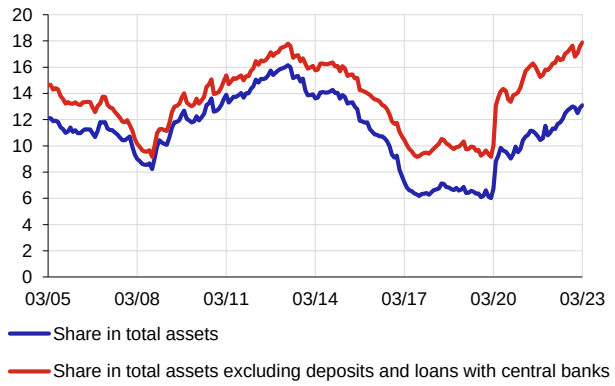
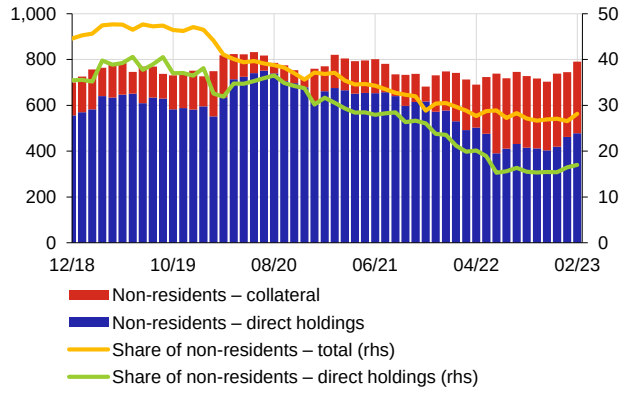


Chart II.34

Holdings of Czech government bonds by non-residents

(CZK billions, right-hand scale in %)



Source: Ministry of Finance of the Czech Republic, CNB

Note: CNB estimate based on Ministry of Finance data and custody data.

The *Adverse Scenario* shows potentially limited room for active fiscal policy in the event of a deep recession

In the *Adverse Scenario*, the evolution of the general government balance would lead to a much wider general government deficit and growth in the general government debt-to-GDP ratio (see Chart II.29 and Chart II.30). The wider deficit in this scenario is driven by a drop in revenues (of 1.6% year on year in 2024, as against growth of 5.3% in the *Baseline Scenario*) due to the assumed sizeable economic contraction. Interest paid would also rise, due to growth in rates and the risk

18 The volume demanded in government bond auctions exceeds the announced auction volume several times over. The weighted average of this ratio (the weights being the volumes announced) across the koruna government bond auctions was 2.5 in 2023 Q1.

19 The average duration of the government bonds held in domestic banks' balance sheets is 5.8 years.

20 In the case of the indicators of the average time to maturity after taking into account cash resources from short-term reserve operations on the money market and the total available state treasury liquidity against the nearest state debt redemptions, the levels of these indicators amounted to 6.5 years and 7.4 years respectively.

premium (see Chart IV.1E).[21] The *Adverse Scenario* does not assume active countercyclical fiscal policy in the sense of using discretionary measures to contribute to stabilising the economy and softening the impacts of a deep recession. Even so, the growth in general government debt would breach the debt brake level of 55% in 2024.[22] The materialisation of the *Adverse Scenario* indicates that the starting position and current imbalance in general government finances is already limiting the ability of fiscal policy to act in a countercyclical manner in the event of a significant economic slowdown.

The risk to financial stability would be reduced by a programme to return to structural balance and create sufficient fiscal space

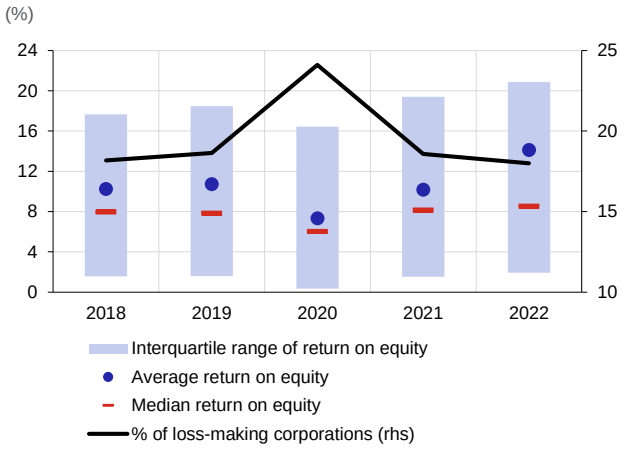
Delaying fiscal consolidation is gradually increasing the risks to financial stability in the medium term due to the growing interconnectedness of general government and the banking sector. The government's fiscal efforts contained in the CNB's forecast (MPR – Spring 2023), and the Czech Ministry of Finance's projections[23] are largely the result of a gradual phasing out of the fiscal support measures adopted in recent years and cannot be assessed as active fiscal consolidation. The trajectory of the return to the medium-term objective of a structural deficit of 0.75% of GDP communicated by the Ministry of Finance does not seem sufficiently ambitious. Long-term Czech public finance sustainability remains unresolved. In the pension system area, legislative measures leading to a significant deterioration in the pension account deficit have been approved in recent years.[24] The recently presented government consolidation package[17] is an indication of a positive budgetary trend for the future. However, these efforts must continue if medium-term public finance sustainability is to be restored and the risk of contagion between the banking sector and general government is to be reduced.

II.2.2 The private non-financial sector

Firms' profitability continued to grow despite their high costs, and the unemployment rate remained low

The strong growth in costs and considerable economic and geopolitical uncertainty weighed on the sentiment of non-financial corporations and households in 2022 (see Chart II.7). However, firms were able to pass on their increased costs to consumers and keep wage growth below the growth in their gross operating surplus in the second half of the year (see Chart II.24 CB). The profitability of non-financial corporations as measured by return on equity thus exceeded the levels seen in previous years and the proportion of loss-making firms continued to fall (see Chart II.35). The trade and energy sectors recorded considerable growth in profitability, while profitability in the automotive industry decreased due to lower external demand and persisting problems with component supplies (see Chart II.25 CB). Firms' favourable results were also reflected in the unemployment rate, which stayed below 2.5% throughout 2022 (see Chart II.36). Nominal wages went up by almost 9% year on year in 2022 Q4. In real terms, however, wages fell markedly in 2022 to the 2018 level.

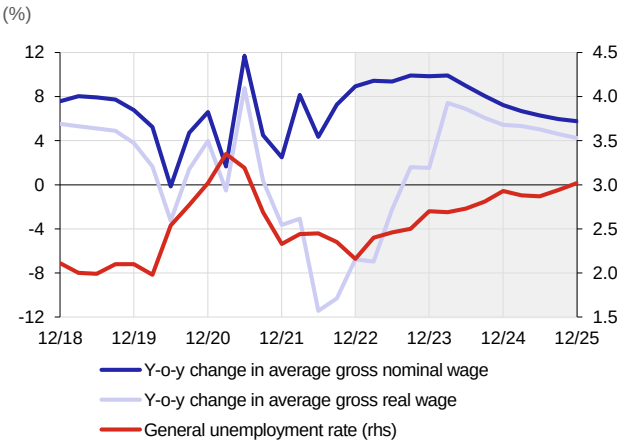
Chart II.35
After-tax return on equity and the share of loss-making non-financial corporations



Source: CZSO

Note: The results are based on a sample of around 1,700 corporations together accounting for more than 40% of the sector's gross value added.

Chart II.36
Labour market indicators in the *Baseline Scenario*



Note: The values in the grey area are based on the *Baseline Scenario*, which is consistent with the CNB's spring forecast in the first two years (MPR – Spring 2023).

21 The share of interest payments would grow to 2.4% of GDP. In 2022, it was 1.2% of GDP.

22 Exceeding this level outside recessions would greatly limit the government's ability to use fiscal policy actively. For details see Article 14 of Act No. 23/2017 Coll., on Budget Responsibility.

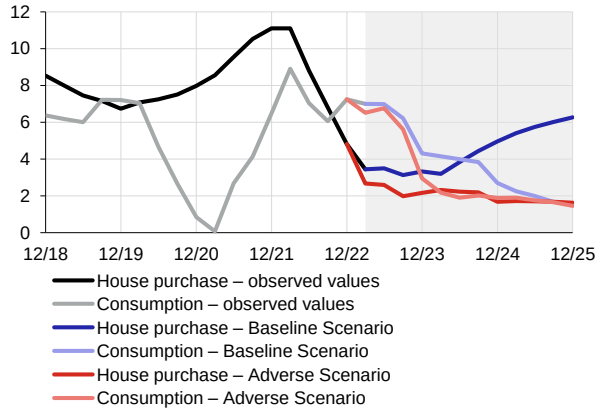
23 According to the Ministry of Finance's estimates provided in the Convergence Programme (2023), the structural deficit will increase from 1.6% of GDP estimated for this year to 2.6% of GDP in 2024. It is then expected to decrease only very moderately (by 0.2 pp a year on average).

24 In 2023, the difference between the revenues from pension insurance payments and expenditure on pension insurance benefits is expected to be negative again, reaching a record level of around CZK -62.5 billion (almost 1% of GDP).

The debt ratio of households and non-financial corporations declined at the end of 2022

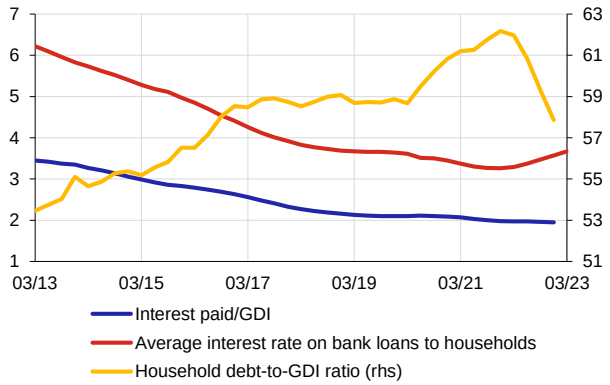
The pronounced decline in growth in the stock of bank loans to households for house purchase (see Chart II.37) was reflected in their debt ratio, which declined steadily in 2022 to 57% of gross disposable income, which is equal to the 2016 level (see Chart II.38 and Chart II.26 CB). The average interest rate on existing loans to households started to increase in 2022. However, due to households' preference for long fixed-rate periods in previous years, this increase was only moderate and the average interest paid on households' nominal disposable income remained at record-low levels of around 2%. In the case of non-financial corporations, the debt ratio fell to its lowest level since 2009 due to higher growth in corporate profits (see Chart II.39). This was despite strong growth in the stock of bank loans (see Chart II.40) as a result of growth in operating expenses and nominal corporate investment (see Chart II.24 CB).[25] The monetary policy rate hikes were reflected quickly in firms' interest expenses, as rates on corporate loans are mostly variable or fixed for up to three months (see Chart II.27 CB). Growth in interest rates on koruna loans slowed in the second half of 2022 after monetary policy rates stabilised. The ECB's rate hikes led to a gradual decrease in the interest rate differential in the second half of 2022. Nonetheless, the average interest rate on euro-denominated loans remained almost 4 pp lower at the end of 2022. The difference between the interest rate on koruna and euro loans continued to narrow in 2023 Q1.

Chart II.37
Projections of growth in bank loans to households
(year on year in %)



Note: The values in the grey area are based on the *Baseline Scenario*, which is consistent with the CNB's spring forecast in the first two years (MPR – Spring 2023).

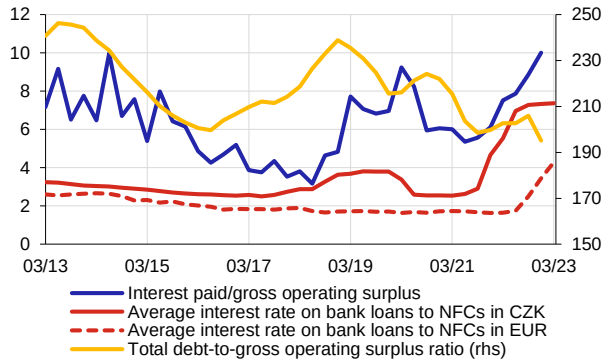
Chart II.38
Debt ratio and interest paid by households
(%)



Source: CNB, CZSO

Note: The household sector also includes data for NPISHs. The interest rate is calculated as the average interest rate on the stock of bank loans to households.

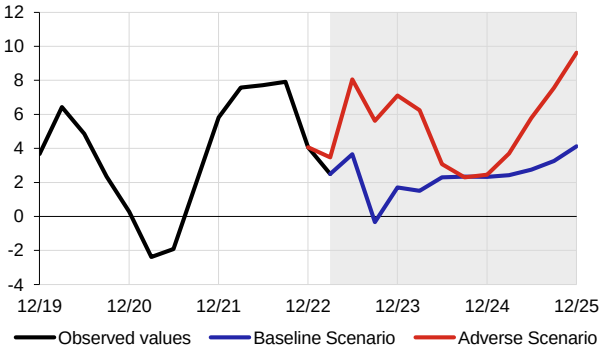
Chart II.39
Debt ratio and interest paid by non-financial corporations
(%)



Source: CNB, CZSO

Note: The interest rate is calculated as the average interest rate on the stock of koruna/euro bank loans to non-financial corporations.

Chart II.40
Projections of growth in the stock of bank loans in the non-financial corporations sector
(year on year in %)



25 The other components of corporate debt also grew apace. Year-on-year growth in inter-company debt stood at 17% at the end of 2022. In absolute terms, however, it was at the 2018 and 2019 levels. At the end of 2022, debt to general government was also up by 217% year on year, due to the provision of loans to producers operating in the energy market.

The share of foreign currency loans increased in the non-financial corporations sector

The stock of euro loans was up by 39% and the stock of koruna loans down by 13% year on year at the end of 2022. This led to a rise in the share of euro loans in the total stock of loans to 44%, a year-on-year increase of 11 pp. The share of euro loans continued to go up in 2023 Q1, reaching 46.5 % (see Chart III.1 CB). From the sectoral perspective, the share of foreign currency loans exceeded 50% in manufacturing and property development. These two sectors together account for 66% of total foreign currency loans to non-financial corporations (see Chart II.29 CB).[26]

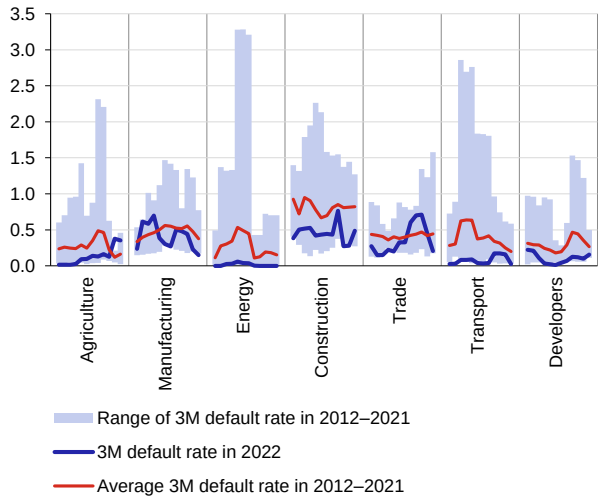
The high profitability was reflected in a lower corporate default rate…

The default rate on loans to non-financial corporations was relatively low despite the large increase in operating costs and interest rate expenses (see Chart II.41), and the 12M default rate was at a historical low of 0.86% at the end of 2022 (see Chart II.30 CB). In the first half of 2022, the three-month default rate rose above its ten-year average solely in manufacturing, mainly because of a sharp rise in energy prices. In the second half of 2022, the three-month default rate recorded above-average increases in the trade sector due to lower household consumption. Adverse developments in the energy market led to an increase in the share of loans to energy-intensive firms in Stage 2 (see Chart II.42 and Chart III.8). The three-month default rate on foreign currency loans was lower than that on koruna loans (see Chart II.31 CB) and the share of loans in Stage 2 or 3 was also lower for these loans (see Chart II.32 CB). The main reason is that firms taking out euro loans mostly fall into the category of large corporations.[27]

…and the low unemployment rate was reflected in a lower household default rate

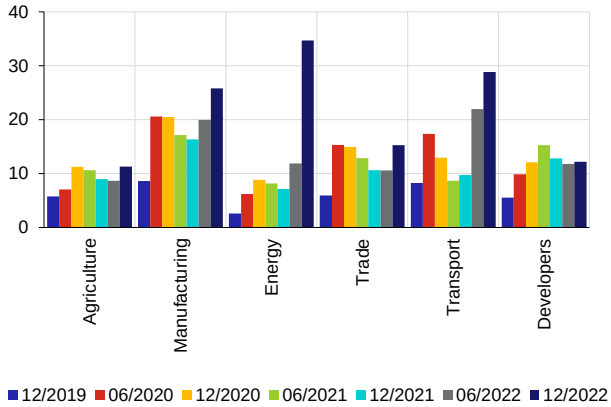
The favourable employment trends affected the default rate on loans to households, which continued to fall, reaching historical lows of 0.5% for loans for house purchase and 2.7% for consumer credit (see Chart II.30 CB). The risk of insolvency of households associated with the refixing of loans at higher interest rates and with growth in the cost of living has thus yet to materialise. The ratio of non-performing loans to total loans is also showing a similar trend to the default rate, reaching 0.7% for loans for house purchase and 3.9% for consumer credit (see Chart II.33 CB).

Chart II.41
3M default rate in selected NFC sub-sectors
(%; x-axis: individual months of year)



Note: The 3-month default rate is a forward-looking indicator defined as the flow of non-performing loans in the next three months divided by the total stock of loans in the starting period.

Chart II.42
Share of loans in Stage 2 by sector
(%)



In the *Baseline Scenario*, the credit activity of non-financial corporations and households is subdued

The low investment activity of non-financial corporations assumed in the *Baseline Scenario* is reflected in growth in the stock of loans to non-financial corporations, which for this reason turns negative in 2023 and stands at 1.7% at the end of 2023 (see Chart II.40). The growth rate of loans rises gradually to 4% over the following two years due to growth in nominal corporate investment. It is thus below the average for the duration of the *Baseline Scenario*.[28] By contrast, in the *Adverse Scenario*, growth in loans to non-financial corporations would be strong over the entire scenario horizon, mainly due to

26 Foreign currency loans to non-financial corporations are also discussed in Box 3 in FSR – Autumn 2022.

27 Large corporations (firms which have more than 250 employees and an annual turnover exceeding EUR 50 million or total assets on their annual balance sheet exceeding EUR 43 million) tend to have a lower default rate.

28 The average year-on-year rate of growth of loans in 2013–2022 was 4%.

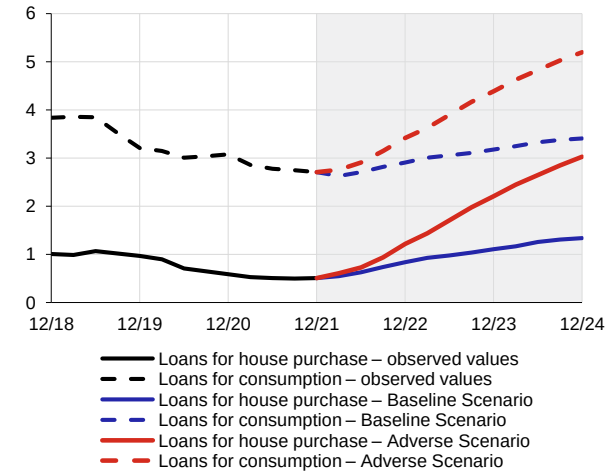
foreign currency loans being revalued using a much weaker nominal exchange rate of the koruna. Until mid-2024, the exchange rate effect also suppresses the sharply falling nominal investment, which subsequently trends upward until the end of the scenario period. In the *Baseline Scenario*, growth in the stock of loans in the household sector is broadly constant in 2023. From around mid-2024 onwards, credit activity in the case of loans for house purchase rises very slowly due to a gradual decline in interest rates and growth in real wages (see Chart II.37). However, growth in consumer credit is expected to decline gradually to 2% in line with the household consumption projection (MPR – Spring 2023). The debt ratio of households drops to around 55% in 2023 due to subdued credit activity combined with growth in households' nominal disposable income. In the *Adverse Scenario*, growth in loans for house purchase and consumer credit would drop to 2% due to a decline in economic activity and then stay at that level until 2025.

Default rates on loans to households and non-financial corporations rise gradually in the *Baseline Scenario*

In the *Baseline Scenario*, the volume of non-performing loans in the household sector rises in 2023 and the default rate rebounds, increasing gradually to 1.3% for loans for house purchase and 3.4% for consumer credit (see Chart II.43). The higher default rate is due mainly to growth in the unemployment rate (see Chart II.36). The environment of higher interest rates and a generally higher price level also contributes, albeit to a lesser extent. The *Adverse Scenario* would lead to faster and stronger materialisation of credit risk due to a surge in the unemployment rate. The default rate would reach almost 3% for house purchase loans and 5% for consumer credit (see section IV.4). Also consistent with the *Baseline Scenario* is a gradual rise in the 12-month default rate on loans to non-financial corporations. It reaches 2.4% at the end of the scenario horizon (see Chart II.44). However, this is well below the Global Financial Crisis level (see Chart II.30 CB). The default rates in trade, construction and property development rise significantly, reflecting the impact of higher interest rates and lower demand for property on those sectors. In the *Adverse Scenario,* the default rate on loans to non-financial corporations would rise above 6% due to similar factors combined with a drop in foreign trade (see section IV.3).

Chart II.43
12M default rate on loans to households by scenario

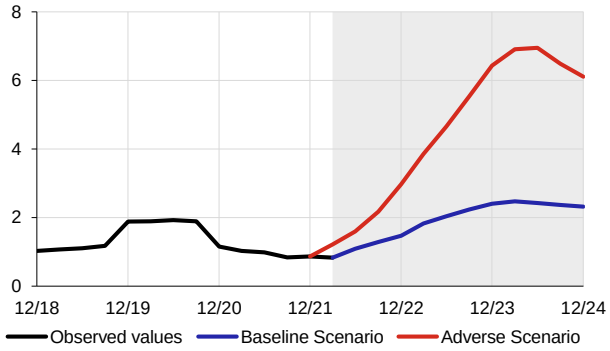
(%)



Note: The 12-month default rate is a forward-looking indicator defined as the flow of non-performing loans in the next 12 months divided by the total stock of loans in the starting period.

Chart II.44
12M default rate on loans to non-financial corporations by scenario

(%)



Note: The 12-month default rate is a forward-looking indicator defined as the flow of non-performing loans in the next 12 months divided by the total stock of loans in the starting period.

III. THE FINANCIAL SECTOR

III.1 DEVELOPMENTS IN THE FINANCIAL SECTOR

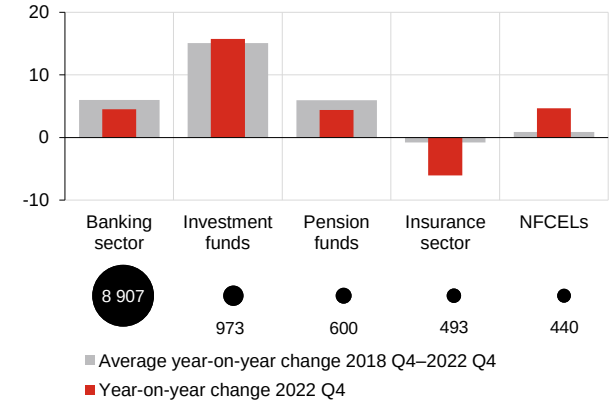
The financial sector continued to grow

The total assets of the financial sector reached CZK 11.4 trillion (168% of GDP) at the end of 2022, up 4.9% year on year (Chart III.1). The crucial banking sector, accounting for almost 80% of the domestic financial sector's assets at the end of 2022, recorded year-on-year growth of 4.5% (CZK 384 billion) to CZK 8.9 trillion (see section III.2). The investment fund sector is showing the fastest growth in the long term, with total assets of close to CZK 1 trillion (see section III.3, Chart III.21), up 15.8% (CZK 133 billion) year on year at the end of 2022. The year-on-year decline in the insurance sector's total assets (CZK 33 billion, see section III.3) was linked mainly to asset repricing due to rising interest rates, including a slight fall in the value of debt securities, which form the largest part of the insurance sector's assets.

Chart III.1

Rates of growth of segments of the financial sector

(%)

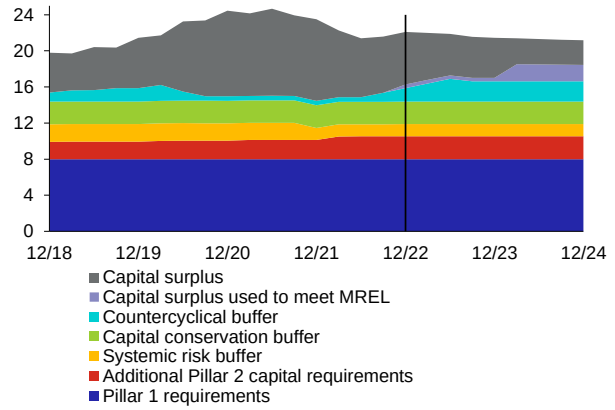


Note: NFCELs = non-bank financial corporations engaged in lending. The sizes of the circles proportionately show the value of the segments' assets in CZK billions as of 2022 Q4. The banking sector also includes credit unions.

Chart III.2

Structure of capital and capital requirements in the domestic banking sector

(pp)



Note: The capital prediction assumes constant risk weights. Risky exposures are calculated on the basis of banks' assumptions about future loans, which banks report in the statement "Bank financing plans" (FPSIFE10). The prediction also takes into account the issuance of eligible liabilities by banks with a non-zero MREL recapitalisation amount.

III.2 BANKING INSTITUTIONS[29]

III.2.1 Own funds and eligible liabilities

Banks maintained their capital above the risk-weighted capital requirements by a significant margin

The capitalisation of the domestic banking sector was indicating robust resilience of the sector at the end of 2022. The sector's capital rose by CZK 9 billion year on year to CZK 626 billion. Most of the capital (around 93%) consisted of the highest-quality common equity Tier 1 capital. The overall capital ratio (the ratio of total capital to risk-weighted exposures) decreased by 1.4 pp year on year to 22.1% (see Chart III.1). This was caused mainly by a rise in the aggregate risk weight (-1.3 pp of the capital ratio) and an increase in total exposures (-0.4 pp). Growth in capital had the opposite effect (+0.3 pp). The capital surplus was CZK 176 billion at the end of 2022. Banks thus met the regulatory risk-weighted capital requirement[30] by a significant margin (6.2 pp of the capital ratio). The surplus fell by CZK 61.8 billion year on year. This was partly due to an increase in the CCyB rate, which was raised further in January and April 2023 by a total of 1 pp. Dividend payouts related to the end of profit distribution restrictions after the pandemic also had an effect.[31]

29 The Czech Export Bank and the National Development Bank are excluded from the analysis of the capital of the banking sector as a whole in the entire section III.2. This is because these banks are wholly owned by the Czech state (providing implicit state guarantees for their liabilities) and have different business models and volatile credit portfolios.

30 The risk-weighted capital requirement, expressed as the ratio of capital to risk-weighted exposures, consists of the minimum level of regulatory capital in Pillar 1 (8%), requirements based on the supervisory review of risks in Pillar 2 (an average of 2.5% for the sector at the end of 2022) and capital buffers (an average of 5.3% for the sector). Its aim is to ensure that the banking sector is sufficiently resilient to shocks.

31 Dividends paid from past profits amounted to CZK 23.6 billion and dividends paid from 2021 profits to CZK 48.5 billion in 2022. The amount of dividends paid was affected by the retention of dividend payouts from the 2019 and 2020 profits, which formed part of the anti-crisis measures. The average dividend in 2019–2021 was CZK 30 billion, whereas the five-year average in 2014–2018 had been CZK 54 billion.

The capital surplus of domestic banks may gradually decrease further…

The current capital surplus increases the banking sector's resilience to risks, which can materialise suddenly and significantly, especially in times of uncertainty about future economic developments, and thus plays a stabilising role in the management of banks' capital position. According to banks' plans, however, growth in client loans, the risk of lower profitability and dividend policy can be expected to lead to a further drop in the capital surplus (see Chart III.2, grey area). The pending reduction of the CCyB rate to 2.25% will have the opposite effect (see section V.3). Some banks use their capital surplus to meet the MREL – in an amount totalling CZK 11 billion. This reduced the usability of the capital surplus for paying dividends, absorbing losses or lending to CZK 165 billion (6.0% of risk-weighted exposures) at the end of 2022.[32]

Chart III.3

Average risk weights of the main categories of exposures under the IRB approach

(%)

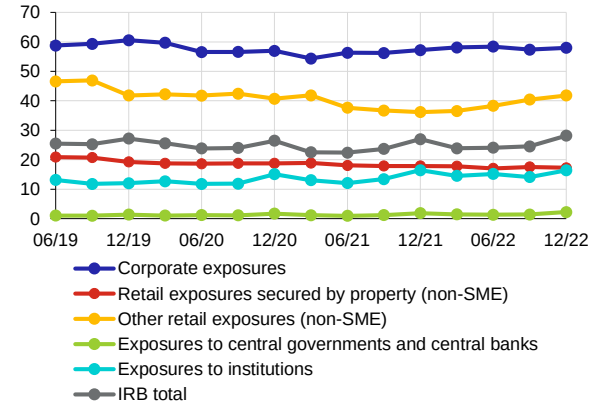
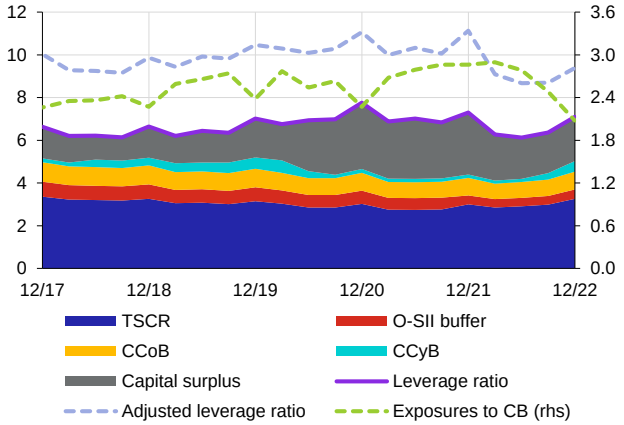


Chart III.4

Structure of the leverage ratio by capital source

(%; right-hand scale: CZK trillions)



Note: TSCR = sum of Pillar 1 and Pillar 2 requirements. Adjusted leverage ratio = Tier 1/total exposures excluding CB.

…and will be affected by the future evolution of risk weights…

The broad downward trend in risk weights for exposures of banks that use internal models to set those weights (the IRB approach) halted during 2022 (see Chart III.3).[33] Average risk weights rose by 1.2 pp year on year to 28.2% at the end of 2022. Other things being equal, growth in risk weights generally increases the capital requirement in absolute terms and reduces the capital ratio. The largest growth in risk weights was observed for unsecured loans to households (of 5.6 pp to 41.8%) and slight growth was observed for corporate exposures (of 0.8 pp to 58.0%). By contrast, the risk weights for the largest credit portfolio of exposures secured by residential property continued to fall (by 0.6 pp to 17.3%).[34]

…depending mainly on the impacts of the still high inflation and tightened financial conditions on loan portfolio quality

The evolution of risk weights will depend on the scale and duration of the adverse economic impacts of the high inflation and the related tightening of financial conditions. The potential increase in risk weights associated with the materialisation of credit risk would not be strong at first, as the parameters of internal models take into account the evolution of credit risk over the longer term (around nine years). However, in the event of an unexpected movement of the economy towards the *Adverse Scenario*, growth in risk weights may accelerate and adversely affect the capital position of banks using the IRB approach. The CNB takes this risk into account when setting the CCyB rate (see section V.3) and also assesses it in its regular macro stress tests of banks (see section IV.1). The results indicated that the risk is currently limited in relation to the sector's capital resilience if the *Baseline Scenario* materialises, thanks mainly to the prudent and preventive use of microprudential (Pillar 2) and macroprudential instruments (see section V).

32 Using a very simplistic estimate, other things being equal, this capital surplus should be sufficient to cover the credit risk of around CZK 2.3 trillion of new exposures without the capital dropping below the regulatory minimum.

33 Exposures whose risk weights are set using the IRB approach amounted to CZK 5.8 trillion at the end of 2022. This corresponded to 71% of the exposures of the domestic banking sector.

34 For details on the risk of procyclicality of risk weights under the IRB approach, see Malovaná, S. (2021): *The Pro-cyclicality of Risk Weights for Credit Exposures: Driven by the Retail Segment*, Economic Systems, vol. 45(1), and Brož, V., Pfeifer, L. (2021): *Are the Risk Weights of Banks in the Czech Republic Procyclical? Evidence from Wavelet Analysis*, Journal of Central Banking Theory and Practice, vol. 10(1).

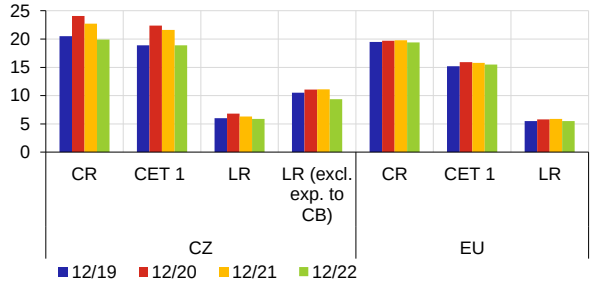
Banks' capital even exceeded the non-risk-weighted capital requirement by a sufficient margin

The robust capitalisation of the domestic banking sector is also indicated by the leverage ratio,[35] which had an aggregate value of 7.1% at the end of 2022. Although this ratio fell by 0.2 pp year on year, it was still well above the 3% regulatory minimum (see Chart III.4). In the domestic banking sector, the ratio is significantly affected by banks' high exposures to the CNB (2.3 pp). As a result of the CNB's foreign exchange interventions to limit the volatility of the koruna exchange rate, those exposures fell by around 0.8 pp to CZK 2.1 trillion (about 24% of the banking sector's total assets) in the second half of 2022. Adjusted for them, the leverage ratio was relatively high at 9.4% at the year-end. Capitalisation is on the higher side by international comparison in both risk-weighted and non-risk-weighted terms (see Chart III.5).

Chart III.5

Capitalisation in the domestic and European banking sectors

(%)



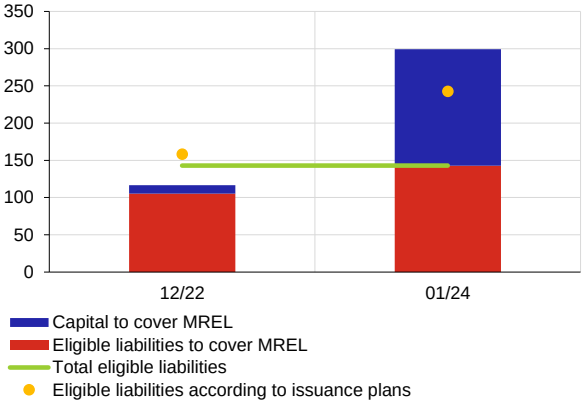
Source: EBA

Note: CR = capital ratio, CET1 = Common Equity Tier 1 capital ratio, LR = leverage ratio. The values in the chart are based on EBA data. In view of the different source, they may not be identical to the values given in section III.2.1. The leverage ratio adjusted for exposures to the central bank is also given for the domestic banking sector because of their significant share in total assets (24%).

Chart III.6

MREL recapitalisation amount and compliance structure

(CZK billions)



The banking sector's resolvability is enhanced by compliance with the MREL…

The intermediate MREL[36] stood at CZK 424 billion at the end of 2022, with the loss absorption amount, consisting of own funds, standing at CZK 307 billion and the recapitalisation amount at CZK 116 billion. The recapitalisation amount is crucial for the effective resolution of banks providing critical functions, which manage almost 90% of the total assets in the domestic banking sector. At the end of 2022, banks were using both eligible liabilities (CZK 105 billion) and own funds (CZK 11 billion) to meet the recapitalisation amount. Eligible liabilities were CZK 15.4 billion lower at the end of 2022 than banks had planned (see Chart III.6, left-hand column). This may have been linked to the growth in market interest rates and the borrowing costs associated with the issuance of this type of financial instrument during 2022 and 2023, or to a change in banks' strategy regarding the MREL compliance structure.

…the final MREL will become binding and the recapitalisation amount will increase at the start of 2024

The recapitalisation amount will increase sharply when the final MREL comes into effect at the start of 2024 (see Chart III.6, right-hand column). The MREL compliance structure will depend on the amount of eligible liabilities issued by banks in 2023. To fully cover the recapitalisation amount using eligible liabilities, banks would have to issue around CZK 157 billion of them. However, banks plan to issue CZK 100 billion of eligible liabilities in 2023 and therefore meet the rest (CZK 57 billion) with own funds at the start of 2024 (see Chart III.6, right-hand column). The compliance structure of the MREL recapitalisation amount affects the usability of the capital surplus and potentially also the capital buffers for absorbing losses (see section V.1).[37] The CNB therefore analyses and evaluates banks' approaches to compliance with the MREL on an ongoing basis.

35 A leverage ratio requirement, expressed as the ratio of Tier 1 capital to total exposures, has been applicable in the EU since June 2021. Its aim is to mitigate the risk of excessive leverage, particularly in institutions with relatively low aggregate risk weights. See Pfeifer, L., Hodula, M., Holub, L., Pikhart, Z. (2018): *The Leverage Ratio and Its Impact on Capital Regulation*, CNB WP 15/18.

36 An intermediate objective has been in effect since 1 January 2022. The MREL is designed to ensure that banks have sufficient capacity for the absorption of losses and subsequent recapitalisation in the event of resolution. See Kahoun, T. (2019): *Minimum Requirement for Own Funds and Eligible Liabilities (MREL): General Approach of the Czech National Bank*, Thematic Article on Financial Stability 4/2019, Czech National Bank.

37 MREL compliance in the case of own funds reduces the capital surplus and the usability of capital buffers. For details see Pfeifer, L., Holub, L. (2022): *The Relationship between the MREL and Macroprudential Capital Buffers*, Thematic Article on Financial Stability 2/2022, Czech National Bank.

III.2.2 Credit risk

Banks continued to lend across all credit segments in 2022

The total volume of loans provided[38] rose by 8% (CZK 293 billion) year on year to CZK 3,968 billion in 2022 (see Table III.1). Exposures in the household segment grew by 8.5% (CZK 178 billion) to CZK 2,266 billion in 2022 (see Table III.1 CB), mainly due to year-on-year growth in loans secured by residential property (7.2%; CZK 118 billion), but also because of stronger relative growth in consumer credit (16%; CZK 44 billion). Growth in loans to households almost halted in early 2023, due to tightening financial conditions (+0.3% to CZK 2,273 billion as of 28 February 2023). A similar trend can be observed in the non-financial corporations segment, which grew by 7.2% (CZK 98 billion) to CZK 1,457 billion in 2022 and by 0.7% to CZK 1,468 billion in the first two months of 2023. Euro loans – which rose by 39% (CZK 153 billion) year on year to CZK 543 billion – played a key role in the growth in loans to non-financial corporations in 2022, while koruna loans fell year on year (see Chart III.1 CB and section II.2.2).

Table III.1
Exposures, provisions and coverage rates by risk stage and portfolio

Client		Exposures		Provisions		Coverage rate	
Stage	Date	Volume (CZK billions)	Change (%)	Volume (CZK billions)	Change (%)	Rate (%)	Change (pp)
Total	12/19	3,268		54.4		1.66	
	12/20	3,399	4.0	74.5	37.0	2.19	0.53
	12/21	3,675	8.1	68.8	-7.7	1.87	-0.32
	12/22	3,968	8.0	71.1	3.4	1.79	-0.08
	02/23	4,043	1.9	70.5	-0.8	1.74	-0.05
S1	12/19	2,989		5.9		0.20	
	12/20	2,969	-0.7	8.7	46.4	0.29	0.09
	12/21	3,201	7.8	8.1	-6.1	0.25	-0.04
	12/22	3,284	2.6	9.3	13.8	0.28	0.03
	02/23	3,362	2.4	9.3	0.1	0.28	-0.01
S2	12/19	207		6.7		3.24	
	12/20	339	63.8	18.7	179.3	5.52	2.28
	12/21	391	15.3	15.7	-15.9	4.02	-1.49
	12/22	607	55.5	20.3	29.2	3.34	-0.68
	02/23	604	-0.5	20.0	-1.3	3.31	-0.03
S3	12/19	72		41.8		57.88	
	12/20	91	26.1	47.2	12.8	51.78	-6.10
	12/21	84	-8.2	44.9	-4.7	53.74	1.96
	12/22	77	-8.1	41.5	-7.5	54.09	0.35
	02/23	77	0.0	41.2	-0.8	53.65	-0.44

Note: Client exposures denote exposures to non-financial corporations, households and credit institutions. S1 and S2 comprise performing loans; S3 can be considered identical to non-performing loans.

The share of loans with increased credit risk rose due to uncertainty about future economic developments…

The intensity of migration of loans to the increased credit risk category (Stage 2) continued to rise in 2022. The loans moved from Stage 1 to Stage 2 during 2022 totalled CZK 375 billion (as against around CZK 200 billion a year in 2020 and 2021 and CZK 100 billion a year in 2018 and 2019; see Chart III.7). The volume of loans with increased credit risk rose by 56% year on year and its share in total loans reached a historical high of 15.3%.

…with greater intensity in the household segment…

Amid a substantial increase in the cost of living and an expected economic downturn, banks reflected the increase in credit risk primarily in the household segment (see section II.2.2). In the course of 2022, they moved CZK 231 billion of loans to households from Stage 1 to Stage 2 (65% of total migrations; see section III.7). The volume of loans in Stage 2 rose by 81.4% year on year to a resulting share of 14.6% (see Chart III.8). The migrations intensified in 2022 Q3, when the worsening current and expected economic conditions started to become apparent.

…than in the case of non-financial corporations

The intensity of migration in the corporate loans segment was lower in 2022 (CZK 130 billion; 35% of total loan migrations). This may be related to the relatively good economic situation of non-financial corporations (see section II.2.2 and section IV.3). Another possible explanation is the increased volume of migrations recorded in 2020 in response to the pandemic (CZK 125 billion; 60% of all loan migrations in 2020). The volume of Stage 2 loans in the corporate segment rose by 40.6% year on year to a resulting share of 18.6%.

38 Loans provided include new and refinanced loans.

Chart III.7
Migrations of credit exposures from Stage 1 to Stage 2
(CZK billions)

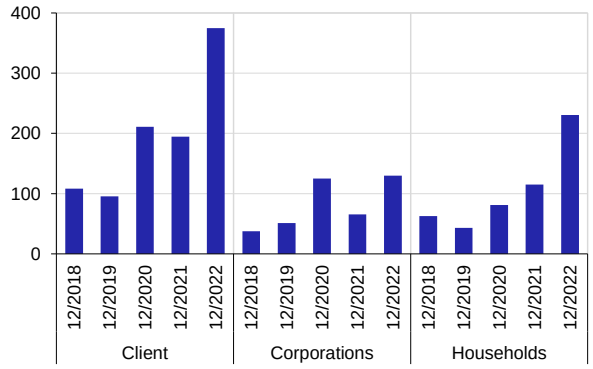
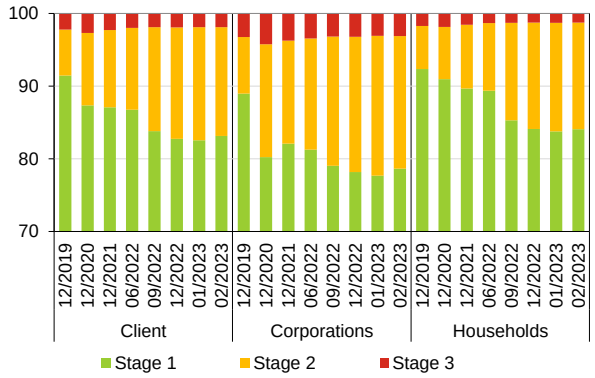


Chart III.8
Structure of credit exposures by portfolio quality
(%)



Note: Non-performing loans (NPLs) correspond to loans classified in Stage 3 – impaired loans.

Despite the reduction in credit portfolio quality, banks do not expect a significant increase in credit losses…
Under the new IFRS 9 accounting standard, banks should classify loans according to credit quality (Stages 1–3) and create provisions in connection with the risks identified in the event of a worsening of macroeconomic forecasts and related expectations of credit losses. In 2022, provisions rose by CZK 2.3 billion (2.3%) year on year overall, due mainly to provisioning in Stage 2 (+CZK 4.6 billion), which was evenly spread across segments. The situation remained broadly unchanged in the first two months of 2023. The relatively low provisioning for loans in Stage 2 in both segments indicates that banks perceive increased credit risks, but their expectations regarding real losses remain low (for details see Box 1).

Chart III.9
Coverage of credit exposures by provisions
(%)

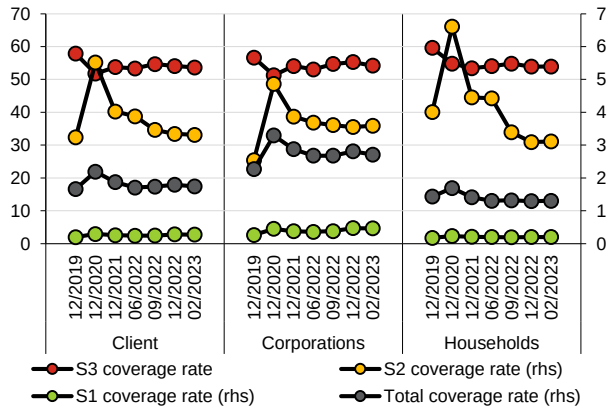
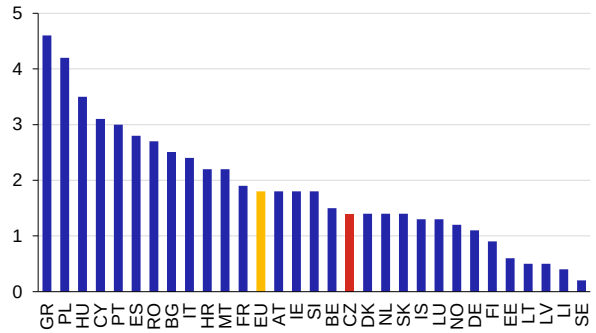


Chart III.10
Shares of non-performing client loans in selected EU countries
(%; as of 31 December 2022)



Source: EBA
Note: The figures in the international comparison may differ from the CNB's figures due to a different data source.

…which is leading to a decline in the coverage of credit exposures by provisions
The total coverage of client credit exposures by provisions fell by 0.08 pp year on year to 1.79% at the end of 2022 (see Chart III.9). The decline continued in the first two months of 2023 (1.74%). This was mainly due to the household segment (where the coverage rate fell from 1.41% to 1.29% year on year), as the drop in the coverage rate in the corporations segment was relatively insignificant (0.1 pp). In this situation, the assessment of all aspects of provisioning requires constant microprudential supervisory attention and more cautious use of macroprudential instruments, particularly the CCyB rate, given the potential risk of a cliff effect[39] (see Box 3.2 in FSR 2018/2019).

39 The cliff effect means relatively significant provisioning within a very short time due mainly to a sudden and significant upward revision of the model-based estimate of the necessary coverage rate.

The ratio of non-performing loans fell in 2022

Non-performing loans (Stage 3) have shown a favourable downward trend since 2020 in both segments. While their share in total loans was 2.3% in 2020, it was 1.9% at the end of 2022, which is low by international comparison (see Chart III.10). At the same time, the coverage rate for non-performing loans was above the EU average in the same period (see Chart III.2 CB). Non-performing loans fell by CZK 6.8 billion (8.1%) year on year, the decrease being greater in the loans to households segment (13.4%) than in the loans to corporations segment (7.4%). The drop in NPLs allowed for an overall reduction in provisions of CZK 3.4 billion (CZK 2.2 billion for households, CZK 1.5 billion for corporations).

BOX 1: Analysis of factors which may affect the coverage of loans with increased credit risk (Stage 2)

The share of loans for which banks have identified an increase in credit risk (loans reclassified as Stage 2; see Chart 1) has been growing since the start of the coronavirus pandemic in 2020. However, the increase in this share has not led to a significant rise in provisioning for these loans. This may signal that, although banks are identifying an increase in the risk of future default on these loans (PD), the implications of that increase for credit losses are maybe being limited by some qualitative characteristics of borrowers, as assessed, for example, using:

1) the share of loans 30–90 days past due in total loans classified in Stage 2 ("past-due Stage 2 loans"). A lower share may indicate a potentially lower PD for loans in Stage 2, and
2) collateral, defined as collateral accepted for performing exposures ("collateral"). A higher level of collateral may indicate a lower loss given default (LGD).[40]

Credit risk for loans to households in Stage 2

The rise in the cost of living and debt service in an environment of elevated inflation and subdued economic growth (see section II.1) has led to an increase in the risk that some borrowers will default on their loans. Banks have responded by raising the share of loans in Stage 2, especially in the case of loans for house purchase (see Chart 1, shares S1–S3). The share of loans in the housing loan portfolio reclassified as Stage 2 was up 6.1 pp year on year to 13.9% at the end of 2022. In the consumer credit portfolio, this share grew by 5.5 pp to 18.5%. However, this was not accompanied by equally strong growth in provisioning. As a result, the coverage rate for Stage 2 loans dropped by 0.6 pp to 1.5% in the housing loan portfolio and by 1.1 pp to 8.1% in the consumer credit portfolio in 2022 (see Chart 2). At the portfolio level, both these rates were at their lowest level since reporting started in 2020.

