# FINANCIAL STABILITY REPORT

2015 /2016

CNB CZECH NATIONAL BANK

# FINANCIAL STABILITY REPORT 2015 / 2016

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

Article 2

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

**...**

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

**...**

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

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

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

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

**BOXES**

The Czech National Bank is pleased to present its twelfth Financial Stability Report (FSR) to the public. The aim is to analyse and identify the risks to the financial stability of the Czech Republic. This year's FSR focuses mainly on the risks that may arise in connection with increased volatility in global financial markets, the environment of very low interest rates and the financing of property purchases. Significant space is devoted to macroprudential capital buffers and other instruments aimed at mitigating systemic risk in the banking sector.

The FSR is based on an advanced analytical and modelling framework and contains stress tests of individual segments of the financial sector. The FSR also contains the results of bottom-up micro stress tests conducted by the CNB in partnership with selected banks, stress tests of households and a public finance stress test, which the CNB uses to assess the management of sovereign exposure concentration risk in individual financial institutions. This year, the FSR does not contain stress tests of insurance companies, as domestic insurance companies are involved in EIOPA tests, whose results will be published in a coordinated manner for the entire EU at a later date.

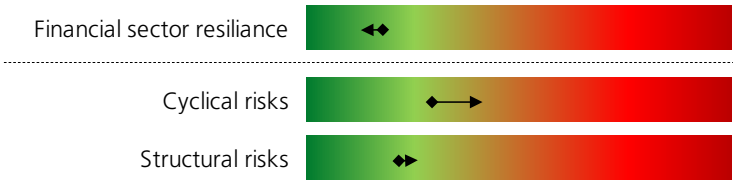
The financial sector's resilience is tested by means of an adverse macroeconomic stress scenario entitled the *Adverse Scenario*. This scenario, whose probability is very low, describes the risk of a pronounced and long-lasting decline in domestic economic activity caused mainly by low external demand. The adverse economic situation will erode the financial reserves of households and non-financial corporations and cause a significant deterioration in their ability to service their debts. This will lead to sizeable credit losses in the banking sector. The *Adverse Scenario* also assumes a pronounced increase in long-term bond yields, which will result in financial institutions incurring losses due to market risk. This stress scenario is compared with the *Baseline Scenario*, which is based on the CNB's official May forecast. The impacts of both scenarios are assessed not only from the perspective of the financial sector, but also with regard to the property market and the non-financial corporations and household sectors.

The FSR is divided into four main sections followed by thematic articles that respond to selected topical issues relating to financial stability. The *Real economy and financial markets* section deals with the macroeconomic environment, property markets, corporations and households and analyses overall developments in the financial markets. The section called *The financial sector* discusses developments in the banking and non-banking financial sector and assesses the resilience of sectors on the basis of stress tests. The section *Macroprudential policy* contains an overall risk assessment, information on macroprudential instruments for mitigating risks identified, and an analysis of risks associated with developments in the regulatory environment.

This FSR was approved by the CNB Bank Board at its regular meeting on financial stability issues on 19 May 2016 and was published on 14 June 2016. It is available in electronic form at http://www.cnb.cz/.

# PART I

## OVERALL ASSESSMENT




*The Czech financial sector has developed favourably since spring 2015. Systemic risks have moved in line with expectations and with the conclusions of last year's Financial Stability Report, and they remain only potential in all areas. The aggregate macroprudential dashboard[1] shows that the sector's already high resilience to potential adverse shocks strengthened year on year. This was due mainly to an increase in capital adequacy, favourable liquidity developments and positive changes in risk management by financial institutions. As regards potential sources of risks to financial stability in the future, the aggregate macroprudential dashboard indicates an increase in cyclical risks and a very modest rise in structural risks. The increase in cyclical risks is due to a recovery in demand for loans and an easing of credit standards, exceptionally low loan interest rates, growth in property prices, a further decline in returns on high-quality assets and a fall in interest margins and risk premiums. Potential risks arising from the global environment increased. The CNB is responding to the increase in cyclical risks on an ongoing basis by configuring relevant instruments. The very modest rise in structural risks is due mainly to an increase in maturity transformation of deposits and loans in the banking sector and to a rising share of non-residents in the domestic government bond market.*

## DEVELOPMENTS IN 2015 AND 2016 Q1

**The economic recovery in advanced economies remains fragile**

Economic growth remained weak in the euro area and mixed across the member countries in 2015. The fourth quarter of 2015 saw a slowdown in GDP growth in the USA and many other advanced economies, including Asian ones. This was reflected in worsening outlooks for this

1 The figure illustrates the overall situation in the Czech financial sector in aggregated form from the macroprudential perspective. In line with the macroprudential policy literature, the figure is divided into two main areas. The first describes the financial sector's current degree of resilience, i.e. its ability to absorb shocks stemming from potential risks (a position further to the right indicates a lower absorption capacity). This area is backward-looking, as the change in the financial sector's current degree of resilience is due to actual developments. The second area, by contrast, is forward-looking, as it assesses the strength of potential sources of risks to financial stability in the future (a position further to the right indicates a higher level of risk). The sources of risks in this area are subdivided into factors linked with the financial cycle and structural factors. The arrows denote the shift in the period from April 2015 to April 2016, i.e. since the previous Financial Stability Report was issued. The aggregate dashboard reflects the results of an assessment of the individual factors contained in the detailed macroprudential dashboard (see section 4.1 of this Report) and an evaluation of other financial stability indicators.

year. By contrast, the Czech Republic continued to enjoy robust economic growth in 2015. It was fuelled by a combination of domestic factors. In the area of economic policy, these included easy monetary conditions and increased growth in government investment.

**Economic growth in emerging economies is slowing**

Some emerging economies recorded slowing GDP growth and a downward revision of their outlooks for the next two years in 2015. This, together with expectations of interest rate growth on US markets, was reflected in a substantial outflow of capital from some emerging countries. Private and public sector debt continues to increase in many emerging economies. A large proportion of this debt consists of liabilities denominated in foreign currencies. This, coupled with low commodity prices and the slower economic growth, is putting pressure on important sectors of the economy.

**The monetary policies of central banks remain very loose**

The ECB cut its monetary policy rates further and expanded its quantitative easing programme in late 2015 and early 2016 on concerns about strengthening deflationary pressures. By contrast, the US Federal Reserve raised its monetary policy rates in December 2015 in response to robust data from the real economy. However, it did not continue tightening the monetary conditions at its subsequent meetings. The CNB's monetary policy rate has been at "technical zero" since November 2012 and the CNB has been using the exchange rate as an additional instrument for easing the monetary conditions since November 2013. At its meeting in May this year, the Bank Board confirmed the commitment to intervene on the foreign exchange market if needed to weaken the koruna against the euro so that the exchange rate is kept close to CZK 27 to the euro. It stated that the CNB would not discontinue the use of the exchange rate as a monetary policy instrument before 2017. It stands ready to move the exchange rate commitment to a weaker level if there were to be a systematic decrease in inflation expectations manifesting itself in nominal variables, especially wages.

**The easing of monetary and financial conditions is fostering growth in loans**

The easy monetary and financial conditions combined with the renewed growth in the Czech economy also affected the conditions and activity on the domestic financial market. The result is a shift in the financial cycle to a phase of stronger recovery. Total bank loans to the private sector rose by almost 6% year on year in 2015 and their rate of growth accelerated. Bank loans for house purchase increased by more than 7% and loans to corporations by almost 10% in the second half of last year. Growth in loans to households and non-financial corporations in the Czech Republic ranks among the four fastest in Europe.

**The condition of the corporate sector has improved further and the sector's debt remains relatively low despite rising growth in bank loans**

The non-financial corporations sector as a whole recorded a further rise in performance and profitability in 2015. This was reflected in a drop in the non-performing loan ratio and a modest decrease in the sector's credit risk as measured by the 12-month default rate. However, exposures to businesses in the energy sector and to the smallest firms continue to show an elevated level of risk. Non-financial corporations' demand for bank loans increased considerably in 2015. The growth slowed slightly in the first quarter of this year. However, longer-term investment loans maintained fast growth. As regards the structure of

financing, the growth in the share of debt securities in the sector's total funds halted in 2015.

**The environment of very low interest rates is fostering growth in household indebtedness**

New loans to households (adjusted for refixations and refinancing) grew by more than 20% year on year in 2015. This trend continued into the first quarter of 2016. The growth was due to all types of loans, including consumer credit. Despite a marked improvement in the labour market situation, growth in total loans to households continued to outpace growth in households' income in 2015. This was reflected in a further increase in indebtedness. The higher indebtedness started to show up in the net interest burden of households, which increased in terms of annual totals at the end of 2015. Credit risk, as expressed by the 12-month default rate, is still relatively low in all segments.

**Residential and commercial property prices continued to go up**

Property prices in the Czech Republic went up in 2015, as they did in many other European countries. Transaction prices of apartments rose by almost 5% year on year. The methodology used by the CNB assesses apartment prices as being slightly above the level consistent with fundamentals at the end of 2015. The apartment price trend in Prague is characterised by faster growth in asking prices than actual transaction prices. Due to a further reduction of interest rates on loans for house purchase, the affordability of loans and the perceived profitability of buying an apartment on credit meanwhile increased. In line with the global trend in commercial property markets, prime yields on the domestic market declined further in 2015. The volume of realised transactions remained relatively high, close to the 2007 level. Increased construction is being reflected in a relatively high vacancy rate for office property.

**The developments in the Czech financial sector were favourable**

The developments recorded in the Czech financial sector were positive in 2015. The performance of the banking sector was positively affected by the strong economic recovery. This was reflected in an increase in profitability and sustained high capitalisation and favourable liquidity. Deposits continued to increase despite a continuing decline in deposit interest rates. The domestic banking sector has long been independent of foreign sources of funding. Insurance companies are well capitalised and most of them are maintaining stable profitability even in the current period of low interest rates. Investment funds are showing dynamic growth. The pension management companies sector remains stable. Following the abolition of the second pillar, planholders are saving in traditional transformed funds and new participation funds, which may have a riskier profile.

## RISKS TO FINANCIAL STABILITY AND ASSESSMENT OF THE FINANCIAL SECTOR'S RESILIENCE

**The main sources of risks are the fragility of the world economy…**

Uncertainty surrounding the continuation of the economic recovery is one of the key sources of risks to financial stability in advanced countries. In the euro area, it is being magnified by the unfinished process of stabilisation of banks' balance sheets. This uncertainty started to increase this year due to a worsening of the economic growth outlooks in some emerging economies. Weak global demand is creating anti-inflationary

pressures. Central banks are responding to the risks to price stability by maintaining very loose monetary policies or by easing them further.

**…and the related environment of very low interest rates**

On the one hand, the exceptionally low interest rates are supporting domestic demand and helping achieve the objective of price stability. However, they are also encouraging banks and other types of financial institutions to invest in assets with riskier profiles to maintain their existing profitability or hit profit targets. This is being done through softer lending conditions. Likewise, the willingness of financial institutions' clients to accept higher risk may increase. The perceived advantageousness of low loan interest rates may significantly boost the interest of households and firms in new loans. This may result in excessive growth in loans provided under insufficiently prudent standards and in a potentially unsustainable rise in asset prices.

**The low interest rates are squeezing the profitability of financial institutions**

The falling market interest rates and returns on financial assets are directly affecting the income and profitability of financial institutions in the Czech Republic. In the case of banks, this may occur primarily via declining interest margins. With the exception of consumer credit, a further marked decline in margins on new loans in the Czech Republic is not very likely. Nevertheless, it is necessary to assume that interest margins will have a negative impact on domestic banks' income and profitability over the next few years. This may negatively affect their ability to strengthen their capital adequacy. The performance of banks, insurance companies and pension funds may also be adversely affected by very low, or even negative, yields on government bonds and other high-quality assets in the longer run.

**Developments on the Czech government bond market are being reflected in a change of the structure of risks**

A side-effect of the monetary policies of the ECB and the CNB is increasing interest among foreign investors in government bonds issued in Czech koruna, which is pushing down domestic government bond yields to negative values even at longer maturities. This trend is becoming a potential source of vulnerability for the domestic financial sector, particularly in relation to interest rate risk. Higher sales of Czech government bonds by foreign investors combined with low market liquidity could result in increased market volatility and potentially also a marked drop in their prices. In addition, persisting supply of government bonds with negative yields could squeeze domestic financial institutions out of this market and motivate them to buy riskier assets.

**The risk of domestic property prices becoming significantly overvalued has increased**

The combination of exceptionally low interest rates and easy access to loans for house purchase is creating conditions for growth in residential property prices above levels consistent with fundamentals. The source of this risk is rapid growth in new mortgage loans fostered by falling interest rates. After adjustment of new mortgage loans for refixed and refinanced loans, genuinely new mortgage loans (including loan increases) recorded year-on-year growth of around 30% in 2015. Their rate of growth stayed at around 20% in the first quarter of this year.

**Some new mortgage loans have increased risk characteristics…**

In June 2015, the CNB issued a *Recommendation on the management of risks associated with the provision of retail loans secured by residential property* directed against potential growth in risks in the area of new

loans secured by residential property. The Recommendation set quantitative LTV limits and qualitative criteria for prudential provision of such loans. Based on detailed data for the second half of 2015, the CNB assessed the riskiness of new loans and compliance with the quantitative and qualitative criteria contained in the Recommendation. The assessment revealed that the LTV limits are mostly being observed at an aggregate level. However, some institutions are providing some new loans with LTVs of over 100% and exceeding the 10% limit on new loans with an LTV of 90%–100%. A comparison of property price growth, average loan size and average collateral value indicates that the introduction of the Recommendation might have led to a deliberate increase in estimated collateral value in some cases.

**…mainly concerning clients' ability to service loans in an adverse economic situation**

Very easy credit standards are evidenced by indicators of clients' potential ability to service loans from their own resources in a worse economic situation. Many new loans are being provided with a relatively high LTI (the ratio of loan size to net annual income) or DSTI (the ratio of the monthly loan instalment to net monthly income). At the same time, these loans often have a high LTV or are provided to applicants with relatively low incomes. In the event of shocks in the form of interest rate growth or a drop in income, a significant number of these borrowers could run into repayment problems.

**The risk of exposures to the commercial property market is also increasing**

Low returns on alternative investments and excess liquidity are leading to growth in demand for domestic commercial property among domestic and foreign investors. Given signs of increased activity on the commercial property market and a fast-growing volume of loans to developers, the CNB started to conduct surveys on new loans secured by commercial property provided since the second half of 2014. According to the data gathered, the amount of new loans in this category rose by 17% year on year in second half of 2015. The highest year-on-year growth was recorded for loans for investment in office property. The CNB considers the fact that loans with a high LTV are in many cases being provided with low debt service coverage by income from the property to be a potential risk. A drop in property prices accompanied by a fall in incomes in individual segments could thus give rise to a higher default rate and a lower recovery rate in the subsequent sale of collateral. If newly completed space remains vacant or if the rent obtained is lower than planned, the quality of loans to developers may worsen.

**The banking sector remains highly resilient; credit risk has decreased, but interest rate risk is increasing**

Credit risk, which is the principal source of potential losses in the domestic financial sector, has decreased. The structure of non-performing loans (NPLs) has also improved, but this in turn has led to a drop in their coverage by provisions. The provisions created by banks at the aggregate level nevertheless seem to be sufficient to cover the current expected loss given default. However, there are significant differences across the sector in the prudence of banks with regard to NPL coverage. Risk weights in the main credit portfolios remain stable. By contrast, interest rate risk is potentially increasing on account of bond market developments.

**The interconnectedness of financial market institutions is broadly unchanged and the structural component of systemic risk remains low**

The evolution of financial assets and liabilities forming the links between institutions in the financial sector does not indicate significant changes in

their interconnectedness. The risk of transmission of financial distress across segments in the event of adverse developments remains low. Interconnectedness inside the banking sector has decreased slightly and the risk of interbank contagion has therefore dropped. Contagion risks are also being suppressed by the banking sector's large liquidity buffer. The structural component of systemic risk has increased slightly despite the stable level of interconnectedness. This is due mainly to an increase in maturity transformation of bank deposits and loans and to increasing holdings of government bonds by non-residents. Despite that, the structural component of systemic risk remains low.

**The domestic financial system was exposed in stress tests to very adverse developments associated with a lengthy recession**

The resilience of the domestic financial system was assessed by means of stress tests on banks and pension management companies using alternative economic scenarios. The *Baseline Scenario* is based on the CNB's May forecast and is considered by the CNB to be the most probable. The *Adverse Scenario*, whose probability is very low, assumes a strong recession and a fall of the economy into deep deflation. The adverse economic situation will erode the financial reserves of households and non-financial corporations and cause a significant deterioration in their ability to service their debts. This will lead to sizeable credit losses in the banking sector. This scenario is supplemented in sensitivity analyses with other shocks, e.g. write-offs of claims on indebted EU countries, losses from operational risk and the collapse of the largest debtors of each bank. The *Adverse Scenario* also assumes a pronounced increase in long-term government bond yields, which will result in financial institutions incurring losses due to market risk. The potential upward adjustment of interest spreads and asset prices is thus increasing the importance of high-quality management of interest rate risk.

**According to the stress tests, banks are highly resilient, but pension management companies show higher sensitivity to interest rate risk**

The stress test results demonstrate that the banking sector remains highly resilient to adverse scenarios. While the *Baseline Scenario* predicts credit risk to remain flat, materialisation of the *Adverse Scenario* would mean, among other things, that the banking sector's credit losses would more than triple over the three-year test horizon. However, the banking sector has a large capital buffer which enables it to absorb highly adverse shocks and maintain its overall capital adequacy sufficiently above the regulatory threshold of 8% even in such an unfavourable scenario. The banking sector is also highly resilient to short-term liquidity risk. In the stress test, the LCR took an aggregate value of 191%, well above currently required 70%. All banks would also be compliant with the regulatory limit of 100% required as from 2018. The pension management companies sector remains sensitive to an increase in yields on securities holdings. Pension management companies should therefore prudently assess the size of the impact of the potential rise in interest rates and the ensuing decline in the prices of their debt securities holdings.

**MACROPRUDENTIAL POLICY**

**The Czech economy is still in a growth phase of the financial cycle and the countercyclical buffer rate can be left at its current level of 0.5% for the time being**

When setting the countercyclical buffer rate, the CNB assesses credit growth and other indicators of the financial cycle so as to ensure that the capital buffers are consistent with any losses that the banking sector as a

whole might be exposed to in the future. In December 2015, the CNB reacted to the shift of the domestic financial cycle into a phase of stronger recovery by setting the countercyclical capital buffer rate at 0.5% of exposures located in the Czech Republic with effect from January 2017. This year, the Czech economy continues to be in a growth phase of the financial cycle, characterised by rapid credit growth in many credit segments, increasing household debt relative to income and growth in residential property prices. However, there has been no significant change in cyclical risks indicating growth in systemic risk since the last decision on the setting of the countercyclical buffer rate was made in March 2016. The rate can therefore be left at the current level of 0.5% for the time being. However, if credit growth remains high, credit standards ease further and investor optimism continues to grow, the CNB will stand ready to increase this buffer rate further.

**Highly relaxed standards for the provision of loans for house purchase necessitate a macroprudential response from the CNB**

The CNB does not assess the trends in the area of loans for house purchase as an acute market overheating giving rise to direct risks to financial stability. However, the CNB considers credit standards to be highly relaxed. It has identified the taking on of higher risks by some institutions. This primarily involves the provision of new loans with simultaneously high LTV, LTI and DSTI ratios. Households with such loans are very sensitive to potential income and interest rate shocks. However, the falling interest rates on new loans may not be increasing the affordability of housing, as the growth in property prices is being reflected simultaneously in the size of the loans needed to finance property purchases. This situation necessitates a macroprudential response from the CNB.

**The CNB is tightening some parameters of the Recommendation on the provision of loans secured by residential property**

The CNB is tightening its *Recommendation on the management of risks associated with the provision of retail loans secured by residential property* by lowering the maximum LTV levels. The current upper LTV limit of 100% will be reduced to 95% as from 1 October 2016 and to 90% as from 1 April 2017. The current recommended limit of 10% of new loans with an LTV of 90%–100% will change to a limit of 10% of new loans with an LTV of 85%–95% as from 1 October 2016. The limit will be set at 15% of new loans with an LTV of 80%–90% as from 1 April 2017. The CNB has also issued a new recommendation that institutions should use all available information to determine whether a loan is being used to finance owner-occupied housing or as an investment. If they find that an application for an investment loan shows a combination of characteristics with a higher risk level, they should apply an LTV of 60% at most. If the domestic property market were to show increasing signs of overheating in the years ahead, the CNB would tighten the conditions further or, where appropriate, use other instruments defined by law.

**The CNB will pay increased attention to banks' collateral valuation procedures**

As there is a risk of a softening of collateral valuation standards connected with the Recommendation, the CNB will assess the collateral valuation procedures in individual institutions from the perspective of both internal methodologies and practices.

**The CNB will seek enactment of the power to set risk parameters for loans for house purchase**

In accordance with ESRB recommendations, the CNB will also seek enactment of the power to set risk parameters for loans for house purchase. They include the option to set binding LTV, LTI and DSTI limits as well as other risk parameters for loans for house purchase. Such powers would enable the CNB to respond effectively to emerging risks to financial institutions and consumers which might arise from excessive softening of credit standards. The alternative would be strong measures in the area of institutions' capital, which could be more costly from the perspective of the national economy.

**Given the favourable results of the Czech public finance stress test, the CNB will not apply additional capital requirements to cover sovereign exposure concentration risk**

Since 2015, the CNB has been applying an internal methodology for reviewing and assessing the risk of systemic concentration of sovereign exposures under Pillar 2. One reason for this is the large share of Czech government bonds in domestic banks' assets. This share dropped from 14% to 11% between March 2015 and March 2016. If the domestic credit institutions fail to address this risk sufficiently, the CNB could apply an additional capital requirement to them under the above methodology. Despite the slight year-on-year decline, the CNB considers the exposure to Czech government debt to be systemically important. The CNB has therefore conducted a stress test of Czech public finance. Its results indicate that the current fiscal situation in the Czech Republic does not represent a threat to the financial stability of the domestic banking sector. Consequently, the CNB will not apply additional capital requirements to credit institutions at the three-year horizon.

**The CNB is paying attention to risks associated with systemically important institutions**

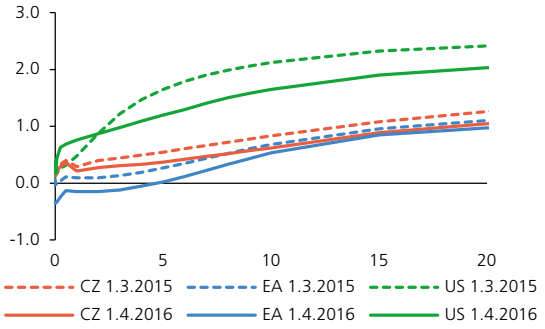
Robust capital adequacy is a condition for maintaining high public and investor confidence in the stability of the Czech banking sector and the financial sector as a whole. Maintaining sufficient capital buffers is of particular importance for banks that are systemically important by dint of their position and character. The CNB sets a systemic risk buffer for such banks. It is required by law to review this rate at least once every two years. It has therefore assessed the systemic importance of domestic banks using data from 2015. Based on the results of this assessment, it will inform banks and the relevant authorities during the course of this year about whether it will be confirming or changing existing systemic risk buffer rates or introducing new ones for banks that have not previously been required to create a systemic risk buffer.

**The CNB considers stabilisation of the EU regulatory framework to be a priority and it continues to see risks in the BRRD, particularly in the configuration of the MREL**

The CNB's general priorities for the regulatory area in future years are stabilisation of the EU regulatory framework and enhancement of national authorities' powers to respond to sources of systemic risk in a timely and adequate manner. The CNB's activities in the regulatory area stem from the fact that proposals for new regulations in the EU do not always take account of the features of the financial sectors of non-euro area countries and hence may not suit the comparatively small and conservative Czech financial sector. One example is the Bank Recovery and Resolution Directive (BRRD), especially the minimum requirement for own funds and eligible liabilities (MREL). The CNB has therefore been actively involved in the debate on the parameters of this tool. As the interpretation of legislation and standards has not yet been unified in the EU, the future configuration of the MREL for the domestic banking sector remains a potential risk.

CHART II.1

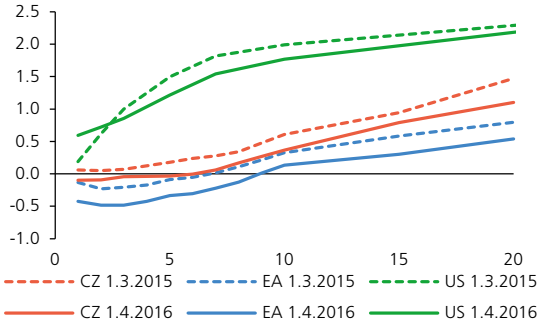
**Movement of swap yield curves in selected economies**
(x-axis: maturity; y-axis: yield in %)




Source: Bloomberg L.P.
Note: The yield curves are derived from interbank rates with maturities of up to six months and swap rates denominated in the currency of the relevant region.

CHART II.2

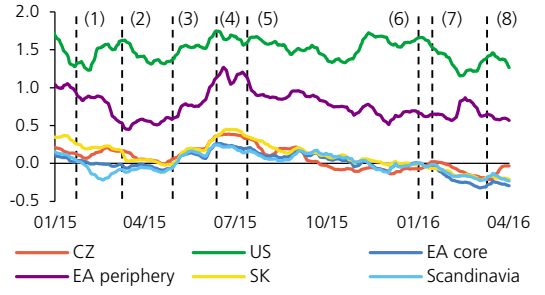
**Movement of government yield curves in selected economies**
(x-axis: maturity; y-axis: yield in %)




Source: Bloomberg L.P.
Note: The yield curves are derived from generic government bond yields. German government bonds are used for EA.

CHART II.3

**5Y government bond yields in selected countries**
(%)




Source: Thomson Reuters, Bloomberg, CNB calculation
Note: EA core comprises AT, BE, DE, FR and NL. Periphery consists of ES, IE, IT, PT and SI. Scandinavia is represented by DK, FI and SE. The figures for groups of countries are the simple averages of the yields. The series are smoothed by the 5-day moving average. (1) The announcement of QE by the ECB on 22 January 2015, (2) the launch of QE by the ECB on 9 March 2015, (3) the FOMC meeting on 29 April 2015 and the deadline for renegotiating Greek aid conditions, (4) the start of the decline on the Shanghai exchange on 12 June 2015, (5) the agreement with Greece on a new bail-out programme on 13 July 2015, (6) the lowering of the deposit rate by the ECB on 3 December 2015, (7) the increase of the main MP rate by the Fed on 17 December 2015, (8) the further reduction of MP rates by the ECB and the modification of its QE programmes on 10 March 2016.

# 2 THE REAL ECONOMY AND FINANCIAL MARKETS

## 2.1 THE MACROECONOMIC AND FINANCIAL ENVIRONMENT

*The recovery in advanced economies, including the euro area, remains fragile. As a result of persisting anti-inflationary risks, the ECB and other central banks in Europe are continuing to ease monetary conditions. Euro area credit growth is showing signs of recovery, but remains very mixed across countries. Economic growth in some emerging economies is slowing further. Coupled with a high share of foreign currency debt and low commodity prices, this is generating risks with regard to the debt servicing ability of some countries. The growth of the Czech economy and the easy monetary conditions are being reflected in faster growth in loans to the private sector. The easy monetary conditions are also giving rise to a further decline in Czech government bond yields, which have turned negative even for longer maturities. Given the low liquidity of this market, the rising share of non-residents in holdings of Czech government bonds could become a source of vulnerability for the domestic financial sector. However, a potential return to recession and financial market instability in the euro area remain the primary risks to the Czech economy.*

### 2.1.1 THE EXTERNAL ENVIRONMENT

**The economic recovery in advanced economies is still fragile...**

Economic growth remained weak in the euro area and mixed across the member countries in 2015. The GDP forecasts for this year and the next expect relatively modest growth of around 1.5% in both Germany and the euro area as a whole. In the USA, by contrast, the strong economic recovery observed in 2014 continued in the first half of 2015. According to preliminary data,[1] however, 2015 Q4 saw a slowdown in GDP growth in the USA and many other advanced economies, including Asian ones. The economic growth outlooks for this year worsened in some advanced countries in connection with these data.[2] Global economic growth thus remains surrounded by many uncertainties.[3]

**...and the monetary conditions will remain easy for a longer period to come**

In December 2015, the Fed responded to robust data from the real economy (in particular from the labour market) by raising its monetary policy rates by 0.25 pp for the first time since 2008. So far it has not continued to tighten the monetary conditions because of uncertainty

1 IMF (2016): *World Economic Outlook*, April.
2 According to these outlooks, the rate of growth of the euro area economy will be close to that of the US economy this year, but will diverge from it again next year, with the US economy accelerating ahead by 0.8 pp. Japan is still expecting growth of only just above 0.5% this year, with slightly declining outlooks.
3 For details see CNB (2016): *Global Economic Outlook*, March.

regarding a more lasting recovery of the US real economy, and its recent communications have been shaping expectations of more gradual monetary policy tightening. There are also concerns that a sharper increase in dollar interest rates could have an adverse effect on global market risk premia and could lead to higher volatility of interest rates, exchange rates or asset prices. Expectations of a somewhat longer period of very low interest rates are also visible in a further downward shift of the long end of the dollar yield curve (see Charts II.1 and II.2).

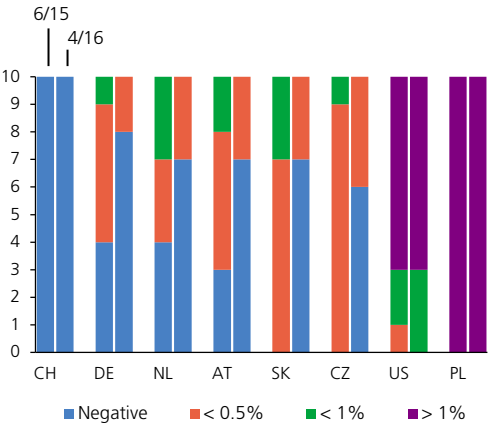
The euro area monetary conditions remain easy, with no sign of tightening before the end of 2017. The ECB cut its monetary policy rates in December 2015 and again in March 2016. The key rate was set at 0% and the deposit rate at -0.40%. In addition, the quantitative easing programme was expanded. As from April 2016, the monthly amount of purchased instruments was extended from EUR 60 billion to EUR 80 billion and investment-grade corporate bonds will now also be purchased. In addition, a new programme of longer-term refinancing operations (TLTRO II) with a maturity of four years was announced, with the first operation to be launched in June 2016. In response to the announcement, euro yield curves fell again along their entire length (see Charts II.1 and II.2) and negative values can now be observed for the government bond yield curves of the euro area core countries and Scandinavia (DK, FI, SE) even for maturities of 5–8 years (see Charts II.3 and II.4). Government bonds of euro area countries represent about 70% of the instruments purchased under the ECB's asset purchase programme.[4] In several lower-debt countries, purchased bonds now account for a significant proportion of government debt (see Table II.1).

### The low asset yields are a source of market risk

The low interest rates on bank products and very low government bond yields are creating an incentive for investors to take on risk on riskier asset markets. This may result in some asset prices rising above levels consistent with the long-term trends in economic fundamentals. From the global perspective, high prices on corporate bond markets combined with a decline in their risk premia remain one of the possible sources of systemic risk. The spreads on US and European high-yield corporate bonds have increased since the start of last year but remain relatively low (see Chart II.5). Rather than a low risk level, this may indicate a reduced ability of the markets to price the relevant risks. A sudden correction in bond prices (for example in response to negative economic news or stronger geopolitical risks) could be amplified by low market liquidity on bond markets. Owing to the strong correlation between many assets, there could be contagion to other markets and subsequent sizeable market losses.

CHART II.4

**Decline in government bond yields in selected countries**
(yields by maturity in years)




Source: Bloomberg L.P., CNB calculation
Note: The first column of each pair denotes data as of 1 June 2015 and the second data as of 1 April 2016. On the vertical axis, yields for maturities of 1 to 10 years are colour-coded into one of four categories by yield level.

TABLE II.1

**Share of the purchased portion of government bonds in the ECB's QE programme**
(%; as of 1 April 2016)

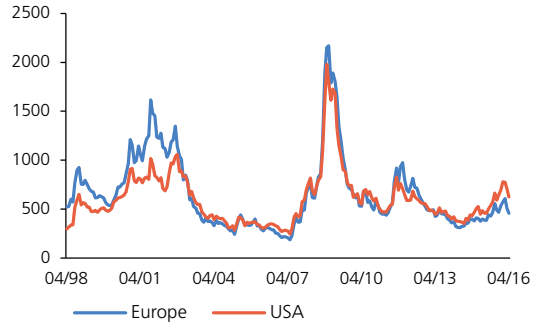
| Country | Share of purchased portion in country's EUR issuance | | ECB capital key | Debt to GDP (%) | 5Y yield |
|---|---|---|---|---|---|
| LU | 24.6 | | 0.3 | 21.4 | -0.24 |
| LT | 20.0 | | 0.6 | 42.7 | 0.44 |
| PT | 19.9 | (8.8) | 2.5 | 129.0 | 1.78 |
| SK | 19.6 | | 1.1 | 52.9 | -0.22 |
| LV | 18.0 | | 0.4 | 36.4 | 0.05 |
| GR | 17.7 | (17.7) | 2.9 | 176.9 | 8.90 |
| IE | 14.9 | (7.2) | 1.6 | 93.8 | -0.01 |
| SI | 14.2 | | 0.5 | 83.2 | 0.28 |
| FI | 11.9 | | 1.8 | 63.1 | -0.20 |
| ES | 10.8 | (2.8) | 12.6 | 99.2 | 0.33 |
| DE | 10.1 | | 25.6 | 71.2 | -0.33 |

Source: ECB, Bloomberg L.P., CNB calculation
Note: The figure in parentheses denotes the portion purchased under the SMP programme discontinued in June 2014, which remains on the ECB's balance sheet. Capital key represents the country's share in the capital of the ECB, which determines the composition of government securities purchased in the ECB's QE programme. Debt to GDP as of the end of 2015. The table lists the countries whose share of the purchased portion exceeds 10%.

4 www.ecb.europa.eu/mopo/implement/omt/html/index.en.html

CHART II.5

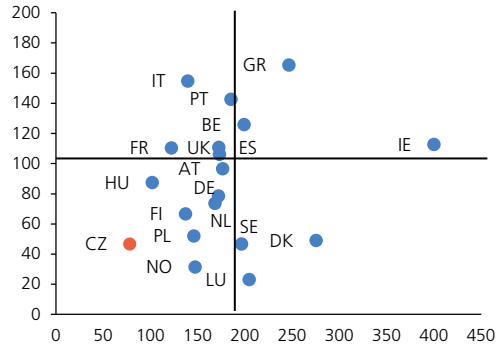
**Yield spreads on risky private sector bonds**
(bp)




Source: Bloomberg L.P.
Note: The spread is the difference between yields on risky bonds and yields on government bonds adjusted for any embedded options (the option-adjusted spread). A risky bond is a speculative-grade bond (BB+ or lower).

CHART II.6

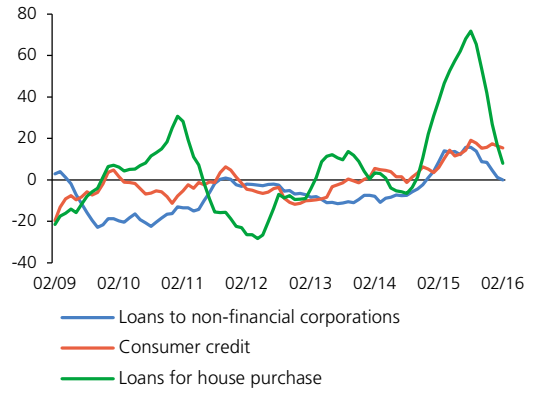
**Private and government debt in EU countries**
(% of GDP; x-axis: private debt; y-axis: government debt)




Source: BIS
Note: Debt is the sum of all credit provided by domestic banks, non-banks and non-residents. The private sector comprises non-financial corporations, households and NPISHs. The BIS debt calculation methodology may differ from that used by national authorities. For that reason, the data in the chart may not match those reported by other institutions.

