

IV. STRESS TESTS

The resilience of selected sectors was tested in macro stress tests using a Baseline Scenario and an Adverse Scenario as usual (see section II.1). This year, the Baseline Scenario is similar in its parameters to the adverse scenarios of the tests performed in previous years. This year's Adverse Scenario assumes a resurgence of the pandemic and a long-running downturn in economic activity coupled with growth in government debt.

The macro stress test of the banking sector confirmed the sector's capital and liquidity resilience to the selected scenarios. However, if the Adverse Scenario were to materialise, the capital surplus held by banks would play a key role in keeping the sector's overall capital ratio above the 8% regulatory threshold over the test horizon. Currently solid capitalisation coupled with a strong client deposit base and a high proportion of liquid assets ensured banks' resilience to liquidity shocks. The results of the insurance sector stress tests showed that the sector as a whole is sufficiently resilient even if the adverse developments in financial markets were to continue. The stress test of pension management companies showed a slight increase in resilience. The outcome was favourably affected by growth in the excess of assets over liabilities and an improvement in the risk profile of the asset portfolio. The stress test of households with a mortgage is signalling a relatively low level of risk. Compared with 2019, however, the default rate among households is expected to increase after the loan moratorium ends. The vulnerable group will mainly comprise low-income households and households with a debt service-to-income ratio of over 45%. The CNB continues to regard credit institutions' sovereign exposures to the Czech government as systemically important. Despite the Czech Republic's current and expected state budget deficit, the results of the Czech public finance stress test did not show any need to require credit institutions to create an additional capital requirement to cover the risk of concentration of these exposures. A new test of investment funds, focusing on quantifying this sector's contribution to systemic network risk, revealed that this contribution was relatively small.

IV.1 STRESS TESTS OF BANKS

IV.1.1 Solvency macro stress test of banks

The solvency stress test is one of the most important tools for assessing the resilience of the domestic banking sector to potential risks to its stability. Particular attention is paid to credit risk, which has long been the most important risk in the Czech banking sector and whose evolution is closely linked with developments in the non-financial corporations and household sectors.

The modelling of credit losses is based on conservative assumptions

The modelling of credit losses is based, among other things, on an assumption of perfect foresight regarding the future evolution of the key credit risk parameters, which allows for the necessary level of conservatism.

The key stress test parameters take into account the government's and CNB's stabilisation measures

Both scenarios take into account the government's and CNB's stabilisation measures in the form of a loan moratorium for non-financial corporations and households, government-guaranteed loans, income support for some groups of the population, rent postponements/discounts, monetary policy rate cuts, a CNB recommendation to financial institutions to suspend dividend payouts, and partial release of the countercyclical capital buffer. However, the effect of the economic stabilisation measures would be weaker in the *Adverse Scenario*, mainly due to a persisting strong contraction in economic activity and potential exhaustion of the currently widened fiscal space on both the domestic and international scale.

In the *Baseline Scenario*, peaking credit losses cause the banking sector to incur a systemic loss in the second year

The *Baseline Scenario* is characterised by a pattern usually attributed to adverse scenarios. In this scenario, the economy contracts sharply in the first year of the test and recovers in the following two years (see [section II.1.3](#)). The sharp and strong contraction leads to a deterioration in the ability of non-financial corporations and households to service their debts. This is reflected in an increase in their default rates and loss given default (see [Table IV.1](#)). However, the economic stabilisation measures (the moratorium, government guarantees and income support) reduce the default rates, whose growth is not felt in full until the second year (see [Table IV.1](#)). The overall credit losses and provisions peak in the second year. A drop in the default rate in the third year of the test causes provisions for performing loans to stabilise.

Losses from market risk do not reach systemically material levels. Earnings for covering losses decline in the first two years, due mainly to a reduction in monetary policy rates. The banking sector's favourable starting position and the stabilisation measures enable the sector to stay profitable in the first year of the test. The impact of the coronavirus crisis is felt in full in the second year and the banking sector records an overall loss. It turns profitable again in the third year as the economy gradually stabilises.

Table IV.1
Key variables

(averages for given years in %)

	Actual value	Baseline Scenario			Adverse Scenario		
	2019	2020	2021	2022	2020	2021	2022
Macroeconomic variables (y-o-y)							
GDP	2.5	-8.0	4.2	3.9	-13.5	-0.9	2.0
Inflation	2.8	2.8	2.1	2.1	2.5	1.7	2.1
Unemployment*	2.0	3.5	4.8	4.3	4.0	7.9	7.9
Nominal wage growth	6.6	1.9	5.7	4.5	-2.2	4.2	1.6
Effective GDP growth in EMU	1.2	-6.0	5.2	3.0	-9.2	-0.8	2.7
Credit growth							
Non-financial corporations	4.2	3.2	-2.7	2.9	1.9	-6.8	-0.4
Loans for house purchase	7.3	4.6	3.0	4.6	4.2	-0.2	0.8
Consumer credit	5.0	1.3	2.1	5.7	-1.1	-2.7	3.2
Default rate (PD)							
Non-financial corporations	1.3	2.7	4.4	3.2	5.4	9.8	5.5
Loans for house purchase	0.6	0.6	1.8	1.6	1.7	5.5	4.8
Consumer credit	3.6	2.6	5.2	4.6	3.7	9.8	8.6
Loss given default (LGD)							
Non-financial corporations	32	35	38	38	44	53	51
Loans for house purchase	15	18	21	21	23	34	35
Consumer credit	42	48	53	51	50	65	65
Asset markets							
3M PRIBOR	2.1	0.9	0.6	1.1	0.0	-1.7	-0.8
5Y GB yield	1.5	0.8	0.8	1.5	1.1	1.7	2.1
3M EURIBOR	-0.4	-0.4	-0.5	-0.5	-0.4	-0.5	-0.5
5Y EUR GB yield	-0.6	-0.6	-0.5	-0.5	-0.5	-0.5	-0.5
Residential property prices	9.2	3.4	3.0	3.8	-2.2	-11.3	5.5
Share prices	-8.5		-15.0			-45.0	

Source: CNB, BRCI

Note: * The ratio of the number of unemployed persons to the labour force under ILO methodology.

Table IV.2
Impact of the scenarios on the banking sector

	Actual value	Baseline Scenario				Adverse Scenario		
	2019	2020	2021	2022	2020	2021	2022	
Provisions for non-performing loans								
CZK billions	9.4	-16.6	-39.2	-49.1	-18.2	-116.6	-130.9	
Provisions for performing loans								
CZK billions	0.0	-14.2	-12.1	5.2	-79.9	-35.1	28.0	
Total provisions								
CZK billions	9.4	-30.8	-51.3	-44.0	-98.1	-151.7	-102.9	
% of assets	0.1	-0.4	-0.7	-0.6	-1.3	-2.0	-1.4	
Profit/loss from market risks								
CZK billions	6.4	3.0	-0.7	-2.3	3.1	-0.8	-0.8	
Earnings for covering losses (adjusted operating profit)								
CZK billions	104.6	62.5	39.6	48.8	59.7	27.6	17.2	
Pre-tax profit/loss								
CZK billions	108.8	34.7	-12.4	2.5	-35.3	-125.1	-87.9	
% of assets	1.4	0.5	-0.2	0.0	-0.5	-1.7	-1.2	
Capital ratio at end of period in %								
Total	21.2	22.4	19.1	17.5	20.0	14.2	10.1	
Tier 1	20.7	21.9	18.7	17.1	19.6	13.8	9.8	
Capital injections								
CZK billions			0.0			28.1		
% of GDP			0.0			0.5		
No. of banks below 8% capital ratio								
			0			13		

Source: CNB

Note: Provisions are presented with a minus sign.

The banking sector remains well capitalised in the *Baseline Scenario*

The sector's aggregate capital ratio falls by 3.7 pp to 17.5% over the three-year test horizon (see Table IV.2). The decrease is due mainly to dividend payments after the easing of the restrictions on profit distribution and to growth in the risk weights of credit portfolios (see Chart IV.1). The aggregate credit losses are not so large as to reduce the sector's capital over the test horizon, due partly to the stabilisation measures, which positively affect the default rate, loss given default and lending to the economy. The banking sector thus stays resilient and maintains sufficient capital buffers owing to its capital surplus. Without the surplus, the capital ratio would drop to the level of the systemic risk buffer (see Chart IV.3). The results indicate that no bank's capital ratio would fall below the regulatory minimum of 8% (see Table IV.3). However, the capital ratios of three banks could drop below the total supervisory review and evaluation process capital requirement (TSCR, the sum of the Pillar 1 and Pillar 2 requirements), implying a need to top up capital by CZK 0.6 billion.⁸¹

The *Adverse Scenario* assumes a fall into a deep and long-lasting recession...

The *Adverse Scenario* assumes that the coronavirus crisis will persist due to a resurgence of COVID-19, which will hit Europe, including the Czech Republic, at the end of 2020. Its global scale (see section II.1.3) would lead to a further decline in foreign and domestic economic activity (see Table IV.1). Labour demand would continue to fall and aggregate employment would rise due to gradual exhaustion of governments' fiscal capacity to mitigate the impacts of the crisis and the deep downturn in economic activity.

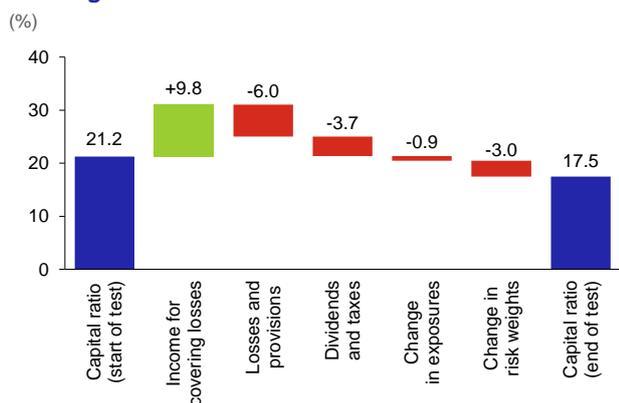
⁸¹ A bank may also get into a situation of an insufficient capital ratio because the stress test methodology assesses its business model as unsustainable even if this is not necessarily true. This is because the methodology is based on a universal bank model and may not be entirely accurate for specialised banking institutions. The CNB therefore takes institutions' specific characteristics into account when assessing the test results.

...which would result in the banking sector incurring significant losses

The risk parameters (PD and LGD) of the credit portfolio would increase sharply. However, the growth in the default rates of non-financial corporations and households would not manifest itself fully until the second and third years, as economic stabilisation measures would play a positive role in the first year, although their effect would gradually disappear. The growth in credit losses would peak in the second year (see Table IV.2). Losses from market risk would not reach systemically material levels. The high level of credit losses would lead to persisting systemic losses of the banking sector, which would also be caused by a drop in lending activity and an environment of sustained low monetary policy interest rates (see Table IV.2).