Chart 1 (BOX 1)
Shares of exposures in individual stages at the portfolio level

(%)

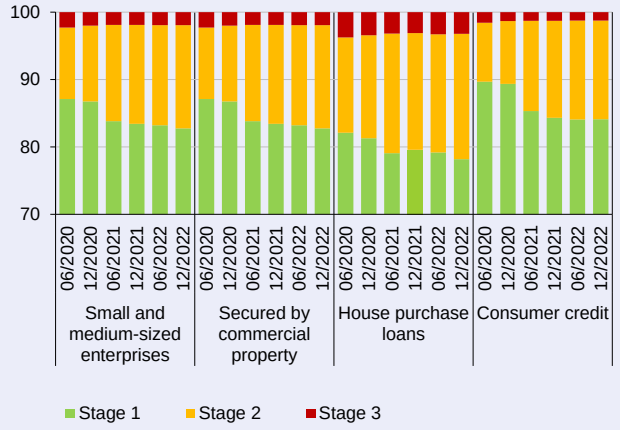
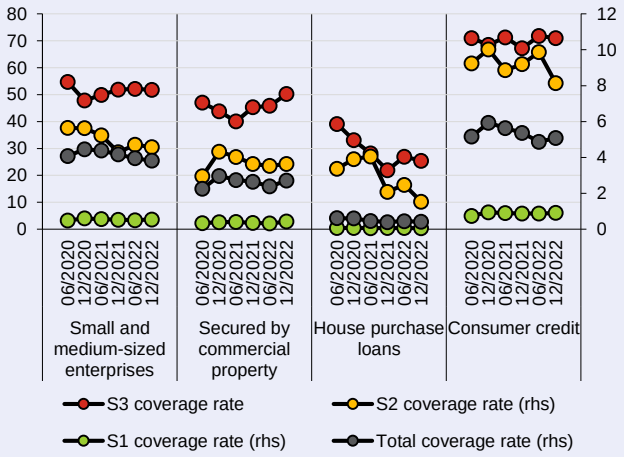


Chart 2 (BOX 1)
Coverage rates in individual stages at the portfolio level

(%)



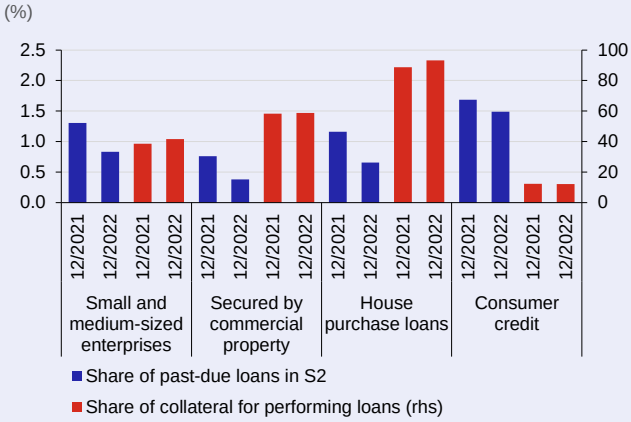
40 Higher collateral indicates lower losses given default and hence lower expected losses. A lower share of exposures 30–90 days past due in total exposures in Stage 2 indicates that banks are being more cautious when deciding on moving exposures to Stage 2.

However, there is a favourable trend in the qualitative characteristics of the portfolio of loans to households in Stage 2 as measured by the share of past-due loans (see Chart 3, blue bar) and the share of collateral (see Chart 3, red bar). The low and decreasing shares of past-due Stage 2 loans in the case of house purchase loans (0.7%) and consumer credit (1.5%) may to some extent explain the observed paths of the coverage rates (see Chart 2, yellow points).

Credit risk for corporate loans in Stage 2

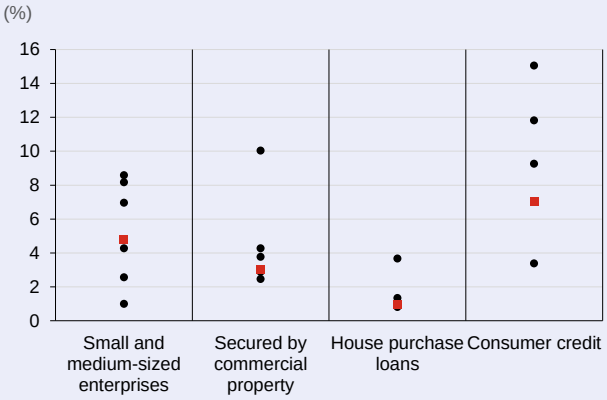
The share of Stage 2 loans in the corporate portfolio has been rising at a slower pace than that in the household portfolio, and from a lower level. This may be because companies have so far been able to pass on part of their increased costs to customers and raise their profitability (see section II.2). The share of loans reclassified as Stage 2 grew by 2.4 pp to 19.2% in the portfolio of small and medium-sized enterprises and by 2.2 pp to 18.9% in the portfolio of corporate loans secured by commercial property (see Chart 1). The coverage rate for corporate loans secured by commercial property was flat year on year, while that for loans to small and medium-sized enterprises recorded a slight increase of 0.3 pp to 4.6% (see Chart 2). Risk materialisation remains very low in both the corporate and household segments (see section II.2.2). This may be due to the favourable evolution of the share of past-due Stage 2 loans (see Chart 3) in the segments of loans to small and medium-sized enterprises (0.8%) and loans secured by commercial property (0.4%).

Chart 3 (BOX 1)
Selected indicators of credit risk at the portfolio level



Note: The share of past-due S2 loans was calculated as the share of loans 30–90 days past due in the volume of loans in Stage 2. The share of collateral for performing loans was calculated as the share of collateral accepted for performing loans in the volume of performing loans.

Chart 4 (BOX 1)
Heterogeneity of coverage of Stage 2 exposures across institutions



Note: Red dots denote the median for the given portfolio.

Coverage in Stage 2 is quite mixed across banks. The widest range of rates can be observed in the consumer credit portfolio (see Chart 4). By contrast, low heterogeneity was recorded in the coverage rate for loans secured by residential property. In some banks, the coverage rates were low across all portfolios, but this could not be explained by the above qualitative factors. The coverage rates of some banks thus may not take sufficient account of the systemic risks associated with the relevant loan portfolio, especially given the risks and uncertainties of the economic outlook at the horizon of the CNB's forecast.[41] The CNB will therefore continue to closely monitor the coverage rates and the related risks at both the microprudential and macroprudential level.

41 *Monetary Policy Report – Spring 2023*.

III.2.3 Profitability and liquidity

The profitability of the banking sector increased significantly

The banking sector's profit for 2022 was CZK 102.6 billion, a year-on-year increase of CZK 33.1 billion (48%). The return on assets (RoA) of domestic banks grew by 0.3 pp year on year to 1.1% in December 2022 (see Chart III.11).[42] It mainly reflected the contribution of interest profit due to credit growth and slower monetary policy transmission to interest rates on current and term accounts, and relatively low impairment losses (see Chart III.12; for details see section III.2.2).

Chart III.11
Return on assets and profit
(%; right-hand scale: CZK billions)

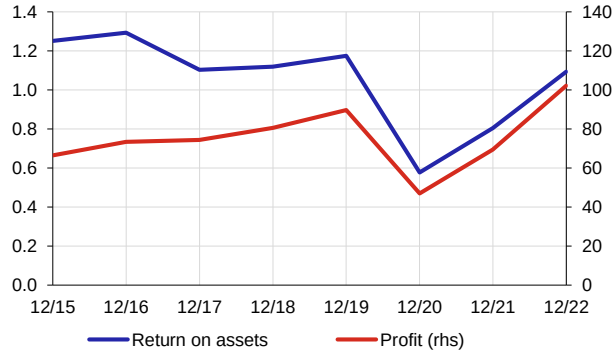
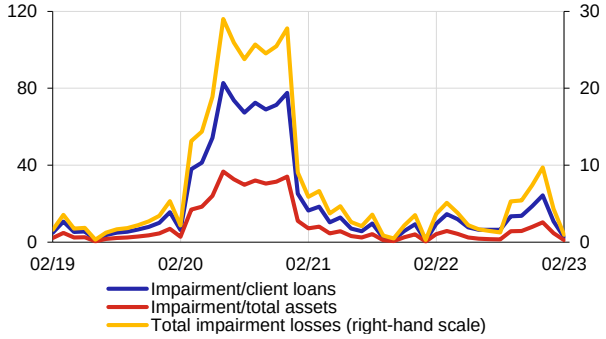


Chart III.12
Asset impairment losses
(bp; right-hand scale: CZK billions)



Continued monetary policy transmission is affecting interest profit…

The growth in monetary policy rates starting in late 2021 led to a faster rise in interest income than interest costs in the first phase of monetary policy transmission (see Chart III.13). This led to growth in interest profit and the interest profit to assets ratio. In a situation of stable monetary policy rates, the factors affecting the banking sector's profitability relatively favourably in the short term dropped out. This is apparent from a reversal of the upward trend in interest margins on new client loans in the household and non-financial corporations sectors (see Chart III.14). The market competition factors pushing interest margins down by increasing deposit rates, with a knock-on effect on the banking sector's profitability, are now probably having a stronger effect.

Chart III.13
Decomposition of interest profit
(monthly contributions in CZK billions; right-hand scale in %)

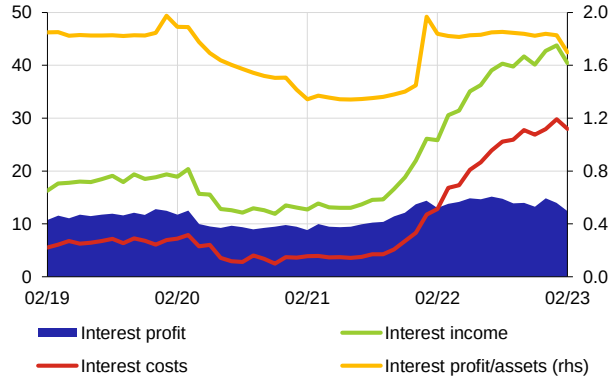
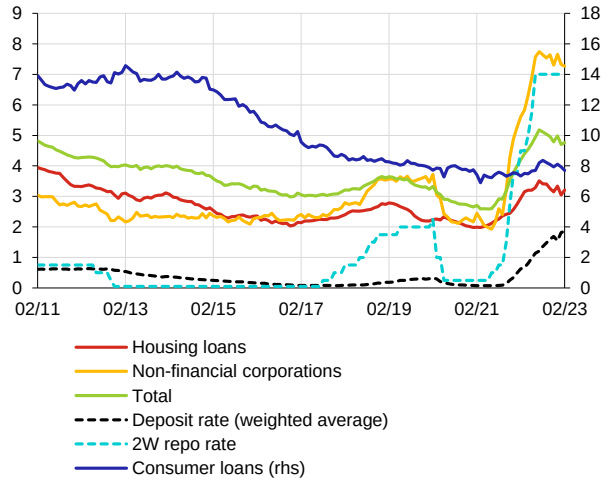


Chart III.14
Interest margins on new client loans
(rates in %; margins in pp)



Note: Margins are calculated as loan rates for the given sector minus the average deposit rate. The non-financial corporations item excludes revolving loans and credit cards.

42 Excluding the CEB and the NDB, RoA was 1.15%. RoA in the EU reported on a quarterly basis stood at around 0.5% from mid-2022 to December 2022 (EBA Dashboard 4Q 2022).

…now mainly through interest rates on deposits

Chart III.15 illustrates the gradual pass-through of monetary policy rates to client deposit rates and the gradual process of growth in the share of higher-rate term deposits in total deposits. It shows that, in an environment of subdued lending, growth in interest rates on deposits led to the stabilisation and a gradual decrease of net interest income starting in the second half of 2022. The share of term deposits in total deposits rose by 9.2 pp year on year to 24.2% at the end of 2022. The trend of migration to term accounts and the intensity of the growth in average interest rates on the relevant types of deposits have been slowing. However, a significant difference in the rates[43] continues to encourage transfers of funds from demand to term deposits, including better remunerated savings deposits. The drop in monetary policy rates assumed in the *Baseline Scenario* may, under certain conditions, induce depositors to try to lock in the higher deposit rates for longer. This would affect the banking sector's costs and potentially also interest margins on loans. Besides the growth in client deposit rates, the possibility of depositors placing part of their excess liquidity outside the banking sector also poses a risk to banks' interest profit (see section III.3).

Chart III.15

Interest rates on term and demand accounts

(%)

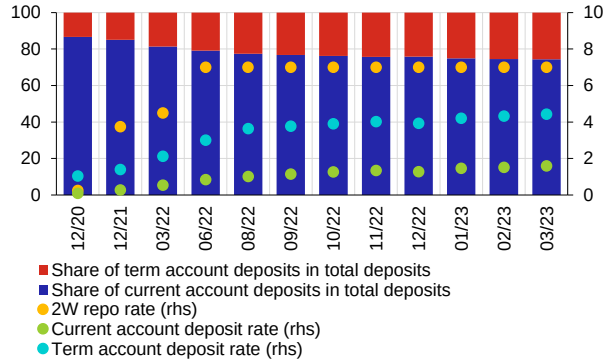
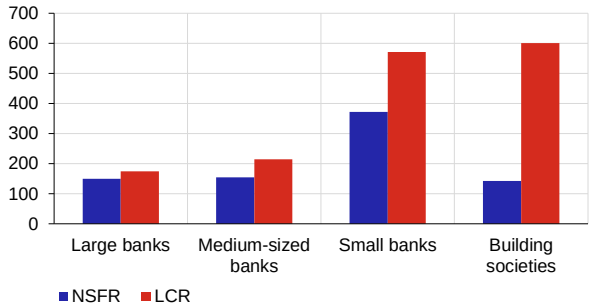


Chart III.16

Comparison of selected indicators of banks' balance-sheet liquidity

(%; as of 31 December 2022)



Note: The LCR is the ratio of the liquidity buffer to the net liquidity outflow of banks over a 30-day stress horizon as defined by EC Regulation 2015/61. The NSFR is the ratio of available stable funding to required stable funding as defined by Basel III. The results take liquidity subgroups into account and exclude state-owned banks.

The liquidity position of the banking sector as measured by the LCR and the NSFR remained robust…

The banking sector's aggregate LCR was 193% at the end of 2022. It was consistently above the limit in the individual months of the second half of 2022, averaging 181%. All banks were compliant with the regulatory limit of 100% throughout this period (see Chart III.16). Domestic banks traditionally meet the regulatory limits by a very wide margin thanks to a large amount of highly liquid assets made up of reserves at the CNB (97%) and highly liquid claims on central governments.

…and the level of highly liquid assets remains stable

Highly liquid assets had dropped by around CZK 250 billion at the end of 2022, mainly due to the CNB's foreign exchange interventions to limit the exchange rate volatility of the koruna. However, this drop was largely offset by a decrease in net potential outflows (of CZK 220 billion). The LCR of the banks under review thus remained high. The NSFR as of the end of 2022 confirmed the strong liquidity position of domestic banks and the prevalent use of stable funding. The average NSFR across banks was 219%[44] in December. Small banks as usual had the highest levels thanks to their high volume of stable retail deposits (see Chart III.16 and Chart III.17).

The growth in foreign currency loans provided by domestic banks could give rise to foreign currency funding risk

The LCR and NSFR in euros for selected banks together accounting for almost 90% of euro lending to non-financial corporations were 68% at the aggregate level at the end of 2022.[45] The share of net potential outflows in euros and dollars is significant at more than 15% of total potential net liquidity outflows in the banking sector regardless of currency. The main sources of funding of euro lending are wholesale ones, i.e. less stable sources obtained from counterparties other than retail depositors (see Table III.2). Parent companies represent a relatively significant source of euro funding for domestic banks (37% for banks active on the euro loan market). The LCR calculation method assumes a 100% outflow of funds provided by other financial institutions, including parent banks. In other words, it assumes that these sources are

43 As of March 2023, rates on new deposits on term accounts were up 2.4 pp year on year to 5.06%, while rates on new deposits on demand accounts were up 1.06 pp to 1.59%.

44 The aggregate NSFR for the sector is 168%.

45 An LCR and an NSFR of at least 100% in each currency is not a regulatory requirement.

relatively unstable, especially in times of market stress. Assuming a zero outflow factor for payable transactions with the parent bank, and hence assuming that the outflow can be fully refinanced at a time of liquidity stress in the euro market by means of another transaction with the parent bank, some banks' LCRs will increase substantially. A significant increase in liquidity stress on euro markets, linked with outflows of unstable or even relatively stable euro funds,[46] could require parent banks to provide additional funds to domestic banks very quickly. This would increase some domestic banks' reliance on this source. This could be accompanied by volatility of the domestic currency and a potential increase in haircuts on koruna-denominated collateral leading to growth in foreign currency funding costs. For these and other reasons, the CNB closely monitors the risks associated with the foreign currency funding of domestic banks and is ready to respond using suitable microprudential and/or macroprudential tools to mitigate these risks.

Systemic resilience to liquidity shocks is being enhanced by the balance-sheet structure of the domestic banking system

The main reasons for domestic banks' high resilience to liquidity shocks remain the same. They include a high share of liquid assets and an excess of client deposits over client loans (see Chart III.18 and section IV.1.2). The banking sector's claims on the CNB account for almost 24% of its balance-sheet total (see Chart III.18). At the same time, the share of less stable funding sources from non-resident credit institutions in total liabilities decreased last year. It started falling again from an all-time high of almost 20% recorded in 2017 and stood at 6.8% of the balance-sheet total at the end of 2022. This is roughly equal to the average share observed before 2013. According to banks' plans, coverage of loans by primary funds will remain high in the future (see Chart III.19).

Chart III.17

Structure and amount of items ensuring stable funding

(% of balance sheet as of 31 December 2022)

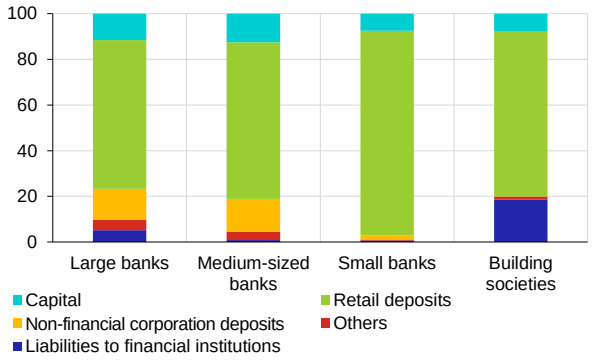


Table III.2

Selected indicators of euro funding of selected banks

(%)

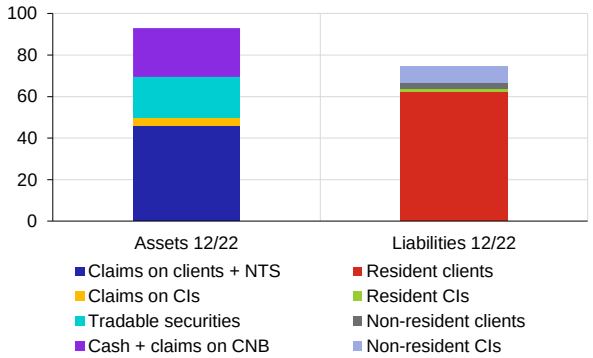
Average euro LCR	68
Average euro NSFR	68
Share of retail deposits in euro funding	24
Share of funding from parent companies in total euro wholesale funding	37

Note: Data as of 31 December 2022 for selected banks together accounting for almost 90% of euro lending to non-financial corporations.

Chart III.18

Selected balance-sheet items of the domestic banking sector

(% of balance sheet)

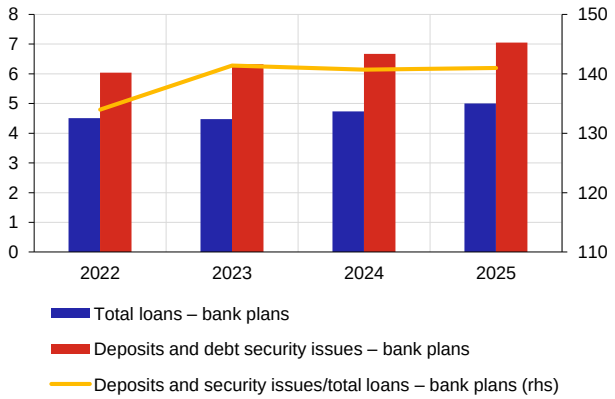


Note: CIs = credit institutions. NTS = nontradable securities.

Chart III.19

Funding plans of domestic banking institutions

(CZK trillions; right-hand scale: %)



Note: Includes loans and deposits to the private sector defined as households, non-financial corporations and financial institutions. Also includes debt securities with maturities equal to or more than three years. Data on a consolidated basis and for selected entities for which plans were available as of 11 May 2023.

46 High liquidity stress on markets often triggers a "self-insurance mechanism" where market participants tend to accumulate liquidity. Money and credit markets freeze in such extreme situations.

III.3 NON-BANK FINANCIAL CORPORATIONS

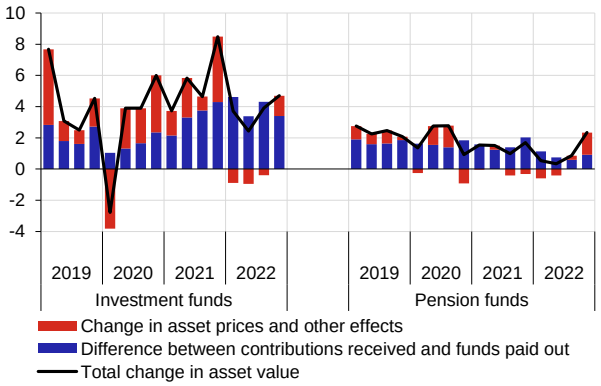
Assets rose in value in almost all segments of non-bank financial corporations

The total assets of domestic non-bank financial corporations increased in 2022 (see Chart III.1). Investment funds recorded the highest growth (of around CZK 131 billion to CZK 973 billion). It was driven by an inflow of new client funds (see Chart III.20). By contrast, the contribution of asset performance was negative in 2022 owing to the price correction on financial markets. However, the decline in asset value varied considerably depending on investment strategy (see Chart III.3 CB). Equity securities were still the largest component of the aggregate investment fund portfolio (see Chart III.21). The total assets of pension funds also increased in 2022 (by CZK 25 billion to CZK 600 billion). This was due mainly to an inflow of new funds into participation funds (see Chart III.4 CB). In addition, the value of assets managed by pension funds was affected by movements in Czech government bond prices and in some cases also by changes in the use of synthetic hedging.[47] By contrast, the insurance sector recorded a fall in assets (of CZK 33 billion to CZK 493 billion) in 2022, owing mainly to revaluation as a result of the rise in interest rates. Debt securities remain the largest item of the insurance sector's asset portfolio (see Chart III.21), but they dropped slightly in value due to revaluation. Loans provided by non-bank financial corporations engaged in lending rose by CZK 23 billion to CZK 339 billion in 2022. The developments in 2023 Q1 suggest that assets will continue to grow in most non-bank financial segments this year.

Chart III.20

Decomposition of the change in the value of investment and pension funds' assets

(% of assets as of end of previous quarter)

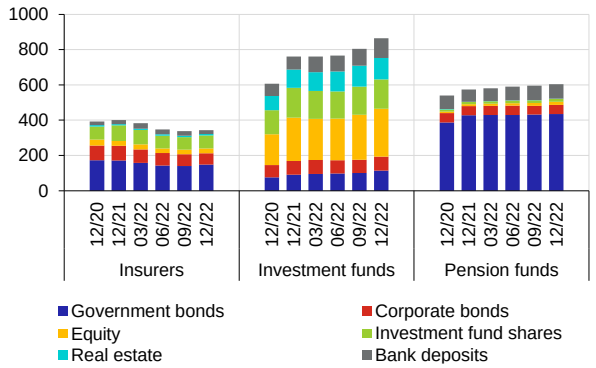


Note: For pension funds, change in asset value and other effects does not include assets associated with the use of synthetic hedging. Other effects include the effect of derivatives transactions and effects related to changes in leverage.

Chart III.21

Main components of domestic non-bank institutional investors' investment assets

(CZK billions)



Note: The difference between investment assets and total assets (see Chart III.1) is material for insurers and investment funds. Non-investment assets include, for example, insurance claims and reinsurance recoverables in the case of insurers and loans and receivables in the case of investment funds. Moreover, in the case of insurers, this chart excludes branches of foreign insurance companies, the Export Guarantee and Insurance Corporation and the Czech Insurers' Bureau.

The share of liquid assets declined in bond funds and was flat in other fund types

The risks to financial stability associated with the investment fund sector stem mainly from potential maturity mismatches between funds' assets and liabilities. These risks arise mainly at times of falling financial asset prices and rising market uncertainty, when the number of investors prone to leaving funds increases. In the event of elevated outflows, investment funds are forced to use their liquidity buffers to pay redeeming clients and to sell off less liquid assets if the buffers prove insufficient.[48] In conditions of impaired market liquidity, this increases the downward pressure on prices and amplifies the initial shock. However, neither the asset price correction caused by the growth in global interest rates nor Russia's aggression against Ukraine had a major impact on investment funds' solid liquidity position in 2022. Despite falling by 10 pp, the share of liquid assets remains the highest in bond funds.[49] It was flat in other fund types (see Chart III.22).[50]

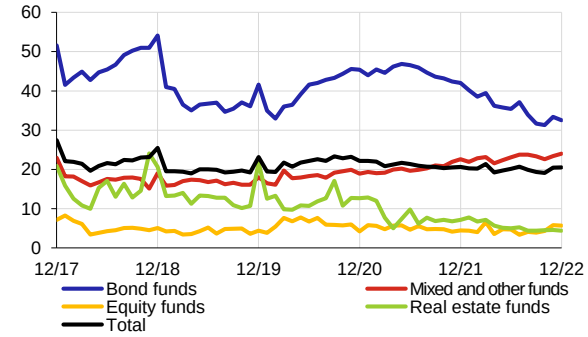
47 Synthetic hedging is used by entities that hold foreign currency assets and wish to hedge against appreciation of the koruna and which consider hedging through currency derivatives to be too expensive. The hedging entity accepts a foreign currency loan, which it converts into koruna and, for example, deposits it on a koruna-denominated bank account. This increases both the assets and liabilities of the entity. The loan is subsequently repaid by gradually converting the koruna deposit back into the foreign currency. If the koruna appreciates, the foreign exchange losses on the foreign currency assets are then offset by a decrease in the koruna value of the foreign currency liability.

48 For details see Szabo, M. (2022): *Meeting Investor Outflows in Czech Bond and Equity Funds: Horizontal or Vertical?* CNB WP 6/2022.

49 This decline was due mainly to a rise in the share of time deposits in the total assets of bond funds. At the same time, however, it helped bond funds achieve higher returns on the assets they manage (see Chart III.2 CB).

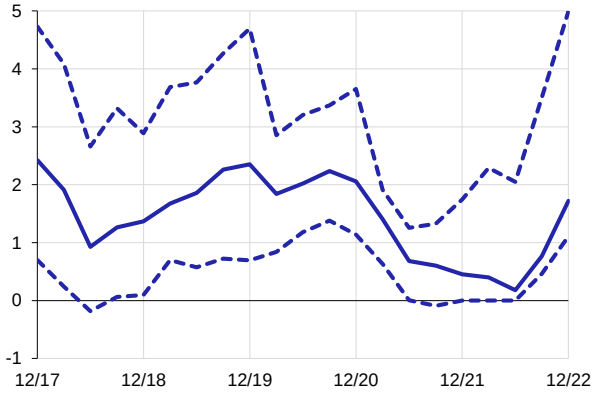
50 The collective investment funds sector excludes funds for qualified investors. The share of liquid assets is not shown for the latter because this segment is highly heterogeneous and changes in the aggregate indicator are therefore difficult to interpret.

Chart III.22
Share of liquid assets on the balance sheets of collective investment funds
(%)



Note: Liquid assets comprise cash, debt securities issued by general government, and bank deposits and other claims payable on demand. The collective investment funds sector excludes funds for qualified investors.

Chart III.23
Surplus of assets over liabilities of transformed funds
(% of total assets of TFs)



Note: Dashed lines denote the minimum and maximum values across TFs.

The investment fund sector is not currently generating risks to financial stability

The CNB assesses the risks associated with collective investment funds using a macro-stress test with a three-year horizon (see section IV.2.3). Its results demonstrated an insignificant contribution of these funds to domestic systemic risk via potential fire sales. Given the buoyant asset growth in the investment fund sector, however, increasing potential for the formation or amplification of adverse shocks and thus for a rise in investment funds' contribution to systemic risk can be expected in the future. However, this is partly reduced by the placement of a substantial part of their funds in foreign assets. The CNB also conducts a quarterly assessment of alternative investment funds, which comprise special collective investment funds[51] and funds for qualified investors. The CNB monitors in particular the contribution of alternative funds with increased leverage to risks associated with fire sales, lending by funds and the interconnectedness of funds and other domestic financial corporations. The results of this assessment currently do not directly indicate the existence of any excessive risks to domestic financial stability.[52]

The rise in interest rates adversely affected the performance of funds managed by pension management companies in 2022

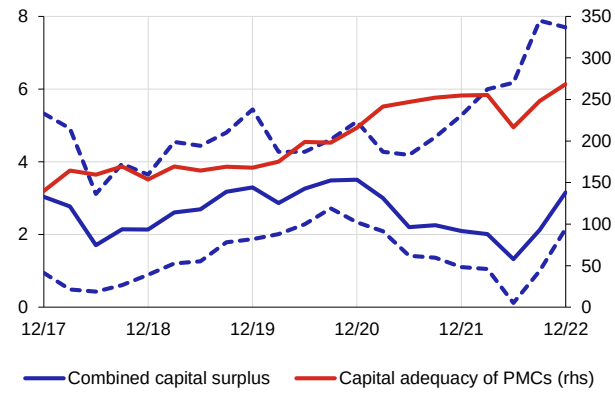
Czech government bonds account for the largest part of pension fund assets (see Chart III.21), especially in the case of transformed funds. The revaluation of part of the government bond portfolio (bonds held for trading[53]) during 2022 (see section II.1 and Chart II.17) caused the value of the assets of some transformed funds to fall below that of their liabilities. This generated a need to top up the capital in these funds and also in some pension management companies (PMCs) (see Chart III.23). Thanks to the capital injections in some PMCs, however, the aggregate capital adequacy of PMCs remained sufficient despite the capital top-ups in transformed funds. At the end of 2022, all PMCs recorded a combined capital surplus of at least 2% of assets (see Chart III.24). The need for higher capital injections was reduced significantly by the share of bonds held at amortised cost, which do not have to be marked to market if interest rates increase (see Chart III.5 CB). Despite a one-off negative impact on asset value, higher interest rates are mostly positive for transformed funds in the long run, as they increase the return on the assets they hold. On the other hand, they can make conservative banking products more attractive and provide an incentive for clients to request lump-sum payments of their funds from transformed funds. According to the results of the PMC sector stress test, the economic developments assumed in the *Baseline Scenario* (see section IV.2.2) would lead to a need to top up the capital of transformed funds by CZK 0.3 billion. The rise in monetary policy rates and risk premia in the *Adverse Scenario* would generate a need to top up the capital of transformed funds by CZK 7.0 billion and consequently make capital injections in some PMCs totalling CZK 1.9 billion. However, the necessary capital injections would be insignificant relative to the size of the segment and the sector would remain relatively stable at the aggregate level (see section IV.2.2).

51 Special funds are collective investment funds that do not meet the requirements of Directive 2009/65/EC (UCITS IV) and hence are not standard funds.

52 The CNB is required by law to conduct this assessment under Article 25 of Directive 2011/61/EU of the European Parliament and of the Council of 8 June 2011 on alternative investment fund managers. The CNB has been conducting quarterly assessments since the second half of 2021, when the related guidelines of the European Securities and Markets Authority entered into force.

53 Bonds measured at fair value through other comprehensive income (FVOCI) or fair value through profit and loss (FVTPL).

Chart III.24
Combined capital surplus and capital adequacy of the pension fund sector
(%)



Note: Dashed lines denote the minimum and maximum values of the combined capital surplus across TFs. The combined capital surplus is the ratio of the sum of (1) the capital surplus of pension management companies and (2) the difference between the assets and liabilities of TFs to the assets of TFs.

Portfolio concentration in domestic government bonds remains a long-term risk for the PMC sector

Given the high concentration of Czech government bonds, transformed funds are sensitive to volatility in their prices. Higher volatility could temporarily jeopardise PMCs' ability to meet the statutory requirements. This risk is connected mainly with a potential material deterioration in the sovereign credit risk rating of the Czech government and an increase in the risk premium on government bonds, which would give rise to a need to create provisions for bonds that are not marked to market. According to the results of the public finance stress test (see section IV.5), however, the likelihood of this occurring in the coming years is low. Nonetheless, the risks associated with domestic public finance sustainability may increase in the longer term (see section II.2.1).

The insurance sector remains resilient

The value of the domestic insurance sector's investment portfolio decreased in 2022, main because of a decline in the value of bond holdings (see Chart III.21). Premiums written rose markedly in both non-life insurance (by 15.7% year on year; see Chart III.6 CB and Chart III.7 CB) and life insurance (by 5.3% year on year). Increases in sums insured due to high inflation were an important factor behind the rise in premiums, especially in non-life insurance. Claim settlement costs rose more slowly than premiums. This had a positive effect on the sector's profitability.[54] Aggregate profitability remained above average in 2022 by long-term comparison, even though return on assets fell by 2 pp year on year to 3.4% (see Chart III.1 CB). However, this fall was due to one-off base effects linked with changes in the ownership structure of some insurance companies in 2021. The aggregate solvency ratio remained above 200%, well above the regulatory threshold of 100% (see Chart III.25). This was due mainly to interest rates stabilising in the second half of 2022. The insurance sector thus remains resilient and is not currently a source of risks to the stability of the financial system.

Elevated inflation and a disorderly price correction on financial markets are still the main risks for the insurance sector

Despite the financial market situation stabilising in the second half of 2022 (see section II.1), the evolution of yield curves and credit spreads remains one of the main risks for insurance companies. In spite of the increase in market uncertainty during 2022, credit spreads were near their averages for the last decade and the peak in interest rates is not currently a highly adverse environment for insurers. However, in the event of a disorderly price correction on financial markets due to significant risk repricing, insurance companies operating mostly in the life insurance segment could run into problems. In the area of non-life insurance, premium sufficiency risk persists due to the elevated inflation (see section II.1), which may substantially increase claim settlement costs. Developments in reinsurance also remain a risk, as the recent pandemic, the aggression against Ukraine and the effects of climate change may be reflected in reinsurance prices.[55] A combination of increases in sums insured and high reinsurance prices could have a significant effect on insurance companies' profitability and reduce their capital resilience. The CNB uses, among other things, macro-stress tests of the

54 This holds true both in gross terms and net of reinsurance.

55 This has been partially incorporated into reinsurance programmes for 2023.

insurance sector to assess these risks. The results of this year's test showed that the domestic insurance sector remained resilient to potential adverse shocks at the aggregate level based on the end-2022 data (see section IV.2.1).

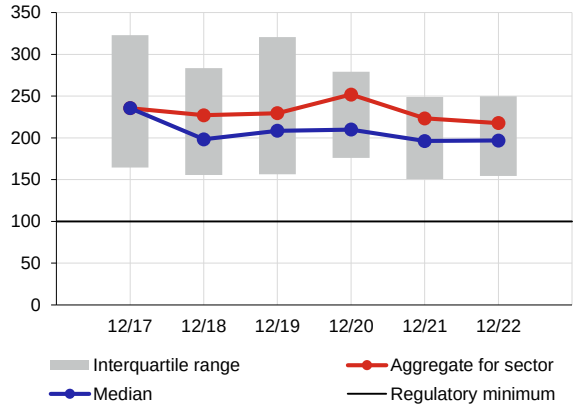
Loans provided by non-bank financial corporations engaged in lending increased

Total loans provided by non-bank financial corporations engaged in lending (NFCELs) increased by CZK 23 billion to CZK 338 billion in 2022, recording the highest growth rate in five years (see Chart III.22). As in the case of bank lending, this was due above all to loans to non-financial corporations, which rose by around CZK 20 billion. There were no major changes in market share, as the ratio of loans provided by NFCELs to those provided by banks was flat at around 18% in the case of non-financial corporations and 3% in the case of households. Given its current size, nature of business[56] and minimum level of interconnectedness, the NFCEL segment is not a significant source of systemic risk.

Chart III.25

Ratio of insurance companies' eligible own funds to the solvency capital requirement

(%)

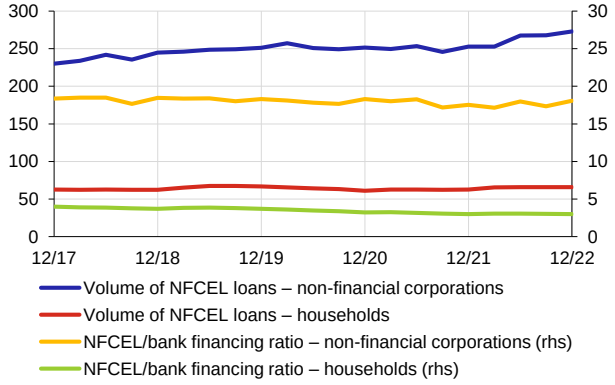


Note: The values exclude the Export Guarantee and Insurance Corporation and the Czech Insurers' Bureau.

Chart III.26

Financing by non-bank financial corporations engaged in lending

(CZK billions; right-hand scale: %)



III.4 INTERCONNECTEDNESS OF THE FINANCIAL SYSTEM

The interconnectedness of the sectors of the domestic financial system mostly fell at the aggregate level

The interconnectedness of the sectors of the domestic financial system has not grown significantly in recent years.[57] Domestic banks traditionally play a key role in the network of direct links between domestic financial institutions. They are an important counterparty for other financial institutions, which need to keep part of their assets in liquid form in bank accounts. The rise in interest rates on bank deposits made them more attractive, and their share in the total assets of non-bank financial institutions increased in 2022 (see Chart III.9 CB). Banks also continued to be an important source of funding for some firms in their domestic financial groups. This is particularly evident for NFCELs (mostly leasing companies). In the area of indirect interconnectedness, common exposures in the form of Czech government bonds continued to dominate. A sell-off of these bonds by any of their major holders (see Chart III.21) could lead to a rise in stress on the Czech government bond market and thereby propagate to the balance sheets of other financial institutions. The likelihood of this happening is currently relatively low and any stress would probably be short-lived, as the experience with rising market stress in the first quarters of 2020, 2022 and 2023 showed. The sensitivity of Czech government bond prices and the level of contagion through them could nonetheless increase if perceived sovereign risk were to deteriorate (see section II.2.1).

56 Leasing companies account for over 70% of this segment.

57 A more detailed description of interconnectedness in the Czech financial system based on data as of 30 June 2020 was presented in Kučera, A., Szabo, M. (2020): *Interconnectedness and contagion in the Czech financial system*, CNB, Thematic Article on Financial Stability 5/2020.

The non-balance-sheet interconnectedness of the sectors of the domestic financial system remains stable

Non-balance-sheet interconnectedness is monitored mainly using the nominal value of derivatives transactions (see Chart III.10 CB). From this point of view, the interconnectedness of the sectors of the domestic financial system remains mostly stable and, given its size, does not indicate risks to financial stability.[58] In particular, the banking sector's international exposures are still important, but about one-half of these are exposures within ownership groups. In contrast to the stable evolution of the interconnectedness of the Czech financial system, the interconnectedness between domestic banks and non-financial corporations and between non-financial corporations and non-residents rose significantly in 2022. The increase mainly reflected exchange rate hedging operations by non-financial corporations and to a lesser extent also interest rate hedging operations and derivatives transactions relating to commodities, so it does not pose a risk to the stability of the financial system.

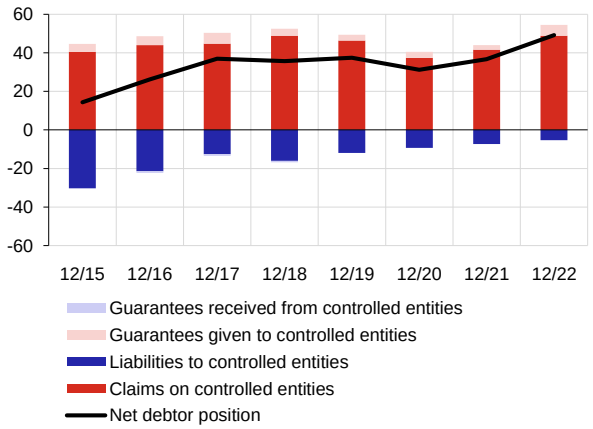
Banks remain in a net creditor position in their ownership groups; their debtor position vis-à-vis non-residents declined

The net creditor position of the banks under review increased over the last three years, reaching 49.1% of total regulatory capital at the end of 2022 (see Chart III.27). Net claims on controlled entities rose by CZK 24 billion year on year to CZK 208 billion. At the same time, absolute liabilities to controlled entities fell by CZK 9.3 billion year on year to CZK 22.4 billion. On the asset side of banks' balance sheets, own NFCELs remain the largest debtor within bank groups. However, the high concentration of claims on NFCELs has long been stable and, given the nature of the controlled companies' transactions (leasing and factoring), does not give rise to increased risk. As in previous years, liquidity received from building societies accounts for the largest part of the liabilities side of banks' balance sheets. The net debtor position of the five largest domestic banks vis-à-vis their foreign parent banks decreased year on year from -163.9% to -135.6% of their regulatory capital at the end of 2022 (see Chart III.24). The decrease was due mainly to a drop in domestic banks' liabilities. The net debtor position of Czech banks vis-à-vis foreign entities remains highly negative but fell year on year from CZK -1,031 billion to CZK -732 billion. However, given the high level of the banking sector's excess liquidity at the CNB (see Chart III.29, yellow line), this position does not pose a risk to financial stability.

Chart III.27

Interconnectedness in domestic bank groups

(% of regulatory capital of domestic parent banks)



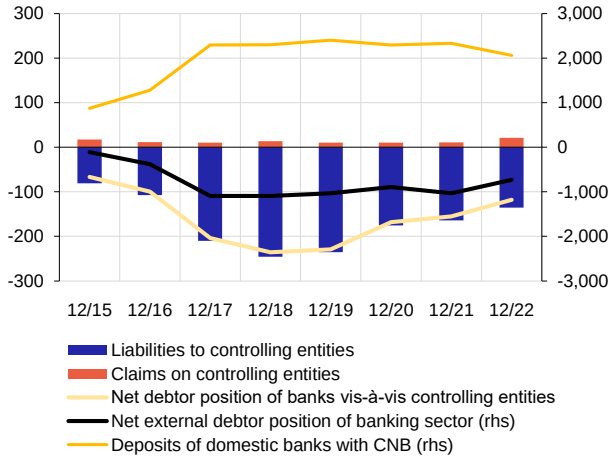
Source: Obligatory information to be disclosed pursuant to Decree No. 123/2007 and Decree No. 163/2014

Note: The chart depicts the aggregate credit interconnectedness of the largest domestic banks, i.e. Česká spořitelna, ČSOB, Komerční banka, Raiffeisenbank and UniCredit Bank.

Chart III.28

Interconnectedness vis-à-vis non-residents

(% of regulatory capital of domestic banks; right-hand scale: CZK billions)



Source: Obligatory information to be disclosed pursuant to Decree No. 123/2007 and Decree No. 163/2014, banks' annual reports, CNB

Note: The chart depicts the aggregate credit interconnectedness of the five largest domestic banks vis-à-vis their parent companies. The net debt position of the banking sector represents the overall net position of all banks vis-à-vis all non-residents excluding shares and other equity.

58 From the perspective of the banking sector, the chart shows the nominal values of derivatives transactions in the banking and trading books of individual banks. The values thus reflect both hedging operations and the closing of open positions in the trading book. From the point of view of non-bank financial institutions, the interconnectedness mainly reflects hedging operations.

IV. STRESS TESTS

IV.1 STRESS TESTS OF BANKING INSTITUTIONS

IV.1.1 Solvency macro stress test of banks

The solvency macro stress test (SMST) is a tool for assessing the resilience of the domestic banking sector. The test has a three-year horizon (2023–2025) based on the end-2022 data and assesses two economic scenarios. The *Baseline Scenario*[59] captures expected developments and is based on the macroeconomic forecast published in *Monetary Policy Report – Spring 2023*. The *Adverse Scenario* describes a hypothetical situation where the inflation pressures do not recede but persist for longer and monetary policy responds to the new situation with an additional rate increase (for details on the degree of stress and the impacts of adverse scenarios see Box 2). Projections of key variables in the two scenarios are shown in Charts IV.1A–F and Table IV.1 and are also used as a basis for stress testing other segments of the financial sector and the real economy.[60] The results of the stress testing of the Czech banking sector demonstrated the sector's robust capitalisation, which is sufficient to absorb adverse shocks caused by high inflation. The results also show that banks made progress in preparing for binding compliance with the minimum requirement for own funds and eligible liabilities (MREL), which will become effective to the full extent in 2024.

Chart IV.1A
Alternative scenarios: real GDP
(CZK billions; quarterly data)

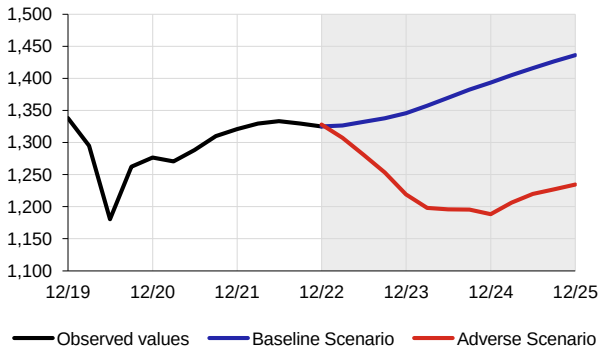


Chart IV.1B
Alternative scenarios: unemployment rate
(%)

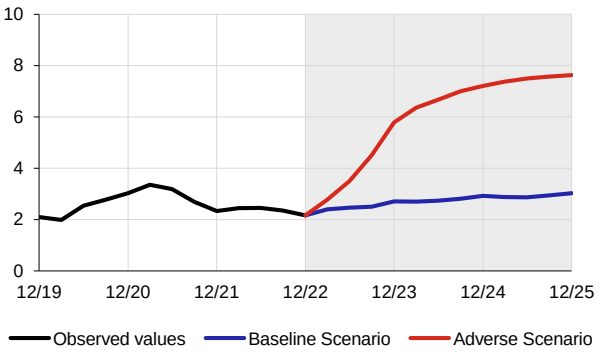


Chart IV.1C
Alternative scenarios: inflation
(year on year in %)

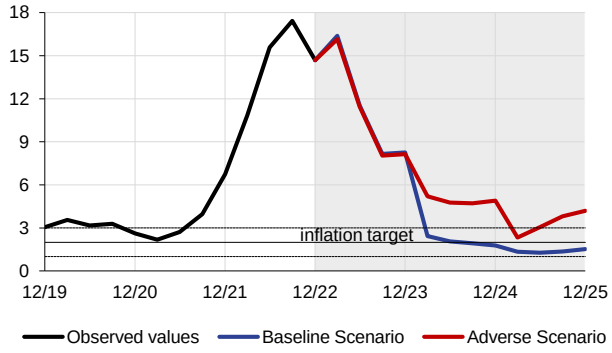
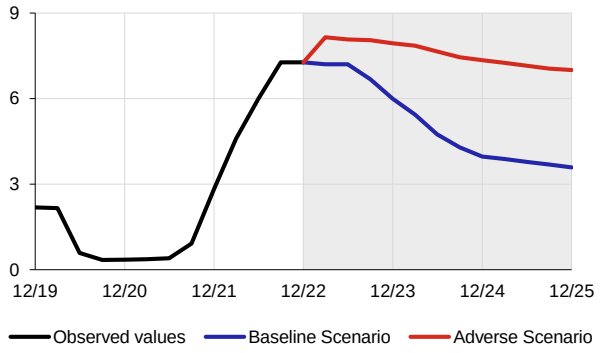


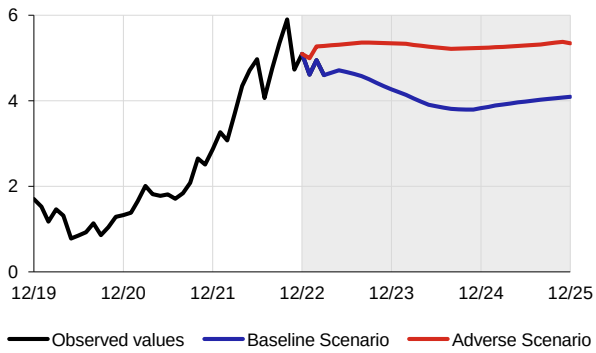
Chart IV.1D
Alternative scenarios: 3M PRIBOR
(%)



59 The time series of the variables for the third year of the *Baseline Scenario* and all years of the *Adverse Scenario* were created solely for stress testing purposes. For this reason, neither the Baseline Scenario beyond the forecast horizon, nor the *Adverse Scenario* is the CNB's official forecast. The *Adverse Scenario* used in the test is based on the adverse scenario used by the EBA in its 2023 EU-wide stress test of banks.

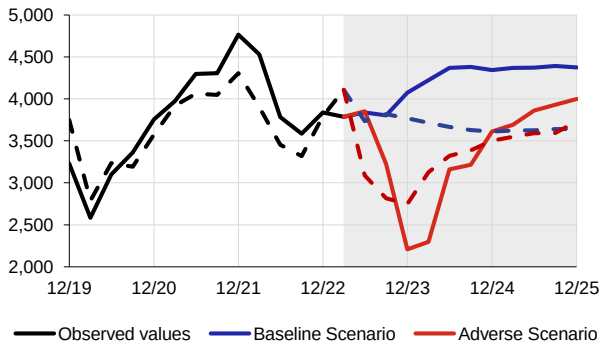
60 Projections of other variables, such as property price growth, credit growth and the default rate, can be found in section II.