CHART II.7

**Year-on-year growth rates of new bank loans in the euro area**
(%)




Source: ECB
Note: Smoothed by the three-month moving average.

## The effectiveness of ECB monetary policy may be reduced by persisting high indebtedness

Persisting high private debt, which is often accompanied by sizeable government debt, is one of the obstacles to a return to stable economic growth in some euro area countries (see Chart II.6). This may reduce the effectiveness of the ECB's unconventional monetary policy instruments[5] and prompt a need to extend the period of very low interest rates. On the one hand, very low rates support domestic demand, but on the other hand they may be reflected in a further rise in private sector debt and a pick-up in property prices. These trends may not be sustainable from the long-term perspective.[6] At the same time, very low interest rates may contribute to the provision of lower-quality and riskier loans.[7] A return to recession would then lead to higher credit losses, which would complicate the still unfinished process of stabilisation of bank balance sheets.

## Credit growth remains very mixed across euro area countries

The year-on-year growth rates of the stock of loans to households range from -4% in Ireland to 13% in Slovakia. The range is even wider for loans to non-financial corporations – from -15% in Malta to 8% in Estonia.[8] The aggregate perspective suggesting a recovery in euro area credit growth (see Chart II.7) thus conceals significant differences between countries. The low rates of growth, and in some countries absolute declines, in the stock of loans provided to the private sector, indicate a risk of a sustained deflation trend. Together with a further decrease in interest rates on new bank loans (see Chart II.8), this is significantly increasing the importance of preventive macroprudential policies at both the national and international level.

## Economic growth in emerging market economies is slowing…

The GDP growth rates of emerging market economies (EMEs), including China, declined in 2015. The outlooks for this year and the next were subsequently revised downwards.[9] This, together with expectations of interest rate growth on US markets, was reflected in a substantial outflow of capital from these countries. While the slowdown in economic growth is putting pressure on countries' ability to repay existing debt, the capital outflow may contribute to a rise in potential future debt

5 CNB (2015): *Financial Stability Report 2014/2015*, pp. 21–22.
6 Shirakawa, M. (2015): *Debate on deflation and the role of "nominal anchor"*, presentation at an inflation expectations symposium, Federal Reserve Bank of Minneapolis, 30 March 2015.
7 Negative effects connected with excessive risk-taking by banks and the private sector may occur. For details see, for example, BIS (2012): *82nd Annual Report*, June, or Frait, J., Malovaná, S., Tomšík, V. (2015): *The interaction of monetary and macroprudential policies in the pursuit of the central bank's primary objectives*, Financial Stability Report 2014/2015, CNB.
8 ESRB (2016): *ESRB Risk Dashboard*, March.
9 In particular, news about the Chinese economy leads to swings in international capital flows. The impact of such news on other EMEs has increased markedly over the last 20 years. According to estimates, it currently explains about one-third of the total volatility on global stock and currency markets. Rising financial integration between countries plays a key role in this case and has become a more important factor than international trade. For details, see IMF (2016): *Global Financial Stability Report*, April.

refinancing costs. In some countries, rising debt servicing costs may result in defaults and substantial losses for investors.[10]

**…which, together with the high share of foreign currency debt and low commodity prices, is putting pressure on important sectors of the economy**

The debt of the EME non-financial sector relative to GDP climbed to more than 170% in 2015, due mainly to non-financial corporations (around 100%), and to a lesser extent to government (around 40%) and households (around 30%). As many large corporations are state-owned, a deterioration of the debt sustainability outlook in the corporate sector may make public debt financing more expensive via state guarantees.[11] Liabilities denominated in US dollars, which could be subject to currency risk, account for a sizeable share of total EME debt (see Chart II.9). As a result of the expected economic slowdown in EMEs, the currencies of EMEs are weakening against the dollar, which is raising the cost of servicing this debt (see Chart II.10). Low commodity prices are another factor adversely affecting the debt servicing ability of some countries. Falling prices of oil, food and other commodities are generating risks for the public, non-financial and financial sectors. The risks mainly originate from persisting low commodity prices in the energy sector, which financed itself using a large quantity of bonds in the period of high profitability (a similar scenario pertains to the domestic energy sector – see section 2.3).[12]

### 2.1.2 THE DOMESTIC ENVIRONMENT

**The external environment is still the main risk to domestic economic growth**

Domestic GDP increased by 4.3% in 2015, making the Czech economy one of the fastest-growing economies in Europe. The economic growth was fuelled by a combination of domestic factors. In the area of economic policy, these included easy monetary conditions and increased growth in government investment. A potential deterioration of economic activity in advanced countries (especially the euro area) is the main source of risk to the Czech economy over the next two years. Any adverse developments on emerging markets would hit the domestic economy only indirectly through a worsening of global sentiment and volatility in global financial markets.

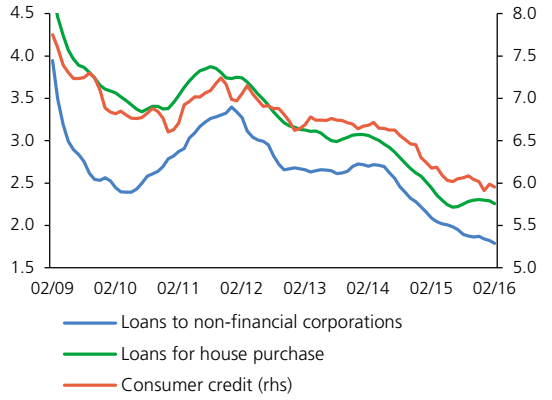
**The growth of the Czech economy and the easy monetary conditions are being reflected in faster growth in loans to the private sector**

Total bank loans to the private sector rose by 5.8% and total deposits by 7.0% year on year in 2015. The faster credit growth reflected stronger dynamics of loans to both non-financial corporations and households

10 Increased debt problems of firms, reflected in a rise in NPLs, are now visible in some EMEs.
11 IMF (2016): *Global Financial Stability Report*, April; p. 25.
12 IMF (2016): *Global Financial Stability Report*, April; p. 24.

CHART II.8

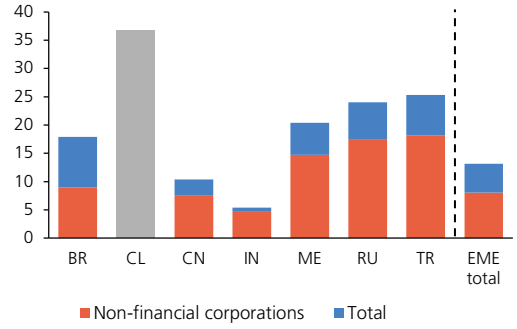
**Interest rates on new bank loans in the euro area**
(%)




Source: ECB
Note: Smoothed by the three-month moving average.

CHART II.9

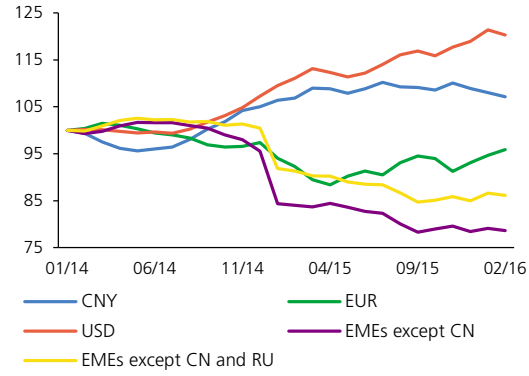
**USD-denominated debt of non-banks**
(shares in GDP as of 2015 Q2)




Source: BIS, IMF
Note: Non-banks comprise non-bank financial institutions, non-financial corporations, government, households and international organisations. Debt is the sum of local and cross-border loans and bonds issued in USD. In the case of Chile, it was not possible to separate non-financial corporations from the rest of the non-bank sector.

CHART II.10

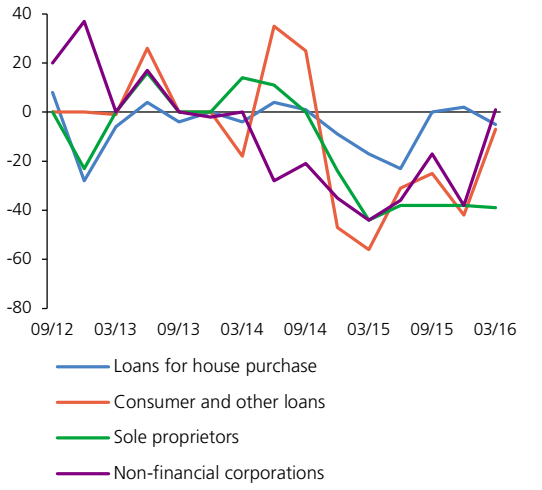
**Nominal effective exchange rates in EMEs and selected economies**
(index: January 2014 = 100)




Source: BIS, IMF, CNB calculation
Note: The index for EMEs is calculated as a weighted sum, where the weights are annual GDP. The index covers 20 countries accounting for more than 80% of the total GDP of all EMEs. Higher values mean appreciation.

CHART II.11

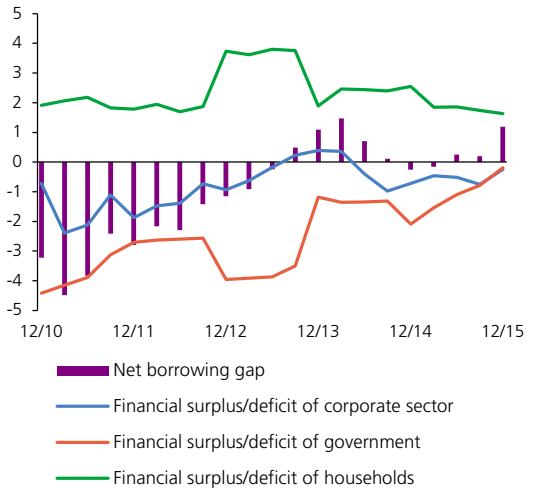
**General lending standards in the Czech Republic**
(difference in market share of banks in pp)




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

CHART II.12

**Financial surpluses/deficits by sector and the net borrowing gap**
(annual moving totals as a ratio to GDP; %)




Source: CZSO, CNB

(see sections 2.3 and 2.4). The sizeable decline in the average client interest rate on new loans to the private sector has stabilised in recent months, mainly because the declines in interest rates on loans to non-financial corporations and loans for house purchase halted. By contrast, rates on new consumer credit started to fall more markedly during 2015 (see section 2.4). According to the Bank Lending Survey,[13] demand for loans for house purchase and consumer credit, and to a lesser extent corporate loans, saw broad growth in 2016 Q1. The easing of credit standards applying to most types of loans came to a halt (with the exception of loans to sole traders; see Chart II.11). In 2016 Q2, banks expect credit standards to ease for corporate loans and consumer credit, but to tighten for house purchase loans.

### The risk of a balance-sheet recession in the Czech economy remains low

The financial surplus of households decreased slightly and the financial deficit of the corporate sector (non-financial and financial corporations) declined during 2015 amid a decrease in the general government deficit (see Chart II.12). The gap between the financial surpluses of the private sector and general government thus remained close to zero for most of the year. This indicates that the domestic economy is not generating excessive financial surpluses with a negative effect on demand.

### Czech government bond yields are falling into negative territory even for longer maturities

The combination of a persisting positive interest rate differential between the Czech koruna and the euro in some financial market segments and the use of the exchange rate as an additional monetary policy instrument increased the interest of foreign investors in domestic assets. The increased interest of non-residents was reflected in a rise not only in their share of the financing of Czech banks, but also in their share in Czech koruna government bond holdings (see Chart II.13). The free koruna liquidity held by non-residents, coupled with the situation on the koruna foreign exchange market, led to a drop in domestic government bond yields to negative levels for maturities of up to six years (see Chart II.2). The Czech Republic has negative rates even on the primary market (see Table II.2). The same can be seen for some euro area countries and for Switzerland and Sweden.

### The rising share of non-residents in holdings of Czech assets is increasing the risk of elevated volatility of the prices of such assets

The risk of spillover of external shocks to the domestic financial system is rising as the presence of non-residents increases and their share in holdings of domestic assets. In an environment of lower liquidity on Czech financial markets, a sell-off of domestic assets by global investors could cause high market price volatility. This would affect domestic financial institutions, which are still major holders of such assets

13 CNB (2016): *Bank Lending Survey*, April.

(see Chart II.14). The CNB has long analysed this scenario in its Financial Stability Reports. Market risk in each sector is stress tested on an annual basis (see sections 3.2 to 3.4). The stress tests confirm that institutional investors are among the most sensitive to market risk (especially interest rate risk). This results from the structure of their portfolios, which are made up mainly of high-quality bonds revalued to fair value (see Chart II.15). The impact of this scenario on financial institutions depends to a large extent on the size of the revalued bond portfolio, the volume and price of sales, the amount of bonds used as collateral in repo operations in the event of sale of collateral, and above all the level of hedging of each financial institution against interest rate risk. The portfolios of the different types of institutional investors are very similar (see Chart II.16). However, their reactions to sharp temporary swings in bond prices may not take the uniform shape of mass sell-offs and immediate realised losses. Insurance companies are partially protected against temporary market swings by the rules for pricing assets and liabilities (see the relevant thematic article in this Report)[14] and their level of hedging against interest rate risk is relatively high. The pension management company sector uses interest rate risk hedging to a limited extent (see section 3.2). Transformed funds of pension management companies may be partly protected against temporary swings by an accumulated buffer of unrealised revaluation changes from previous years. In addition, pension management companies might prefer the risk of having to temporarily supply their own funds in the event of a decline in the asset value of a transformed fund below its liabilities as they did in 2007–2009, to realising their high-quality assets at disadvantageous prices.

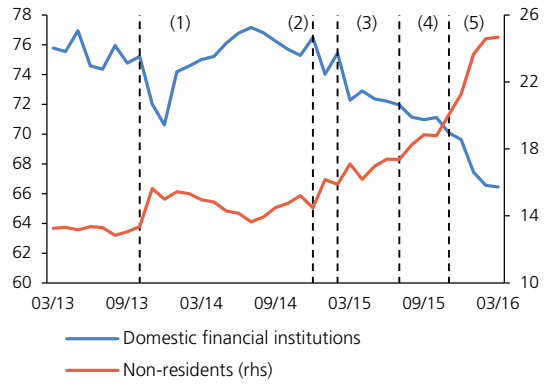
### Domestic financial institutions could reduce their presence on the domestic government bond market

The current developments on the Czech government bond market seem to be pointing to a potential rise in medium-term systemic risks. With yields in negative territory, Czech government bonds are ceasing to be an attractive investment for domestic financial institutions. The traditional government bond holders are thus being gradually crowded out of the market by non-residents (see Chart II.13). On the one hand, this means a gradual decrease in sovereign exposure concentration risk in the domestic sector (see section 3.4) and hence in the risk of sizeable market losses if yields were to rise back to historically normal levels. On the other hand, the options for these institutions to diversify their liquid portfolios have narrowed considerably (see section 3.3). For banks, depositing liquidity with the CNB remains virtually the only koruna option. The environment of negative yields is having a greater impact on institutional investors, whose balance sheets are dominated by Czech government bonds (see Chart II.15). These institutions do not have direct access to CNB facilities, and bank deposits are often subject to intra-group limits. They

14 Dvořák, M., Gronychová, M., Hausenblas, V., Komárková, Z. (2016): *Could the Czech insurance sector be a source of systemic risk?* Financial Stability Report 2015/2016, CNB.

CHART II.13

**Holders of Czech government bonds**
(% of stock of Czech CZK government bonds)




Source: MF CR, CNB calculation
Note: Vertical lines denote the last monthly observation before (1) the announcement of the exchange rate commitment by the CNB on 7 November 2013, (2) the official announcement of QE by the ECB on 22 January 2015, (3) the launch of QE by the ECB on 9 March 2015, (4) the first CNB foreign exchange intervention since November 2013 on 17 July 2015 and (5) the lowering of the deposit rate by the ECB on 3 December 2015.

TABLE II.2

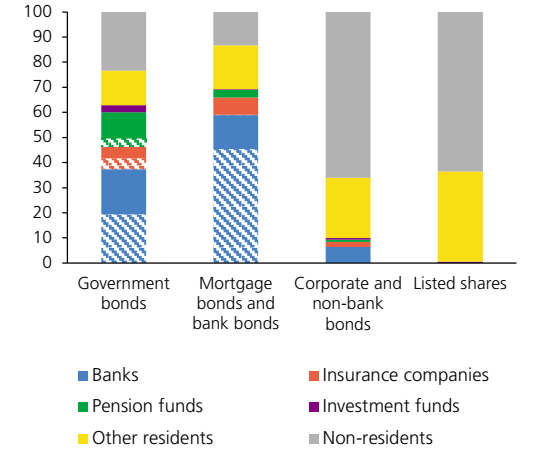
**Tenders for Czech government securities with negative yields**

| Tender period | No. of tenders | Average maturity (years) | Average yield (%) | Volume of issue (CZK billions) | Share in koruna bonds (%) |
|---|---|---|---|---|---|
| 2015 Q3 | 6 | 1.29 | -0.26 | 45 135 | 3.3 |
| 2015 Q4 | 9 | 1.90 | -0.27 | 70 329 | 5.2 |
| 2016 Q1 | 14 | 1.62 | -0.11 | 66 134 | 4.9 |
| Total | 29 | 1.65 | -0.21 | 181 598 | 13.3 |

Source: MF CR, CNB, CNB calculation
Note: The volume does not include issues purchased by the Finance Ministry. Tenders up to 1 April 2016. The share in koruna bonds relates to the debt outstanding by the end of 2015.

CHART II.14

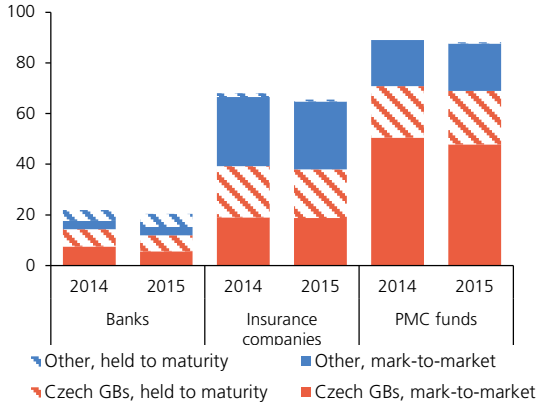
**Holdings of financial assets issued by residents broken down by sector**
(% of total amount; as of 30 September 2015)




Source: CNB
Note: The hatched areas represent securities in the accounting categories "held to maturity" or "loans and other receivables", which are not available for sale.

CHART II.15

**Structure of the bond portfolio by sector and valuation method**
(share in assets in %; at end of period)




Source: CNB
Note: The category "mark-to-market" includes available-for-sale assets. The figures for the insurance sector include financial placement of unit-linked policies. GBs = government bonds.

CHART II.16

**Similarity of sectors of the financial market according to the composition of assets managed**
(%)

| | PFs | ICs | CIFs | FAs | CFIs | Bs | OFIs | |
|---|---|---|---|---|---|---|---|---|
| Pension funds (PFs) | | 90 | 55 | 51 | 56 | 39 | 2 | 4.7 |
| Insurance companies (ICs) | 90 | | 80 | 65 | 63 | 45 | 5 | 5.9 |
| Collective investment funds (CIFs) | 55 | 80 | | 74 | 55 | 42 | 19 | 3.1 |
| Financial auxiliaries (FAs) | 51 | 65 | 74 | | 47 | 63 | 21 | 2.1 |
| Captive financial institutions (CFIs) | 56 | 63 | 55 | 47 | | 47 | 42 | 4.3 |
| Banks (Bs) | 39 | 45 | 42 | 63 | 47 | | 65 | 75.1 |
| Other financial intermediaries (OFIs) | 2 | 5 | 19 | 21 | 42 | 65 | | 4.9 |

Source: CNB, CNB calculation
Note: A high figure (red) denotes high similarity in the composition of financial assets. The last column represents the sector's importance in terms of its share in total assets. Similarity is measured as cosine similarity (Brechler et al. 2014: *Similarity and Clustering of Banks: Application to the Credit Exposures of the Czech Banking Sector*, CNB Research and Policy Notes 2014/04). The asset composition is divided into categories: loans to non-financial corporations, loans to households, Czech government bonds, bonds of non-financial corporations, bonds of financial institutions, equities and shares of non-financial corporations, equities and shares of financial institutions, currency and deposits, other domestic exposures, foreign equities and shares, foreign bonds and deposits, other foreign assets.

may therefore opt to invest in riskier assets, including foreign currency assets (see section 3.1).

### Shortening average residual maturity may imply medium-term risks

From the point of view of current government debt servicing costs and fiscal space, the continued negative yields achieved in bond auctions are having a favourable effect and are contributing to a further drop in the Czech government's interest rate expenditure. This is in line with the nature of demand from non-residents (see Charts II.17 and II.18). From the medium-term perspective, however, this trend is increasing the risks regarding future refinancing of domestic debt. The possibility of negative debt financing costs is creating an incentive to issue at the short end of the yield curve. However, a longer average maturity would be desirable, as it generally acts as a safeguard against adverse conditions arising when too much debt is refinanced over a short time (insufficient demand, higher interest rates in the future). From the financial stability perspective, it would be beneficial to at least maintain the medium-term horizon for the average residual maturity of Czech government debt with a target value of six years until 2018, or even extend it as in other countries given the generally favourable interest rate conditions (see Chart II.18). Such an issuance policy would also partly satisfy the demand among domestic institutional investors for government bonds with positive yields. Their demand tends to be more stable over time than demand from non-residents.

### Alternative economic scenarios

Alternative economic scenarios were defined on the basis of potential alternative future macroeconomic trends along with the risks identified. These scenarios are used mainly in sections 3.2 to 3.4 to test the resilience of the Czech financial sector. The paths of key variables in each scenario are shown in Charts II.19 A–D.[15] The evolution of other variables relevant to the stress tests in relation to the evolution of the macroeconomic environment (credit growth, the default rate, the NPL ratio[16] and property prices) is presented in the following sections.

The *Baseline Scenario* is based on the CNB's May macroeconomic forecast published in Inflation Report II/2016 and assumes slower growth in economic activity of 2.3% this year due to a decline in government investment co-financed from EU funds. On the other hand, economic activity will still be supported by easy monetary conditions, rising external demand and low oil prices. This scenario expects economic growth to pick up pace to more than 3% in 2017 and 2018. The general unemployment rate falls to 4% as economic activity increases at the scenario horizon. Headline inflation will rise from its current low levels

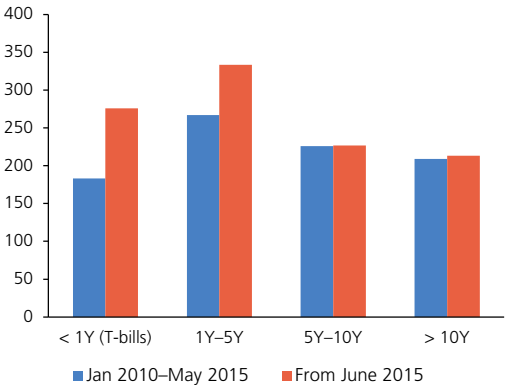
15 The path for the *Baseline Scenario* in the first two years is based on the CNB's official prediction of May 2016. Beyond this horizon it is extrapolated towards the expected long-term equilibrium values.
16 The default rate and the NPL ratio relate to the same event, i.e. to default. Whereas the default rate is a (usually forward-looking) flow indicator focused on a particular time interval (see the Glossary), the NPL ratio is a stock indicator describing the level of NPLs at a given point in time.

and reach the 2% inflation target in the second half of 2017. Consistent with the forecast is stability of market interest rates until mid-2017, followed by a gradual increase in rates in the second half of 2017. The forecast also assumes that the exchange rate will be used as a monetary policy instrument until mid-2017.

The *Adverse Scenario* assumes an end to the euro area recovery and a marked drop in economic activity in Europe. This may be caused, for example, by negative expectations about global economic growth and a renewed increase in investors' risk aversion with regard to the EU and emerging economies. The Czech economy falls back into recession owing to a decrease in external demand. This causes a return of pessimistic private sector expectations about future economic developments and renewed deferral of household consumption and corporate investment. The combination of a downturn in external demand and then also in domestic demand will cause a sizeable decline in economic activity in the Czech Republic and result in a V-shaped recession. In addition, the debt deflation scenario will materialise, with price deflation leading to an increase in private sector debt in real terms as a result of declining economic activity, rising unemployment and falling wages. The adverse economic situation causes the funds of households and non-financial corporations gradually to become exhausted. Coupled with a rise in real debt, this causes a significant deterioration in their ability to repay their obligations. The problems in the real economy later also affect the financial sector, which records considerable credit losses and a marked decline in profits. Monetary policy remains easy, the three-month PRIBOR stays very low over the entire test horizon and the exchange rate weakens sharply. However, long-term bond yields surge as global risk aversion increases and the quality of some assets is re-assessed. At the same time, banks tighten their view of credit risk and increase their risk mark-ups on interest rates on new loans, which will shift to a much higher level also due to an increase in long-term interest rates. The related rise in debt service together with the other impacts of recession will increase the default rate for loans for house purchase and loans to non-financial corporations.

CHART II.17

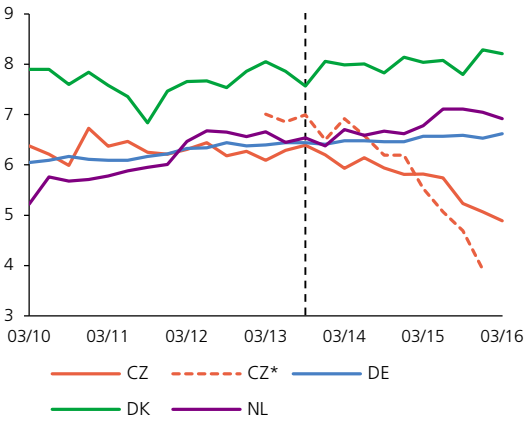
**Excess demand in tenders for Czech government securities**
(x-axis: maturity of issue; y-axis: demand from primary dealers relative to original supply from ministry in %)




Source: CNB, CNB calculation
Note: Tenders up to 1 April 2016. A total of 56 issues have taken place since June 2015. Weighted by issue size.

CHART II.18

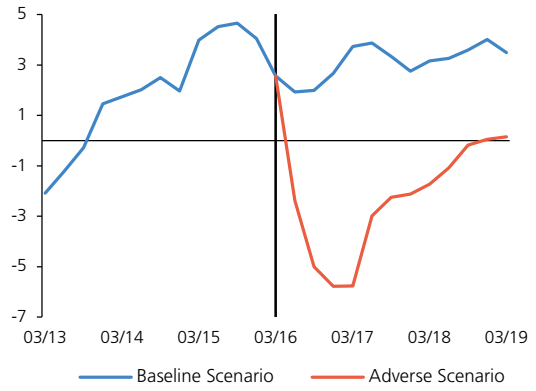
**Average residual maturity of government debt in selected countries**
(years)




Source: Bloomberg L.P., CNB, CNB calculation
Note: CZ* represents the average residual maturity of koruna government bonds held by non-residents. The vertical line denotes the last quarterly observation before the announcement of the exchange rate commitment by the CNB.

CHART II.19 A

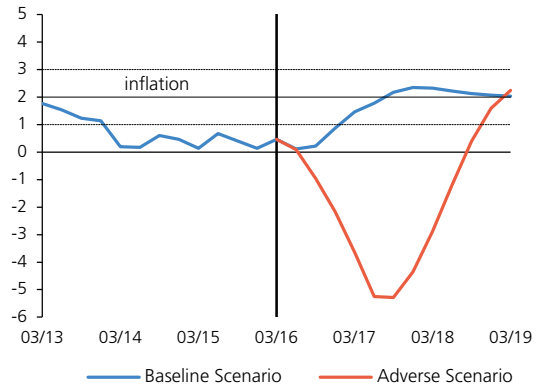
**Alternative scenarios: real GDP growth**
(year-on-year change in %)




Source: CNB

CHART II.19 B

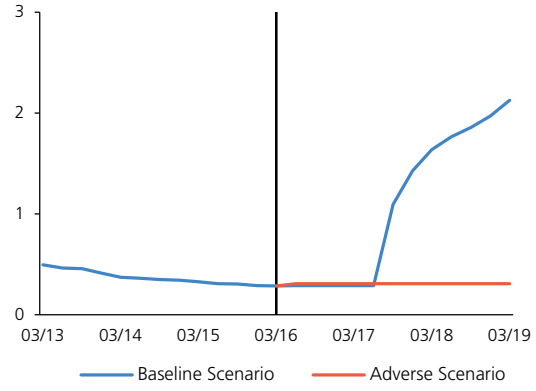
**Alternative scenarios: inflation**
(%)




Source: CNB

CHART II.19 C

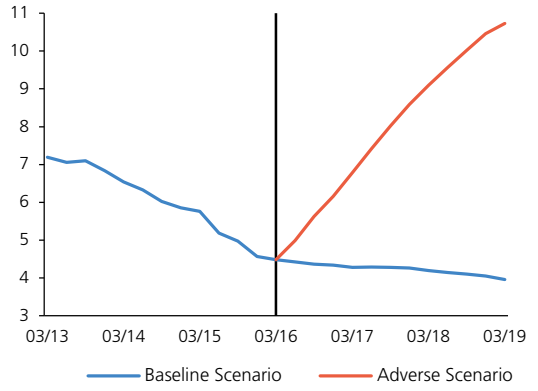
**Alternative scenarios: 3M PRIBOR**
(%)




Source: CNB

CHART II.19 D

**Alternative scenarios: unemployment**
(%)




Source: CNB

## 2.2 THE PROPERTY MARKET

*Residential and commercial property prices in the Czech Republic both went up in 2015, as they did in many other countries. As regards residential property, the highest growth was recorded for apartment prices, which accelerated throughout the year. The different growth in apartment prices in Prague and the rest of the country equalised. In Prague, the difference between asking prices and transaction prices continued to widen. Overly optimistic expectations about future price growth could lead to adjustment of transaction prices towards asking prices and to the emergence of a price spiral. In the event of an adverse shock in the form of a sizeable increase in interest rates and a deterioration in the income of borrowers, credit losses on mortgage loans could increase significantly. In the event of lower-than-planned selling prices, credit losses on loans to developers could rise.*

### Easy monetary conditions in many countries are fostering property price growth

Globally low interest rates on loans for house purchase and the search for yield in an environment of low returns on alternative assets are motivating households and investors to purchase property and are thus fostering property price growth. In some countries, residential property prices are continuing to show growth driven by demographic trends and long-term easing of credit standards (SE, NL). Prices are also rising sharply in countries that experienced substantial corrections in past years (UK, IE, EE). Some markets are seeing much faster price growth in their capital cities or several large agglomerations (AT, DE, IE, DK).[17] In most cases, this is being fuelled in part by foreign demand. Commercial property prices are also rising and their prime yields are falling. These returns are already below their pre-crisis levels in some countries (DE).[18]

### Residential property prices are also rising in the Czech Republic…

Residential property prices went up in all segments in the Czech Republic (see Chart II.20).[19] Transaction prices of apartments rose by 4.5% year on year in 2015, with the pace of growth increasing as the year progressed (see Chart II.21). This was fuelled by accelerating price growth outside Prague, which according to estimates reached 7.4% year on year in 2015 Q4 and outpaced that in Prague (4.6%). According to regional estimates available for the first half of the year, apartment prices rose in most regions. Consistent with the *Baseline Scenario* is a further gradual rise in apartment prices (see Chart II.22).

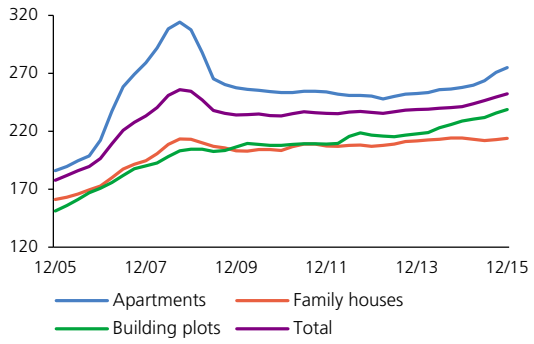
### …and are assessed as slightly overvalued

The methods used by the CNB indicate that apartment prices were slightly overvalued at the end of 2015. The estimated overvaluation in relation to economic fundamentals was mostly close to 5%

17 ECB (2015): *Financial Stability Review*, November 2015.
18 Ibid.
19 Transaction prices of family houses fell in some regions; on average they were flat.

CHART II.20

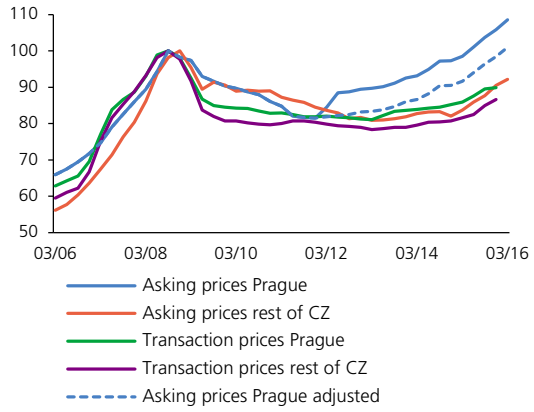
**Residential property prices in the Czech Republic – transaction prices**
(1999 Q1 = 100)




Source: CZSO, HB index, CNB calculation
Note: The data for family houses and apartments for 2015 H1 are preliminary. The other data for 2015 are calculated from alternative sources of data on transaction prices (apartment transaction prices from a CZSO survey, the HB index and the CZSO House Price Index).

CHART II.21

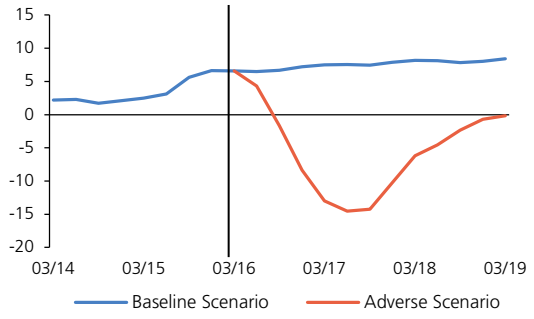
**Apartment prices – transaction and asking prices**
(cyclical maximum = 100)




Source: CZSO, CNB calculation
Note: The adjustment of asking prices in Prague according to the CZSO involved reducing them by the significant growth recorded in 2012, which has not been confirmed by alternative data sources.

CHART II.22

**Year-on-year property price growth**
(%)




Source: CNB

TABLE II.3

**Degree of apartment price overvaluation according to various methods**
(%)

| | |
|---|---|
| Supply and demand model | 0.3 |
| Adjusted price-to-income ratio | 4.8 |
| Adjusted price-to-rent ratio | 4.5 |
| Accelerator model | 5.2 |

Source: CNB calculation

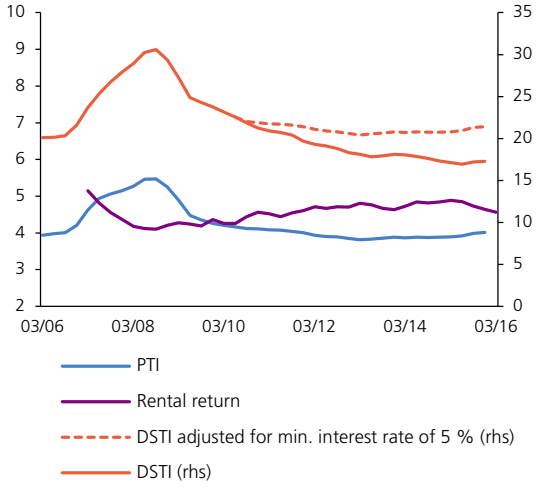
CHART II.23

**Minimal estimated difference between asking and transaction prices in Prague**
(% of 2015 Q4 asking prices)


Source: CZSO, CNB calculation
Note: The adjustment of asking prices in Prague involved reducing them by the significant growth recorded in 2012, which has not been confirmed by alternative data sources.