Chart IV.1

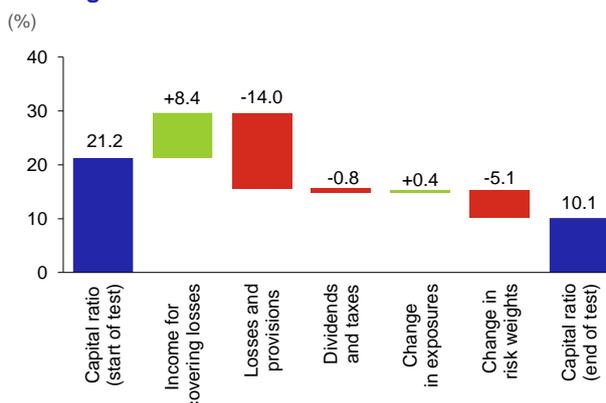
Decomposition of the change in the capital ratio of the banking sector in the *Baseline Scenario*



Source: CNB

Chart IV.2

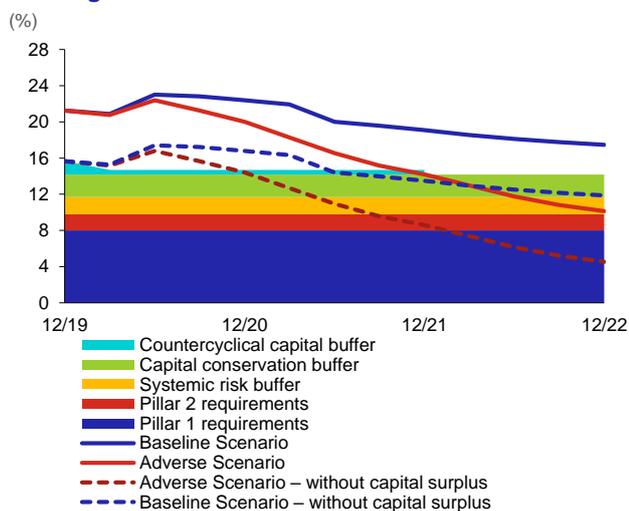
Decomposition of the change in the capital ratio of the banking sector in the *Adverse Scenario*



Source: CNB

Chart IV.3

Impact of the scenarios on the capital ratio and interactions with the capital requirements of the banking sector



Source: CNB

Note: The illustration depicts the macroprudential policy response as represented by full or partial release of the countercyclical capital buffer in the *Adverse Scenario*.

Table IV.3

Results of the stress tests for different minimum capital settings

Minimum settings	<i>Baseline Scenario</i>		<i>Adverse Scenario</i>	
	Capital injections in CZK billions	Banks below minimum	Capital injections in CZK billions	Banks below minimum
Pillar 1 (8%)	0.0	0	28.1	13
TSCR (Pillar 1 + Pillar 2)	0.6	3	62.6	17
TSCR + systemic risk buffer	0.6	3	96.5	18

Source: CNB

Note: Constant requirements in Pillar 2 and the systemic risk buffer over the entire test period are assumed for the calculation of capital injections.

In the *Adverse Scenario*, the capital ratio would fall sharply and would not comply with the regulatory minimum without the current capital surplus

The sector's aggregate capital ratio would fall by 11.1 pp to 10.1% over the three-year test horizon. The decline in the capital ratio would be due to significant credit losses (see Chart IV.2), which would be reduced to only a limited extent by the economic stabilisation measures, and growth in risk weights. The model results indicate that without the capital surplus, which would amount to 5.6% at the end of 2019, the capital ratio would decline to 4.5% and the sector would thus not comply with the regulatory minimum (see Chart IV.3) and the total supervisory review and evaluation process capital requirement (TSCR, the sum of the Pillar 1 and Pillar 2 requirements). The results show that the capital surplus

would play a key role in ensuring banking sector stability in the event of highly adverse economic developments. Thirteen banks would not comply with the 8% regulatory minimum in this model situation (see [Table IV.3](#)), implying a need to top up capital by CZK 28 billion (0.5% of GDP, or 5.2% of the banking sector's current capital). The capital ratios of 17 banks would fall below the TSCR, implying a need for a capital injection of CZK 63 billion (1.1% of GDP, or 11.5% of the banking sector's current capital).

The falling capital ratio would be reflected in the countercyclical capital buffer rate

The model impact of the *Adverse Scenario* shows that the capital ratio of the banking sector as a whole would gradually decrease, converging to the level of the capital requirements including the CCyB in the seventh quarter after the start of the test (see [Chart IV.3](#)).⁸² It would subsequently fall to the level of the capital requirement excluding the CCyB at the end of the eighth quarter.⁸³ Under the model assumptions of the *Adverse Scenario*, it can be assumed that by this time, the CNB would respond by fully releasing the CCyB, allowing it to be used to absorb the adverse economic shock.

IV.1.2 Bank liquidity stress test

The CNB assesses the banking sector's resilience to liquidity risk by means of a stress test

The stress test of the banking sector's liquidity is idiosyncratic⁸⁴ and static.⁸⁵ The aim of the test is to monitor the extent to which each bank balances its liquidity outflows by means of its liquidity inflows and its initial counterbalancing capacity over a period of six months. The test results yield information about whether and which banks experience a shortage of liquidity, i.e. fully exhaust their counterbalancing capacity in the form of liquid assets, after the stress scenario is applied (see [Box 5](#)). It is assumed that banks do not respond to any shortage of liquidity over the entire test period.

BOX 5: Methodology of the idiosyncratic stress test of the banking sector's liquidity

The test methodology is based on a similar principle as the LCR requirement for covering net liquidity outflows⁸⁶ (see the equation). The bank's counterbalancing capacity (b) comprises its liquidity buffer (LA) in the given period (t) and its net liquidity outflows (NO) accumulated in the previous period ($t-1$). The bank uses its counterbalancing capacity to cover its net outflows (NO) in the given period (t). These net outflows represent the difference between its liquidity outflows (OUT_t) and inflows (IN_t). The test is dynamic and simply monitors over a period of six months ($t = 1-6$) whether the bank will exhaust its counterbalancing capacity (a negative liquidity gap; $LG < 0$):

$$\sum_{t=1}^6 LG_t^b = \sum_{t=1}^6 \left(\sum_{i=1}^n LA_{i,t}^b (1 - h_{i,t}) - \sum_{T=1}^t NO_T^b \right)$$

$$NO_t^b = \sum_{i=1}^n OUT_{i,t}^b r_{i,t} - \sum_{i=1}^n IN_{i,t}^b (1 - p_{i,t})$$

The liquidity buffer (LA) is made up of the following assets (i): cash, withdrawable central bank reserves and tradable assets (T-bills, government bonds and other securities). The calculation of outflows (OUT) includes the following items (i): liabilities from securities issued and collateralised loans, deposit outflows, maturity of derivatives, loan facilities provided (an increase in loans) and other outflows (e.g. guarantees received and monetary pledges received). The calculation of expected inflows (IN) includes the following items (i): due amounts from collateralised loans and capital market transactions (e.g. inflows from repurchase operations, and bonds) and from loans and other receivables (interest on loans), maturity of derivatives, maturing securities in own portfolio, and other inflows.

The test parameters are given by the scenario (see [Table IV.1 CB](#)). Specifically for this year's test, the haircut on assets (h) in the liquidity buffer (LA) was set similarly as in the LCR test, the rate of outflow/realisation of credit lines (r) was set partly by expert judgement given the current situation and partly in line with the LCR test, the haircut on the expected inflow for retail loans and NFC loans (p) linked with the loan moratorium was set by expert judgement, and the rest were the same as in the LCR test.

82 The point of intersection of the upper bound of the light blue band indicating the CCyB and the red line showing the path of the capital ratio in 2021 Q3.

83 The point of intersection of the lower bound of the light blue band indicating the CCyB and the red line showing the path of the capital ratio in 2021 Q4.

84 The test does not assume a simultaneous liquidity outflow in all banks, i.e. a liquidity outflow from the system. The test focuses on individual banks. The test results therefore cannot be simply summed. This is because, in reality, a liquidity outflow of one bank often means a liquidity inflow of another.

85 The method corresponds to the sensitivity analysis conducted by the ECB "[Sensitivity Analysis of Liquidity Risk – Stress Test 2019](#)".

86 Although the LCR requirement for covering net liquidity outflows has rather stricter scenario parameters than those used in this test, the LCR is a stress test with a horizon of "only" 30 days.

The test scenario reflected developments related to the coronavirus crisis

The liquidity stress test on a sample of 18 banks applied a scenario designed solely to test the resilience of domestic banks to liquidity risk. On top of the stress parameters used every year, such as an outflow of deposits and unstable liabilities and a decline in the value of tradable assets, this year's scenario reflected the developments related to the coronavirus crisis. In the context of the loan moratorium (see Table II.1), a haircut of up to 50% on the liquidity inflows from repayments of loans to households and non-financial corporations was applied over the test horizon. In response to the difficult liquidity situation of many sole proprietors and non-financial corporations (see section II.2.2), up to 15% drawdown of credit lines and increased provision of operating loans to non-financial corporations (up to 10% over the test horizon) are also simulated. The scenario parameters can be considered quite severe (see Table IV.1 CB).

The test confirmed banks' robust liquidity position...

The test results confirmed banks' resilience to the liquidity risk tested (see Chart IV.4). Only one bank showed a slightly negative liquidity gap, and only at the six-month horizon. The sufficient level of liquid assets together with the high volume of stable deposits of the banks tested was able to cover net outflows in the longer term in the event of the idiosyncratic shock simulated. This was aided by the composition of domestic banks' liquid assets, which are made up almost entirely (97%) of T-bills and CNB bills (see Table IV.4). The loan moratorium did not significantly affect the liquidity position of most domestic banks either, as it accounted for only a small proportion of total quick assets (around 17% at the end of March 2020). An additional sensitivity analysis based on stricter scenario parameters revealed greater sensitivity of domestic banks to the level of drawdown of credit commitments to retail and non-financial corporations, as for some banks such commitments account for a relatively large proportion of total quick assets (around 21% on average at the end of March 2020). Although the hypothetical growth in drawdown of credit facilities to 50% used up a large part of the liquidity buffer, the liquidity gap remained positive.

Table IV.4
Shares of inflows in quick assets

(CZK billions; as of 31 March 2020)

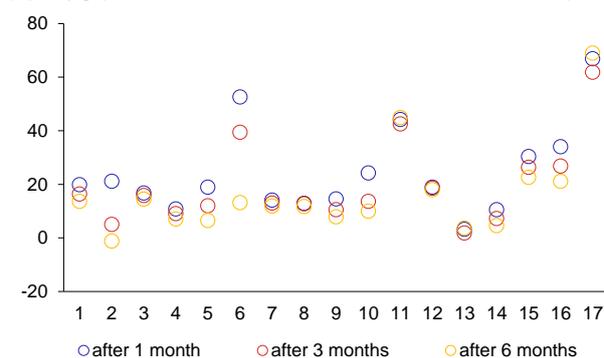
	Quick assets	Inflows from loans and other receivables in the following six months from:		Inflows as % of quick assets
		retail customers	non-financial corporations	
Banks, total	2,302	167	219	17
Large banks	1,698	128	159	17
Medium-sized banks	252	18	41	24
Small banks	292	10	18	10
Building societies	59	11	1	19

Source: CNB

Note: Quick assets are level 1 assets under Commission Delegated Regulation (EU) 61/2015. The definition of retail customers is also as set forth in this Regulation.

Chart IV.4
Results of the idiosyncratic test of the liquidity of individual banks

(liquidity gap in % of total assets; x-axis: bank; as of 31 March 2020)



Source: CNB

Note: The results take liquidity subgroups into account and exclude state-owned banks.

...but the CNB still broadened the range of collateral accepted in liquidity-providing repo operations for precautionary reasons

Although domestic banks' resilience to liquidity risk is high, the CNB for precautionary reasons added koruna mortgage bonds (MBs) to the range of collateral accepted in its liquidity-providing repo operations.⁸⁷ This change will enable domestic banks to expand their counterbalancing capacity of liquid assets to encompass MBs, as by pledging MBs they can obtain additional liquidity from the CNB in the amount set forth in the MB eligibility criteria (see Box 6). The koruna MBs held by the banks tested make up 4% of their total assets. If they were included, the counterbalancing capacity would rise by 13%. Koruna MBs account for almost 17% of the total mortgage loan portfolio.

87 See: <https://www.cnb.cz/en/monetary-policy/bank-board-decisions/CNB-Board-decisions-1588862880000/?tab=statement> and <https://www.cnb.cz/en/financial-markets/money-market/parameters-of-the-liquidity-providing-repo-operations/>.