Chart IV.1E
Alternative scenarios: ten-year Czech government bond yield
(%)



Source: CNB, Refinitiv

Chart IV.1F
Alternative scenarios: stock indices
(points)



Source: CNB, Refinitiv
Note: The solid line denotes the S&P 500 index and the dashed line the EURO STOXX 50 index.

The *Baseline Scenario* assumes a gradual renewal of economic growth…
The *Baseline Scenario* assumes subdued growth in economic activity (of around 0.5%) in the first year, due to low consumption by households as a result of a decline in their real income and an increased saving rate. Net exports have a positive effect on growth, supported by a decrease in value chain problems, lower energy prices and a gradual recovery in external demand. Economic growth rises in the second and third years, reaching 3% (see Table IV.1). This rise is fostered by a decline in inflation, which gets into single digits at the end of 2023 and drops to the 2% target during 2024. Interest rates also go down accordingly. The tightness in the labour market persists and the unemployment rate increases only slightly in the following years. Real wages start to grow again in 2024, further supporting positive sentiment and growth in household consumption and fostering a larger economic recovery. The expected effect of fiscal policy is neutral initially and then slightly countercyclical. Government bond yields decline gradually to 4% at the scenario horizon. The exchange rate weakens slightly to CZK 24.50 to the euro in the second year of the scenario and stays there until the year-end.

…accompanied by only a slight increase in credit risks
Consistent with the *Baseline Scenario* is a gradual increase in lending, which is muted at the start of the scenario in the case of loans to non-financial corporations and loans to households for house purchase due to high interest rates and negative economic sentiment. The default rate rises slightly at the start of the scenario, rather more so for non-financial corporations than for households, but both rates are flat in the following years (see Table IV.1). The increase in the default rate in non-financial corporations is due to growing debt service costs and lower growth in property prices, reflected mainly in the trade, construction and property development sectors. The slight rise in the household default rate is associated mainly with a gradual increase in the unemployment rate. Loss given default would go up slightly in non-financial corporations in the first two years of the scenario and then be flat, while for households it would rise gradually until the end of the scenario.

In the *Adverse Scenario*, the economy would enter a recession, but monetary policy would remain restrictive…
The hypothetical adverse global developments related to the war in Ukraine, commodity price growth and continued issues in value chains would lead to inflation remaining elevated for longer. Inflation (of around 11% in the first year, 5% in the second year and 3% in the third year) would thus continue to limit household consumption and corporate investment activity. A decline in external demand, accompanied by falling confidence of households and firms, would also weigh on the domestic economy. GDP would thus decrease by around 5% in the first and second years of the scenario, unemployment would gradually rise to 7.5% in the third year of the scenario and wage growth would slow. The economy would recover only in the third year on the back of growth in external demand and investment. Government finances would show high deficits, but fiscal policy would not be actively countercyclical in the sense of using discretionary measures to contribute to stabilising the economy and dampening the impacts of the deep recession. The adverse economic developments would lead to an increase in the default rate among households and non-financial corporations. Credit growth would also decline sharply, especially in the case of households. Residential property prices would record a sharp correction and their year-on-year growth would turn negative and remain so until the end of the test period. Given the persisting inflation pressures, monetary policy would be restrictive and monetary policy rates would go down only gradually from their elevated levels. As a result of the monetary policy stance, Czech government bond yields would rise in 2023 and gradually fall at shorter maturities in the following years, while remaining flat at elevated levels at longer maturities due to growth in the credit risk premium. The exchange rate would gradually depreciate to CZK 30 to the euro.

…which would lead to the materialisation of credit risks

The adverse economic developments would be reflected in worsening credit risk parameters among both non-financial corporations and households. The economic downturn, accompanied by rising debt service costs, would, in combination with falling profitability in non-financial corporations in 2023, foster a sharp rise in the default rate in the first two years and a slight decline in the last year. Households would also show a gradual increase due to rising unemployment and falling real wages. Loss given default also rises sharply at the start of the *Adverse Scenario* and continues to grow in the following years for both non-financial corporations and households. Credit growth in non-financial corporations increases in nominal terms. On the one hand, this is due to an increase in input prices, which implies robust growth in nominal investment. On the other, it reflects a weaker koruna exchange rate. The rate of growth of loans to households for house purchase initially drops significantly and continues to slow modestly in the subsequent years. The decline in growth of loans to households for consumption would be similarly strong but is spread over more years.

The stress test takes into account current fiscal policy, including the impacts of the windfall tax

Both scenarios take into account the current fiscal policy support for the economy, which is being financed by the issuance of government bonds. This is reflected in continued growth in the proportion of government bonds in banks' balance sheets in both the *Baseline Scenario* and the *Adverse Scenario*, which both assume only gradual fiscal policy tightening. The increase in the share of government bonds in banks' balance sheets positively affects their profits through increased interest income. However, the growth in concentration could also increase the risks associated with the link between banks and the state (for details see section II.2.1). The impacts of the windfall tax are also taken into account in both scenarios.

Table IV.1

Key variables in the alternative scenarios and their impact on the banking sector

	Actual value	*Baseline Scenario*			*Adverse Scenario*		
	2022	2023	2024	2025	2023	2024	2025
Macroeconomic variables (y-o-y, averages for given periods in %)							
Real GDP growth	2.5	0.5	3.0	3.3	-4.9	-5.5	2.3
Inflation rate	15.1	11.2	2.1	1.4	11.1	5.0	3.3
Unemployment rate*	2.4	2.5	2.8	2.9	4.1	6.8	7.5
Nominal wage growth	7.2	9.6	8.5	6.2	7.7	5.0	4.0
Real GDP growth in EMU	2.9	0.5	1.4	1.8	-3.2	-3.6	1.6
Growth in loans (y-o-y, averages for given periods in %)							
Non-financial corporations	6.8	1.6	2.1	3.1	6.1	3.5	6.7
Loans for house purchase	7.9	3.4	4.1	5.9	2.4	2.1	1.7
Consumer credit	7.3	6.0	3.7	1.9	5.5	2.0	1.7
Growth in securities (y-o-y, averages for given periods in %)							
Growth in debt securities holdings	15.1	6.9	8.4	5.3	9.2	11.1	9.0
Default rate (PD)*							
Non-financial corporations	0.8	1.5	2.4	2.3	3.0	6.3	6.0
Loans for house purchase	0.5	0.8	1.1	1.3	1.2	2.2	3.0
Consumer credit	2.6	2.9	3.2	3.4	3.4	4.4	5.2
Loss given default (LGD) (averages for given periods in %)							
Non-financial corporations	31.9	35.1	35.5	35.4	37.6	40.7	42.2
Loans for house purchase	14.0	15.9	16.6	17.8	18.2	19.5	20.7
Consumer credit	42.5	42.4	43.1	44.3	45.0	46.0	47.2
Asset markets (averages for given periods in %)							
3M PRIBOR	6.3	6.8	4.6	3.7	8.1	7.6	7.1
5Y IRS CZK	5.0	4.9	3.8	3.6	6.1	5.9	5.8
5Y Czech GB yield	4.8	4.9	3.8	3.6	6.4	6.4	6.3
3M EURIBOR	0.3	3.2	3.1	2.7	4.7	4.4	3.8
5Y IRS EUR	1.8	2.8	2.8	2.9	1.6	2.3	2.2
Residential property (y-o-y)	17.3	-0.7	5.0	2.3	-9.6	-12.5	-7.1
Equities (y-o-y)	-11.3	7.0	-5.2	-0.6	-12.0	7.8	8.6

	Actual value	*Baseline Scenario*			*Adverse Scenario*		
	2022	2023	2024	2025	2023	2024	2025
Items in P/L statement and OCI (CZK billions)							
Profit to cover losses*	114.6	119.7	133.4	141.8	149.3	185.4	201.5
Credit losses*	-6.6	-15.5	-26.4	-23.3	-59.6	-63.4	-48.5
in stage 1 and 2	-0.2	0.4	-3.2	2.6	-34.0	-7.8	15.9
in stage 3	-0.6	-15.9	-23.2	-25.9	-25.7	-55.5	-64.4
Profit from market risks (P/L)	14.6	0.3	0.3	0.0	-3.1	1.6	0.5
Pre-tax profit	118.1	104.6	107.3	118.5	86.6	123.6	153.5
Profit from market risks (OCI)	-7.0	0.4	1.6	0.3	-7.9	2.8	0.7
Interbank contagion	0.0	0.0	0.0	0.0	-0.1	0.0	0.0
Balance-sheet items (CZK trillions; end of period)							
Assets	8.10	9.53	9.87	10.20	9.65	10.03	10.54
Client loans (net)	4.13	4.23	4.36	4.55	4.26	4.30	4.50
Debt securities holdings	1.63	1.81	1.94	2.02	1.87	2.04	2.22
Regulatory capital	0.63	0.60	0.61	0.63	0.62	0.67	0.71
TREA	2.84	2.91	3.05	3.20	3.10	3.37	3.68
TEM	8.51	9.79	10.06	10.34	9.92	10.18	10.58
Regulatory indicators (% as of end of period)							
Overall CAR (% of TREA)	22.1	20.5	20.0	19.7	20.1	19.8	19.4
CET 1 CAR (% TREA)	20.5	19.0	18.5	18.3	18.6	18.4	18.1
Leverage ratio (% TEM)	7.1	5.9	5.8	5.9	6.1	6.3	6.5
MREL* (% of TREA)	26.9	29.4	28.7	28.1	28.4	27.6	26.7
MREL* (% TEM)	9.0	8.7	8.7	8.7	8.9	9.1	9.3
Other							
Dividends for given year* (CZK billions)	102.5	76.2	63.1	71.6	27.9	49.9	63.6
Loss rate* (%)	-0.2	-0.4	-0.6	-0.5	-1.4	-1.4	-1.1
RoA* (in %)	1.1	0.8	0.8	0.9	0.7	1.0	1.0

Source: CNB, BRCI

Note: * Profit to cover losses represents pre-tax profit adjusted for credit losses and losses from market risk. The PD values represent the expected default rate in the given year. Credit losses (with a minus sign) represent impairment losses due to credit risk. If loss allowances are released, the figure is shown with a plus sign. The MREL is the sum of own funds and eligible liabilities. The loss rate is calculated as credit losses divided by gross average client loans. RoA is calculated as after-tax profit divided by average assets at the end of the period.

Operating profit increases in the *Baseline Scenario*…

Pre-tax profit remains above CZK 100 billion in all the years of the scenario and gradually rises. This is because growth in profit to cover losses exceeds the increase in credit losses in the second and third years of the scenario. Profit to cover losses goes up to CZK 141.8 billion in the third year, due mainly to continued intensive purchasing of government bonds by banks (growth in the portfolio of CZK 300 billion at the scenario horizon), which increase banks' interest income. However, the rise in profit to cover losses is limited by growth in deposit expenses.[61] The increase in credit losses from their current low levels to around CZK 25 billion a year in the second and third years of the scenario has a negative but gradually weakening impact on pre-tax profit. Banks' profitability, as measured by return on assets (RoA), decreases, mainly because of an increase in total assets. The decomposition of the change in the overall capital ratio (see Chart IV.2) shows that profit to cover losses (+13.1 pp) contributes 8.4 pp to the increase in the capital ratio after taking into account credit losses (-2.2 pp), market risk losses (0.1 pp) and taxes (-2.6 pp). However, an increase in the total risk exposure amount (TREA), which reflects increasing risk weights (-0.6 pp) and a rise in exposures (-1.9 pp), has a negative effect (-2.5 pp) on the resulting capital ratio. The latter thus increases from 21.5% to 27.5% before dividends are taken into account.

Chart IV.2

Decomposition of the change in the banking sector's overall capital ratio in the alternative scenarios

Note: CAR = overall capital ratio. Items increasing the capital ratio are shown in green and items reducing it in red.

…and the capital ratio remains well above the regulatory threshold even after dividends are taken into account

Dividend payments in the modelling framework[62] (CZK 210.9 billion) reduce the resulting capital ratio from 27.5% to 19.7%. The latter thus stays above the overall capital requirement (OCR) by a sufficient margin. No systemically important bank[63] would breach the O-SII buffer requirement in the *Baseline Scenario* (see Chart IV.4), while other banks would breach the SREP capital requirement (TSCR) in one case; conversion of eligible liabilities would not be applied.[64] Topping up the capital to the TSCR would require a capital injection totalling CZK 5.0 billion. The banking sector as a whole remains above the binding 3% leverage ratio requirement by a sufficient margin. Individually, however, one bank would be required to replenish its capital. The introduction of the windfall tax will not have a significant effect on the sector's resilience.

61 The figure reflects the situation where household deposits see an additional rise in rates of 1 pp due to migration to savings and term products and greater competition.

62 For details on the methodology see *Solvency macro stress test of the domestic banking sector*.

63 Five banks with an O-SII buffer level set for 2023 are considered systemically important.

64 A bank may also get into a situation of an insufficient capital ratio because the stress test methodology assesses its business model as unsustainable even if this is not necessarily true. This is because the methodology is based on a universal bank model and may not be entirely accurate for banks with specific business models. The CNB therefore takes institutions' specific characteristics into account when assessing the test results.

Higher monetary policy rates in the *Adverse Scenario* would lead to an additional increase in profitability…
The increase in monetary policy rates in the first year of the *Adverse Scenario* and their only a gradual decline in the second and third years would allow banks to additionally increase profit to cover losses. It would amount to CZK 149.3 billion in 2023 and rise gradually to CZK 201.5 billion in 2025. Overall, there is an increase of CZK 141.3 billion at the scenario horizon relative to the *Baseline Scenario*. In addition to income on newly purchased government securities (an increase in the portfolio of CZK 588.0 billion in total), profit to cover losses is positively affected by a larger difference between interest rates on assets and liabilities (the net interest margin). However, the decline in economic activity and growth in unemployment would cause credit losses to surge. This would have a negative effect on pre-tax profit. Credit losses amount to around CZK 60 billion in the first two years and drop to CZK 48.5 billion in the following year. The growth in interest rates and worse macroeconomic situation would also reduce the value of marked-to-market assets, but the impact of this reduction on profit would be fairly low. Following an initial decline, profitability as measured by RoA would rise due to growth in after-tax profit, reaching 1.05% in the third year of the scenario. The decomposition of the change in the overall capital ratio (see Chart IV.2) shows that profit to cover losses (+16.6 pp) would sufficiently cover the increased credit losses (-5.3 pp), the slight market risk losses (-0.2 pp), the negligible interbank contagion losses (-0.002 pp) and taxes (-2.9 pp) and would contribute 8.2 pp to the increase in the capital capital ratio. Given the materialisation of credit risk and the increase in the volume of loans, capitalisation would decline (by 5.3 pp) due to growth in the total risk exposure amount (TREA). The impact of the increase in risk weights in the *Adverse Scenario* is -3.3 pp and that of the growth in exposures is -2.0 pp. In particular, the growth in the TREA would cause a more moderate increase in the overall capital ratio to 24.4% (3.1 pp lower than in the *Baseline Scenario*).

…but the overall capital ratio would end up lower than in the *Baseline Scenario*
Owing to dividend payments (CZK 141.4 billion), the resulting overall capital ratio would decline to 19.4%. The outcome would be only 0.3 pp worse than in the *Baseline Scenario*, where, however, around CZK 70 billion more would be paid out in dividends. A capital injection would be required in one systemically unimportant bank (see Chart IV.4) due to a breach of the TSCR. It would amount to CZK 6.6 billion.[64] The leverage ratio of the banking sector in the *Adverse Scenario* would rise to 6.5%, well above the 3% threshold. However, one systemically unimportant bank would be individually non-compliant and would require a capital injection of CZK 5.9 billion to meet the threshold, without the use of recapitalisation with eligible liabilities. The resulting overall capital ratio shows that the banking sector as a whole would be sufficiently resilient to the adverse developments assumed in the *Adverse Scenario*.

Growth in interest rates on household deposits above and beyond the *Adverse Scenario* poses no risk to stability
The sensitivity of the stress test results to related uncertainties was analysed on top of the *Adverse Scenario*. The currently high inflation is leading depositors to optimise returns on deposits. Funds are therefore being moved from current account deposits to savings and term deposits. This is causing banks' deposit expenses to rise. An increase in deposit interest expenses of 1 pp implies a decline in profit to cover losses of around CZK 36 billion a year.[65] Nonetheless, given the still high dividends paid in the *Adverse Scenario*, only a moderate impact on the overall capital ratio can be expected. However, if banks failed to respond to the situation by reducing their dividends, the overall capital ratio could decrease by 1.5 pp.[66] This notwithstanding, the banking sector would stay well above the minimum requirements.

Higher materialisation of losses on consumer credit could reduce capitalisation only slightly
Households' consumer credit portfolio is currently recording strong growth in loans to clients who have already obtained a mortgage loan. If there was a higher default rate on the consumer portfolio in the *Adverse Scenario*, which would be associated with a higher loss given default, the banking sector would be additionally subject to credit losses of CZK 16.5 billion at the test horizon.[67] If banks failed to respond to the situation by reducing their dividends, the overall capital ratio could decrease by 0.4 pp.

Increased caution with respect to loans connected with the commercial property market would have a minimal downward effect on capitalisation
In the event of adverse economic developments, banks may be more cautious when identifying a significant increase in credit risk (SICR) for loans connected with investment in commercial property. If these loans were to be moved from Stage 1 to Stage 2, there would be a one-off increase in credit losses of CZK 1.4 billion. The materialisation of this risk would have only a very modest impact on the overall capital ratio.

65 The figure reflects the situation where household deposits see an additional rise in rates of 1 pp due to migration to term products and greater competition.

66 The figure is based on the assumption that banks would pay 0.5 pp higher rates on household deposits throughout the stress test relative to the expected level.

67 In this situation, the default rate on consumer credit in the Adverse Scenario would increase by an additional 3.3 pp and loss given default would rise by 10 pp at the scenario horizon.

Owing to the high cost of eligible liabilities, banks are using capital to meet the MREL

During 2023, the banking sector is finishing its preparations for when the MREL-related requirements enter into force in 2024. These requirements are aimed at ensuring sufficient eligible liabilities to recapitalise banks in a crisis. However, eligible liabilities are currently relatively costly to issue, so banks in the Czech banking sector are currently planning to use their capital surpluses to meet the requirements. Banks are also adjusting their dividend policies to this situation. This is reflected the overall capital ratio being maintained at higher levels than previously estimated and in a relatively constant leverage ratio (see Chart IV.3). Even so, there is a small degree of non-compliance with the MREL[68] in both the *Baseline Scenario* and the *Adverse Scenario*. The shortfall amounts to 0.24% of the TREA in the *Baseline Scenario* (see Chart IV.5) and 0.56% of the TREA in the *Adverse Scenario*, most of which has to be made up with ºwn funds.

Chart IV.3

Compliance with selected regulatory requirements by the banking sector in the alternative scenarios

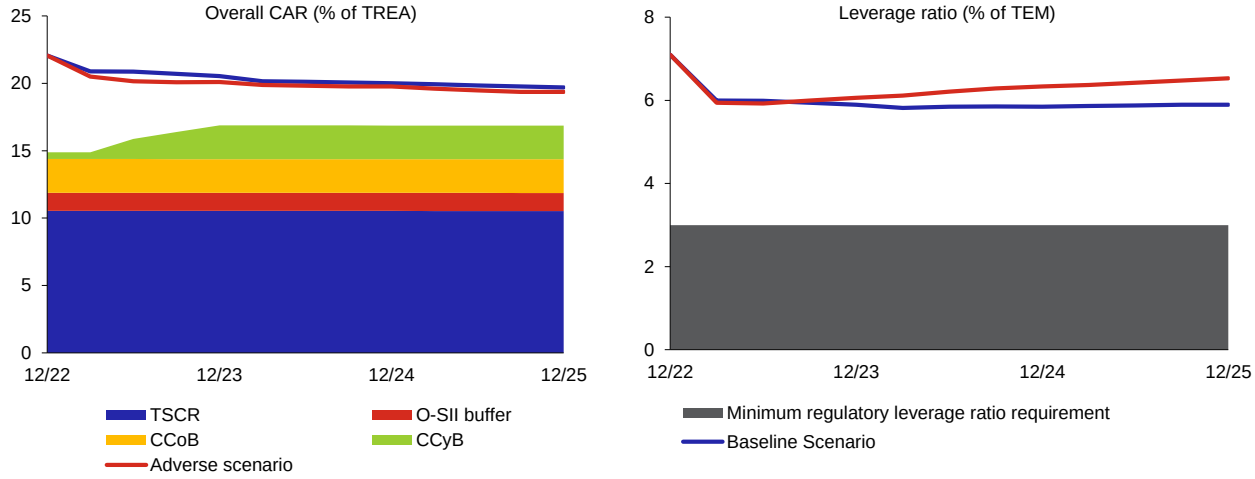


Chart IV.4

Need and method for replenishing own funds at different capital requirement levels

(CZK billions; right-hand scale: number of banks)

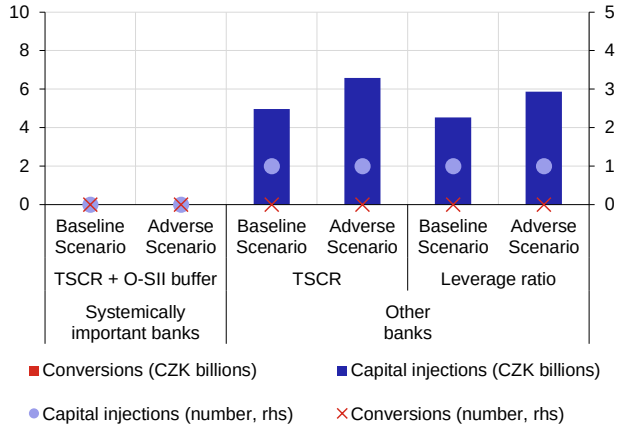
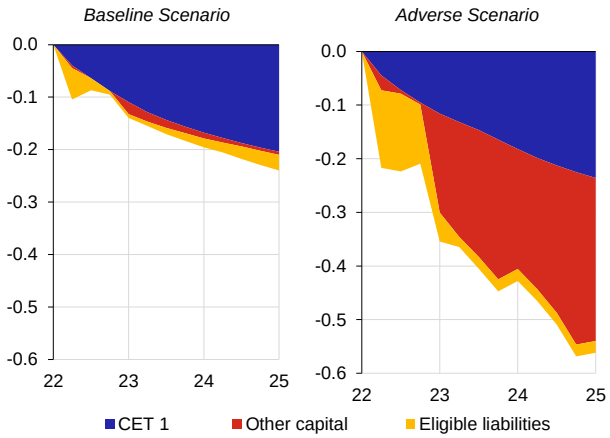


Chart IV.5

MREL shortfall and its structure

(% of TREA)



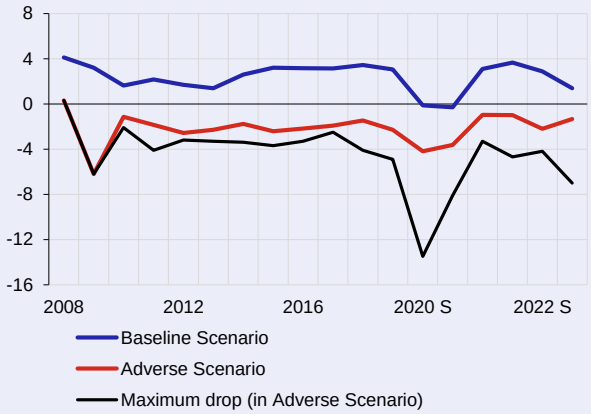
68 The MREL shortfall is calculated as the amount of eligible liabilities and own funds required so that individual banks comply with the MRELTREA plus the combined capital buffer and the MRELTEM. This is then aggregated for the entire banking sector and normalised by the value of the TREA. The structure of the MREL shortfall is calculated so that banks not only meet the MRELTREA and the MRELTEM requirements, but also comply with the CET 1 capital ratio, the overall capital ratio and the binding leverage ratio requirement once the corresponding CET 1 level is replenished. For the purpose of topping up to the overall capital ratio, no distinction is made between AT 1 and Tier 2. It is assumed that banks will meet the MREL recapitalisation amount by issuing eligible liabilities.

BOX 2: Comparison of the degree of stress and the impacts of adverse scenarios

Stress testing is a standard tool for assessing the resilience of the financial system and a support tool for macroeconomic policy decision-making. The underlying input for the testing is a consistent scenario describing the paths of key macroeconomic and financial variables. Besides the *Baseline Scenario*, which is based on the CNB's official forecasts published in its Monetary Policy Report and describes the most probable future developments, an *Adverse Scenario* is traditionally compiled as well. The purpose of the *Adverse Scenario* is to test the financial system's resilience in a hypothetical situation of extremely unfavourable macroeconomic developments. This box presents the CNB's approach to compiling adverse scenarios and documents their impacts on the banking sector over time. It also discusses to what extent the stress test results depend on the nature of the *Adverse Scenario*.

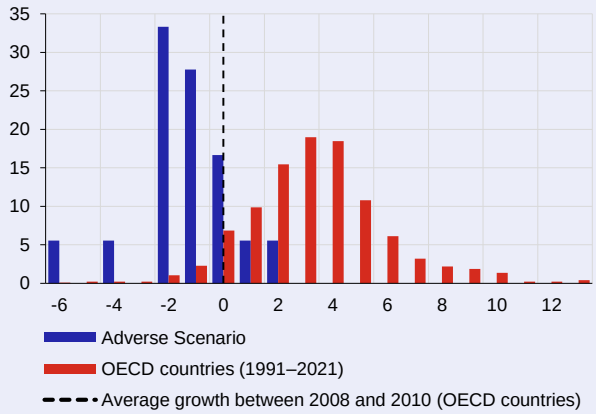
The CNB has been stress testing the banking sector using internally consistent *Adverse Scenarios* since 2010.[69] Their compilation starts with the identification of existing macrofinancial risks and uncertainties. Based on this, and taking into account historical observations, the size of economic shocks consistent with the materialisation of the risks identified is then set and their distribution over time is determined. The construction of the *Adverse Scenario* thus takes into account the current situation and the nearest-term outlooks and reflects the position of the economy in the business and financial cycle. This makes it possible, on the one hand, to analyse the impact of the materialisation of specific risks to financial stability at a given time and, on the other, to test the banking sector's resilience to a wider set of various macrofinancial scenarios over time. However, the common requirement for all types of scenarios is compliance with the principle of a severe but plausible degree of stress.

Chart 1 (BOX 2)
GDP growth in individual historical scenarios
(average growth rate during scenario in %)



Note: The maximum drop shows the largest year-on-year decline in GDP over the course of the scenario. Until 2009, the scenarios tested only had a one-year horizon, so the maximum drop in GDP equals the average growth rate for the scenario as a whole. Since 2020, two rounds of stress tests have been conducted every year ("S": spring, "A": autumn).

Chart 2 (BOX 2)
Comparison of the CNB's *Adverse Scenarios* with historical developments in OECD countries
(% of total number; x-axis: average growth rate during scenario in %)



Source: World Bank, CNB

Note: The horizontal axis shows three-year moving average GDP growth. The vertical axis shows the share of the total number of observations. The dashed vertical line depicts the average cumulative growth in OECD countries during the GFC (-0.05%).

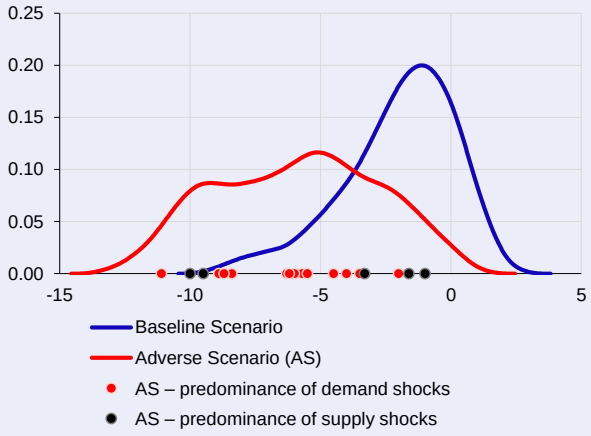
The main indicator of the size of the stress in the *Adverse Scenario* is the rate of economic slowdown. The average GDP growth rate during the *Adverse Scenario* is usually around 4 pp lower than that in the *Baseline Scenario*, while the maximum year-on-year decline in the *Adverse Scenario* is around 4%. However, the decline may be significantly deeper in times of crisis (see Chart 1). The severity but plausibility of the *Adverse Scenarios* can be demonstrated by comparing them with the distribution of the historical average year-on-year GDP growth rates in OECD countries (see Chart 2). The growth rate in the CNB's *Adverse Scenarios* lies in the left-hand tail of the distribution and, with a few exceptions, is below the average recorded by the OECD countries during the Global Financial Crisis.

69 In previous years, stress to the financial system was only tested in the form of one-off shocks to individual variables.

Chart 3 (BOX 2)

Change in the capital ratio in various scenarios

(kernel estimate of probability density function; x-axis: change in pp)

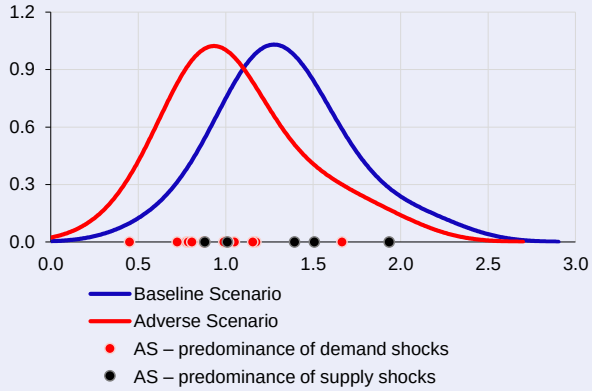


Note: The chart shows the scenarios compiled since 2010. Demand/supply shocks in the *Adverse Scenario* refer to situations where output growth decreases while the price level decreases/increases.

Chart 4 (BOX 2)

Profit to cover losses in various scenarios

(kernel estimate of probability density function; x-axis: average annual profit/assets in %)



Note: The chart shows the scenarios compiled since 2010. Demand/supply shocks in the *Adverse Scenario* refer to situations where output growth decreases while the price level decreases/increases.

The key output of the stress tests of the banking sector is the impact of the chosen scenario on the change in the capital ratio at the test horizon (see Chart 3). In the *Adverse Scenarios*, the capital ratio decreases substantially compared to the initial state (by around 6 pp on average), much more so than in the *Baseline Scenario*.[70] However, the results vary across scenarios. In addition to the size of the economic slowdown, which can differ significantly between crisis periods and calmer times (see Chart 3, red line, double-peak distribution), the variability depends on the other assumptions made (for example regarding dividend policy) and on the specific features of the *Adverse Scenario*.[71]

One of the important features of the *Adverse Scenario* is the predominant nature of the negative shocks considered. In scenarios where demand shocks predominate, the economic downturn is accompanied by low inflation (a decline below inflation in the *Baseline Scenario*), low interest rates and compressed long-term yields. By contrast, in scenarios where supply shocks play a major role, the slowdown is accompanied by inflation above that in the *Baseline Scenario*, to which both interest rates and long-term yields respond by rising. Their elevated level has a positive effect on the profit generated by banks, so in scenarios where supply shocks predominate, the level of profit features more frequently in the right-hand tail of the distribution (see Chart 4). On the other hand, rapid growth in the cost of living amid elevated inflation can lead to greater debt servicing problems unless it is accompanied by a corresponding rise in income. Those problems are exacerbated by growth in interest paid, reflecting tighter monetary policy and rising interest rates. This can manifest as a sizeable rise in the default rate. In this situation, a role is played by the specific nature of the *Adverse Scenario* in the given phase of the business and financial cycle and the strength of the individual channels that ultimately predominate in it. The assumptions made about the fiscal policy response also play a significant role in the scenario. If general government responds to the slowdown by providing greater support to the real non-financial sector, credit risk may materialise to a relatively limited extent and the banking sector's credit losses may be minimised. At the same time, the banking sector's profits may increase additionally – especially in an environment of increased yields – due to deficit funding of fiscal support and the relatively significant share of government securities (at amortised cost) contained in banks' balance sheets.[72]

Overall, the degree of stress tested can vary over time depending on the prevailing economic conditions. However, the test results depend to a large extent on the resilience of the banking sector and its ability to withstand adverse shocks at the given time. The specific story underlying the scenario helps the public to better understand the assumptions and results of the stress tests.

70 The decline in the capital ratio in the *Baseline Scenario* is often caused by the conservative approach taken to stress testing, where the entire capital surplus is assumed to be paid to owners in the form of dividends right at the start of the test.

71 Some degree of variability is also caused by technical changes stemming from the gradual refinement and extension of the stress testing methodology. One example of this is the ongoing refinement of the satellite models used to obtain projections of key financial variables (yield curves, property prices, credit growth, default rates, etc.).

72 While a scenario featuring significantly increasing and debt-financed government expenditure can have a positive effect on the banking sector's profitability up to some point in time, such a scenario implies growing risks to government finance sustainability and an increase in sovereign risk in the longer run. Growth in yields on government securities may not have only positive effects on the results of other non-bank financial institutions either.

IV.1.2 Bank liquidity stress test

The CNB stress tested the banking sector's resilience to liquidity risk

The CNB assessed banks' resilience using an idiosyncratic,[73] static liquidity stress test. The test monitors to what extent and in what way each bank balances its expected liquidity outflows using its expected liquidity inflows and its initial counterbalancing capacity (the liquidity gap) over a period of six months. The test yields information about whether any banks would experience a liquidity shortfall (a negative liquidity gap), i.e. fully exhaust their counterbalancing capacity in the form of liquid assets, in the stress scenario. The test focuses exclusively on liquidity shocks, the source of which is disruption to interbank markets and financial collateral markets combined with a large outflow of unstable deposits. It is also assumed that banks do not respond to any liquidity shortfall over the entire test period. The main purpose of the test is to check whether the bank is too reliant on unstable sources of funding and has a sufficient buffer of liquid assets. The scenario parameters are based on the methodology in force (see Table IV.1 CB). Except for state-owned banks, all 19 domestic banks were tested for negative liquidity gap risk using data as of December 2022. This involved a total of 16 entities after taking liquidity subgroups[74] into account.[75]

The test confirmed domestic banks' robust liquidity position

The domestic banking sector has long been characterised as highly liquid (see section III.2.3). This is confirmed by this year's stress test results. If the scenario were to materialise, all the banks tested would show a positive liquidity gap over the entire six-month stress horizon (see Chart IV.6). The robust liquidity position was due mainly to a sufficient level of liquid assets[76] totalling CZK 2.5 trillion (about a third of total assets) combined with a high volume of stable retail deposits (household deposits make up around 55% of total liabilities). Retail deposits (60% of total outflows) continue to be the main component of expected outflows. Claims on the CNB make up about 55% of the liquid assets of domestic banks. This mainly reflects the amount of repo operations conducted. Government securities, which are marked to market for the purposes of the test and the calculation of liquidity indicators, make up 40% of liquid assets.

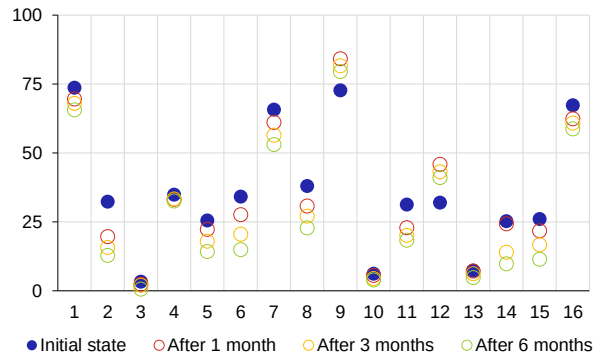
Indicators of systemic liquidity also confirm resilience to liquidity risk

Selected ratios which track the main sources of risk are also used to assess the the banking sector's systemic liquidity (see Table IV.2). These indicators mainly measure the domestic banking sector's reliance on short-term or less stable sources of funding and excessive interconnectedness in sources of funding. Domestic banks continue to be characterised by a very low ratio of encumbered assets to total assets (including collateral received) and low rehypothecation (the ratio of encumbered collateral received to total assets) for the purposes of obtaining liquidity. Repo operations with the central bank are usually the source of encumbrance. This, along with a low share of short-term wholesale funding and a robust loan-to-deposit ratio, signals a limited risk stemming from interconnectedness and reliance on unstable sources of funding.

Chart IV.6

Results of the idiosyncratic test of the liquidity of individual liquidity subgroups

(liquidity gap in % of total assets; x-axis: liquidity subgroup)



Note: The initial state represents the share of highly liquid assets in total assets as of 31 December 2022.

Table IV.2

Selected indicators of systemic liquidity

(%; as of 31 December 2022)

	Large banks	Medium -sized banks	Small banks	Building societies
Ratio of encumbered assets to total assets, including collateral received	20	17	0	0
Ratio of transactions with CNB to sources of encumbered assets	98	100	100	100
Ratio of encumbered collateral received to total assets, including collateral received	14	14	2	0
Ratio of liquid assets eligible for acceptance by CNB to total assets	34	44	57	5
Ratio of LCR outflows to liquid assets eligible for acceptance by CNB	58	39	26	46
Ratio of wholesale funding sources to total assets	15	11	3	16
Loan-to-deposit ratio	73	58	45	112

Note: Averages weighted by the bank's balance sheet size.

73 Given the nature of the test, only the liquidity position at individual bank (liquidity group) level is monitored. The test thus does not assume a simultaneous outflow of liquidity from all the entities tested. The test results therefore cannot be simply aggregated and used to assess systemic liquidity risk.

74 See Article 8 of the Capital Requirements Regulation (CRR).

75 The test would involve 19 entities on an individual basis.

76 The majority of liquid assets are Level 1 assets under Commission Delegated Regulation (EU) 61/2015.

IV.2 MACRO STRESS TESTS OF NON-BANK FINANCIAL INSTITUTIONS

IV.2.1 Stress test of the insurance sector

The macro stress test assesses the aggregate resilience of the insurance sector…
The macro stress test of the domestic insurance sector covers 20 domestic insurance companies, which in 2022 together accounted for 91% of the Czech market (85% of the life insurance market and 93% of the non-life insurance market) as measured by their share in net premiums written.[77] The test is calculated using data as of 31 December 2022, which are based on the Solvency II legislative framework. The test is performed at quarterly frequency, with selected insurance and market variables and their effect on the solvency capital ratio, profit and liquidity positions of the tested insurance companies considered over a period of three years. The resilience of the insurance sector is assessed primarily using the solvency capital ratio, i.e. the ratio of eligible capital to the solvency capital requirement, which insurance companies are required to maintain above 100%. The test also monitors net cash flows related to the investment assets held by insurance companies and their insurance products. This makes it possible to evaluate the extent to which they would be forced to sell investment assets if they exhausted their liquidity buffers. As in previous years, the test uses a number of methodological assumptions.[78] The stress test considers the evolution of relevant market variables under the *Baseline Scenario* and the *Adverse Scenario* (see section IV.1).

…the results are significantly affected by the scenarios for risk-free interest rates…
The key indicator for insurance companies is the movement of risk-free rates, which primarily reflects the movement of domestic swap rates, which in turn are affected by the monetary policy rates considered (see Chart IV.D). In the *Baseline Scenario*, domestic risk-free rates are initially flat and then fall, while in the *Adverse Scenario* domestic rates would increase slightly and foreign ones sharply as a result of additional inflation pressures. The movement of risk-free swap rates affects the value of insurance companies' liabilities through changes in discount rates. However, the discount rates of some insurance companies are significantly affected by the possibility of applying volatility adjustment.

…prices of financial assets…
Insurance companies' resilience is also affected by changes in prices of financial assets – shares, bonds, property, investment fund units and financial derivatives. In the *Baseline Scenario*, Czech government bonds record an increase in prices accompanied by a drop in yields starting in the second half of 2023 (see Chart IV.E), while corporate bond spreads and share prices remain broadly flat. In the *Adverse Scenario*, prices of Czech government bonds would fall sharply in the first year, reflecting growth in risk-free rates and an increase in risk premia, especially in the case of bonds with longer maturities. Also in the *Adverse Scenario*, share prices drop sharply on global stock markets (US shares by around 40%, European shares by 30% and shares of other countries by 50% at most), risk premia on corporate bonds rise (those on speculative grade bonds by more than 500 bp), risk premia on foreign government bonds increase and property prices fall (by around 30% at the scenario horizon). This trend would reverse only partly in the following years (see section IV.1).

…and premiums and claim settlement costs
Besides the above market variables, change in premiums and claim settlement costs in non-life insurance is relevant to the macro stress test. The *Baseline Scenario* assumes that the amount of premiums and claim settlement costs reflects inflation (see Chart IV.C). As an additional stress, the *Adverse Scenario* assumes that, for reasons of competition, insurers would not pass on the higher inflation to their clients and instead cover part of their inflation costs with their profits. Inflation would thus be fully reflected in claim settlement costs but not in premiums.[79] The growth in premiums in the *Adverse Scenario* is therefore adjusted for inflation by the decline in real GDP (see Chart IV.A) to take into account the impact of the decrease in demand for insurance products resulting from the economic downturn.[80] The *Adverse Scenario* also

77 Branches of foreign insurance companies were not included in the test.

78 The test assumptions are described in detail in the methodology of the macro stress test of insurance companies. The most important are as follows:
(i) The test does not consider any change in the solvency capital requirement relative to the level at the start of the test and uses the solvency capital requirement for insurance companies that have to comply with a minimum capital requirement.
(ii) The test calculates insurance-technical provisions in a simplified way by discounting the originally expected future cash flows. This calculation method ignores the absorption capacity of technical provisions to respond to changes in yield curves, for example by reducing the originally expected payments of shares in investment income to clients.
(iii) The test takes into account the fact that, in the case of unit-linked life insurance products, the impact of market risks on the value of investment assets is adequately reflected in the change in liabilities arising from these products.
(iv) The test takes into account insurance companies' option to apply volatility adjustment.
(v) The impact of additional life insurance policy lapses was evaluated solely from the perspective of insurance companies' liquidity position; the effect of this shock on their capital position was not considered.

79 In the third year of the test, both premiums and claim settlement costs are assumed to reflect inflation again. This reflects the fact that that non-life insurance maintains some of its profitability given the highly inflationary nature of the *Adverse Scenario*.

80 The coefficients of correlation between change in insurance variables and change in GDP and inflation are set at 0.7–1.5 depending on the individual non-life insurance segments and are taken from Hodula, M., Janků, J., Časta, M., Kučera, A. (2021): *On the Macrofinancial Determinants of Life and Non-life Insurance Premiums*, *Geneva Papers on Risk and Insurance – Issues and Practice*, November 2021.

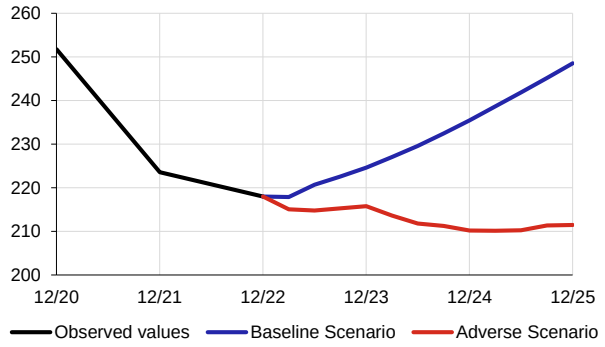
assumes moderate growth in the lapse rate of life insurance policies proportionate to the decline in real GDP. The average additional annual lapse rate in life insurance in excess of the lapses expected by insurance companies would be 2%.

The *Baseline Scenario* indicates an increase in the insurance sector's aggregate capital ratio at the three-year horizon

In the *Baseline Scenario*, the solvency capital ratio rises from its initial level of 218% to 248% as of 31 December 2025. The insurance sector as a whole thus remains sufficiently resilient at the aggregate level (see Chart IV.7). The main reason for the growth in the capital ratio is the assumed continued aggregate profitability in non-life insurance, where, however, insurers are assumed to still be able to pass on the growth in insurance costs to insurance prices in full. The payment of dividends has the opposite effect on the aggregate ratio (see Chart IV.8), where a stable payout ratio equal to the average of the past four years is assumed. The test results under the *Baseline Scenario* indicate that most of the insurance companies tested will be well above the regulatory minimum of 100% and none will breach the capital requirements. However, the impact of the scenario on individual insurance companies differs depending on their business models, the composition of their investment portfolios and the sensitivity of their assets and liabilities to change in interest rates.

Chart IV.7
Solvency capital ratio

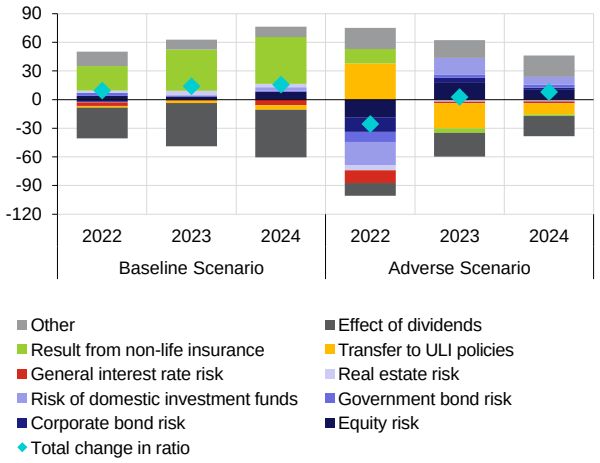
(%)



Note: Insurance companies are required to maintain the solvency capital ratio above 100%.

Chart IV.8
Decomposition of year-on-year changes in the solvency capital ratio

(pp)



Note: Other comprises taxes, income and dividends on investment, and fixed costs. ULI = index-linked and unit-linked life insurance. In addition to the effect of change in risk-free interest rates, general interest rate risk reflects the possible application of volatility adjustment.

The insurance sector remains resilient at the aggregate level even in the *Adverse Scenario*

In the *Adverse Scenario*, the aggregate solvency capital ratio would fall to 215% in the first year and 210% in the following year and stay close to that level in the remaining year of the scenario (see Chart IV.7). The capital ratio would thus be high enough above the regulatory minimum. The drop in the solvency capital ratio in the first year of the test would be due mainly to market risks stemming from a decline in the value of holdings of shares, bonds and investment fund units (see Chart IV.8). Persistently high government bond yields, which would lead to a 10.5 pp drop in the solvency ratio due to an increase in spreads and a further decrease of 13 pp due to movements of risk-free rates if unadjusted for the transfer of part of losses to clients, would have the biggest effect in the first year.[81] The ratio would also be adversely affected by a fall in the value of equity holdings (an unadjusted contribution of 18 pp) and a rise in credit spreads on corporate bonds (an unadjusted contribution of 16 pp). However, a large part of the drop (38 pp) would be offset by a decline in the value of insurance liabilities arising from index-linked or unit-linked life insurance where the investment risk is borne by the policy holder (see Chart IV.8, *Transfer to ULI policies*). Profitability in non-life insurance would also have a favourable effect in the first year. In the subsequent years, the sector would record a profit on marked-to-market assets at the aggregate level. However, this would be offset by a drop in the profitability of non-life insurance. At the individual insurance company level, no company would fail to meet the capital requirement even under the *Adverse Scenario*. However, the solvency capital ratio of one insurance company would drop almost to the regulatory minimum at the end of the third year of the scenario In another two companies, the solvency capital ratio would fall below 130% during the last year.

81 However, this indicator includes revaluation of technical provisions, including the use of volatility adjustment.

The liquidity position of insurance companies would remain sufficient even in the *Adverse Scenario*

In both the *Baseline Scenario* and the *Adverse Scenario*, insurance companies fail to fully cover their cash outflows (claim settlements, dividend payments and tax payments) with their cash inflows in the form of premiums received, maturing bond coupons and principal and other cash income on investment assets. The total liquidity shortfall would be CZK 10 billion in the *Baseline Scenario* and CZK 17.5 billion in the *Adverse Scenario* (see Chart IV.1 CB). In the *Adverse Scenario*, the shortfall is due primarily to a fall in net income on non-life insurance products and investment assets and to additional liquidity requirements arising from growth in life insurance policy lapses (however, dividend payments have the greatest weight in the first year in both scenarios). The aggregate liquidity shortfall would peak at around CZK 8 billion in 2023 Q2. This amount would not represent a significant liquidity risk for insurance companies, as they could obtain additional liquidity through, among other things, sales or repo operations using Czech government bonds, nor would it unbalance the government bond market even in the event of direct sales. The test results thus show that insurance companies' contribution to the risk of contagion through the indirect interconnectedness of the domestic financial sector in the form of fire sales of Czech government bonds (see section III.3) is not currently significant.

IV.2.2 Stress test of pension management companies

The stress test of pension management companies assesses the sector's resilience at the one-year horizon

The stress test of pension management companies (PMCs) focuses on assessing the risks to transformed funds (TFs) managed by PMCs using data as of the end of 2022.[82] TFs' portfolios were tested using the parameters of the *Baseline Scenario* and the *Adverse Scenario* (see Table IV.1). The *Baseline Scenario* is characterised by a modest economic recovery and a drop in interest rates (see Chart IV.1D). The *Adverse Scenario* assumes a global economic downturn accompanied by persisting higher government bond yields and rising credit risk premia (see Chart IV.1E).