CHART II.24

**Housing affordability indicators**
(returns and DSTI in %)




Source: CZSO, IRI, CNB calculation
Note: PTI and DSTI are obtained as the ratio of, respectively, the price of and monthly instalment on a 68 m² apartment to, respectively, the moving average of the annual and monthly wage. A mortgage with an LTV of 65% and a repayment period of 20 years was considered for the DSTI calculation. The data for 2015 are preliminary. The apartment rental return was obtained as the ratio of annual rent to the price of a 68 m² apartment.

(see Table II.3).[20] At times of economic growth and buoyant credit growth, however, property price determinants may themselves show "better-than-sustainable" growth. Price sustainability evaluation techniques that work with such determinants can therefore underestimate the actual overvaluation. One of these determinants that is currently at historical lows is the interest rate on loans for house purchase.[21] According to the *Baseline Scenario,* the overvaluation of apartment prices will increase further over the next two years.[22]

**The growth in asking prices of apartments may become one of the sources of a price spiral…**

The apartment price trend in Prague continued to be characterised by faster growth in asking prices than transaction prices. While asking prices in Prague as of the end of 2015 recorded cumulative growth of 30% compared to their previous lows, thus exceeding their 2008 high (see Chart II.21), transaction prices were only 12% higher on the same date.[23] By contrast, asking and transaction prices in the rest of the Czech Republic were up by a close 12% and 14% on their previous lows. According to CNB estimates, asking prices in Prague may have been at least 14% higher than transaction prices at the end of 2015 (see Chart II.23).[24] Moreover, growth in asking prices in Prague accelerated further in 2016 Q1 (to 10.2% year on year). Earlier and faster growth in asking prices than in transaction prices is typical of an initial price recovery stage. However, sustained excessive growth in asking prices could lead to self-fulfilling expectations about future price growth and to the emergence of a price spiral.

**…and lead to credit losses on mortgage loans in the event of a significant change in interest rates…**

Slightly faster growth in residential property prices relative to wage growth in 2015 led to a gradual decrease in apartment affordability (the price-to-income ratio, PTI; see Chart II.24). Slowing growth or a decline in rent in some regions also led to a decrease in rental returns.[25] Due to a further reduction of interest rates on loans for house purchase, the affordability of loans and the perceived profitability of purchasing an apartment on credit (the debt service-to-income ratio, DSTI) increased

20 Three out of the four methods used by the CNB to evaluate price sustainability indicate price overvaluation of close to 5%. The fourth method evaluates prices as being in line with fundamentals.
21 In relation to income (i.e. excluding all other factors), apartment transaction prices rose by 7% from their last low.
22 The forecasts were drawn up using the accelerator model, which is a method used to evaluate the sustainability of current prices. The advantage of this model is that it works with fundamentals predicted by CNB satellite models.
23 Part of the growth in asking prices in Prague was due to rapid year-on-year growth recorded in 2012. As apartment prices went down in this period according to alternative apartment price estimates, this could be a statistical anomaly in the CZSO data.
24 The average difference between asking and transaction prices in Prague cannot be determined exactly – information on such prices is only available in the form of a price index measuring their relative growth, not their absolute level. The estimation therefore assumes that asking prices were equal to or higher than transaction prices when they reached their trough in the monitored period. For the purposes of this estimation, asking prices in Prague according to the CZSO were reduced by the growth recorded in 2012, which has not been confirmed by alternative data sources.
25 Apartment rental returns were obtained as the ratio of annual rent to the price of a 68 m² apartment.

further. However, the ability of some households to service these loans could deteriorate in the event of a sharp rise in interest rates (see sections 2.4 and 4.3). Given a hypothetical assumption of a 5% increase in interest rates on loans for house purchase, the ratio of the instalments on an illustrative mortgage[26] to the wage would have been 4 pp higher at the end of 2015.

### …or to credit losses on loans to developers in the event of lower-than-expected price growth

An analysis of the number of apartment starts reveals[27] that in 2015 apartment starts in Prague were broadly in line with the average price elasticity to asking prices observed since 2006 (see Chart II.25). In the rest of the Czech Republic, by contrast, apartment starts were relatively lower. However, a simple model of the relationship between growth in asking and transaction prices[28] indicates that at the end of 2015, asking prices in Prague were 7% higher than implied by the relationship between those two types of prices observed since 2005. A potential downward adjustment in asking prices could therefore lead to lower selling prices of real estate projects than those expected by developers, and eventually to credit losses on loans on those projects.

### Commercial property prices in the prime segment have also been rising…

In line with the global trend in commercial property markets, prime yields in the Czech Republic declined further in 2015 (by 0.4 pp on average; see Chart II.26). At the end of the year, they were lowest for retail property (5%), for which they fell below the 2007 level. Capital prices meanwhile increased across all types of commercial property.[29] Growth in realised transactions stopped as the room for profit in the prime commercial property segment narrowed, but it remained close to the 2007 level.

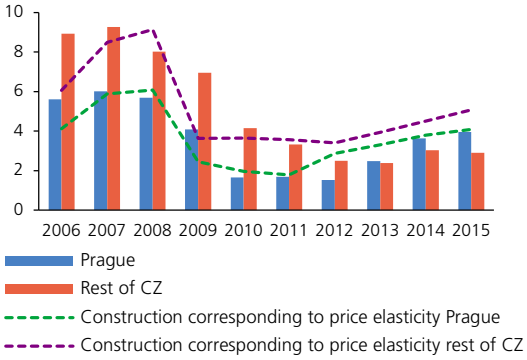
### …but high office property vacancy and construction rates still pose a risk

Planned construction of industrial and office property remained elevated in 2015, at 65% and 56% respectively of its 2007 and 2008 highs. Despite a further substantial rise in stock (of 14% year on year), the vacancy rate for industrial property decreased significantly further in 2015 (see Chart II.27). The vacancy rate for office buildings also fell, but remains quite high (15%). Part of the new office stock may be absorbed by migration of tenants from lower segments to the prime segment. The high rate of construction, however, is generating a risk of vacancies or lower-than-planned rent in newly completed premises. In such case, credit losses on loans to developers could increase.

26 The estimates are based on an assumption of a mortgage with an LTV of 65% and a maturity of 20 years.
27 The number of apartment starts corresponding to the price elasticity to asking prices was obtained as the balanced values from the estimation of the equation (*number of apartment starts = a + b · change in asking prices*) on annual data for 2006–2015 using OLS.
28 The implied level of asking prices in relation to transaction prices was obtained by estimation of the Johansen cointegration between asking and transaction prices on quarterly data for 2005–2015.
29 Capital prices are calculated as the ratio of the rent to the prime yield.

CHART II.25

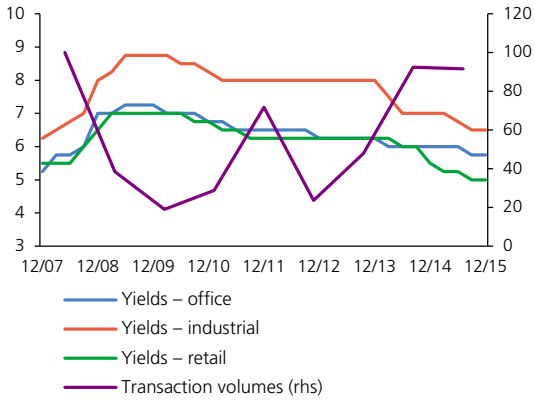
**Numbers of apartment starts**
(thousands)




Source: CZSO, CNB calculation
Note: Numbers of apartment starts in apartment blocks. The number of apartment starts corresponding to the price elasticity to asking prices was obtained as the balanced values from the estimation of the equation (*number of apartment starts = a + b · change in asking prices*) on annual data for 2006–2015 using OLS.

CHART II.26

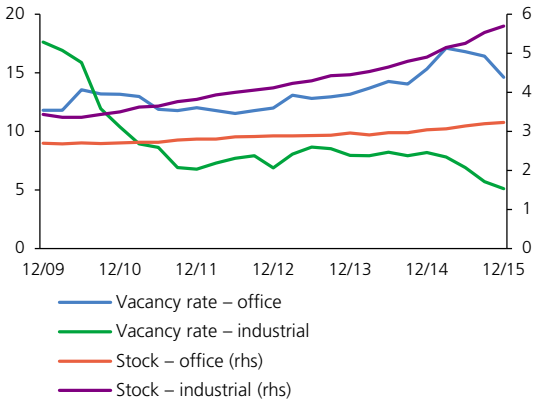
**Yields and volumes of commercial property transactions**
(%; right-hand scale: index 2007 = 100)




Source: Jones Lang LaSalle
Note: Prime yields.

CHART II.27

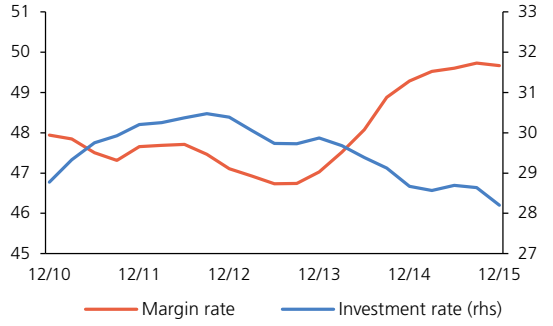
**Total stock and vacancy rates for commercial property**
(%; right-hand scale: thousands of m²)




Source: Jones Lang LaSalle

CHART II.28

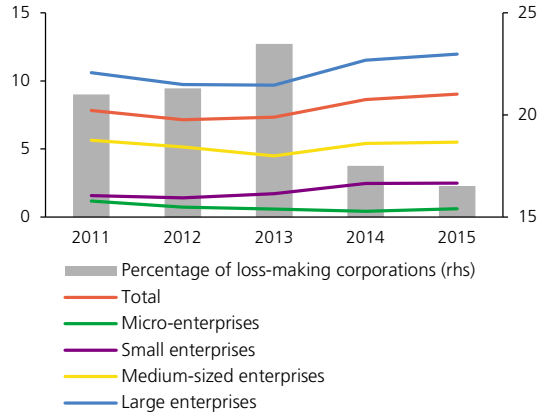
**Margin rate and investment rate**
(as % of gross value added of sector; calculated from annual moving totals)




Source: CZSO
Note: Margin rate = gross operating surplus/gross value added of sector. Investment rate = gross fixed capital formation/gross value added of sector.

CHART II.29

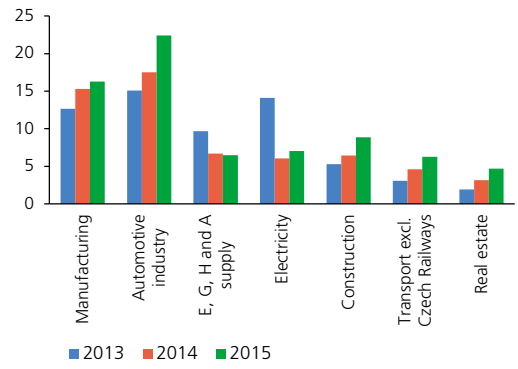
**After-tax RoE by enterprise size and percentage of loss-making corporations**
(%)




Source: CZSO, CNB calculation
Note: The results are based on a sample of corporations. The sample contains around 1,500 corporations together accounting for more than 40% of the sector's gross value added.

CHART II.30

**After-tax RoE in selected branches of activity**
(%)




Source: CZSO, CNB
Note: E, G, H and A are electricity, gas, heat and air-conditioned air. The results are based on a sample of corporations. The sample contains around 1,500 corporations together accounting for more than 40% of the sector's gross value added. The property development sector is included under construction. The automotive industry contains companies in NACE 29.

## 2.3 NON-FINANCIAL CORPORATIONS

*The non-financial corporations sector as a whole recorded a further rise in performance and profitability thanks to strong economic growth. This was reflected in a decline in the sector's credit risk. Nevertheless, the situation is not improving much in some segments. In particular, the smallest firms and energy companies are facing increased stress. Credit risk thus remains at elevated levels in these segments. Despite rising growth in bank loans, the sector's debt remains relatively low and its debt servicing ability has improved. Adverse external developments are the main risk scenario.*

### The economic growth is being positively reflected in the sector's overall condition...

The sector's overall performance rose further during 2015 and the favourable economic situation had a positive impact on the financial condition of most non-financial corporations (NFCs). The sector's aggregate profitability increased further in 2015, although Q4 saw a slight slowdown (see Chart II.28). The improvement in the sector's overall situation in 2015 also fostered a decline in the total number of loss-making firms (see Chart II.29). An increase in investment optimism was also apparent in the first half of 2015, even though investment activity grew more slowly than value added and the total investment rate fell (see Chart II.28).

As usual, the growth in performance was due mainly to manufacturing, which saw a year-on-year increase in production of 5.8% last year.[30] Combined with lower input prices, the sector recorded a further rise in profitability (see Charts II.30 and II.31). Positive increases were recorded in other sectors besides manufacturing, including services, trade and transport. The growth in domestic demand in 2015 also had a favourable effect on businesses in the real estate sector (see section 2.2) and in construction, which had been in long-running decline until the end of 2014.[31] However, the performance of the construction industry started to slow in 2015 Q4 and production fell by 4.6% year on year in 2016 Q1.

### ...but the situation remains unfavourable in some branches and parts of the sector

Along with the construction industry, the energy sector has been facing a combination of adverse factors for several years now. Besides an EU-wide energy strategy targeted at supporting renewable energy sources,[32] the sector's problems are due to falling energy commodity prices. The

30 Within manufacturing, the automotive industry is of key importance. It increased its production by 10.7% year on year in January 2016.
31 The rise in demand for construction output was driven mainly by increased drawdown of EU funds in the previous programme period and to a lesser extent by growth in private investment.
32 Generation from renewable sources is subsidised in the form of either guaranteed electricity purchase prices or "green bonuses".

electricity generation price[33] dropped by more than 60% between 2011 Q2 and February 2016 to a 12-year low. In these conditions, given the use of standard sources and the need to subsidise renewable sources, electricity generation is exposed to increased pressure. The RoE of the energy sector in 2015 indicates improving profitability (see Chart II.30), but this is due to a decline in equity. The current condition is better documented by value added, which fell by 9.7% year on year in the first half of 2015 (see Chart II.31).[34] Expectations regarding energy commodity prices do not suggest any major reversal in the current trend in the near future, so the outlook for the sector as a whole remains very unfavourable. Another sector in long-running decline is mining and quarrying, where black coal mining is being cut back. While coal mines have gradually been closed down in most EU countries, some mines in the Czech Republic are still running. Given developments in the global black coal market, characterised by surplus stocks, purchase prices of coal are being squeezed to very low levels.[35] The costly mining industry is thus becoming loss-making and the process of winding down mining in some regions of the Czech Republic will probably continue.[36]

In the wake of the recent financial crisis, the financial results of corporations also remain very heterogeneous in terms of company size. In particular, the smallest (micro-)corporations, whose profitability was very low for the fifth consecutive year, remain exposed to high financial stress (see Chart II.29). The available data suggest that the strong growth in domestic demand is passing through to the condition of the smallest firms only very slowly.

### Adverse external developments remain the main source of risks faced by the sector in recent years

Given the strong dependence of the sector's performance on export-oriented industries, adverse developments in the external environment can be viewed as a potential source of risk. The probability of this scenario materialising has increased in recent quarters due to a combination of several factors observed in the global economy (see section 2.1). However, the potential impacts might be partly reduced by domestic demand and consumer (and, to a lesser extent, investment)

33 The price of 1 MWh of electricity (base load) with annual delivery in the Czech Republic traded on the Central European energy exchange.

34 The financial indicators were also affected by unplanned outages of various power units of the Dukovany power station (which covers about one-fifth of total electricity consumption in the Czech Republic when in full operation) in the second half of 2015. The longest outage was in Unit 1, which was out of operation for about six months starting in mid-September. Units 2 and 3 were also out of action from September to December 2015 and only Unit 4 was running in this period. Three of the four Dukovany units were in operation at the time of writing (May 2016). The losses from the unplanned outages are estimated at CZK 3–4 billion.

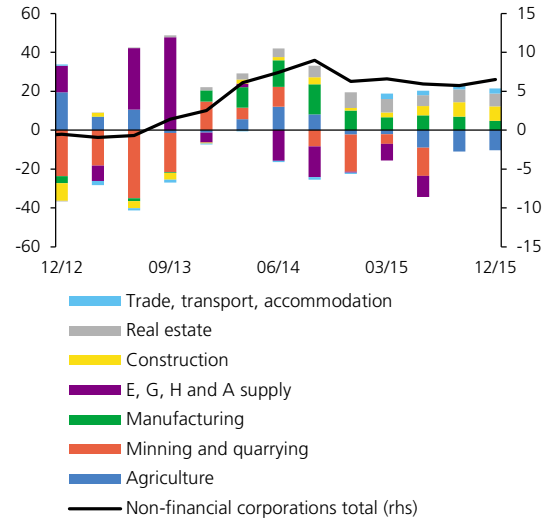
35 The excess coal stocks on the global market are due to increased shale gas output in the USA and declining demand for coal in emerging economies (China in particular).

36 For example, an insolvency petition has been filed for the reorganisation of OKD at the time of writing (May 2016). The Czech banking system is exposed rather marginally to risks relating to loans to OKD. Banks in the Czech financial system account for around CZK 0.6 billion of the total debt of around CZK 17 billion.

CHART II.31

**Year-on-year growth in gross value added by branches of activity**

(%)

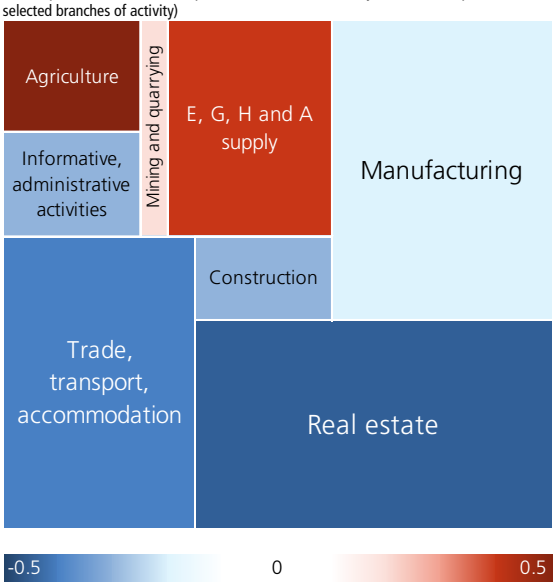



Source: CZSO
Note: E, G, H and A are electricity, gas, heat and air-conditioned air. The available data for mining and quarrying and E, G, H and A supply end in 2015 Q2.

CHART II.32

**Correlation between changes in prices of selected commodities and changes in gross value added in selected branches of activity**

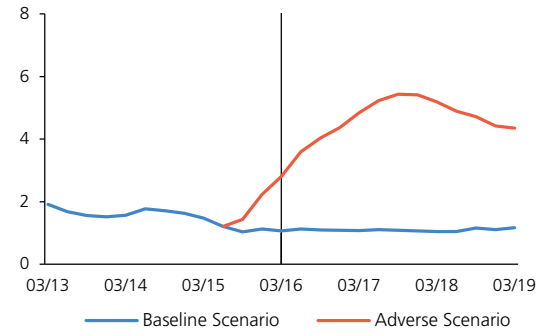
(area represents share of credit provided to branch of activity in total credit provided to selected branches of activity)




Source: CNB, CZSO, Thomson Reuters
Note: E, G, H and A are electricity, gas, heat and air-conditioned air. The presented correlation is defined as the median of three values: (i) the correlation between changes in the price of Brent crude oil and gross value added, (ii) the correlation between changes in the price of natural gas and gross value added, (iii) the correlation between changes in the price of coal and gross value added. The correlations are calculated on data covering 2012 Q2–2015 Q4. A longer time series is not available for all branches of activity.

CHART II.33

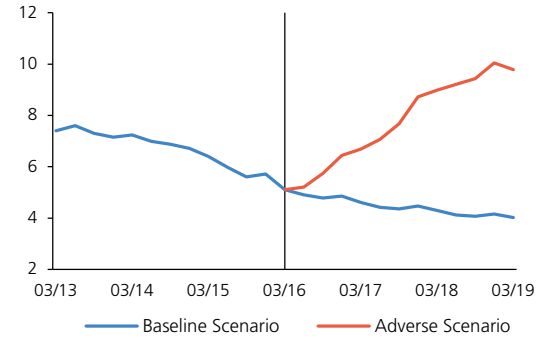
**12-month default rate on bank loans to non-financial corporations**
(%)




Source: CNB

CHART II.34

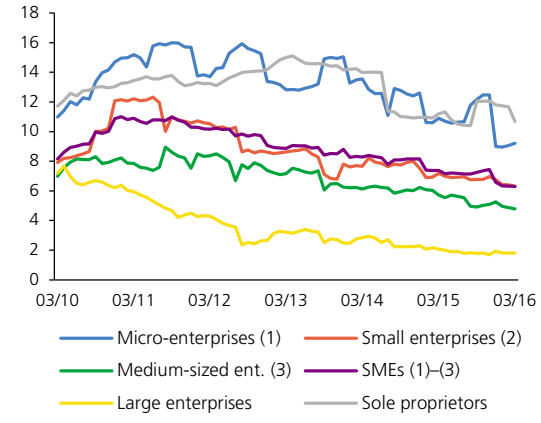
**NPL ratio for bank loans in the non-financial corporations sector**
(%)




Source: CNB

CHART II.35

**NPL ratios for bank loans by non-financial corporation size**
(as % of given category)




Source: CNB
Note: The breakdown available in the CCR database does not allow entirely exact categorisation of corporations in accordance with the valid definitions. The categories are therefore approximated using the following criteria. Micro-enterprises: 1–9 employees + turnover < CZK 60 million; small enterprises: 10–49 employees + turnover < CZK 300 million; medium-sized enterprises: 50–249 employees + turnover < CZK 1 billion; large enterprises: the rest. Where only one of the two criteria is satisfied, the company belongs in the higher category.

sentiment.[37] A sharp decline in prices of some (mostly energy) commodities over the last two years can also be considered a favourable factor.[38] Energy commodities constitute production costs in most industries, so favourable prices foster greater performance (see Chart II.32). Conversely, this situation is having an adverse effect on the condition of the energy and mining and quarrying industries, where output prices depend heavily on the prices of such commodities (see also the discussion below). Overall, if prices of oil and other energy commodities were to surge in the near future, the NFC sector would be hit negatively, with spillovers to credit risk. However, this scenario is currently viewed as unlikely.[39]

### The sector's credit risk is decreasing overall…

Credit risk, as measured by the 12-month default rate, decreased in 2015 as a result of the economic growth (see Chart II.33). The share of non-performing loans (NPLs) in total loans showed a similar trend, falling from 7.0% in 2014 to 5.9% (see Chart II.34). The number of petitions for insolvency proceedings and the number of bankruptcies also went down. If the *Adverse Scenario* were to materialise, credit risk would rise sharply. The 12-month default rate would increase significantly at the four-year horizon (see Chart II.33). It would start falling again during 2018, but the risk would remain elevated. An increase in the credit risk of NFCs would also be reflected significantly in the NPL ratio (see Chart II.34), which would almost double from 5.1% to 9.8% over the three-year test horizon.

### …but remains high for small enterprises and in energy and construction

With the exception of sole proprietors, enterprises of all sizes recorded a further decline in credit risk in 2015 and early 2016 (see Chart II.35).[40] Despite the generally positive trend, significant differences in credit risk persist across the enterprise size categories. The level of risk in smaller enterprises is still well above its pre-crisis levels, while that in large enterprises has returned to a level comparable with its historical low (see Chart II.35). Differences in the level of credit risk can also be seen across sectors. Risk exposures to manufacturing have been falling since mid-2014. The NPL ratio in this sector was 10.7% in March 2016.[41]

37 The rate of slowdown of public investment connected with the slower start of investment under the new EU programme period remains an uncertainty in the domestic environment. However, this uncertainty is partly reduced by growth in real wages in 2015.
38 One example is Brent crude oil, which fell by around 70% in dollar terms between June 2014 and February 2016. Similar developments were recorded for other energy commodities, such as natural gas, coal and emission allowances, and hence for electricity, whose prices are derived from these variables in the Central Europe context.
39 An agreement among OPEC producers to regulate oil production would represent a big change. However, such an agreement is proving hard to reach given the current positions of individual OPEC members.
40 The number of declared bankruptcies of legal entities provides similar information. Despite a year-on-year decline of 21% for all entities, sole proprietors recorded a year-on-year increase of around 4%.
41 VW's problems have not so far affected the credit risk of the automotive industry (and manufacturing). Information about the total costs of covering the related damage will be of crucial importance. However, demand for VW cars seems to have been little affected so far.

Credit risk is showing a similar trend in the property developers segment (see Chart II.36), which accounts for more than 25% of all loans to the NFC sector. By contrast, construction has long been showing an elevated level of risk. Its NPL ratio was 25.1% in March 2016 (see Chart II.36). Given the observed slowdown in performance in construction, the credit risk outlook is unfavourable. This is evidenced by a falling volume of actual orders, a slow start to the new budget period for EU funds and current prices of construction work, which two-thirds of construction companies regard as undervalued.[42]

Businesses in the energy sector have also been showing an adverse trend in credit risk over the last two years. Risk exposures to this segment have been rising in recent years because of adverse conditions (see above). The NPL ratio recorded its most recent jump in the second half of 2015 (see Chart II.36). This indicator reached a historical high of 17.2% in March 2016. This maximum is three times higher than the figure for the NFC sector as a whole and almost six times higher than the December 2013 figure for the energy sector. Given the current outlook for energy commodity prices, credit risk in the energy sector is likely to increase further and affect the credit risk of the entire sector.[43] The slight deterioration in the external conditions in 2015 (see above) was also reflected in credit risk for the 1,000 largest exporters, whose NPL ratio increased slightly (see Chart II.37).

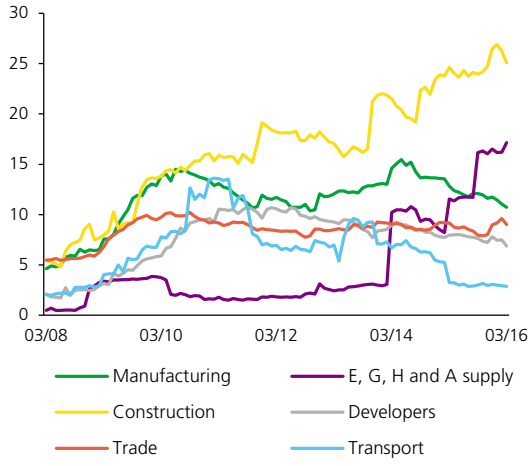
### Individual data from corporate balance sheets are signalling a drop in the sector's credit risk

In addition to aggregate data, it is useful to monitor financial indicators at the level of individual corporations and to assess to what extent they may be signalling an increase in credit risk in the future. Thanks to newly available data from corporate balance sheets and profit and loss accounts at the CNB's disposal, corporate information can be linked with information about the risk categories of loans extended to those corporations.[44] By comparing the financial indicators of firms whose loans have been reclassified as NPLs with those of firms with standard loans, suitable indicators for the early identification of future credit problems can be determined.[45]

RoA and return on sales seem to be particularly significant indicators, as they display the biggest differences between firms with standard loans and those with loans reclassified as NPLs (see Chart II.38). Large

CHART II.36

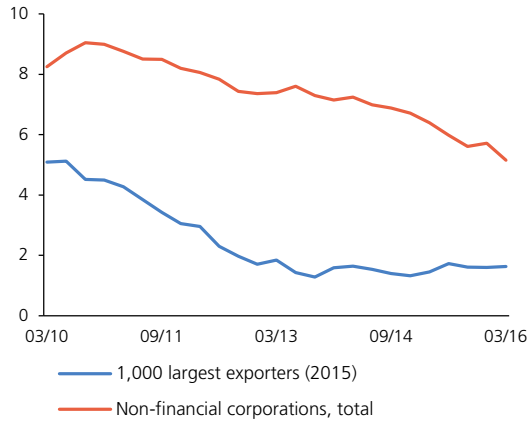
**NPL ratios for bank loans in selected branches of activity**
(as % of total stock of loans in given category)




Source: CNB
Note: E, G, H and A are electricity, gas, heat and air-conditioned air. The developers category comprises NACE 411 (Development of building projects) and NACE 68 (Real estate activities).

CHART II.37

**Non-performing bank loans ratio for the 1,000 largest exporters**
(%)

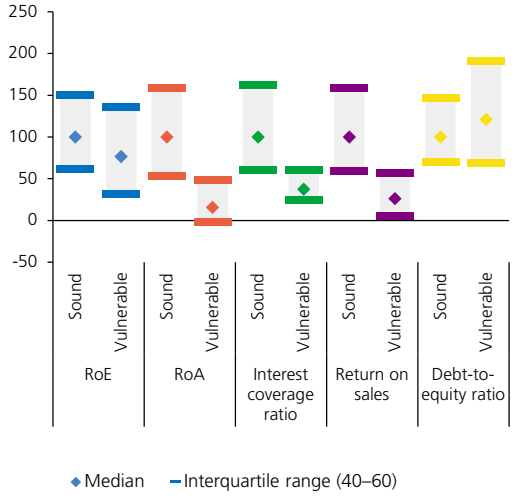



Source: CNB
Note: The structure of the 1,000 largest exporters changes over time, so for this series we give the year indicating the set of exporters to which the time series pertains.

42 This information is based on a quarterly analysis of the Czech construction industry (2016 Q1) conducted by CEEC Research, which surveyed 223 construction firms (www.ceec.eu/research).
43 The ratio of bank loans to energy businesses to total bank loans to the NFC sector has been rising over the last eight years. It stood at 15.8% in March 2016, almost four times higher than its trough level in September 2008.
44 The information from NFCs' balance sheets is obtained from Bisnode. The information about loans to NFCs and their risk classification comes from the Central Credit Register.
45 Return on equity (RoE), return on assets (RoA), return on sales, the interest coverage ratio and the debt-to-equity ratio were selected as potentially suitable indicators The period over which deteriorating indicator levels should lead to the materialisation of credit risk was set at two years. In 2016, therefore, the latest available data are for 2014.

CHART II.38

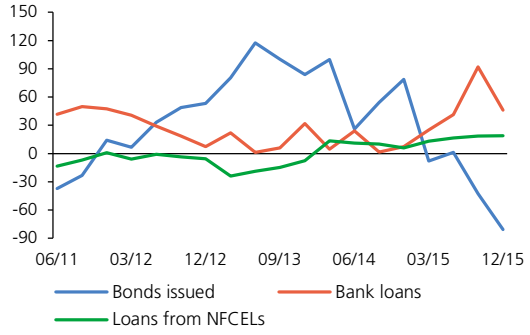
**Difference in selected indicators between sound and vulnerable non-financial corporations two years prior to risk materialisation**
(median of each indicator of sound corporations in 2007 = 100)




Source: CCR, CNB
Note: Risk materialisation means reclassification of a standard loan to the non-performing loan category. Sound corporations are those whose loans were not reclassified from the standard to the default category in 2009. Vulnerable corporations are those whose loans (at least one) were reclassified from the standard to the non-performing loan category in 2009.

CHART II.39

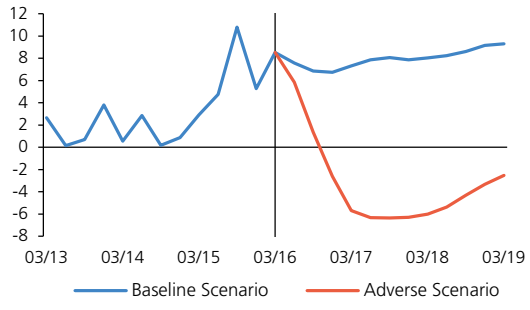
**Dynamics of selected sources of financing of non-financial corporations**
(year-on-year changes in CZK billions)




Source: CNB

CHART II.40

**Year-on-year growth in bank loans to non-financial corporations**
(%)




Source: CNB

differences are also observed for the interest coverage ratio.[46] The information value of these three indicators can be described as constant over time, as they indicate similar differences between the analysed categories of enterprises in different years. Given the improvement in RoA, return on sales and the interest coverage ratio, the latest available data suggests that the credit risk of the sector as a whole should decrease in 2016.

### Aggregate growth in loans and bonds is relatively subdued, and growth in the share of bond financing has halted

Loans and bonds in the NFC sector are showing relatively subdued growth despite the favourable economic situation.[47] This type of financing recorded a year-on-year increase of 1.7% in 2015. The ten-year average is more than double that figure. As regards structure, the upward trend in the share of debt securities issues came to halt in 2015, after having increased gradually since the end of 2011 (see Chart II.39). The largest increases in issuing activity in recent years have been due to energy businesses. Given the negative outlook for this sector (see above), the strong sector concentration of bond financing may generate risks for Czech corporate bond holders. However, it is still non-residents that are primarily exposed to them.[48]

### The rate of growth of bank loans increased in 2015 but has started to lose momentum in recent months…

NFCs' demand for bank loans started to rise more strongly at the end of 2014 than in previous quarters. After peaking in September 2015 (at 10.8%), the growth in bank loans started to slow slightly. However, the year-on-year growth rate went up again to 8.5% in March 2016 (see Chart II.40). According to the *Baseline Scenario* of the current round of stress tests, the growth rate of bank loans will stabilise in the quarters ahead at levels comparable with the ten-year average (6.3%). Credit growth will then start to rise above this level in 2017 Q1. If the *Adverse Scenario* were to materialise, the credit growth rate would only be positive in the first year and there would be a sizeable credit contraction at the three-year horizon (see Chart II.40).

Turning to the currency structure, the growth rate of foreign currency bank loans increased slightly in 2015. However, their share of the total remains relatively stable, standing at around 24.7% in March 2016.[49] This is 3.6 pp higher than the five-year average. It seems that the CNB's communications regarding its future exit from the exchange rate

46 The interest coverage ratio is defined as the ratio of interest paid plus pre-tax profit to interest paid.
47 These loans do not include cross-border loans between NFCs, which are calculated under the ESA95 methodology, i.e. on a net basis.
48 Domestic financial institutions' holdings of Czech corporate bonds have long been below CZK 40 billion. This represents less than 10% of the total issued. The high concentration of the corporate bond market is also evidenced by developments in the second half of 2015, when large issues of two industrial businesses, totalling around CZK 59 billion, were redeemed.
49 As regards natural hedging, the foreign currency loans of the 1,000 largest exporters accounted for about 25% of total foreign currency loans.

commitment is reducing the pressure for speculative borrowing in foreign currency and no major changes in foreign currency financing are being recorded.

### …and indicators of new loans confirm the moderately slowing tendency

Besides the stock of loans, it is also necessary to monitor growth in new loans in order to understand credit dynamics (see also Box 6 in section 4.2.2). The amount of new loans was rising from roughly mid-2014 until 2015 Q3, when it started to decline year on year (see Chart II.41). The evolution of new loans was in line with that of genuinely new loans[50] to NFCs. Faster growth was observed mainly for investment loans and to a lesser extent for operating loans as from December 2014.[51] As regards sectors, the largest increases were due mainly to manufacturing and services (see Chart II.42), whose financial results have improved significantly in recent years (see above). The growth rate of genuinely new loans to businesses in the real estate sector was relatively subdued in 2015, but credit growth surged in 2016 Q1. Given the rising property prices and the growing share of investment loans in total loans, this might have implied an increase in risk to financial stability (see section 4.2.2). By contrast, genuinely new loans are not increasing much in the riskiest sectors, i.e. energy and construction. As regards corporation size, the biggest increases in new loans in 2015 were recorded mainly by medium-sized enterprises and to a lesser extent by small and large ones. For the smallest (micro-)corporations, by contrast, the amount of genuinely new loans was almost unchanged.