BOX 6: Mortgage bonds as newly accepted collateral in the CNB's liquidity-providing operations

The CNB has been accepting MBs from banks as collateral for short-term credit since 18 May 2020 (see [Box 1, section II.1.2](#)). In simple terms, MBs are bonds issued by a bank and covered by an asset portfolio consisting largely of mortgage loans. MBs issued in CZK amounting to around CZK 332 billion had been issued as of the end of March 2020 (see [Table 1](#)). Most of them were held by banks, primarily within groups. These MBs had thus evidently not been issued to raise additional funding through the capital market.

Table 1 (BOX)
Mortgage bonds issued in CZK broken down by holder

(CZK billions; mostly as of 31 March 2020)

MB type by law	Holder					Total
	Banks	Insurance companies (as of 9 Apr 2020)	Pension funds	Investment funds (as of 29 Feb 2020)	Holder not identified	
MBs under the old Act	243.2	2.7	0.9	1.5	14.8	263.1
MBs under the new Act	60.9	4.5	1.4	0.174	1.8	68.8
Total	304.1	7.2	2.3	1.6	16.6	331.9

Source: CNB

MBs are issued pursuant to the Act on Bonds (No. 190/2004 Coll.), which was amended on 1 January 2019 (No. 307/2018 Coll.). The bulk of MBs issued in CZK (around CZK 263 billion as of 31 March 2020) are still issued under the old legislative framework (see [Table 1](#)). The amendment generally increased the legal certainty of MB holders, as it resolved their previously unclear position in insolvency proceedings in the event of bankruptcy of the issuer.⁸⁸ There are other differences as well (see [Table 2](#)): the upper LTV limit for individual cover mortgage loans, the level of over-collateralisation of the value of MBs, the number of cover pools created by issuers of covered bonds, and the treatment of cover-asset-related market risks. Cover mortgage loans may be covered by either residential or commercial property – the framework does not stipulate shares for them in the cover pool.⁸⁹ Cover pools made up of a higher share of mortgage loans backed by commercial property usually bear higher credit risk.

Table 2 (BOX)
Selected differences in legal frameworks

	Old framework	Amended framework
Limits for accepting assets into the cover pool	Individual LTV limit 200% and average for the entire portfolio max. 70%	LTV limit for individual receivables 100%, no limit for the entire portfolio but implicitly max. 100%
Rules for the cover pool*: over-collateralisation	NO: 100% collateralisation, i.e. the total value of all cover assets** is equal to the total value of the MBs they cover	YES: 2% over-collateralisation, i.e. the total value of all cover assets** must be equal to at least 102% of the total value of the MBs they cover
Rules for the cover pool*: coverage	One asset portfolio covering all MBs	A specific asset portfolio covers a specific MB. Together, they make up a cover block
Currency and interest rate risk related to the cover pool***:	Derivatives not part of the cover pool	Derivatives may be part of the cover pool
Insolvency proceedings:	Insolvency trustee: risk of automatic acceleration of MBs (sale of loans in the cover pool at an "unfavourable" price)	Trustee: administers the portfolio of cover assets; no acceleration of MBs

Note: * Cover pool = the sum of the cover assets; ** Cover assets = the sum of mortgage loans with prescribed properties and a limited percentage of other assets (other high-quality assets or derivatives at market value); *** Significant where the cover assets are in a different currency than the MB they cover.

The eligibility criteria set by the CNB for accepting MBs⁹⁰ as collateral take into account the legislative framework under which the MBs were issued and also whether the MBs have been admitted to trading on an exchange, have received an external rating and meet the conditions for preferential treatment under CRR. The haircuts applied are derived from these criteria. They range from 6% for MBs with a high external rating to 42% for MBs issued under the legislation in effect until January 2019, in own use, with no rating, and not satisfying the condition for preferential treatment under CRR.⁹¹

88 The Act was amended mainly because of the unclear scope of mortgage assets and the regime applying to them, especially as regards the moment of inception of mortgage assets and the range of assets included in mortgage assets, as well as the actual effect of commenced insolvency proceedings on mortgage assets and liabilities arising from MBs and on the risk of automatic acceleration of liabilities arising from MBs when the issuer is declared bankrupt.

89 The framework stipulates "only" the maximum share of cover mortgage loans in the portfolio. The share of mortgage loans is 90% in the old framework and 85% in the new one. Other assets and derivatives account for the rest.

90 MB eligibility criteria (in Czech only): <https://www.cnb.cz/cs/financni-trhy/penezni-trh/parametry-dodavaci-repo-operace/kriteria-prijatelnosti-pro-hypotecni-zastavni-listy-hzi-a-nastaveni-haircutu/>

91 Covered bonds eligible for preferential treatment under Regulation No 575/2013 of the European Parliament and of the Council (EU) of 26 June 2013 on prudential requirements for credit institutions and investment firms and amending Regulation (EU) No 648/2012. In simple terms, mortgage loans that cover these MBs have LTVs of 80% where the loan is secured by residential property and 60% where the loan is secured by commercial property. MBs worth almost CZK 400 billion met the condition for preferential treatment, regardless of the currency of the issue, at the end of 2019.

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

IV.2.1 Stress test of the insurance sector

This year's test focused mainly on the asset side of the sector's balance sheet

Given the high financial market volatility (see [section II.1](#)), the purpose of this year's macro stress test was to assess the domestic insurance sector's resilience to the risk of a further drop in investment asset prices.⁹² The test therefore only assessed the impact of investment risks (equity risk, real estate risk and growth in risk premia on government and corporate bonds) on the net earnings of the companies tested and subsequently on their solvency capital ratio (the ratio of eligible capital to the solvency capital requirement, SCR) at the three-year horizon. Companies are required to maintain this ratio at a minimum of 100%. Only investment assets for which the company tested bears an investment risk were repriced (i.e. assets linked to unit-linked products were excluded). Due to the high uncertainty regarding economic developments (see [section II.1](#)), the test makes a one-off assumption of a neutral aggregate impact of general interest rate risk,⁹³ future profit, insurance risks, dividend payments and other variables on companies' capitalisation.⁹⁴ In line with the prudential approach, recalculation of the SCR was not assumed in the test and the SCR value as of 31 December 2019 was considered over the entire test horizon. If the SCR were recalculated, it could be expected to decline mostly after the materialisation of the risks considered. This would favourably affect the resulting solvency capital ratio.

Prices of investment assets were tested under the *Baseline Scenario* and the *Adverse Scenario*

The test was based on companies' balance sheets as at the end of 2019. It covered 25 domestic insurance companies (excluding branches of foreign insurance companies) and one reinsurance company, which together accounted for 85% of the life insurance market and 95% of the non-life insurance market in 2019 as measured by their share in net premiums written. Investment assets in the tested companies' portfolios were gradually repriced according to the *Baseline Scenario* and the *Adverse Scenario* (see [Table IV.1](#)). In 2020 Q1, both scenarios roughly mirror the actual financial market developments. In the following periods, the *Baseline Scenario* assumes a gradual return of optimism and related gradual growth in share prices and a drop in risk premia on bonds. By contrast, the *Adverse Scenario* would lead to a further fall on stock markets and growth in risk premia due to a resurgence of the coronavirus pandemic and renewal of the related economic restrictions. This is consistent with a drop in property prices on the domestic market (see [section II.1.3](#)).

The domestic insurance sector gradually returns to the initial situation in the *Baseline Scenario*

The fall in prices of investment assets in 2020 Q1 led to a decline in the aggregate ratio of eligible capital to the SCR of 40 pp to 188% (see [Chart IV.5](#)).⁹⁵ The biggest absolute contribution to the aggregate decline in eligible capital of CZK 19 billion came from equity risk, which caused eligible capital to decrease by CZK 8.5 billion, followed by the risk premium on Czech government bonds (which caused capital to drop by CZK 7 billion). Under the *Baseline Scenario*, the decline halts in the following quarters and prices of investment assets start to rise again. In line with this, the ratio of eligible capital to the SCR gradually returns to roughly its initial level (see [Table IV.5](#)).

The insurance sector as a whole would also remain sufficiently capitalised in the *Adverse Scenario*...

In the *Adverse Scenario* there would be a bigger fall in prices of investment assets throughout 2020. Its materialisation would lead to a drop in aggregate eligible capital of CZK 28 billion to CZK 79 billion and a decline in the ratio of eligible capital to the SCR of 60 pp to 169% at the end of 2020 (see [Table IV.5](#)). As in the *Baseline Scenario*, the main source of this drop in capital in 2020 Q1 would be equity risk, while the growth in risk premia on bonds, including Czech government bonds, would be the biggest contributor in the rest of the year (see [Chart IV.6](#)). In the following two years of

⁹² Like last year, the macro stress test is based on insurance and reinsurance companies' balance sheets under the Solvency II legislative framework and evaluates their dynamic evolution at quarterly frequency.

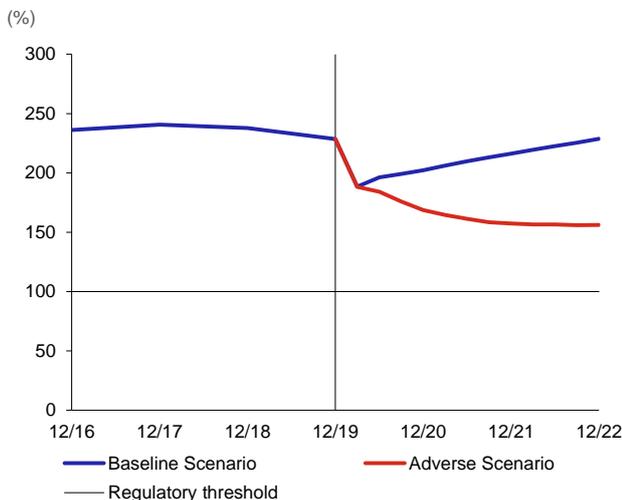
⁹³ For simplicity, this year's test assumed a zero impact of general interest rate risk for two reasons. First, this risk had a small impact in the previous rounds of tests due to the degree of matching of cash flows arising from companies' assets and liabilities. Second, given the macroeconomic developments, risk-free rates can be expected to remain very low and show relatively low volatility over most of the test horizon, so the probability of them changing suddenly and impacting on insurance and reinsurance companies' balance sheets is low. Abstracting from interest rate risk resulted in the test not assessing the effect of the application of volatility adjustment this year.

⁹⁴ This can be interpreted as an assumption of a drop in insurance and reinsurance companies' profit due to the partial materialisation of some insurance risks in both scenarios. The reduced profit would be paid out fully in dividends due to assumed pressure from shareholders. For prudential reasons, the test was based on the amount of eligible capital reported at the end of 2019, i.e. the amount reduced by the initially expected dividends. Likewise, the test did not consider future mergers and acquisitions in the insurance sector and did not account for the fact that the SCR of some small reinsurance companies was lower than the minimum capital requirement that insurance and reinsurance companies are also obliged to meet.

⁹⁵ The data reported by companies covered as of 31 March 2020 showed that the actual decline in the aggregate ratio of eligible capital to the SCR in 2020 Q1 was 34 pp and was thus slightly smaller. Some specific effects also contributed to this decline, so the actual impact of the fall in prices on financial markets on capitalisation was lower as of 31 March 2020 than the test result under the *Baseline Scenario*. This was due, among other things, to the scenario assuming "average" repricing of assets in various risk categories, while the actual repricing differed across assets.

the test, the materialisation of the Adverse Scenario would give rise to a further moderate fall in prices of investment assets, which would lead to a drop in eligible capital of a further CZK 6 billion and a fall in the ratio of eligible capital to the SCR of 13 pp to 156%.