The assets of transformed funds consist mainly of government bonds

Transformed funds invest mainly in domestic government bonds, which accounted for 91.6% of the value of debt securities held at the start of the test. Growth in yields is reflected in higher profitability of TFs. RoA was 2.9% in 2022, up 1.4 pp on a year earlier. TFs recognise a large part of government bonds (64.2%) at amortised cost, which means that these bonds need not be marked to market even if interest rates rise, hence TFs are not exposed to risks associated with financial market volatility (see Chart III.5 CB). If TFs were forced to revalue their marked-to-market portfolio or even sell a part thereof for regulatory or liquidity reasons, they would make a loss. If they revalued 5% of the portfolio held to maturity, the value of their assets would fall and they would incur impairment losses of CZK 2 billion (see section III.3).

Transformed funds remain sensitive to general interest rate risk…

Interest rate risk naturally remains the main risk for TFs (see Table IV.3). In the *Baseline Scenario*, the koruna swap curve drops by 1.6 pp at one-year maturity and 0.7 pp at five-year maturity. The decline in the euro curve is more modest: in the *Baseline Scenario* it falls by 0.3 pp at one-year maturity and rises slightly at the longer end. The impact of the interest rate shock is softened by derivative hedging. The drop in yield curves would lead to a 0.7% rise in TFs' assets. In the *Adverse Scenario*, which assumes growth in rates, however, TFs post losses in the form of a 0.8% drop in assets.

…and a rise in the risk premium

Credit spread risk for both government and corporate bonds is the most significant risk to TFs. The rise in credit spreads reflects bond maturity and the issuer's credit rating. Credit spread risk causes TFs to incur losses in both the *Baseline Scenario* and the *Adverse Scenario*. An increase in risk mark-ups on debt securities results in assets falling in value by 0.2% in the case of government bonds and 0.1% in the case of corporate bonds in the *Baseline Scenario* (see Table IV.3). In the *Adverse Scenario*, assets would decline by 0.5% and 0.6% respectively.

Other risks are less significant for TFs

The credit risk of portfolios measured at amortised cost is low. Coverage of assets by loss allowances stood at 0.012% at the end of 2022. This reflects the low riskiness of the main asset component, Czech government bonds. TFs did not incur any losses due to credit risk in the *Baseline Scenario* and their assets dropped by CZK 0.1 billion in the *Adverse Scenario*. The impact of equity risk on TFs is limited, reflecting the fact that they further reduced their investment in shares and units in 2022. Real estate risk also remains negligible for Czech TFs, as they rarely invest in property. Exchange rate risk does not imply any major losses for TFs either, as foreign currency balance-sheet exposures accounted for just 5.2% of their assets at the end of 2022. TFs do not incur any losses on foreign currency investments in the *Baseline Scenario* (see Chart IV.9). In the *Adverse Scenario*, in which the koruna appreciates by 10%, TFs would record a CZK 0.5 billion loss.

82 *Macro-stress tests of the Pension Management Companies*

The capital adequacy of some PMCs would fall below the required minimum in both scenarios…

PMCs guarantee non-negative returns for the clients of their TFs by law. If a TF's assets decline below its liabilities, the relevant PMC is obliged to top up the TF's assets with capital. The *Baseline Scenario* implies a need to top up the capital of four out of the eight TFs by a total of CZK 0.3 billion (see Table IV.3).[83] In the *Adverse Scenario*, which assumes growth in interest rates and a rising risk premium, TFs would record significant losses necessitating capital top-ups totalling CZK 7.0 billion in seven out of the eight TFs.[84]

Table IV.3
Results of the stress tests of PMCs

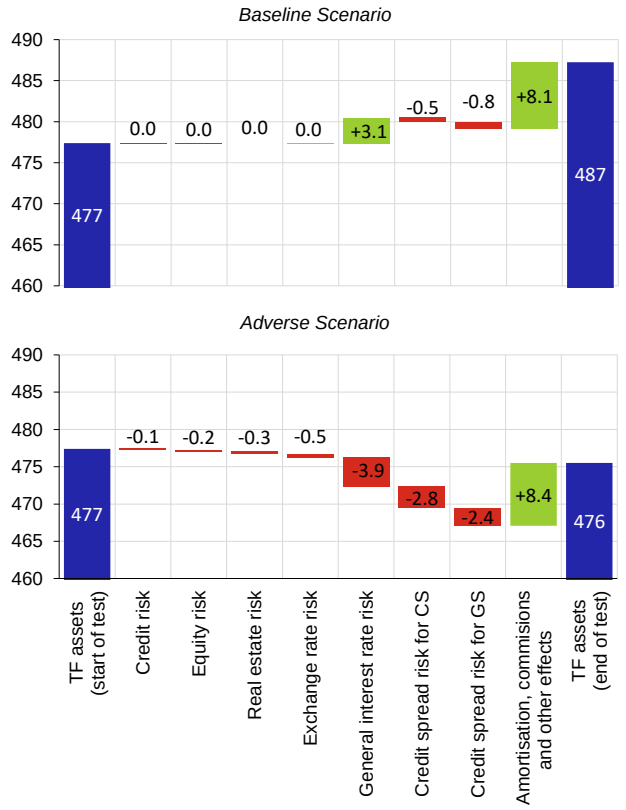
Start of test:	CZK billions	
Excess of assets over liabilities in TFs	8.2	
PMC equity	10.8	
PMC capital requirement:	4.0	

	Baseline scenario		***Adverse Scenario***	
	CZK bn	% of TF assets	CZK bn	% of TF assets
TF assets at start of test	**477.4**		**477.4**	
Total impact of risks on TF assets	1.7	0.4	-10.3	-2.2
General interest rate risk	3.1	0.7	-3.9	-0.8
Credit spread risk for CS	-0.5	-0.1	-2.8	-0.6
Credit spread risk for GS	-0.8	-0.2	-2.4	-0.5
Credit risk	0.0	0.0	-0.1	0.0
Exchange rate risk	0.0	0.0	-0.5	-0.1
Equity risk	0.0	0.0	-0.2	-0.1
Real estate risk	0.0	0.0	-0.3	-0.1
Change in assets due to amortisation, commissions and other effects*	8.1	1.7	8.4	1.8
TF assets at end of test	**487.2**	**102.1**	**475.5**	**99.6**
TF liabilities at start of test	**469.2**		**469.2**	
Change in liabilities due to profit distribution	15.7		13.1	
TF liabilities at end of test	**484.8**		**482.2**	
End of test:	CZK bn		CZK bn	
Excess of assets over liabilities in TFs	2.4		-6.7	
TF asset top-up need	**0.3**		**7.0**	
Number of TFs needing top-ups	**4**		**7**	
PMC equity (after commissions from TFs and TF top-ups)	11.4		4.4	
PMC capital requirement:	4.0		3.8	
Capital injection into PMCs	0.0		1.9	
Number of PMCs needing capital injections	**0**		**3**	

Note: TF = transformed fund, PMC = pension management company, CS = corporate securities, GS = government securities. * Other effects are bond coupons received, dividend income and income from deposits.

Chart IV.9
Change in the value of assets of transformed funds due to the risks tested in the *Baseline* and *Adverse Scenarios*

(CZK billions)



Note: CS = corporate securities, GS = government securities. Other effects are bond coupons received, dividend income and income from deposits. Change in the value of foreign currency liabilities (cross-currency repos) is accounted for when considering exchange rate risk.

…however, capital replenishment does not represent a major risk for PMCs

A TF's profit/loss is directly linked to the PMC. If the total value of a TF's assets is lower than that of its liabilities after the stress test is performed, the difference is deducted from the PMC's capital, as PMCs are obliged to top up the TFs they manage. If the PMC's eligible capital falls below the minimum capital requirement, its capital has to be replenished. In the *Baseline Scenario*, the capital adequacy of no PMC fell below the required statutory level. In the *Adverse Scenario*, the owners of three PMCs would have to inject capital of CZK 1.9 billion in order for their PMCs to satisfy the capital adequacy requirement.[85] As in the past, some PMCs replenished the capital of their TFs without problems in 2022. For prudential reasons, the presented results do not include PMCs' TF management fees, which would increase PMCs' own funds by an additional CZK 3.5 billion in the *Baseline Scenario* and CZK 3.4 billion in the *Adverse Scenario*. If PMCs were credited with the fees, only one PMC would have to top up its capital by a total of CZK 0.2 billion in the *Adverse Scenario*.

83 However, this result is affected by the test methodology, according to which, due to the static nature of the test, liabilities also include participants' share in the 2023 profit for prudential reasons. In reality, this share is credited to participants in the following calendar year, during which TFs generate further profits, which they use to balance assets and liabilities. If these liabilities were not credited in the stress test, no TF would have to replenish its capital in the *Baseline Scenario*, while in the *Adverse Scenario* four TFs would require capital top-ups totalling CZK 3 0 billion.

84 In last year's round of PMC stress tests, seven TFs had to top up their funds by a total of CZK 5.7 billion in the *Baseline Scenario* and the funds of all eight TFs had to be replenished by a total of CZK 5.9 billion in the *Adverse Scenario*.

85 In last year's PMC stress test, three PMCs had to top up their capital by a total of CZK 0.9 billion in the *Baseline Scenario* and the capital of two PMCs had to be replenished by a total of CZK 1.1 billion in the *Adverse Scenario*.

IV.2.3 Stress test of collective investment funds and PMC participation funds

The CNB tests the contribution of fund investment to systemic risks through its contribution to stress on the Czech government bond market

The CNB uses a stress test of collective investment funds and PMC participation funds (hereinafter "funds")[86] to assess their contribution to systemic risk in the domestic financial sector. The source of this contribution is the mismatch between the liquidity of funds' assets and liabilities.[87] The test is based on the assumption that in the event of asset repricing on the financial markets, sell-offs of fund units will increase and investors will exit individual funds, leading to a sharp increase in funds' liquidity need. By paying redeeming investors, funds will gradually exhaust their liquidity buffers and start to sell off assets if their buffers are insufficient. Increased sell-offs and a subsequent drop in the prices of those assets, which other domestic financial institutions also hold in their portfolios, may create an additional source of contagion in the domestic financial system.[88] The test considers sell-offs of Czech government bonds and a subsequent drop in their prices, as these bonds are held by all domestic financial institutions.

The test is performed dynamically on a significant part of the collective investment funds sector and on all PMC participation funds

The test involves repricing of individual funds' assets under the *Baseline* and *Adverse Scenarios* (see section II.2), followed by additional rounds of stress multiplication caused by exits of investors and participants. The test is based on funds' balance and off-balance sheets as of 31 December 2022. It covers 151 open-ended collective investment funds, which were managing assets totalling CZK 500 billion, i.e. around 95% of the assets of the collective investment funds sector, at the end of 2022. It also covered 30 PMC participation funds, with assets totalling CZK 116.8 billion, i.e. around 17% of the entire pension funds sector.[89]

The *Baseline Scenario* indicates a slight fall in assets in the first year and rising growth in subsequent years

In the *Baseline Scenario*, the aggregate test result is affected most strongly by a drop in monetary policy rates, the largest part of which occurs in the second year of the scenario, and a related shift in yield curves (see Chart II.21D and Chart II.21E). The total assets of collective investment funds decrease slightly (by 1.2%) in the first year of the scenario, but grow by 6% to CZK 533.4 billion at the stress test horizon. The types of funds according to investment asset class show mixed trends. In line with the drop in yield curves and growth in the value of bonds, bond funds record the largest increase in assets in the *Baseline Scenario* (12.5% at the scenario horizon; see Table IV.4). By contrast, the worst performers are equity funds. Their value falls by 7.4% in the first year of the scenario and remains 6.3% below its initial level at the test horizon. This decrease is also due to continued growth in interest rates in economies abroad in the first year of the scenario and a gradual return of the equity risk premium to its long-term average. Equity funds are also the only ones to record significant investor exits in the first year. The liquidity needed to cover these exits is CZK 4.7 billion. The assets of real estate funds increase slightly in line with the property price scenario (see Chart II.17), rising by 4.3% (or CZK 3.5 billion to CZK 85 billion) over the scenario horizon. Mixed and other funds also record an overall increase in assets (of 8.5% to CZK 184.8 billion) over the horizon of the *Baseline Scenario* despite a slight decline (of 1.3%) in the first year. Given the large share of Czech government bonds in the balance sheets of PMCs' participation funds, the assets of these funds grow in every year of the scenario and their value is 16.4% (or CZK 19.1 billion) higher at the scenario horizon.

The impact of the *Adverse Scenario* on collective investment funds is affected most of all by a sharp increase in risk premia on financial markets…

The *Adverse Scenario* implies a sharp increase in nervousness on financial markets and in the premiums demanded for risk undertaken. A drop in the prices of financial instruments would imply a decline in the value of assets in collective investment funds of CZK 118.9 billion (or 23.6%) to CZK 384.1 billion in the first year of the scenario. The adverse trend would have the strongest impact on stock markets (see Chart IV.1F) and the value of equity funds' assets would thus fall by CZK 41 billion (or 40.7%) to CZK 59.7 billion in the first year of the test (see Chart IV.10). Mixed funds would also be

86 For this year, the test has been extended to include PMC participation funds, whose business model and regulatory treatment is similar to that of collective investment funds. The term "fund" here refers to both collective investment funds and participation funds, while the term "investor" refers to both investors in investment funds and participants in pension funds.

87 Liquid assets comprise the deposits of individual funds on bank accounts with maturities of up to one year, deposits in money market funds and credit lines. Funds' liabilities consist mainly of the deposits of individual investors/participants.

88 The test assumptions and calculation method are presented in a methodology. Assets are repriced in each quarter based on the scenario, and the repricing is used to derive the liquidity stress caused by the exit of investors and participants. A 10% decline in the value of a fund's assets will lead to the exit of investors holding 4% of assets in the case of equity funds, 8% in the case of mixed and other funds, and 12% in the case of bond funds. In the case of real estate funds, the fact that these funds have one year to redeem investors' units is considered. Similarly, in the case of participation funds, the loss of state contributions and the back-payment of tax in the event of early withdrawal are taken into consideration. The test takes into account yields on bond holdings and related cash flows, and currency hedging, including the impacts of any changes in margin requirements for derivatives on funds' liquidity position. On the other hand, the test abstracts from yields and cash flows on assets other than bonds, arrivals of new investors and purchases of new assets by funds (the static balance sheet assumption).

89 The remainder of the PMC sector comprises transformed funds, which the CNB tests separately due to differences in their business model and the nature of the associated risks (see section IV.2.2).

hit hard; their asset value would be CZK 114.5 billion at the end of the first year (a drop of CZK 55.9 billion, or 32.8%). Bond funds would be affected by combined growth in the credit risk premium and monetary policy rates (see Chart IV.1D and Chart IV.1E) and would drop in value by CZK 12.7 billion (or 8.5%) to CZK 137.8 billion. Property prices would correct in the *Adverse Scenario* (see Chart II.20) and real estate funds' assets would be down CZK 9.3 billion (or 11.4%) in value at CZK 72.2 billion at the end of 2024 (see Table IV.4). In the following years, the financial market stress would ease a little and asset prices would reverse the fall observed in the first year (with the exception of property prices, which decline over the entire scenario horizon). The total value of collective investment funds' assets would thus be down just CZK 18.5 billion (or 3.7%) compared to 31 December 2022 at the scenario horizon. The overall liquidity need would be CZK 57.3 billion in the first year of the test and CZK 69.4 billion over the entire scenario period. The impact of the *Adverse Scenario* on PMC participation funds would be weaker relative to collective investment funds due the dominant share of government bonds in their balance sheets. The total value of participation funds' assets would decline by CZK 9.4 billion (or 8%) to CZK 107.4 billion in the first year of the scenario. However, a decrease in interest rates in the following years would lead to strong growth at the scenario horizon (of 28.9% compared to the initial value). In line with this, participation funds' liquidity need would be insignificant (only CZK 1.2 billion in the first year of the *Adverse Scenario*).

The test results indicate that funds do not contribute significantly to systemic risk in the form of amplification of adverse market developments through sales

The stress test results indicate that the funds tested would not contribute significantly to systemic risk in the form of amplification of adverse market developments. Collective investment funds held Czech government bonds totalling CZK 88.7 billion (i.e. 3.4% of the total government debt and 5.1% of the total Czech government bond portfolio held by domestic financial institutions) in their balance sheets at the end of 2022. PMC participation funds held Czech government bonds amounting to CZK 46.6 billion (1.8% of the total government debt and 2.7% of the Czech government bonds held by domestic financial institutions) in their portfolios. In the *Baseline Scenario*, funds would not be forced to sell off government bonds thanks to the relatively favourable trend in the value of investment funds' assets. In the *Adverse Scenario*, some funds would be forced to sell off government bonds to ensure sufficient liquidity. Owing to funds' high liquid asset holdings, however, the value of the bonds sold (CZK 12.1 billion; see Table IV.4) would not be material and the impact on government bond prices would be relatively moderate (a drop of 1.7% on average).

Table IV.4

Results of the stress test of collective investment funds and PMC participation funds

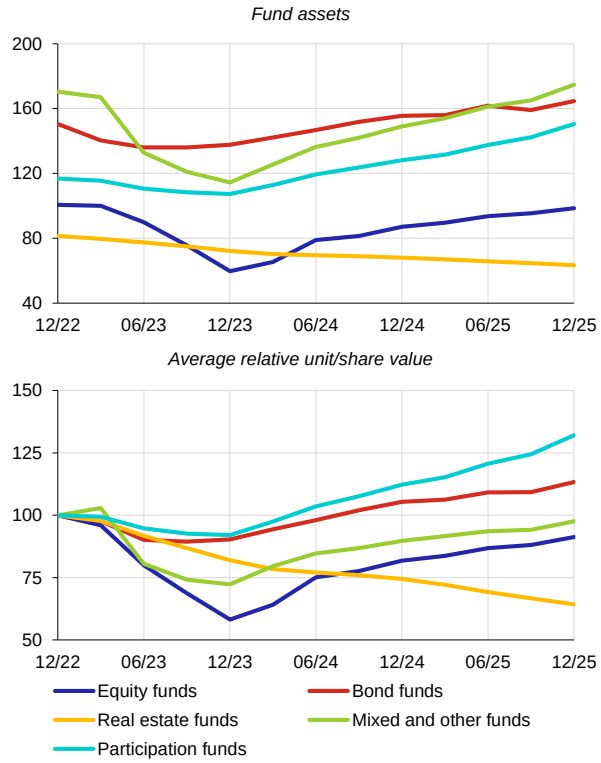
Actual value		*Baseline scenario*			*Adverse Scenario*		
	2022	2023	2024	2025	2023	2024	2025
Assets of funds covered by test (CZK billions)							
Collective investment funds	503.0	384.1	459.8	484.5	497.1	519.8	533.4
Equity funds	100.6	59.7	87.2	98.6	93.2	94.4	94.3
Bond funds	150.5	137.8	155.5	147.6	154.2	165.3	169.3
Real estate funds	81.5	72.2	68.1	63.5	81.6	84.0	85.0
Mixed and other funds	170.3	114.5	149.0	174.8	168.1	176.2	184.8
PMC participation funds	116.8	107.4	128.2	150.6	118.9	126.8	135.9
Unit value (% of initial value)							
Collective investment funds	100	74.4	90.8	99.5	95.4	98.3	102.2
Equity funds	100	58.2	81.8	91.3	90.3	90.8	91.4
Bond funds	100	90.3	105.4	113.3	103.9	111.7	117.6
Real estate funds	100	81.9	74.5	64.3	101.0	103.2	104.8
Mixed and other funds	100	72.3	89.8	97.6	99.0	98.8	101.6
PMC participation funds	100	92.0	112.2	132.0	102.2	109.9	118.2
Liquidity need (CZK billions)							
Collective investment funds		57.3	2.8	9.2	6.1	1.5	1.2
Equity funds		12.5	0.3	0.5	4.2	0.8	0.1
Bond funds		12.4	1.0	4.6	0.2	0.2	1.0
Real estate funds		2.2	0.9	1.6	0.2	0.2	0.0
Mixed and other funds		30.2	0.6	2.5	1.6	0.3	0.1
PMC participation funds		1.2	0.0	0.0	0.3	0.0	0.0
Impact on Czech government bond (GB) market (CZK billions)							
Czech GBs sold		0.0	0.0	0.0	12.0	0.0	0.0
Decrease in bond price (%)		0.0	0.0	0.0	1.7	0.0	0.0

Note: The liquidity need consists of the value of redeeming investors' units and margin requirements on derivative transactions. The waterfall method is used for portfolio sales.

Chart IV.10

Aggregate paths of funds' assets and units/shares in the *Adverse Scenario*

(upper panel: CZK billions; lower panel: % relative to start)



IV.3 STRESS TEST OF NON-FINANCIAL CORPORATIONS

The CNB conducts a macro stress test of non-financial corporations to identify which industries could be hit hardest in the *Baseline* or *Adverse Scenario* (see section IV.1).[90] Of key importance from the financial stability perspective is an analysis of the adverse impacts on the industries with the highest shares of loans provided by the domestic banking sector. In the Czech economy, these have long been manufacturing, wholesale and retail trade, and real estate activities (also referred to here as property developers). One output of this stress test is an estimate of the default rate on loans to individual industries, which is a key input to the bank stress tests (see section IV.1, Table IV.1).

In the *Baseline Scenario*, the default rate on loans to trade, construction and property developers rises slightly
For the duration of the *Baseline Scenario*, the performance of non-financial corporations continues to be affected by growth in some input costs (see Chart IV.1C), higher interest rates (see Chart IV.1D) and a positive trend in the trade balance.[91] Despite a slight year-on-year decline in real economic activity in the first year of the scenario (see Chart IV.1A), nominal output increases throughout the scenario (see Chart IV.11). This is due in the first year of the scenario to growth in the price level and in subsequent years to growth in economic activity, driven mainly by foreign trade. The result is higher output in export-oriented manufacturing than in aggregate output. A favourable trend can also be seen for the profit rate in manufacturing in every year of the scenario (see Chart IV.12), although nominal wage growth outpaces growth in gross operating surplus in most sectors. The aggregate default rate on loans to non-financial corporations in the *Baseline Scenario* increases slightly to 1.7% in 2023 and 2.4% in 2024 and 2025 (see Chart IV.13). Given the relatively high profit rate in manufacturing, the default rate on loans to this sector is very low over the entire scenario horizon. By contrast, the default rate on loans to trade, construction and property developers rises more markedly. This is due to higher debt servicing costs and lower growth in property prices than in previous years (see Chart II.20).

In the *Adverse Scenario*, the default rate on loans would increase markedly across sectors
The *Adverse Scenario* would lead to a sharp fall in real economic activity (see Chart IV.1A) in an inflationary economic environment (see Chart IV.1C). This would cause economic output to drop below the end-2022 level in nominal terms (see Chart IV.11), with growth subsequently not renewing until the start of 2025. The decrease in the trade balance and investment activity would lead to a fall in output, especially in manufacturing and construction. This would be reflected in growth in the profit rate, which would be lower in each year of the scenario than at the end of 2022 (see Chart IV.12). Tight financial conditions (see Chart IV.1D) along with rising corporate sector debt (see Chart II.40) would lead to significant growth in debt service costs. In addition, construction and property development would be burdened by a decline in property prices (see Chart II.20). The default rate would increase as a result of these factors, especially in manufacturing, trade, construction and property development (see Chart IV.13). In aggregate terms, the default rate would increase steadily to 3% in 2023 and peak at 6.5% in 2024.

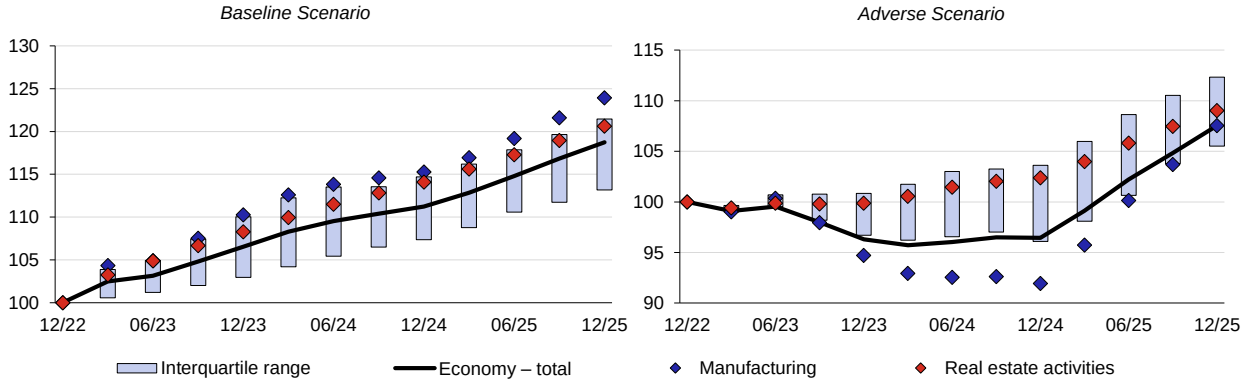
90 More information on stress testing of non-financial corporations can be found in a methodological document on the CNB website and in Siuda, V. (2020): *A Top-down Stress-testing Framework for the Nonfinancial Corporate Sector*, CNB Working Paper 12/2020. The current stress test was based on the structure of demand in the individual industries and the relations between them observed in 2021. This structure was estimated for 2022 based on the observed evolution of the economy and the banking sector's credit exposures.

91 The first two years of the *Baseline Scenario* are consistent with the CNB's spring forecast (MPR – Spring 2023), which assumes growth in net exports due to a recovery in external demand and the fade-out of supply chain problems.

Chart IV.11

Economic output in industries in the *Baseline Scenario* and the *Adverse Scenario*

(index of nominal variables, 12/22 = 100)

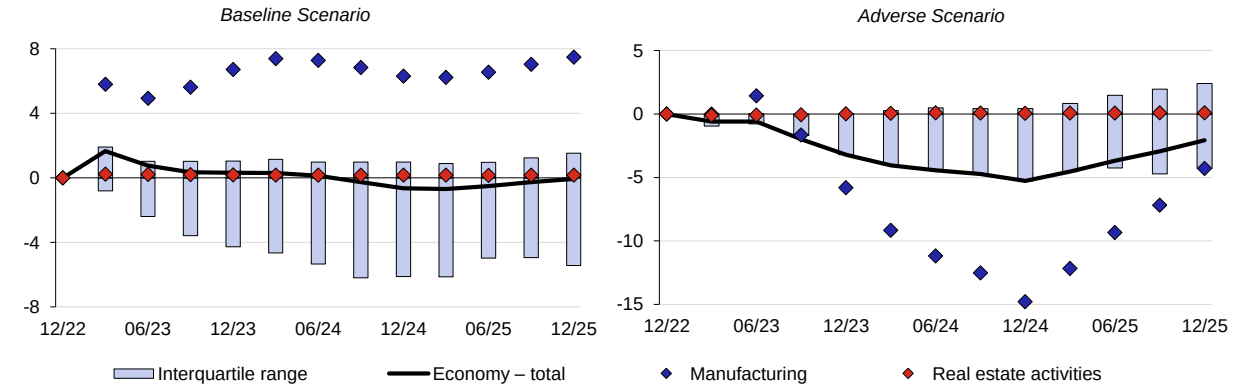


Note: Owing to a delay in the availability of macroeconomic data, the figures for 12/22 are estimated.

Chart IV.12

Growth in the profit rate in industries in the *Baseline Scenario* and the *Adverse Scenario*

(change in pp)

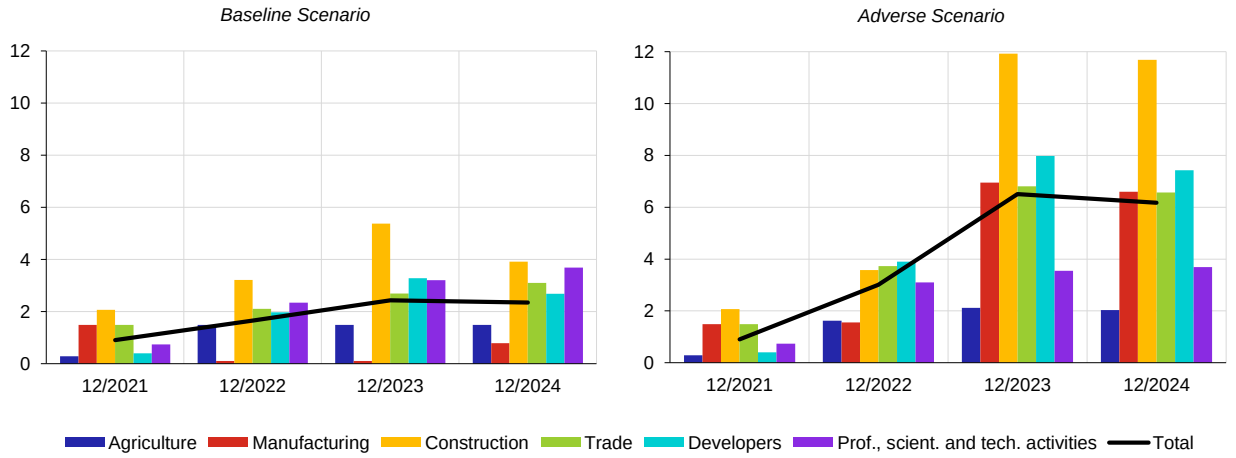


Note: The profit rate is the ratio of gross operating surplus to gross value added. Owing to a delay in the availability of macroeconomic data, the figures for 12/22 are estimated.

Chart IV.13

12M default rate in selected industries in the *Baseline Scenario* and the *Adverse Scenario*

(%)



IV.4 HOUSEHOLD STRESS TEST[92]

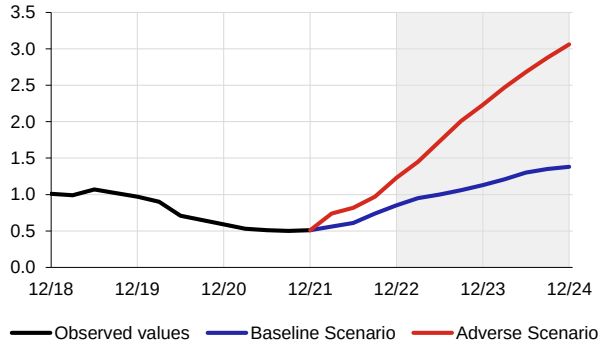
The household stress test focuses on the credit risk of households with consumer loans secured by residential property (referred to hereinafter in section IV.4 as "mortgage loans"), which the CNB measures using the 12-month default rate.[93] The default rate is monitored over a three-year horizon using the *Baseline* and *Adverse Scenarios* (see section IV.1) and the resulting estimate is used – among other things – as one of the main inputs to the bank stress test (see section IV.1). Stress testing has gained importance in recent years mainly because of the rise in inflation and debt servicing costs (see section II.1), which has fed through to Czech households' budgets.

The default rate will gradually increase in the *Baseline Scenario*

The household stress test shows that in the *Baseline Scenario* the 12-month default rate is already starting to increase slightly at the start of the projection (see Chart IV.14). This trend persists until the end of 2024, when the default rate climbs to just below 1.4% at the one-year horizon, thus reaching its 2017 level (see Chart II.30 CB). The distribution of the default rate by DSTI category indicates elevated default risk for a DSTI of over 40%, in line with the CNB's Recommendation,[94] while significant risk is evident for loans with a DSTI ratio of over 55% (see Chart IV.15). Loans with a DSTI ratio of up to 30% can be considered low-risk loans in this context.

Chart IV.14
12M default rate on mortgage loans

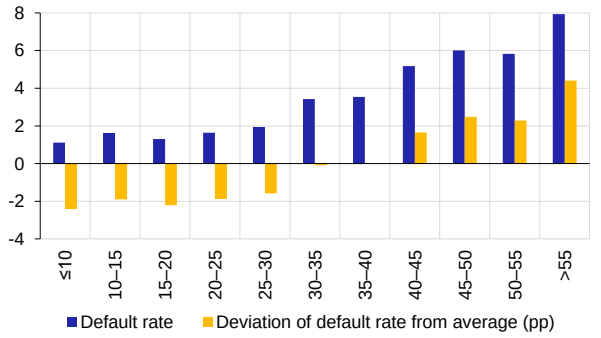
(%)



Note: The 12-month default rate is a forward-looking indicator defined as the flow of non-performing loans in the next 12 months divided by the total stock of performing loans in the starting period.

Chart IV.15
Default rate at the scenario horizon by DSTI category

(%)



Note: The chart shows the aggregate 36M default rate in the *Baseline Scenario*. The default rate is a forward-looking indicator defined as the flow of non-performing loans in the months ahead divided by the total stock of performing loans in the starting period. Interval closed from the right.

Refixing of interest rates on existing mortgage loans will have little effect on the increase in the default rate…

The high interest rates are gradually being reflected in the total portfolio of mortgage loans provided to households. However, the rate of change in interest rates on the stock of loans provided is still relatively low due to the long-standing preference for long fixed-rate periods. This is evidenced by the average interest rate on the stock of loans to households, which has started to increase only gradually (see Chart II.38). In 2023, refixing is expected on around 11% of existing mortgage loans (CZK 183 billion). According to the household stress test estimates, interest rates on refixed loans will increase by 3–3.5 pp on average in 2023 (see Chart IV.2 CB). This will have an effect on the DSTI ratio for such loans, which, given the amount of principal outstanding, will rise by 10 pp on average (see Chart IV.3 CB). Despite that, the average DSTI ratio will remain relatively low at around 33% and the effect of refixing at higher interest rates will have very little effect on the default rate. This is also evident from a sensitivity analysis, in which, other things being equal, the default rate would only rise significantly if interest rates on mortgage loans increased by 5 pp relative to the *Baseline Scenario* (see Chart IV.16 and Chart IV.4 CB).

92 The stress testing methodology is described on the CNB website (see Stress testing: Household sector).

93 The 12-month default rate is a forward-looking indicator defined as the flow of non-performing loans in the next 12 months divided by the total stock of performing loans in the starting period.

94 *Recommendation on the management of risks associated with the provision of consumer loans secured by residential property.*

…a key variable affecting the default rate is the unemployment rate…

In the *Baseline Scenario*, a gradual increase in the default rate to some extent reflects the rise in the unemployment rate considered in the scenario, where the rate approaches 3% at the end of 2024. According to the sensitivity analysis, a more pessimistic labour market situation than the one considered in the *Baseline Scenario* would worsen the solvency of Czech households, and even a modest rise in the unemployment rate would lead to a larger increase in the default rate. If, hypothetically, the unemployment rate were to increase by 5 pp over and above the *Baseline Scenario*, the default rate would approach 4%, a level last seen in the crisis years of 2008 and 2009 (see Chart IV.16 and Chart IV.4 CB). A rise in the unemployment rate of 10 pp above the level in the *Baseline Scenario* would move the default rate to 7%. It is apparent from the sensitivity analysis that the unemployment rate fundamentally shapes the default rate on mortgage loans.

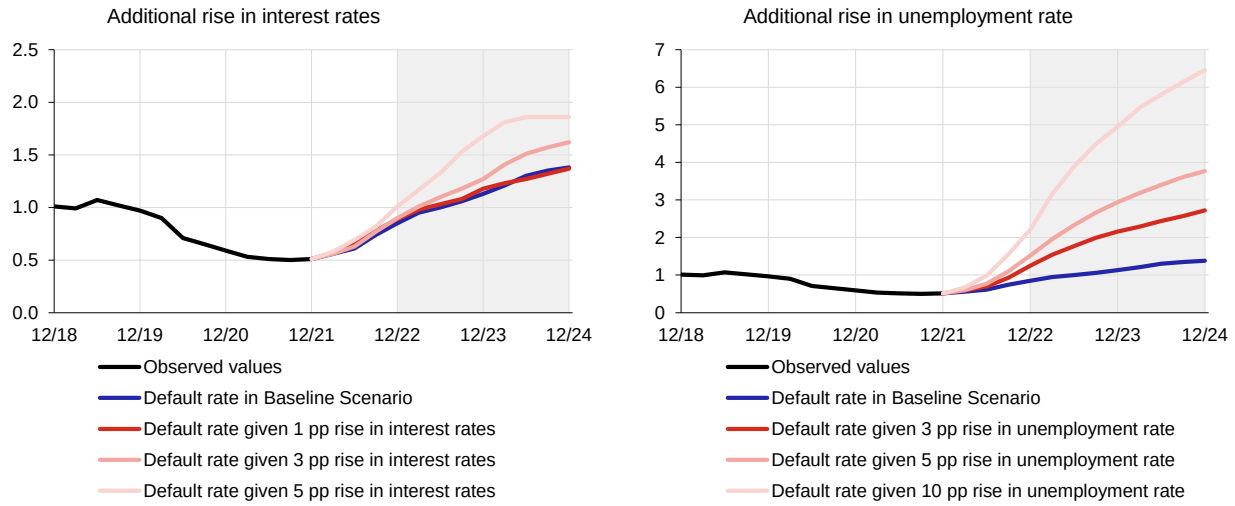
…as confirmed by the results under the *Adverse Scenario*

The materialisation of credit risk would increase markedly in the *Adverse Scenario*. Compared to the *Baseline Scenario,* the 12-month default rate would increase at twice the rate and would exceed 3% at the scenario horizon (see Chart IV.14). Developments on the labour market would contribute substantially to this situation, as the unemployment rate would increase to 7.5% and real wages would be broadly flat in the *Adverse Scenario*.

Chart IV.16

12M default rate on mortgage loans to households given an additional rise in the unemployment rate and interest rates going beyond the *Baseline Scenario*

(%)



Note: The 12-month default rate is a forward-looking indicator defined as the flow of non-performing loans in the next 12 months divided by the total stock of performing loans in the starting period.

IV.5 PUBLIC FINANCE STRESS TEST

The CNB reviews and evaluates the risks of concentration of sovereign exposures

Since 2015, based on its internal methodology,[95] the CNB has been annually reviewing and evaluating the risks of concentration of exposures to sovereign issuers in the balance sheets of credit institutions based in the Czech Republic (hereinafter "banks"). In its *Financial Stability Reports* it informs the market about which sovereign exposures it has identified as systemically important and whether it will require relevant banks to meet an additional capital requirement to cover the risk of concentration of these exposures at a three-year horizon. The methodology defines an important sovereign exposure as an exposure to a sovereign issuer with a minimum ratio of 100% to the bank's eligible capital. It becomes systemic if the assets of banks with important sovereign exposures exceed 5% of the total assets of all the banks operating in the Czech Republic, including branches of foreign banks. It is indicated that an additional capital requirement must be met if the three-year outlook for the sovereign risk indicator (ISR) in the *Adverse Scenario* exceeds one of its thresholds.[96] The CNB requires additional capital where the bank holds exposures in excess of the limit and this above-limit exposure is not already sufficiently covered by capital.[97]

Exposures to Czech general government debt were assessed as systemically important…

The CNB assessed the investments of banks based in the Czech Republic in Czech government bonds as a systemically important sovereign exposure. The value of these exposures in the banks under review rose by CZK 155 billion year on year to CZK 1,150 billion at the end of 2022, accounting for 14.1% of these banks' total assets. The assets of banks with above-limit exposures accounted for 72% of the banking sector's total assets (as against 73% in 2021). Exposures to general governments of other countries, the EU and the EIB were not found to be systemically important.

…the CNB will not set an additional capital requirement for these exposures over a three-year horizon

The sovereign risk indicator (ISR) was estimated for systemically important exposures. Over the three-year horizon of the *Adverse Scenario*, it would peak at 0.52% in 2023. The ISR falls in the remaining years of the stress test – to 0.2% in 2024 and 0.14% in 2025 (see Chart IV.17). The ISR was constantly well below the supervisory thresholds of 5% and 8% over the test period. The CNB will therefore not require banks based in the Czech Republic to meet an additional capital requirement to cover the risk of concentration of exposures to Czech general government in the next three years.

In the *Adverse Scenario* six of the variables determining the ISR would exceed their critical limits…

The *Adverse Scenario* (see section IV.1.1 and Chart IV.1A) expects a significant year-on-year decline in real GDP growth in the first year, followed by a stagnation and increase in the following years. According to the scenario, the difference in year-on-year GDP growth entering the ISR would thus exceed the critical limit and increase the ISR in the first year only (see Chart IV.17). The rise and subsequent stagnation of 10-year government bond yields in the *Adverse Scenario* would lead to an increase in the ISR in the first year only. The difference between the real 10-year GB yield and real GDP growth would foster a rise in the ISR in the second year, which, in the scenario, would see a combination of positive real interest rates and a drop in real GDP (see Table IV.1). The general government structural balance in per cent of GDP would exceed its critical limit over the entire stress test horizon, owing to a significant structural imbalance in general government finances in the base year 2022 (see section II.2.1). In the *Adverse Scenario,* general government debt (in per cent of GDP) would exceed its critical limit in 2025 and would increase by almost 20 pp to 62.5% of GDP given the sharp growth considered in the scenario.

…but several key variables remained below their critical limits over the horizon of the *Adverse Scenario*

The share of non-residents in debt holdings fell below the critical limit again. At the end of 2022, the holdings of non-residents were very slightly below the critical limit at 25.3%, whereas in previous stress tests they had exceeded their critical limit. In a scenario assuming weaker domestic demand, due, for example, to banks' internal limits on sovereign exposures being exceeded (see section II.2.1), and a need to absorb net debt issuance by non-residents, the share of non-residents would again exceed its critical limit of 25.9%, increasing the ISR to 1.04% in 2023. In the event of additional pressure on the risk premium and resulting higher growth in government bond yields than assumed in the *Adverse Scenario*, the ISR would rise to 1.06% in 2024 (the critical limit has already been exceeded in 2023). Variables that reflect the potential liquidity risk of general government debt financing, i.e. the share of short-term debt, are important for the ISR. These variables remained below their critical limits over the entire *Adverse Scenario* horizon. For the critical limits to be exceeded, all future general government debt issuance would have to be moved solely to maturities of up to one year over

95 *Internal CNB methodology for the review and evaluation of sovereign exposure concentration risk*.

96 The CNB primarily monitors two ISR thresholds: a soft threshold of 5% indicating the creation of an additional capital requirement where an additional expert analysis proves this to be necessary, and a hard threshold of 8% indicating unconditional creation of an additional capital requirement.

97 The above-limit part of a sovereign exposure is determined using the ISR where the latter exceeds its thresholds. The ISR provides a simplified assessment of the risk of default on a sovereign exposure. The threshold separating the limit and above-limit parts of a sovereign exposure gradually falls as this indicator increases. As a result, the above-limit part rises. The highest effective limit is 222% and the lowest is 0%.

the entire three-year horizon. These limits were exceeded because of the Czech Republic's initial refinancing and liquidity position, which features a low volume of short-term debt and a stable average debt maturity (see section II.2.1). The high-weight variables of the current account balance reaching their critical limits would also lead to a marked rise in the ISR (see Chart IV.18). However, the current account deficit remained below the critical limit over the three-year horizon of the *Adverse Scenario*.

Table IV.5
Czech public finance stress test (in pp)

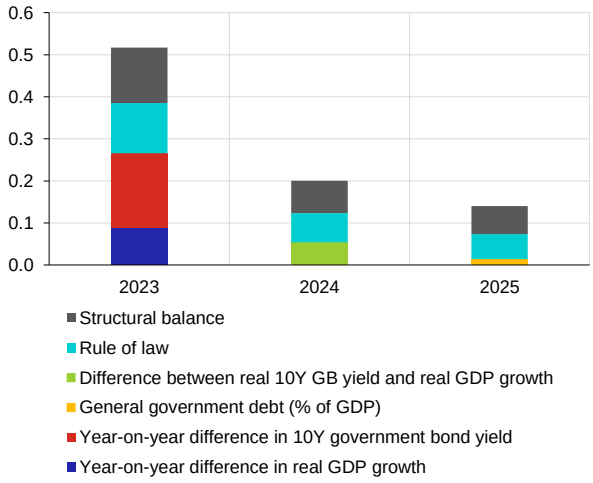
	Actual value	*Adverse Scenario*				Critical limit
	2022	2023	2024	2025		
Macroeconomic variables						
Year-on-year difference in real GDP growth (pp)	-1.0	-7.4	-0.7	7.9	<	-1.0
Current account balance (% of GDP)	-6.1	-0.5	0.2	0.9	<	-1.4
Gross national savings (% of GDP)*	27.9	27.9	27.9	27.9	<	19.3
External debt (% of GDP)*	65.5	65.5	65.5	65.5	>	113.5
Difference between real 10Y GB yield and real GDP growth (pp)	-13.1	3.0	7.0	-0.1	>	6.4
Fiscal variables						
General government debt (% of GDP)	43.0	48.7	57.7	62.5	>	61.4
Structural balance (% of GDP)	-4.0	-5.2	-5.3	-6.5	<	-3.1
Year-on-year difference in 10Y government bond yield (pp)	2.2	1.3	-0.1	0.1	>	0.5
Government debt maturing within one year (% of GDP)	3.3	3.2	5.2	5.6	>	15.1
Share of government debt maturing within one year (%)	7.7	6.6	9.1	8.9	>	33.2
Share of foreign currency debt (%)	11.1	3.9	2.8	2.3	>	29.0
Share of non-residents in debt holdings (%)*	25.3	25.3	25.3	25.3	>	25.9
Institutional variables						
Government effectiveness (WGI score)*	1.1	1.1	1.1	1.1	<	0.1
Political stability (WGI score)*	1.0	1.0	1.0	1.0	<	0.8
Rule of law (WGI score)*	1.1	1.1	1.1	1.1	<	1.2
Banking crisis	No	No	No	No	=	Yes
Past sovereign defaults	No	No	No	No	=	Yes
Sovereign risk indicator (ISR, %)	**-**	**0.52**	**0.20**	**0.14**		

Source: CNB, CZSO, ECB, World Bank

Note: The symbol > (< or =) denotes that a higher (lower or equal) value means a breach of the critical limit and indication of increased risk. The figures are rounded. Indications of a breach of the critical limit are based on unrounded figures. Where the limit is breached, the relevant variables are further indicated in red. * Variable not modelled; last known value assumed in projection. The *Adverse Scenario* was prepared before the general government debt and deficit notification for 2022. For this reason the actual debt and deficit values correspond to the initial values in the *Adverse Scenario* and not to those notified by the CZSO.

Chart IV.17
Decomposition of the sovereign risk indicator in the *Adverse Scenario*

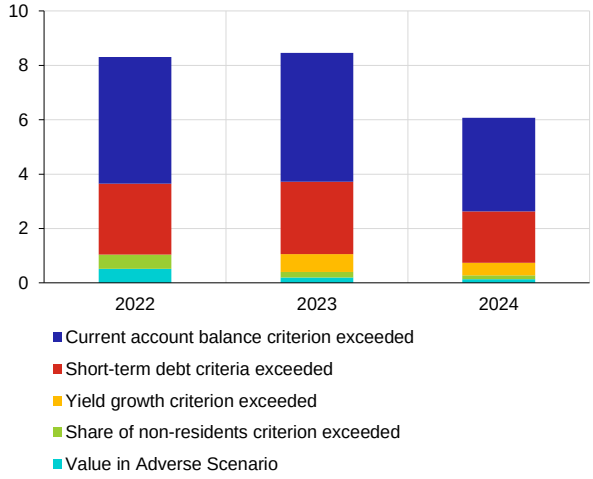
(%)



Source: CNB, World Bank

Chart IV.18
ISR sensitivity analysis

(%)



V. MACROPRUDENTIAL POLICY

Pursuant to Article 2 of the Act on the CNB, the CNB maintains financial stability and sees to the sound operation of the financial system in the Czech Republic.[98] In conformity with an ESRB recommendation, it focuses on the fulfilment of intermediate objectives (see Table V.1 CB) reflecting the existence of various sources of systemic risk and their own transmission mechanisms. To achieve these objectives, it conducts macroprudential policy. To this end, it uses a set of macroprudential instruments focused mainly on the banking sector, which is the largest sector in the domestic financial system. This section of the Report evaluates the current position of the Czech economy in the financial cycle, the resilience of the domestic financial sector to the risks identified, and the tasks and recommendations arising from analyses for the settings of the CNB's macroprudential policy instruments.

V.1 THE CNB'S MACROPRUDENTIAL POLICY INSTRUMENTS

Capital buffers and upper limits on credit ratios are the macroprudential instruments used by the CNB

Capital buffers are among the most important macroprudential instruments in the CNB's regulatory framework. As of June 2023, three capital buffer rates were being applied (see Table V.1) to strengthen the resilience of the domestic banking sector to potential shocks related to the systemic importance of domestic banks (see section V.2) or the persisting economic and geopolitical uncertainty (see section II.1). The sum of the capital buffers (the combined capital buffer) ranges between 4.75% and 7.25% as of July 2023 (see Table V.1).[99] The capital buffer rates reflect the extent and expected evolution of structural risks (see section V.2) and cyclical risks (see section V.3) primarily faced by the domestic banking sector. To mitigate systemic risks arising from the housing market, the CNB uses, among other instruments, upper limits on the LTV, DTI and DSTI credit ratios. As of 1 July 2023, such limits are set by the CNB for the LTV and DTI ratios (see section V.4).

Table V.1
Summary of macroprudential instruments currently activated in the Czech Republic
(%; as of July 2023)

Instrument	Rate	Date of effect
Capital conservation buffer (CCoB)	2.50	2014
Countercyclical capital buffer (CCyB)	2.25	1 July 2023
Buffer for other systemically important institutions (O-SIIs)	0.5–2.50	1 October 2021
LTV upper limit	80% (90%)	1 April 2022
DTI upper limit	8.5 (9.5) times	1 April 2022

When configuring its macroprudential instruments, the CNB takes into account their interaction

The CNB chooses macroprudential policy instruments that complement and reinforce each other. Upper limits on credit ratios are set to enhance the resilience of the banking sector by preventing the provision of housing loans with overly risky characteristics to a systemically undesirable extent, whereas capital buffers are applied to make the banking sector more resilient to risks associated with potential adverse economic developments. The CCyB and SRB can complement each other. While the CCyB has a broad effect enhancing the banking sector's resilience to cyclical systemic risk across loan portfolios, the SRB can be targeted at specific risks if necessary. Some macroprudential instruments can have similar effects as regards their purpose – for example a sectoral SRB on the housing loan portfolio or minimum risk weights under Article 458 CRR. The CNB has long focused on the interaction of macroprudential instruments in order to prevent them from being ineffective due to adverse side effects.