### The sector's total debt remains low and its debt servicing ability has improved

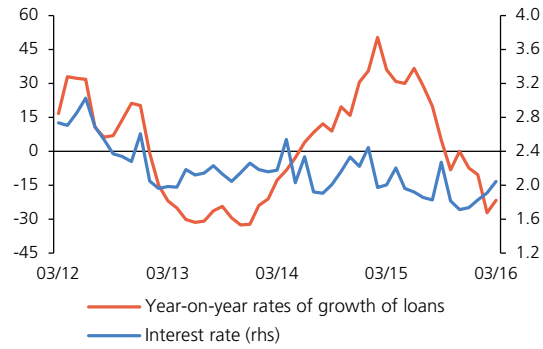
Despite the upswing in bank loans in 2015 and early 2016, the sector's total debt remains low by European standards. Improved financial results, coupled with the environment of low interest rates, are fostering the creation of new debt repayment funds. Despite the decreasing amount of interest paid, however, total repayments of bank loans are increasing (see Chart II.43). If interest rates were to go up, total repayments would rise further. This might represent a potential source of vulnerability for the sector in the future.

50 Despite the term "new loans" used in the published statistics, such loans cannot always be viewed as genuinely new. A loan is reported as new in cases where the existing loan conditions are changed under a new agreement signed by the contracting parties, even though in reality it is the same (previously provided) loan. It is therefore necessary to monitor genuinely new loans, which consist solely of newly concluded loan agreements and agreements to increase existing loans.

51 Investment and operating loans accounted for around 24% and 28% respectively in 2015. The remainder consisted of loans for current assets (24%), financial loans (22%) and other loans (2%).

CHART II.41

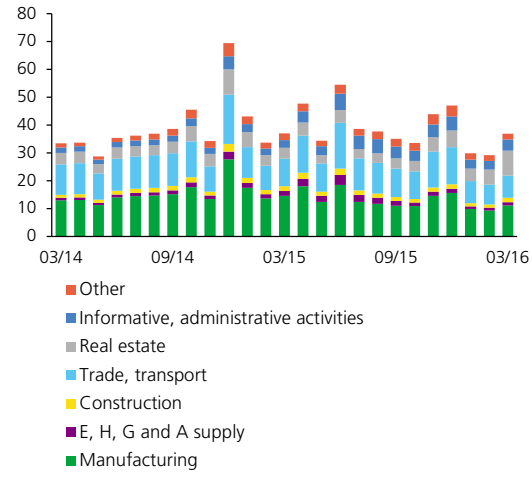
**New koruna loans to non-financial corporations**
(%)




Source: CNB
Note: Year-on-year rates of growth are smoothed by the 3-month moving average.

CHART II.42

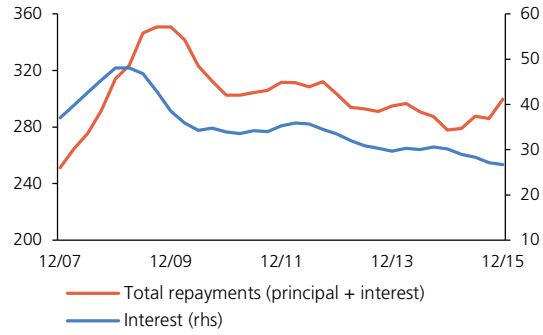
**Amount of actually new loans in selected branches of activity**
(CZK billions)




Source: CCR, CNB
Note: E, G, H, A and W are electricity, gas, heat, air-conditioned air and water. Genuinely new loans also include increases in existing loans.

CHART II.43

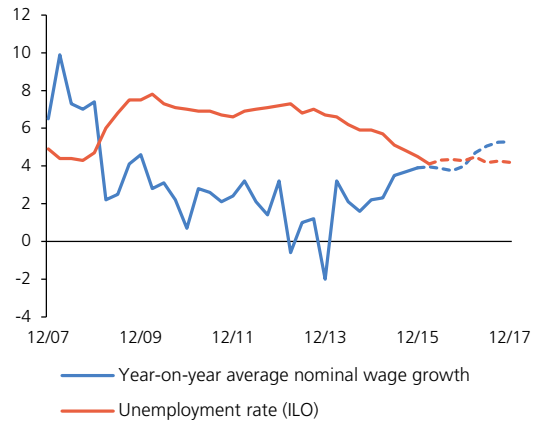
**Total repayments and repayments of interest on bank loans**
(CZK billions; annual moving totals)




Source: CNB
Note: Total repayments are calculated on the basis of CCR data.

CHART II.44

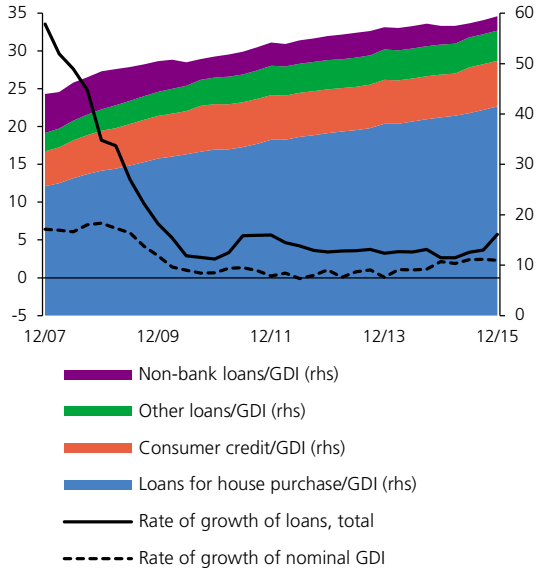
**Labour market indicators**
(%)




Source: CNB
Note: The unemployment rate is seasonally adjusted. Dashed lines indicate the CNB's May 2016 predictions.

CHART II.45

**Household indebtedness and income indicators**
(year-on-year, %; right-hand scale: ratios in %)




Source: CNB
Note: Non-bank loans are loans provided to other financial institutions.

## 2.4 HOUSEHOLDS

*The environment of very low interest rate is starting to be reflected in an increase in household debt. Genuinely new loans to households including increases (adjusted for refixations and refinancing) grew by more than 20% year on year in 2015. This trend continued into 2016 Q1. The growth was due to all types of loans, including consumer credit. Credit risk remained relatively low in all segments. If loan interest rates remain very low for a protracted period of time, the sensitivity of households to a potential income and interest rate shock may increase, which may be reflected in credit losses and a decline in economic activity.*

### The labour market situation is improving significantly

The strong economic growth in 2015 and its continuation into 2016 Q1 were reflected in an improvement in the overall labour market situation. The unemployment rate declined by 1.6 pp year on year to 4.1% in 2016 Q1, close to its pre-crisis levels. The number of vacancies increased by more than a half year on year. Wage growth responded by accelerating – the average nominal wage increased by 3.9% at the end of 2015 (see Chart II.44). The outlooks for the next two years foresee further growth in nominal wages and a decline in the unemployment rate.

### The growth in household indebtedness is due largely to new mortgage loans…

Despite the marked improvement in the labour market situation, growth in total loans to households continued to outpace growth in households' income in 2015. This was reflected in a further increase in indebtedness (see Chart II.45). However, Czech households remain significantly less indebted (60% of gross disposable income, GDI) compared to the euro area average (100% of GDI; see Chart II.46). The higher indebtedness started to show up in the net interest burden of households, which increased in terms of annual totals in 2015 (see Chart II.47). This was due to a decline in interest income on deposits and a simultaneous increase in interest paid on bank loans. The rise in indebtedness was due largely to new loans for house purchase and, since the end of 2015, to new consumer credit (see Chart II.48). New loans for house purchase consist mostly of mortgage loans for residential property (around 75%), which recorded a year-on-year rise of more than 20% in 2015. They increased by an additional 15% year on year in 2016 Q1. Genuinely new loans (including loan increases) and refixed loans make up the bulk of new mortgage loans (with shares of around 50% and 35% respectively).[52] After adjustment of total new mortgage loans for refixed and refinanced loans, genuinely new mortgage loans (including loan increases) recorded

52 New mortgage loans can be divided into genuinely new, refixed, refinanced loans and loan increases. Only the categories of genuinely new loans and loan increases represent a real increase in the banking sector's claims on households. In the remaining two cases, a new interest rate is only negotiated for the outstanding part of the loan – either with the borrower's original bank (refixation) or with another bank (refinancing).

year-on-year growth of around 30% in 2015 and an additional 20% in 2016 Q1.

### ...but the amount of new bridging credit from construction savings and consumer credit on real estate is also on the rise

The remainder of new house purchase loans consists of consumer credit on real estate (around 12%) and credit from construction savings (around 13%).[53] While new credit from construction savings consist mostly of bridging loans (around 98%),[54] consumer credit on real estate is made up mainly of pre-mortgage loans (according to anecdotal evidence).[55] In 2015, building societies provided households with around 30% more in genuinely new loans (including increases) and banks with around 20% more in genuinely new consumer credit on real estate (including increases) in year-on-year terms (see Chart II.49). This year-on-year growth slowed to around 10% on average in 2016 Q1. New credit from construction savings are increasing despite their still significantly higher interest rate. The average rate on mortgage loans and consumer credit on real estate was around 2.2% and 2.6% respectively at the start of the year, whereas that on credit from construction savings was 4%. The growth in new credit from construction savings may be due to a shift in business model towards the provision of a larger amount of unsecured loans, a shift that some building societies have publicly declared.[56] By their very nature, unsecured loans are riskier than secured loans, a fact reflected in higher interest. Their riskiness might increase further if such loans are provided together with mortgage loans with higher LTV ratios.[57]

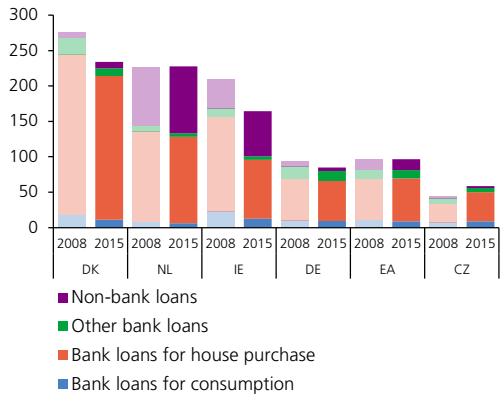
### Growth in the average interest rate fixation period for new mortgage loans has halted

The average fixation period for new mortgage loans stabilised at around 4 and 1/2 years in the second half of 2015 (see Chart II.50). This was due mainly to slower growth in the share of loans with fixation periods of between three and five years at around 60% and of between five and ten years at around 20%. The previous sharp decline in rates slowed at the same time (see Chart II.51). The interest rate on mortgage loans fell modestly again in 2016 Q1, primarily in a situation of lower bank funding

53 Consumer credit on real estate is special-purpose credit provided to finance investment in owner-occupied housing. Credit from construction savings is also special-purpose credit, although it is provided solely by building societies to finance housing needs under Act No. 96/1993 Coll. on Building Savings Schemes.
54 It is possible to apply for bridging credit from construction savings if one of the conditions for obtaining standard credit from construction savings is not met (e.g. the applicant has been saving for less than two years, has not deposited a sufficient percentage of the target amount to his account or has not attained the necessary rating score).
55 Pre-mortgage loans are usually repaid within one year by means of a mortgage loan that must be negotiated simultaneously with the pre-mortgage loan. For this reason, this type of loan can be viewed practically as secured.
56 Association of Czech Building Societies: *Yearbook 2015*; www.acss.cz/cz/novinari-a-odbornici/vyrocni-zpravy-acss/rocenka-2015.
57 The CNB therefore recommends banks not to circumvent the LTV limits through the concurrent provision of unsecured consumer credit relating to the residential property concerned above and beyond retail loans secured by residential property (see Recommendation on the management of risks associated with the provision of retail loans secured by residential property of 16 June 2015).

**CHART II.46**

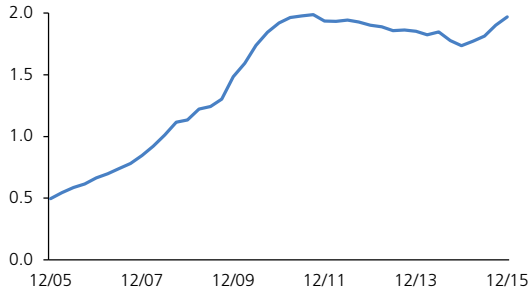
**Household debt in relation to gross disposable income in international comparison**
(shares in %)




Source: BIS, ECB, CNB, Eurostat
Note: The data for 2008 are as of 2008 Q1 (the peak of the economic cycle in the euro area) and the data for 2015 are as of 2015 Q3. The comparison is performed with the most indebted European Union countries.

**CHART II.47**

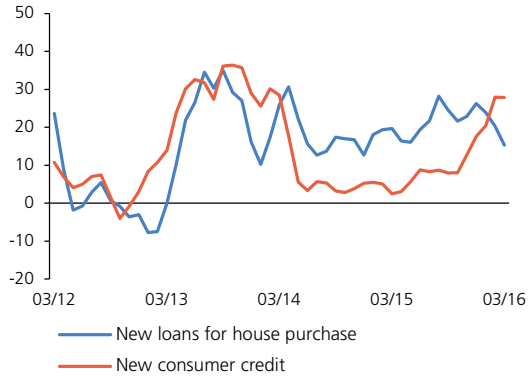
**Net interest paid to banks by households in relation to gross disposable income**
(shares in %)




Source: CNB
Note: Net interest paid is the difference between households' loan interest costs and their interest income on bank deposits. The indicator is calculated as the share of annual moving totals.

**CHART II.48**

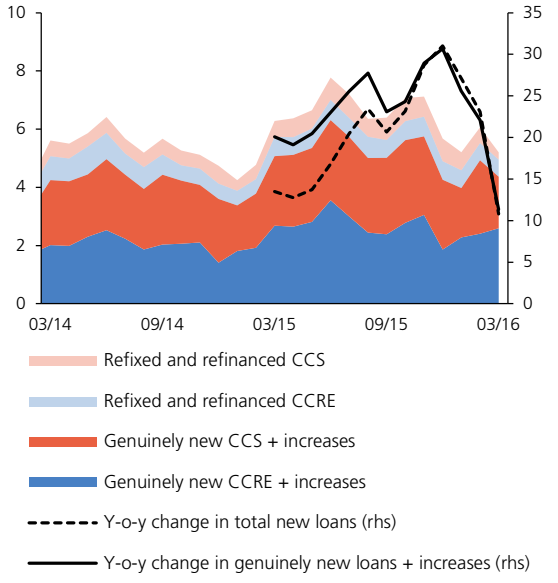
**Rates of growth of new bank loans for households**
(year-on-year, %)




Source: CNB
Note: Year-on-year rates of growth are smoothed by the 3-month moving average.

CHART II.49

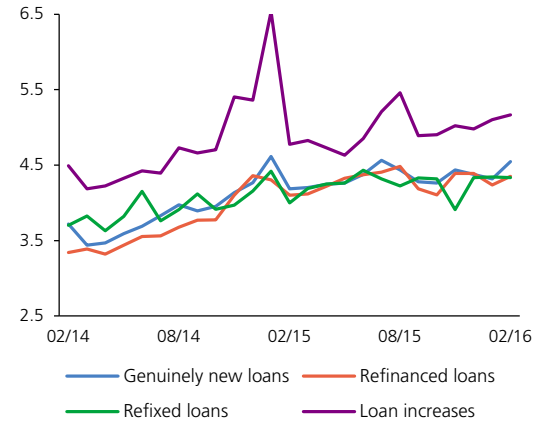
**Other categories of new loans for house purchase without mortgages**
(CZK billions; right-hand scale: %)




Source: CNB
Note: CCRE = consumer credit on real estate, CCS = credit from construction savings. Year-on-year rates of growth are smoothed by the 3-month moving average.

CHART II.50

**Average interest rate fixation periods for new mortgage loans for residential property**
(years)




Source: CNB
Note: The average fixation period is calculated for each loan category as the share of the weighted sum of new loans in the unweighted sum, where the weight is the central value in the range of the reported interest rate fixation period. The growth in the average fixation period for loan increases between November 2014 and January 2015 was due to a large amount of newly provided increases with fixation periods exceeding 10 years.

costs and strong competition. Should this trend reverse and the average fixation period for new mortgage loans start to decrease, households would become more sensitive to interest rate movements. In such case, if rates went up, households with mortgage loans with shorter fixation periods could quite quickly face higher loan instalments (see Box 1).

## BOX 1: HOW SENSITIVE ARE CZECH HOUSEHOLDS TO A RISE IN INTEREST RATES AND A DECLINE IN INCOME?

### An assessment of the impact of a rise in interest rates is important for both monetary policy and financial stability

Monetary policy analyses focus mainly on estimating the effect of a change in interest rates on aggregate expenditure, while financial stability analyses focus rather on estimating the impact on growth in credit risk. However, the two types of impacts cannot be assessed separately. A decrease in aggregate expenditure due to a rise in interest rates can have an adverse effect on the financial sector, which, in turn, will pass through to the real economy and subsequently the monetary policy stance. Presented below is a sensitivity analysis of a rise in loan interest rates coupled with a change in net income of households with mortgage loans. The analysis has the character of a reverse stress test. This test explores how interest rates and the net income of borrowers would have to change, *ceteris paribus*, for their debt service to increase to a level considered excessive.

Consistent with the May CNB forecast is a gradual rise in interest rates after the 2% inflation target has been reached and anti-inflationary pressures have faded away.[58] The scenario of stronger growth in rates, which might have a negative effect on borrowers' ability to repay, would thus be a consequence of an adverse external shock rather than domestic developments.[59] Similarly, if we consider an increase in unemployment associated with a decline in the net income of households, this would in all probability be a response to adverse developments in the Czech Republic's major trading partner countries (see section 2.1). Aggregate data on the household sector have only a limited information content in the case of estimating the impact of an interest rate or income shock. For this reason, the reverse stress test and sensitivity analysis are performed on individual data.[60]

58 For details, see *Inflation Report II/2016*.
59 In line with the *Adverse Scenario*, which assumes a sizeable decrease in economic activity in Europe, banks might revise their view of credit risk and respond by increasing risk mark-ups on interest rates on new loans. Those mark-ups might also increase to a much higher level due to a rise in long-term interest rates.
60 The analysis uses data from the Household Budget Statistics and the Survey of Income and Living Conditions (SILC).

**The mortgage repayment burden of households is comparable with the euro area average**

About 40% of Czech households have a loan, and half of them have a mortgage loan. In terms of amount, mortgage loans dominate, accounting for 65% of the total stock of household loans. This share has long been increasing. Czech households with mortgage loans pay out about 13% of their gross monthly income and 16% of their net monthly income in mortgage loan instalments.[61] These figures are in line with the levels observed in the euro area, where around 44% of households have a loan and 23% have a mortgage loan. Mortgage repayments account for around 16% of households' gross income.[62]

The growing amount of new mortgage loans provided by banks at historically low interest rates is increasing the sensitivity of households to a potential rise in loan interest rates not accompanied by growth in their income. For this reason, the presented sensitivity analysis addresses the issue of what income and interest rate shock combination would lead to an increase in households' debt burden to a level considered excessive at the five-year horizon. In this case, the debt burden is measured by means of the debt-service-to-income (DSTI) ratio.[63] Households with a DSTI exceeding 40% are considered to be highly sensitive to financial stress.[64] The speed of pass-through of an increase in rates to instalments depends, among other things, on the interest rate fixation period. Existing mortgage loans with floating rates or residual fixation periods of up to one year accounted for around 24% and mortgages with fixation periods of over one year and up to five years for another 57% at the end of 2015. Gradual refixation of 80% of the current portfolio over five years is thus considered.[65]

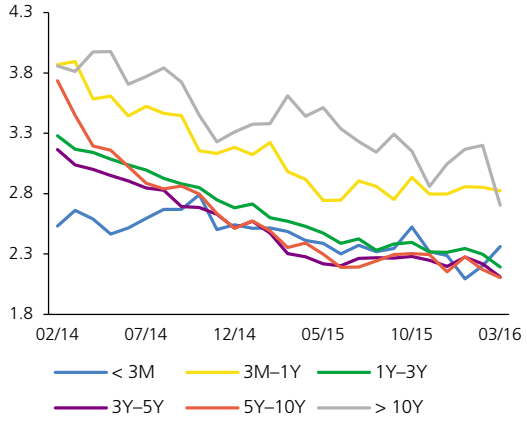
**Households with mortgage loans remain resilient to the simulated stress**

Chart II.1 Box shows the combinations of the total change in net

CHART II.51

**Interest rates on new mortgage loans by interest rate fixation period**

(%)

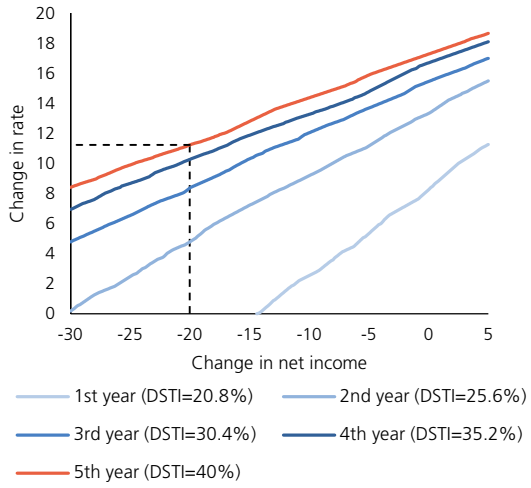



Source: CNB

CHART II.1 BOX

**Reverse stress test: Interest rate and income shock combinations over a five-year horizon**

(x-axis: %, y-axis: pp)




Source: SILC, HBS, CNB, CNB calculation

Note: The curves depict the combinations of changes in income and low interest rates over a horizon of 1–5 years compared to the initial level which lead to a linear rise in the median DSTI ratio from its current level to a stress level of 40%. If, for example, we consider a 20% decrease in income over five years so that the median DSTI ratio rises to 40%, this shock would have to be accompanied by a gradual increase in rates by a total of around 11 pp (red curve).

61 The figures are calculated as the median.

62 ECB (2013): *Household Finance and Consumption Survey*.

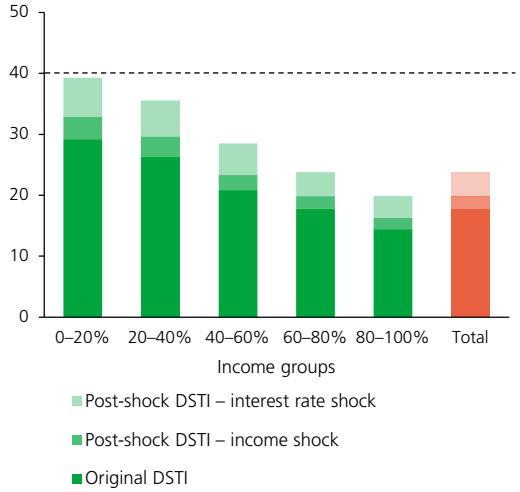
63 Data on monthly mortgage loan instalments are available for individual households from SILC data. Data on monthly consumer credit instalments were estimated using HBS data, which reveal that around 18% of households with a mortgage have also consumer credit.

64 A DSTI ratio exceeding 40% is generally considered excessive in the literature and in the publications of other central banks (such as the BoE and the NBP). However, other national and sectoral specifics must also be taken into account in such assessments.

65 Refixation occurs gradually, with 24% of the total mortgage portfolio being refixed in the first year and 14% in the second to fifth years (around a quarter of the 57% of mortgages with fixation periods of over one year and up to five years).

CHART II.2 BOX

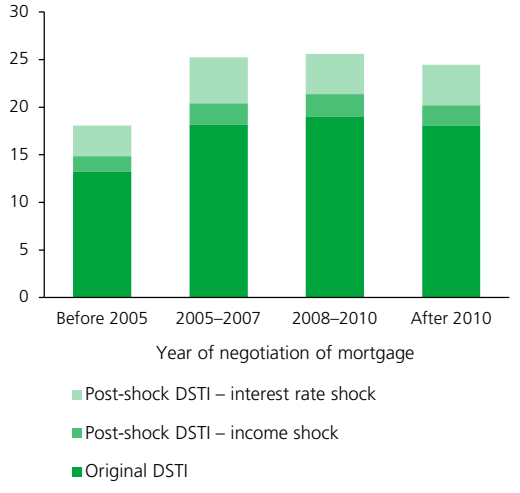
**Sensitivity of the DSTI ratio of households with a mortgage loan by income group**
(DSTI ratio in %)




Source: SILC, HBS, CNB, CNB calculation

CHART II.3 BOX

**Sensitivity of the DSTI ratio of households with a mortgage by year of negotiation of mortgage loan**
(DSTI ratio in %)




Source: SILC, HBS, CNB, CNB calculation

income and the increase in rates which would lead, under the given assumptions, to a rise in the median DSTI to 40% at the five-year horizon.[66] Some of these combinations are less likely, but they clearly illustrate the size of the shocks that would lead to the said DSTI being reached. If, for example, we consider the highly adverse scenario of a sizeable contraction in economic activity where income falls by 20% on average over five years (consistent with a decline of around 4.5% a year) due to growth in unemployment, rates on mortgage loans would have to go up by around 11 pp for the median DSTI of borrowers to reach 40%. However, this scenario is highly implausible, illustrating the current resilience of Czech households with mortgage loans to an income and interest rate shock. The information content of this analysis is reduced by the omission of last year's data on mortgages, where signs of riskier behaviour might be visible (see section 4.3).

The following analysis is based on a more moderate assumption of an increase in loan interest rates of 5 pp combined with a decline in net income of 10% over three years. In this case, households would not exceed 40% in any income group (see Chart II.2 Box). The overall median DSTI would increase by around 6 pp to just under 24%, due more to the interest rate shock than the income shock. Breaking down mortgage loans by their year of negotiation, the average sensitivity of households with a mortgage negotiated after 2005 is very similar. Only households with a mortgage negotiated before 2005 display lower sensitivity to the simulated stress (see Chart II.3 Box).

**Middle income groups cut back consumption expenditure the most in response to a rise in rates**

In the case of net borrowers, a rise in loan rates results in an increase in debt servicing costs. This may be negatively reflected in their net disposable income[67] and consumption expenditure. The analysis[68] reveals that a rise in rates would have the greatest impact on the net disposable income of low-income households (see Chart II.4 Box). The same does not apply to the change in consumption expenditure, where households in the lowest and highest income groups react the least to growth in instalments.[69]

66 A gradual linear increase in the DSTI to a target stress level of 40% at the five-year horizon is considered. The DSTI of borrowers thus increases by around 5 pp a year.
67 For the purposes of this analysis, disposable income is defined as the household's net income less instalments, i.e. as income that can be used for consumption.
68 This part of the sensitivity analysis tracks the change in households' net income and consumption expenditure solely in response to the interest rate shock. It thus abstracts from the income shock considered above. If the income shock were included, the effect would merely be multiplied.
69 The specific impact on consumption is calculated on the basis of an estimate of the marginal propensity to consume of household income groups. The marginal propensity to

In the case of high-income households, the explanation is simple – consumption expenditure accounts for around 65% of their net income. Even if their loan instalments increase, these households have a sufficient financial surplus and do not have to reduce their consumption significantly. In the case of low-income households, consumption expenditure accounts for around 90% of their net income, and most of it is essential expenditure,[70] which cannot be reduced significantly.

### The growth rate of new consumer credit picked up at the beginning of this year

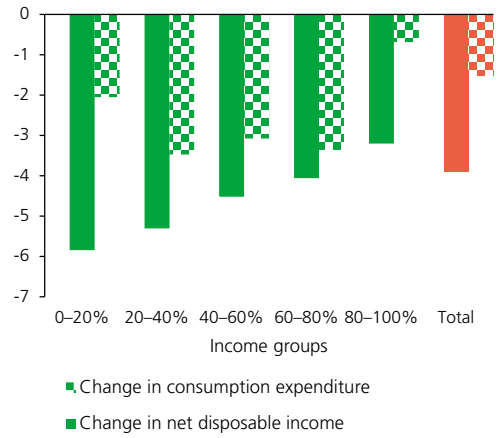
New consumer credit recorded average year-on-year growth of around 10% in 2015. The growth was driven by refixed and refinanced loans, which increased by almost 30% year on year. Genuinely new consumer credit (including increases) rose only by around 6% in 2015 compared to 2014. However, the year-on-year growth rates of total new consumer credit and genuinely new consumer credit (including increases) picked up significantly in 2016 Q1 (to 28% and 27% respectively; see Chart II.52). This was due mainly to large banks (around 60%). Faster annual growth was also observed in the other bank groups, which pushed interest rates down significantly at the same time (see Chart II.53). The results of the Bank Lending Survey in 2016 Q1 indicate that rates were squeezed in response to rising competition among banks and non-banks and banks' improved perceptions regarding the outlook for the overall economic situation and the creditworthiness of clients. Besides banks, non-banks are the second group engaged actively in providing consumer credit to households (see Box 2).

### BOX 2: NEW FORMS OF NON-BANK FINANCING

Other financial institutions[71] and entities with a trade licence for the provision or intermediation of consumer credit in the Czech Republic are involved in providing non-bank loans to households. To strengthen consumer protection and clean up the loan providers and intermediaries market for consumers, political representatives have decided to submit a bill on loans for

CHART II.4 BOX

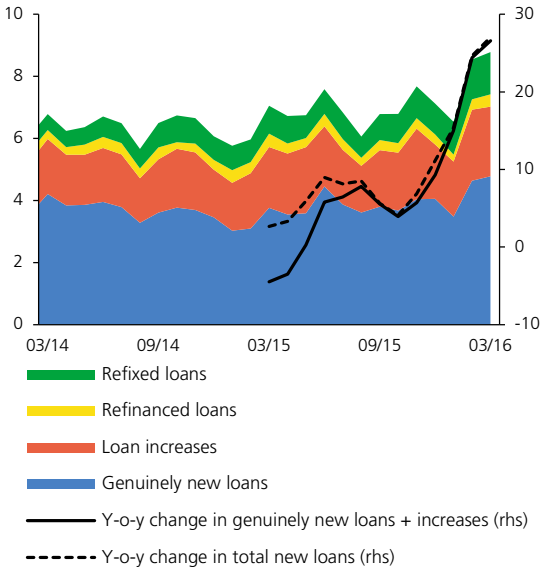
**Change in the net income and consumption of households with a mortgage loan in response to a rise in rates of 5 pp**
(%)




Source: SILC, HBS, CNB, CNB calculation
Note: The distribution into income groups (quintiles) is performed on the basis of the net income of all households.

CHART II.52

**New consumer credit to households**
(CZK billions; right-hand scale in %)




Source: CNB
Note: Year-on-year rates of growth are smoothed by the 3-month moving average.

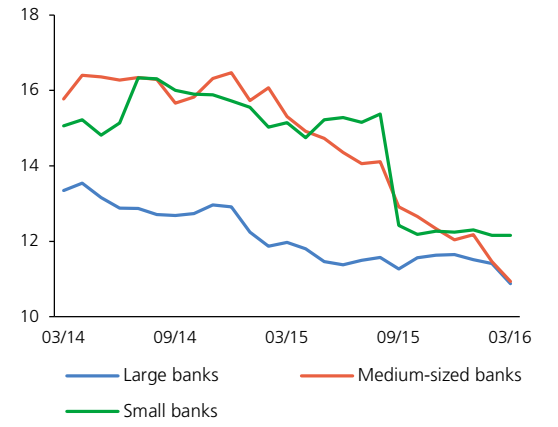
consume expresses the percentage change in consumption expenditure in response to a 1% decline in net income.

70 Essential expenditure includes expenditure on food, housing, pharmaceutical products and transport.

71 Other financial institutions include investment funds excluding money market funds, financial auxiliaries, captive financial institutions and non-bank financial corporations engaged in lending, of which in reality only non-bank financial corporations engaged in lending are involved in lending to consumers.

CHART II.53

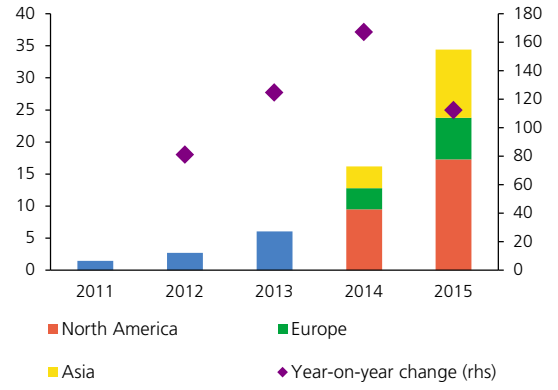
**Interest rates on new consumer credit by bank type**
(%)




Source: CNB

CHART II.5 BOX

**Amounts of crowdfunding and P2P financing**
(USD billions; right-hand scale: %)




Source: Massolution Report 2012–2016.
Note: The sharp year-on-year growth in Asia in 2014 and 2015 was driven by growth in P2P loans in China. Data are not available for the Czech Republic.

consumers and on the amendment of certain related acts. The statute will simultaneously implement Directive 2014/17/EU (the Mortgage Credit Directive, MCD).[72] The MCD regulates mortgage loans, which up to now have been exempted from the legislation on loans for consumers.

New credit products and forms of non-bank financing not covered by MCD are now appearing in the Czech market. In the area of loans for house purchase, these include reverse mortgages. This term is used for various business models in which the client sells a property while retaining lifelong rights to use it. The client usually receives a one-off payment for the sale of property together with a regular life annuity.[73] In the event of deferred gradual payments, the seller bears an increased risk that the full price of property will not be covered if the reverse mortgage provider goes bankrupt. In such a situation, the client might lose both the property and the life annuity. For this reason, the CNB considers reverse mortgages to be a risky product. However, the level of risk depends on the specific reverse mortgage model and on the specific way in which the reverse mortgage is offered. It should also be noted that the provision of reverse mortgages is not currently subject to CNB supervision.

New forms of non-bank financing have started to emerge in the Czech consumer credit market over the last three years. These include peer-to-peer (P2P) lending and debt and equity crowdfunding, based on the business models of companies that have been operating for a number of years in the USA and the UK.[74] However, the number of such platforms in the Czech Republic is low at the moment. Globally, P2P and crowdfunding lag well behind standard forms of financing in terms of their share of total credit, but they are showing dynamic growth in all major world regions (see Chart II.5 Box). This is partly due to base effects. Although, in general, new financial products and forms of financing can foster a more efficient market environment,[75] they

72 Directive of the European Parliament and of the Council No 2014/17/EU of 4 February 2014 on credit agreements for consumers relating to residential immovable property.
73 Depending on the type of reverse mortgage, ownership of the property passes to the new owner either when the contract is signed or after the client's death. As the sale of property is connected with the payment of a life annuity, a reverse mortgage is partly an insurance product and providers usually (in other countries, where reverse mortgages are more common) need to hold an insurance licence.
74 In standard P2P lending, a potential lender assesses loan applications and offers a loan to one specific applicant based on the auction principle. In debt crowdfunding, multiple lenders (investors) invest in a single applicant. In equity crowdfunding, investors can obtain shares in a company or project. Those shares may increase in value over time (if the business succeeds) or turn out to be worth nothing (if the business fails).
75 In the longer run, as financial intermediation moves outside the banking system, financial and technological innovations may lead to greater competition and efficiency inside the banking system. If this also leads to smoother financing of the real economy by a more diversified range of investors and institutions, it may be considered positive in terms of financial stability (BoE: *Financial Stability Report*, June 2012).