Chart IV.5
Ratio of eligible capital to the solvency capital requirement



Source: CNB

Table IV.5
Results of the macro stress test of the domestic insurance sector

(CZK billions; year-end values, impact of repricing for whole year)

	Actual value	Baseline Scenario				Adverse Scenario		
		2019	2020	2021	2022	2020	2021	2022
Total assets of companies covered	452							
Assets covered by tests	294	281	288	294	266	260	260	
Shares and other equity	38	32	35	38	29	25	22	
Czech government bonds	145	140	143	145	133	134	137	
Foreign government bonds	26	26	26	26	25	25	25	
Corporate bonds	67	65	65	66	62	61	60	
Real estate	17	18	18	19	17	15	16	
Impact of asset repricing								
CZK billions		-12	7	6	-28	-5	-1	
% of previous year's assets		-4.2	2.3	2.0	-9.5	-2.0	-0.2	
SCR	47	47	47	47	47	47	47	
Eligible capital to cover SCR	107	95	101	107	79	74	73	
Eligible capital/SCR (%)	229	202	216	229	169	157	156	

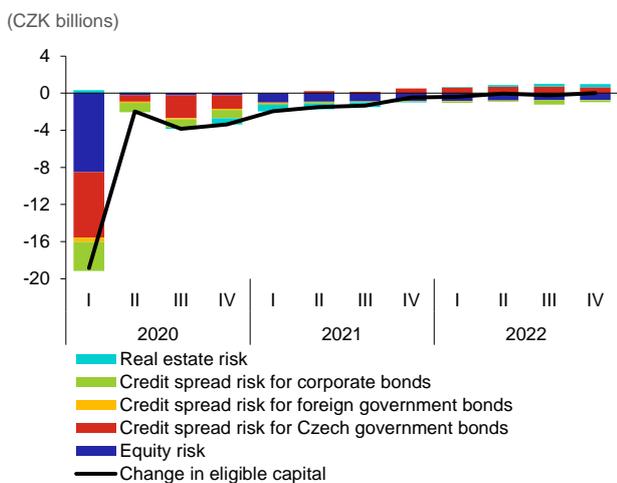
Source: CNB

Note: SCR = solvency capital requirement.

...the drop in eligible capital would lead to one of the tested insurance companies failing to meet the SCR

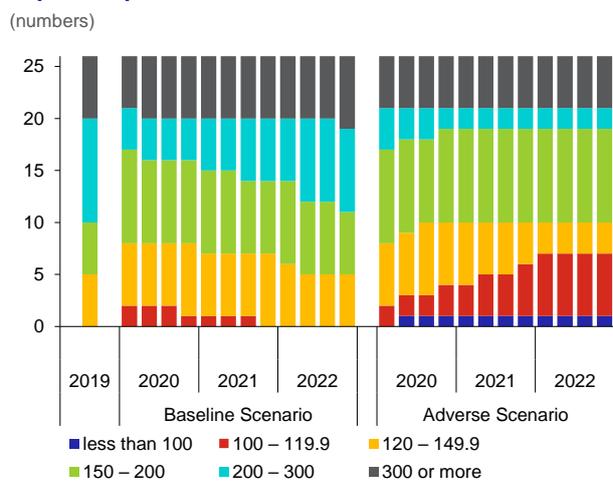
Under the *Adverse Scenario*, the continued decline in prices of investment assets would lead to one insurance company's ratio of eligible capital to the SCR dropping below 100%. Other companies would approach the 100% level from above. As of 31 December 2019, the ratio of eligible capital to the SCR was 120%–150% in five companies and exceeded 150% in the rest. After the application of the *Adverse Scenario*, it would fall below 120% in seven companies at the end of 2022 (see [Chart IV.7](#)).

Chart IV.6
Decomposition of the changes in eligible capital in the Adverse Scenario



Source: CNB

Chart IV.7
Companies by ratio of eligible capital to the solvency capital requirement



Source: CNB

IV.2.2 Stress test of pension management companies

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

The stress tests of pension management companies (PMCs) focus on assessing the risks to transformed funds (TFs) managed by PMCs⁹⁶ at the one-year horizon using the end-2019 data. Besides the *Baseline Scenario*, the sector's resilience to the model *Adverse Scenario* was also tested (see section II.1.3 and Table IV.1). Due to the financial market developments in the first few months of 2020, the *Baseline Scenario* is rather similar in its parameters to the *Adverse Scenario* of the tests performed in previous years. The *Adverse Scenario* assumes a resurgence of the pandemic, a long-running downturn in economic activity and gradual exhaustion of state budgets' fiscal room for supporting the economy. The tests were performed on TFs' portfolios using the end-2020 rate and risk parameter projections as stress scenario parameters. The parameter levels also reflect the developments observed on financial markets up to the end of 2020 Q1.

The assets of transformed funds would be favourably affected by a decline in risk-free rates in both scenarios...

Risk-free money market rates (IRS) would reprice significantly in both the *Baseline Scenario* and the *Adverse Scenario* (see Chart II.23F) in response to the monetary policy easing. A decline in IRS curves would lead to growth in TFs' total assets of 3.1% in both scenarios (see Table IV.6).

Table IV.6
Results of the stress test of PMCs

	<i>Baseline Scenario</i>		<i>Adverse Scenario</i>	
PMC equity (start of test, CZK bil)	10.5		10.5	
Capital ratio (start of test, %)	168.0		168.0	
Change in TF asset value due to:	CZK billions	% of TF assets	CZK billions	% of TF assets
general interest rate risk	13.6	3.1	13.9	3.1
credit spread risk for corporate securities	-2.7	-0.6	-6.7	-1.5
credit spread risk for government securities	-7.1	-1.6	-15.7	-3.5
exchange rate risk	0.0	0.0	-0.6	-0.1
equity risk	-0.7	-0.1	-1.9	-0.4
real estate risk	0.0	0.0	-0.3	-0.1
Total impact of risks on TF assets	3.1	0.7	-11.3	-2.5
TF asset top-up need (CZK billions)	0.0		3.9	
PMC equity (end of test, CZK billions)	11.2		7.0	
Capital ratio (end of test, %)	182.1		116.4	
Capital injection into PMCs (CZK billions)	0.0		1.0	

Source: CNB

Note: Start of test: end of 2019; end of test: end of 2020. TF stands for transformed funds. PMC stands for pension management company.

Table IV.7
Year-on-year comparison of PMC stress test results in the *Adverse Scenario*

Data on capital and exposures as of	31 Dec 2018	31 Dec 2018	31 Dec 2019
Scenario	Last year's (FSR 2018/2019)	This year's (FSR 2019/2020)	This year's (FSR 2019/2020)
Fall in TF asset value due to shocks considered (%)	1.8	2.7	2.5
TF top-up need (CZK billions)	3.4	6.4	3.9
Number of TFs needing top-ups	7	7	7
Injections by owners to meet capital requirements (CZK billions)	0.9	3.3	1.0
Number of PMCs needing capital injections to meet capital requirements	3	6	3

Source: CNB

Note: Remuneration for asset management is not included. This year's methodology includes an assessment of corporate bonds underwritten by the government as government bonds and other technical changes. This year's scenario also includes a change in the method for calculating the shock to corporate bonds. PMC stands for pension management company.

...but the growth in the risk premium would outweigh the positive effect in the *Adverse Scenario*

TFs' bond portfolio responds to a rise in the risk premium on bonds. An increase in the credit spreads on government and corporate bonds would result in a drop in TFs' assets of 1.6% and 0.6% respectively in the *Baseline Scenario* and would lead to a drop in TF's assets of 3.5% and 1.5% respectively in the *Adverse Scenario* (see Table IV.6). In the *Baseline Scenario* the overall impact of the materialisation of interest rate risk (the drop in risk-free rates and the rise in the risk premium) is positive, whereas in the *Adverse Scenario* the growth in the risk premium would outweigh the effect of the drop in risk-free rates, so the overall impact would be negative (see Table IV.6). TFs holding a large part of their assets in fixed-rate koruna bonds with longer durations would be hit hardest by the materialisation of credit spread risk. TFs would reduce the impact of the potential interest rate shock by holding bonds to maturity⁹⁷ (39% of the bond portfolio is valued at amortised cost)⁹⁸ and investing in floating-rate bonds (a further 23% of the bond portfolio).⁹⁹ The impacts of

96 Participation funds were not tested, as their market losses affect the funds' clients and not PMCs. Moreover, they account for 12.0% of the sector's total assets.

97 In the case of market repricing of all bonds regardless of their accounting classification, in the *Adverse Scenario* total assets would fall by a further 0.8 pp and the size of the capital injection by PMC owners would rise by CZK 1.6 billion due to a drop in IRS rates and a change in the credit spread. Market repricing of the portfolio held to maturity does not create a need for a capital injection in the *Baseline Scenario*.

98 The law allows TFs to include high-quality government bonds of up to 35% of their total assets in the portfolio classified as held to maturity, which is valued at amortised cost. This portfolio accounted for 30.2% of TFs' total assets in December 2019.

both shocks (especially in the case of koruna assets) would be reduced slightly by derivative hedging, which, however, TFs have long made little use of.

The other risks monitored have no material impact in the stress test

Foreign currency assets account for 10.8% of total assets in TFs' balance sheets. Due to long-term high-quality derivative hedging, however, exchange rate risk (see [Chart IV.9](#)) would not lead to material impacts and the value of TFs' assets would decrease by just 0.1% in the *Adverse Scenario* (see [Table IV.6](#)). Equity securities account for only 1.4% of TFs' assets, so the impact of equity risk would not be very significant despite a considerable fall in share prices of 45% in the *Adverse Scenario*. Risks associated with investment in real estate have a minimal impact.

In the *Adverse Scenario*, the capital adequacy of some PMCs would fall below the required minimum

PMCs guarantee non-negative returns for the clients of their TFs by law. If a TF's assets declined below its liabilities, the relevant PMC would be obliged to top up the TF's assets with capital. This situation does not arise in the *Baseline Scenario*. The *Adverse Scenario* would indicate a need to top up the assets of seven of the eight PMCs by a total of CZK 3.9 billion. The capital adequacy of three of them would simultaneously decline below the required level. The PMC owners would have to inject capital of CZK 1 billion in order for their PMCs to satisfy the capital adequacy requirement. This constitutes a slight increase compared with last year's stress test. However, it does not indicate any material systemic risks for PMCs.

Transformed funds and pension management companies increased their capitalisation compared to last year

After the application of this year's *Adverse Scenario* to last year's data, the capital injection need would amount to CZK 3.3 billion (CZK 1.0 billion this year) and would concern six PMCs (three this year). TFs would simultaneously be required to top up capital by CZK 6.4 billion,¹⁰⁰ as against CZK 3.9 billion this year (see [Table IV.7](#)). PMCs' enhanced resilience is due to an increase in the combined capital surplus, i.e. the capital surplus of PMCs and the surplus of assets over liabilities of TFs, and a simultaneous improvement in the risk profile of TFs' portfolios.

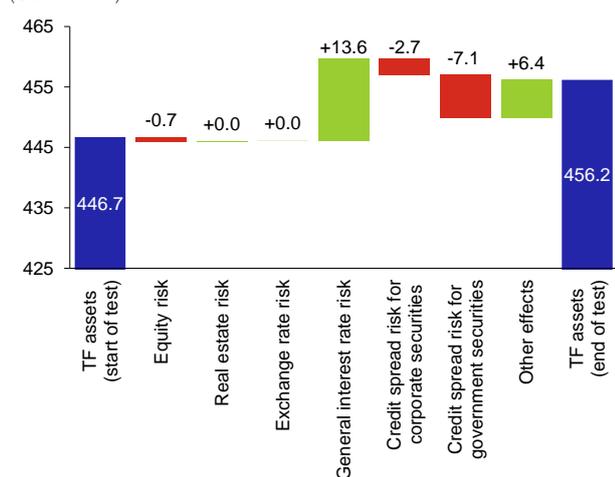
The higher combined capital surplus enhances the sector's resilience

Despite the strong stress of the *Baseline Scenario*, the year-on-year growth in capitalisation enables PMCs to absorb market shocks without the need to top up their TFs' assets. However, the impact of the *Adverse Scenario* would reveal a potential need to top up the capital of TFs and PMCs, indicating that larger capital surpluses of both TFs and PMCs (see [section III.3](#)) would further enhance their resilience to the risks associated with highly adverse economic developments.