The CNB also monitors overlaps between parallel capital requirements…

Under the current regulations, banks may use capital from the combined capital buffer to meet the leverage ratio requirement and, in certain circumstances, to meet the MREL (the "parallel capital requirements"). If capital buffers are released, however, banks may only use the part which is not bound by the parallel capital requirements to absorb losses

98 The macroprudential instruments used to mitigate specific systemic risks are described in the CNB's *Macroprudential Policy Strategy*.

99 The estimated credit potential of the capital buffers was CZK 2.6 trillion at the end of 2022. The credit potential depends not only on the capital buffer rates and on lending activity in individual sectors, but also on the risk weights. If risk weights increase, the credit potential of the buffers decreases (see section III.2 for details on the risks of a change in trend in risk weights).

or cover the risks of new lending. In the opposite case, they would fail to comply with these requirements.[100] The overlaps between the capital buffers and the parallel capital requirements amounted to CZK 16 billion (or 11% of the combined capital buffer) at the end of 2022 (see Chart V.1). The overlaps between the parallel capital requirements have not yet reached the level where they systemically limit the effectiveness of macroprudential policy capital instruments.

…for some institutions, the overlaps could limit the usability of capital buffers to cover losses

The overlaps between the parallel capital requirements concerned six institutions at the end of 2022. These institutions recorded lower usability of capital buffers for covering losses due to their overlap with the leverage ratio requirement (see Chart V.2). The usability of the CCyB was also fully limited for three of them. The CNB will monitor the overlaps on an ongoing basis and, where necessary, respond with microprudential or macroprudential supervisory actions or resolution measures to ensure that the effectiveness of the capital buffers is not systemically weakened.

Chart V.1
Usability of the combined capital buffer at the sectoral level
(CZK billions; right-hand scale: % of CBR)

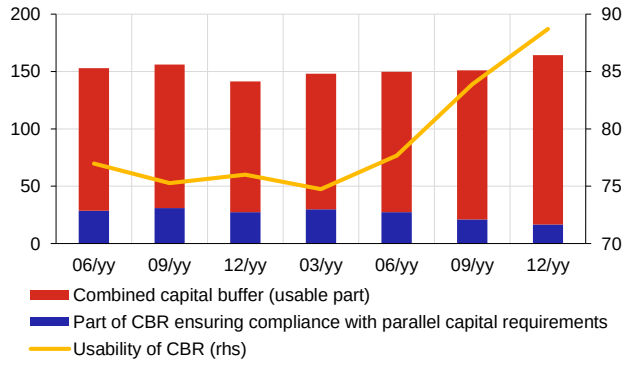
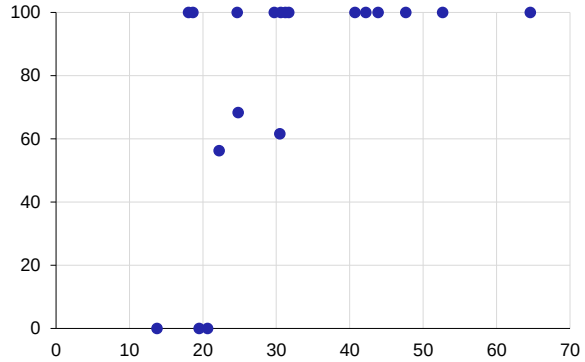


Chart V.2
Usability of the combined capital buffer for individual institutions
(%; x-axis: aggregate risk weight in %)



A debate about systemic risk in non-bank financial institutions is gaining momentum in EU countries

The rising importance of non-bank financial institution (NBFIs) in recent years has prompted supervisory and macroprudential authorities also to focus on systemic risks outside the banking sector. In response, efforts to achieve greater standardisation are visible at the European level – both for risk monitoring and assessment and for the potential introduction of macroprudential instruments for NBFIs. In 2022, some European countries reacted to elevated systemic risk in the alternative investment fund sector by introducing macroprudential instruments limiting maturity mismatch between assets and liabilities and risks arising from the excessive use of leverage (see Box 3 for details).

BOX 3: Macroprudential instruments for mitigating risks in non-bank financial institutions

The total assets of non-bank financial institutions[101] (NBFIs) in the euro area have almost doubled since the Global Financial Crisis (see Chart 1), mainly as a result of buoyant growth in investment fund assets, reflecting households' increasing investment in unit certificates.[102] The sector's potential contribution to risks to financial stability is also naturally increasing as it grows in importance. The sector may contribute to these risks above all through significant maturity mismatch between assets and liabilities and a high share of debt financing (leverage). This box describes these risks in more detail and lists the financial instruments introduced to mitigate them in selected countries' investment fund sectors in 2022.

The systemic risk associated with maturity mismatches usually materialises at times of high market uncertainty, when clients sensitive to swings in the value of their funds want to avoid further potential falls in the value of their investments.

100 For details on the overlap between capital buffers and the leverage ratio requirement see Pfeifer, L. (2020): *Usability of Capital Buffers under a Binding Leverage Ratio Requirement*, CNB, Thematic Article on Financial Stability 6/2020, and for details on the overlap between capital buffers and the MREL see Pfeifer, L. and Holub, L. (2022) *The Relationship Between the MREL and Macroprudential Capital Buffers*, CNB, Thematic Article on Financial Stability 2/2022.

101 Non-bank financial institutions mainly comprise investment funds, pension funds, insurance companies and non-bank financial corporations engaged in lending.

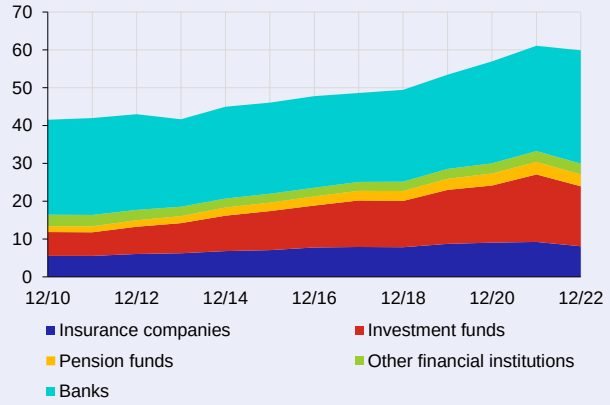
102 NBFIs' interconnectedness with the real economy increased at the same time: their share in total loans to non-financial corporations rose from 11% to 20% and their share in the funding of corporate bonds from 10% to 19%.

The institutions concerned often have to resort to fire sales of assets to meet the higher demand for settlement within the specified deadline. In some cases, the market liquidity of the assets needed to pay clients is so limited that the assets can only be sold rapidly at a significantly reduced price. The drop in prices in turn fosters further exits of clients and also causes all financial institutions holding the assets to incur losses. The risk of fire sales and amplification of adverse shocks in an environment of elevated market volatility increases in a situation where a large proportion of institutions use excessive leverage. The risk can be particularly serious if the above combination of risks in NBFIs' balance sheets (most often in the case of real estate funds) is accompanied by stricter margin and haircut requirements applying to assets used as collateral.

Chart 1 (BOX 3)

Financial sector assets in the euro area

(EUR trillions)



Source: ECB.

Note: Data as of 31 December 2022 are not available for banks and other financial institutions, so the latest values as of 30 September 2022 were used.

If systemic risks increase significantly, they must be reduced using the available macroprudential instruments. In 2022, two European countries identified elevated risks in their investment fund sectors and responded by activating instruments. The Irish central bank reacted to the high debt of alternative investment property funds. Of the funds analysed, 22% were using leverage on a substantial basis[103] and their median leverage ratio was 677%. This was well above the average for the EU, where only 5% of funds were employing leverage on a substantial basis and their average median leverage ratio was 433%. The reasons for the response also included the high share of Irish alternative investment funds on the commercial property market (roughly 35% of property investment in Ireland takes place through these funds). To mitigate systemic risk, the Irish central bank with effect from 2027 introduced a limit of 250% to the leverage ratio for funds which have at least 50% of their physical investments on Irish territory (i.e. the maximum ratio of a fund's total debt to its total assets is 60%). Besides limiting the leverage ratio, it introduced a measure to limit maturity mismatch between assets and liabilities in property funds. Irish alternative property funds are required to extend the upper limit for settlement periods to at least 12 months, which better matches the liquidity profile of their assets. Austria also decided to limit liquidity mismatch between investment fund assets and liabilities. With effect from 2027, the Austrian law on property funds stipulates a minimum investment period of 12 months. After this period expires, settlement can be made within a timeframe of 12 months.

Long-running growth in the share of NBFIs in total financial sector assets (currently about 22%) can also be observed in the Czech Republic. As in the EU, investment funds are showing the fastest growth (see Chart III.1). The CNB performs detailed analyses of the individual NBFI segments and their mutual links, conducts stress tests of them (see section IV.2) and regularly reports the results (see section III.3). According to the current results, no NBFI segment is a source of systemic risks to financial stability in the Czech Republic. However, given the rising systemic importance of alternative investment funds, the CNB will continue to carefully assess their potential systemic risks and monitor the activities of foreign authorities in the application of macroprudential instruments in this segment.

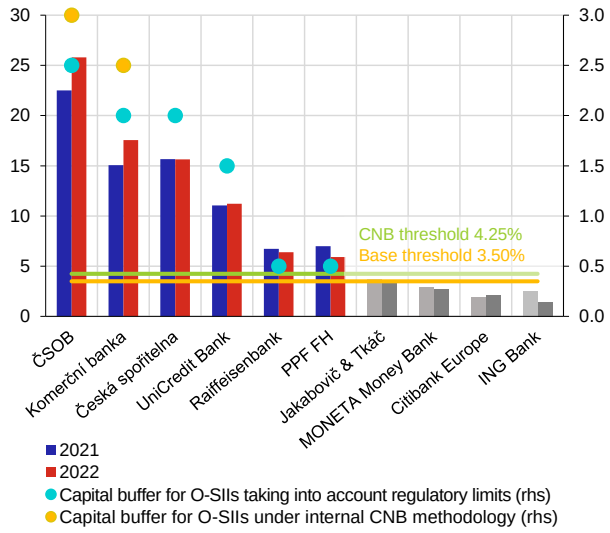
103 Pursuant to Article 111 of Commission Delegated Regulation (EU) No 231/2013, leverage is considered to be employed on a substantial basis when the exposure of a fund as calculated according to the commitment method exceeds three times its net asset value.

V.2 STRUCTURAL CAPITAL BUFFERS

Risks associated with the systemic importance of institutions are mitigated by the O-SII buffer

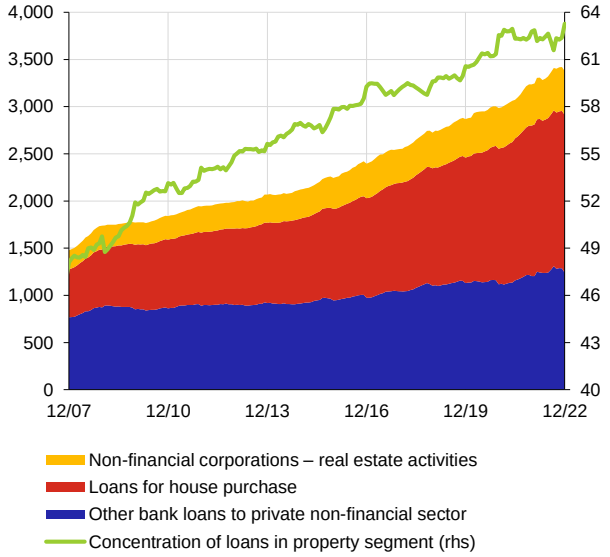
Based on a review conducted in September 2022, six banking groups designated as other systemically important institutions (O-SIIs) are active in the domestic financial sector in 2023.[104] The total assets of these institutions accounted for 80% of the domestic banking sector at the end of 2022. For this reason in particular, the resilience of these institutions is of crucial for financial stability. The CNB has set O-SII buffer rates ranging between 0.5% and 2.5% for these institutions depending on their systemic importance (see Chart V.3).[105] The buffer rates of two institutions are lower than their systemic importance scores would imply due to the regulatory cap on the rate for subsidiaries (see Chart V.3).[106] This limitation partly violates the level playing field principle in the Czech Republic and implies potential volatility should their home macroprudential authorities change the settings of this buffer.[107]

Chart V.3
Systemic importance scores and O-SII buffers
(score in %; right-hand scale: rate in %)



Note: Grey denotes institutions not included in the list of other systemically important institutions for 2023.

Chart V.4
Concentration of bank loans in the property segment
(CZK billions; right-hand scale: %)



The concentration of the portfolio of property financing loans remains elevated…

Structural systemic risks have the potential to amplify adverse economic shocks and thus exacerbate the materialisation of cyclical risk during periods of adverse economic developments. In the domestic banking sector, these risks include long-running growth in the concentration of property financing loans. The share of property exposures in loans to the private non-financial sector stood at 63.3% at the end of 2022 and has risen by 4.2 pp over the past five years. Loans for house purchase accounted for 49.5%, having increased by 4.5 pp in the same period. Given the substantial decrease in growth in new loans for house purchase in 2022, however, the concentration trend halted. Projections of these loans (see Chart II.37) suggest that the situation will remain unchanged in the short term (see section II.2.2).

…the current tight financial conditions are significantly limiting any further accumulation of these risks

The risks associated with the concentration of property financing loans are being significantly reduced by relatively high interest rates, the set upper limit on the LTV ratio (see section V.4), projected very low demand for loans for house purchase (see Chart II.37), record-low volumes of new loans for commercial property (see section V.4.2) and subdued demand for loans from non-financial corporations (see Chart II.40 and Chart V.2 CB) over the horizon of the CNB's spring forecast, and, last but not least, by the applicable CCyB rate (see section V.3).

104 For details see the CNB website: https://www.cnb.cz/en/financial-stability/macroprudential-policy/list-of-other-systemically-important-institutions/.

105 To calibrate the O-SII buffer, the CNB applies the bucketing approach. See Pfeifer, L. (2021). *The CNB's Approach to Setting the Capital Buffer for Other Systemically Important Institutions: Past and Present*, CNB, Thematic Article on Financial Stability 2/2021.

106 The O-SII buffer cap is 3%. In the case of domestic institutions that are subsidiaries of foreign institutions identified by their domestic supervisors as O-SIIs or G-SIIs, the cap on the O-SII buffer rate cannot be more than 1 pp above the parent institution's O-SII or G-SII buffer rate. Five of the six domestic O-SIIs are subsidiaries of foreign institutions identified by their domestic regulators as O-SIIs or G-SIIs and may thus be subject to the specific cap on the buffer rate for subsidiaries.

107 The CNB has long opposed this regulation. For details see the CNB's response to the *Targeted Consultation on Improving the EU's Macroprudential Framework for the Banking Sector.*

The capital intensity of the key housing loan portfolio continues to decrease…
The implicit risk weights on the housing loan portfolio derived from domestic banks' internal models reached record lows at the end of 2022 (having dropped by 5.7 pp to 17.3% over the past five years) and may not fully reflect the macroprudential systemic risks associated with the relevant portfolio in the current economic conditions (see section III.2).

…but the results of the *Adverse Scenario* of the stress test of banks do not indicate a need to set a SRB rate
Should the *Adverse Scenario* of the solvency macro stress test materialise (see section IV.1), average quarterly provisioning for the housing loan portfolio would total around CZK 2.6 billion, while net interest income on housing loans would be around CZK 4.4 billion. Therefore, in the test, total new provisions would not exceed the income on this portfolio and result in a loss which, coupled with a steady rise in risk weights, could weaken the banking sector's capital position. It thus does not seem necessary for now to use a sectoral buffer to cover systemic risk in the case of housing loans.

The risk of foreign currency loans was not identified as systemically important…
In the case of foreign currency loans, traditional credit risk may be connected with the borrower's exchange rate risk (where there are cash-flow currency mismatches and no other financial instruments are used for hedging). The results of an additional sensitivity analysis conducted by the CNB (see Box 5 in *FSR – Autumn 2022*) using data on loans to non-financial corporations available as of the end of April 2023 show that the hypothetical additional loss given default on foreign currency loans would be around CZK 10 billion in the scenario featuring the strongest shock involving a simultaneous 30% depreciation of the koruna and 30% decrease in the recovery rate.[108] Even though the estimate is somewhat simplified, this figure should not represent an important systemic risk taking into account, among other things, the total amount of capital buffers (see Chart III.2). The cyclical component of the risk associated with foreign currency lending is considered in the CCyB rate-setting process (see section V.3).

…but will continue to be monitored above all with regard to unhedged loans
Although the foreign currency loan portfolio currently does not represent a systemic risk, it could increase in certain highly adverse circumstances (such as a decline in the availability, or a sharp rise in the price, of foreign currency funding;[109] see section III.2.3). Based on the results of a supervisory survey, the CNB has already taken steps to ensure greater stability of the foreign currency loan portfolio in the domestic banking sector, especially as regards the quality of foreign currency loan risk management systems, and will continue to do so.[110] A potential risk to financial stability could arise if large amounts of unhedged foreign currency loans were provided.[111] According to the CNB's supervisory survey, such loans accounted for about 2% of the banking sector's total foreign currency loan exposure at the end of September 2022. Unhedged foreign currency loan exposures made up around EUR 750 million of the total of EUR 32.2 billion of euro-denominated loans. The share of unhedged foreign currency loans was therefore negligible. According to the CNB survey, banks also usually mitigate the risk associated with unhedged foreign currency loans by setting stricter parameters than for koruna loans. For example, they test applicants for foreign currency loans for undervaluation of their foreign currency income and require a higher debt service coverage ratio. They also assess the client's ability to repay the foreign currency loan in the event of adverse exchange rate developments.

Systemic cyber risk remains insignificant but may have the potential to increase
Cyber risk can be considered a potential source of systemic risk of a structural nature, partly because of an increase in cyber fraud in 2022. The potential financial impacts of a systemic cyber incident could run to CZK 21.3 billion in the Czech banking sector as of December 2022 (a year-on-year rise of CZK 1.3 billion; for details see Box 3 in *FSR – Spring 2022*). The capital requirement for operational risk was CZK 30 billion. Financial institutions are reacting by creating information campaigns alerting the public to current threats and by further enhancing their cyber resilience, with an emphasis on electronic customer service technologies.

108 There was an increase of just 3% compared with the autumn 2022 data, due mainly to a lower probability of default and loss given default.

109 The short-term euro liquidity and euro funding of domestic banks are ensured mainly via parent companies.

110 The four largest institutions accounted for 80% of foreign currency loan exposures to non-financial corporations. This represents a concentration risk, but it also reduces the number of institutions requiring increased attention.

111 Unhedged borrowers are borrowers without a sufficient natural or financial hedge.

The European Systemic Risk Board is also reacting to cyber risk

In February 2023, the ESRB issued a report[112] taking on board the DORA Regulation[113] in the testing of individual institutions' resilience. In the report, the ESRB focuses on three key cyber risk areas and their mitigation. First, the ESRB encourages competent national authorities to test cyber risk.[114] It will monitor the progress made in this area and act as a hub for exchanging information and sharing good practice. On this basis, it will prepare a review of the stress testing framework for this area. Second, the ESRB recommends the use of thresholds for determining the systemic importance of cyber risk (SITOs[115]) and will propose appropriate SITOs at the EU level in its next steps. Third, the ESRB is assessing the usability of existing instruments (including macroprudential ones) for cyber risk management. In this respect, it is focusing mainly on capital buffers, deposit insurance, recovery and resolution frameworks, moratoria and liquidity provision by central banks. The speed at which the available instruments can be applied to curb the spread of a cyber attack and its impacts is crucial from the macroprudential perspective. Another key aspect is effective coordination and communication among competent authorities across the EU. To this end, the ESRB issued a recommendation in 2021 proposing the establishment of a pan-European cyber crisis management framework.[116]

BOX 4: Structural risks in the banking sector and how macroprudential policy can respond to them

The definition and list of structural risks are not entirely settled and differ slightly depending on the source used.[117] However, there is a consensus that a general feature of structural risks is their potential to amplify adverse economic shocks, exacerbate the materialisation of cyclical risk and deepen economic downturns. Structural risks can mutually reinforce themselves, create clusters and thereby increase the potential for serious disruption to the financial system with undesirable consequences for the real economy.

An international comparison of structural risk indicators among 30 OECD countries indicates that the domestic banking sector faces a potentially elevated risk of high concentration of property financing loans, high concentration of sovereign exposures in banks' balance sheets, high and persisting dependence of the domestic economy on foreign trade, and relatively significant shares of foreign currency loans to non-financial corporations and foreign ownership in the domestic banking sector.

The systemic risk buffer (SRB) can be used to increase the domestic banking sector's resilience to manifestations of structural risk. Some countries apply both a general SRB and, after transposing CRD V, a sectoral SRB (see Chart 1). The reasons for introducing a general buffer are very diverse: the risk to a small open economy exposed to external shocks and the risk of exposure concentration are most often mentioned. The sectoral SRB is used primarily to mitigate risks associated with the portfolio of housing loans secured by residential property. One country that mitigates housing loan portfolio risks is Belgium, which introduced a sectoral SRB after transposing CRD V. This buffer replaced the previously applied Article 458 CRR, which had been used to set minimum risk weights for these loans.

An upper limit on the SRB rate is applied at the discretion of the home macroprudential authority. The ceiling on the sum of the O-SII and SRB structural capital buffers is 5% of risk-weighted exposures.[118] The buffer rates are summed in absolute terms, not as the weighted average of the entire portfolio.[119] In the case of the domestic banking sector, this regulatory limit indicates (given the O-SII buffer rate) a maximum SRB rate of about 2.5% of risk-weighted exposures. In the current situation, this would correspond to a general SRB of around CZK 70 billion or a sectoral SRB of roughly CZK 6.6 billion focused, for example, on the housing loan portfolios of banks applying the IRB approach (see Table 1).

112 *Advancing Macroprudential Tools for Cyber Resilience*, ESRB 2023.

113 Regulation (EU) 2022/2554 of the European Parliament and of the Council of 14 December 2022 on digital operational resilience for the financial sector.

114 See *Mitigating Systemic Cyber Risk*, ESRB 2022.

115 Systemic impact tolerance objectives. It is not possible to accurately identify the point at which a cyber incident becomes a systemically important cyber risk. It is therefore necessary to specify for each key economic function a maximum cumulative threshold at which an incident turns into a systemic event.

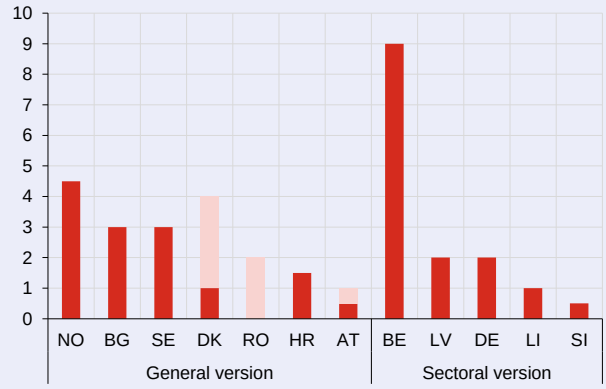
116 *ESRB Recommendation on a pan-European systemic cyber incident coordination framework for relevant authorities*.

117 Hodula, M., Janků, J., Pfeifer, L. (2022). *The Effect of Structural Risks on Financial Downturns*. ESRB Working Paper Series No 138/September 2022.

118 When the sum of the structural buffer rates (O-SII and SRB) exceeds 5%, the rate settings are subject to authorisation by the European Commission.

119 In the "macroprudential review" (*Targeted Consultation on Improving the EU's Macroprudential Framework for the Banking Sector*), the CNB signalled that the ceiling needed to be revised so that it applies to 5% of total risk-weighted exposures. The ESRB's input to the consultation (*Review of the EU Macroprudential Framework for the Banking Sector*) also favours this approach.

Chart 1 (BOX 4)
General and sectoral SRB rates in selected European countries
(% of risk-weighted exposure)



Source: ESRB
Note: Dark colour indicates a fixed SRB rate applicable to all institutions in the given country. Light colour indicates that the SRB rate varies within the given range depending on the level of systemic risk.

The application of a sectoral SRB has its benefits and its limitations. The benefits certainly include the possibility of targeting a specific type of systemic risk. However, some limitations of a sectoral SRB may arise when the risk weights of the underlying portfolio reach a certain level. In such case, the sectoral SRB may need to be calibrated at a relatively high level to achieve a sufficient increase in the capital buffers – above 2.5% of risk-weighted exposures in the case of the domestic banking sector. Such a high rate is subject to authorisation by the European Commission and the macroprudential authority thus faces a lengthier process. For example, to mitigate risks associated with housing loan portfolios in the Czech Republic, it might be more effective to apply Article 458 CRR, which sets minimum risk weights for this portfolio (see Table 1). The additional capital requirement due to the setting of minimum risk weights is higher for banks applying lower risk weights, which do not have to take macroprudential risks additionally into account. Moreover, if a sectoral SRB were used, the SRB rate would have to be recalibrated every time the risk weights change.

Table 1 (BOX 4)
Comparison of additional capital requirements under Article 458 CRR and under a general/sectoral SRB

Minimum risk weights under Article 458 (IRB housing loans)	Additional capital requirement	General SRB of 2.5%	Sectoral SRB of 2.5% (IRB housing loans)
20%	CZK 6.6 billion	around CZK 70 billion	around CZK 6.6 billion
22.5%	CZK 12.7 billion		
25%	CZK 18.8 billion		

Note: The additional capital requirement is calculated using the end-2022 figures. IRB housing loans comprise the housing loan portfolios of banks applying the IRB approach.

The CNB regularly assesses the structural risks of the domestic banking sector and is gradually refining its methodologies for identifying those risks and calibrating the SRB and other instruments that can potentially be used to mitigate structural risks having the potential to amplify adverse economic shocks.

V.3 THE COUNTERCYCLICAL CAPITAL BUFFER

The CNB has been setting the countercyclical capital buffer (CCyB) since 2014 with the aim of limiting the negative impacts of the financial cycle on the banking sector and thus preventing the transmission of adverse financial shocks to the real economy. Given the wide range of manifestations of the financial cycle in the real economy and the financial sector, the CNB sets the CCyB rate on the basis of a comprehensive assessment of a set of macrofinancial and banking sector-specific indicators. The CNB regards as appropriate a CCyB rate that is sufficient to cover the potential losses stemming from the materialisation of cyclical risks while maintaining banks' capital capacity for lending at a sufficient level.[120]

The CNB is lowering the CCyB rate to 2.25%

The CNB Bank Board decided at its meeting on 1 June 2023 to lower the CCyB rate to 2.25% (see Chart V.5). Banks and credit unions will be required to apply this rate from 1 July 2023. Given the expected evolution of the financial cycle in the coming quarters and the related expected persisting decline in cyclical risks newly accepted into the domestic banking sector's balance sheets, the CCyB rate is highly unlikely to be increased further for at least 12 months.

In adopting this decision, the Bank Board took into account indicators and analyses assessing the position of the Czech economy in the financial cycle and the degree of vulnerability of the banking sector. The Bank Board agreed that the size of new cyclical risks accepted into the banking sector's balance sheet is falling and that the cyclical risks accumulated in the banking sector's balance sheet have also started to fade steadily without materialising to any major extent in the form of provisioning for loans. This is consistent with the position of the economy now visibly past the peak of the financial cycle (see Chart V.7). The Bank Board left the new CCyB rate above the levels indicated by quantitative approaches (see Chart V.6) due to the persisting economic and geopolitical uncertainty (see Chart II.3 CB), which is creating potential for sudden and large-scale materialisation of credit risks in the short term. The CNB is ready to lower the CCyB rate further, if the cyclical risks continue to disappear naturally from the banking sector's balance sheets. Should the scenario of a significant deterioration of the economic situation and the occurrence of unexpected credit losses in the domestic banking sector materialise, the CNB is ready to release the CCyB fully in order to cover these losses while ensuring that banks have sufficient capital capacity to lend to the real economy.

Chart V.5
Pending and applicable CCyB rate in the Czech Republic
(% of total risk exposure)

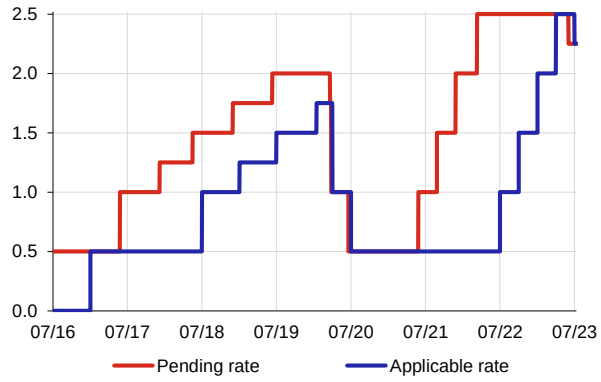
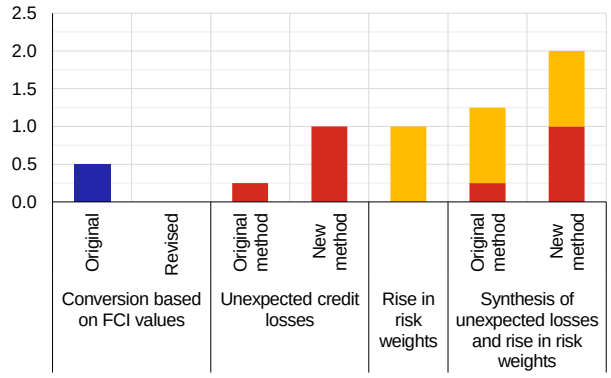


Chart V.6
CCyB rate covering financial cycle effects monitored
(% of total risk exposure)



The decision to lower the rate reflects the evolution of the financial cycle…

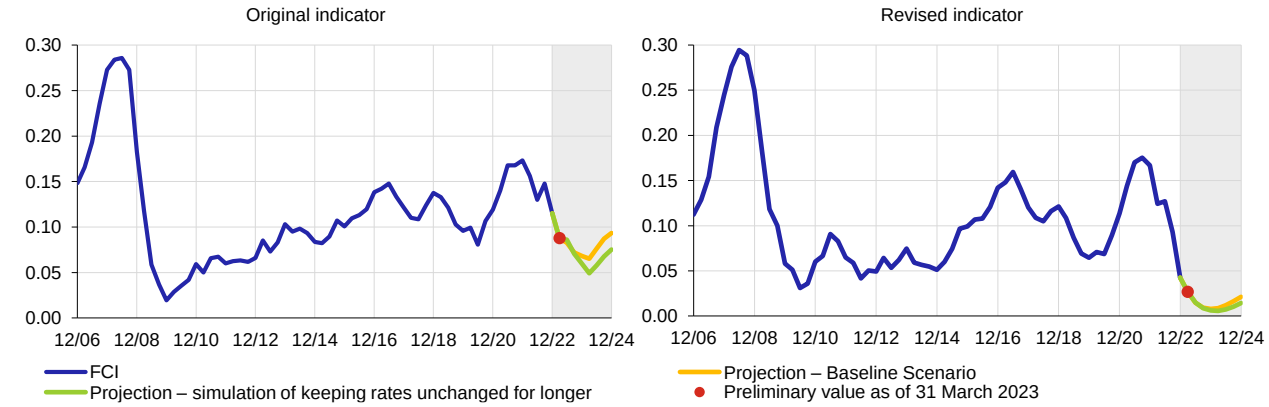
The aggregate financial cycle indicator (FCI) continued to drop in the second half of 2022 (see Chart V.7), implying a clear decline of the economy from the local peak reached at the end of 2021. The drop in the FCI was due primarily to slower growth in newly negotiated loans to households, lower growth in property prices and a fall in the debt levels of households and firms. Only slightly slowing drawdown of bank loans to non-financial corporations[121] and a decrease in the interest rate spread on loans to households slowed the pace of decline in the FCI (see Chart V.1 CB). According to a preliminary

120 For more details on the setting of the CCyB rate in the Czech Republic see: *The CNB's approach to setting the countercyclical capital buffer*. The CNB has revised the methods and the database used to set the CCyB rate. The changes will be published in an official document in the second half of 2023.

121 For newly negotiated and newly drawn loans, the FCI only covers bank loans that accounted for 36% of the total debt of non-financial corporations as of 31 December 2022. The financial cycle hypothetically considered in the broader sense – additionally including corporate bonds, inter-company loans and receivables, and liabilities to the other sectors of the real economy and non-bank financial institutions – could thus evolve differently to some extent. However, the individual components of corporate debt can be expected to correlate positively. Given the use of the FCI to set the CCyB for the banking sector, a narrower financial cycle concept has been adopted.

estimate, this decline continued into 2023 Q1. If the projection consistent with the CNB's spring forecast materialises, the downward trend will not reverse until mid-2024. The same holds in the simulation of keeping interest rates unchanged for longer (MPR – Spring 2023). This indicates that the scale of cyclical risks newly accepted into the domestic banking sector's balance sheets is highly subdued and that these risks are not expected to grow to an extent that would be significant from the financial stability perspective in the coming quarters. According to an indicative conversion of the FCI value (0.11) into the CCyB rate, a CCyB rate of 0.5% is needed to cover the newly accepted risks (see Chart V.6 and Table V.2 CB).

Chart V.7
Financial cycle indicator
(0 minimum, 1 maximum)



Source: CNB, CZSO

Note: In the first two years, the *Baseline Scenario* is consistent with the CNB's spring forecast published in MPR – Spring 2023, which also describes a simulation of keeping interest rates unchanged for longer with anchored inflation expectations.

…the revised indicator also implies a downturn in the financial cycle

The CNB has revised its methodological approach to the calculation of the FCI[120] and now also calculates a revised FCI. The revised FCI differs from the original one in that it contains a revised set of input variables, the choice of which better reflects economic and financial conditions in an environment of higher inflation and also uses newly available data sources. The revised FCI shows a shift of the economy into a more subdued phase of the financial cycle than the original FCI (see Chart V.7). This is mainly because it includes newly negotiated loans to households and newly drawn loans to non-financial corporations relative to gross disposable income and gross operating surplus respectively, instead of the original nominal volume of new loans. This adjusts the FCI for price developments in the economy.[122]

Growth in outstanding loans to the private non-financial sector has been subdued across the main segments since the end of 2022…

Growth in outstanding loans to households for house purchase peaked at the start of 2022 and then started to fall (see Chart V.8). The growth rate of the stock loans to non-financial corporations was highest in August 2022, mainly as a result of the situation on the energy commodities market and the need to finance margins in commodity derivatives The growth rate then started to decrease, too. The growth rate of outstanding loans has thus been falling across the monitored segments since 2022 Q4.[123] If the projection for growth in outstanding loans consistent with the CNB's spring forecast (MPR – Spring 2023) materialises, credit growth will remain subdued in the coming quarters and, in the case of loans to non-financial corporations, the absolute stocks will switch to a temporary decline (see Chart II.37 and Chart II.40).

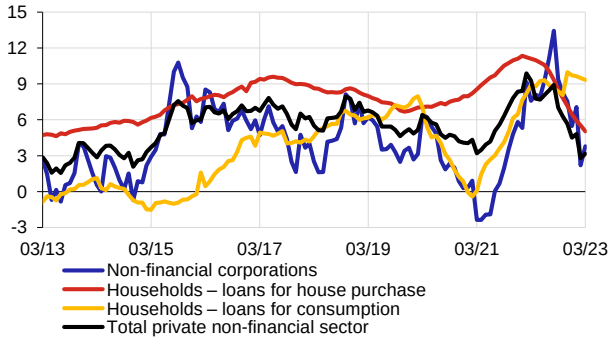
…the lending slowdown was reflected in newly negotiated loans, drawdown of loans and credit standards

The drop in credit growth during 2022 and 2023 Q1 was visible from the perspective of pure newly negotiated koruna loans to households for house purchase (CZK 11.2 billion in March 2023, down 56% year on year; see Chart V.9) and to non-financial corporations (CZK 27.6 billion in March 2023, down 50% year on year). This simultaneously caused an increase in the share of euro funding of non-financial corporations (see Chart V.10). Growth in euro loans to non-financial corporations has also slowed since 2022 Q4. As a result, the share of euro bank loans at both negotiation (CZK 21 billion in March 2023, down 22% year on year; see Chart V.10) and drawdown (see Chart V.2 CB) has also stabilised. A tightening of credit conditions across the monitored segments in 2022 and their subsequent stagnation in 2023 Q1 is consistent with the developments described. Conditions in the consumer credit segment continue to tighten (see Chart V.11).

122 In other words, the revised FCI is not distorted by growth in the nominal value of loans in an environment of elevated inflation. In addition to including new loans, the revised methodology refines the calculation of drawdown of new loans to non-financial corporations and links it to the Anacredit data source. It also includes euro rates in the calculation of the interest rate spread on euro-denominated loans to non-financial corporations.

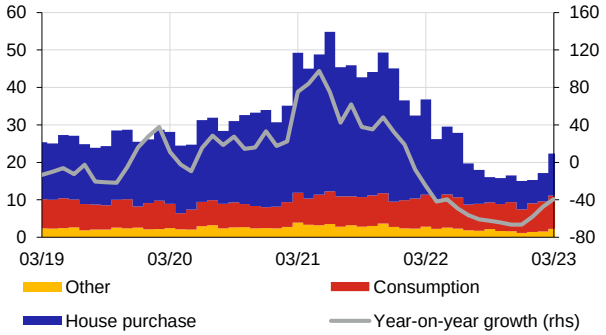
123 The increased growth in outstanding loans to households for consumption in November 2022 was due to technical factors – loan reclassification. Adjusted for this factor, the growth rate in this segment would also have fallen in the second half of 2022.

Chart V.8
Year-on-year growth in outstanding amounts of bank loans to the private non-financial sector
(%)



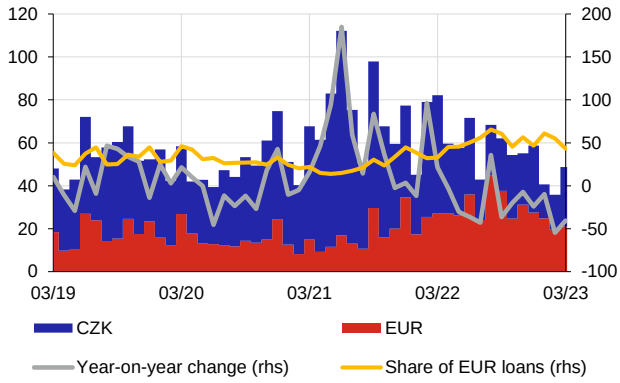
Note: The data are adjusted for the credit portfolio of Sberbank.

Chart V.9
Pure newly negotiated bank loans to households
(monthly volumes in CZK billions; right-hand scale: %)



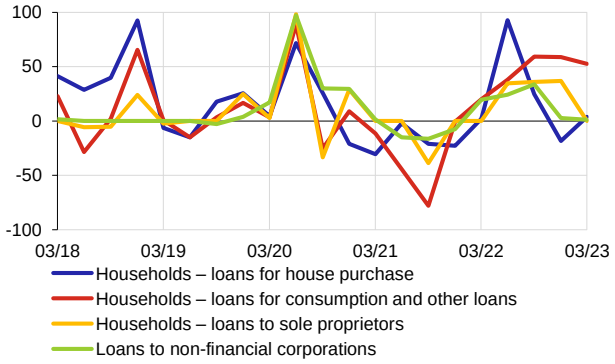
Note: Pure new loans comprise increases in existing loans and are adjusted for refinanced and refixed loans. The figures include signed contracts regardless of drawdown. They do not include revolving loans.

Chart V.10
Pure newly negotiated bank loans to non-financial corporations
(monthly volumes in CZK billions; right-hand scale: %)



Note: Pure new loans comprise increases in existing loans and are adjusted for refinanced and refixed loans. The figures include signed contracts regardless of drawdown. They do not include revolving loans.

Chart V.11
Credit standards in the Czech Republic
(net percentages)



Source: Bank Lending Survey, CNB
Note: The data represent the difference between the market share of banks that reported a tightening of lending standards and banks that reported an easing of lending standards in the past three months. More information on the indicator methodology can be found on the CNB website.

The lowering of the CCyB rate will not have an immediate upward effect on lending activity
Other things being equal, the 0.25 pp CCyB rate cut represents a release of capital of around CZK 7 billion based on data as of 31 December 2022. The credit potential of the released CCyB will hypothetically cover credit activity for the next two years if the ratio in the main credit market segments is maintained. In the *Baseline Scenario*, credit activity is expected to be subdued (see section II, Chart II.37 and Chart II.40). According to an indicative estimate,[124] it would require capital of around CZK 11 billion to cover the risks. Credit growth in the *Baseline Scenario* is slowed mainly by demand for loans due to the interest rate environment and persisting economic uncertainty (see section II). The impact of the CCyB rate cut in terms of supporting banks' capacity to lend to the economy, i.e. the potential expansion of credit supply, will be very limited.

The financial cycle and credit market developments indicate a fall in the pace of accepting new cyclical risks
The drop in the FCI and the decline in growth of loans to the private non-financial sector imply that the pace of accepting new cyclical risks slowed in the second half of 2022 and early 2023. As a result, the estimated unexpected credit losses based on the conditional credit loss distribution decreased further compared to previous assessments to CZK 6.8 billion.[125] This corresponds to a CCyB rate of 0.25% needed to cover the related risks.

A new method for estimating unexpected credit losses makes it possible to quantify accumulated cyclical risks
The method used to date for estimating unexpected credit losses on the basis of their conditional distribution is built on the current pace of accepting cyclical risks and responds quite quickly to downturns in the financial and credit cycle. As the CNB previously stated in its official methodological document,[120] the use of this method is appropriate primarily in the

124 The indicative estimate approximates growth in risk exposures (CZK 65 billion at most over a two-year horizon) based on the risk weights of IRB portfolios as of 31 December 2022 and the total expected growth in outstanding loans in the main segments in the *Baseline Scenario*. The additional capital needed to cover the growth in outstanding loans is then estimated using the initial capital requirement as of 31 December 2022 in relative terms adjusted for the current CCyB rate.

125 This is an estimate of the size of the cumulative credit losses at the two-year horizon.

strongly expansionary phase of the cycle. For prudential reasons, the CNB has long maintained that the CCyB is intended to cover not only the cyclical risks currently being accepted into banks' balance sheets, but also those accumulated in previous periods, which decrease as they materialise or gradually subside. The CNB has therefore decided to use another method to estimate unexpected losses that will capture both the gradual accumulation of risks during the strongly expansionary phase of the financial cycle and their subsequent gradual fade-out in the contraction phase. The new approach is based on estimating the probability distribution of the default rates of non-financial corporations and households. Like the previous approach, it monitors the difference between the credit losses based on default rates in the tail of the estimated distribution and those losses implied by the *Baseline Scenario*. The shape of the distribution is conditional on the previous risk accumulation resulting from the movement of the economy in the financial cycle, the evolution of key macroeconomic variables, and on the default rates at the forecast horizon in the *Baseline Scenario*. The new approach uses a different method to the previous one,[126] includes additional variables and provides a stronger linkage to the projections in the *Baseline Scenario*.

The new method indicates substantial cyclical risks in banks' balance sheets and a need for a CCyB rate of 1%…
Under the new method, unexpected cyclical credit losses total CZK 26.7 billion, corresponding to a CCyB rate of 1%. This estimate is consistent with the banking sector's persisting vulnerability due to still low levels of new non-performing loans (see Chart II.30 CB) and related relatively low provisioning (see section III.2.2, Chart III.9). However, continued elevated geopolitical uncertainty and macroeconomic risks (see Chart II.3 CB) maintain an increased possibility of greater materialisation of accumulated cyclical risks in the near future. This could be reflected, among other things, in sudden growth in non-performing loans and faster and higher provisioning. The relatively high significance of euro financing of non-financial corporations (see Box 5, FSR Autumn 2022) may be an additional source of cyclical credit risks.

…but according to the CNB's assessment, these risks have already started to fade gradually
The previous strong profitability of non-financial corporations (see Chart II.35), the persistently low unemployment (see Chart II.36) and the application of binding upper limits on the LTV, DTI and DSTI ratios during the previous growth phase of the credit and financial cycle (see section V.4) are aiding the gradual disappearance of the cyclical risks accumulated in banks' balance sheets. If the growth of the FCI remains subdued amid calming geopolitical uncertainty, we can expect a further gradual fading of the above risks and a related decrease in the indicated need for the CCyB under the new approach to estimating unexpected cyclical credit losses.

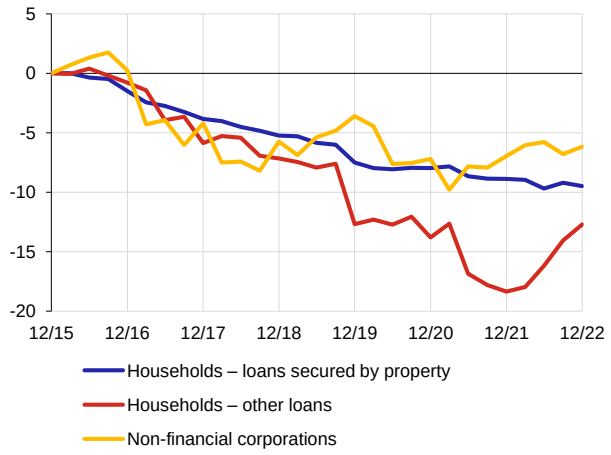
The downward trend in risk weights halted in 2022…
Risk weights on credit portfolios under the IRB approach ("risk weights") are one of the key indicators of the banking sector's vulnerability over the financial cycle. A drop in risk weights reduces the capital requirement in absolute terms. The previous downward trend in the risk weights of the main credit portfolios halted in 2022. The risk weights for loans to households for house purchase stabilised, while the average risk weight on loans to non-financial corporations and loans to households for consumption increased (see Chart IV.12). However, compared with the start of the strongly expansionary phase of the financial cycle which, according to the CNB's analyses, the Czech economy entered at the end of 2015, risk weights in all the main credit portfolios were still considerably lower as of 31 December 2022.

…a cyclical deterioration in risk parameters would lead to growth in risk weights and an increase in the capital requirement in absolute terms
In addition to covering the manifestations of the financial cycle in the real economy (credit losses), the CCyB rate should cover the growth in the absolute capital requirement due to the effects of the financial cycle on risk weights. The CNB derives the buffer rate using cyclically deteriorated risk parameters of the probability of default (PD) and loss given default (LGD), which enter the models used to calculate risk weights. According to the current estimate, growth in risk weights would lead to an increase in the capital requirement in absolute terms of CZK 25 billion (see Chart V.13), which would be covered by a CCyB rate of 1% (see Chart V.6).

Above and beyond quantitative approaches, the new CCyB rate takes into account the persisting risks stemming from macroeconomic and geopolitical conditions
The CNB also regards a prudential approach of gradually reducing the CCyB rate as desirable in light of the assessment of the risks of the CNB's spring macroeconomic forecast as significant and going in both directions (see section II and MPR – Spring 2023). The CNB considers a rate of 2.25% as sufficient to cover unexpected cyclical credit losses and the impact of a cyclical rise in risk weights according to quantitative approaches – using the updated loss estimation model, their current materialisation would be covered by capital of CZK 52 billion, which corresponds to a CCyB rate of 2% (see Chart V.6). As with the shocks seen in previous years (the pandemic and Russia's aggression towards Ukraine), a CCyB rate slightly above the level indicated by quantitative approaches includes an additional buffer taking into account the potential non-standard and difficult-to-model nature of future adverse shocks and the ways in which they support the materialisation of cyclical risks.

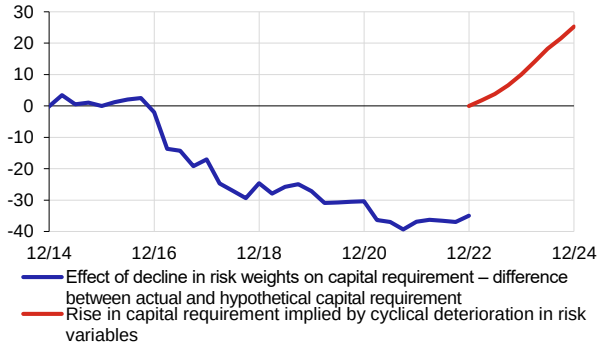
126 The approach is based the quantile regression method as described in Szabo, M. (2022): *Growth-at-Risk: Bayesian Approach*. The individual quantiles of the distribution are modelled and the predicted median of the estimated distribution is linked to the default rates in the *Baseline Scenario*.

Chart V.12
Change in risk weights compared with the start of the strongly expansionary phase of the financial cycle
(pp)



Note: According to the CNB's analyses, the strongly expansionary phase of the financial cycle started in 2015 Q4.

Chart V.13
Effect of a change in risk weights on the capital requirement
(CZK billions)



Note: The chart shows the capital requirement for the following IRB portfolios reported in the given period: retail exposures – non-SME exposures secured by property, and retail exposures – other non-SME and corporate exposures. The actual capital requirement is based on the actually observed risk weights and exposures. The hypothetical capital requirement is calculated on the basis of the risk weights as of the beginning of the expansionary phase of the financial cycle (12/2015) and the actually observed exposures.