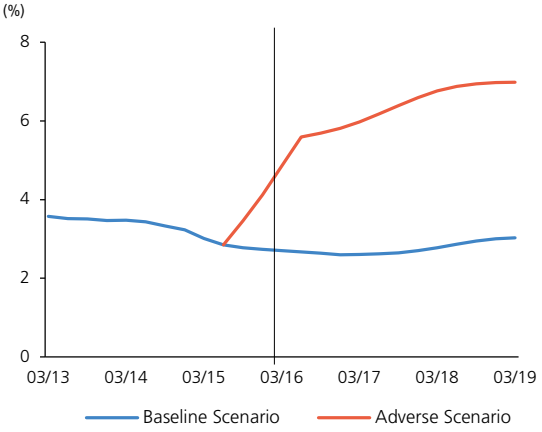
are potentially a source of risks. P2P and crowdfunding platforms behave like financial intermediaries but are not subject to the same laws and regulations as banks and other financial institutions. New forms of financing may also generate other risks relating to consumer protection, cybersecurity and money laundering.

**The credit risk of households has stabilised**

Thanks to the favourable macroeconomic situation, the credit risk of households – as expressed by the 12-month default rate on bank loans – stabilised at around 3% in the second half of 2015 and 2016 Q1 (see Chart II.54). This was due to developments in both the consumer credit and loan for house purchase segments. The 12-month default rate on consumer credit to households fluctuated around 7% and that on loans for house purchase around 2%. According to the *Baseline Scenario*, the credit risk of households should not change significantly over the next three years. Were the risks in the *Adverse Scenario* to materialise, the 12-month default rate on loans to households would increase by around 4 pp at the three-year horizon. At the same time, lending activity would drop significantly and bank loans to households would show strongly negative year-on-year growth (see Chart II.55).

CHART II.54

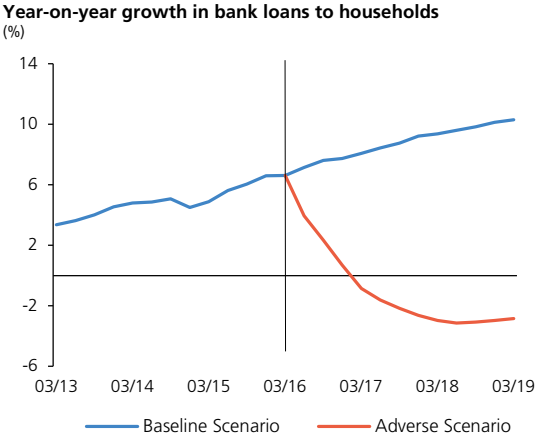
**12-month default rate on bank loans to households**




Source: BRCI, CNB calculation
Note: As the 12M default rate is calculated as a forward-looking indicator, the scenario values start to diverge in 2015 Q2.

CHART II.55

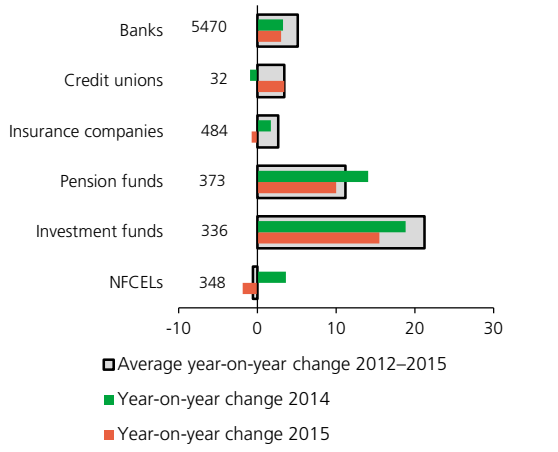
**Year-on-year growth in bank loans to households**




Source: CNB

CHART III.1

**Rates of growth of segments of the financial sector**
(%)




Source: CNB
Note: NFCELs = non-bank financial corporations engaged in lending. The figure next to the segment name denotes total assets as of the end of 2015 in CZK billions.

# 3 THE FINANCIAL SECTOR

## 3.1 DEVELOPMENTS IN THE FINANCIAL SECTOR

*The favourable developments seen in the Czech financial sector in past years continued into 2015. The faster economic growth was reflected in growth in the assets of banks, investment funds and pension funds. The banking sector strengthened its capital adequacy and liquidity and also improved its loan portfolio quality. It is maintaining high profitability despite a continuing decline in interest margins. The insurance sector is also maintaining favourable capitalisation and profitability. Rapid growth of investment funds and pension funds is making them the most dynamic segment of the financial sector. However, it is also leading to increasing exposure to market risks and growth in the investment risks faced by households.*

*The main risk scenarios for the financial sector are still a contraction in economic activity accompanied by growth in credit and market risk, the environment of sustained low interest rates, and asset price volatility linked with uncertainty in global markets. Acting together, these factors may result in a drop in the profitability of all segments of the financial market, particularly the banking and insurance sectors. They may also lead to a drop in the performance of investment funds and pension funds and to a weakening of the liquidity situation of the banking sector. However, the current capitalisation, liquidity and profitability levels of the most important segments of the banking sector guarantee resilience to such shocks, as evidenced by stress test results.*

**The financial sector's assets are rising, with investment and pension funds recording particularly dynamic growth**

Most segments of the financial market saw year-on-year growth in total assets in 2015 (see Chart III.1). The banking sector, which accounts for 80% of the size of the financial sector, recorded the largest absolute year-on-year growth (CZK 160 billion, or 3.0%). The total assets of credit unions also increased (by CZK 1 billion, or 3.4%). As in the previous year, the highest growth rates were recorded by investment funds (CZK 45 billion, or 15.5%) and pension funds (CZK 34 billion, or 10.0%). These two segments also posted the highest average growth in assets in 2012–2015. Only insurance companies and non-bank financial corporations engaged in lending (NFCELs) saw a drop in assets (of CZK 4 billion, or 0.7%, and CZK 7 billion, or 1.9%, respectively).[1]

1 The drop in the assets of NFCELs was caused by the conversion of one of them into a branch of a foreign bank. Adjusted for this effect, this segment's assets would have increased by CZK14 billion, or 4.2%, year on year.

### 3.1.1 THE BANKING SECTOR AND CREDIT UNIONS

**Banks' capitalisation increased moderately in 2015**

The total regulatory capital in the Czech banking sector rose by almost CZK 24 billion[2] in 2015, reaching CZK 421 billion at the year-end. The overall capital ratio increased by 0.4 pp to 18.4% and the Tier 1 capital ratio by 0.4 pp to 17.9% (see Chart III.2). For the Czech banking sector, Tier 1 is almost identical to Common Equity Tier 1.

**The capital requirement consists of Pillar 1 and Pillar 2 requirements...**

The minimum level of regulatory capital is stipulated by the CRR in Pillar 1. Its main component is the capital requirement for credit risk. A smaller part consists of market and operational risks, whose share has long been stable. The Pillar 2 requirements, set in the internal capital adequacy assessment process (ICAAP) and the supervisory review and evaluation process (SREP), cover other risks that Pillar 1 does not fully take into account for the bank.[3]

**...and is complemented by capital buffers**

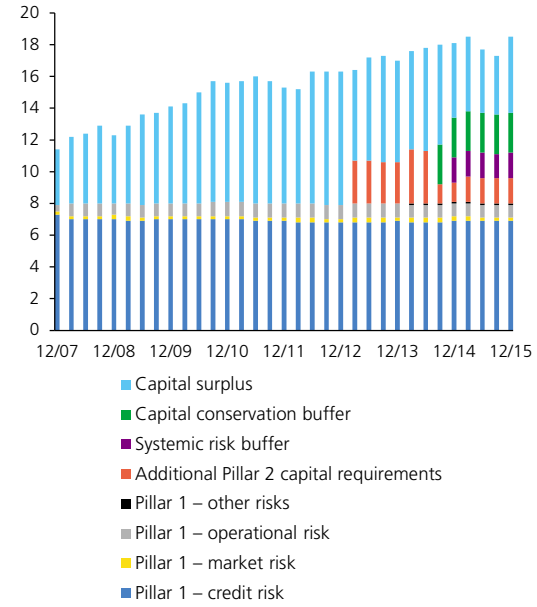
CRD/CRR also allows capital buffers[4] to be used as a macroprudential policy instrument (see section 4.2). They strengthen the banking sector's resilience and the CNB has been using them actively since the regulations made this possible. Banks thus have the duty to comply with overall capital requirements which, in addition to Pillar 1 and Pillar 2, contain a capital conservation buffer (2.5% since July 2014), a systemic risk buffer (1%–3% for some banks since October 2014) and a countercyclical capital buffer (0% since August 2014 and 0.5% since January 2017).

**The capital surplus is significant after all components of the requirements are accounted for...**

The capital surplus relative to the Pillar 1 minimum requirements amounts to CZK 238 billion. After the current requirements of Pillar 2 and the combined capital buffers are accounted for, it falls to CZK 109 billion (4.8 pp of the capital ratio). Most banks are compliant with the overall Pillar 1, Pillar 2 and capital buffer requirements (the overall capital requirement) by a sufficient margin. One bank is at the threshold level of the overall capital requirement, and the capital surpluses of two other banks are smaller than 2 pp of the capital ratio (see Chart III.3). The CRD requires banks that fail to meet the minimum amount of capital buffers applied to them to activate capital conservation measures.[5]

CHART III.2

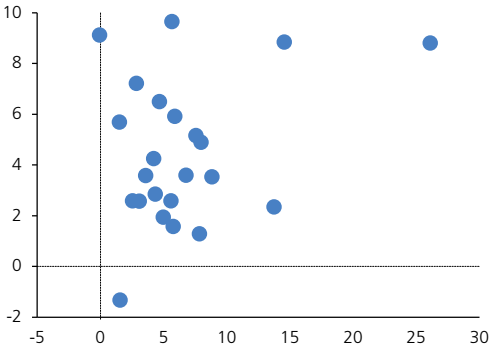
**Structure of capital requirements in the Czech banking sector**
(%)




Source: CNB
Note: Due to partial overlap of the capital conservation buffer requirements with the Pillar 2 requirement, the Pillar 2 requirements have since July 2014 been adjusted for the requirements arising from the stress tests conducted for supervisory purposes.

CHART III.3

**Deviations from the minimum capital and leverage ratios at the end of 2015**
(y-axis: deviation of leverage ratio in pp; x-axis: deviation of total capital ratio in pp)

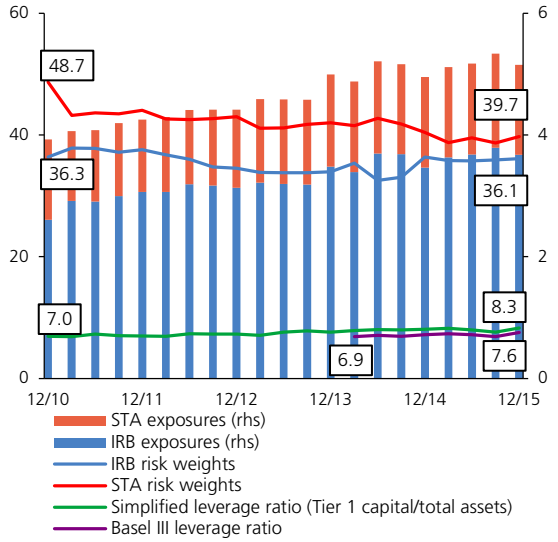



Source: CNB
Note: The minimum capital ratio is given by the sum of the Pillar 1, Pillar 2 and capital buffer requirements applicable to the bank as of the end of 2015. A limit of 3% is assumed for the minimum leverage ratio.

2 Despite the fact that one bank paid an extraordinary dividend and its capital dropped by about CZK 15 billion.
3 For example, business model, internal governance and other aspects of liquidity and solvency risk.
4 Set as a percentage of the total risk exposure amount.
5 The capital conservation plan (capital restoration plan under Article 70 of Decree No. 163/2014) should state how restrictions on distributions and other measures the bank plans to take to ensure full compliance with the capital buffer requirements will be applied. The bank should have it approved by the competent authorities (Articles 141 and 142 of the CRD).

CHART III.4

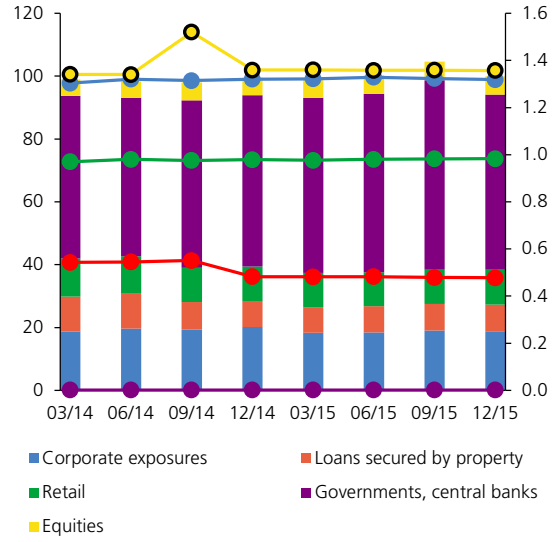
**Risk weights, the leverage ratio and the size of banks' credit exposures**
(%; right-hand scale in CZK trillions)




Source: CNB
Note: In contrast to the Basel III leverage ratio, the simplified leverage ratio does not take into account off-balance-sheet items. Data are not available for the Basel III leverage ratio until the start of 2014.

CHART III.5

**Risk weights and the size of the main credit portfolios of STA banks**
(%; right-hand scale in CZK trillions)




Source: CNB
Note: The points connected by lines denote the size of the risk weights for individual credit portfolios (left-hand scale). The size of the columns denotes the size of the exposure (right-hand scale). The colour coding of the points corresponds to the colour coding of the columns.

**…but it may not be sufficient for some banks in an adverse phase of the business cycle.**

The overall impact of the *Adverse Scenario* of the CNB's stress tests (see section 3.2) on the banking sector reveals that the capital ratio does not fall below the Pillar 1 and Pillar 2 capital requirement (the total capital requirement). In individual cases, however, it indicates that some banks may not be able to satisfy the Pillar 1 and Pillar 2 capital requirement in the *Adverse Scenario* of the stress test. The CNB takes stress test results into account in the assessment of capital adequacy in the SREP. The interaction of the Pillar 1, Pillar 2 and capital buffer requirements and stress tests are described in more detail in section 4.2.4.

**The overall capital requirement is determined mainly by risk weights**

The total risk exposure amount[6] is crucial for setting the Pillar 1 and combined buffer requirements. In the Czech Republic, it is determined primarily by the amount of risk-weighted exposures for credit risk. This means it is vital to assess whether the evolution and current level of the risk weights used for the relevant credit exposures give rise to any risk of underestimating the necessary level of capital.

**The risks arising from the modest downward trend in risk weights…**

Since 2010, the aggregate risk weights in banks using the standardised approach to determining risk weights (STA banks) have dropped by 9 pp to 39.7%. In banks using internal models (IRB banks, accounting for 71% of the sector's exposures) they have been fluctuating moderately around 36%. The total value of credit exposures was CZK 3,700 billion in IRB banks and CZK 1,500 billion in STA banks at the end of 2015 (see Chart III.4).

**…are offset by growth in the banking sector's leverage ratio**

A positive factor is that the sector's leverage ratio (the ratio of Tier 1 capital to non-risk-weighted exposures) rose slightly in the period under review despite the downward trend in aggregate risk weights.[7] The fall in aggregate risk weights is thus not being accompanied by a decline in the banking sector's capital. The aggregate leverage ratio was 7.6% at the end of 2015, well above the 3% preliminary regulatory and supervisory limit under consideration in the EU (see Chart III.4). Although the leverage ratios of most banks significantly exceed this limit, there is significant heterogeneity across banks (see Chart III.3). Some are close to the 3% limit and one is even below it. The future use of the leverage

6 Pursuant to Article 92(3) of the CRR.
7 As defined in Basel III. The advantage of this indicator is its relative simplicity and its robustness to potential efforts by banks to optimise the calculation of risk weights or banks' limited ability to predict potential risks of individual assets with sufficient accuracy. Preliminary data from the leverage ratio reporting template LRS 10-4 are used for the calculation.

ratio for supervisory and regulatory purposes may thus mitigate the risk of insufficient capital in such cases.[8]

### Changes in aggregate risk weights are determined mostly by changes in the structure of total credit exposures

An analysis of the risk weights of the main credit portfolios[9] in 2014 and 2015[10] reveals that they were stable for STA banks and showed low variability for IRB banks (see Charts III.5 and III.6). For both groups of banks, then, the changes in aggregate risk weights in this period were caused mainly by changes in the structure of total credit exposures and not by changes in risk weights for individual loan portfolios. In the case of STA banks, the drop in aggregate risk weights can be explained mainly by a modestly rising share of exposures to governments and central banks, whose risk weights are close to zero. IRB banks generally show a lower risk weight for similar credit portfolios than STA banks (with the exception of exposures to governments and central banks).

### Constant attention should be paid to the setting of risk weights in the IRB approach

The main risk characteristics that determine risk weights in the internal models of IRB banks are the probability of default (PD) and the loss given default (LGD). A favourable long-term trend in the economy or insufficient robustness of the models due to a low frequency of failures and related losses may give rise to a situation where the risk weights may not capture the level of credit exposure risk with sufficient prudence. The Basel Committee addresses this issue in its consultation documents (see section 4.4.6). The CNB pays constant attention to the issue of internal model risks.

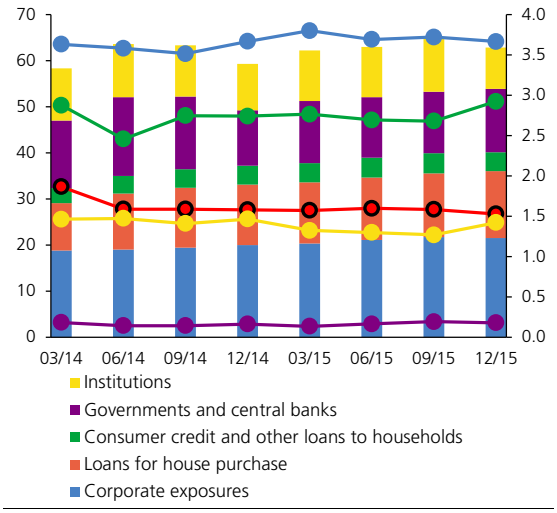
### The share of NPLs continues to fall and their quality has improved…

The size of the NPL portfolio, its expected losses and its coverage by provisions are important elements in the assessment of the condition and resilience of the banking sector.[11] Credit risk, as expressed by the ratio of NPLs to total loans, dropped by 0.6 pp in 2015 to stand at 4.3% at the year-end (see Chart III.7).[12] The downward trend continued for the fifth consecutive year. The decrease in the NPL ratio was achieved through a combination of growth in total loans and an absolute decline in NPLs in

8 For details, see the thematic article *The Role of the Leverage Ratio in Capital Regulation of the Banking Sector* in this Report.
9 Covering 98% (in the case of IRB banks) and 90% (in the case of STA banks) of total credit exposures. The main credit portfolios of IRB and STA banks are not entirely identical owing to different approaches to loan classification.
10 Detailed data for the individual types of exposures in the single European reporting framework COREP have only been available since 2014.
11 The Czech Export Bank and the Czech-Moravian Guarantee and Development Bank were excluded from the analysis of credit risk of the banking sector as a whole. This is because these banks are wholly owned by the Czech state (providing implicit state guarantees for their liabilities), have different business models and have riskier and more volatile credit portfolios.
12 The figure includes both resident and non-resident loans.

CHART III.6

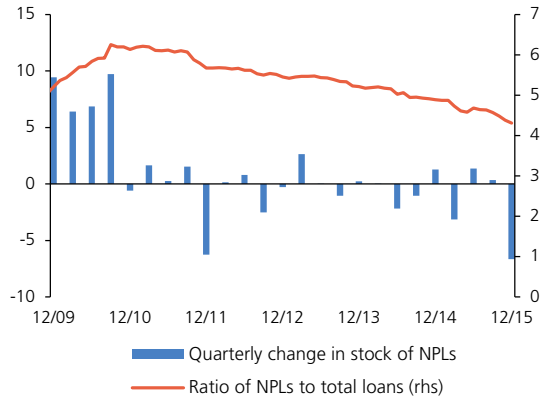
**Risk weights and the size of the main credit portfolios of IRB banks**
(%; right-hand scale in CZK trillions)




Source: CNB
Note: The points connected by lines denote the size of the risk weights for individual credit portfolios (left-hand scale). The size of the columns denotes the size of the exposure (right-hand scale). The colour coding of the points corresponds to the colour coding of the columns.

CHART III.7

**NPLs in the Czech banking sector**
(CZK billions; right-hand scale in %)




Source: CNB

TABLE III.1

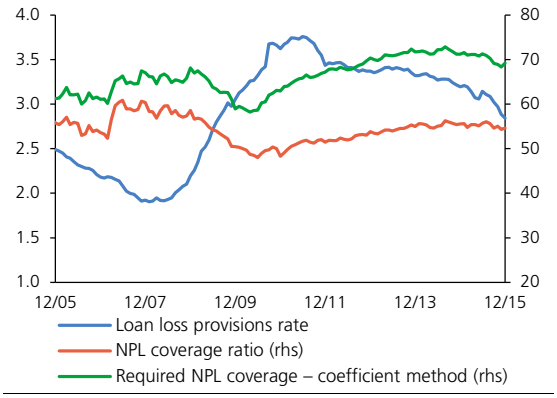
**Structure of NPLs**
(%)

| | NPLs by categorization | | | |
|---|---|---|---|---|
| | Non-standard | Doubtful | Loss | Total NPLs |
| 2011 | 32.4 | 13.8 | 53.8 | 100.0 |
| 2012 | 29.4 | 12.2 | 58.4 | 100.0 |
| 2013 | 27.7 | 12.2 | 60.2 | 100.0 |
| 2014 | 29.4 | 10.4 | 60.2 | 100.0 |
| 2015 | 32.5 | 9.5 | 58.0 | 100.0 |

Source: CNB

CHART III.8

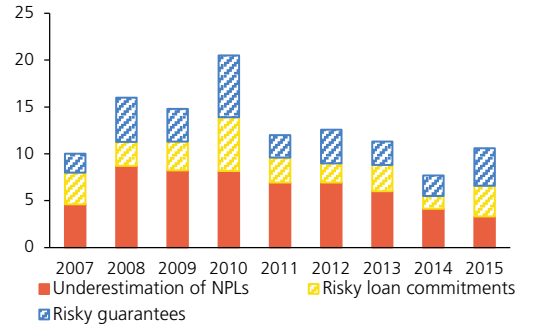
**Provisions and coverage of NPLs by provisions**
(%)




Source: CNB

CHART III.9

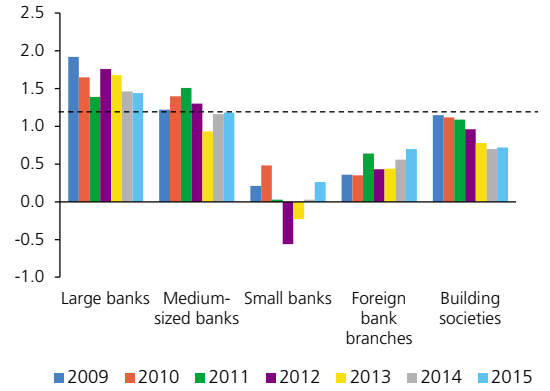
**Potential underestimation of NPLs, risky loan commitments and risky guarantees**
(CZK billions; non-financial corporations, residents)




Source: CNB
Note: Underestimation of NPLs = volume of loans provided to clients that are not classified as NPLs even though some bank has already classified its loans to the given clients as NPLs. Risky guarantees/loan commitments = volume of guarantees/irrevocable loan commitments given to clients who have an NPL with the given bank or another bank.

CHART III.10

**Return on assets (RoA)**
(%)




Source: CNB
Note: The classification of banks by asset size relates to the year for which the RoA value is reported. The horizontal line depicts the RoA value for the banking sector as a whole for 2015.

2015.[13] In the case of resident loans, the NPL ratio of households dropped by 0.7 pp to 4.1% and the NPL ratio of non-financial corporations fell by 1.0 pp to 5.4%. In the case of non-resident loans, the NPL ratio, by contrast, increased by 0.9 pp to 5.5%. The long-term trend of growth in the NPL ratio in the worst, i.e. loss, category reversed in 2015. The NPL ratio in the substandard category rose at the expense of the NPL ratios in the two worse categories (Table III.1). The trends in the NPL portfolio can thus be described as mostly positive.

### …which is being accompanied by a drop in NPL coverage

The overall coverage of NPLs by provisions fell by 1.2 pp to 54.3% in 2015, the first year-on-year drop since 2010. It reflects the observed improvement in the NPL structure (see Chart III.8). That improvement also gave rise to a drop in the NPL coverage theoretically required under the simplified coefficient method, where the expected impairment losses are not estimated on the basis of models but are determined using coefficients laid down in a decree.[14] Although the difference between NPL coverage calculated using this method and real NPL coverage decreased, it was still at 14.6% at the end of 2015. However, the calculation does not take account of collateralisation of NPLs, which reduces the necessary level of provisioning.

### Hidden balance-sheet credit risk continues to decline…

There are loans in banks' balance sheets that are not currently classified as non-performing even though they may be at increased risk of default. These are loans to clients who have credit from several banks and some of those banks already classify their claims on such clients as NPLs while others still record their loans to such clients as performing loans. Such loans represent a potential source of undervaluation of the NPL level and thus also of the credit risk in banks' balance sheets. Underestimation of NPLs to resident non-financial corporations of CZK 3.3 billion was identified at the end of 2015 using CCR data (see Chart III.9).[15] This represents a year-on-year drop of 20%, the third in a row. The pace of decline was much higher than that of the overall decline in NPLs. This suggests greater consistency in the categorisation of loans across banks. Despite the repeated fall, underestimation of NPLs in domestic non-financial corporations still makes up about 6.3% of NPLs. If this risk were to materialise in full, the ratio of NPLs to non-financial corporations as of the end of 2015 would rise by 1.0 pp to 6.4%.

13 The drop in the NPL ratio was also partly due to write-offs of such loans from banks' balance sheets (as the loans written off are mostly loss loans). The ratio of NPL write-offs to total NPLs increased by 5.9 pp to 14.3% in 2015. However, the supply of new NPLs in 2015, calculated by adjusting the change in total NPLs for the write-off effect, was the same as in 2014 and total NPLs would have decreased in absolute terms in 2015 even if write-offs of such loans had not increased.

14 Under Article 86 of Decree No. 163/2014, banks may determine impairment losses by means of (i) discounting of expected future cash flows, (ii) the coefficient method or (iii) statistical models. The coefficient method consists in setting the impairment loss at 1% for watch claims, 20% for substandard claims, 50% for doubtful claims and 100% for loss claims. Under the decree, however, the coefficients are applied to the unsecured part of the claim only. This could not be done in the analysis in question because of insufficient information on the value of collateral relating to NPLs.

15 Due to data unavailability, it is not possible to perform an analogous analysis for the household segment.

### …while off-balance-sheet risk has increased

To quantify the credit risk stemming from off-balance-sheet items, risky guarantees and risky loan commitments were calculated using CCR data. These are defined as guarantees and irrevocable loan commitments given to non-financial corporations that have a bank loan classified as an NPL. The credit risk of off-balance-sheet items increased markedly in 2015 (by 104% to CZK 7.3 billion), so its long-running decline since 2010 has halted. If the underestimation of banks' balance-sheet and off-balance-sheet credit risk were to materialise in full, the ratio of NPLs to non-financial corporations as of the end of 2015 would rise by 1.9 pp to 7.3%.

### The profitability of the banking sector remains high

The banking sector turned in a profit of CZK 66.9 billion in 2015, a rise of 6.1% on a year earlier.[16] Profit is the principal source of capital for covering capital requirements related to growth in credit activities in good economic times and the primary source of capital for absorbing shocks in bad times. The Czech banking sector has long been profitable and its profitability significantly exceeds the euro area average.[17] As in the previous year, the return on assets (RoA) was 1.2% (the EU average was 0.2% in 2014). However, large differences persist across the groups of banks (see Chart III.10). The RoA of large and medium-sized banks remained at 1.4% and 1.2% year on year respectively. The continued growth in the profitability of small banks, which recorded a 0.2 pp increase in RoA to 0.3%, is a good sign. Building societies maintained their profitability following several years of decline. This can also be seen as positive.

### The decline in profit from fees and commissions continues…

The overall profit was negatively affected by a continued decline in profit from fees and commissions, which fell for the fourth year in a row. Profitability was positively affected by profit from financial revaluation and also by a modest rise in interest profit (see Chart III.11). Growth in profit from financial revaluation was recorded primarily for financial assets held for trading, mostly derivatives. The cost-to-income ratio dropped by 1.5 pp year on year to 44.3%, while the average ratio in the EU was 59.8% in Q3. The operational efficiency of the Czech banking sector is thus high by international comparison and contributes substantially to its profitability.

### …as does the pressure on interest profit from falling interest margins

The fall in interest rates has been accompanied by a decline in client interest margins in recent years. The average interest margin on existing loans has been falling for six years now (see Chart III.12). Margins on new

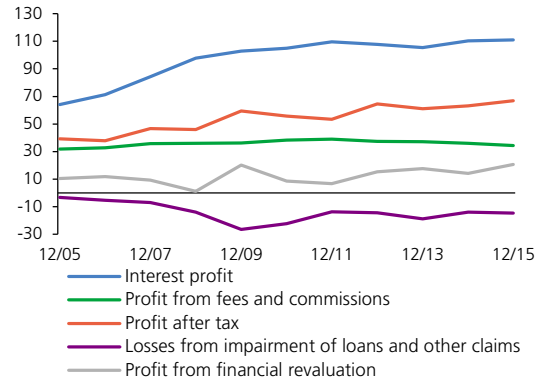
16 Domestic banks' profit also includes dividends paid by their subsidiaries. They totalled CZK 6.7 billion in 2014 and rose to CZK 8.1 billion in 2015. Excluding dividend profit, the banking sector's profitability would have risen by 4.0% year on year.

17 See CNB (2015): *Analyses of the Czech Republic's Current Economic Alignment with the Euro Area*, p. 102

CHART III.11

**Key components of total profit**

(CZK billions)

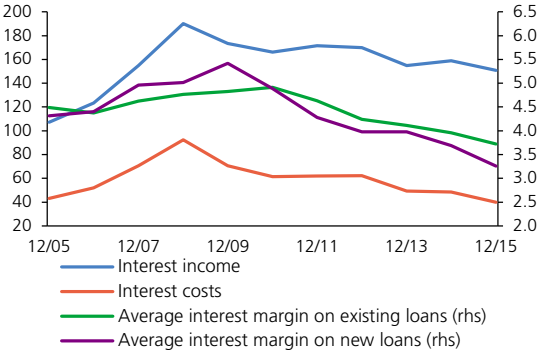



Source: CNB

CHART III.12

**Key components of interest profit**

(CZK billions; right-hand scale: pp)



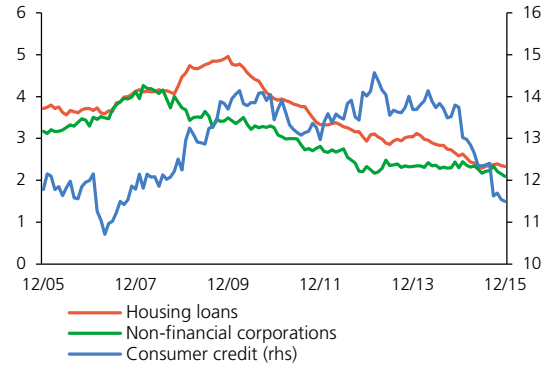

Source: CNB

Note: Margin is calculated as the difference between the average client loan rate and the average client deposit rate.

CHART III.13

**Czech banks' interest margins on new loans**

(pp)

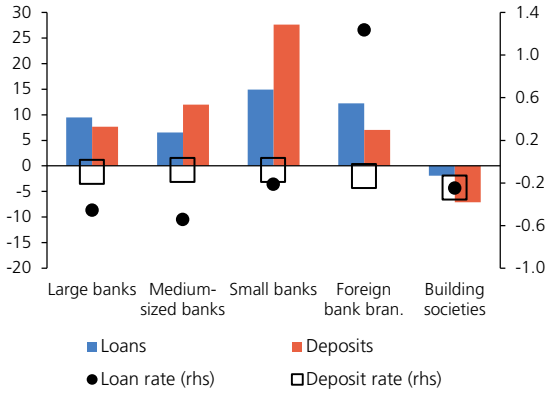



Source: CNB, CNB calculation

Note: Margin is calculated as the difference between the average client loan rate for the sector and the average client deposit rate. The non-financial corporations item excludes revolving loans and credit cards.

CHART III.14

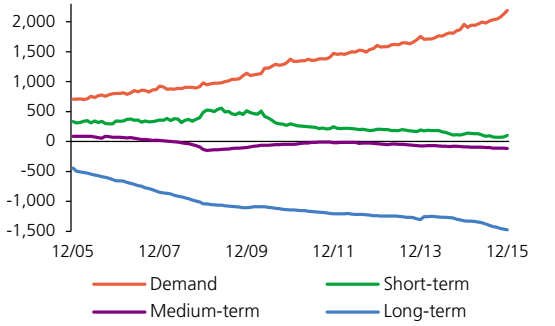
**Year-on-year change in client (resident) loans, deposits and rates**
(CZK billion; right-hand scale: pp; as of 31 December 2015)




Source: CNB
Note: Households and non-financial corporations are included in the client category.

CHART III.15

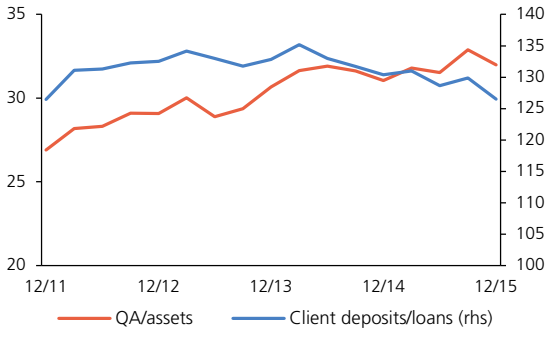
**Maturity mismatch between client loans and deposits: net balance-sheet position**
(in CZK billions; deposits minus loans of households and non-financial corporations)




Source: CNB
Note: Short-term deposits and loans have maturities of up to 1 year, medium-term deposits and loans have maturities of 1–5 years and long-term deposits and loans have maturities of over 5 years.

CHART III.16

**Liquidity ratios over time**
(%)




Source: CNB
Note: QA = quick assets. The ratio of deposits to loans covers both residents and non-residents.

consumer credit are falling at the fastest year-on-year rate. The decline in margins on new loans to households for house purchase and loans to non-financial corporations to record lows continues (see Chart III.13). The modest year-on-year rise in interest profit was due to growing credit activity and a drop in interest costs, which fell markedly faster (by 17.6%) than interest income (by 5.0%) in year-on-year terms. The faster decline in the interest margin on new loans (see Chart III.12) together with the limited room for a future marked decrease in interest costs are expected to continue to squeeze interest profit. The pressure may be reduced by the continuing growth in loans, which is currently increasing the risks to financial stability (see section 4.2.2).

### Growth in client loans is being accompanied by growth in client deposits

Client deposits (88%) and loans (81%) continue to be denominated mostly in Czech koruna. Most deposits accepted (95%) and loans provided (88%) are resident ones. Client loans provided to residents rose by CZK 128 billion (7.2%) year on year and client deposits by CZK 157 billion (6.1%). The highest growth rates of both loans and deposits were recorded by small banks (see Chart III.14). Building society loans and deposits declined for the third consecutive year. The year-on-year decline in interest rates on client loans (by 0.38 pp to 4.2%)[18] and client deposits (by 0.15 pp to 0.47%) continues.