Chart IV.8

Change in the value of assets of transformed funds due to the individual types of risks in the *Baseline Scenario*

(CZK billions)

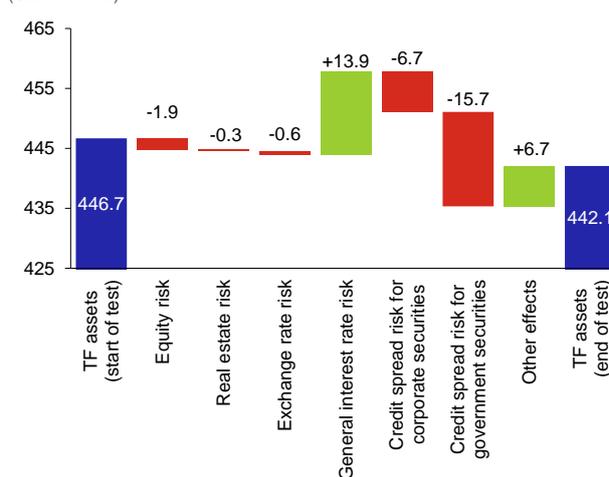


Source: CNB

Chart IV.9

Change in the value of assets of transformed funds due to the individual types of risks in the *Adverse Scenario*

(CZK billions)



Source: CNB

Note: Other effects represent dividend income, bond coupons received and the return on the HTM portfolio. Change in the value of foreign currency liabilities (cross-currency repos) is accounted for when considering exchange rate risk.

99 Floating-rate bonds held to maturity are not included in this 23%.

100 Of this amount, CZK 2 billion would be required due to a lower surplus of assets over liabilities and the remaining CZK 4.4 billion due to a riskier portfolio profile.

IV.2.3 Stress test of investment funds

A new macro stress test of investment funds assesses liquidity and fire sale risks

The CNB has created a new framework for macro stress testing open-ended investment funds. The aim of the test is to assess the contribution of investment funds to systemic risk in the domestic financial sector. The CNB has thus joined the ranks of central banks and institutions that use stress testing to assess the risks arising from the increasing importance of investment funds in financial intermediation (see [section III.3](#)). Investment funds contribute to systemic risks primarily through liquidity risk in the form of asset and liability liquidity mismatches.¹⁰¹ These arise mainly in the event of adverse developments on financial markets, when sell-offs of investment fund units may increase. By redeeming units, investment funds exhaust their liquidity buffers and may be forced to sell assets if the buffers are insufficient. This, however, has an adverse impact on the prices of those assets. In this way, investment funds may contribute to an adverse liquidity spiral of falling prices of financial assets and outflows of investors (households or firms holding investment fund units) leading to sell-offs of those assets and affecting other market participants.

The test dynamically assesses the impact of initial repricing under the *Baseline Scenario* and the *Adverse Scenario* and investors' subsequent reactions...

The test is based on the balance sheets of individual open-ended investment funds as of the end of 2019. It covers 144 open-ended collective investment funds. At the end of 2019, the CZK 381 billion of assets managed by those investment funds accounted for more than 90% of this segment's assets. Financial asset holdings undergo a one-off initial repricing due to market shocks at the start of the test under the *Baseline Scenario* and the *Adverse Scenario* (see [section II.1.3](#)). The test considered adverse shocks in the form of an increase in the credit risk of corporate bonds, a shift in government bond yield curves, depreciation of the koruna, and a fall in equity and property prices.¹⁰² These shocks were applied at the level of individual investments. The initial shock was followed by three rounds of secondary effects.¹⁰³ In each round, investors at first exit funds to an extent depending on the type of fund and the size of its losses (i.e. the drop in the unit value). The test assumed that a 10% decline in the value of a fund's assets would lead to an outflow of investors holding 4% of assets in the case of equity funds, 8% of assets in the case of mixed and other funds, and 12% of assets in the case of bond funds.¹⁰⁴ A need to fill in margins in currency derivatives contracts held by investment funds was considered as an additional source of liquidity stress in each round. The amount of the additional margins was estimated on the basis of information on derivatives held by funds at the end of 2019 and the path of the exchange rate in the scenarios considered.

...where potential liquidity shortages in investment funds lead to sales of financial assets

The test assumed two sell-off methods.¹⁰⁵ The first was the waterfall method, in which funds address their liquidity needs first by using cash and bank deposits and only then by selling less liquid assets. Using this method, the test-generated liquidity needed to satisfy redeeming investors and to top up margins was compared with the liquidity buffers of individual funds. Funds whose liquidity buffers were insufficient sold financial assets in the test. The second, "slicing" method assumed that funds maintain constant proportions of individual asset classes in the portfolio. Using this method, funds responded to the need for liquidity by partially reducing their liquidity buffers and by selling off all other components of their financial asset holdings equally and to the same extent.¹⁰⁶ Each round of the calculation ended with an assessment of the extent to which the sale of financial assets by investment funds reduced the prices of those assets. The

101 Unlike other financial market segments, the contribution of investment funds to systemic risk is not associated directly with their resilience, as losses on investment portfolios are passed on to unit holders.

102 The scenarios considered for the purposes of the other stress tests are mostly dynamic, whereas the macro stress test of investment funds assumed a one-off initial impact. It therefore used shock values roughly equal in magnitude to the materialisation of the scenarios as of the end of their first year. In the case of the *Baseline Scenario*, whose degree of stress was broadly in line with the actual market developments in 2020 Q1, equity prices fall by 20%, the exchange rates depreciate to CZK 27.5/EUR and CZK 24.6/USD, and the credit spread on corporate bonds widens slightly. In the *Adverse Scenario*, equity prices fall by 40% and property prices by 20%, the exchange rates depreciate to CZK 29.7/EUR and CZK 27.8/USD, the Czech government bond yield curve shifts upwards, and the credit spread on corporate bonds, particularly those with worse ratings, widens significantly.

103 Three rounds of stress were chosen due to a relatively rapid drop in the contribution of each round to the overall stress. Only the first round of the test made a relevant contribution to the stress on the Czech government bond market.

104 These parameters were set on the basis of a combination of regression analysis performed on historical data for domestic investment funds and estimates employed by similar studies in other countries, such as Bank of England (2018): *Financial Stability Report*, June 2018. In the case of real estate funds, no outflow of investors was considered in this year's test, as these funds have a statutory time limit of up to two years to pay units to redeeming investors. Real estate funds were thus only exposed to stress from the requirement to have additional margins in derivatives transactions. The analysis does not reflect any duplication arising from the master-feeder arrangement of investment funds. The fund breakdown was performed according to the list used for the monetary and financial statistics.

105 The same approach was applied, for example, in European Securities and Markets Authority (2019): *Stress Simulation for Investment Funds*, ESMA Economic Report, September 2019.

106 Maintaining a constant ratio of asset components, including the share of very liquid assets, leads to a greater need to sell off assets and consequently to greater stress. However, this assumption is relatively strong, especially in the event of adverse market developments, as it can be expected that funds will prefer a drop in the relative share of their liquid assets to asset sell-offs in the event of a market fall and simultaneous liquidity stress. Also, however, funds cannot be expected to sell off assets only after they have completely exhausted their liquidity buffers. The actual response of funds will thus probably consist in a combination of both methods considered.

relationship between the amount of financial assets sold and the change in their prices was estimated on the basis of the depth of the market. This year's test considered and calibrated this effect only for Czech government bonds,¹⁰⁷ as domestic investment funds account for only a relatively negligible part of demand/supply on most of the other markets considered in the test. The drop in prices of the sold-off financial assets at the end of each round increased investors' losses, thereby creating another round of stress.

Table IV.8
Results of the macro stress test of investment funds

(CZK billions; value of unit in % of initial value)

Scenario Method Test round	As of 31 Dec 2019	Baseline Scenario						Adverse Scenario							
		Initial shock	Slicing			Waterfall			Initial shock	Slicing			Waterfall		
			1st	2nd	3rd	1st	2nd	3rd		1st	2nd	3rd	1st	2nd	3rd
Assets of funds covered by test	380.8	342.9	324.4	326.3	326.3	324.5	326.7	326.7	304.5	270.6	272.3	272.8	270.7	272.9	273.6
Equity funds	80.4	65.6	62.3	63.5	63.5	62.3	63.6	63.6	50.7	45.2	46.8	47.1	45.2	46.9	47.3
Bond funds	152.6	144.6	137.4	137.8	137.8	137.4	138.0	138.0	136.2	122.2	122.6	122.8	122.3	122.9	123.2
Real estate funds	49.6	46.7	46.7	46.7	46.7	46.7	46.7	46.7	43.7	43.7	43.7	43.7	43.7	43.7	43.7
Mixed and other funds	98.2	86.1	78.1	78.3	78.3	78.1	78.4	78.4	73.9	59.6	59.2	59.2	59.6	59.4	59.5
Unit value (%)															
Equity funds	100.0	78.0	79.0	79.8	79.8	79.0	79.8	79.9	60.6	61.7	62.4	62.5	61.7	62.5	62.7
Bond funds	100.0	94.0	94.2	94.3	94.3	94.2	94.4	94.4	87.3	87.4	87.5	87.5	87.5	87.7	87.7
Real estate funds	100.0	91.2	91.5	91.7	91.7	91.5	91.8	91.7	82.5	82.7	83.0	83.0	82.7	83.0	83.0
Mixed and other funds	100.0	86.4	86.5	86.6	86.6	86.5	86.7	86.7	72.9	72.7	72.4	72.2	72.7	72.5	72.4
Liquidity need – investor outflow			20.8	0.2	0.0	20.8	0.2	0.0		36.4	0.6	0.2	36.4	0.5	0.2
Equity funds			4.6	0.0	0.0	4.6	0.0	0.0		7.4	0.0	0.0	7.4	0.0	0.0
Bond funds			7.9	0.2	0.0	7.9	0.1	0.0		14.7	0.3	0.1	14.7	0.2	0.1
Real estate funds			0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Mixed and other funds			8.3	0.1	0.0	8.3	0.1	0.0		14.3	0.2	0.1	14.3	0.2	0.1
Liquidity need – additional margins			0.4	0.4	0.0	0.4	0.4	0.0		0.7	0.7	0.3	0.7	0.7	0.3
Equity funds			0.1	0.1	0.0	0.1	0.1	0.0		0.2	0.2	0.1	0.2	0.2	0.1
Bond funds			0.1	0.1	0.0	0.1	0.1	0.0		0.2	0.2	0.1	0.2	0.2	0.1
Real estate funds			0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Mixed and other funds			0.2	0.2	0.0	0.2	0.2	0.0		0.3	0.3	0.1	0.3	0.3	0.1
Assets sold			19.7	0.6	0.1	9.7	0.4	0.0		34.0	1.2	0.5	22.2	1.0	0.4
Equity funds			3.9	0.1	0.0	2.1	0.1	0.0		7.0	0.2	0.1	4.3	0.2	0.1
Bond funds			7.2	0.3	0.0	2.7	0.1	0.0		13.1	0.4	0.2	7.0	0.3	0.2
Real estate funds			0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Mixed and other funds			8.1	0.3	0.0	5.0	0.2	0.0		13.8	0.5	0.2	10.9	0.5	0.2
Impact on Czech government bond market															
Czech government bonds sold			3.1	0.0	0.0	1.3	0.1	0.0		5.0	0.3	0.1	3.7	0.3	0.1
Decrease in bond price (%)			0.4	0.0	0.0	0.2	0.0	0.0		0.9	0.1	0.0	0.6	0.1	0.0

Source: CNB

Note: The fund breakdown was performed according to the list used for the monetary and financial statistics.