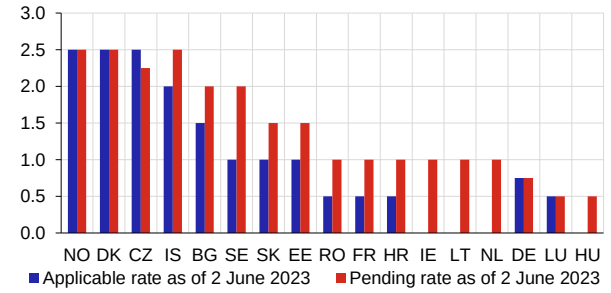
Some EU countries are still in the phase of creating a countercyclical capital buffer

The CNB's timely, forward-looking approach to raising the CCyB rate (see Chart V.5) allows it to lower the rate as cyclical risks decline gradually in the downward phase of the financial cycle, in which the Czech economy currently finds itself. As EU countries are in different phases of the financial cycle and use different methods to set the CCyB rate, many of them have not set a CCyB rate or have changed it at different times than the Czech Republic. Some EU countries only created a CCyB in response to the ESRB Warning[127] regarding increased cyclical risks, even though tightening financial conditions and falling credit growth in these countries were signalling an imminent turn in the financial cycle. Later activation of the tool is thus forcing some of them to raise the rate to a greater extent or from relatively low levels (see Chart V.14).

Deviations of the credit-to-GDP ratio from its trend do not provide a suitable guide to setting the CCyB for the Czech Republic

In accordance with an ESRB recommendation,[128] the CNB should take into account the credit-to-GDP ratio and its deviation from the long-term trend when determining the position in the financial cycle and deciding on the CCyB rate. In 2022 Q4, the ratio was 83.1% and the relevant deviation -8.6 pp. The CNB has long maintained that this approach is not a suitable tool for assessing cyclical risks in the Czech economy and is subject to a range of shortcomings which reduce its reliability.[129] The additional gap (the expansionary credit gap), which uses an alternative approach to determining the long-term trend and partially eliminates the problems associated with the recommended methodology, was 0 pp in 2022 Q4, implying a zero CCyB rate (see Chart V.1 CB). However, this indicator must also be viewed as only a very simplified way of assessing the position in the financial cycle, with very limited direct usefulness as regards deciding on the CCyB rate.

Chart V.14
CCyB rates in selected European countries
(% of total risk exposure)



Source: ESRB

127 *Warning of the ESRB on vulnerabilities in the Union financial system*.
128 European Systemic Risk Board (ESRB, 2014): *Recommendation (ESRB/2014/1) on guidance for setting countercyclical buffer rates*.
129 *The CNB's Approach to Setting the Countercyclical Capital Buffer* (Appendix 1).

V.4 RISKS ASSOCIATED WITH PROPERTY MARKETS

V.4.1 Risks associated with residential property markets

The CNB responds to systemic risks associated with residential property financing by setting upper limits on credit ratios…

The Czech National Bank is authorised to issue a provision of a general nature to set upper limits on one or more credit ratios (LTV, DTI and DSTI) where it identifies systemic risks relating to the provision of consumer loans secured by residential property (for details see section V.4.1).[130] In accordance with the law, the CNB reviews the reasons for setting the upper limits at least once every six months and is empowered to issue a new provision of a general nature or to amend or abolish the provision in force. In the review, it assesses whether a substantial change has occurred in the factors giving rise to systemic risks related to mortgage lending (see Box 5).

…and carefully monitors the quality of the mortgage loan portfolio and compliance with the upper limits

In response to growth in systemic risk associated with the mortgage loan market, the CNB issued a provision of a general nature in December 2021 setting upper limits on the LTV of 80% (90% for applicants under 36 years for purchases of owner-occupied housing), on the DSTI of 45% (50%) and on the DTI of 8.5 (9.5) times net annual income with effect from 1 April 2022.[131] The CNB also sets some additional parameters and requirements limiting the risks associated with mortgage lending in its *Recommendation on the management of risks associated with the provision of consumer loans secured by residential property*[132] (the "Recommendation"). The main source of information for aggregate analyses is the quarterly *Survey of consumer loans secured by residential property* (the "Survey"). In addition to assessing the level of credit risks in banks' balance sheets, the CNB uses data from the Survey to verify compliance with the provision of a general nature and the Recommendation. Regular stress testing of households (see section IV.4) is also used to assess the level of risks associated with the provision of new mortgage loans. The results of the stress test, along with other detailed analyses conducted by the CNB (see sections II–IV), are taken into account in the review of the upper limits on credit ratios.

The mortgage loan market remained subdued…

The relatively tight financial conditions observed since mid-2022 have led to a significant downturn in mortgage lending. The volume of pure new mortgage loans fell from a record high of CZK 368 billion in 2021 to CZK 148.7 billion in 2022 (see Chart V.5 CB). It remained very low in early 2023, when the volume of loans provided between January and March was the lowest since 2014. The March data suggest a very slight recovery of the mortgage market, with the amount of loans having increased from CZK 5.9 billion in February to CZK 9.2 billion (see Chart V.15).[133] The level of monetary policy interest rates thus had the intended effect of significantly dampening the strong activity seen on the mortgage market in previous years. This reduced the pressure on property prices (see section II.1). In line with the trend in lending, the estimated share of mortgage-funded apartment and family house transfers decreased (see Chart V.16).

…the average loan amount and property price decreased and the average number of loan applicants increased

The average mortgage amount started to fall gradually in 2022 Q1, reaching CZK 2.84 million in January and February 2023 (see Chart V.17). The median for the period was CZK 2.39 million (see Table V.3 CB). In response to rising interest rates and hence also instalment amounts, whose median rose by 6.2% year on year to CZK 14,900, households thus bought property at lower prices and applied for smaller loans. Another way of reducing instalments was to extend the loan maturity, which returned to 27 years on average, the median staying at 30 years. The maturities of refinanced loans were naturally lower, the median and average both being 24 years in February 2023 (see Chart V.18). The room for reducing instalments by extending the loan maturity thus seems to have been exhausted, partly because the Recommendation provides that "as a rule, it should not exceed 30 years". Mortgages with shorter maturities were taken out almost solely by older applicants, who usually come up against maturity restrictions due to their horizon of economic activity. The average number of mortgage applicants also increased, the observed figure being 1.6, as did the number of residential properties used to secure the loan (see Chart V.17), although the growth was modest in both cases. In some cases, however, the upper limits on the LTV, DSTI and DTI were met met because there was a co-applicant for the loan and additional property was used as collateral.

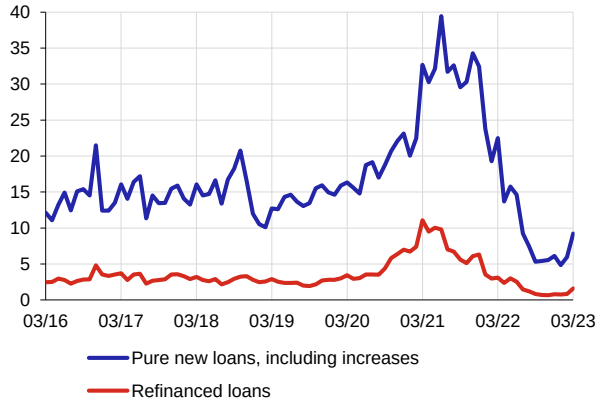
130 This involves the following credit ratios: the ratio of the consumer's total debt arising from consumer loans secured by the same residential property to the value of the collateral ("the LTV ratio"), the ratio of the consumer's expenditure arising from the consumer's total debt to the consumer's income ("the DSTI ratio") and the ratio of the consumer's total debt to the consumer's net income ("the DTI ratio").

131 *Provision of a general nature on setting upper limits on credit ratios No. I/2021*.

132 *Recommendation on the management of risks associated with the provision of consumer loans secured by residential property.*

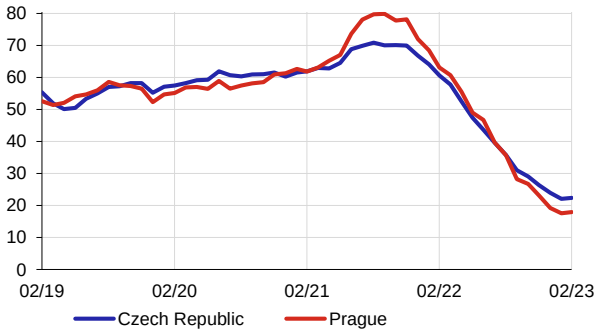
133 The month-on-month increase is associated to some extent with seasonality in the mortgage market.

Chart V.15
Pure new mortgage loans for house purchase
(CZK billions)



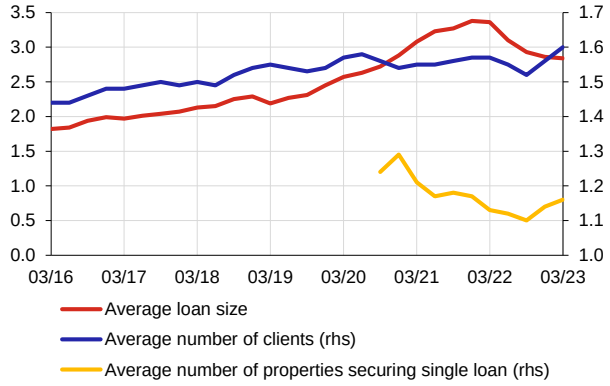
Note: Mortgage loans fall within the category of loans for house purchase and for the purposes of this chart are defined as loans provided to households that are secured at least partly by a lien on immovable property.

Chart V.16
Share of apartment and family house transfers financed using mortgage loans
(% of total number; half-yearly moving averages)



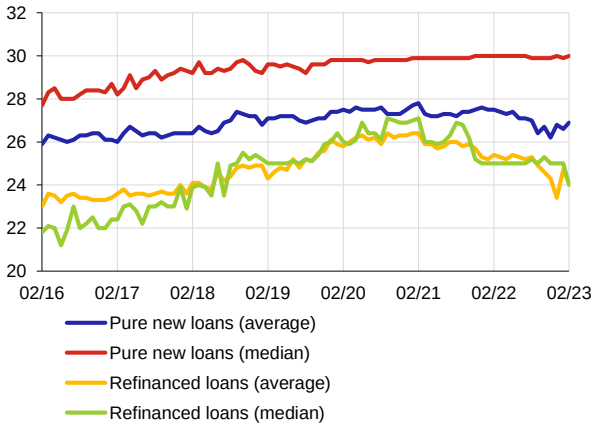
Source: CNB, COSMC
Note: Calculated as the ratio of the number of pure new loans for purchasing property according to the Survey to the number of transactions registered by COSMC.

Chart V.17
Selected characteristics of new mortgage loans
(CZK millions; right-hand scale: number of persons/properties)



Note: The average number of properties securing a single loan and the number of clients are weighted by the loan size. Loans only include pure new consumer loans secured by residential property. The data may also contain undrawn loans. The figures for 2023 Q1 (03/23) contain data for January and February only.

Chart V.18
Maturities of mortgage loans
(years; averages weighted by loan amount)



Note: The data are based on the Survey and include mortgage loans and standard and bridging building society loans secured by residential property. The data may also contain undrawn loans.

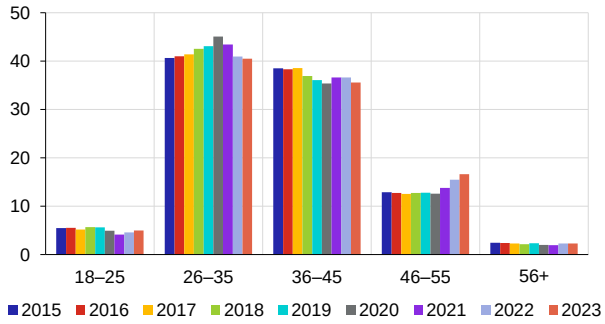
New mortgage loans were provided to borrowers aged 36+

The situation on the property market, coupled with the higher client interest rates (see section II.1), was reflected in the distribution of new loans by age in favour of borrowers in higher age categories. Despite the softer upper limits on the credit ratios for applicants under 36 years, the share of loans in this category declined (see Chart V.19). The statutory volume exemption from the upper limits on credit ratios was used mainly by applicants aged 36+. In 2022 Q3 and Q4, this was particularly apparent for the DSTI ratio, which was the most restrictive ratio for mortgage applicants at the given level of interest rates (see Chart V.7 CB).

Banks are pricing riskier loans with an interest rate mark-up

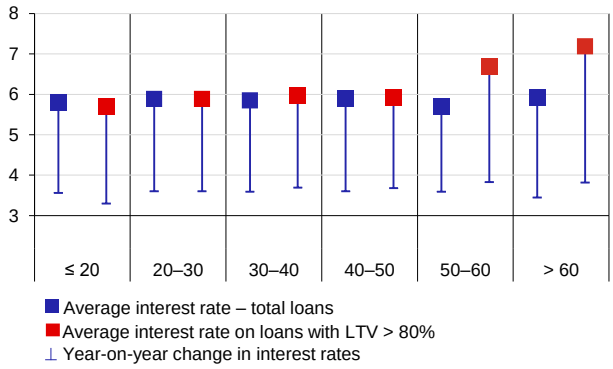
The average interest rate was broadly the same across various DSTI and LTV ratios, except for riskier loans with LTVs of over 80% and simultaneously DSTIs of over 50% and 60% respectively, for which the interest rate was 1 pp and 1.3 pp higher respectively on average (see Chart V.20). However, the total volume of these loans represented a negligible proportion of new mortgage loans provided in the first two months of 2023, not exceeding CZK 10 million. The relatively high level of interest rates is also changing consumers' preferences as regards the fixed-rate period, which dropped to five years on average (see Chart V.21).

Chart V.19
Distribution of pure new mortgage loans by age of the principal borrower
(share in total volume in %; x-axis: age of principal borrower in years)



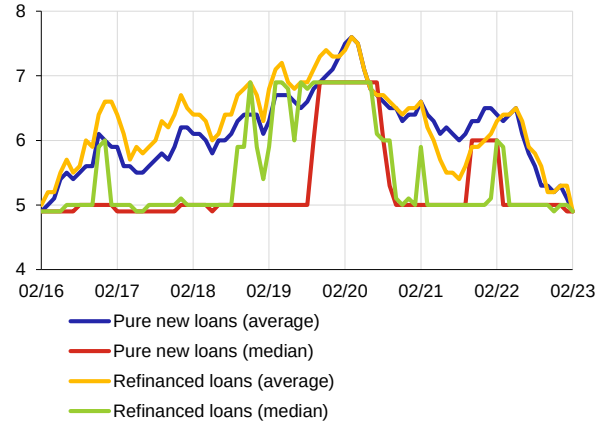
Note: Loans only include pure new consumer loans secured by residential property. The data may also contain undrawn loans. The figures for 2023 contain data for January and February only.

Chart V.20
Average interest rates by loan characteristics
(average interest rate in %; x-axis: DSTI in %)



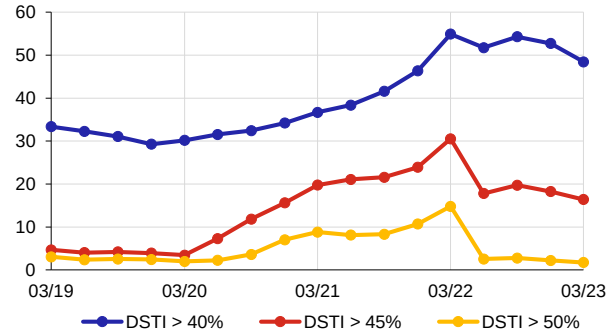
Note: Loans include only pure new consumer loans secured by residential property. The data may also contain undrawn loans. Data for January and February 2023. Average interest rates are weighted by the mortgage loan size. Interval closed from the right.

Chart V.21
Fixed-rate periods of mortgage loans
(years; averages weighted by loan amount)



Note: Data are based on the Survey and include mortgage loans and standard and bridging building society loans secured by residential property. The data may also contain undrawn loans.

Chart V.22
Pure new mortgage loans with DSTIs in selected bands
(share of loans in volume provided in given quarter in %)



Note: Loans include only pure new consumer loans secured by residential property. The data may also contain undrawn loans. The figures for 2023 Q1 (03/23) contain data for January and February only. The chart provides information on current changes in risks accepted from the DSTI perspective, not on formal (non-)compliance with the binding upper limits on the DSTI ratio.

The setting of upper limits on the LTV, DTI and DSTI ratios helped reduce the provision of loans with highly risky characteristics…

The setting of upper limits on the LTV, DTI and DSTI ratios, coupled with increases in monetary policy interest rates, helped limit the build-up of systemic risk associated with the provision of mortgage loans with riskier characteristics in banks' balance sheets. With some – mostly technical – exceptions, banks were compliant with the upper limits in 2022 Q3 and Q4. The downturn in lending strengthened the resilience of the most vulnerable part of banks' mortgage portfolios (loans up to five years since provision) to the then expected increase in risk in the form of a higher default rate of households due to the energy crisis and the forecasted recession.[134]

…the slightly elevated risks associated with debt service concerned a relatively low volume of mortgage loans…

The CNB regards loans with DSTIs of over 40% as highly risky and expects providers to proceed with utmost caution when providing these loans.[132] The share of mortgage loans with DSTIs of over 40% has been relatively high since early 2022, although it dropped to 48% in January and February 2023 (see Chart V.22). Such loans amounted to CZK 84 billion in 2022 as a whole and CZK 6 billion in January and February 2023. The stress test of households (see section IV.4) and other analyses by the CNB (see Chart V.11 CB) confirm elevated default risk for these loans. Partly due to the upper DSTI limit, highly risky loans with DSTIs of more than 50% were seldom provided and did not exceed CZK 220 million in January

134 *Financial Stability Report – Spring 2022*.

and February 2023. Amid the current high interest rates, the introduction of the upper DSTI limits also contributed significantly to a rapid decline in loans with risky DTI levels (see Chart IV.23). Thanks to this, the entire DTI distribution of mortgage loans moved to the left towards lower levels (see Chart V.10 CB) and the share of loans with DTIs of over 8 was only 2.3% in the first two months of 2023.

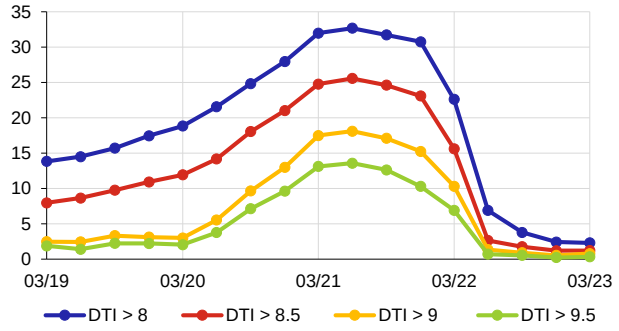
…perceived risk was low from the perspective of the LTV ratio and impairment

Although the share of mortgage loans with LTVs of over 80% started to increase gradually in mid-2022, it remained relatively low and does not pose a risk to financial stability (see Chart V.24). Such loans accounted for 11% of total pure new mortgage loans (CZK 1.38 billion) in the first two months of 2023. The volume of mortgage loans provided with LTVs above 90% was close to zero. The volume exemption for the LTV ratio was used mainly for mortgage loans with LTVs of 80%–90%. The median LTV ratio also declined in 2022, fluctuating around 66% for new mortgage loans (see Table V.3 CB). Overall, growth in new loans based on the LTV ratio suggests relatively high resilience of the banking sector to adverse shocks to property prices (see section II.1, Chart II.16 CB).

Chart V.23

Pure new mortgage loans with DTIs in selected bands

(share of loans in volume provided in given quarter in %)

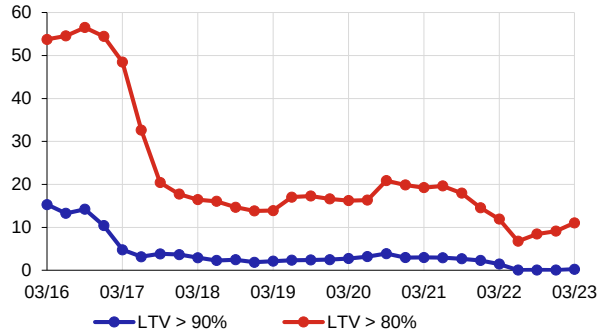


Note: Loans include only pure new consumer loans secured by residential property. The data may also contain undrawn loans. The figures for 2023 Q1 (03/23) contain data for January and February only. The chart provides information on current changes in risks taken on from the DTI perspective, not on formal (non-)compliance with the binding upper limits on the DTI ratio.

Chart V.24

Pure new mortgage loans with LTVs in selected bands

(share of loans in volume provided in given quarter in %)



Note: Loans include only pure new consumer loans secured by residential property. The data may also contain undrawn loans. The figures for 2023 Q1 (03/23) contain data for January and February only. The chart provides information on current changes in risks taken on from the LTV perspective, not on formal (non-)compliance with the binding upper limits on the LTV ratio.

The Bank Board decided to leave the upper limits on the LTV and DTI ratios unchanged and to deactivate the upper limit on the DSTI ratio

At its meeting on 1 June 2023, the Bank Board decided to amend the provision of a general nature effective since 1 April 2022 setting upper limits on the LTV, DSTI and DTI ratios. It deactivated the upper limit on the DSTI ratio but left that on the LTV ratio at 80%/90% and that on the DTI ratio at 8.5/9.5 times net income. The Bank Board concurred that although the CNB did not expect significant growth in systemic risks stemming from the mortgage and property markets at the two-year horizon, the risks of the CNB's macroeconomic forecast were significant and going in both directions.[135] The Bank Board continues to recommend by means of official information for lenders that the upper limit on the LTV ratio of no mortgage loan should exceed 100% and applications for mortgage loans with LTVs of over 80%, DSTIs of over 40% and/or DTIs of more than 8 times net annual income should be assessed with an increased level of prudence.

The risks to financial stability stemming from the mortgage and property markets are falling…

According to the CNB's assessment, the potential risks associated with mortgage lending have lessened and, under the *Baseline Scenario*, are not expected to increase significantly at the two-year horizon (see Chart 2 in Box 5). Most of the factors defined in the Act on the CNB are currently either at their long-term averages or heading towards them at the scenario horizon (see Chart 1 in Box 5). Based on the CNB's macroeconomic forecast, domestic economic activity will be subdued in 2023 and return to higher growth in 2024 (see Chart IV.1A). Although the labour market situation points to a rise in the unemployment rate and a decline in nominal wage growth at the forecast horizon, these indicators are expected to return to their steady-state levels (see Chart II.36). At the same time, interest rates are expected to remain elevated for longer (see Chart IV.1D). The stress tests of households (see section IV.4) and the banking sector (see section IV.1) do not indicate the presence of significantly elevated systemic risk either. The factors underlying the issuance of the provision of a general nature of 25 November 2021 have thus changed significantly and the CNB is therefore amending it.

135 *Monetary Policy Report – Spring 2023*.

…the CNB does not expect them to increase significantly at its forecast horizon

The current combination of still relatively high property prices in terms of affordability, high interest rates and general consumer sentiment is greatly reducing demand for new mortgage loans and, in the *Baseline Scenario*, no significant change in this trend is expected at the forecast horizon. Given a hypothetical change in loan characteristics towards riskier DSTI, DTI and LTV levels, the volume of new potentially risky loans poses no risk to financial stability. In the *Baseline Scenario*, the projected inflow of new loans accounts for around 13% of the loan portfolio, or CZK 213 billion, at the end of the two-year horizon (see Chart 3 in Box 5).

The risk of property prices correcting persists due to their overvaluation…

The still relatively high overvaluation of residential property prices remains a risk (see Chart II.24). Residential property prices in relation to consumers' income and rents are deviating from their long-term averages. In the *Baseline Scenario*, this deviation decreases gradually in the years ahead due to faster growth in income and rents (see Chart 1 in Box 5, *Price-to-income ratio* and *Price-to-rent ratio*). However, amid significant macrofinancial uncertainties and a risk of them increasing further, the current residential property market situation may result in a sharper decline in residential property prices, even though CNB analyses suggest that the probability of a major price correction dropped at the end of 2022 (see Chart II.16 CB). A potential marked decrease in the value of collateral in the case of new loans amid a rise in defaults could lead to higher credit losses. For this reason, the CNB is leaving the upper limit on the LTV ratio at 80%/90%. In this price environment, and with regard to the evolution of household income, there is still some risk of households becoming overindebted, as less than 10% of households can safely debt-finance an average-price apartment. The CNB therefore left the upper limit on the DTI ratio at 8.5/9.5 times the applicant's net income.

…The CNB will monitor the risks and is ready to amend the Recommendation or issue a new provision of a general nature if needed

The CNB monitors and assesses the situation on the mortgage loan market on a quarterly basis using, among other things, data obtained from the Survey and statistical reporting, which provide a detailed insight into the credit characteristics of mortgage loans provided. Should the risk characteristics giving rise to potential systemic risks for new loans change, the CNB is ready to respond quickly and change the mortgage lending conditions by means of a provision of a general nature setting upper limits on credit ratios.

BOX 5: An introduction to the CNB's approach to setting upper limits on the LTV, DTI and DSTI ratios[136]

The CNB sets upper limits on the LTV, DTI and DSTI ratios based on the Act on the CNB and regularly reviews the reasons for setting them, leaving them unchanged, changing them or cancelling them. **The upper limits are used to mitigate systemic risks** associated with mortgage lending. Each ratio mitigates a different type of risk. The CNB's approach to setting the upper limit on the LTV ratio is intended to prevent significant losses on non-performing loans. The upper limit on the DTI ratio mitigates the risk of excessive indebtedness of households and that on the DSTI ratio prevents excessive risk of insolvency of households.

The CNB uses **three main approaches when setting upper limits on credit ratios: an indicator approach, a simulation approach and an expert approach**.

The **indicator approach** takes into account current and expected future developments linked to the CNB's macroeconomic forecast for the indicators defined in the Act on the CNB and other key indicators used to identify systemic risks to financial stability as recommended by the BIS[137] and the IMF.[138] The aim of the indicator approach is to recognise in good time whether conditions are being created on the mortgage and property markets for the formation or build-up of potential systemic risks. These indicators include the total volume of consumer credit, the volume of new consumer loans secured by residential property, residential property transaction prices, the ratio of total consumer credit to consumers' income, the ratio of residential property prices to consumers' income, the ratio of residential property prices to rents, the ratio of the average loan size to consumers' average income and the ratio of the average mortgage loan size to the average property price (see Chart 1). For simplicity, the individual indicators are combined into composite risk perception indicators based on the overlap of standard deviations and the deviation from the long-term average (see Chart 2).

It is evident from the historical observations that there was an increase in the composite risk perception indicator in 2014 (see Chart 2), when the Czech economy entered the strongly expansionary phase of the financial cycle (see section V.3, Chart V.7). The CNB responded by recommending that lenders maintain an upper limit on the LTV ratio, which the CNB then gradually lowered.[139] The reduction in systemic risk perceptions was gradual at first. The indicator fell rapidly in 2017 owing to growth in interest rates and again in 2018 Q4 after upper limits were set on the DTI and DSTI ratios. The indicator started to increase again at the start of 2020 and peaked in 2021 Q1, when the economy was close to a local peak of the financial cycle (see section V.3, Chart V.7). At the end of 2022, the composite indicator fell to the 2019 levels, due mainly to an increase in monetary policy interest rates coupled with the reintroduction of upper limits on credit ratios, and, according to the CNB's projection, it will fall further.

The **simulation approach** helps to quantify whether the potential risks indicated by the above indicators can take on a systemic dimension. The approach is based on simulations in the household stress test with different upper limits on the credit ratios.[140] This approach takes into account the current size and quality of the loan portfolio and simulates its future trends based on a combination of CNB projections consistent with the macroeconomic forecast (the first two years of the simulation) and an extremely adverse scenario[141] (the next three years). The simulations are thus conducted over a five-year horizon (see Table V.4 CB). The simulation outputs are the default rate, loss given default and the size of the expected absolute losses for different upper limits on the credit ratios.[142] The simulation results depend largely on the narrative of the scenario and the riskiness of the initial mortgage portfolio.

The results of the simulation performed using real data available at the end of February 2023 showed that with the chosen scenario the difference in default rates and losses would be relatively small for different upper limits on the credit ratios (see Table 1). As regards the default rate, the simulations indicated almost identical developments. Differences were apparent for expected losses on loans. The spread between the highest and lowest expected losses in the simulation would be CZK 11.5 billion for the whole period under review. This figure would be fairly low in relation to the banking sector's profits and capital buffers and surpluses (see Chart III.2). The simulations confirmed that the potential risks arising from the mortgage market do not attain a systemic dimension at present.

136 The CNB's approach to setting upper limits on the LTV, DTI and DSTI credit ratios, including the methods and data sources used, will be issued in a separate publication on the CNB website in the second half of 2023.

137 BIS (2012). *Operationalising the selection and application of macroprudential instruments*, CGFS Papers. No 48.

138 IMF (2014). *Staff guidance note on macroprudential policy*.

139 See the brief overview of the main changes in the Recommendations issued.

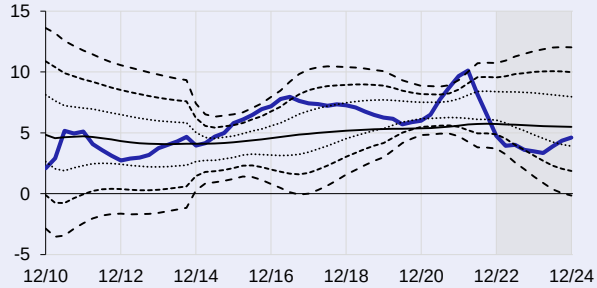
140 A narrower group of combinations is always selected from the broad set of possible combinations of upper limits on credit ratios. This narrow group should reflect the direction of the debate on setting upper limits on credit ratios.

141 The adverse scenario chosen in the simulations is defined solely for the purposes of the simulation and is deflationary in nature. The narrative of the scenario is different from the *Adverse Scenario* used for stress testing (see section IV).

142 The potential effect on interest income is also taken into account in the simulations so that the resulting losses from are not assessed in isolation.

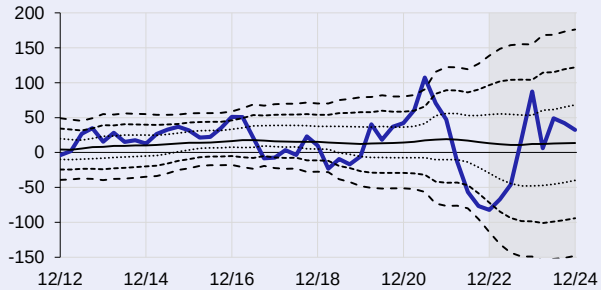
Chart 1 (BOX 5)
Indicators of systemic risk associated with mortgage lending
(%; ratio of property prices/loan size to gross annual income; ratio of property prices/rent in multiples of annual rent)

Year-on-year change in consumer credit



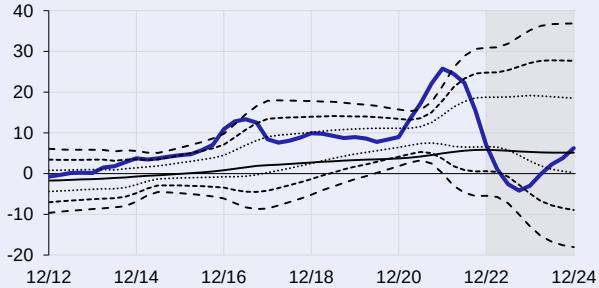
The chart is based on total outstanding consumer credit to households.

Year-on-year change in new mortgage loans



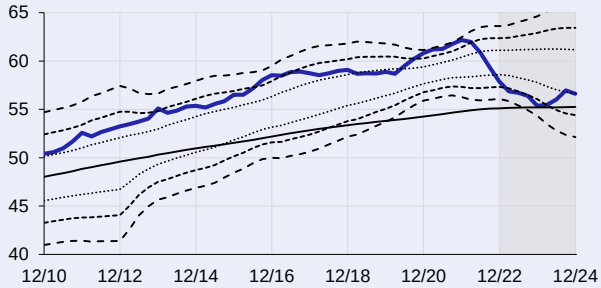
The chart shows pure new mortgage loans for house purchase, including increases.

Year-on-year change in property prices



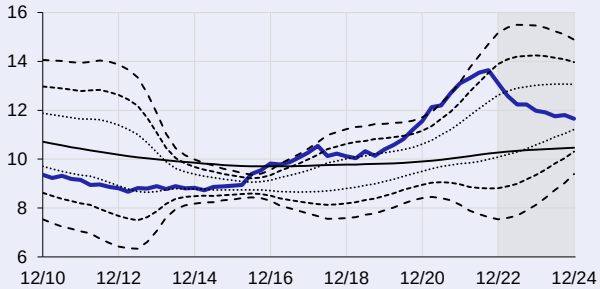
The chart depicts the housing price index, including land.

Consumer credit-to-income ratio



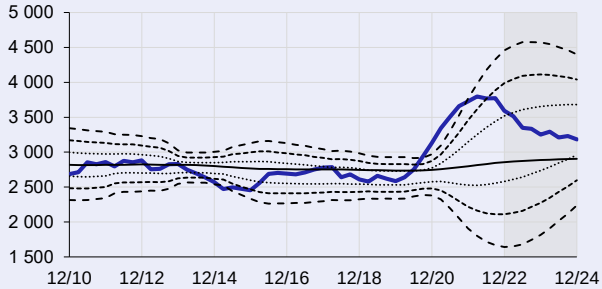
The chart depicts the total amount of loans to households relative to the gross disposable income of households.

Price-to-income ratio



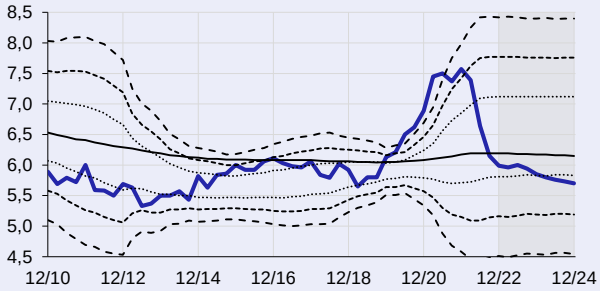
The chart shows the transaction price of a 68 m^2 apartment relative to average gross annual income.

Price-to-rent ratio



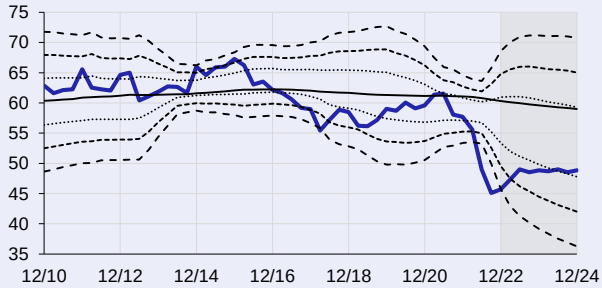
The chart shows the apartment transaction price per m^2 relative to annual rent per m^2.

Loan-to-income ratio



The chart shows the average loan size relative to average gross annual income.

Loan-to-price ratio



The chart shows the average loan size relative to the transaction price of a 68 m^2 apartment.

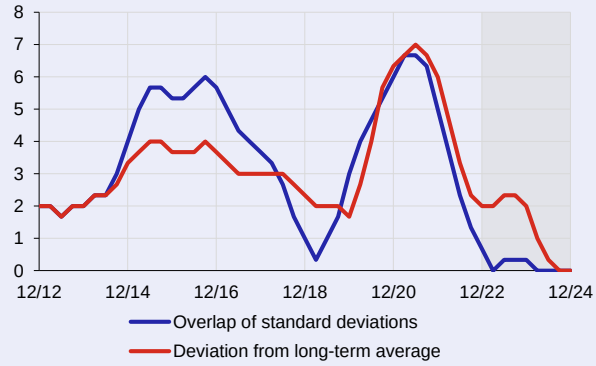
Note: The dashed black lines show spreads of one, two and three standard deviations from the average over the last 20 quarters. The black solid line shows the long-term average calculated using the time series starting in 2006–2010 (by specific indicator). The grey area shows the projected values consistent with the spring forecast (MPR – Spring 2023).

The **expert approach** takes into account all other factors, including market uncertainty. It is based on the analytical perspective and expert judgement of the Bank Board and the recommendations of the Financial Stability Department, Monetary Department and Financial Market Supervision Department. This allows the broader macroeconomic conditions, the interaction between monetary and macroprudential policies, the specific nature of past or expected future adverse shocks, structural changes in the economy and so on to be incorporated into the decision. For example, the pace of change of the existing portfolio is also taken into account (see Chart 3). This gives the rate at which loan portfolio quality as measured by the LTV, DTI and DSTI ratios changes at given ratio levels. A significant parameter for change in the portfolio is the volume of new mortgage loans. In general, however, changes to the upper limits on credit ratios for new loans (up or down) are reflected relatively slowly in the total stock of loans. Taking into account the current loan projection (see Chart II.37, new loans affected by a change to the upper limits on credit ratios would account for around 13% of the total portfolio (CZK 213 billion). In the hypothetical case of a massive increase in new loans corresponding to the number of loan contracts negotiated in 2021,[143] new loans would make up around 30% of the loan portfolio. This relatively slow effect of changes to credit ratios gives the CNB enough time to respond in the event of unexpected developments.

Chart 2 (BOX 5)

Composite risk perception indicators by overlap of standard deviations and deviation from the average

(min. 0; max. 8)

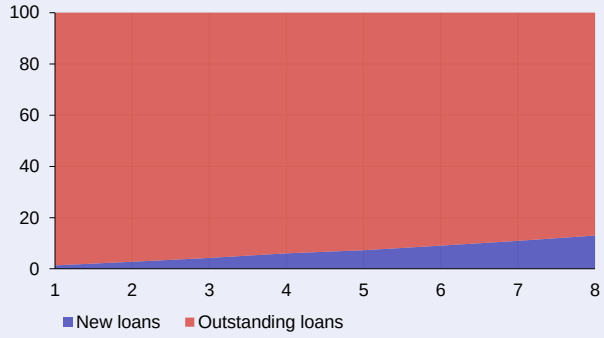


Note: The indicators are smoothed by the moving average.

Chart 3 (BOX 5)

Share of inflow of new loans at the two-year horizon

(%; x-axis: number of quarters)



Note: The volume of new loans and the interest rate on new loans consistent with the *Baseline Scenario* are considered in the estimate. The maturity on new loans considered is 30 years and the residual maturity on outstanding loans is 16.9 years. The interest rate on outstanding loans is 3%. Default rates of 2% and 0.6% are assumed for new loans and outstanding loans respectively.

Table 1 (BOX 5)

Default rates and loss rates for different limits on credit ratios

	12M default rate (%)						Loss given default (%)						Expected losses (CZK billions)					
	1	2	3	4	5	Average	1	2	3	4	5	Average	1	2	3	4	5	Total
0--0--0	0.9	1.1	1.8	3.4	4.7	2.4	11.6	12.4	15.2	21.3	19.3	15.9	1.9	2.5	5.3	15.0	19.3	44.0
80-0--0	0.9	1.1	1.8	3.4	4.6	2.4	11.4	10.8	12.5	17.9	16.6	13.8	1.7	2.2	4.4	12.5	15.9	36.8
90-0-0	0.9	1.1	1.7	3.4	4.6	2.4	11.9	12.2	14.7	20.9	19.0	15.7	1.9	2.6	5.0	14.5	18.4	42.4
80-0-8	0.9	1.0	1.6	3.2	4.5	2.2	11.6	10.8	11.5	17.0	15.5	13.3	1.9	2.0	3.6	10.9	14.1	32.5
80-0-9	0.8	1.1	1.7	3.2	4.5	2.3	11.1	10.2	11.4	17.4	16.0	13.2	1.6	2.0	3.7	11.4	14.6	33.3
90-0-8	0.8	1.1	1.6	3.2	4.5	2.2	11.1	12.6	13.2	19.4	18.2	14.9	1.6	2.5	4.2	12.6	16.7	37.6
90-0-9	0.9	1.1	1.7	3.3	4.5	2.3	11.8	12.0	13.8	20.1	18.2	15.2	1.9	2.4	4.7	13.4	17.1	39.4
80-45-9	0.9	1.0	1.7	3.2	4.7	2.3	11.0	10.9	11.7	16.8	15.7	13.2	1.7	2.0	3.8	11.0	14.9	33.4
90-50-9	0.9	1.1	1.8	3.3	4.7	2.3	11.2	11.2	14.7	20.0	18.9	15.2	1.8	2.3	5.1	14.0	18.5	41.7

Note: The third row presents the values in the individual years of the scenario and according to the average or total value over the entire scenario period.

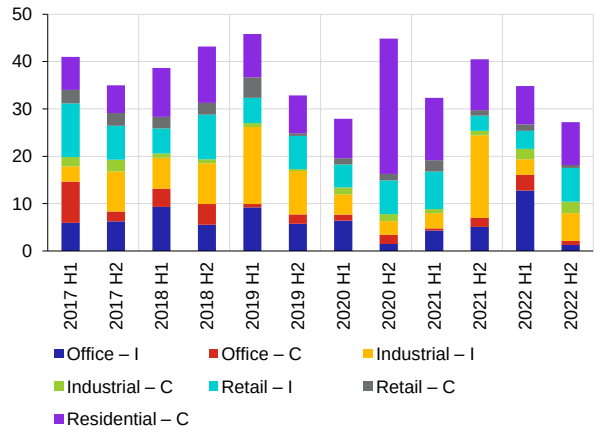
143 During this period, however, monetary policy rates were low and different incentives for investing in residential property probably dominated during the pandemic compared to now.

V.4.2 Risks associated with commercial property markets

Loans secured by commercial property declined appreciably in the second half of 2022

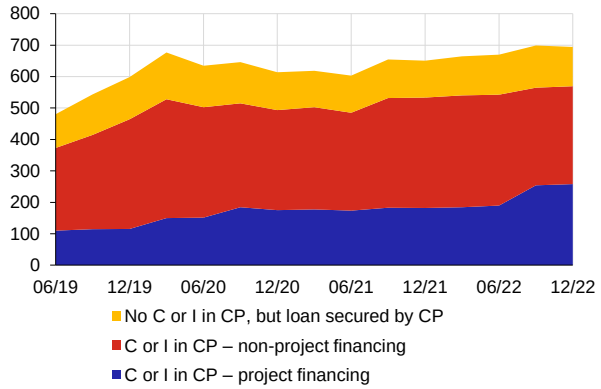
New loans secured by commercial property amounted to around CZK 27 billion in the second half of 2022 (see Chart V.25).[144] This is the lowest volume of loans provided in a six-month period since 2015. It implies a substantial drop in lending activity in this sector taking into account inflation. The cooling is due mainly to uncertainty about future developments and high interest rates (see section II.1). As regards the structure of new loans, the share of office premises declined considerably and the shares of industrial property and residential construction increased in the second half of 2022. However, the distribution of new loans across segments is highly variable over time, and in the case of mixed-purpose property it can be difficult to fully differentiate the amount of financing by type.

Chart V.25
Amount of new loans secured by commercial property
(CZK billions)



Note: I: investment in existing property, C: construction. Results based on data for selected banks.

Chart V.26
Outstanding loans secured by commercial property provided by banks to non-financial corporations
(CZK billions)



Note: I: investment in existing property, C: construction. CP: commercial property.

The risks associated with commercial property markets continue to be largely exported…

Foreign investors funded by the foreign financial sector have long played an important role on the commercial property market. Adverse trends accompanied by an increase in the default rate on loans financing this segment would therefore be passed on mainly to foreign entities and are not a direct source of systemic risk for the domestic financial sector. However, in the event of highly adverse financial conditions, the commercial property market could become a significant aggravating factor that would contribute to exacerbating the domestic shocks and increasing their duration.

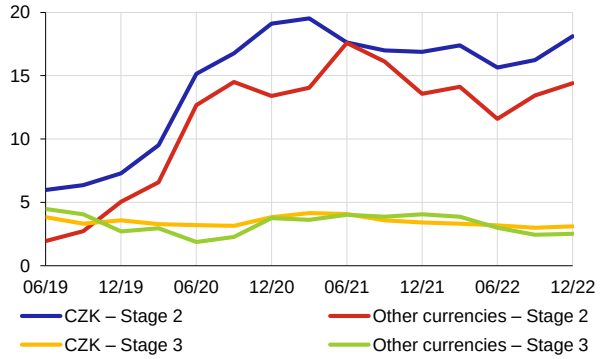
…but loans secured by commercial property still make up a large proportion of domestic banks' credit portfolio

Exposures secured by commercial property on Czech banks' balance sheets account for around half of all loans provided to non-financial corporations (see Chart V.26). About 82% of these loans were for investment or construction of commercial property at the end of 2022.[145] In times of uncertainty and turns in the financial cycle, when yields are increasing and prices are falling (see section II.1), these exposures can bear increased risk due to the falling value of collateral. During the pandemic, domestic banks transferred part of these loans from Stage 1 to Stage 2, and most have not been moved back yet. The share of loans secured by commercial property in Stage 2 rose slightly again in the second half of 2022 (see Chart V.27), but so far it does not differ much from the levels observed for other loans to non-financial corporations. Similarly, the credit risk for foreign currency loans (most often in euro) is slightly lower. The share of loans in Stage 3 is yet to deviate from the long-term average, but the current situation and the increased share of Stage 2 loans may lead to increased credit default risk.

144 The results are based on a semi-annual survey of loans secured by commercial property, conducted usually among seven banks covering around 70% of the market.

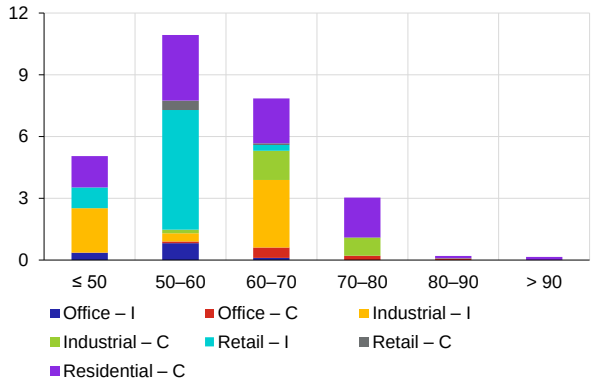
145 This is merely an estimate; precise categorisation is difficult based on the available data.

Chart V.27
Loans to non-financial corporations for investment or construction of commercial property by impairment stage and currency
(%)



Note: Stages 2 and 3 are the second and third stages of loan impairment according to IFRS9.

Chart V.28
LTV distribution of new loans secured by commercial property in 2022 H2
(CZK billions; x-axis: LTV in %)

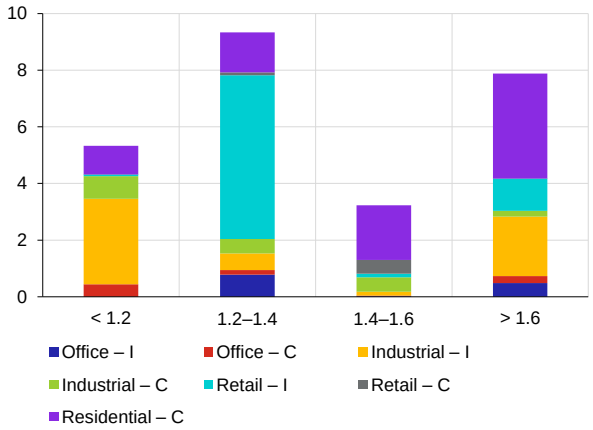


Note: I: investment in existing property, C: construction. Results based on data for selected banks. Interval closed from the right.

Banks applied a prudent approach to the provision of new loans secured by commercial property

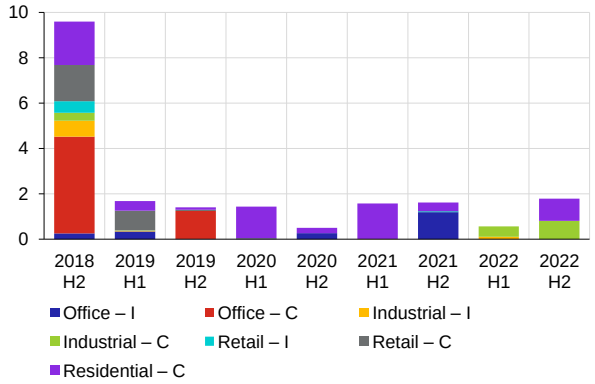
Given the existing uncertainties, banks continued to take a prudent approach in 2022 (especially in the second half of the year) and restricted the provision of loans in the riskiest categories. Amid stricter collateral requirements, hardly any loans with LTVs of over 80% were provided in the second half of 2022 (see Chart V.28) and loans with LTVs of between 50% and 60% were dominant, unlike in the first half of 2022, when loans with LTVs of between 60% and 70% had predominated. The provision of new loans with LTVs of over 70% has thus been significantly limited over the past two years (see Chart V.14 CB). From the perspective of the DSCR ratio, too, newly provided loans in the riskiest category, defined by a DSCR of less than 1.2, recorded a further slight reduction, while loans in the least risky category with a DSCR of more than 1.6 increased quite sharply (see Chart V.29). Banks' prudence is also evidenced by their strict requirement for a high degree of collateral for loans falling in the riskier DSCR categories. The volume of new loans with a DSCR of less than 1.2 and simultaneously an LTV of more than 70% remained very low in the second half of 2022 (see Chart V.30).

Chart V.29
DSCR distribution of new loans secured by commercial property in 2022 H2
(CZK billions; x-axis: DSCR in %)



Note: I: investment in existing property, C: construction. Results based on data for selected banks. Interval closed from the right.