### The growing share of demand deposits and long-term loans is increasing the risks linked with maturity transformation…

The falling deposit rates and the preference for liquidity are reducing the share of time deposits in the total deposits of households and non-financial corporations. At the same time, the low loan rates are boosting demand for long-term loans. The share of client demand deposits in total client deposits was 48.5% at the end of 2005 but had reached 78.8% by the end of 2015. The share of long-term client loans in total client loans rose from 47.6% to 72.5% in the same period. The maturity mismatch between client loans and client deposits is therefore growing significantly, partly because of low interest rates (see Chart III.15). The risks linked with maturity transformation can be mitigated by the net stable funding ratio (NSFR) requirement, a minimum standard for which will be introduced in 2018 (see section 3.3).

### …but the liquidity position of banks remains good

The banking sector has long had a good liquidity position with a sizeable excess of deposits over loans. The ratio of client deposits to loans went down by 3.9 pp year on year to 126.5% (see Chart III.16). The ratio of quick assets to total assets rose by 0.9 pp to 32%. This was due mainly to a 33% year-on-year increase in cash holdings at the CNB, which was linked with its foreign exchange interventions and with the negative Czech government bond yields. The liquidity buffer, which domestic

18 They increased only in the case of branches of foreign banks, although this was due to the conversion of one non-bank into a branch of a foreign bank.

banks can use in the event of a sudden liquidity shock and to ensure compliance with the new CRR liquidity rules (see section 3.3), also leaves sufficient room for the further development of lending activity.

**The prudential rules applying to credit unions have been tightened…**

Act No. 333/2014 Coll., which responds to the riskiness of the credit union segment by setting rules for some of its activities, came into force in 2015. The new legislation ties the maximum amount of client deposits to the amount of the membership deposit (the "1:10" rule effective since mid-2015) and sets a cap on a credit union's balance-sheet total (CZK 5 billion with effect from 2018). Furthermore, contributions to the Deposit Insurance Fund have been doubled since 2015 (to 0.08% of insured deposits) and a minimum membership deposit (of CZK 1,000) and a maximum loan to members (of CZK 30 million) have been set.

**…and the segment's growth rate and riskiness have declined**

Growth in the total assets of the credit union segment slowed in 2015. Their year-on-year growth was 3.4%, reaching CZK 32.3 billion at the year-end. On the liabilities side, client deposits increased by 0.6% in 2015, accounting for 85% of total liabilities. Stagnation or a decline in the segment's assets can be expected in the years ahead due to the need to convert credit unions that exceed the cap on total assets (they accounted for 65% of the segment's total assets at the end of 2015). The segment's riskiness remains high compared to banks, but fell in year-on-year terms. The NPL ratio dropped by more than 5 pp to 24.6%, while the liquid asset ratio, the coverage of loans by provisions, the Tier 1 capital ratio and the aggregate RoE all rose (see Table III.2). The CNB continues to pay constant attention to this segment and its risks.

### 3.1.2 INSURANCE COMPANIES

**The insurance sector is maintaining its capitalisation and profitability…**

The financial stability of the Czech insurance sector remains high and its contribution to systemic risk is not currently significant (see the thematic article[19] in this Report for more information about the systemic importance of Czech insurance companies). The profitability of the sector as a whole is relatively stable (RoE of 13.3%; see line *NI.6* in the Table of Indicators) and its solvency is well above the regulatory minimum of 100% (solvency ratio of 319% for life insurance, see line *NI.3,* and 338% for non-life insurance, see line *NI.4*).[20] Its investment structure is conservative, consisting mainly of debt securities (about 60% of assets), more than half of which are Czech government bonds (see Chart II.15). Thanks to the recovery of the Czech economy, the non-life insurance market, which is more closely tied to the business cycle, even recorded

19 Dvořák, Hausenblas, Gronychová and Komárková (2016): *Could the Czech Insurance Sector Be a Source of Systemic Risk?*

20 Unless stated otherwise, the data in this section cover insurance companies based in the Czech Republic, including EGAP.

TABLE III.2

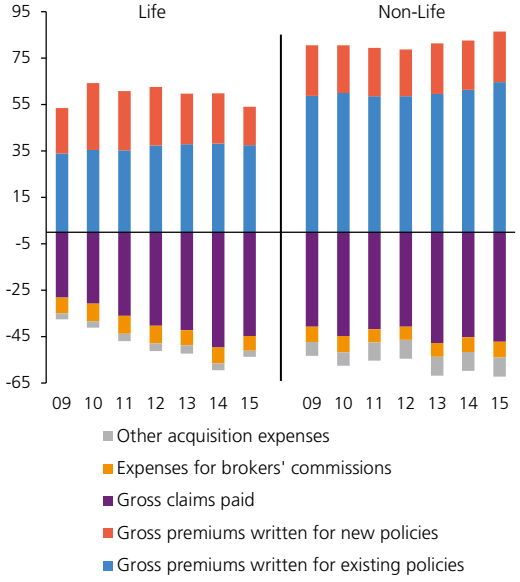
**Selected indicators of credit unions as compared to banks**
(%; end-2014 and end-2015 data; credit unions active as of 31 December 2015)

| | 2014 | | 2015 | |
|---|---|---|---|---|
| | Credit unions | Banks | Credit unions | Banks |
| Client NPL ratio | 30.0 | 6.3 | 24.6 | 5.9 |
| Quick assets/total assets | 11.0 | 27.4 | 16.9 | 32.0 |
| Coverage of NPLs by provisions | 18.4 | 47.6 | 20.4 | 46.3 |
| Tier 1 capital ratio | 12.4 | 17.5 | 15.4 | 17.9 |
| RoE | 0.5 | 16.3 | 1.0 | 16.3 |

Source: CNB
Note: Liquid assets are assets pursuant to Article 416 of the CRR. Any inconsistency with figures in other parts of this section is linked with different approaches to the inclusion of the figures for Czech Export Bank and the Czech-Moravian Guarantee and Development Bank.

CHART III.17

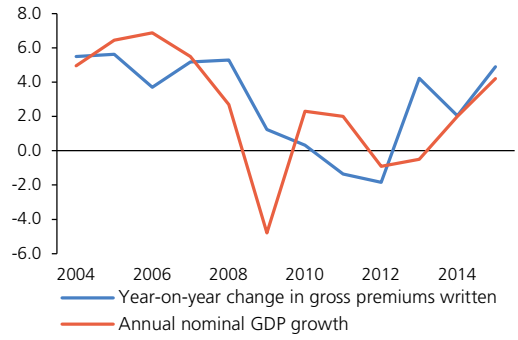
**Key financial indicators for the insurance sector**
(CZK billions)




Source: CNB
Note: The data only cover insurance companies with their headquarters in the Czech Republic and active as of 30 September 2015.

CHART III.18

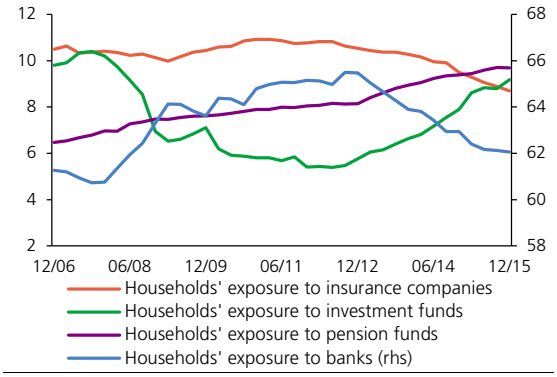
**Economic growth and the non-life insurance market in the Czech Republic**
(%)




Source: CNB, CZSO, Czech Insurance Association
Note: The data on premiums written cover all insurance companies active in the Czech Republic, including branches of foreign insurance companies.

CHART III.19

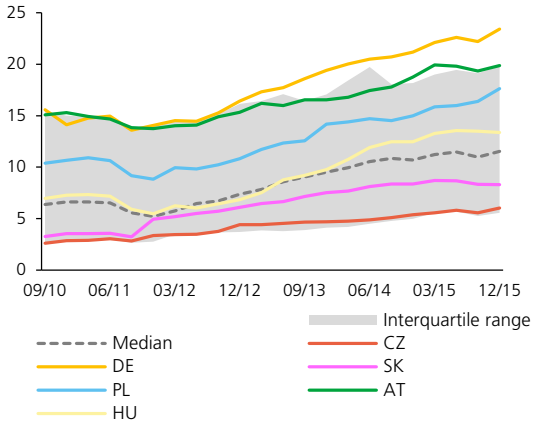
**Structure of households' exposures to financial institutions**
(% of households' total exposures to financial institutions)




Source: CNB
Note: Exposures include both resident and non-resident financial institutions. The chart does not show exposures of households to other financial sector institutions: NFCELs, non-bank security dealers, financial auxiliaries and the central bank.

CHART III.20

**Comparison of the ratio of investment fund financial assets to bank financial assets**
(% of banking sector financial assets)




Source: ECB, CNB calculation
Note: The grey area represents the interquartile range from a sample of 23 EU countries; EU; BG, DK, HR, SE and UK are excluded due to data unavailability.

growth across product segments (see Charts III.17 and III.18), particularly in insurance related to the operation of motor vehicles.

**…the risks associated with the low-yield environment persist…**

The life insurance segment as a whole shrank significantly in 2015 (see Chart III.17). Traditional life insurance products saw a further gradual decline in the number of policies and a marked fall in total premiums paid. The persisting low-rate environment has been a source of risk for the life sector in recent years. The long-running decline in returns on high-quality assets is particularly unfavourable for insurers with long-term liabilities arising from life insurance with guaranteed yields. To reduce exposures to interest rate risk, it is vital for life insurers to set a sufficiently prudent technical interest rate relative to their expected investment returns and to maintain a low maturity mismatch between their technical reserves and investments. For some time now, the Czech insurance sector has also been reducing the supply of traditional insurance products and focusing more on products with declared guarantees and unit-linked investment life insurance products. In addition, the average duration of the life insurance liabilities of most Czech insurance companies does not exceed the duration of the assets used to cover them (both are close to 7 years on average; see Chart 2 in the aforementioned thematic article). However, the current downward trend in returns on high-quality assets (see section 2.1), which account for the bulk of insurance companies' investments, poses medium-term risks for life insurance companies. Yields on the secondary Czech government bond market have turned negative for maturities of up to 6 years and the supply of bonds with positive yields on the primary market has been declining.

**…and will be tested using the EIOPA stress test**

The domestic insurance sector's resilience to risks, including those mentioned above, is regularly evaluated in stress tests conducted by the CNB in cooperation with insurance companies. The CNB will not carry out its own stress test this year, as the EIOPA Stress Test 2016 will be conducted. This test will involve the domestic insurers that previously took part in the stress tests conducted by the CNB. It will be based on two scenarios defined by the EIOPA. The CNB will supply an additional stress scenario reflecting the specifics of the Czech insurance market. Given the timing of the EIOPA Stress Test 2016, the communication of the aggregate test results will change. The aggregate results are not presented in this Report, but will be published on the CNB website under *Financial stability/Stress testing*.

### 3.1.3 THE NON-BANK FINANCIAL SECTOR EXCLUDING INSURANCE COMPANIES

**The role of institutional investors in the Czech financial sector is increasing…**

The relative importance of the segments of the financial sector has been changing in recent years. There has been sizeable growth in the amount invested by households in investment and pension funds, whose share in households' total financial assets is thus rising (see Chart III.19). Households' investment in investment funds rose by 24.5% year on year

to CZK 333 billion and that in pension funds by 10.4% to CZK 351 billion. This growth is outpacing that in households' deposits with banks (5.5%) and that in households' investments in insurance products (a year-on-year decline of 2%). Besides households, investment funds are becoming increasingly important in the portfolios of insurance companies and funds themselves.

### …the low interest rate environment is encouraging the transfer of investment risks to households

The upward trend in the importance of investment products can be partially explained by the decline in deposit interest rates (see Chart III.14), which is motivating economic agents to look for more profitable ways of investing their assets (see section 2.1).[21] This is leading to partial transfer of the risk of investment losses from the financial sector to households. Such a shift on the one hand is reducing risk concentration (increasing diversification), but on the other may give rise to new risks.

### A large proportion of invested funds is in foreign investment funds

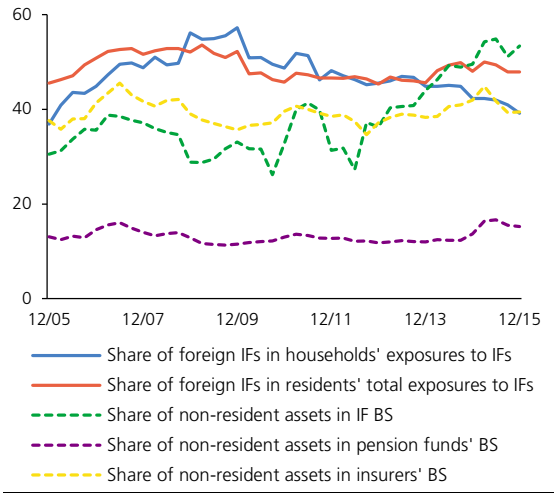
The importance of investment funds in the Czech Republic is still among the lowest in the EU. The amount of assets in domestic investment funds relative to banking sector assets is much lower than in Slovakia or Hungary (see Chart III.20). However, foreign investment funds play a major role. They account for about 50% of residents' total investment in investment funds (see Chart III.21). Institutional investors (insurance companies and domestic investment funds) maintain particularly large exposures to non-resident funds. By contrast, the share of foreign funds in households' total investments in investment funds is showing a slight downward trend and stood at 39% at the end of the period under review. Investments in foreign funds expose investors to heightened sensitivity to the global financial market situation (see section 2.1).

### Investment funds hold a large amount of liquid assets

In the event of adverse market developments, investment funds are exposed to a risk of investor redemptions. Funds are responding to this risk by holding large quantities of liquid assets. The share of quick assets in funds' total assets dropped by 3 pp year on year to 30% at the end of 2015. This was primarily due to a relative decline in the importance of government bonds in investment funds' assets, mainly in favour of foreign assets (see sections 2.1 and 3.1.4). The risk of exit from funds is not material for financial stability at present. However, it may increase in importance as investment funds' assets grow.

CHART III.21

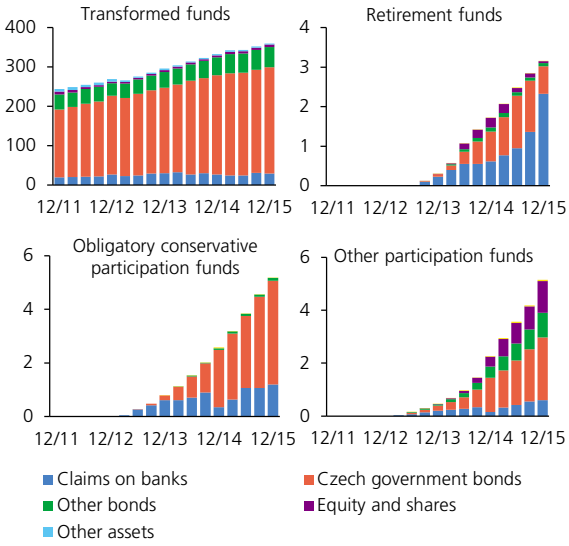
**Share of non-resident assets in investors' balance sheets**
(%)




Source: CNB
Note: IFs = investment funds, BS = balance sheet.

CHART III.22

**Pension fund assets and their placement**
(CZK billions)

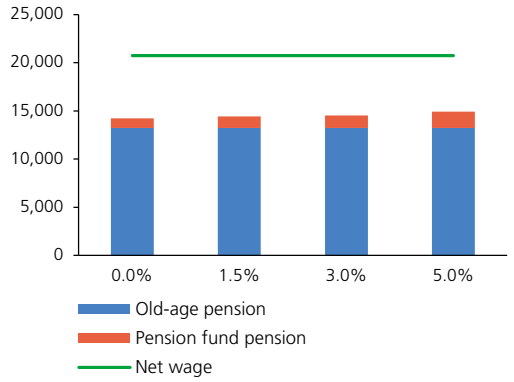



Source: CNB

21 However, there are more reasons behind the relative growth in the importance of institutional investors. To some extent this is a natural process accompanying growth in the wealth of economic agents and the related willingness to invest part of their savings in riskier assets.

CHART III.23

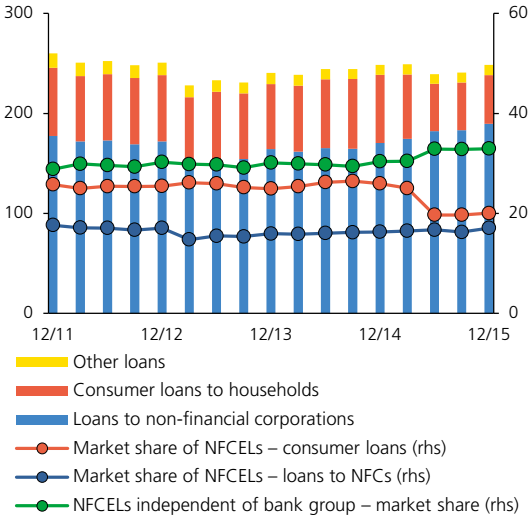
**Effect of private pension policies on retirement income under various asset profitability assumptions**
(CZK; monthly; at 2015 wage level)




Source: CNB
Note: The calculation is based on the situation of the average pension fund client (age 50 years, saved amount CZK 80,000, saving CZK 620 a month, employer contributing CZK 130 a month) and an average gross wage of CZK 26,400. Wage inflation of 2% and the current state support in real terms are assumed. On retirement at the age of 65, the policyholder withdraws the saved amount, deposits it at a rate of 1% and withdraws a fixed amount every month until her death at the age of 80. "Pension fund pension" is the maximum size of that withdrawal.

CHART III.24

**Loans provided by non-bank financial corporations engaged in lending**
(CZK billions; right-hand scale in %)




Source: CNB
Note: The market share of NFCELs is related to total loans provided to residents by banks and NFCELs combined. The market share of independent NFCELs relates solely to loans to residents provided by all NFCELs.

### The importance of pension funds continues to grow

Total assets administered by pension management companies continue to grow (see Chart III.22). A slight fall in the number of clients (which has dropped by 8.5% to CZK 4.6 million since June 2013) is being offset by a rise in the average client deposit (from CZK 559 a month in 2013 to CZK 620 in 2015). However, the role of pension funds in providing savings for old age is still relatively low (see Chart III.23) and the upward trend in deposits and assets in funds is therefore set to continue. The rising amount of savings in transformed funds, which are the most important type of fund,[22] is increasing the risks faced by pension management companies, which provide clients with a guarantee of non-negative returns, as they would have to cover a higher amount of liabilities with their own funds in the event of adverse market developments. By contrast, a legislative change allowing the portfolio of government bonds held to maturity, which is not marked to market, to be increased from the 30% to 35% of transformed funds' assets has helped reduce market risks. The CNB regularly assesses the stability of pension management companies in stress tests (see section 3.2).

### The second pension pillar is undergoing liquidation

Pension funds making up the second pension pillar are undergoing liquidation in 2016. About CZK 3 billion in savings of the funds' more than 84,000 clients will be paid back to clients or transferred to pension management companies' other funds, including transformed funds. Pension management companies' parent groups are therefore expected to make efforts to retain these clients. In the third pension pillar, new clients may only join participation funds, which, however, do not offer the statutory guarantee of non-negative returns[23] and have generally riskier profiles than transformed funds operating under the previous legislation (see Chart III.22).

### The amount of loans provided by NFCELs was unchanged…

The segment of non-bank financial corporations engaged in lending (NFCELs) is dominated by leasing companies (which account for more than 80% of its assets). It also contains factoring companies and other providers of loans – particularly consumer credit to households. The total amount of loans provided was almost unchanged from a year earlier, standing at CZK 249 billion at the year-end (see Chart III.24). However, the importance of loans to non-financial corporations in the NFCELs segment increased. Such loans rose by CZK 19 billion year on year to CZK 190 billion. NFCELs thus also increased their share in the total market for loans to non-financial corporations, which exceeded 17% for the first time since 2012. By contrast, loans to households for consumption dropped by CZK 19.3 billion year on year to CZK 48.9 billion. This led to a year-on-year decline in NFCELs' market share in this segment of 5.9 pp to 20%.[24]

22 Transformed funds account for 96% of total assets of funds administered by pension management companies.
23 However, pension management companies often offer similar guarantees to clients at their own initiative if certain conditions are met.
24 This decline was due in large part to the conversion of an NFCEL providing loans to households into a branch of a foreign bank. Adjusted for the effect of this conversion, the

**…while the quality of the loans remains at a favourable level**

At the aggregate level, the default rate on NFCEL loans is higher than that on bank loans. The secured nature of financial leasing loans is reflected mainly in the quality of loans to non-financial corporations. The three-month default rate on these loans has long been declining and is converging towards the riskiness of comparable bank loans. In the case of loans to households, the default rate is approximately double that on bank loans and is stable at around 3% (see Chart III.25)

### 3.1.4 INTERCONNECTEDNESS OF THE FINANCIAL SECTOR

**The links between the segments of the financial sector are not amplifying systemic risks**

The interconnectedness of the financial sector fundamentally affects the outcomes of adverse shocks to which the sector may be exposed. There are two important areas of interconnectedness: balance-sheet interconnectedness and common exposures. As regards balance-sheet interconnectedness, the segments of the financial sector are interconnected through exposures in the form of deposits, loans, ownership interests and other instruments. A strengthening of balance-sheet interconnectedness in the financial sector could intensify the structural component of systemic risk, leading to an increased risk of financial distress spreading across segments. However, the level and evolution of the credit interconnectedness of banking groups suggests that the structural component of systemic risk has not been rising in recent years. The existence of significant common exposures is giving rise to a risk of a potential adverse shock associated with such exposures having a simultaneous impact on multiple segments of the financial sector. This is resulting in growth of the systemic impacts of such shocks. Common exposures exist mainly in relation to the public sector and non-residents as of the end of the period under review.

**The balance-sheet interconnectedness of the main segments of the Czech financial sector is unchanged**

The most important link in the balance-sheet interconnectedness of Czech financial institutions is Czech banks, on which all segments of the financial market[25] have aggregate claims in the form of deposits and other instruments (mainly long-term debt securities). This is a natural exposure based on institutions' need to keep part of their funds in sufficiently liquid form, while also being an appropriate portfolio diversification tool. Besides exposures in banks, holdings of investment fund shares and units by banks, insurance companies and investment funds themselves and exposures to other financial intermediaries are significant aspects of interconnectedness (see Chart III.26). The share of mutual asset and liability exposures of the segments of the financial

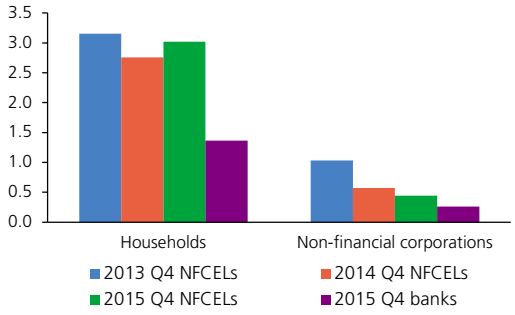
amount of loans provided by NFCELs to households for consumption dropped by CZK 2.3 billion and the share of NFCELs in the market for such loans fell by 0.7 pp.

25 Namely banks, insurance companies, investment companies, investment funds, pension management companies, pension funds and other financial intermediaries (mainly NFCELs and non-bank security dealers). The central bank, non-residents and captive companies are excluded from the description of balance-sheet interconnectedness, as by nature they are not entities through which a financial shock could be transmitted.

CHART III.25

**3M default rate on loans provided by credit institutions**

(%)

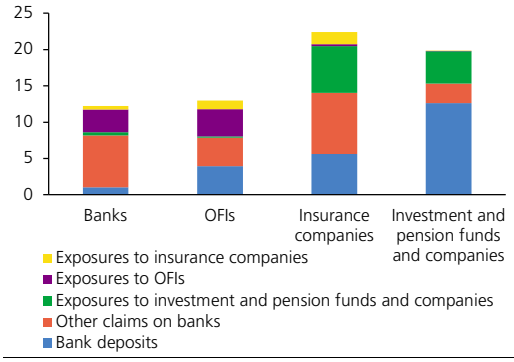



Source: CBCB, CNCB, SOLUS, CNB
Note: The default rate on loans provided to households by NFCELs is calculated as the average of the data from the NRCI and SOLUS. Only the NRCI is used for loans to non-financial corporations.

CHART III.26

**Mutual balance-sheet exposures of financial institutions**

(% of assets of segments)

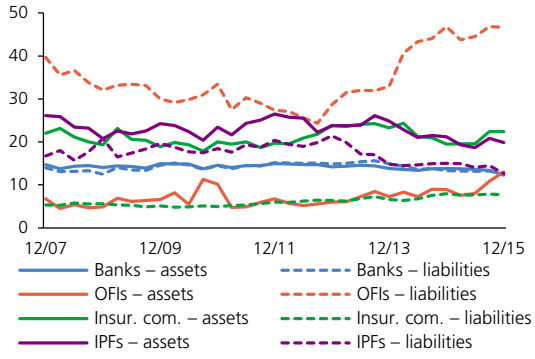



Source: CNB
Note: The segment of other financial intermediaries (OFIs) comprises non-bank financial corporations engaged in lending and non-bank security dealers.

CHART III.27

**Share of exposures to domestic financial counterparties**

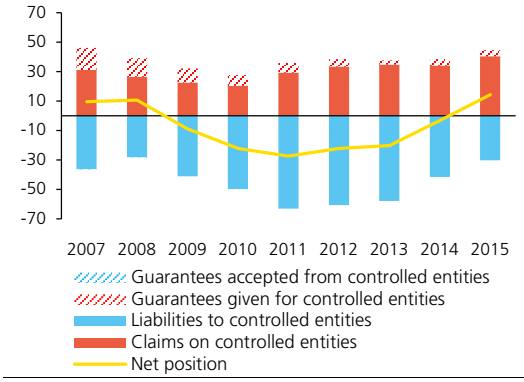
(% financial assets and liabilities of segments)




Source: CNB
Note: IPFs = Investment and pension funds and companies. The segment of other financial intermediaries (OFIs) comprises non-bank financial corporations engaged in lending and non-bank security dealers.

CHART III.28

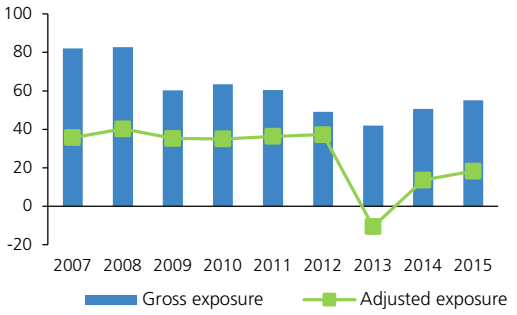
**Credit interconnectedness in domestic bank groups**
(% of regulatory capital of domestic parent banks)




Source: Obligatory information to be disclosed pursuant to Decree No. 123/2007 and Decree No. 163/2014
Note: The chart depicts the aggregate interconnectedness of the largest domestic banks, i.e. Česká spořitelna, ČSOB, Komerční banka and Raiffeisenbank. UniCredit Bank is included only in the periods when it controlled entities.

CHART III.29

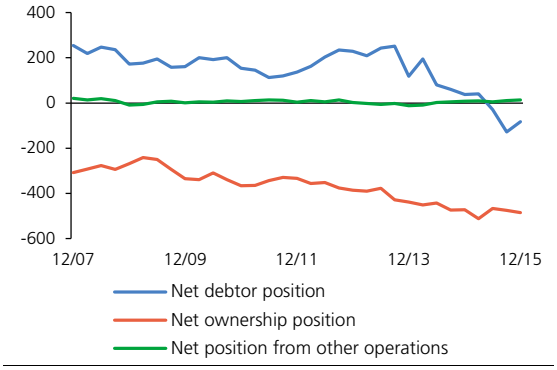
**Gross and adjusted exposure to parent groups**
(%; exposure in relation to regulatory capital)




Source: CNB
Note: The chart shows the aggregate exposure of the five largest banks in the Czech Republic, which have foreign parents in the euro area. Gross exposure consists mainly of claims in the form of loans provided to the parent group and claims arising from derivatives transactions and other off-balance-sheet items in the investment and trading portfolios. Adjusted exposure = gross exposure minus liabilities in the form of deposits and loans accepted from foreign parent banks. The values in the chart do not reflect any collateralisation. In cases where a bank did not record exposures to its foreign parent in a particular period, it is not included in the calculation in that period.

CHART III.30

**Net position of the banking sector vis-à-vis non-residents**
(CZK billions)




Source: CNB

sector is stable at less than one-quarter of their assets and liabilities. The exception is other financial intermediaries: more than 40% of their funds come from the financial sector, mostly in the form of long-term loans and ownership interests of banks in consolidated groups (see Chart III.27). The significant presence of the real sector, the central bank and non-residents in financial institutions' balance sheets reduces the risk of transmission and multiplication of adverse shocks across the financial sector.

**The interconnectedness of domestic banking groups is little changed…**

The interconnectedness of domestic banking groups saw no major year-on-year structural changes. Banks returned to being net creditors of their domestic groups for the first time since 2008 (see Chart III.28). Claims on controlled entities rose by CZK 28 billion to CZK 118 billion. In their banking groups, the largest banks are in a creditor position mainly vis-à-vis NFCELs. Those claims increased by CZK 14.4 billion, accounting for 80.3% of total claims on controlled entities. By contrast, liabilities to controlled entities continued to fall (by CZK 21 billion to CZK 88 billion) in 2015. These liabilities consist mainly of excess liquidity from building society subsidiaries.

**…banks remain net creditors of their foreign parents…**

The aggregate gross exposure of the largest Czech banks to their foreign parents rose by 4.4 pp year on year to 55.1% of regulatory capital. Liabilities to parents also went up in 2015, although at a slower pace. Banks thus remain net creditors of their parent groups (see Chart III.29).

**…and banks become a net debtor vis-à-vis non-residents**

The downward trend in the banking sector's net position vis-à-vis non-residents continued. The net debtor position decreased by CZK 121 billion year on year to CZK -83 billion. The banking sector thus became a net debtor vis-à-vis foreign entities in 2015 (see Chart III.30). This was due mainly to growth in foreign entities' deposits in domestic banks as a result of the exchange rate commitment. The net ownership position decreased by CZK 13 billion year on year to CZK -474 billion at the end of the period under review. The position from other operations (particularly financial derivatives) remains balanced in the long run.

**Common exposures are dominated by the government sector and, in the case of institutional investors, also by foreign investments**

Czech government bonds make up a large part of financial institutions' exposures. Although their relative importance in balance sheets is not rising, interest rate risk is growing due to increasing holdings of Czech government bonds by non-residents (see section 2.1). The CNB monitors risks relating to sovereign exposures in a public finance stress test (see section 3.4). The low yields on Czech government bonds are simultaneously motivating institutional investors to look for investment alternatives. This is resulting in growth in the share of non-resident assets in investors' balance sheets, particularly in the case of investment funds (see Chart III.21). Exposure to foreign shocks connected with a drop in foreign asset prices carries a risk of losses for institutional investors and households and liquidity risks for investment funds.

## 3.2 SOLVENCY STRESS TESTS OF BANKS AND PENSION MANAGEMENT COMPANIES

*The stress tests demonstrate that the banking sector is highly resilient to selected adverse scenarios. Banks have a large capital buffer enabling them to absorb adverse shocks and maintain their overall capital ratio sufficiently above the regulatory threshold of 8% even in a very adverse scenario. The pension management company sector has long been sensitive to interest rate volatility. In certain circumstances, a decline in prices of Czech government bonds could adversely affect its profitability and solvency.*

### The stress tests are based on the *Adverse Scenario*, which has been extended to include other sensitivity analyses

The resilience of banks and pension management companies was tested in macro stress tests using a *Baseline Scenario* for the most probable future developments and a hypothetical *Adverse Scenario* assuming a strong and long-running decline in economic activity in the Czech Republic accompanied by a fall of the economy into deflation (see section 2.1). The developments represented by the *Adverse Scenario* are extended to include other sensitivity analyses that amplify its impacts and thus enable the sectors' resilience to relevant risks to be assessed.

### The bank stress test methodology is regularly updated

The stress tests saw no major methodological changes. As usual, the test parameters were refined using satellite models, which were re-estimated using the most recent time series. As in the previous Report, the banking sector tests were performed on end-2016 Q1 data.[26] A sensitivity analysis concerning the impact of hypothetical losses from operational risk was newly added.

### In the *Baseline Scenario* credit risks stagnate and the sector's profitability continues to decline

Stress tests are traditionally one of the most important tools for assessing the resilience of the banking sector to potential risks to the stability of the Czech financial sector. Particular attention is paid to credit risk, which is the most important risk in the Czech banking sector. The evolution of credit risk is closely linked with developments in the household and corporate sectors. The economic growth is reflected in the *Baseline Scenario* in a greater ability of households and corporations to repay their debts, i.e. a low level of credit risk (see sections 2.2 and 2.3). The default rate, a key indicator of credit risk, remains low in both the non-financial corporations and household sectors (see Table III.3). The long-standing environment of low interest rates reduces banks' traditional interest income. Given the expected interest rate developments, the *Baseline*

TABLE III.3

**Key variables in the individual scenarios**
(averages for given years)

| | Actual value | *Baseline Scenario* | | | *Adverse Scenario* | | |
|---|---|---|---|---|---|---|---|
| | 2015 | 2016 | 2017 | 2018 | 2016 | 2017 | 2018 |
| **Macroeconomic variables** | | | | | | | |
| GDP (y-o-y %) | 4.3 | 2.3 | 3.4 | 3.5 | -2.7 | -3.3 | -0.7 |
| Inflation (%) | 0.3 | 0.4 | 1.9 | 2.2 | -0.6 | -4.6 | -0.5 |
| Unemployment (%) | 5.1 | 4.4 | 4.3 | 4.1 | 5.3 | 7.7 | 9.8 |
| Nominal wage growth (%) | 3.4 | 4.0 | 5.2 | 4.7 | -1.7 | -11.7 | -2.9 |
| Effective GDP growth in euro area (%) | 2.0 | 2.1 | 2.0 | 2.0 | 0.6 | -2.0 | -1.0 |
| **Credit growth (%)** | | | | | | | |
| Total | 5.5 | 6.8 | 7.2 | 8.2 | 2.7 | -4.1 | -4.2 |
| Corporations | 5.9 | 7.4 | 7.8 | 8.5 | 3.3 | -6.2 | -4.8 |
| Households | 5.8 | 7.3 | 8.6 | 9.7 | 3.4 | -1.8 | -3.0 |
| **Default rate (PD, %)** | | | | | | | |
| Corporations | 1.2 | 1.1 | 1.1 | 1.1 | 3.7 | 5.2 | 4.8 |
| Loans for house purchase | 2.2 | 2.0 | 2.0 | 2.2 | 4.4 | 5.1 | 5.8 |
| Consumer credit | 5.5 | 5.3 | 5.5 | 6.0 | 9.8 | 11.4 | 11.6 |
| **Loss given default (LGD, %)** | | | | | | | |
| Corporations | 45.0 | 45.0 | 45.0 | 45.0 | 54.9 | 58.4 | 53.5 |
| Loans for house purchase | 22.0 | 22.0 | 22.0 | 22.0 | 25.4 | 39.1 | 42.6 |
| Consumer credit | 55.0 | 55.0 | 55.0 | 55.0 | 58.2 | 67.9 | 76.2 |
| **Asset markets (%)** | | | | | | | |
| 3M PRIBOR | 0.3 | 0.3 | 0.8 | 1.8 | 0.3 | 0.3 | 0.3 |
| 5Y yield | 0.1 | 0.0 | 0.7 | 2.2 | 1.6 | 3.3 | 3.5 |
| 3M EURIBOR | 0.0 | -0.2 | -0.3 | -0.2 | -0.2 | -0.3 | -0.2 |
| 5Y EUR yield | 0.0 | 0.0 | 0.0 | 0.0 | 0.6 | 1.2 | 1.2 |
| Change in residential property prices | 4.5 | 6.7 | 7.6 | 8.0 | 0.2 | -13.0 | -3.4 |
| Change in share prices | 1.0 | | -5.0 | | | -30.0 | |
| **Banks' earnings** | | | | | | | |
| Adjusted operating profit (y-o-y %) | -0.7 | -2.0 | -2.0 | -1.0 | -16.0 | -22.6 | -21.7 |

Source: CNB, CNB calculation, BRCI

26 Data on capital ratios were unavailable at the time of the testing, so end-2015 capital values were used.

TABLE III.4

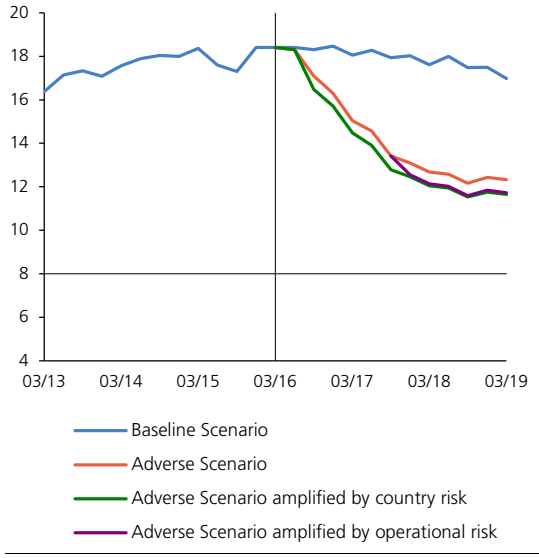
**Impact of the alternative scenarios on the banking sector**

| | *Baseline Scenario* | | | *Adverse Scenario* | | |
|---|---|---|---|---|---|---|
| | 2016 | 2017 | 2018 | 2016 | 2017 | 2018 |
| **Expected credit losses** | | | | | | |
| CZK billions | -17.1 | -20.7 | -23.1 | -45.8 | -77.2 | -78.5 |
| % of assets | -0.3 | -0.3 | -0.4 | -0.8 | -1.4 | -1.4 |
| **Profit/loss from market risks** | | | | | | |
| CZK billions | 4.5 | -11.5 | -5.4 | -14.1 | -3.7 | -0.7 |
| % of assets | 0.1 | -0.2 | -0.1 | -0.2 | -0.1 | 0.0 |
| **Earnings for covering losses (adjusted operating profit)** | | | | | | |
| CZK billions | 73.9 | 72.4 | 71.7 | 63.3 | 49.0 | 38.4 |
| % of assets | 1.2 | 1.2 | 1.1 | 1.1 | 0.9 | 0.7 |
| **Pre-tax profit/loss** | | | | | | |
| CZK billions | 61.3 | 40.2 | 43.2 | 3.3 | -33.1 | -40.9 |
| % of assets | 1.0 | 0.6 | 0.7 | 0.1 | -0.6 | -0.7 |
| **Capital ratio at end of period in %** | | | | | | |
| **Total** | 18.5 | 18.0 | 17.5 | 16.3 | 13.1 | 12.4 |
| **Tier 1** | 18.0 | 17.6 | 17.1 | 15.9 | 12.8 | 12.1 |
| **Capital injections** | | | | | | |
| CZK billions | | 0.5 | | | 6.6 | |
| % of GDP | | 0.01 | | | 0.1 | |
| **No. of banks below 8% capital ratio** | | 3 | | | 7 | |

Source: CNB, CNB calculation
Note: Minus sign for losses. Stress tests covered all banks active on 31 December 2015.