Equity funds were hit the hardest by the initial shock but recorded no significant secondary effects...

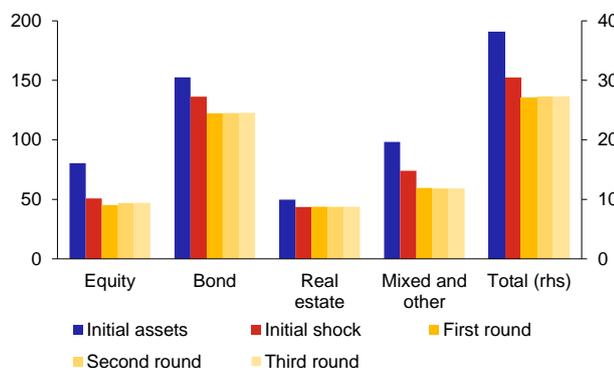
The *Baseline Scenario* leads to a drop in equity funds' assets of CZK 17 billion (21%) to CZK 64 billion due to the initial shock and the subsequent three rounds of stress multiplication (see [Table IV.8](#) and [Chart IV.10](#)). This decline is caused mainly by the initial shock in the form of a fall in the value of equity holdings of CZK 15 billion and by a subsequent outflow of investors totalling almost CZK 5 billion due to a fall in the value of investment fund units (see [Chart IV.11](#)). The liquidity need due to growth in margins in derivatives transactions is relatively negligible (CZK 0.2 billion). The exchange rate depreciation considered fosters an increase in the koruna value of holdings of foreign currency financial assets, which partly offsets the impact of the initial shock (by up to CZK 2 billion at the end of the third round of the test). In the *Adverse Scenario*, equity fund assets would fall by a total of CZK 33 billion (or 41%) to CZK 47 billion, with an initial drop in equity value of CZK 30 billion leading to a subsequent investment outflow of CZK 7 billion. In the case of the *Adverse Scenario*, the effect of the exchange rate depreciation on equity funds' liquidity needs would again be negligible (CZK 0.5 billion), while leading to additional growth in the koruna value of assets of CZK 2 billion (in the first round) to CZK 4 billion (at the end of the third round). The liquidity stress was partly covered in both scenarios by equity funds'

¹⁰⁷ The calibration was similar as in Cont, R., Kukanov, A., Stoikov, S. (2010): *The Price Impact of Order Book Events*. Journal of Financial Econometrics, Volume 12, Issue 1. The drop in bond prices is directly proportional to the amount of bonds sold and indirectly proportional to market depth (i.e. the historical average daily trading volume relative to bond price volatility). The sale of CZK 10 billion of Czech government bonds in one month would cause their value to decrease by 1.8% in this calibration. The depth of the Czech government bond market was calibrated on the basis of daily data from the MTS trading platform.

existing liquidity buffers. When the waterfall method is applied, equity funds have to sell shares or other assets of CZK 2.2 billion in the *Baseline Scenario* (in the *Adverse Scenario* equity funds would have to sell shares or other assets of CZK 4.6 billion). Equity sell-offs under the slicing approach were higher (CZK 4.0 billion in the *Baseline Scenario* and CZK 7.3 billion in the *Adverse Scenario*).

Chart IV.10
Value of assets in the *Adverse Scenario*
(slicing approach)

(CZK billions)

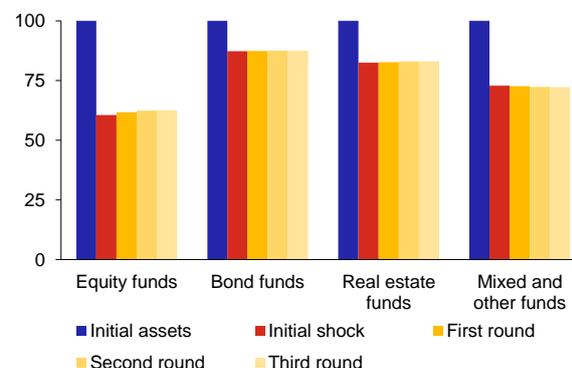


Source: CNB

Note: The fund breakdown was performed according to the list used for the monetary and financial statistics.

Chart IV.11
Average unit value in the *Adverse Scenario*
(slicing approach)

(% of unit value as of 31 December 2019)



Source: CNB

Note: The fund breakdown was performed according to the list used for the monetary and financial statistics.

...sales of Czech government bonds would be limited and would not lead to multiplication of the initial stress

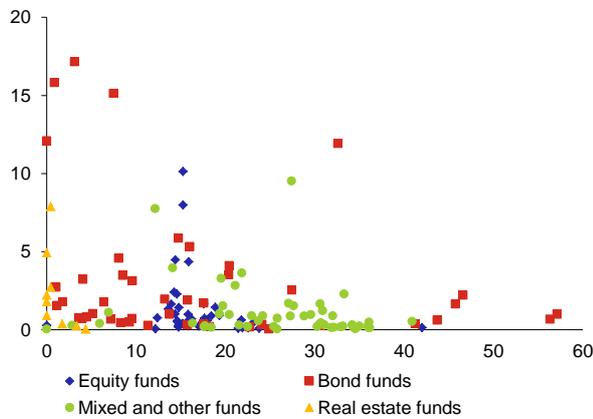
Some bond, mixed and other investment funds covered by the test held Czech government bonds totalling CZK 46 billion in their balance sheets at the end of 2019. For these funds, the test considered potential multiplication of the initial price drop due to subsequent fire sales of those bonds. As the amount of Czech government bonds sold off was relatively low, the initial stress did not multiply materially after the application of the scenarios considered. On the aggregate level, the initial drop in the aggregate value of bond fund assets of CZK 16 billion (or 11%) would result in an investor outflow of CZK 15 billion in the *Adverse Scenario*. In the case of mixed and other funds, a drop in assets of CZK 24 billion (or 25%) would lead to investor redemptions of CZK 14 billion. The additional contribution of the liquidity stress due to top-ups of margins in derivatives transactions would total CZK 0.5 billion for bond, mixed and other funds in the first round of the test and would again be substantially lower than the liquidity stress stemming from the outflow of investors. As in the case of equity funds, the change in the exchange rate of the koruna would have a favourable effect on the value of these funds' assets, fostering growth after the initial fall (see [Chart IV.10](#)). Under the slicing approach, the existing liquidity buffers would cover just 9% of the overall aggregate liquidity need (of CZK 30 billion) of bond, mixed and other funds in the first round (but 39% under the waterfall method). The funds would have to sell off their assets, including Czech government bonds, to satisfy the remaining needs. The first round of stress in the *Adverse Scenario* would lead to sales of Czech government bonds of CZK 5 billion (CZK 3.7 billion under the waterfall method). This would result in a drop in Czech government bond prices of 0.9% (0.6%). Such a slight impact of the sell-offs on bond prices would draw only a negligible response from investors in the second round of the test (see [Table IV.8](#)) and would not lead to any additional stress on the Czech government bond market in the subsequent test rounds.

The resulting level of stress reflected the riskiness of the hardest hit investment funds

The relatively low volume of Czech government bonds sold off was also linked with the relative distribution of the stress according to the size and riskiness of investment funds. The overall liquidity needs of most bond investment funds would not exceed 20% of their total assets even under the *Adverse Scenario* and the higher-stress slicing method (see [Chart IV.12](#)). The larger impact of the initial shock, the investor outflow, and the formation of a liquidity need would mainly concern smaller funds, which do not hold large quantities of Czech government bonds. Under the slicing approach, these bonds therefore would make up only a small proportion of the sell-offs conducted to raise additional liquidity. Under the waterfall method, moreover, the funds would use their liquidity buffers first. These buffers would be sufficient to cover a relatively large share of the liquidity needs of a large proportion of bond funds, so the necessity to subsequently sell off assets, including Czech government bonds, would be relatively low (see [Chart IV.13](#)). The relatively small stress stemming from the above developments is also due to the fact that the test did not consider the effect of other Czech government bond holders (banks, insurance companies and pension funds) on the shift in market equilibrium following the initial shock and in the subsequent rounds of sell-offs. Some of these entities may be more sensitive to changes in price than investment funds. This, in turn, would multiply the contribution of investment funds to systemic risk.

Chart IV.12
Relationship between liquidity need and fund size in the Adverse Scenario (slicing approach)

(x-axis: fund's relative liquidity need in % of assets; y-axis: investment fund's assets in CZK billion)

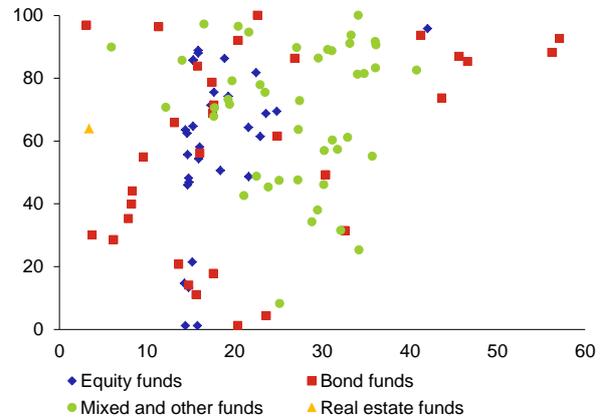


Source: CNB

Note: Assets following initial repricing. For reasons of anonymisation, the chart does not show several of the largest funds. Their relative liquidity needs were in the range of 0.3%–16.6% of assets. The fund breakdown was performed according to the list used for the monetary and financial statistics.

Chart IV.13
Relationship between liquidity need and asset sales in the Adverse Scenario (waterfall method)

(x-axis: fund's relative liquidity need in % of assets; y-axis: coverage of liquidity need by asset sales in %)



Source: CNB

Note: Only funds that had to resort to asset sales when the waterfall method was applied are shown. The fund breakdown was performed according to the list used for the monetary and financial statistics.

IV.3 THE HOUSEHOLD STRESS TEST¹⁰⁸**The household stress test enables the sector's resilience to be assessed**

The household stress test focuses on the risk of overindebtedness of households, whose potential debt service problems could cause credit risk in the banking sector to increase. The stress test is based on data on individual loans secured by residential property (mortgage loans), whereas the identification of the risk of default is based on the concept of the maximum hypothetically repayable loan and that of the financial reserve for repaying debt under stress.¹⁰⁹ A household's financial reserves are considered insufficient if they are negative. Households with a negative financial reserve are identified as potentially "at risk of default". If a household is unable to cover the negative financial reserve from its savings, its mortgage loan is identified as "defaulting" after 90 days. Using this framework, the resilience of the sector of households with mortgage loans was assessed against adverse economic shocks, and the credit risk associated with these loans was estimated.

The monthly mortgage loan instalment of the median household increased markedly in 2019

The test is performed on the portfolio of mortgage loans provided over the period of 2005–2022. Until 2019 the portfolio is based on actually provided mortgage loans and from 2020 it is based on a simulation of inflows and outflows of individual loans in the given scenario. The total size of the mortgage portfolio as of the end of 2019 was CZK 1,262 billion, while the addition of new loans for 2019 was CZK 171 billion. The median net monthly income for households with mortgage loans taken out in 2019 exceeded CZK 40,000 (see Table IV.9). In addition to incomes, property prices rose, leading households to draw larger loans. The median mortgage loan value in 2019 was CZK 1,815,000. Households with a principal applicant aged under 35 applied for higher loans on average (see Table IV.10). Strong year-on-year growth was recorded for the median mortgage loan instalment, which rose from CZK 7,500 to CZK 8,100. Higher instalments are more frequently paid by persons above the age of 50. However, comparing the median mortgage loan size in this age category, it is clear that the higher instalments are mainly due to shorter maturity. After having fallen in 2018, the median value of the additional debt of a mortgage loan applicant returned above CZK 80,000. The highest additional debt was recorded for applicants aged 36 to 50. Significantly less additional debt is observed in the category of applicants under 35 years of age.