Chart V.30
Amount of new loans secured by commercial property with an LTV of more than 70% and a DSCR of less than 1.2
(CZK billions)



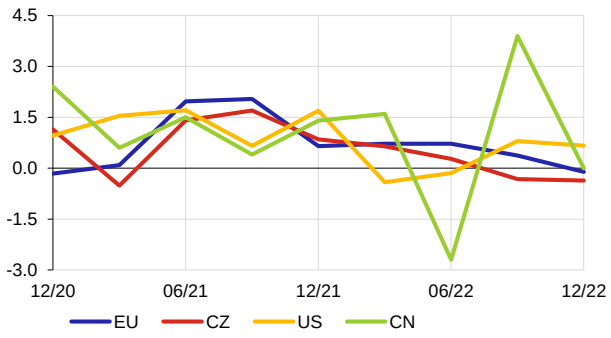
Note: I: investment in existing property, C: construction. Results based on data for selected banks. Interval closed from the right.

VI. CHARTBOOK

SECTION II

Chart II.1 CB
Economic growth in selected regions

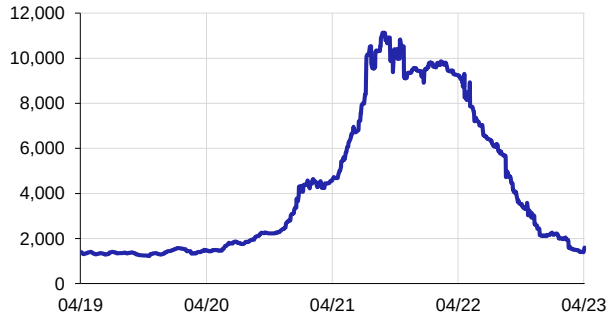
(quarterly real GDP growth in %)



Source: OECD

Chart II.2 CB
Container transport prices

(USD)

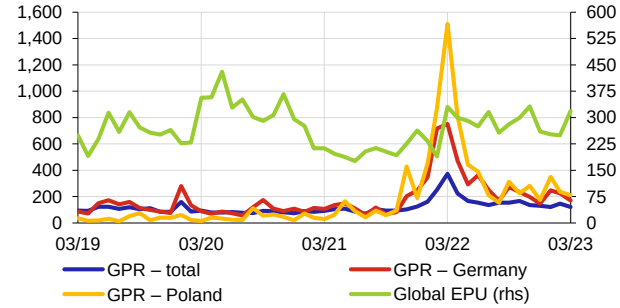


Source: Freightos, Refinitiv Datastream

Note: The chart depicts the Freightos Baltic Index: Global Container Freight Index.

Chart II.3 CB
Indicators of perceived geopolitical risk (GPR) and economic policy uncertainty (EPU)

(index)

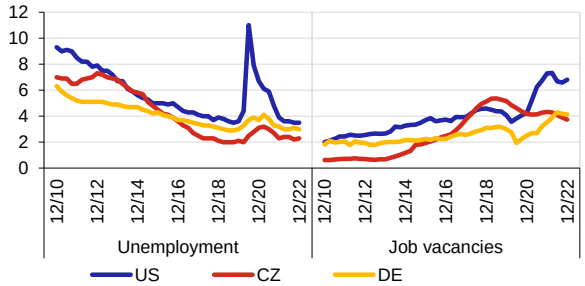


Source: Websites – Matteo Iacoviello and Economic Policy Uncertainty

Note: GPR data are not available for CZ. GPR and EPU are based on keyword occurrences in newspaper articles. The indicators are normalised: 100 corresponds to January 2019 for GPR and the 1997–2015 average for EPU. The GPR index is available at matteoiacoviello.com/gpr.htm and the global EPU at policyuncertainty.com.

Chart II.4 CB
Labour market indicators in selected economies

(%)

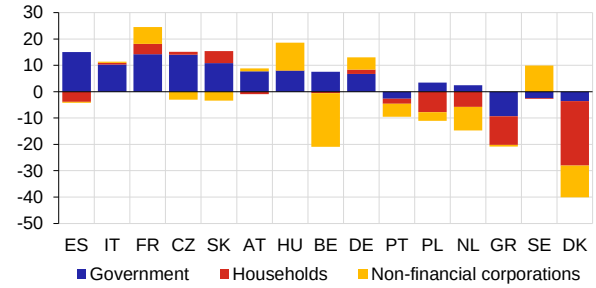


Source: Eurostat, U.S. Bureau of Labor Statistics

Note: The job vacancy rate is calculated as the ratio of the number of vacancies to the total labour force.

Chart II.5 CB
Change in the debt ratios of economic agents in selected EU countries

(pp; as of 31 December 2022)

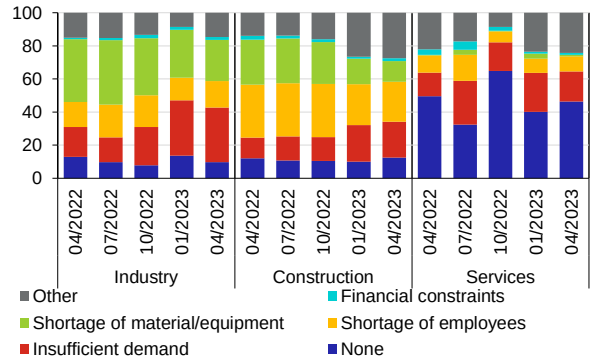


Source: ECB

Note: Change compared to 31 December 2019. Debt is expressed relative to GDP.

Chart II.6 CB
Barriers to growth in production by sector in the Czech Republic

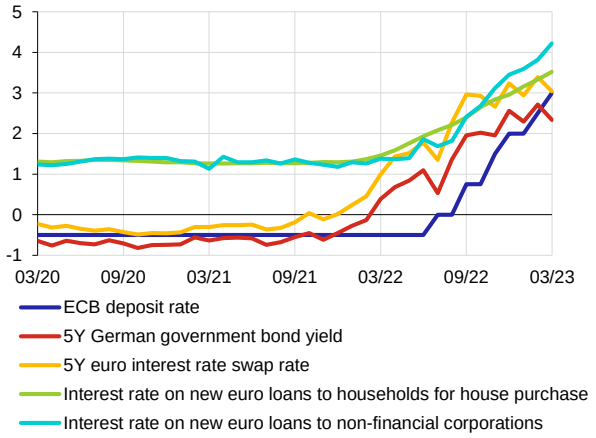
(%)



Source: CZSO

Note: Results of a CZSO survey in the corporate sector.

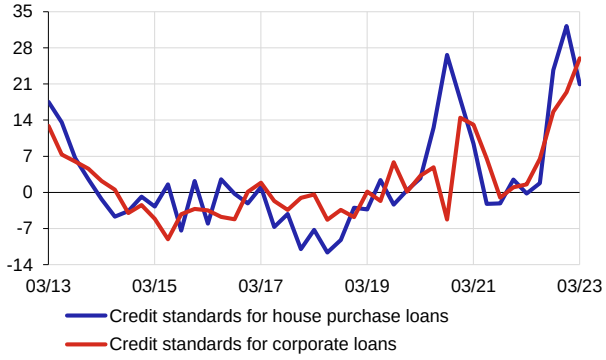
Chart II.7 CB
Interest rates and yields in the euro area
(%)



Source: Refinitiv, ECB

Note: Month-end values are used, except for interest rates on new loans, where monthly averages are used instead.

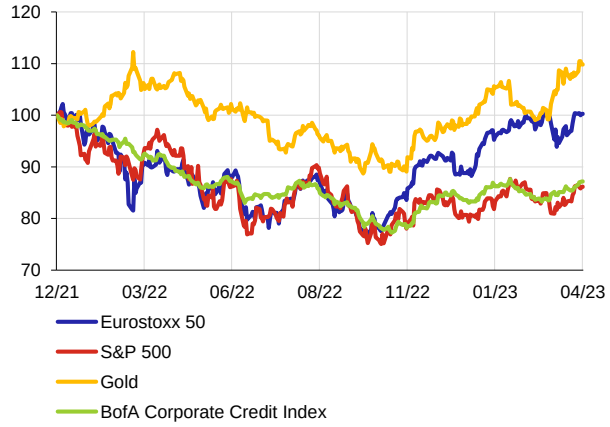
Chart II.8 CB
Changes in credit standards in the euro area
(net percentages)



Source: ECB Bank Lending Survey, January 2023

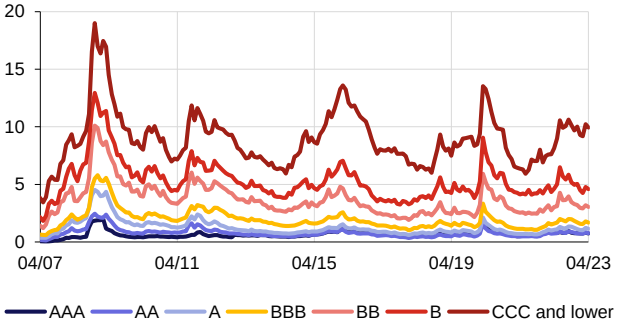
Note: Results of the ECB's January 2023 Bank Lending Survey. The data represent the difference between the market share of banks that reported a tightening of lending standards and banks that reported an easing of lending standards in the given quarter. More information on the indicator methodology can be found on the ECB and CNB websites.

Chart II.9 CB
Key global asset price indices
(index: 31 December 2021 = 100)



Source: Refinitiv

Chart II.10 CB
Risk premia on corporate bonds by rating grade
(pp)



Source: Bank of America Merrill Lynch, Refinitiv

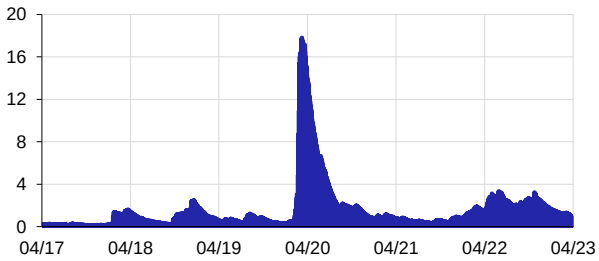
Note: Risk premia are expressed as the spread of corporate bond yields over government bond yields.

Chart II.11 CB
Risk premia for the S&P 500 and Euro Stoxx 50
(pp)

Source: ECB, Fed, Refinitiv

Note: The risk premium is calculated using the dividend discount model. Estimates of future dividends are based on dividend futures. Discount factors are calculated using the US swap curve. For details see Časta, M. (2022): *Deriving Equity Risk Premium using Dividend Futures*, North American Journal of Economics and Finance 60.

Chart II.12 CB
Realised volatility of the S&P 500
(%)

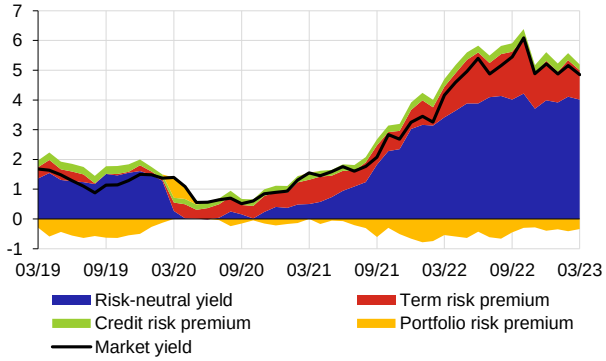


Source: Refinitiv

Note: Realised volatility was obtained from daily data using an exponentially weighted moving average with lambda set at 0.97.

Chart II.13 CB
Decomposition of the five-year Czech government bond yield

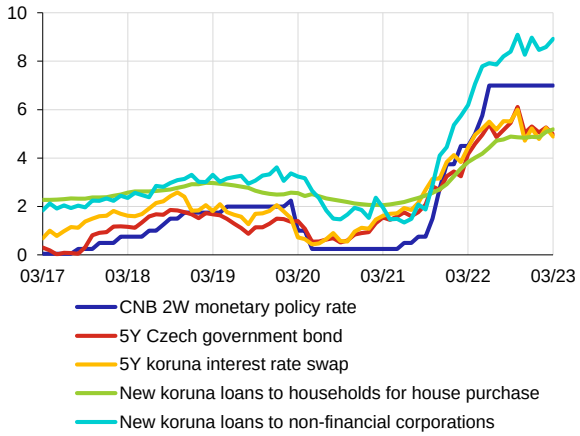
(yield in %; yield components in pp)



Source: Refinitiv, CNB

Chart II.14 CB
Selected interest rates and yields in the Czech Republic

(%)

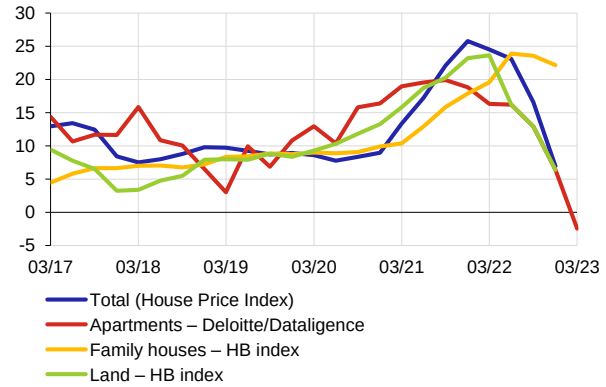


Source: Refinitiv, CNB

Note: Month-end values are used, except for interest rates on new loans, where monthly averages are used instead.

Chart II.15 CB
Transaction prices by type of property

(year-on-year growth in %)



Source: CZSO, Deloitte, Dataligence, HB index

Chart II.16 CB
Probability of average apartment prices in the Czech Republic falling by more than 10% over the next two years

(%)

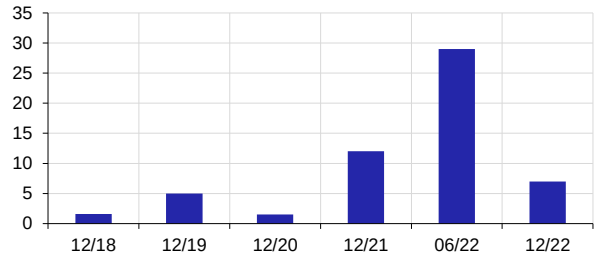
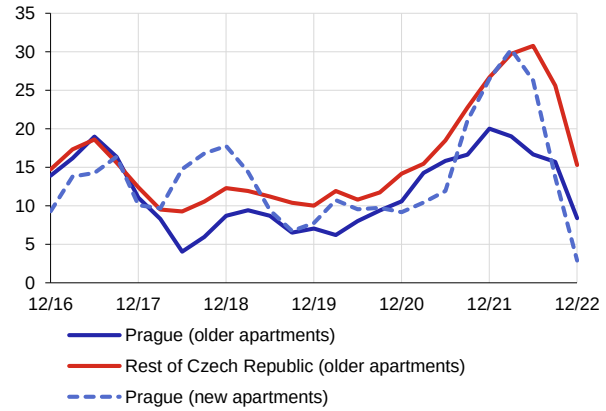


Chart II.17 CB
Apartment transaction prices by region

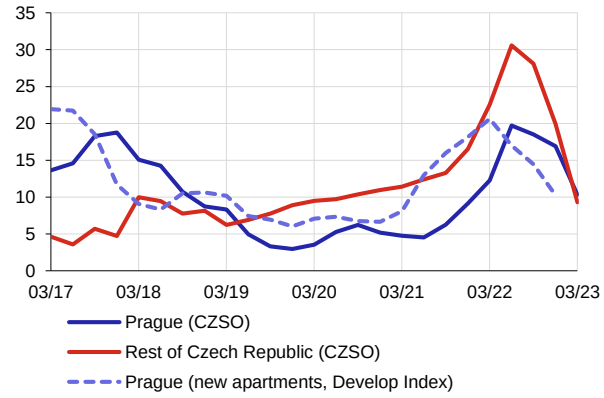
(year-on-year growth in %)



Source: CZSO

Chart II.18 CB
Apartment asking prices by region

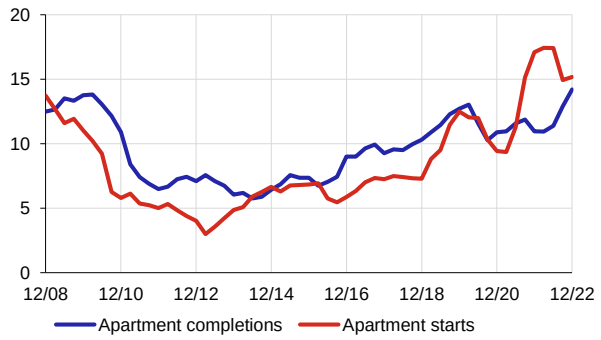
(year-on-year growth in %)



Source: CZSO, Společnost pro cenové mapy ČR, s.r.o./Dataligence

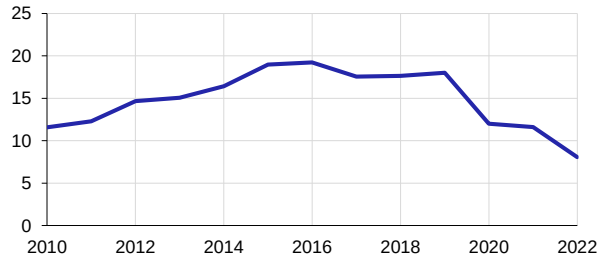
Note: As the Develop Index is published every two months, the figures for March and September were obtained as the average of the year-on-year growth rates in February and April and in August and October respectively.

Chart II.19 CB
Size of housing construction
(annual moving totals in thousands of apartments)



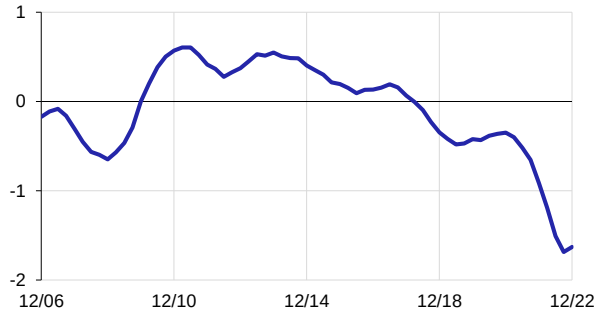
Source: CZSO
Note: Number of apartments in apartment blocks.

Chart II.20 CB
Share of households with income sufficient to safely repay a house purchase loan
(%)



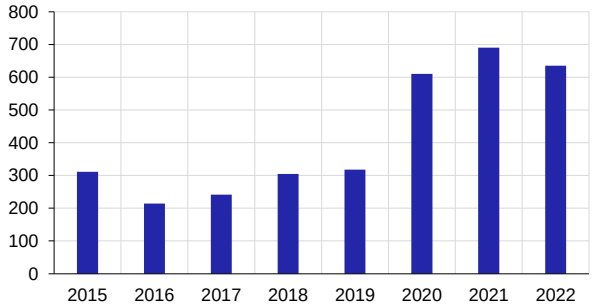
Note: Percentage of households whose income allows them to repay a loan for the purchase of housing of the average price and floor area in the given year. Regional differences in income and housing prices are not taken into account. A mortgage loan with a repayment period of 25 years and an LTV of 80% is considered.

Chart II.21 CB
Risk premium for yields on commercial property
(pp)



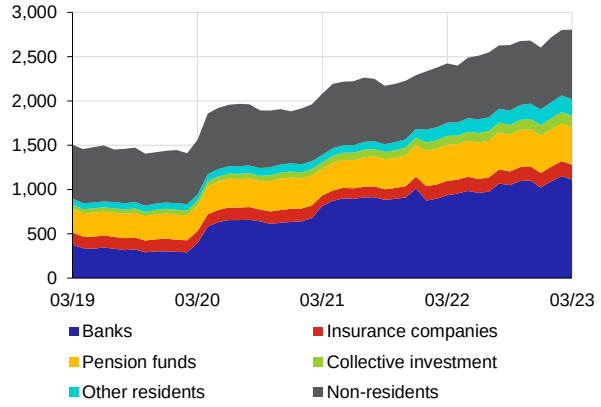
Note: The risk premium is calculated as the difference between the observed yield and the model-implied value.

Chart II.22 CB
Funding needs of the Czech Ministry of Finance
(CZK billions)



Source: Ministry of Finance of the Czech Republic

Chart II.23 CB
Holdings of koruna-denominated Czech government securities
(CZK billions)



Source: Ministry of Finance of the Czech Republic

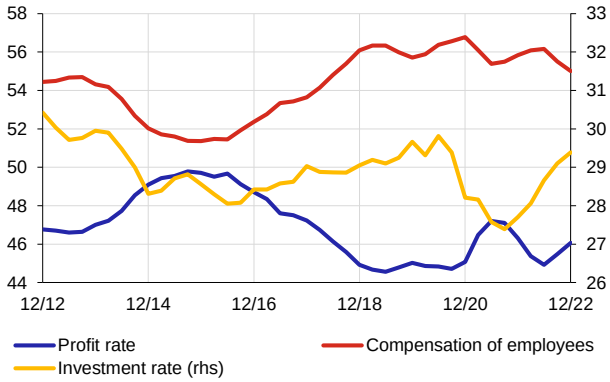
Table II.1 CB
The Czech Republic's ratings

Rating agency	Ratings	Outlook
Moody's	Aa3	Negative
S&P Global Ratings	AA	Stable
Fitch Ratings	AA-	Negative
JCR	AA	Stable
R&I	AA-	Negative
Scope Ratings	AA	Negative
Dagong Global Credit Rating	A+	Stable
ACRA Europe	AA	Stable
ACRA	AA	Stable

Source: Ministry of Finance of the Czech Republic

Chart II.24 CB
Compensation of employees, profit rate and investment rate in the non-financial corporations sector

(% of gross value added)

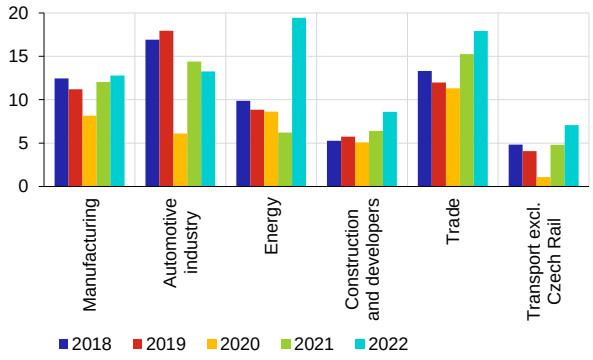


Source: CZSO

Note: Profit is defined as the annual moving total of gross operating surplus and investment as the annual moving total of gross fixed capital formation.

Chart II.25 CB
After-tax return on equity in selected sectors

(%)

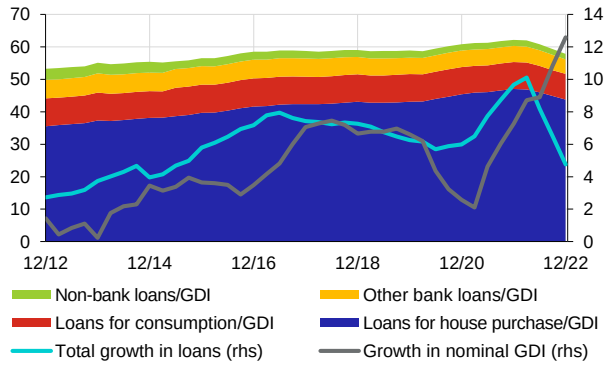


Source: CZSO

Note: Energy comprises electricity, gas, heat and air-conditioned air. The results are based on a sample of non-financial corporations.

Chart II.26 CB
Household indebtedness and disposable income indicators

(ratios in %; right-hand scale: year on year in %)



Source: CNB, CZSO

Note: Non-bank loans are loans provided by other financial institutions. GDI stands for gross disposable income. The household sector also includes data for NPISHs.

Chart II.27 CB
Residual fixed-rate period by currency and purpose for loans to non-financial corporations

(share in volume of loans as of 31 March 2023 in %)

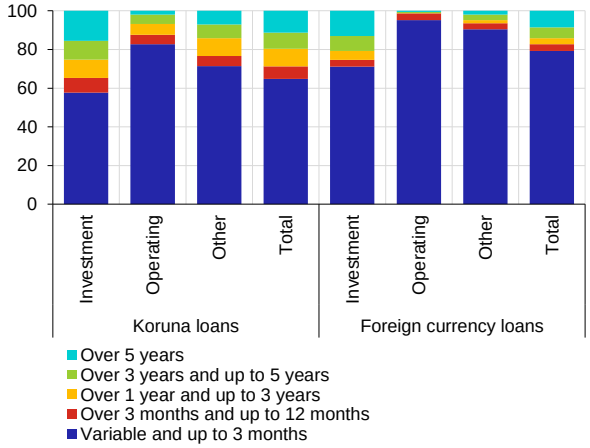


Chart II.28 CB
Residual maturity by currency and purpose for loans to non-financial corporations

(%)

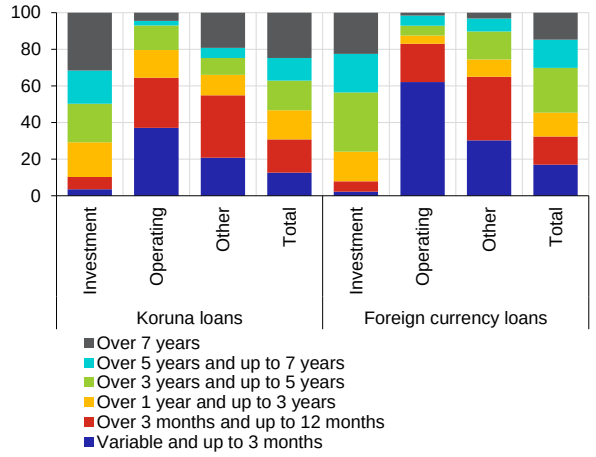
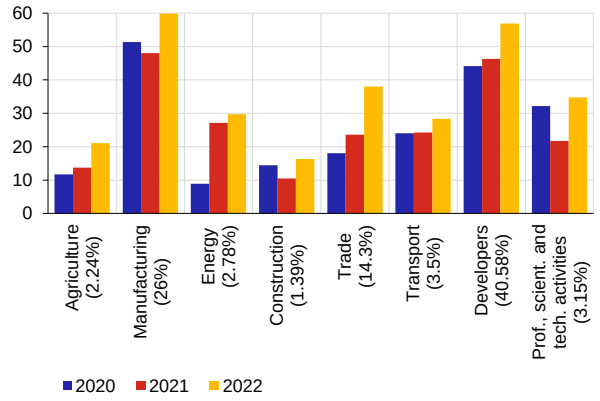


Chart II.29 CB
Share of foreign currency loans in total loans to sector

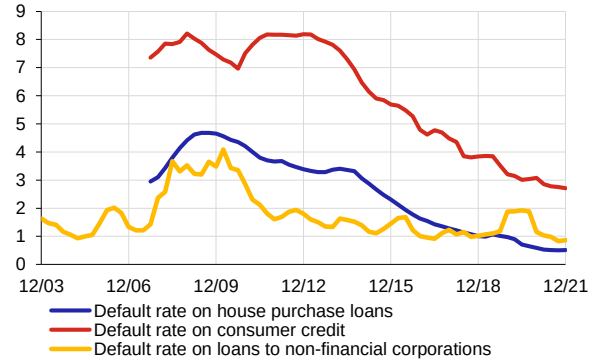
(%)



Note: The share of foreign currency loans to the given sector in total foreign currency loans as of 31 December 2022 is shown in brackets.

Chart II.30 CB
12M default rate on loans to the private non-financial sector

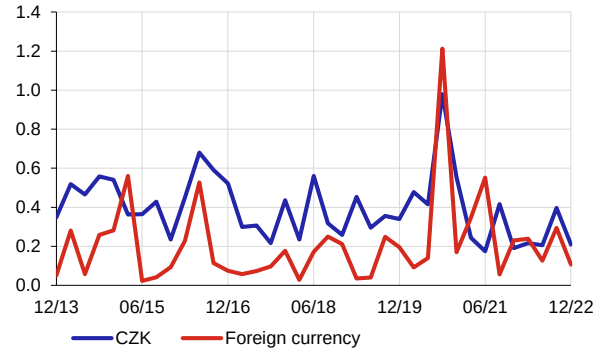
(%)



Note: The 12-month default rate is a forward-looking indicator defined as the flow of non-performing loans in the next 12 months divided by the total stock of loans in the starting period.

Chart II.31 CB
3M default rate on loans to non-financial corporations by currency

(%)



Note: The 3-month default rate is a forward-looking indicator defined as the flow of non-performing loans in the next 3 months divided by the total stock of loans in the starting period.

Chart II.32 CB
Breakdown of loans to non-financial corporations by currency

(%)

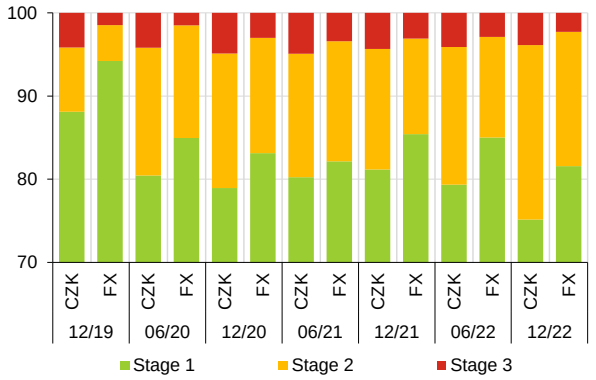
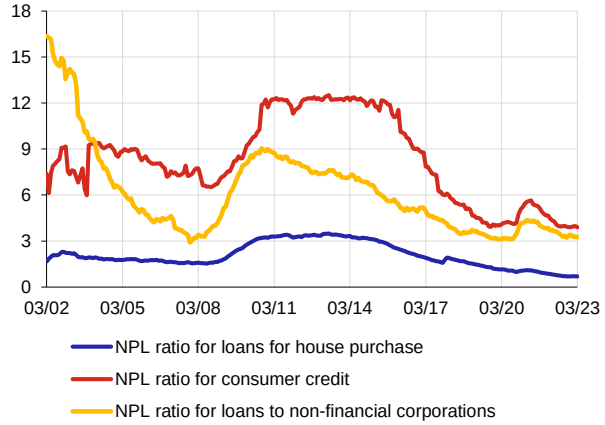


Chart II.33 CB
NPL ratio in the private non-financial sector

(%)



SECTION III

Table III.1 CB
Exposures, provisions and coverage rates by risk stage and portfolio

Households		Exposures		Provisions		Coverage rate	
Stage	Date	Volume (CZK billions)	Change (%)	Volume (CZK billions)	Change (%)	Rate (%)	Change (pp)
Overall	12/19	1,734		24.8		1.43	
	12/20	1,854	7.0	31.4	26.3	1.69	0.26
	12/21	2,089	12.7	29.5	-6.2	1.41	-0.28
	12/22	2,266	8.5	29.3	-0.4	1.29	-0.12
	02/23	2,273	0.3	29.6	1.0	1.30	0.01
S1	12/19	1,601		2.8		0.18	
	12/20	1,687	5.3	3.9	37.8	0.23	0.05
	12/21	1,873	11.0	3.9	-0.1	0.21	-0.02
	12/22	1,906	1.8	3.9	-0.5	0.20	0.00
	02/23	1,911	0.2	3.9	0.5	0.20	0.00
S2	12/19	102		4.1		4.01	
	12/20	133	30.2	8.8	114.7	6.61	2.60
	12/21	183	37.4	8.1	-7.5	4.45	-2.16
	12/22	332	81.4	10.3	26.1	3.09	-1.36
	02/23	333	0.5	10.4	1.0	3.11	0.02
S3	12/19	30		17.9		59.61	
	12/20	34	13.4	18.7	4.4	54.83	-4.78
	12/21	33	-4.3	17.4	-6.8	53.43	-1.40
	12/22	28	-13.4	15.2	-12.7	53.89	0.46
	02/23	29	1.0	15.4	1.1	53.94	0.05

NFCs		Exposures		Provisions		Coverage rate	
Stage	Date	Volume (CZK billions)	Change (%)	Volume (CZK billions)	Change (%)	Rate (%)	Change (pp)
Overall	12/19	1,298		29.4		2.27	
	12/20	1,304	0.4	43.0	45.9	3.30	1.03
	12/21	1,359	4.2	39.1	-9.0	2.88	-0.42
	12/22	1,457	7.2	40.9	4.7	2.81	-0.07
	02/23	1,468	0.7	39.8	-2.8	2.71	-0.10
S1	12/19	1,155		3.1		0.26	
	12/20	1,046	-9.4	4.7	54.5	0.45	0.19
	12/21	1,116	6.6	4.2	-11.1	0.38	-0.07
	12/22	1,139	2.1	5.4	27.7	0.47	0.09
	02/23	1,155	1.3	5.4	0.0	0.46	-0.01
S2	12/19	101		2.6		2.54	
	12/20	202	100.4	9.8	283.7	4.86	2.32
	12/21	193	-4.8	7.4	-24.3	3.87	-1.00
	12/22	271	40.6	9.6	29.0	3.55	-0.32
	02/23	267	-1.2	9.6	-0.1	3.59	0.04
S3	12/19	42		23.8		56.64	
	12/20	55	31.7	28.4	19.2	51.27	-5.37
	12/21	51	-8.4	27.4	-3.4	54.08	2.81
	12/22	47	-7.4	26.0	-5.4	55.28	1.20
	02/23	46	-2.5	24.8	-4.4	54.18	-1.11

Note: Client exposures denote exposures to non-financial corporations, households and credit institutions. S1 and S2 comprise performing loans; S3 can be considered identical to non-performing loans.

Chart III.1 CB
Stocks of loans to non-financial corporations by currency and purpose

(CZK billions; right-hand scale: %)

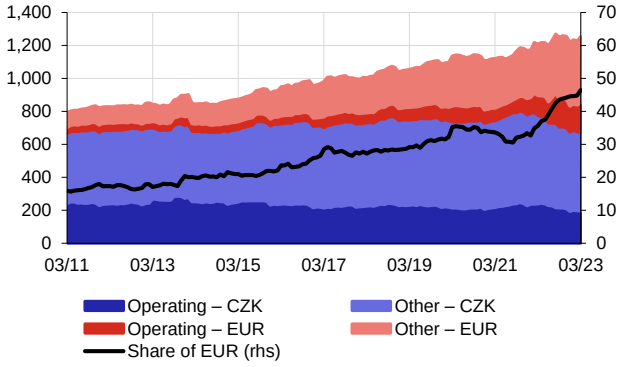
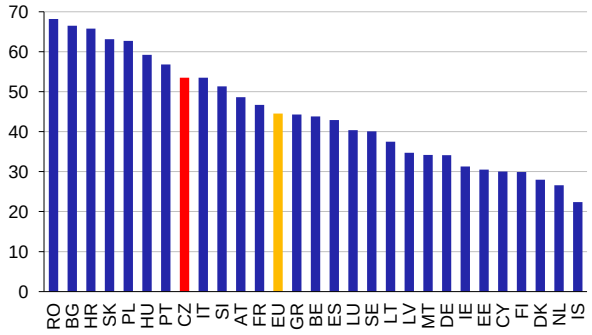


Chart III.2 CB
Coverage rates of non-performing client loans by provisions in selected EU countries

(%; as of 31 December 2022)



Source: EBA

Chart III.3 CB
Decomposition of the change in the value of investment funds' assets by investment policy in 2022

(CZK billions; x-axis: individual months of 2022)

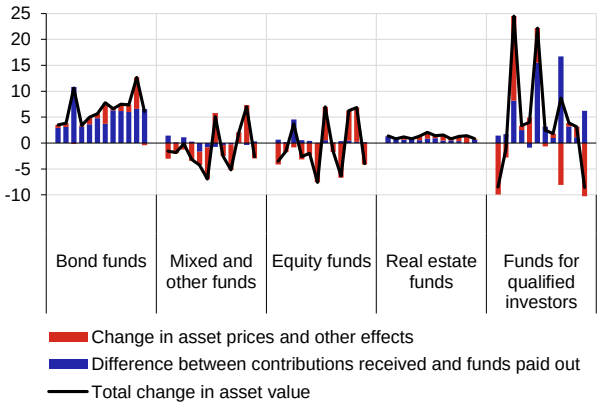


Chart III.4 CB
Decomposition of the change in the value of pension funds' assets

(CZK billions)

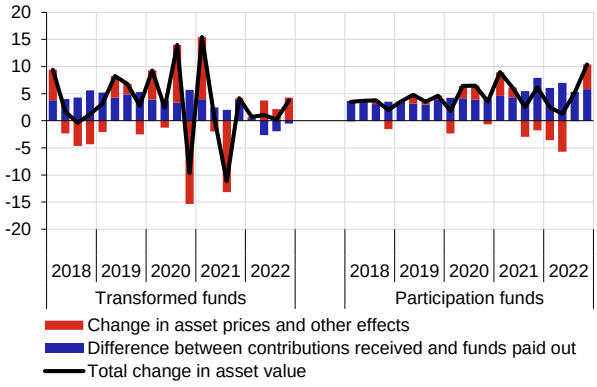
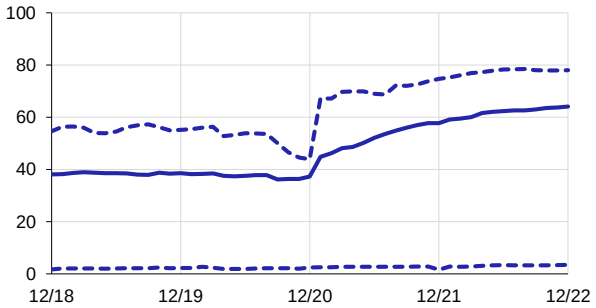


Chart III.5 CB
Share of bonds not marked to market held by transformed funds

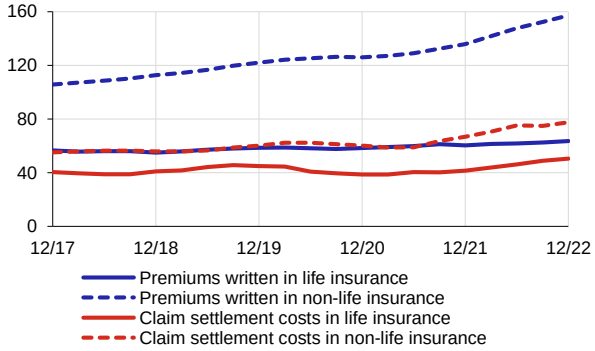
(% of total value of bonds held by transformed funds)



Note: Bonds not marked to market mean bonds at amortised cost and, before 2021, bonds classified as held to maturity. Dashed lines denote the minimum and maximum values across TFs.

Chart III.6 CB
Developments in the insurance sector

(four-quarter sum; CZK billions)



Note: The values are in gross terms, i.e. unadjusted for reinsurers' share.

Chart III.7 CB
Premiums and claim settlement costs in non-life insurance

(CZK billions)

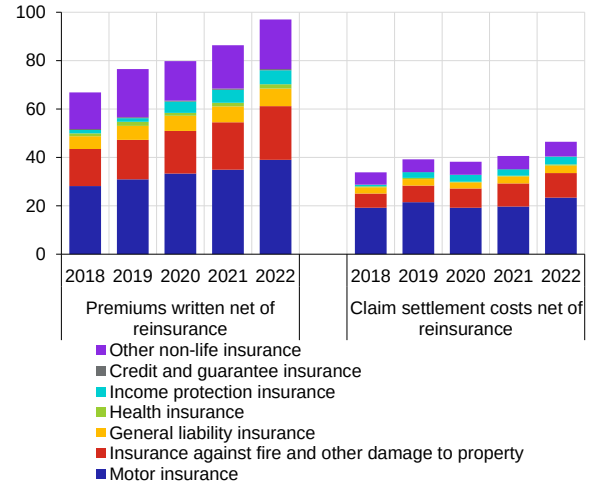


Chart III.8 CB
Insurance sector profitability

(%)

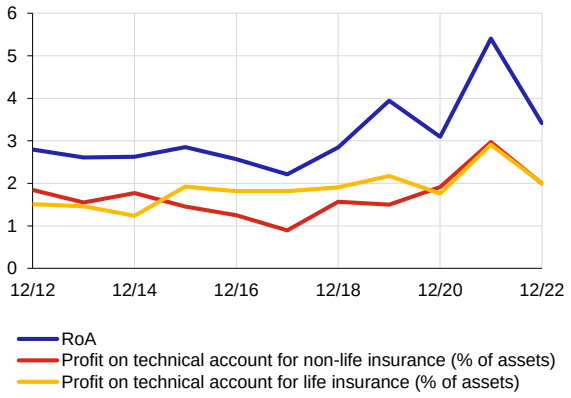
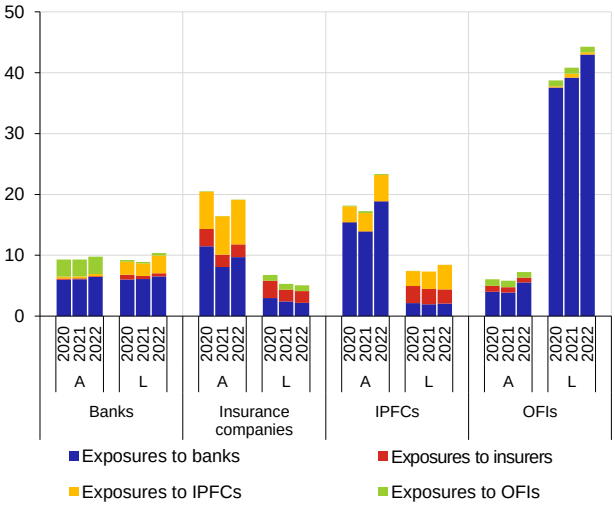


Chart III.9 CB
Share of exposures to domestic financial counterparties

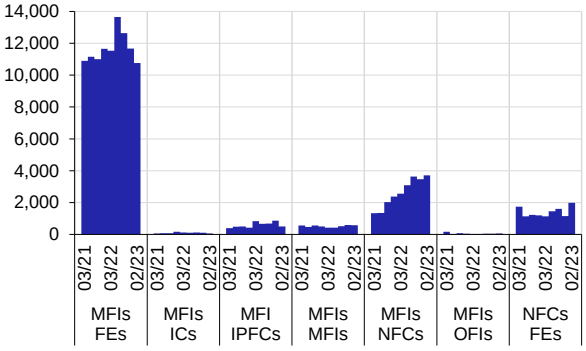
(% of financial assets and liabilities of segments)



Note: A = assets, L = liabilities. IPFCs = investment and pension funds and companies. Other financial intermediaries (OFIs) primarily comprise NFCELs and non-bank investment firms. Year-end values.

Chart III.10 CB
Interconnectedness via derivatives transactions

(CZK billions)



Note: MFIs = banks, ICs = insurance companies, IPFCs = investment and pension funds and companies, FEs = foreign entities. Other financial intermediaries (OFIs) primarily comprise NFCELs and non-bank investment firms. The chart shows the nominal value of derivatives transactions between individual sectors. It is adjusted for mirror records. The data in the chart are for individual quarters from 2021 Q1 to February 2023.

SECTION IV

Table IV.1 CB
Liquidity stress test scenario

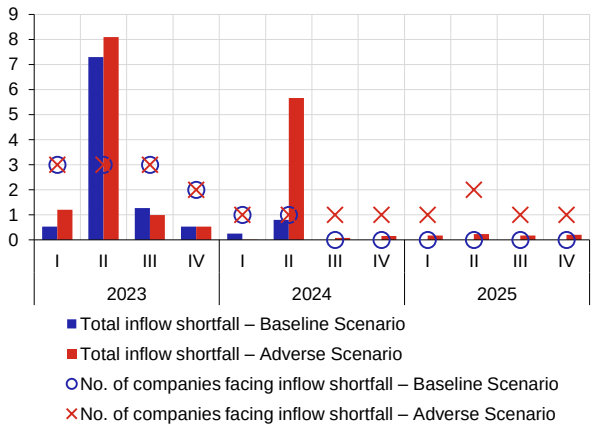
Outflow items, rate of outflow in %:	1M	2M&3M	>3M
Stable retail deposits	2%	1%	1%
Other retail deposits	3%	2%	1%
Operating deposits	10%	7%	5%
Non-operating deposits of credit institutions	100%	100%	100%
Non-operating deposits of other financial customers	25%	25%	25%
Non-operating deposits of central banks	0%	0%	0%
Non-operating deposits of non-financial corporations	10%	7%	5%
Non-operating deposits of other counterparties	15%	10%	5%
Liabilities from secured loans	100%		
Liabilities from securities issued	100%		
Maturity of derivatives	100%		
Other outflows	100%		
Increase in NFC loans	10% per 6M (1.6% per M)		
Retail credit lines	5%	5%	5%
NFC credit lines	15%	15%	15%

Inflow items, inflow haircut in %:	for each month
Retail loans	50%
Corporate loans	50%
Loans to other non-financial counterparties other than NFCs and retail	50%
Loans to and receivables from credit institutions and financial customers	0%
Other inflows	100%
Inflows from secured operations	0%

Liquid assets, haircut on liquid assets in %:	for each month
Corporate bonds	10–100% depending on quality
Covered bonds	10–100% depending on quality
Shares	40–100% depending on quality
Central government	10–20% depending on quality
Cash, T-bills, government bonds	0%

Chart IV.1 CB
Matching of insurance companies' cash inflows and outflows

(CZK billions and number of companies)



Note: The inflow shortfall is the total difference between cash inflows and cash outflows for insurance companies whose outflows exceeded inflows in the given quarter.

Chart IV.2 CB
Estimated change in interest rates on mortgage loans at refixing

(pp)

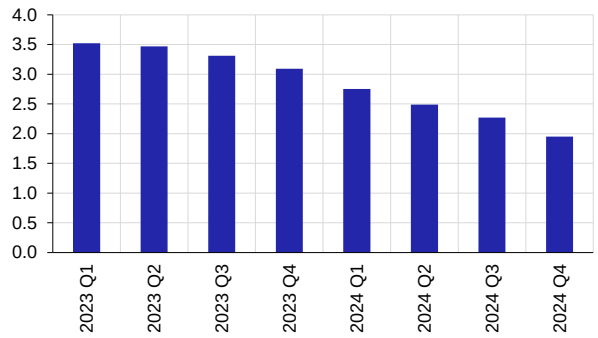
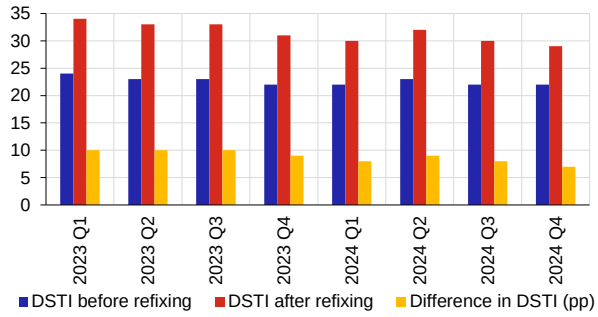


Chart IV.3 CB
Estimated DSTI ratios for refixed mortgage loans

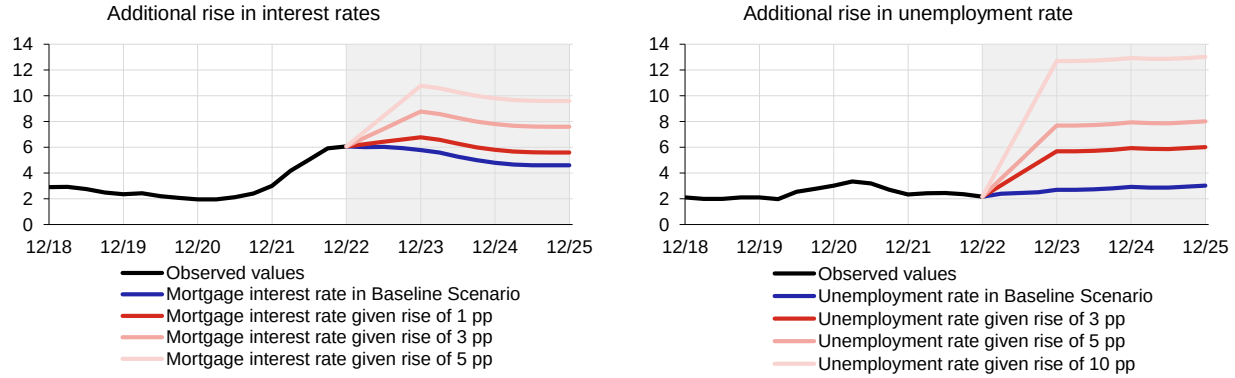
(%)



Note: The values in the chart are the weighted average DSTI ratios for refixed loans, weighted by the amount of principal outstanding.

Chart IV.4 CB
Additional rise in the unemployment rate and mortgage interest rates going beyond the *Baseline Scenario*

(%)



Note: The rise is adjusted to the given level in the first year of the scenario. A constant spread between the values in the *Baseline Scenario* and the modelled rise is maintained from the second year of the scenario onwards.