CHART III.31

**Capital ratios of the banking sector depending on scenarios**
(%)




Source: CNB, CNB calculation

*Scenario* expects banks' adjusted operating profit to continue to trend downwards by around 2% a year in 2016 and 2017.[27]

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

Despite the worse profitability outlook, the banking sector remains resilient over the entire three-year test horizon and has sufficient capital reserves. The sector's aggregate capital ratio is around 17.5%, i.e. well above the regulatory minimum of 8%. The Tier 1 capital ratio is only about 0.4 pp below the total capital ratio, illustrating high quality of the capital structure. Nevertheless, three banks (which, however, represent only around 1.8% of the sector's assets) get into a situation of insufficient capital adequacy in the *Baseline Scenario*, which could imply a need to adjust their business models or top up their capital in the future.[28]

### The *Adverse Scenario* would imply significant accounting losses for the banking sector…

The *Adverse Scenario* assumes that seriously negative developments in the EU would result in a sizeable decline in economic activity in the Czech Republic, a surge in unemployment and financial market turbulence, leading to a significant jump in EU government bond yields. Since this negative shock would result in a contraction of the domestic economy over the entire test horizon, the financial reserves of some households and corporations would be exhausted and debt repayment by the real sector would deteriorate. This would be reflected in a sizeable rise in the default rate in both the non-financial corporations and household sector. The banking sector's overall credit losses would be roughly three times larger than in the *Baseline Scenario* at the three-year horizon. Given the expected rise in government bond yields in the Czech Republic and other EU countries, banks would also record market losses due to a decline in the value of these debt instruments (see Table III.4, column 2). These credit and market losses, combined with a decline in operating profit, result in an accounting loss of the sector and a sizeable fall in its capital ratio.

### …but the sector's overall capital ratio would remain sufficiently above the regulatory threshold

Despite these adverse developments, the capital ratio of the banking sector does not drop below 12% in the *Adverse Scenario* (see Chart III.31). Although the aggregate capital ratio stays sufficiently above 8%, seven banks – representing about 7.5% of the sector's assets

27 Adjusted operating profit comprises net interest income and net income from fees and commissions less administrative expenses, depreciation and amortisation. Adjusted operating profit is largely the same as pre-provision profit but does not include the impacts of market (interest rate and exchange rate) gains/losses.

28 Banks may also get into a situation of an insufficient capital ratio because the stress test methodology assesses their business model as unsustainable in the longer run, although this may not be the case. 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 into account institutions' specific characteristics when assessing the test results.

– record a fall in capital adequacy below the regulatory minimum and have to top up their capital. The necessary capital injections total around CZK 6.6 billion, i.e. 0.15% of GDP (see Table III.4, column 2). Relative to the size of the banking sector, this figure is not significant enough to jeopardise its stability. The banking sector's stability is based on its high capital ratio, which went up by a further 0.4 pp compared to the previous year, and on its ability to generate income to cover losses even in the event of highly adverse developments.

**The capital ratio falls in the *Adverse Scenario* mainly because of high losses and a sharp rise in risk weights**

A decomposition of the change in the capital ratio clearly illustrates the impacts of the main factors underlying the evolution of the capital ratio in the stress tests. In the *Baseline Scenario*, the Czech banking sector's income increases the capital ratio by as much as 10.7 pp over the test horizon.[29] Part of this income is used to cover expected credit and market losses (-3 pp) and to pay dividends and taxes (-5.9 pp). The growth in economic activity leads to a rise in banks' exposures, lowering the capital ratio by 2.7 pp. A change in risk weights due to a change in the structure of lending reduces the capital ratio by a further 0.6 pp to 17% at the end of the three-year test horizon (see Chart III.32).[30]

Even in the *Adverse Scenario*, banks are able to generate income to cover their losses (+9.8 pp). This income is sufficient to cover all the expected losses over the test horizon (-9.3 pp). Dividends and taxes, paid mainly from profits for 2015, make a negative contribution to the capital ratio of 2.8 pp. Banks then react to the worse situation by lowering the volume of loans, which reduces the decline in the capital ratio by 1.2 pp. The deterioration of the economic environment and the materialisation of credit risk increase the risk weights, fostering a marked drop in the banking sector's capital ratio of 5 pp to 12.3% in the final period of the test (see Chart III.33).

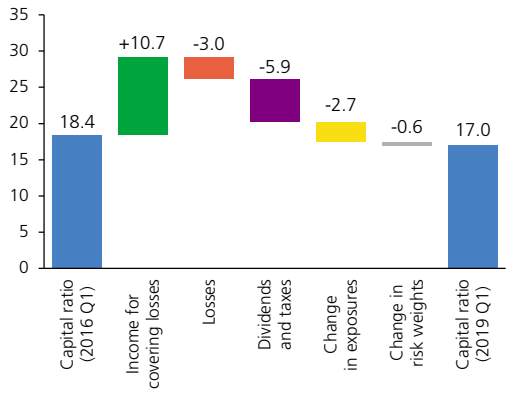
**An additional sensitivity analysis in the *Adverse Scenario* assesses the impacts of partial impairment of exposures to indebted countries**

Within the *Adverse Scenario*, a sensitivity analysis is performed assuming partial impairment of all domestic banks' exposures to EU countries with debt exceeding 60% of GDP. Some haircut on exposures is already assumed in the *Adverse Scenario* through a decline in the value of government bonds of EU countries, including the Czech Republic, due to growth in their yields. To this baseline haircut the additional sensitivity analysis adds haircuts on all domestic banks' exposures to indebted countries derived from those countries' average ratings (see Table III.5). This assumption generates additional losses of CZK 22 billion for the

CHART III.32

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

(%)

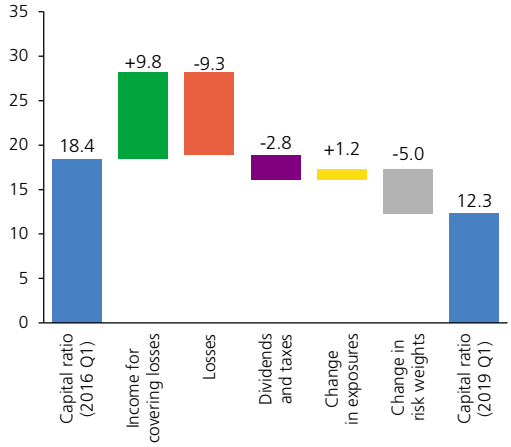



Source: CNB, CNB calculation

CHART III.33

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

(%)




Source: CNB, CNB calculation

29 The income used to cover losses includes profits for 2015 and expected income in 2016, 2017 and 2018.

30 Stronger growth in loans to households than in loans to corporations is expected in the *Baseline Scenario*. Loans to households, especially consumer credit, are riskier (have higher default rates), which leads to an increase in the average risk weights.

TABLE III.5

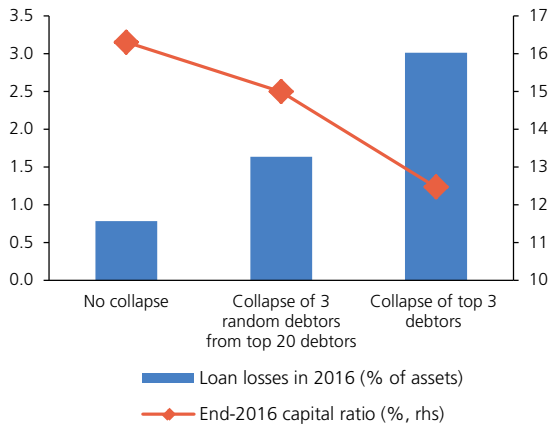
**Haircuts on EU countries' exposures**
(%)

| Country | Haircut |
|---|---|
| Belgium | 7 |
| Finland | 2 |
| France | 6 |
| Croatia | 33 |
| Ireland | 16 |
| Italy | 24 |
| Cyprus | 38 |
| Hungary | 30 |
| Malta | 18 |
| Germany | 0 |
| Netherlands | 0 |
| Portugal | 30 |
| Austria | 2 |
| Greece | 49 |
| Slovenia | 22 |
| Spain | 22 |
| United Kingdom | 2 |

Source: Rating agencies, CNB calculation
Note: The haircuts are calculated using the main agencies' ratings as of May 2016 for EU countries with debt exceeding 60% of GDP.

CHART III.34

**Impact of the collapse of the top three debtors of each bank**
(%; in Adverse Scenario; LGD = 50 %)




Source: CNB, CNB calculation

banking sector. The sector's capital ratio remains above 11.5% over the test horizon (see Chart III.31, *Adverse Scenario* amplified by country risk), while three more banks fall below the 8% threshold and the capital injections increase to CZK 12 billion (around 0.5% of GDP).

**A further sensitivity analysis in the *Adverse Scenario* analyses the impacts of losses from operational risk**

Owing to an increase in risks in the areas of information security and compliance with legislative rules ("conduct risk"), a test of banks' operational risk has been newly added to the stress test. For the end of the second year of the tests in the *Adverse Scenario*, banks are assumed to have incurred losses equivalent to double the three historically highest losses arising from operational risk in 2005–2011.[31] The sector's capital ratio remains above 11.5% over the test horizon (see Chart III.31, *Adverse Scenario* amplified by losses from operational risk), while one more bank falls below the 8% threshold and the capital injections increase to CZK 9 billion (around 0.2% of GDP).

**The portfolio concentration test represents a strong shock…**

The final sensitivity analysis in the *Adverse Scenario* focuses on testing concentration risk and assumes default by the largest debtors of each bank. Although the concentration of client loan exposures (as measured by the share of the three largest exposures in the portfolio of loans to legal entities) has long been relatively constant at around 14%, the largest loans may not be sufficiently collateralised in some cases. This is evidenced by the fact that the share of uncollateralised loans in loans to the top three debtors was 55% at the end of 2015.[32] If these debtors default, banks' credit losses could reach high levels.

**…but the banking sector is resilient to this major shock, too**

The concentration test is performed in two variants. The first assumes the collapse of three random debtors from the top 20 debtors of each bank. The other, stricter one assumes the collapse of the top three debtors of each bank. Given the above share of uncollateralised loans in loans to the largest clients, a 50% haircut on these exposures is considered in both cases. This shock has a big effect on the banking sector's credit losses and capital ratio. The capital ratio falls to 15% at the end of 2016 for the collapse of three random large debtors. The collapse of the top three debtors of each bank would cause an even sharper fall in the capital ratio, to 12.5% (see Chart III.34). The concentration test represents a very strong stress scenario, and the resulting banking sector capital ratio based on such a large shock can therefore be assessed as positive.

31 The historical data on losses from operational risk are obtained from the banks participating in the joint stress tests, which accounted for almost 75% of the sector's assets at the end of 2016 Q1. An alternative approach was used for the other banks. It assumes that the losses are equal to the capital requirement for operational risk (see the fall-back option in the methodology of the 2016 EU-wide stress tests).
32 The share of uncollateralised claims to non-financial corporations in loans to the three largest borrowers was 59% at the end of 2014.

## BOX 3: JOINT STRESS TESTING BY THE CNB AND SELECTED BANKS

In addition to top-down macro stress tests of the banking sector, the CNB has been performing bottom-up micro stress tests in partnership with selected Czech banks since 2009. Such testing is also being performed in 2016 for the largest EU banks. The micro stress tests differ from the macro stress tests mainly in that the impacts of shocks on banks' capital ratios are calculated based on their portfolios by the banks themselves. They thus use much more detailed information on individual portfolios than that available to the CNB for its macro stress tests. However, it is the CNB that defines the most probable and adverse macroeconomic scenarios in both types of test.

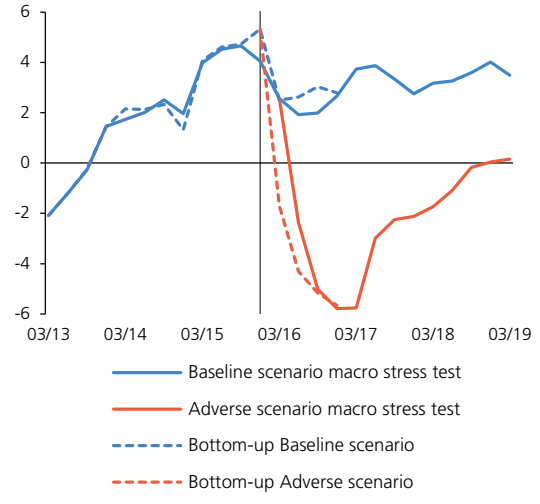
Ten domestic banks, representing 75% of the assets of the Czech banking sector, took part in the twelfth round of micro stress tests using end-2015 data. As usual, the focus was on testing credit risk, which is the largest risk for the Czech banking sector. Since 2014 the micro stress tests have also included a sensitivity analysis of interest rate risk for the banks' entire portfolios and specific interest rate risk for domestic government bonds.

Since the micro stress test scenarios are prepared one quarter before the macro stress tests presented in this Report and the horizon of the micro stress tests is only one year, the scenarios and results of the two types of test are not fully comparable. The baseline scenario for the micro stress tests (*Bottom-up Baseline*) is based on the CNB's macroeconomic forecast published in Inflation Report I/2016 and assumes a slightly higher growth rate of the Czech economy at the one-year horizon than this Report's *Baseline Scenario*. The fall in economic activity in the stress scenario of the micro stress tests (*Bottom-up Adverse*) is similar to that in the *Adverse Scenario* of this Report (see Chart III.1 Box).

The macroeconomic developments assumed in the *Bottom-up Baseline* and *Bottom-up Adverse* scenarios are reflected in the credit risk parameters. As the micro stress tests are calculated for a one-year horizon, faster transmission of credit risks to banks' balance sheets is assumed than in the macro stress tests. In the *Bottom-up Baseline* scenario, a constant level of credit risk in the case of corporate exposures and a slight increase in the case of retail portfolios can be observed at the one-year horizon relative to the actual figures reported by banks. In the *Bottom-up Adverse* scenario, considerably higher credit risk is visible, reflecting the hypothetical adverse evolution of economic activity. This is expressed by a broad rise in both the probability of default (PD) and the loss given default (LGD) in all the credit portfolios tested except central government, for which the PD remains at zero (see Table III.1 Box).

CHART III.1 BOX

**Differences in the evolution of real GDP**
(%)




Source: CNB

TABLE III.1 BOX

**Risk parameters for the credit segments and scenarios tested**
(%; weighted by EAD)

| | 31.12.2015 | | *Bottom-up Baseline* 31.12.2016 | | *Bottom-up Adverse* 31.12.2016 | |
|---|---|---|---|---|---|---|
| | PD | LGD | PD | LGD | PD | LGD |
| **Corporate exposures** | 1.4 | 36.8 | 1.4 | 36.8 | 2.9 | 48.0 |
| - large enterprises | 0.9 | 38.3 | 1.0 | 38.1 | 2.0 | 50.0 |
| - small and medium-sized enterprises | 2.0 | 34.8 | 2.0 | 34.7 | 4.1 | 45.4 |
| - specialised credit exposures | 1.6 | 37.4 | 1.6 | 37.2 | 3.3 | 48.8 |
| **Retail exposures** | 2.2 | 29.4 | 2.3 | 29.7 | 3.3 | 39.2 |
| - real estate SMEs | 4.8 | 35.0 | 4.8 | 35.1 | 9.9 | 47.9 |
| - loans for house purchase | 1.5 | 22.9 | 1.5 | 22.9 | 2.3 | 31.3 |
| - revolving loans | 2.6 | 53.2 | 3.1 | 56.6 | 3.7 | 70.1 |
| - other loans to individuals | 3.5 | 48.3 | 4.4 | 48.4 | 5.2 | 59.8 |
| - other loans to SMEs | 4.8 | 43.5 | 4.7 | 43.4 | 9.6 | 56.7 |
| **Institutions** | 0.2 | 23.9 | 0.3 | 23.9 | 0.4 | 27.5 |
| **Central governments** | 0.0 | 11.5 | 0.0 | 11.5 | 0.0 | 17.3 |

Source: CNB

TABLE III.2 BOX

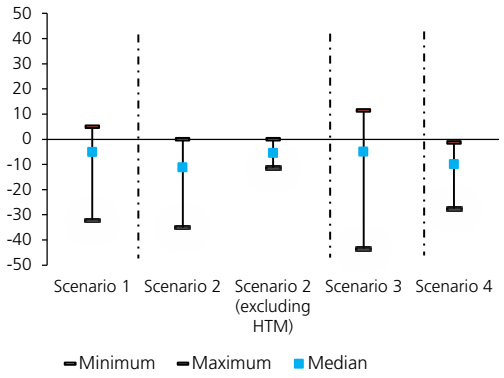
**Banks' capital requirements and capital ratios**
(%)

| | 31.12.2015 | *Bottom-up Baseline* 31.12.2016 | *Bottom-up Adverse* 31.12.2016 |
|---|---|---|---|
| Capital requirements (year-on-year change) | - | 3.3 | 51.0 |
| Regulatory capital (year-on-year change) | - | 2.9 | -2.4 |
| Tier 1 capital ratio | 18.7 | 18.5 | 12.3 |
| Capital ratio | 19.0 | 18.8 | 12.6 |

Source: CNB

**CHART III.2 BOX**

**Interest rate risk sensitivity analysis**
(as % of regulatory capital)




Source: CNB
Note: Banks included in micro stress tests, excluding building societies. In Scenario 2 (excluding HTM), accounting principles are taken into consideration and so CZK government bonds held to maturity are not marked to market. HTM = held to maturity.

The results of the micro stress tests for the *Bottom-up Baseline* scenario point to a slight rise in the capital requirements of banks and a fall in annual profit of 10%. The aggregate Tier 1 capital ratio of the banks tested would decrease slightly to 18.5%. In the *Bottom-up Adverse* scenario the capital requirements rise by a significant 51% and profit declines by more than 43% overall. Despite these adverse developments, the aggregate Tier 1 capital ratio of the institutions tested remains well above the 8% threshold at the one-year horizon, dropping to 12.3% (see Table III.2 Box).

The micro stress test results confirm that the banks tested are highly resilient to adverse scenarios, in line with the results of the macro stress tests of the banking sector. The results and individual parameters, however, are not fully comparable, not only because of the slightly different macroeconomic scenarios, but also because of the different samples of institutions tested and different test horizons, which lead to different assumptions about the speed of transmission of risks to banks' portfolios.

In addition to the *Bottom-up Baseline* and *Bottom-up Adverse* scenarios, a sensitivity analysis of general interest rate risk and the specific interest rate risk for CZK government bonds was performed. The economic logic of the test was applied in the interest rate risk testing and the effect of accounting categories on the revaluation of bank assets and liabilities was suppressed. The sensitivity analysis thus covered the entire bank portfolio (the banking and trading books) and used four scenarios. *Scenario 1* assumed a 3 pp parallel shift of the yield curve, *Scenario 2* assumed a 3 pp widening of the CZK government bond spread vis-à-vis the IRS yield curve,[33] *Scenario 3* assumed a larger increase in the slope of the yield curve[34] and *Scenario 4* contained a combination of a more moderate increase in the slope of the yield curve and a 2 pp widening of the CZK government bond spread vis-à-vis the IRS yield curve.[35]

The results of the sensitivity analysis show that a rise in interest rates would have mixed impacts across the banks tested

33 A variant of *Scenario 2* in which accounting principles are taken into consideration and so CZK government bonds held to maturity are not marked to market was also considered for comparison.
34 A 5 pp shift was assumed for maturities of over 5 years, the curve was left unchanged for maturities of up to 3 months, and linear interpolation was used for the shift for maturities of over 3 months and up to 5 years.
35 Increase in the yield curve slope: a 3 pp shift was assumed for maturities of over 5 years, the curve was left unchanged for maturities of up to 3 months, and linear interpolation was used for the shift for maturities of over 3 months and up to 5 years. Widening of the CZK government bond spread: a 2 pp shift was assumed for maturities of over 5 years, and linear interpolation was used for the shift for maturities of over 3 months and up to 5 years.

(see Chart III.2 Box). In *Scenario 1*, the impact of a parallel shift of the yield curve would be between -32.1% and 5.0% of capital. In *Scenario 3*, banks' sensitivity to rotation of the yield curve increases further, with the impact on the banks' capital ranging from -43.4% to 11.5%. *Scenario 2* assumes a widening of the CZK government bond spread because of a rise in the yield demanded by investors. The strongly negative impact of this scenario (between -35.0% and 0.0%) is due to the significant exposure of domestic banks to Czech government bonds. However, if accounting principles are taken into consideration, moving away from a purely economic perspective, the impact of the test is significantly smaller (between -11.2% and 0.0%), since domestic banks hold more than half of domestic government bonds in the "held to maturity" accounting category and hence do not mark these debt securities to market (see section 2.1). In *Scenario 4*, the impact is between -27.6% and -1.2%.

### 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 the sector at the one-year horizon. Besides the *Baseline Scenario*, the sector's resilience to the *Adverse Scenario* was also tested; this variant captures adverse economic developments coupled with a rise in risk premia in financial markets. The *Adverse Scenario* manifests itself in a marked decline on property and stock markets, a weakening of the koruna, a rise in interest rates in the Czech Republic and the euro area, and a decrease in prices of all types of bonds. Given their current exceptionally low yields, Czech government bonds are hit hard by these developments (see Table III.3).

### The PMC stress-testing methodology has been revised in the area of interest rate risk

The PMC stress-testing methodology was further refined in this year's tests. The most important change was an innovation in the creation of the scenario for interest rate risk of government and corporate securities. For Czech koruna government bonds and euro government bonds with the highest rating, the issuer-specific interest rate risk (the interest rate spread indicating the difference between the yield on the relevant asset and "risk-free" swap rates) is now derived from the forecast for the yield on Czech and German government bonds (see Table III.3). The interest rate spread for other government bonds is set by adding a margin for the highest-rated euro bonds. The interest rate spread for corporate bonds is set as the spread for the government bonds of the issuer's country plus a margin corresponding to the bond's rating. This ensures that corporate bonds will be hit harder by a rise in risk aversion than the governments of the countries in which they are based. In addition, a stronger reaction to market developments is assumed for longer-term bonds than for short-term ones.

TABLE III.6

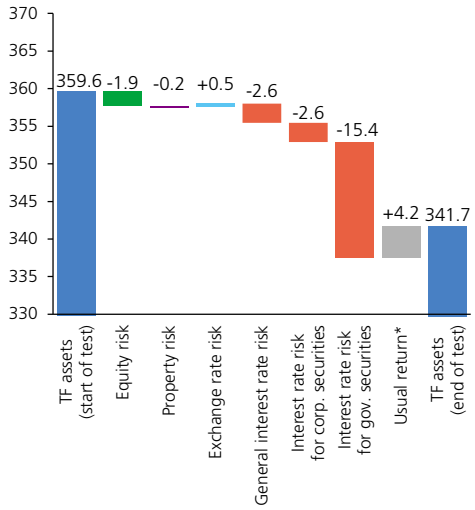
**Results of the stress tests of PMCs**

| | | *Baseline scenario* | *Adverse scenario* |
|---|---|---|---|
| PMC Equity (start of test) | CZK billions | 8.8 | 8.8 |
| Capital ratio (start of test) | % | 136.1 | 136.1 |
| Change in TF asset value - interest rate risk | CZK billions | -2.1 | -20.5 |
| | % of TF assets | -0.6 | -5.7 |
| Change in TF asset value - exchange rate risk | CZK billions | 0.0 | 0.5 |
| | % of TF assets | 0.0 | 0.1 |
| Change in TF asset value - equity risk | CZK billions | -0.3 | -1.9 |
| | % of TF assets | -0.1 | -0.5 |
| Change in TF asset value -property risk | CZK billions | 0.1 | -0.2 |
| | % of TF assets | 0.0 | 0.0 |
| Total impact of risks on TF assets | CZK billions | -2.3 | -22.0 |
| | % of TF assets | -0.6 | -6.1 |
| Profit of transformed funds | CZK billions | 4.0 | 1.0 |
| PMC Equity (end of test) | CZK billions | 9.2 | 2.3 |
| Capital ratio (end of test) | % | 142.7 | 33.8 |
| Capital injection | CZK billions | 0.0 | 4.7 |

Source: CNB, CNB calculation
Note: Start of test: end of 2015; end of test: end of 2016.

CHART III.35

**Change in the value of assets of transformed funds due to the individual types of risk in the Adverse Scenario**
(CZK billions)




Source: CNB, CNB calculation
Note: * The assumed rise in value that would occur even without market revaluation of assets in the Adverse Scenario. It represents dividend income, bond coupons and the return on the HTM portfolio. A usual return of 1.2% of the book value of assets at the start of the test is considered for all TFs. This equals the average return (net profit/assets of TFs) in recent years. Start of test: end of 2015; end of test: end of 2016.

**Transformed funds are mainly sensitive to interest rate risk…**

The effect of the considered risks on the results of transformed funds and PMCs is summarised in Table III.6 and Chart III.35. As these funds invest mainly in government bonds, interest rates have the largest impact on their results, as in previous years. The sharp rise in yields on Czech and foreign government bonds assumed in the *Adverse Scenario* leads to a 5.7% decrease in the value of asset holdings. Funds holding a large proportion of their assets in fixed-rate koruna bonds with longer average residual maturities are hit the hardest. Approaches to interest rate risk differ across funds. The predominant method for mitigating the impact of interest rate risk is to hold assets to maturity and invest in floating-rate bonds (both account for more than 58% of the koruna bond portfolio). By contrast, hedging of interest risk using derivatives is applied to only a limited extent. In the *Adverse Scenario*, it would eliminate only 22% of the total loss caused by the rise in swap rates. Equity risk and real estate risk rose slightly compared to the previous stress test owing to the rising share of such investments in funds' portfolios, but remained insignificant in size. In the *Adverse Scenario*, funds make exchange rate gains as a result of a weakening of the koruna. Despite the sizeable volume of foreign currency investments (12.8% of assets), the effect of the exchange rate on funds' results is limited, as funds use derivatives to hedge exchange rate risk. However, the degree of exchange rate risk hedging fell slightly in some funds compared to the previous stress test.

**…but remain profitable even in the *Adverse Scenario***

The change in the value of assets of transformed funds has only a limited impact on their accounting profit, as only some investments are realised in the given period. Therefore, assuming materialisation of 15% of the potential profit or loss, even the sizeable decrease in asset value in the *Adverse Scenario* results in the generation of profit by transformed funds and non-zero returns for their clients.

**In the *Adverse Scenario*, a large proportion of PMCs would see a fall in capital adequacy**

PMCs guarantee non-negative returns to the clients of their transformed funds by law. If the assets of a transformed fund decline below the level of its liabilities, the PMC has to top up the transformed fund's resources. This is the case for all PMCs in the *Adverse Scenario*. As a result of the top-up, the capital ratios of seven out of the eight PMCs falls below the required level, leading to negative capital for four of them. The owners would have to inject capital of CZK 4.7 billion in order to meet the capital adequacy requirement. These results are consistent with last year's stress test.[36] When the value of the transformed fund assets rises again, the PMC may withdraw the injected funds. However, it is apparent that in the event of highly adverse market developments, the duty to top up

36 The *Adverse Scenario* can be assessed as slightly less stressful than last year's stress scenario. A smaller increase in koruna swap rates in this year's test is offset by a larger increase in the interest rate spread for government bonds and especially corporate bonds. If last year's stress scenario is applied, the capital injection is CZK 3.9 billion.

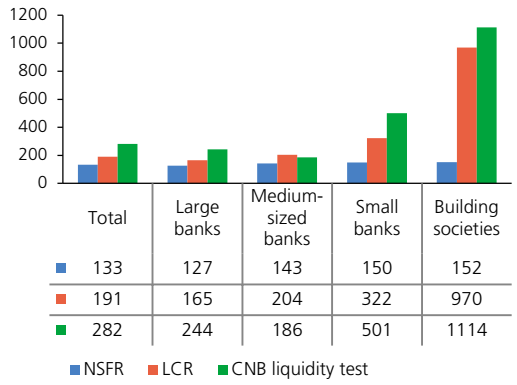
transformed funds' resources represents a substantial burden on PMCs and their owners.

**Koruna assets sell-off in a situation of lower market liquidity could have an adverse impact on PMCs in the short-term**

The scenario of a sizeable decline in prices of Czech government bonds could materialise, for example, in the event of a mass outflow of non-residents from the koruna asset market (see section 2.1). Such a scenario would enable funds to achieve higher returns if they purchased the bonds anew. However, revaluation of the *existing* bonds in funds' portfolios could lead to the above-mentioned transfer of stress to PMC owners.

CHART III.36

**Comparison of selected bank balance-sheet liquidity indicators**
(%)




Source: CNB, CNB calculation
Note: The LCR is the ratio of the liquidity buffer to the net liquidity outflow of banks over a 30-day stress horizon as defined by EC Regulation 2015/61. The NSFR is the ratio of available stable funding to required stable funding as defined by Basel III. The CNB liquidity test indicator is the ratio of the liquidity buffer to the net liquidity outflow of banks over a one-year stress horizon as defined by the CNB.

TABLE. III.7

**Comparison of the impacts of the LCR on groups of banks**
(% of total assets of individual groups of banks; rates in %)

| | Banks | | | Building societies | Total |
|---|---|---|---|---|---|
| | Large | Medium-sized | Small | | |
| Liquidity buffer | 30 | 29 | 44 | 19 | 31 |
| Liquid assets | 30 | 30 | 42 | 19 | 31 |
| Weighted average rate of eligibility after application of haircuts* | 100 | 99 | 100 | 99 | 100 |
| Expected outflows | 27 | 20 | 15 | 3 | 23 |
| Balances of outflows | 97 | 83 | 92 | 31 | 89 |
| Weighted average rate of outflow* | 28 | 24 | 16 | 10 | 26 |
| Expected inflows | 9 | 5 | 2 | 2 | 7 |
| Balances of inflows | 15 | 12 | 19 | 2 | 7 |
| Weighted average rate of inflow* | 59 | 44 | 9 | 84 | 50 |
| LCR | 165 | 204 | 322 | 970 | 191 |

Source: CNB
Note: *The extent to which items subject to haircuts, outflows or inflows in the stress period are represented in balance sheets.

## 3.3 BANK LIQUIDITY STRESS TESTS AND LIQUIDITY REGULATION

*Banks having their registered offices in the Czech Republic passed the liquidity tests. Both the CNB's macro-stress test and the liquidity coverage and stable financing survey demonstrated the high resilience of Czech banks to a liquidity shock. This is due to a strong client deposit base and good capitalisation on the liabilities side and to a significant proportion of high-quality government bonds and exposures to the CNB on the asset side. Low diversification of the liquidity buffer remains a less favourable aspect of the Czech banking sector's liquidity.*

### The values of the liquidity coverage ratio confirm the banking sector's resilience to short-term liquidity risk

The domestic banking sector's resilience to a short-term liquidity shock is regularly tested using the liquidity coverage ratio (LCR[37]). The aggregate LCR for the entire sector based on the end-March 2016 data is 191%[38], well above the current regulatory requirement of 70% (see Chart III.36). All domestic banks are also compliant with the regulatory limit of 100% required as from 2018. Domestic banks continue to hold almost all their assets from the LCR liquidity buffer in the form of Level 1 liquid assets, to which no haircuts are applied (see Table III.7). Given the monthly horizon of the stress considered, the highest aggregate LCR was achieved as usual for building societies, which, compared to the other groups of banks, have a significantly lower share of deposits, to which a higher outflow rate is applied in the test. Small banks also showed comparatively higher aggregate LCRs due to a higher ratio of the liquidity buffer to total assets.

### BOX 4: NET STABLE FUNDING RATIO

The Basel III liquidity instruments include a net stable funding ratio (NSFR). A general stable funding requirement has been applied to banks in the EU since 2016 (Article 414 of the CRR), and a minimum standard is expected to be introduced in 2018[39]. In accordance with the CRR, the European Banking Authority (EBA) has drafted a report assessing the impact of the NSFR and the options for incorporating it into EU law[40]. The report was

37 The LCR is a requirement to cover a net liquidity outflow over a 30-day horizon with liquid assets. It is calculated as the ratio of the liquidity buffer to the net liquidity outflow. The assets in the liquidity buffer are divided into three categories based on their quality and liquidity: Level 1 – cash, highest-rated and highest-liquidity government bonds, and claims on the CNB; Level 2A – government bonds with a 20% risk weight, covered bonds meeting requirements regarding, for example, collateral quality, rating (at least second grade) and issue size (above EUR 250 million); and Level 2B – shares from the main index of an EU Member State and corporate debt securities meeting quality and liquidity requirements.
38 The aggregate results take liquidity subgroups into account.
39 Regulation 575/2013 and Directive 2013/66/EU (CRR/CRD IV), issued in June 2013, contain a set of prudential requirements to be observed by credit institutions, including liquidity rules.
40 *EBA Report on Net Stable Funding Requirements under Article 510 of the CRR.*

published in December 2015. The European Commission is now expected to issue a legislative proposal for a binding minimum standard for stable funding by the end of 2016.