Table IV.9

Median values of households at the time of mortgage loan provision

	2016	2017	2018	2019
Net monthly income (CZK thousands)	32.6	36.8	39.1	42.2
Year-on-year change (%)		12.6	6.3	8.0
Property purchase price (CZK thousands)	1,900	2,190	2,350	2,500
Year-on-year change (%)		15.3	7.3	6.4
Loan size (CZK thousands)	1,500	1,562	1,705	1,815
Year-on-year change (%)		4.1	9.2	6.5
Mortgage loan instalment (CZK thousands)	6.4	7.1	7.4	8.1
Year-on-year change (%)		11.2	4.9	9.0
Client's other debt (CZK thousands)	90.0	88.3	77.3	81.3
Year-on-year change (%)		-1.9	-12.4	5.2

Source: CNB

Table IV.10

Median values of households at the time of mortgage loan provision by age category for 2019

(CZK thousands)

	18–35	36–50	51 +
Share in survey (%)	47%	45%	8%
Net monthly income	38.20	46.61	48.20
One client	30.10	36.34	35.36
More than one client	46.64	54.77	56.87
Property purchase price	2,450	2,600	2,467
One client	2,150	2,375	2,200
More than one client	2,852	2,920	2,600
Loan size	2,000	1,720	1,392
One client	1,710	1,600	1,247
More than one client	2,400	1,900	1,500
Mortgage instalment	8.03	8.05	9.03
One client	7.09	7.35	8.40
More than one client	9.46	8.88	9.68
Client's other debt	33.11	157.00	109.90
One client	10.00	75.84	52.00
More than one client	97.95	287.00	189.61

Source: CNB

The share of low-income households at risk of default is expected to increase over the next few years

The average share of households at risk of default stood at 1.3% in 2019. However, it is expected to increase significantly over the three-year horizon of both the *Baseline Scenario* and the *Adverse Scenario* (2020–2022; see section II.1.3). This increase will be due mainly to a sharp drop in the income of a proportion of households during 2020 caused by the measures introduced to counter the coronavirus pandemic (see section II.1.2 and section II.2.3). The most at-risk group are low-income households (less than CZK 25,000). Under the *Baseline Scenario*, up to 7% of these households will experience loan repayment problems on average during the scenario period (see Chart IV.14).

¹⁰⁸ The household stress test is focused on households with a mortgage.

¹⁰⁹ More detail on these concepts can be found in Gregor, J. and Hejlová, H. (2020): *The Household Stress Test*, Thematic Article on Financial Stability 4/2020.

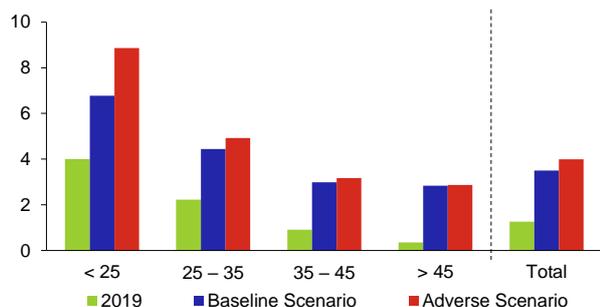
In the *Adverse Scenario*, the situation would be more serious

In the *Adverse Scenario*, up to 9% of households with net income of less than CZK 25,000 would experience repayment problems on average during the stress period (see [Chart IV.14](#)). This indicates that low-income households are significantly more sensitive to adverse economic developments than other income groups. The total share of households at risk of default across all household income groups could average 4% over the horizon of the *Adverse Scenario*. However, there significant differences in the individual stress years, with the share of vulnerable households peaking in 2020 and then gradually declining.

Chart IV.14

Shares of households at risk of default by income group

(share of households in %; x-axis: borrower's net income in CZK thousands)



Source: CNB

Note: All households with a negative financial reserve are considered to be at risk of default. The share of these households is calculated as the average over the individual quarters of the three-year scenario.

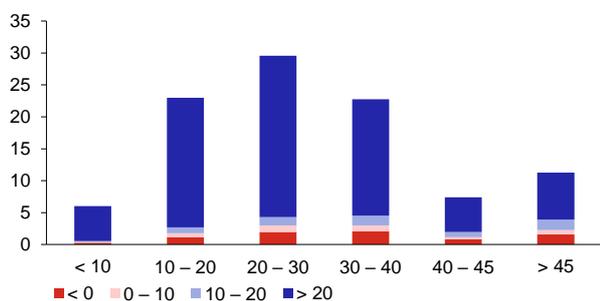
A potential escalation of the coronavirus crisis would impede loan repayment for all households in the first year of stress...

Households' default rate in the first year of the stress test will be influenced by the postponement of mortgage repayments in both scenarios analysed. In the *Baseline Scenario*, almost 8% of households with a mortgage loan will experience repayment difficulties in the first year and another 3% of households will have a reduced financial reserve (under 10% of net income). In total, this roughly matches the mortgage deferral applications registered so far (see [section II.2.3](#)). In the *Adverse Scenario*, repayment problems could arise for up to 12% of households with a mortgage loan. The potential risk of default would affect all categories of households regardless of the size of the DSTI and DTI ratios (see [Chart IV.15](#) and [Chart IV.16](#)). In view of the number of mortgage loans in the given category, however, a slightly higher level of credit risk is still evident for households with a DSTI ratio of over 40% and a DTI ratio of over 8.

Chart IV.15

Classification of loans by DSTI ratio and financial reserves under stress in the first year of stress

(share of loans in %; x-axis: DSTI ratio in %)



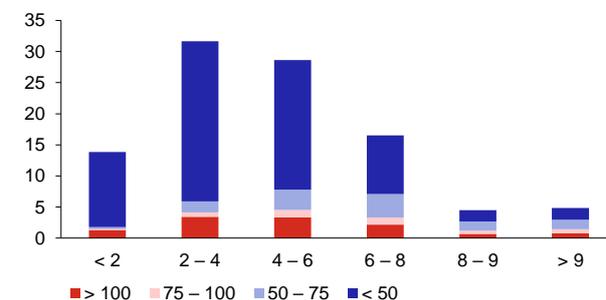
Source: CNB

Note: The colours reflect the size of the financial reserve in per cent of net income (colour scale below the chart). The values correspond to the average for the first year of stress.

Chart IV.16

Classification of loans by DTI ratio and ratio of loans provided to the hypothetically repayable loan in the first year of stress

(share of loans in %; x-axis: DTI ratio in number of net annual incomes)



Source: CNB

Note: The colours indicate the ratio of the loan provided to the hypothetically repayable loan (colour scale below the chart). The values correspond to the average for the first year of stress.

...according to the stress test, the mortgage loan default risk will probably not rise significantly until 2021

Due to the loan moratorium (see [section II.1.2](#), [Table II.1](#)), which will help households experiencing a loss of income to bridge the period of highest risk, the risk of non-repayment of loans will be significantly reduced in 2020. Nevertheless, for some households with a sustained drop in income, the deferral of mortgage loan instalments will only postpone their

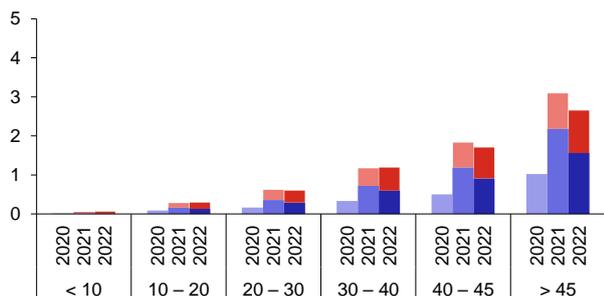
potential default. This becomes apparent in both the *Baseline Scenario* and the *Adverse Scenario* in the second year of the test. Households with loans where the DSTI ratio exceeds 40% and the DTI ratio is above 8 will be affected particularly strongly (see [Chart IV.17](#) and [Chart IV.18](#)). Due to the assumption of a high unemployment rate even in the third year of both the *Baseline Scenario* and the *Adverse Scenario* (see [Chart II.23D](#)), the default rate among households with mortgage loans will stay relatively high in 2022.

The number of defaulting households could increase further in the event of a sharp increase in interest rates

As part of the stress testing, a sensitivity analysis was performed in which an additional rise in the unemployment rate and mortgage rates – of 1, 3 and 5 pp in the final quarter of the scenario – was simulated in excess of the *Adverse Scenario*¹¹⁰ (see [Chart IV.1 CB](#) and [Chart IV.2 CB](#)). In the sensitivity analysis, it is assumed that indebted households with mortgage loans have a greater incentive to find a new job, so the duration of unemployment among indebted households is only short.¹¹¹ Given a temporary loss of employment, households would thus be able to cover the short-term loss of income from their savings. This, combined with the later onset of the increased unemployment rate (in 2021 Q2; see [Chart IV.1 CB](#)), would lead to only a small rise in the cumulative default rate over the entire three-year stress period (see [Chart IV.19](#)). In the event of a change in interest rates, the effect on the cumulative default rate would be more pronounced, as the rise in interest rates and the ensuing increase in loan instalments would be of a long-term nature and could not be permanently covered from savings. An additional rise in interest rates of 5 pp would have a particularly significant effect, with the default rate among households with a DSTI ratio of between 40% and 45% increasing by just under 2 pp and that among households with a DSTI ratio of over 45% by almost 3 pp (see [Chart IV.20](#)).

Chart IV.17
Non-performing loans in each year of the scenario by DSTI ratio

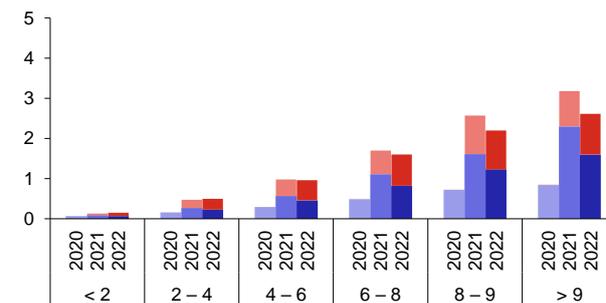
(share of non-performing loans in %; x-axis: DSTI ratio in %)



Source: CNB

Chart IV.18
Non-performing loans in each year of the scenario by DTI ratio

(share of non-performing loans in %; x-axis: DTI ratio in number of net annual incomes)

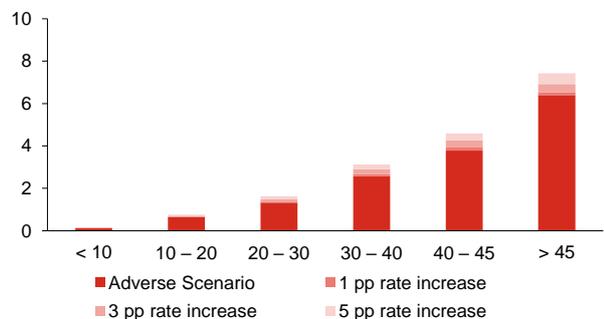


Source: CNB

Note: The share of non-performing loans in the *Baseline Scenario* is shown in blue and the additional share of non-performing loans in the *Adverse Scenario* is shown in red. A loan is indicated as non-performing if the borrower has a negative financial reserve which they are unable to cover from their savings for a period of 90 days.