SECTION V

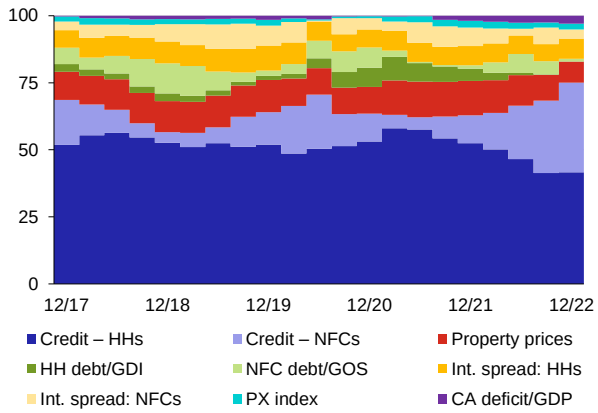
Table V.1 CB
Summary of intermediate objectives and macroprudential instruments and evolution of specific risks

Intermediate objectives	Specific risk	Existence of specific risk in CZ	Key instruments	Applied in CZ	Detailed information
Mitigate excessive credit growth and leverage	Stronger credit recovery accompanied by easing of lending standards	Yes	Countercyclical capital buffer	Yes, since 2015	V.3
	Rising leverage, rising off-balance sheet risk	Potential	Macroprudential leverage ratio	No	-
	Low risk weights of significant credit portfolios	Potential	Macroprudential tool to mitigate systemic risk at Member State level (Article 458 CRR)	No	-
	Elevated growth in loans and risks in specific sector	Potential	Sectoral capital requirements (sectoral and broad-based systemic risk buffer)	Not as yet, CNB reacts to property exposure risks with other instruments	-
	Risk of spiral between property prices and property financing loans	Yes	LTV caps	Yes, from 2015 under Recommendation, since 2021 pursuant to law	V.4
	Risk of excessive household indebtedness and debt service	Yes	LTI, DTI, LSTI, DSTI caps	Yes, from 2018 under Recommendation, since 2021 pursuant to law	V.4
Mitigate excessive maturity mismatch and illiquidity	Long-term liquidity risk	Potential	Macroprudential NSFR	No	III.2
	Short-term liquidity risk	No	Macroprudential LCR	No	III.2
Limit exposure concentrations	Property exposure concentration	Potential	Systemic risk buffer	Not as yet, CNB reacts to property exposure risks with other instruments	-
	Sovereign exposure concentration	Yes	Public finance stress test	Yes, option of additional capital requirements in event of elevated sovereign risk, since 2015	-
Limit misaligned incentives	Potential impacts of problems in SIFIs on financial market stability and real economy	Yes	SIFI capital surcharges (G-SII and O-SII buffer)	Yes, O-SII buffer of 0.5%–2.5%	V.2
			Systemic risk buffer	No	V.2
Strengthen resilience of financial infrastructures	Counterparty default risk, interconnectedness of financial infrastructures	No	Margin and haircut requirements on CCP clearing	No	-
			Increased disclosure	No	-
			Systemic risk buffer	No	-

Note: The main goal of these instruments is to strengthen the resilience of the banking sector, not to mitigate systemic risk. The classification of intermediate objectives and instruments is based on *Recommendation of the ESRB of 4 April 2013 on intermediate objectives and instruments of macro-prudential policy* (ESRB/2013/1).

Chart V.1 CB
Breakdown of the financial cycle indicator

(shares of sub-indicators)



Source: CNB, CZSO

Note: The interest rate spread is defined as the difference between the client rate on new loans and the 3M PRIBOR.

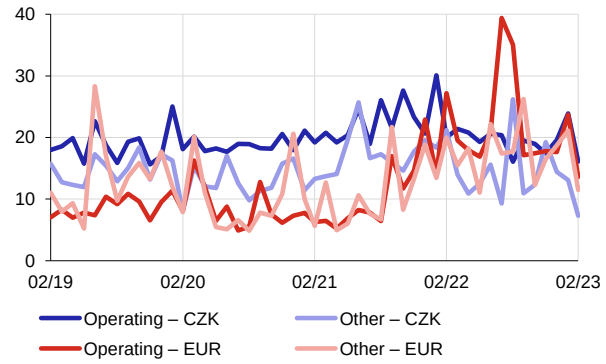
Table V.2 CB
Conversion of FCI values into the countercyclical capital buffer rate

Range of FCI values		CCyB rate
from	to	
0.00	0.09	0.00%
0.09	0.10	0.25%
0.10	0.12	0.50%
0.12	0.14	0.75%
0.14	0.16	1.00%
0.16	0.18	1.25%
0.18	0.20	1.50%
0.20	0.23	1.75%
0.23	0.26	2.00%
0.26	0.29	2.25%
0.29	1.00	2.50%

Note: The interval containing the current FCI value is indicated in red. The data refer to the original FCI, not the revised one.

Chart V.2 CB
Drawdown of loans to non-financial corporations

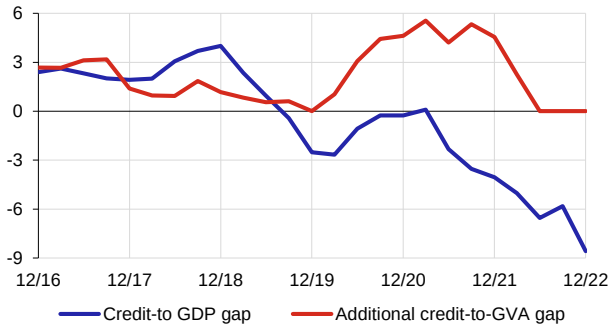
(monthly volume in CZK billions)



Note: The chart shows the estimate of total month-on-month growth in the volume of loans drawn for loans that (1) were not drawn in the previous month or (2) saw an increase in the amount drawn. The drawdown of loans drawn and repaid within one month is excluded. Foreign currency loans are adjusted for exchange rate effects.

Chart V.3 CB
Standardised credit-to-GDP gap and additional gap

(pp)

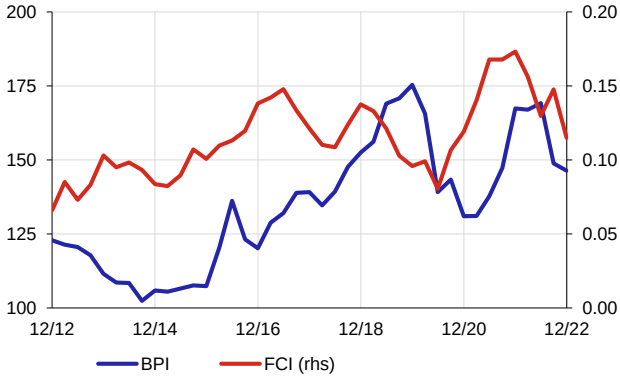


Source: CNB, CZSO

Note: The trend in the standardised gap is estimated using the HP filter (lambda = 400,000) over the entire time series. The additional gap – the expansionary credit gap – is calculated as the difference between the ratio of bank loans to the gross value added (GVA) of the private sector and the minimum level of this ratio over the past eight quarters.

Chart V.4 CB
BPI and FCI

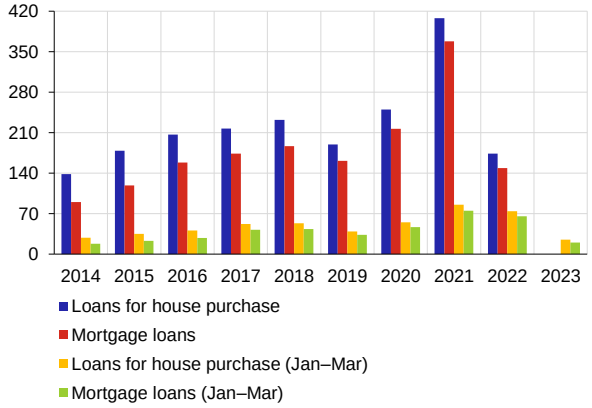
(%; right-hand scale: 0 minimum, 1 maximum)



Note: The BPI expresses the ratio of the margin on outstanding loans to provisions per unit of credit. The margin on outstanding loans is the difference between the client lending and deposit rate.

Chart V.5 CB
Pure new bank loans for house purchase

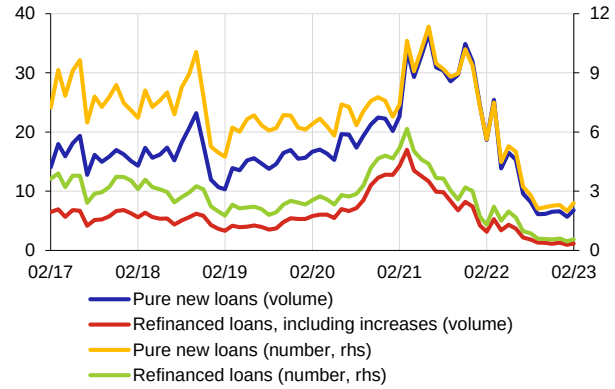
(CZK billions)



Note: All series include increases in existing loans. Mortgage loans fall within the category of loans for house purchase and for the purposes of this chart are defined as loans provided to households that are secured at least partly by a lien on immovable property.

Chart V.6 CB
Consumer credit secured by residential property

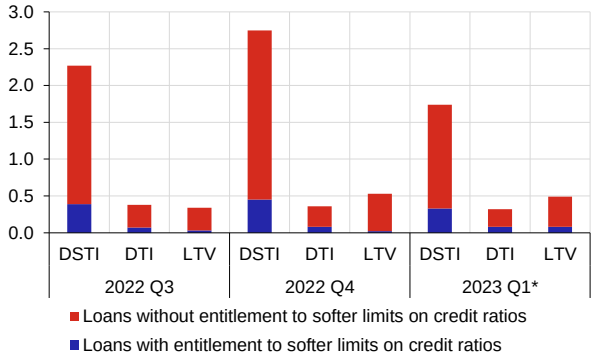
(CZK billions; right-hand scale: thousands)



Note: The data are based on the Survey and include mortgage loans and standard and bridging building society loans secured by residential property. The data may also contain undrawn loans.

Chart V.7 CB
Share of mortgage loans in the volume exemption by entitlement to softer limits on credit ratios

(%)



Note: The figures for 2023 Q1 contain data for January and February only.

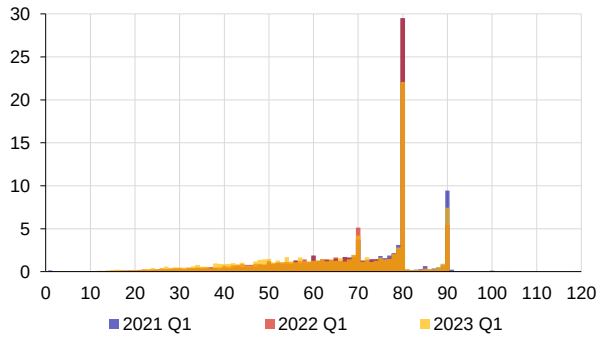
Table V.3 CB
Medians of variables describing the characteristics of households when taking out a mortgage loan

	2019 H2	2020 H1	2020 H2	2021 H1	2021 H2	2022 H1	2022 H2	2023 H1
Net monthly income (CZK thousands)	43.3	47.2	45.8	49.5	52.9	57.6	61.7	63.8
Year-on-year change (%)	9.9	13.2	5.6	4.8	15.7	16.5	16.6	13.5
Loan size (CZK thousands)	2,000	2,168	2,355	2,700	2,820	2,750	2,387	2,385
Year-on-year change (%)	4.2	15.0	17.8	24.5	19.7	1.9	-15.4	-17.5
Property purchase price (CZK thousands)	2,580	2,850	3,100	3,512	3,690	3,900	3,700	3,650
Year-on-year change (%)	9.5	14.2	20.2	23.2	19.0	11.1	0.3	-5.3
Mortgage loan instalment (CZK thousands)	8.2	9.5	9.9	11.2	12.4	14.5	14.9	14.9
Year-on-year change (%)	6.7	15.0	19.8	17.9	25.3	29.1	20.6	6.2
LTV (%)	72.4	71.9	73.8	71.4	70.0	67.6	66.0	66.4
DTI (net annual income)	5.0	5.3	5.5	5.8	5.9	5.5	4.8	4.5
DSTI (%)	32.8	32.8	32.8	33.6	35.3	38.4	38.7	37.3

Note: The figures pertain to the date when the new consumer credit secured by residential property was taken out. Net monthly income is the net income declared in the loan application and comprises the income of all persons listed in the loan agreement. The last half-year, indicated by *, contains data for January and February 2023 only. The year-on-year changes for the last half-year thus compare the January and February values between 2022 and 2023.

Chart V.8 CB
LTV distribution of mortgage loans

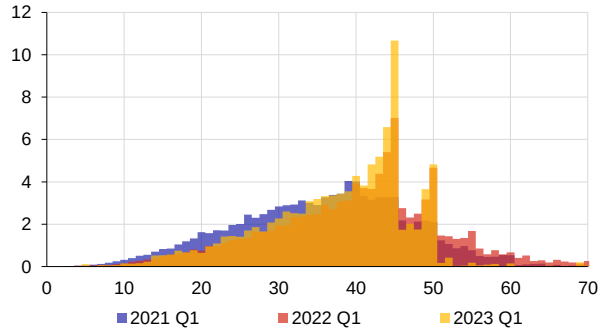
(%)



Note: Only pure new consumer loans secured by residential property are included. The data may also contain undrawn loans. The figures for 2023 Q1 contain data for January and February only.

Chart V.9 CB
DSTI distribution of mortgage loans

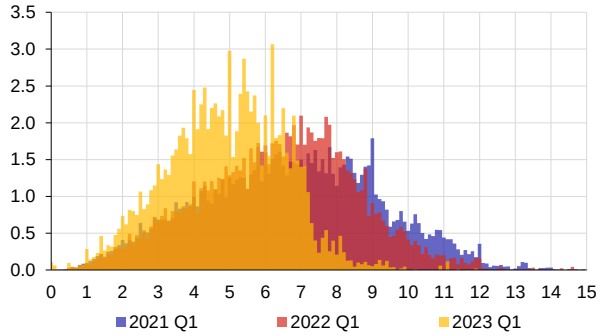
(%)



Note: Only include pure new consumer loans secured by residential property are included. The data may also contain undrawn loans. The figures for 2023 Q1 contain data for January and February only.

Chart V.10 CB
DTI distribution of mortgage loans

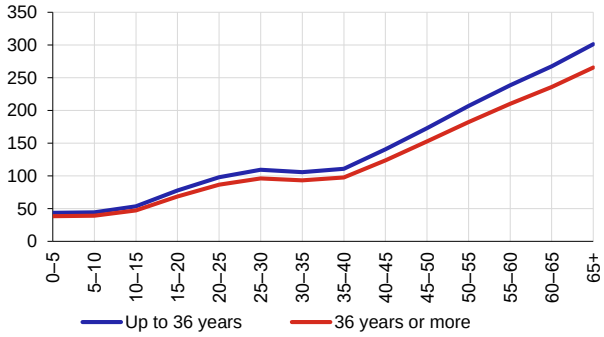
(%)



Note: Only include pure new consumer loans secured by residential property are included. The data may also contain undrawn loans. The figures for 2023 Q1 contain data for January and February only.

Chart V.11 CB
DSTI and estimated default rate on mortgage loans

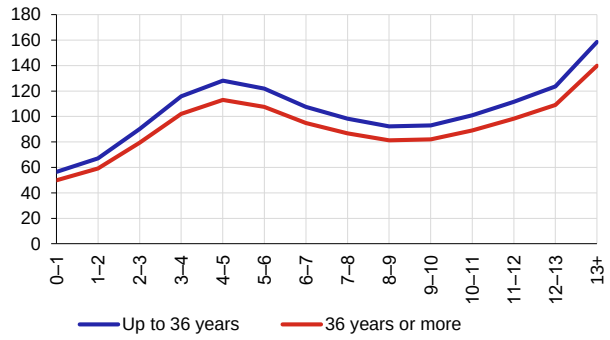
(estimated default rate, average for entire sample = 100; x-axis: DSTI in %)



Note: Model-estimated values smoothed using the LOWESS method. Age means the age of the borrower relevant for the application of the DSTI limit under the Act on the CNB. Intervals closed from the left and open from the right.

Chart V.12 CB
DTI and estimated default rate on mortgage loans

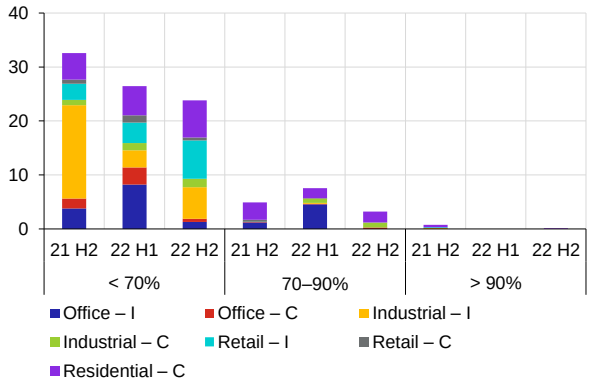
(estimated default rate, average for entire sample = 100; x-axis: DTI in net annual incomes)



Note: Consumer loans secured by residential property. Model-estimated values smoothed using the LOWESS method. Age means the age of the borrower relevant for the application of the DTI limit under the Act on the CNB. Intervals closed from the left and open from the right.

Chart V.14 CB
LTV distribution of new loans secured by commercial property over time

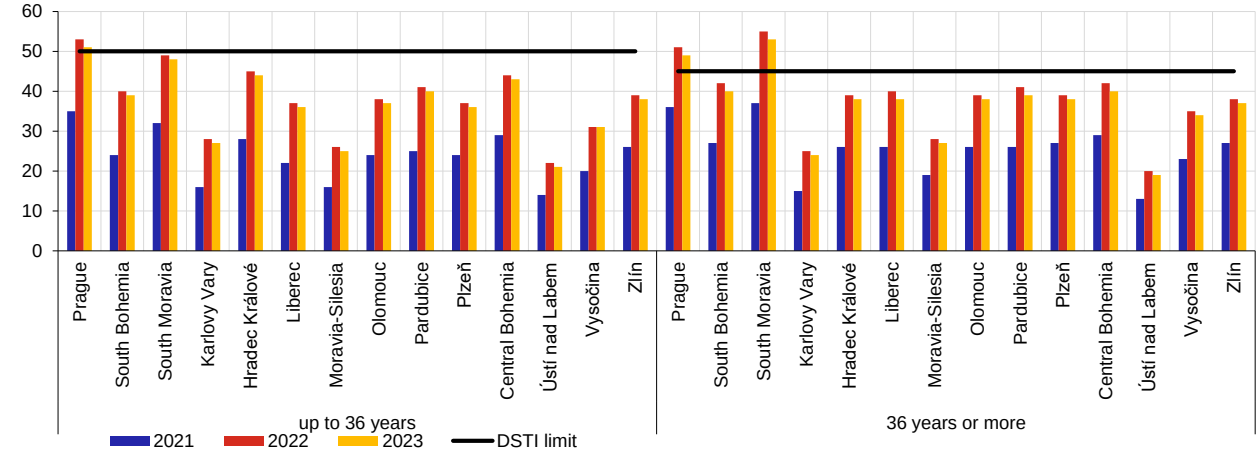
(CZK billions; x-axis: LTV in %)



Note: I: investment in property, C: construction.

Chart V.13 CB
Estimated affordability of a mortgage loan for a median-income household in terms of DSTI by region

(%)



Source: CZSO, CenovaMapa.org, CNB

Note: The calculation for 2023 is consistent with the CNB's spring forecast (MPR – Spring 2023). The estimate assumes that LTV = 80% and the purchase price equals the value of collateral.

Table V.4 CB
Key variables in the five-year scenario for the purposes of the simulation analysis

	Unemployment rate	Year-on-year change in wages	Interest rate on new mortgage loans	Year-on-year change in property prices	Inflation rate	Number of loans provided
1st year	2.5	9.6	5.9	-0.7	11.2	35,388
2nd year	2.8	8.5	5.2	5.0	2.1	44,810
3rd year	4.2	-0.3	4.3	0.7	1.4	43,442
4th year	7.4	2.8	3.2	-16.6	0.4	35,064
5th year	9.2	2.3	2.7	1.5	0.3	41,622

Note: The first two years of the scenario are based on the *Baseline Scenario*. An adverse deflationary scenario is defined for the subsequent three years.

Glossary

Bank Lending Survey: A survey of bank lending conditions for non-financial corporations and households in the Czech Republic, the pilot round of which took place in 2012 Q1. The survey aims to obtain qualitative information on current perceptions of the situation on both the supply and demand side of the credit market.

Basel III: A regulatory framework issued by the Basel Committee on Banking Supervision in 2010 which sets standards for capital adequacy of banks and now also for their liquidity. Overall, Basel III introduces stricter rules than the previous framework and came into existence mainly as a reaction to the financial crisis.

Breakdown of banks by total assets: In some charts and tables in the FSR, banks are assigned to groups based on the amount of their total assets. The breakdown of banks into groups is revised at the end of each calendar year. As from 2016, the breakdown of banks by total assets is as follows: large banks with a share of more than 10% of the banking sector's assets, medium-sized banks with a share of 2%–10% of the banking sector's assets and small banks with a share of less than 2% of the banking sector's assets.

Capital ratio: The ratio of regulatory capital to total risk-weighted assets. The Tier 1 capital ratio is the ratio of Tier 1 capital to total risk-weighted assets (see also Tier 1).

Capital requirement: The capital requirement is the amount of capital a bank has to hold so as to cover all the risks it undertakes.

Collective investment funds (CIFs): Mutual and investment funds whose sole business activity is collective investment, i.e. collecting funds from investors and investing them. CIFs are broken down by investor type into funds intended for the public (dominated by open-ended mutual funds) and funds for qualified investors, and by asset risk into money market, bond, equity, mixed and real estate funds and funds of funds. Sometimes the category of funds of funds is not listed separately, but is included in the other categories according to the type of funds in which they invest.

Consumer credit: A deferred payment, monetary loan, credit or other similar financial accommodation provided or intermediated to a consumer (see Article 2(1) of Act No. 257/2016 Coll., on consumer credit).

Consumer credit secured by residential property: Consumer credit that is secured by residential property within the meaning of the directly applicable EU regulation governing prudential requirements or is secured by a right in rem to that residential property (see Article 45a(2) of Act No. 6/1993 Coll., on the Czech National Bank).

Countercyclical capital buffer: A macroprudential tool designed to increase the banking sector's resilience to cyclical risks associated with fluctuations in lending.

Debt service-to-income (DSTI): The ratio of total debt service to the net income of the loan applicant.

Debt-to-income: The ratio of debt to the net income of the loan applicant.

Default: Default is defined as a breach of the debtor's payment discipline. In regulatory terminology (Regulation (EU) No 575/2013), The debtor is in default at the moment when it is probable that he will not be able to repay his obligations in a proper and timely manner, without recourse by the creditor to settlement of the claim from the security, or when at least one repayment (the amount of which deemed by the creditor to be significant) is more than 90 days past due.

Growth rate of outstanding loans: The year-on-year change in outstanding loans as used in financial stability analyses. Not usually adjusted for reclassifications, write-offs and the exchange rate. Adjustment is only applied in the event of the creation or dissolution of institutions. The growth rate thus differs from that used by the CNB in the monetary policy context, which is fully adjusted in accordance with the ECB approach harmonised across the EU.

IFRS 9: The financial reporting standard IFRS 9 *Financial instruments*, the final version of which was introduced in July 2014 by the International Accounting Standards Board (IASB), took effect on 1 January 2018 pursuant to Commission Regulation (EU) 2016/2067, replacing the previously valid IAS 39 standard. IFRS 9 lays down requirements for the recognition, valuation, impairment and derecognition of financial assets and financial liabilities and general hedge accounting. It aims to provide financial statement users with relevant information for assessing the size, timing and uncertainty of an entity's future cash flows.

Institutional investor: Either (a) a bank executing trades in investment instruments on its own account on the capital market, a management company, an investment fund, a pension management company or an insurance company, or (b) a foreign entity authorised to carry on business in the same fields in the Czech Republic as the entities listed under (a).

Interest margin: The difference between a bank's loan rate and its deposit rate.

Interest rate spread: Also interest rate differential; the spread between the interest rate on a contract (deposit, security) and a reference interest rate.

Leverage: See Leverage ratio.

Leverage ratio: The CRD IV/CRR rules define the leverage ratio as capital to risk-weighted assets. The term leverage is also often used in financial economics. There, however, capital is the denominator in the ratio (e.g. assets/capital or debt/capital). When we say that a bank has high leverage, we generally refer to the definition consistent with the assets/capital ratio. However, such a bank has a low leverage ratio.

Liquidity coverage ratio: A requirement to cover net liquidity outflows over a 30-day time horizon with liquid assets. It is calculated as the ratio of the liquidity buffer to the net liquidity outflow.

Loan for consumption: Credit used to finance household consumption. It also includes bank overdrafts and debit balances and credit card credit.

Loan for house purchase: Consumer credit (a) secured with real property or a lien on real property; (b) the purpose of which is (1) to acquire, settle or maintain rights to real property or part of real property; (2) to build real property or part of real property; (3) to pay for a transfer of a share in a housing cooperative or to acquire a share in another legal entity in order to acquire the right to use a flat or a house, (4) to change a building in accordance with the Building Act or to connect it to public networks; (5) to cover costs related to obtaining a cash loan, credit or other similar financial service with the purpose referred to in (1)–(4), or (6) to repay credit, a cash loan or other similar financial service provided for purposes referred to in (1)–(6); or (c) provided by a building society in accordance with the act regulating building savings schemes.

Loan service-to-income: The ratio of loan-related debt service to the net income of the loan applicant.

Loan-to-income (LTI): The ratio of the amount of a loan to the net income of the loan applicant.

Loan-to-value (LTV): The ratio of the amount of a loan to the value of collateral.

Loss given default (LGD): The ratio of the loss on an exposure in the event of counterparty default to the amount owed at the time of default.

Macroprudential policy: A key component of financial stability policy. It focuses on the stability of the financial system as a whole. Its main objective is to help prevent systemic risk.

Market liquidity: The ability of market participants to carry out financial transactions in assets of a given volume without causing a pronounced change in their prices.

Minimum Requirement for Own Funds and Eligible Liabilities (MREL): A sufficient volume of eligible liabilities is necessary for a failed bank to be recapitalised using internal funds (bail-in). In the event of a crisis, the CNB writes off or converts these liabilities. A sufficient MREL together with the application of a suitable combination of resolution tools thus enables a failed institution to be resolved without the use of public money.

Mortgage loan: Consumer credit secured by residential property.

Mortgage loan refinancing: The process whereby a mortgage debtor accepts a new mortgage loan from a different lender and uses it to repay the mortgage loan with the original lender. He thus becomes a debtor of the other lender. This is usually possible only at the end of the original loan's fixation period.

Mortgage loan refixation: The process whereby at the end of the fixation period of a mortgage loan the debtor selects the length of the new fixation period and negotiates new conditions for this period with the creditor. In this case, the identity of the creditor does not change.

Net stable funding ratio (NSFR): A structural liquidity requirement monitored over a one-year time horizon. It is defined as the ratio of available stable funding to required stable funding.

Non-bank financial corporations engaged in lending: Financial leasing companies, other lending companies, including consumer credit, credit card and hire-purchase providers, and factoring and forfaiting companies.

Non-performing loans: A loan is non-performing if at least one of the following two situations occurs: a) the debtor is unlikely to pay its credit obligations in full without recourse to actions such as realising security, b) the debtor is past due more than 90 days on a credit obligation. For details, see Article 178 of Regulation (EU) No 575/2013 of the European Parliament and of the Council.

Pension funds: In the Czech environment, pension funds are transformed and participation funds which are managed by pension management companies. Participation funds are further classed into obligatory conservative funds and other funds. Obligatory conservative funds are only allowed to invest in a significantly restricted group of assets.

Pillar 1: The first part of the CRD directive, focused on the determination of minimum capital requirements for all credit institutions to cover credit, market and operational risks.

Pillar 2: The second part of the CRD directive, requiring credit institutions to assess whether the Pillar 1 capital requirement is sufficient to cover all the risks to which they are exposed. This assessment process is reviewed by the supervisory authority under the supervisory review and evaluation process (SREP). The supervisory authority then can apply a wide range of instruments, including setting an additional capital requirement, for example to cover concentration risk.

Prague InterBank Offered Rate (PRIBOR): The reference interest rate on the interbank deposit market for deposit sales. Reference banks quoting the PRIBOR must be important participants in the interbank market.

Price-to-income (PTI): A housing affordability indicator calculated as the ratio of the property price to the annual income of the household or loan applicant.

Price-to-rent (PTR): The ratio of the price of an apartment to the annual rent. The price-to-rent ratio is the inverse of the rental return.

Property asking prices: Property sale asking prices in estate agencies. Asking prices should be higher than transaction prices. Property asking prices in the Czech Republic are published, for example, by the CZSO and the Institute for Regional Information (which also publishes data on market rent supply prices).

Property developers/developments: Companies/projects whose aim is to build a complex of residential and commercial property. Property developers' work includes choosing an appropriate site, setting up a project, obtaining the necessary permits, building the necessary infrastructure, constructing the buildings and selling the property. Developers also often organise purchase financing for clients and frequently lease or manage the property once it is built (especially in the case of commercial property). Given the combination of construction activity and speculative property purchases, developers' results are strongly dependent on movements in property prices.

Property transaction prices: Prices of actual transactions on the property market, which should be the closest to actual market prices. The CZSO has been publishing two types of data on property transaction prices since 2011. Prices based on Ministry of Finance statistics from property transfer tax returns and published by the CZSO are the older source. These data contain time series from 1998 and are available in a relatively detailed breakdown (by region, degree of wear and tear and type of property). On the other hand, they do not include transactions which are not subject to property transfer tax (i.e. primarily transactions in new property) and the index is published with a lag of at least half a year. The second, new source of data on property transaction prices is data from CZSO surveys in estate agencies. They cover new property, but are not available in such a long time series and such a detailed breakdown.

Return on assets (RoA): The ratio of pre-tax profit and interest to total assets of a firm.

Risk premium: The risk premium an investor demands on investments in riskier financial instruments.

Sovereign risk: The risk that a government will default on its obligations, leading to national bankruptcy or restructuring of government debt.

Systemic risk: The risk of a threat to the stability of the financial system or of financial instability.

Tier 1: The highest quality and, for banks in the Czech Republic, also the most significant part of regulatory capital. The dominant components of Tier 1 are equity capital, retained earnings and mandatory reserve funds.

VIX: An index of expected 30-day volatility of US stocks (S&P 500 index), derived from market prices of options traded at the Chicago Board Options Exchange. A higher value indicates higher expected volatility of the stock index, and therefore higher market uncertainty.

Volatility adjustment: A Solvency II measure enabling insurance (reinsurance) companies to adjust risk-free interest rates in order to reflect the effect of short-term volatility of bond spreads.

Abbreviations

AEs	advanced economies
BCBS	Basel Committee on Banking Supervision
BEA	Bureau of economic analysis (U.S. Department of commerce)
BIS	Bank for International Settlements
bp	basis point
BRCI	Bank Register of Client Information operated by Czech Credit Banking Bureau
C	construction
CB	central bank
CBCB	Czech Banking Credit Bureau
CCoB	capital conservation buffer
CCyB	countercyclical capital buffer
CDS	credit default swap
CEB	Czech Export Bank
CEE	Central and Eastern Europe
CET1	common equity Tier 1
CF	Consensus Forecast
CISS	Composite Indicator of Systemic Risk
CI	credit institution
CLO	collateralised loan obligation
CNB	Czech National Bank
CNCB	Czech Non-Banking Credit Bureau
COREP	The Common Reporting Framework
Coll.	collection
CPI	Consumer Price Index
CRD	Capital Requirements Directive
CRR	Capital Requirements Regulation
CSDB	Centralised Securities Database
CZK	Czech koruna
CZSO	Czech Statistical Office
DSCR	debt service coverage ratio
DSTI	debt service-to-income
DTI	debt-to-income
EA	euro area
EAD	exposure at default
EBA	European Banking Authority
EC	European Commission
ECB	European Central Bank
ECL	expected credit loss
EGAP	Export Guarantee and Insurance Company
EIB	European Investment Bank
EIOPA	European Insurance and Occupational Pensions Authority
EL	expected loss
EMs	emerging market economies
EMIR	Regulation on OTC derivatives, central counterparties and trade repositories
EMU	European Monetary Union
ESA	Joint Committee of European Supervisory Authorities
ESFS	European System of Financial Supervision
ESMA	European Securities and Markets Authority
ESRB	European Systemic Risk Board
EU	European Union
EUR	euro
EURIBOR	Euro InterBank Offered Rate (reference interest rate on the interbank market)
FCI	financial cycle indicator
FCLs	foreign currency loans
Fed	Federal Reserve System
FI	financial institution
FINREP	Financial Reporting
FSR	Financial Stability Report
G20	Group of Twenty
GB	government bond
GDI	gross disposable income
GDP	gross domestic product
GFSR	Global Financial Stability Report
GNI	gross national income
G-SII	Global systemically important institution
H	half-year
HBS	Household Budget Statistics
I	investment
IAS	International Accounting Standards
IFRS	International Financial Reporting Standards
ILO	International Labour Organization
IMF	International Monetary Fund
IPCC	Intergovernmental Panel on Climate Change
IPFCs	investment and pension funds and companies
IR	Inflation Report
IRB	Internal Rating Based Approach, an approach within the Basel II framework for capital adequacy of banks
IRI	Institute for Regional Information
IRS	interest rate swap

ISR	sovereign risk indicator
IT	information technology
LAA	loss absorption amount
LCR	liquidity coverage ratio
LGD	loss given default
LLP	loan loss provision
LSTI	loan service-to-income
LTI	loan-to-income
LTV	loan-to-value
M	month
MBs	mortgage bonds
MF CR	Ministry of Finance of the Czech Republic
MIT	Ministry of Industry and Trade
MM	money market
MPR	Monetary Policy Report
MREL	minimum requirement for own funds and eligible liabilities
$MREL_{TEM}$	Minimum requirement for own funds and eligible liabilities – total exposure measure
$MREL_{TREA}$	Minimum requirement for own funds and eligible liabilities – total risk exposure amount
MSCI	Morgan Stanley Capital International
NACE	General Industrial Classification of Economic Activities
NBER	The National Bureau of Economic Research
NDB	National Development Bank
NFC	non-financial corporation
NFCEL	non-bank financial corporations engaged in lending
NP	natural person
NPISH	non-profit institutions serving households
NPL	non-performing loan
NRCI	Non-bank Register of Client Information
NSFR	net stable funding ratio
OCI	other comprehensive income
OCR	overall capital requirement
OECD	Organisation for Economic Cooperation and Development
OFIs	other financial intermediaries
O-SII	Other systemically important institutions
PD	probability of default
P/L	profit/loss
PMC	pension management company
PMI	Purchasing Managers' Index
pp	percentage point
PRIBOR	Prague InterBank Offered Rate (reference interest rate on the interbank market)
PTI	price-to-income
Q	quarter
QA	quick assets
RCA	recapitalisation amount
RoA	return on assets
RPN	Research and Policy Notes
S&P	Standard & Poor´s
SCR	Solvency Capital Requirement
SHI	social and health insurance
SMEs	small and medium-sized enterprises
SMST	solvency macro stress test
SOLUS	Sdružení na ochranu leasingu a úvěrů spotřebitelům (Association for the Protection of Leasing and Loans to Consumers)
SRB	systemic risk buffer
STA	standardised approach to credit risk
SFA	stock flow adjustments
TEM	see $MREL_{TEM}$
TF	transformed fund
TLTRO	Targeted Longer-Term Refinancing Operations
TP	technical provision
TREA	see $MREL_{TREA}$
TSCR	total supervisory review and evaluation process capital requirement
TTC	through the cycle
ULI	Unit Linked Insurance
VIX	Volatility index
WGI	Worldwide Governance Indicators
WP	Working Paper
Y	year

Country abbreviations

AT	Austria	IT	Italy
AU	Australia	JP	Japan
BE	Belgium	KR	South Korea
BG	Bulgaria	KZ	Kazakhstan
BR	Brazil	LT	Lithuania
CA	Canada	LU	Luxembourg
CL	Chile	LV	Latvia
CN	China	MT	Malta
CY	Cyprus	MX	Mexico
CZ	Czech Republic	MY	Malaysia
DE	Germany	NG	Nigeria
DK	Denmark	NL	Netherlands
EA	euro area	NO	Norway
EE	Estonia	NZ	New Zealand
ES	Spain	PL	Poland
FI	Finland	PT	Portugal
FR	France	RO	Romania
GR	Greece	RU	Russia
HK	Hongkong	SE	Sweden
HR	Croatia	SI	Slovenia
HU	Hungary	SK	Slovakia
CH	Switzerland	TH	Thailand
ID	Indonesia	TR	Turkey
IE	Ireland	UK	United Kingdom
IL	Israel	US	United States
IN	India	ZA	Republic of South Africa
IS	Iceland		

Abbreviations of regions

HK	Hradec Králové Region
SB	South Bohemian Region
SM	South Moravian Region
KV	Karlovy Vary Region
LIB	Liberec Region
MS	Moravian-Silesian Region
OLO	Olomouc Region
PAR	Pardubice Region
PRG	Prague
PLZ	Plzeň Region
CB	Central Bohemian Region
UL	Ústí nad Labem Region
VYS	Vysočina Region
ZL	Zlín Region

Selected indicators

FINANCIAL STABILITY INDICATORS – PART 1

		2017	2018	2019	2020	2021	2022	2023 Jan.	2023 Feb.	2023 Mar.
Macroeconomic environment										
ME.1	Real GDP growth (year on year, %)	5.2	3.2	3.0	-5.5	3.6	2.5			
ME.2	Consumer price inflation (average annual index growth, %)	2.5	2.1	2.8	3.2	3.8	15.1	15.7	16.2	16.4
ME.3	General government balance / GDP (%)	1.5	0.9	0.3	-5.8	-5.1	-3.6			
ME.4	General government debt / GDP (%)	34.2	32.1	30.1	37.7	42	44.1			
ME.5	Trade balance / GDP (%)	5.1	3.7	4.1	4.9	1.1	-1.5			
ME.6	External debt in % of banking sector external assets	114.0	113.8	108.7	103.2	102.3	117.1			
ME.7	Balance of payments current account / GDP (%)	1.5	0.4	0.3	2.0	-2.8	-6.1			
ME.8	Monetary policy 2W repo rate (end of period, %)	0.50	1.75	2.00	0.25	3.75	7.00	7.00	7.00	7.00
Non-financial corporations										
NC.1	Return on equity (%)	10.7	10.2	10.7	7.3	10.2	14.1			
NC.2	Debt (% of total liabilities)	49.7	49.3	48.4	46.6	41.9	42.1			
NC.3	Credit indebtedness (% of GDP)	50.3	53.1	48.2	49.9	47.6	46.4			
NC.4	– loans from Czech banks (% of GDP)	20.0	20.0	19.3	19.7	19.5	18.2			
NC.5	– loans from Czech non-bank financial corporations (% of GDP)	4.5	4.5	4.3	4.4	4.1	4.0			
NC.6	– other (including financing from abroad. % of GDP)	25.8	28.6	24.5	25.5	24.0	24.2			
NC.7	Interest coverage (pre-tax profit + interest paid / interest paid, %)	26.8	25.2	15.0	14.7	18.4	12.6			
NC.8	12M default rate (%)	1.0	1.2	1.0	1.9	1.1	0.9			
Households (including sole traders)										
H.1	Total debt / gross disposable income (%)	58.8	59.1	59.0	60.8	62.3	57.9			
H.2	Total debt / financial assets (%)	26.3	24.6	24.3	23.2	24.0	23.8			
H.3	Net financial assets (total financial assets − total liabilities, % of GDP)	80.8	90.5	92.1	105.2	103.5	98.9			
H.4	Debt / GDP (%)	31.2	31.6	31.4	33.7	34.6	32.5			
H.5	– loans from Czech banks to households (% of GDP)	28.1	28.7	28.5	30.9	31.9	30.1			
H.6	– loans from Czech non-bank fin. corporations to households (% of GDP)	1.2	1.2	1.2	1.1	1.0	1.0			
H.7	– loans from Czech banks to sole traders (% of GDP)	0.8	0.8	0.8	0.8	0.8	0.7			
H.8	– loans from Czech non-bank fin. corporations to sole traders (% of GDP)	0.1	0.2	0.2	0.2	0.2	0.3			
H.9	– other (including financing from abroad. % of GDP)	1.0	0.9	0.9	0.9	0.8	0.7			
H.10	Net interest expenses / gross disposable income (%)	2.3	2.2	2.1	2.1	2.0	2.0			
H.11	12M default rate (%, excluding sole traders)	1.8	1.5	1.3	1.0	0.8				
Financial markets										
FM.1	3M PRIBOR (average for period, %)	0.4	1.3	2.1	0.9	1.1	6.3	7.2	7.2	7.2
FM.2	1Y PRIBOR (average for period, %)	0.6	1.5	2.2	0.9	1.4	6.5	7.3	7.2	7.2
FM.3	10Y government bond yield (average for period, %)	1.0	2.0	1.5	1.1	1.9	4.3	4.5	4.6	4.7
FM.4	CZK / EUR exchange rate (average for period, %)	26.3	25.6	25.7	26.5	25.6	24.6	24.0	23.7	23.7
FM.5	Change in PX stock index (% year on year, end of period)	17.0	-8.5	9.8	-5.2	38.8	-10.0	-7.2	-0.8	0.4
Property market										
PM.1	Total change in residential property prices (transaction prices, % year on year)	8.4	9.8	8.9	9.0	25.8	6.9			
PM.2	Change in apartment prices (asking prices according to CZSO, % year on year)	11.6	6.5	10.8	16.4	18.8	6.4			
PM.3	Apartment price / average annual wage	10.3	10.1	10.4	11.6	13.1	13.1			
PM.4	Apartment price / annual rent (according to IRI)	27.8	26.1	25.9	31.3	37.3	35.9			
Financial sector										
FS.1	Financial sector assets / GDP (%)	173.2	170.2	165.8	176.9	178.2	168.0			
FS.2	Shares of individual segments in financial sector assets (%)									
FS.3	banks	78.7	78.7	78.5	78.6	78.1	77.8			
FS.4	credit unions	0.3	0.3	0.3	0.3	0.2	0.2			
FS.5	insurance companies	5.7	5.6	5.1	4.9	4.8	4.3			
FS.6	pension management companies and funds	5.0	5.1	5.3	5.3	5.3	5.2			
FS.7	investment funds*	5.4	5.5	6.3	6.7	7.7	8.5			
FS.8	non-bank financial corporations engaged in lending	4.6	4.6	4.5	4.1	3.9	3.8			
FS.9	investment firms	0.3	0.2	0.1	0.1	0.1	0.1			
Non-bank financial corporations										
NI.1	Share in financial sector assets (%)	20.9	21.0	21.2	21.1	21.7	22.0			
	Insurance companies									
NI.2	Premiums written / GDP (%)	3.0	2.9	2.9	3.0	2.9	3.0			
NI.3	Ratio of eligible own funds to the solvency capital requirement (in %)	230.0	243.6	202.4	251.3	230.5	224.0			
NI.4	Change in financial investment of insurance companies (%, year on year)	4.2	1.4	-6.7	0.6	4.0	-10.2			
NI.5	Return on equity of insurance companies (%)	14.7	15.8	24.1	18.4	36.6	23.1			
NI.6	Claim settlement costs / net technical provisions (life, %)	14.4	15.3	16.6	14.2	14.4	19.3			
NI.7	Claim settlement costs / net technical provisions (non-life, %)	59.4	57.8	62.7	58.4	55.1	58.7			
	Pension management companies (PMCs) and PMC funds									
NI.8	Change in assets of funds managed by PMCs (%)	10.8	5.6	8.0	6.8	6.0	4.4			
NI.9	Nominal change in value of assets of PMC funds	3.6	-1.7	0.9	0.3	-0.3	1.0			
	Investment funds									
NI.10	Growth in net assets (= equity; year on year, %)	20.9	6.4	21.5	10.6	23.7	16.0	24.0	23.2	
	Non-bank financial corporations engaged in lending									
NI.11	Growth in loans from non-bank financial corporations engaged in lending (%):									
NI.12	total	7.8	4.6	2.9	-2.2	0.9	7.2			
NI.13	households	0.1	-0.4	6.9	-8.5	2.6	4.9			
NI.14	non-financial corporations	10.0	6.3	2.6	0.1	0.6	7.9			

FINANCIAL STABILITY INDICATORS – PART 2

		2017	2018	2019	2020	2021	2022	2023 Jan.	2023 Feb.	2023 Mar.
Banking sector										
BS.1	Bank assets / GDP (%)	132.7	130.6	126.9	135.5	136.7	131.1			
BS.2	Assets structure (%, end of period)									
BS.3	loans to central bank	32.9	32.0	32.2	29.0	27.7	26.5			23.5
BS.4	interbank loans	3.6	3.3	2.9	2.8	2.3	3.4			3.0
BS.5	client loans	44.7	46.0	46.2	45.8	46.1	44.6			47.3
BS.6	bond holdings	13.9	13.9	13.3	16.4	17.8	18.4			18.8
BS.7	– government bonds	8.1	8.3	7.7	11.2	12.5	13.2			13.5
BS.8	– Czech government bonds	7.2	7.5	7.1	10.5	12.0	12.9			13.1
BS.9	other	4.9	4.8	5.4	6.0	6.1	7.2			7.4
BS.10	Liabilities structure (%, end of period)									
BS.11	liabilities to central bank	0.3	0.3	0.1	0.5	0.5	0.4			0.4
BS.12	interbank deposits	16.2	15.3	12.9	8.2	7.8	9.0			8.3
BS.13	client deposits	61.0	62.5	64.0	66.1	66.0	69.8			67.7
BS.14	bonds issued	11.2	10.9	11.4	12.7	13.0	7.7			9.6
BS.15	other	11.3	11.0	11.6	12.4	12.7	13.1			14.0
BS.16	Client loans / client deposits (%)	73.3	73.6	72.3	69.2	69.9	63.8			69.8
BS.17	Sectoral breakdown of total loans (%)									
BS.18	non-financial corporations	33.1	32.7	32.5	30.2	30.9	30.4			
BS.19	households	46.6	46.9	47.8	47.7	50.6	50.1			
BS.20	sole traders	1.3	1.3	1.3	1.2	1.2	1.1			
BS.21	others (including non-residents)	19.0	19.1	18.4	20.9	17.2	18.3			
BS.22	Growth in loans (%, end of period, year on year):									
BS.23	total	4.6	7.2	4.4	4.2	7.0	5.8			4.9
BS.24	non-financial corporations	4.8	5.7	3.7	0.3	5.8	4.1			2.5
BS.25	– real estate activity (NACE L)	-1.7	5.2	7.5	4.8	0.9	7.1			9.0
BS.26	households	8.0	7.9	6.4	6.9	10.5	5.1			3.9
BS.27	– loans for house purchase	9.0	8.5	6.7	8.0	11.1	4.8			3.4
BS.28	– loans for consumption	4.1	6.4	7.2	0.8	6.5	7.3			7.0
BS.29	sole traders	10.1	5.6	8.1	2.2	1.3	-2.2			-2.8
BS.30	Non-performing loans / total loans (%):									
BS.31	total	4.0	3.3	2.5	2.7	2.4	1.9			1.9
BS.32	non-financial corporations	4.2	3.6	3.2	4.2	3.8	3.4			3.3
BS.33	households	2.5	2.1	1.6	1.7	1.4	1.2			1.2
BS.34	– loans for house purchase	1.8	1.5	1.2	1.1	0.9	0.7			0.7
BS.35	– loans for consumption	6.0	5.1	4.0	5.1	4.7	3.9			3.9
BS.36	sole traders	6.7	5.0	4.3	6.1	6.4	5.1			4.9
BS.37	Coverage of non-performing loans by provisions (%)	54.8	58.2	57.8	52.0	53.8	54.4			53.6
BS.38	Capital ratio (%)	19.4	19.8	21.5	24.7	23.7	21.8			22.3
BS.39	Tier 1 capital ratio (%)	18.8	19.3	21.0	23.9	23.0	21.1			21.5
BS.40	Leverage (assets as a multiple of Tier 1)	15.3	15.2	14.4	13.0	13.7	15.7			14.5
BS.41	Leverage ratio (Tier 1 capital / total exposures)	6.6	6.6	7.0	7.7	7.3	7.1			
BS.42	Return on assets (%)	1.1	1.1	1.2	0.6	0.8	1.1			1.1
BS.43	Return on Tier 1 (%)	17.2	17.8	18.4	8.4	11.5	18.2			16.9
BS.44	Quick assets / total assets (%)	42.0	41.2	40.7	41.2	40.9	38.5	41.8	42.3	42.5
BS.45	Quick assets / client deposits (%)	68.0	65.1	62.8	61.5	61.7	57.0	60.4	60.5	61.5
BS.46	Net external position of banking sector (% of GDP)	-21.4	-20.2	-18.2	-15.8	-16.8	-10.8			
BS.47	Banking sector external debt / banking sector total assets (%)	26.1	25.0	23.3	20.6	20.9	18.9			

ADDITIONAL INFORMATION ON THE INDICATORS

Owing to data revisions, some historical values of the indicators may not be comparable to those published in previous publications. Also, owing to a different date of update, the values of the indicators may not be the same as those referred in the text of this FSR. Missing values were unavailable at the time of preparation of the table.

ME.6	Total external debt in % of external assets held by MFIs and the CNB.
PM.1	Property prices based on the House Price Index, source: CZSO
PM.2	Apartment prices based on data from Společnost pro cenové mapy, s.r.o., apartment size 68 m^2.
FS.7	Act No. 240/2013 Coll., on Management Companies and Pension funds, was adopted in 2013, introducing the term "investment funds". Investment funds comprise collective investment funds and funds for qualified investors.
BS.25	Real estate activities (NACE L) comprise above all the activities of lessors, agents or brokers in the area of selling or purchasing property, renting property and the provision of other services related to property.
BS.37	Loans provided by the Czech Export Bank and the National Development Bank were excluded from the calculation.
BS.44, BS.45	Assets readily available to cover liabilities. They comprise cash and claims on central banks, claims on credit institutions and other clients payable on demand and bonds issued by central banks and general government.
NI.2 to NI.7	These indicators comprise domestic insurance companies (excluding the EGAP) and branches of foreign insurance companies.
NI.2	Premiums written include total gross premiums written for 12 months by domestic insurance companies including branches of foreign insurance companies (excluding EGAP).
NI.9	Change in the assets of pension funds adjusted for contributions and benefits.

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