Chart IV.19
Shares of non-performing loans by DSTI ratio given an additional increase in the unemployment rate

(share of non-performing loans in %; x-axis: DSTI ratio in %)

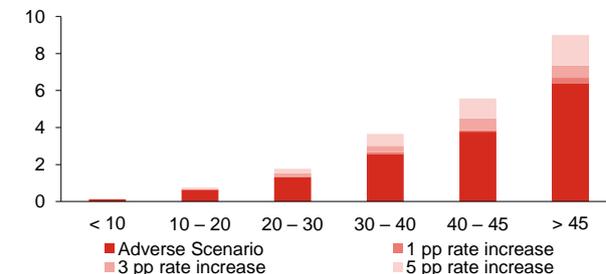


Source: CNB

Note: The chart presents the cumulative default rate for 2020–2022.

Chart IV.20
Shares of non-performing loans by DSTI ratio given an additional increase in interest rates

(share of non-performing loans in %; x-axis: DSTI ratio in %)



Source: CNB

Note: The chart presents the cumulative default rate for 2020–2022. The simulation of growth in interest rates maintained the contractual fixed-rate terms negotiated when the mortgage agreement was concluded.

110 Maintenance of fixed-rate terms is assumed in the event of a change in interest rates. A rise in interest rates will thus only affect borrowers who refixed their loans in the given period.

111 The duration of unemployment is set at 3–6 months for all the stress test scenarios.

IV.4 THE PUBLIC FINANCE STRESS TEST

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

Since 2015, based on its internal methodology, the CNB has been annually reviewing and evaluating the risks of concentration of exposures to sovereign issuers in the balance sheets of credit institutions having their registered offices in the Czech Republic. 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 credit institutions 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 credit institution's eligible capital. It becomes systemic if the assets of credit institutions with important sovereign exposures exceed 5% of the total assets of all the credit institutions 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) exceeds one of its thresholds.¹¹² The CNB requires additional capital where the credit institution holds exposures in excess of the limit and this above-limit exposure is not already sufficiently covered by capital.¹¹³

The CNB has recalibrated the modelling system

As part of deriving the ISR, the CNB carries out regular recalibrations. This is done mainly in order to include new observations and instances of sovereign debt crises, but also to reflect data revisions and transitions to new statistical methodologies. The public finance stress test presented below is based on an updated methodology available on the CNB website.¹¹⁴

Exposures to Czech government debt were assessed as systemically important...

The CNB assessed domestic credit institutions' investments in Czech government bonds as a systemically important sovereign exposure. The value of these exposures fell by CZK 15 billion year on year to CZK 514 billion at the end of 2019, accounting for 7.5% of these institutions' total assets. Despite this decrease, the number of institutions with important exposures went up from eight to ten. Their assets accounted for 62% of the sector's total assets, as against 43% a year earlier. Exposures to other governments, the EU and the EIB were not found to be systemically important.

...but their riskiness did not exceed the thresholds, despite the current outlook

The ISR was estimated for systemically important exposures. Its three-year outlook attained a highest value of 0.66% in 2020 (see [Table IV.11](#)). It is thus very far from the supervisory thresholds of 5% and 8%. The CNB will therefore not require credit institutions having their registered offices in the Czech Republic to meet an additional capital requirement to cover the risk of concentration of exposures to the Czech government.

In the Adverse Scenario only a few variables exceeded their critical limit

The *Adverse Scenario* (see [section II.1.3](#)) assumes that the first wave of the pandemic would recede more gradually and, above all, that another wave would emerge in late 2020. As a result of this second wave, the contraction in GDP would deepen and its year-on-year change would significantly exceed the critical limit (see [Table IV.11](#)). A decline in general government revenue and a massive rise in government expenditure related to the ongoing coronavirus pandemic and the impacts of stabilising fiscal measures would cause the primary balance to deteriorate to -7.5% of GDP in the first year of stress and to exceed the critical limit as a result. Negative financial market sentiment would increase the required credit premia for 10Y government bond yields. The increase in yields and concurrent deep decline in GDP, coupled with a slowdown in inflation, would cause the difference between the real 10Y government bond yield and real GDP growth to exceed the critical limit as well in the first year of the *Adverse Scenario*. The critical limits for the variables monitoring rule of law and the share of foreign holders of government debt, the levels of which are already regarded as risky in terms of the ISR, are exceeded over the entire forecast horizon. The ISR would thus reach 0.66% in 2020 (see [Chart IV.21](#)). In the years ahead, the *Adverse Scenario* assumes that general government would remain in a primary deficit in excess of the critical limit. At the same time, the long end of the yield curve would rise relatively fast owing to a rising credit premium. This would cause the year-on-year difference in the 10Y government bond yield to exceed the critical limit in 2021 and 2022. However, debt service costs would not rise significantly as a result, since a large part of interest costs at the test horizon stem from debt instruments issued in the past. Moreover, the average yield on debt instruments newly issued to finance future borrowing requirements in the *Adverse Scenario* would still be relatively low by historical comparison.

¹¹² 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.

¹¹³ 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%.

¹¹⁴ <https://www.cnb.cz/en/financial-stability/stress-testing/public-finance-sector/>.

Table IV.11
Czech public finance stress test

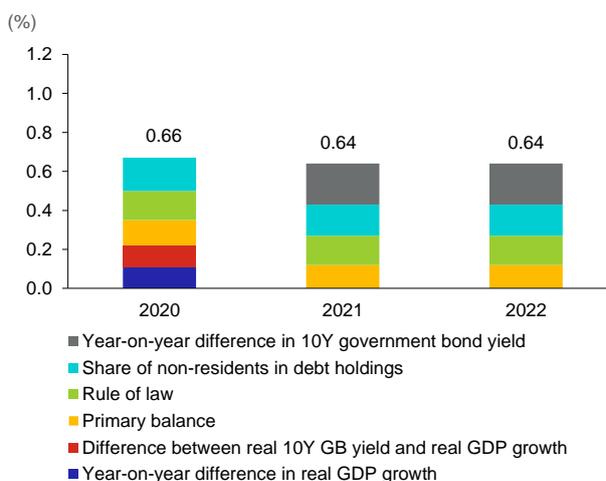
(%)

	Actual value [#]		Adverse Scenario		Critical limit
	2019	2020	2021	2022	
Macroeconomic variables					
Year-on-year difference in real GDP growth (pp)	-0.3	-16.0	12.0	3.4	< -1.0
Current account balance (% of GDP)	-0.4	-1.3	-0.9	0.0	< -1.4
Gross national savings (% of GDP)*	25.9	25.9	25.9	25.9	< 19.3
External debt (% of GDP)*	77.6	77.6	77.6	77.6	> 113.5
Difference between real 10Y GB yield and real GDP growth (pp)	-3.9	13.7	2.5	-0.5	> 6.4
Fiscal variables					
Government debt (% of GDP)	30.8	43.0	47.2	49.8	> 61.4
Government budget primary balance (% of GDP)	1.0	-7.5	-4.5	-3.5	< -2.4
Year-on-year difference in 10Y government bond yield (pp)	-0.3	0.4	1.1	0.5	> 0.5
Government debt maturing within one year (% of GDP)	3.7	6.8	7.6	7.3	> 15.1
Share of government debt maturing within one year (%)	12.0	15.8	16.1	14.6	> 33.2
Share of foreign currency debt (%)	14.9	12.8	6.9	3.0	> 29.0
Share of non-residents in debt holdings (%)*	39.7	39.7	39.7	39.7	> 25.9
Institutional variables					
Government effectiveness (WGI score)*	0.9	0.9	0.9	0.9	< 0.7
Political stability (WGI score)*	1.0	1.0	1.0	1.0	< 0.8
Rule of law (WGI score)*	1.0	1.0	1.0	1.0	< 1.2
Banking crisis	No	No	No	No	= Yes
Past sovereign defaults	No	No	No	No	= Yes
Sovereign risk indicator (ISR, %)	-	0.66	0.64	0.64	

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. # Values known when [Inflation Report II/2020](#) was being prepared.

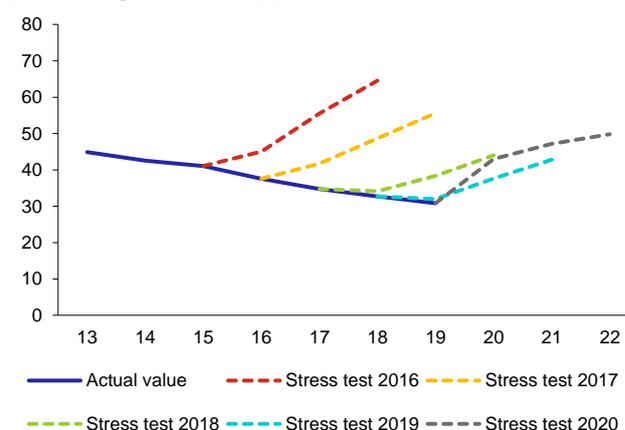
Chart IV.21
Decomposition of the sovereign risk indicator in the Adverse Scenario



Source: CNB, World Bank

Chart IV.22
Comparison of the trajectories of public debt in the public finance stress tests

(% of GDP; right-hand scale: bp)



Source: Refinitiv

Note: Year-end data.

The government's discretionary measures to mitigate the impacts of the second wave of the pandemic would increase the general government deficit

The overall general government budget balance would widen to -8.3% of GDP in 2020 under the *Adverse Scenario* (see [section II.2.1](#)). The second pandemic wave assumed in the *Adverse Scenario* would lead to a deeper downturn in economic activity and higher tax revenue shortfalls. The government would reintroduce support expenditure measures, though on a smaller scale due to the risk of high deficits and rapidly rising debt. The stabilising fiscal measures to support the economy would be one-off in nature and their impacts would largely fade out in the subsequent years of the scenario. Nonetheless, the overall balance would reach -5.2% of GDP in 2021 and -4.4% of GDP in 2022. Beyond the impacts of the pandemic, the general government deficit in these years would be exacerbated by the increase in state budget mandatory expenditure recorded before the pandemic broke out (see [section II.2.1](#)). Total current primary expenditure of general government increased by a sizeable 7.7% year on year in 2019 (and even by 8.2% in 2018).

Government debt would surge in the *Adverse Scenario*

The Czech Republic's government debt stood at 30.8% of GDP at the end of 2019. Government debt would rise significantly under the *Adverse Scenario*, reaching almost 50% of GDP. The speed of the growth in government debt is unprecedented by comparison with previous stress tests (see [Chart IV.22](#)). At the three-year horizon, however, government debt would remain below the “debt brake” threshold of 55% of GDP¹¹⁵ and does not exceed its critical limit of 61.4% of GDP. The stress test assumes that the government guarantees provided are not called (see [Table II.1](#)). If they were, the need to finance them by issuing new debt instruments would cause an additional increase in government debt.

A reassessment of the sustainability of government debt by foreign investors poses a medium-term risk

Confidence in the sustainability of Czech public finances has proved to be robust so far (see [section II.1.3](#)). However, a sharp increase in government debt followed by a moderate public finance consolidation could foster adverse market sentiment on the bond market and portfolio reallocation mainly by non-residents, resulting in higher interest costs for new issues of Czech government bonds. The impact of higher debt service costs would be simultaneously moderated in the test by low government debt and a dominant proportion of funding in the domestic currency.¹¹⁶ The share of non-residents in holdings of Czech government debt is 39.7%, relatively high above the critical limit.

115 Under Article 14 of Act No. 23/2017 Coll., on Budget Responsibility, the government must take steps leading to sustainable public finances if general government debt net of a cash reserve exceeds 55% of GDP. This does not apply if the economy is in a recession or recovering after a crisis.

116 The low share of government debt issued in foreign currencies (14.9%) means that the domestic government sector is facing low exchange rate risk.