The aim of the net stable funding requirement is to ensure that a bank's funding profile adequately reflects the composition and type of its balance sheet and off-balance sheet assets. The financial crisis revealed that banks with insufficient liquid assets and a large proportion of short-term unstable funding sources are more vulnerable to liquidity risk. This vulnerability stems on the one hand from an inability to raise necessary funds in time by quickly selling assets for cash and on the other hand from pressure from creditors withdrawing short-term deposits, which are hard to renew on the market in a crisis.

The NSFR is a structural requirement and is monitored over a one-year horizon. It is defined as the ratio of available stable funding (ASF) to required stable funding (RSF). The items entering the ratio are broken down by quality, liquidity, stability and counterparty on an aggregate basis. These characteristics are reflected in the weights assigned to the items, which range from 0% to 100% (see Table III.3 Box). At the same time, all items are broken down by maturity into short-term (less than one year) and long-term (one year or more). Items with a residual maturity of up to one year are further broken down into two maturity classes (less than six months and six months or more). This is done mainly to eliminate excessive volatility in the quarterly measurement of the ratio. Put simply, an item's weight in the ratio gradually goes down as its residual maturity decreases.

The more stable and longer is the source of funding represented, the higher is the weight of an item included in the available sources (also known as the ASF factor). Capital and all sources of funding with a residual maturity of one year or more are assigned a weight of 100%. Retail deposits have a specific position. These short-term deposits are considered more stable than sources of the same or similar maturity provided by other counterparties (e.g. non-financial corporations and financial institutions). This is mainly because they are covered by the deposit insurance scheme of the Financial Market Guarantee System up to an amount of EUR 100,000, and also because they are small depositors' funds, which correspond in terms of size to such depositors' transaction and precautionary motives and cannot be deposited elsewhere than on cash accounts at banks. Retail deposits therefore have a minimum weight of 90%. By contrast, deposits of financial institutions are not insured and are used mainly for those institutions' own liquidity risk management. Therefore, banks' short-term liabilities to financial institutions mostly do not represent a stable source of funding and are assigned a low or

**TABLE III.3 BOX**

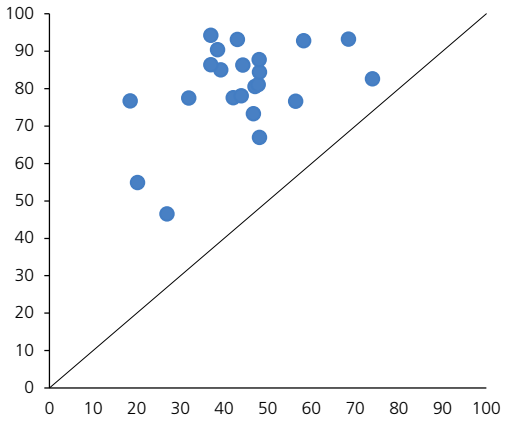
**Simplified list of weights of balance-sheet items in the Basel III net stable funding ratio**
(%)

| **Assets (items requiring stable funding)** | **Weight (RSF factor)** |
|---|---|
| Coins and bank notes<br>Claims on central banks with maturities of less than 6 months | 0 |
| Unencumbered Level 1 assets | 5 |
| Loans to financial institutions with maturities of less than 6 months, where the loan is secured against Level 1 assets with option to rehypothecate | 10 |
| Unencumbered Level 2A assets<br>Loans to financial institutions with maturities of less than 6 months | 15 |
| Unencumbered Level 2B assets<br>Loans to financial institutions and central banks with maturity between 6 months and less than 1 year<br>Deposits held at other financial institutions for operational purposes<br>Encumbered high-quality and liquid assets with maturity between 6 months and less than 1 year<br>Other assets with maturity of less than 1 year | 50 |
| Unencumbered loans to retail segment (max. RW 35% under STA for credit risks) with maturity of 1 year or more | 65 |
| Other unencumbered securities and loans with maturity of 1 year or more, excluding loans to financial institutions | 85 |
| Assets encumbered for 1 year or more<br>NSFR derivative assets and liabilities<br>Other assets with maturity of 1 year or more, | 100 |
| **Off-balance sheet:** Irrevocable and conditionally revocable facilities | 5 |
| **Liabilities (sources ensuring stable funding)** | **Weight (ASF factor)** |
| Total regulatory capital (excluding Tier 2 with maturity of less than 1 year)<br>Priority shares and other capital instruments with maturity of 1 year or more<br>Liabilities with maturity of 1 year or more | 100 |
| Stable retail deposits | 95 |
| Other retail deposits | 90 |
| Operational deposits<br>Liabilities to non-financial corporations or sovereigns with maturity of less than 1 year<br>Liabilities to financial institutions or central banks with maturity between 6 months and less than 1 year | 50 |
| Other liabilities | 0 |

Source: CNB from Basel NSFR standard, October 2014

CHART III.37

**Available and required stable funding sources for banks in the Czech Republic**
(%; y-axis: average ASF factor; x-axis: average RSF factor)




Source: CNB, CNB calculation
Note: Average RSF factor: average volume of items requiring stable funding. Average ASF factor: average volume of items ensuring stable funding. Basel III NSFR standard.

zero weight. With a weight of 50%, liabilities to non-financial corporations lie between stable retail sources and unstable sources from financial institutions.

The lower is the liquidity and quality of an asset and the longer is its residual maturity, the higher is the weight of an item requiring stable funding (also known as the RSF factor).[41] A zero weight thus corresponds to a high-quality, highly liquid asset which does not need to be covered by stable long-term funds. These assets consist solely of cash and claims on the central bank with residual maturities of less than six months. High-quality government bonds are assigned a weight of 5%. For comparison, mortgage loans to households have a weight of 65%. All non-liquid assets – i.e. assets with a residual maturity of one year or more and assets encumbered for one year or more – require a very stable source of funding and are assigned a weight of 100%.

Following the disclosure of the intention to introduce the NSFR, concerns arose that the required minimum 100% level would lead to a significant reshuffling of bank balance sheets and reduce lending to the real economy. However, an EBA report on the impact of the NSFR, assessing data for December 2014 and covering 279 banks representing 75% of the assets of the EU banking sector, states that these concerns are not justified. The report says that 70% of the banks assessed would already be compliant with the 100% minimum requirement today. Only 14% recorded values below 90%. These credit institutions must eliminate a mismatch totalling about EUR 600 billion. The report uses two different methodological approaches to assess the impact of the introduction of the NSFR on lending. Simulation results show that even higher lending does not preclude a higher NSFR level provided that loans remain unencumbered, i.e. provided that they are not used, for example, to cover issued bonds. A regression analysis did not prove a direct relationship between lower NSFR levels and changes in lending. For most banks, efforts to comply with the minimum required NSFR should not lead to major deleveraging. Higher NSFR-related costs pertain more to investment-oriented banks.

The European Systemic Risk Board (ESRB) recommends allowing national discretion to set the NSFR requirement above the 100% minimum based on systemic risk developments, and hence allowing it to be used for macroprudential policy purposes.[42] The ESRB proposes that this instrument be used to reduce both the

41 An asset's quality and liquidity is determined according to the rules of the LCR liquidity standard.
42 *ESRB response to the consultation on the Net Stable Funding Ratio (NSFR) as mandated by Article 510 CRR.*

cyclical and structural dimensions of systemic liquidity risk. The cyclical aspect would enable national authorities to tighten the ratio during good times and relax it during bad times. The structural aspect would take into account the settings of the ratio based on the importance of individual banks from the perspective of systemic liquidity risk. However, these ESRB proposals have yet to undergo detailed discussion.

### Banks' balance sheet liquidity is newly assessed also using an estimate of the stable funding ratio

The resilience of domestic banks to liquidity shocks is confirmed by a preliminary calculation of the net stable funding ratio (NSFR), which is defined as the ratio of available stable funding to required stable funding (see Box 4). The aggregate NSFR for the domestic banking sector is 133% according to end-2015 data (see Chart III.36).[43] This level reflects sufficient sources of available stable funding in Czech banks. This is due to a strong client deposit base, solid capitalisation and an asset structure featuring a significant proportion of government bonds and claims on the CNB, which are associated with a low stable funding coverage need (see Chart III.37).

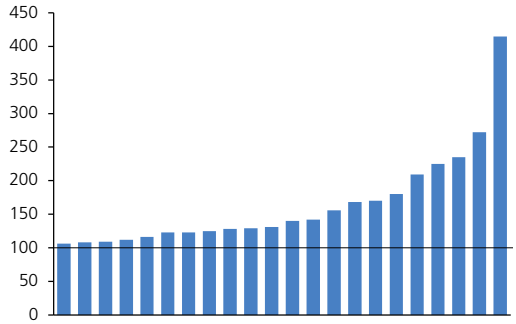
### Client deposits provide sufficient stable funding

The estimated NSFR differs across the bank groups monitored, but is sufficiently above the regulatory limit of 100% for all of them (see Charts III.36 and III.38). As in the case of the LCR survey, building societies have the highest estimated NSFR, as long-term deposits with a contractual maturity of over one year, which are considered 100% stable under the NSFR methodology, account for a relatively large share of their assets (see Chart III.39). Large and medium-sized banks, by contrast, have a shorter and more diversified funding base comprising corporate deposits as well as retail ones. In addition to high-quality and liquid assets, which do not require stable funding, the asset side of Czech banks' balance sheet includes the relatively significant component of claims on non-financial corporations and financial institutions. A need for coverage with a higher weight of stable funding (over 50%) thus pertains to roughly one-half of their balance sheet, with loans to natural persons and non-financial corporations being the largest items (an average weight of 86% and 76% respectively; see Chart III.40). For medium-sized banks, encumbered loans to households, which require full coverage with stable funding, are a significant item relative to total assets.

43 Due to unavailability of data for 2015, data as of 31 December 2014 were used for one bank. Liquidity subgroups are taken into account in the aggregate calculation.

CHART III.38

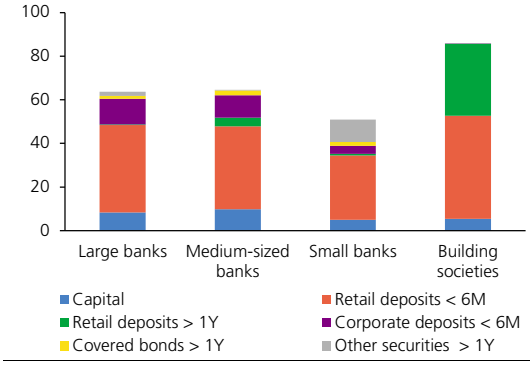
**NSFR estimates for banks in the Czech Republic**
(%)




Source: CNB, CNB calculation
Note.: Basel III NSFR standard.

CHART III.39

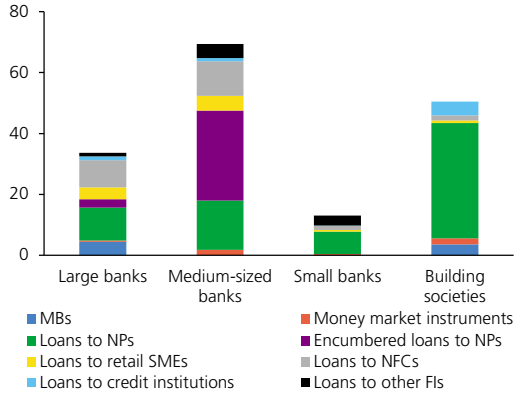
**Structure and amount of selected items ensuring stable funding (ASF)**
(% of balance sheet)




Source: CNB, CNB calculation
Note: The chart contains items whose weights exceed 2% in any of the groups of selected banks. Basel III NSFR standard.

CHART III.40

**Structure and amount of selected items requiring stable funding (RSF)**
(% of balance sheet)




Source: CNB, CNB calculation
Note: The chart contains items whose weights exceed 2% in any of the groups of selected banks. NPs: natural persons; NFCs: non-financial corporations; FIs: financial institutions. Basel III NSFR standard.

TABLE. III.8

**Liquidity stress test scenario**
(%)

| Balance-sheet item / Maturity bands | | < 3M | 3M–6M | 6M–9M | 9M–12M |
|---|---|---|---|---|---|
| **1. Liquidity buffer** | | **Interest rate and equity shock** | | | |
| 1.1 | Q-o-q change in yield curve in pp* | | | | |
| | 1Y PRIBOR | 0.3 | 0.0 | 0.0 | 0.0 |
| | 5Y GB yield | 1.5 | 0.5 | 0.8 | 0.3 |
| | 1Y EURIBOR | 0.2 | 0.0 | 0.0 | 0.0 |
| | 5Y EUR GB yield | 1.0 | 0.4 | 0.2 | 0.1 |
| 1.2 | Haircuts from value of capital instrument | 30.0 | 30.0 | 30.0 | 30.0 |
| **2. Inflows** | | **Size of deduction from expected inflow** | | | |
| 2.1 | Secured claims | 1.2 | 1.2 | 1.2 | 1.2 |
| 2.2 | Unsecured claims due** | | | | |
| | on NPs | 2.3 | 2.4 | 2.5 | 2.6 |
| | on NFCs and retail SMEs | 0.6 | 1.1 | 0.9 | 1.0 |
| **3. Outflows** | | **Expected outflow rate** | | | |
| 3.1 | Drawdown of credit lines | 5.0 | 5.0 | 5.0 | 5.0 |
| 3.2 | Issued debt securities | 100.0 | 100.0 | 100.0 | 100.0 |
| 3.3 | Retail deposits | | | | |
| | insured | 3.3 | 3.8 | 3.8 | 3.8 |
| | others | 6.5 | 7.5 | 7.5 | 7.5 |
| 3.4 | Liabilities to NFC | | | | |
| | insured | 13.1 | 15.0 | 15.0 | 15.0 |
| | others | 26.1 | 30.0 | 30.0 | 30.0 |
| 3.5 | Liabilities to FIs | | | | |
| | insured | 13.1 | 15.0 | 15.0 | 15.0 |
| | others | 32.7 | 37.5 | 37.5 | 37.5 |
| 3.6 | Growth in new loans, of which*** | | | | |
| | secured claims | 0.0 | 0.6 | 0.6 | 0.0 |
| | due to NPs | 0.0 | 0.0 | 0.0 | 0.0 |
| | due to NFCs and retail SMEs | 0.0 | 0.0 | 0.0 | 0.9 |

Source: CNB
Note: The parameter values are the averages of those applied to individual banks. *The haircut is determined by multiplying the change in the yield curve by the duration of the bond portfolio. **Due claims on financial institutions were not subject to deductions in this scenario. ***The credit growth assumption is calculated using satellite models in macro stress tests of bank solvency. NFCs: non-financial corporations, FIs: financial institutions, NPs: natural persons. This table does not contain the endogenous (systemic and reputational) shocks generated in the second round of shocks.

**The CNB also assesses the banking sector's liquidity using its own stress test…**

Besides assessing balance-sheet liquidity using the LCR and NSFR ratios, the CNB conducts its own macro stress test. The test methodology was revised slightly on the introduction of these ratios.[44] The main changes consisted in linking the liquidity test to the macro stress test scenario and the solvency test and extending the horizon of the impact to one year by including four maturity bands. This change enables better testing of the impact of scenarios with a lagged pass-through of an adverse economic situation to the quality of banks' loan portfolios and to the financial markets. The model is still a two-round one and takes into account links between balance-sheet and market liquidity and the feedback reaction of the banking sector. A liquidity indicator is used to assess banks' resilience to liquidity risk. The sufficiency of a bank's liquid asset buffer relative to its maturity mismatch and funding stability is tested using this indicator over a one-year horizon. The indicator is defined as the ratio of the liquidity buffer[45] to net expected liquidity outflows, i.e. the difference between expected outflows and inflows of liquidity. Expected outflows comprise liabilities with maturity less than one year, drawdown of credit lines and newly provided loans. Expected inflows consist of claims with maturity less than one year. As in the case of the LCR and NSFR under Basel III, the lowest permissible value of the indicator is 100%.

The liquidity stress test was applied to 21 banks having their registered offices in the Czech Republic[46] using the *Adverse Scenario* (see section 2.1 and Table III.3) and the end-2015 data. In the first round of stress, a liquidity outflow was generated for each maturity band by increasing the asset funding requirement (see Table III.8, lines 3.1 and 3.6) amid lower sources (see lines 3.2 and 3.5). At the same time, the outflow of expected liquidity (lines 2.1 and 2.2) for the relevant maturity band was lowered, as was the value of some assets in the liquidity buffer (lines 1.1 and 1.2). The second round of stress captures the consequences of the rise in reputational and systemic risk brought about by banks' efforts to cover the net outflow and is expressed through additional losses arising from the sale of assets from the buffer.

**…its results also confirmed strong resilience to liquidity shocks**

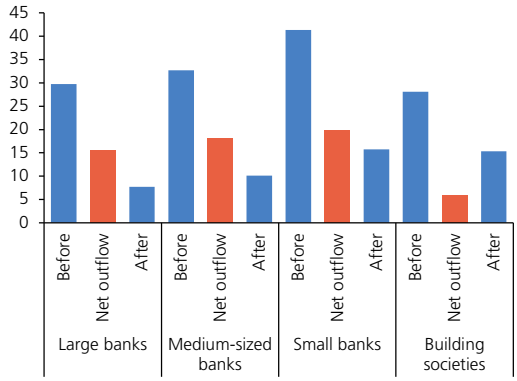
The test results reveal that the domestic banking sector as a whole would withstand the simulated stress and is able to cover a net outflow of liquidity lasting even one year (see Chart III.36). The impacts of the negative shocks on the balance sheets of the groups of banks monitored were mixed. When the impact was measured using the aggregate decline in the total liquidity buffer, large banks were hit hardest, followed by medium-sized banks (a decline of around 70%; see Chart III.41). Four

44 For details see the thematic article *The Relationship between Liquidity Risk and Credit Risk in the CNB's Liquidity Stress Tests* in this Report.
45 The liquidity buffer is the sum of cash, claims on the central bank (excluding minimum reserves), government bonds and corporate marketable securities except those held as loans.
46 State-owned banks, which have a specific business model, were not included in the stress test. Moreover, the test takes liquidity subgroups into account.

banks would exhaust their entire buffer during the test, although not before the fourth quarter. A small impact is apparent for building societies (a decline in the total buffer of around 40%) for similar reasons as in the assessment of the LCR and NSFR results. At the one-year horizon, six banks, whose indicator fell below the 100% minimum, would be unable to cover the outflows generated. Some of them were banks with specific business models. However, the methodology indicated that even some universal banks have less stable funds over a longer horizon relative to the size of their liquidity buffers.

CHART III.41

**Results of the liquidity stress test of the Czech banks**
(% of total assets of individual groups of banks)




Source: CNB, CNB calculation
Note: The column "Before" represents the pre-stress size of the liquidity buffer and the column "After" the post-stress size of the liquidity buffer. The column "Net outflow" represents the outflow of liquidity over the one-year horizon.

TABLE III.9

**Czech public finance stress test**

| | | *Adverse Scenario* | | | |
|---|---|---|---|---|---|
| | 2015 | 2016 | 2017 | 2018 | Critical limit |
| **Macroeconomic variables** | | | | | |
| Real GDP growth (%) | 4.3 | -2.7 | -3.3 | -0.7 | < -2.3 |
| Current account balance (% of GDP) | 0.6 | 3.3 | 2.6 | 1.0 | < -1.8 |
| Gross national savings (% of GDP)* | 28.2 | 28.2 | 28.2 | 28.2 | < 19.3 |
| External debt (% of GDP)* | 70.0 | 70.0 | 70.0 | 70.0 | > 99.6 |
| Difference between real GDP growth and real 10Y GB yield (pp) | -4.0 | 5.0 | 10.4 | 4.4 | > 6.3 |
| **Fiscal variables** | | | | | |
| Government debt (% of GDP) | 41.1 | 45.0 | 55.5 | 64.6 | > 64.7 |
| Primary balance (% of GDP) | 0.7 | -0.5 | -3.8 | -5.8 | < -3.2 |
| 10Y government bond yield (%) | 0.7 | 1.7 | 2.4 | 3.1 | > 10.8 |
| Government debt maturing within one year (% of GDP) | 6.7 | 8.9 | 12.0 | 13.4 | > 19.0 |
| Share of government debt maturing within one year (%) | 16.4 | 19.7 | 21.6 | 20.7 | > 21.7 |
| Share of foreign currency debt (%) | 15.4 | 15.5 | 15.8 | 11.7 | > 27.1 |
| Share of non-residents in debt holdings (%)* | 38.4 | 38.4 | 38.4 | 38.4 | > 34.9 |
| **Institutional variables** | | | | | |
| Government effectiveness (WGI score)* | 1.02 | 1.02 | 1.02 | 1.02 | < 1.0 |
| Political stability (WGI score)* | 1.0 | 1.0 | 1.0 | 1.0 | < 0.8 |
| Rule of law (WGI score)* | 1.1 | 1.1 | 1.1 | 1.1 | < 1.2 |
| Banking crisis* | No | No | No | No | > 0 |
| Past sovereign defaults* | No | No | No | No | > 0 |
| **Sovereign risk indicator (ISR, %)** | **-** | **0.23** | **0.80** | **0.27** | |

Source: CNB, CZSO, ECB, WB, CNB calculation
Note: * Variable not modelled; last known value assumed in projection. The figure for the share of non-residents in debt holdings is derived from the Balance of Payments statistics. The symbol > (<) denotes that a higher (lower) value means breaching of the critical limit and indication of increased risk. Where the limit is breached, the relevant variables are further indicated in red.

## 3.4 SOVEREIGN EXPOSURES AND THE PUBLIC FINANCE STRESS TEST

*The CNB has identified credit institutions' exposures to the Czech public sector as systemically important under its internal methodology. On the basis of stress test results, the CNB will not require credit institutions operating in the Czech Republic to meet an additional capital requirement to cover the risk of concentration of exposures to Czech government debt over a three-year horizon.*

### The CNB reviews and assesses the risks of concentration of sovereign exposures

Since 2015 the CNB has been reviewing and evaluating the risks of concentration of sovereign exposures in the balance sheets of Czech credit institutions under its internal methodology.[47] In its Financial Stability Reports it informs the market about which sovereign exposures it has identified as systemically important and whether it will require credit institutions to meet an additional capital requirement to cover the risk of concentration of these exposures over a three-year horizon. The methodology defines an important sovereign exposure as an exposure held by a credit institution[48] with a minimum ratio to its eligible capital of 100%. It becomes systemic if the assets of credit institutions with important exposures exceed 5% of the total assets of the Czech banking sector. It is indicated that an additional capital requirement must be met if the three-year outlook for the risk indicator of the systemic sovereign exposure exceeds one of its thresholds.[49] However, the CNB requires additional capital only where the credit institution holds exposures in excess of the limit and those exposures are not already sufficiently covered by capital.[50]

### Banks' exposures to the Czech government are systemically important…

The CNB considers exposures to the domestic government to be systemically important sovereign exposures held by credit institutions having their registered offices in the Czech Republic. At the end of 2015, they totalled around CZK 681 billion, or 162% of eligible capital, in aggregate terms. Credit institutions for which this exposure exceeded total eligible capital accounted for 68% of the total assets of credit institutions having their registered offices in the Czech Republic. Sovereign exposures to other governments, the EU and the EIB were not found to be systemically important.

47 The internal methodology is described in FSR 2014/2015.
48 It only covers credit institutions having their registered offices in the Czech Republic.
49 The CNB primarily monitors two thresholds: a soft threshold of 5% indicating additional capital creation where an additional expert analysis proves this to be necessary, and a hard threshold of 8% indicating unconditional creation of additional capital.
50 The above-limit part of a sovereign exposure is determined using the sovereign risk indicator (ISR) where this indicator 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%.

**…but their riskiness does not exceed the thresholds**

The sovereign risk indicator (ISR)[51] was estimated for exposures to Czech government identified as systemically important. Projections of the main variables entering the ISR were obtained using a stress test of Czech public finances based on the *Adverse Scenario* (see section 2.1 and Table III.3). The marked economic decline assumed in the *Adverse Scenario* was reflected in a rise in the primary deficit to 5.8% and a subsequent increase in total government debt to 64.6% of GDP (see Table III.9). The reaction of the financial markets led to an increase in nominal yields on Czech government bonds along the entire government koruna yield curve. However, given the deflation assumed in the *Adverse Scenario*, the ten-year government bond yield did not exceed 3.1% over the three-year test horizon. The impact of debt servicing costs on the total deficit was therefore low. However, the difference between the real yield and the GDP growth rate exceeded the critical limit of 6.3% of GDP. As real economic growth, the primary deficit and the share of non-residents in debt holdings also reached their critical limits (see also section 2.1), the ISR reached its highest level of 0.8% in 2017. In 2018, however, the ISR fell to 0.27% owing chiefly to an assumed increase in the rate of economic growth and its return below the critical limit. The estimated ISR did not exceed its supervisory threshold values of 5% and 8% over the three-year horizon of the Czech public finance stress test. The CNB will therefore not require credit institutions operating in the Czech Republic to meet an additional capital requirement to cover the risk of concentration of exposures to Czech government debt.

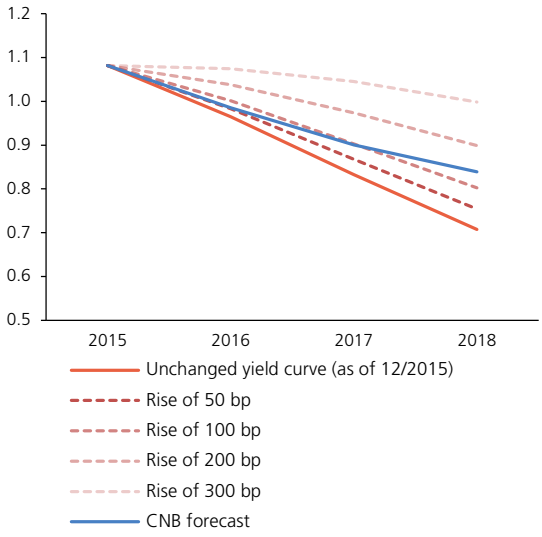
**The stress test results are confirmed by a sensitivity analysis of interest costs on Czech government debt**

The current exceptionally easy monetary conditions on the financial markets are enabling the Czech government sector to be funded at very advantageous terms (see section 2.1). However, a change in these terms may cause a sharp adjustment of market prices and a marked rise in yields on Czech government bonds. In such a scenario, new government debt would have to be issued at a significantly higher cost than at present. A simple analysis was performed to assess the sensitivity of Czech public finances to interest rate risk. Based on the trajectories of the primary deficit and total government debt of the Czech Republic according to the CNB forecast (see *Inflation Report II/2016*), the evolution of interest costs was estimated for a number of alternative scenarios involving a rise in the yield curve. Besides a scenario assuming that the yield curve will stay at the end-2015 level, scenarios assuming a rise of 50–300 bp along its entire length were also modelled (see Chart III.42). The results of the analysis suggest that interest costs would fall relative to GDP even in the case of a sharp increase in government bond yields. This result is affected mainly by the assumed GDP growth and expected primary general government surpluses.

CHART III.42

**Effect of a yield curve movement on total government debt interest costs**

(% of GDP)




Source: CNB

Note: The scenarios differ only in the assumption made about the yields at which new public debt will be issued in 2016–2018. For the CNB forecast see Inflation Report II/2016. The other scenarios assume that yields will be based in all years on the Czech koruna government bond yield curve as of 31 December 2015 shifted by the given number of basis points.

51 This indicator is used solely for the CNB's supervisory purposes. In view of its calculation method, it cannot be unconditionally interchanged with the probability of default on an exposure to the Czech government.

# 4 MACROPRUDENTIAL POLICY

*The aim of this section is to describe the main risks to financial stability and to provide information about risk mitigation tools. To this end, the text evaluates the risks stemming from the external environment, the current position of the Czech economy in the financial cycle, the resilience of the Czech financial sector to the risks identified, and the tasks and recommendations arising from the analyses for macroprudential policy, microprudential supervision and other areas of economic policy. The first part explains the main tasks of macroprudential policy, reflecting key risk sources. The second part describes the settings of the capital buffers used to enhance the resilience of the Czech banking sector and mitigate sources of risks to financial stability. The third part provides detailed information about risks relating to property exposures and describes current and potentially applicable tools for mitigating those risks. The final, fourth part describes macroprudential policy developments in the EU and developments in the national and international regulatory environment.*

## 4.1 SOURCES OF SYSTEMIC RISKS AND MACROPRUDENTIAL POLICY TOOLS

### The macroprudential dashboard indicates a partial increase in potential risks to financial stability

An overview of systemic risk sources and the resilience of individual sectors of the financial system is provided in graphical form by the macroprudential dashboard (see Table IV.1; Box 5). The potential sources of risks to the financial sector remain concentrated in increased credit growth, in an environment of sustained low interest rates and continued growth in property prices. Gradual growth in household indebtedness coupled with loan interest rates staying at very low levels could increase households' sensitivity to potential income and interest rate shocks. Such shocks could have significant negative impacts on their financial situation and consumption and, in turn, on overall economic growth (see section 2.4). If this credit growth is concentrated in loans for financing property purchase and construction, it could foster the creation of a spiral between property prices and property purchase loans (see section 4.3.1). A partial increase in risks is also arising as a result of the rising share of non-residents in government debt given the limited market liquidity of government bonds.

### The low interest rates are squeezing the profitability of financial institutions and increasing their willingness to take on higher credit risk

The falling interest rates and returns on financial assets are directly affecting the income and profitability of financial institutions. In the case of banks, this is occurring primarily via declining interest margins.[1] The

1 Interest margins on bank loans to non-financial corporations were falling sharply until 2013, when average margins on the stock of loans and on new loans reached a similar level. Both types of margin nevertheless continued to decline, albeit only very modestly. Margins on new bank loans to households were decreasing until the middle of last year. Given the prevailing longer fixation periods of loans for house purchase, the average margin has continued to decline only gradually. A further significant decrease in margins on new loans, with the exception of consumer credit, is unlikely.

financial condition of banks, insurance companies and pension funds may also be negatively affected by the very low to negative yields on government bonds and other safe assets (see section 2.1). Besides that, the low interest rates are creating an incentive for banks and other types of financial institutions to invest in riskier assets in order to maintain or increase their current profitability. Likewise, the willingness of financial institutions' clients to accept higher risk may increase, leading to excessive growth in loans provided with insufficiently prudent standards (see section 4.2.2).

TABLE IV.1

**Macroprudential dashboard**


Source: CNB, CZSO

Note: The macroprudential dashboard is divided into two main areas describing sources of risks to financial stability and the resilience of the financial sector. The first area is forward-looking and thus assesses the strength of potential sources of risks to financial stability in the future. The second area is backward-looking, as the change in the current resilience of the financial sector is due to actual developments. The indicators included in each category are given in an appendix to this Report.

**BOX 5: MONITORING FINANCIAL STABILITY – EXPANSION AND MODIFICATION OF THE MACROPRUDENTIAL DASHBOARD**

For several years now, the CNB has been publishing in the Report a simplified tool providing a quick view of current developments in the economy and the financial system from the perspective of systemic risk and macroprudential policy. The main purpose of this "macroprudential dashboard" is to facilitate communication of the CNB's macroprudential policy and to identify weak spots in the financial system. The use of the dashboard should not be viewed as an attempt to forecast the probability or extent of materialisation of systemic risks.[2] For many reasons, the CNB's decisions on the configuration of macroprudential policy are not based mechanically on the dashboard alone, but are based on a far more sophisticated and detailed analysis.[3]

The dashboard has been partially modified compared to the version used in previous years.[4] The set of indicators has been expanded, new risk categories have been defined and weights for subsequent aggregation have been calculated. The dashboard has been divided into two main parts tracking sources of risks to the financial system and the resilience of individual sectors. This division is based on the fact that the impact of the materialisation of various sorts of risks can be exacerbated by low resilience of the financial system and conversely mitigated by high resilience of the financial system. Sources of risks are subdivided into several subcategories, each based on a number of significant forward-looking indicators (see the *Selected financial stability indicators* at the end of this Report). The specific indicators were chosen with regard to the specificities of the Czech financial system and to data availability. The current indicator levels are determined on the basis of a "z-score",[5] which allows them to be standardised. Each risk source category then represents a weighted sum of selected indicators, where the weights reflect their different contributions to the overall score and are based on a series of statistical tests.

2 Another reason for interpreting the dashboard with caution is that relatively short time series are available for some indicators.
3 For each the indicators it is necessary to perform an expert assessment of whether its current level reflects potential future risks or the materialisation of past risks, whether it relates to a short-term or medium-term risk, and so on. The risks and resilience of individual sectors of the financial system are evaluated in more detail in other sections of this Report.
4 The expansion and modification of the dashboard was inspired by the methodology presented and used by the Office of Financial Research (Annual Report 2014).
5 The z-score expresses the distance of the indicator in a given year from its historical mean expressed in terms of the number of standard deviations. This allows its relative position in relation to historical data to be assessed. As the number is based on the assumption of a normal distribution, a distance of two or more standard deviations from the mean is considered to be very high or unusual.

The individual indicators were tested with regard to their ability to signal potential growth in risks in advance and to predict the occurrence of periods of elevated financial stress.[6] Higher weights were assigned to indicators that performed better in the tests and whose information value is therefore higher. The final dashboard is then adjusted to take account of expert knowledge of the issue in each area. In this form the dashboard should provide implications for the desired direction of possible adjustments to the overall configuration of macroprudential policy. Red indicates a need to consider tightening this policy and green indicates that there is no need to consider tightening it or that loosening it can be considered.

**The basis of financial stability in the Czech Republic is a high loss absorption capacity of banks**

The fragility of the economic recovery abroad is increasing the probability of adverse shocks to economic activity and financial market stability. The robust capital adequacy, favourable aggregate capital ratio, prudential liquidity management and stable income base and profitability of banks form the basis for absorbing such shocks and maintaining high confidence in the stability of the Czech banking sector. The banking sector is in good shape. This is confirmed by the solvency and liquidity stress test results (see sections 3.2 and 3.3). In the present situation, however, banks, like other types of financial institutions, must maintain and, where appropriate, further enhance their capitalisation to cover credit, market and macroeconomic risks (see sections 4.2.2 and 4.3.2). Maintaining robust capital buffers is of particular importance for banks that are systemically important by dint of their position and character (see 4.2.3). Table IV.2 presents a summary of the available capital and other instruments by risk source.

**The CNB is focusing on differences in risk management across institutions**

Significant differences in capitalisation, profitability and approaches to credit risk and liquidity management persist across institutions. Small banks are vulnerable because of their low profitability. Changes in the regulation of credit unions have significantly reduced the room for them to engage in risky behaviour. However, this segment will continue to need increased supervisory attention given the low quality of its credit portfolios. On a general level, it is essential for banks and credit unions to

6 The financial cycle indicator (FCI) was used as a proxy for periods of elevated financial stress. The ability to signal potential growth in risks in advance was tested on the basis of the Granger causality test, where the number of lags of the dependent variable was determined by means of information criteria (AIC, BIC). The ability to predict the occurrence of periods of elevated financial stress was then tested with the aid of logistic regression, where a period of increased stress was defined as the upper quartile of the FCI. The resulting weight is determined on the basis of the statistical significance and predictive power of the model.

remain prudent in measuring the risks linked with their claims and in classifying their loans, to assess collateral quality conservatively, to set aside sufficient loan loss provisions and to manage their NPL portfolios effectively. The environment of unusually low yields and the potential upward adjustment of interest spreads and asset prices is increasing the need for high-quality management of interest rate risk. Pension management companies should prudently assess the size of the impact of the potential rise in interest rates and the ensuing decline in the prices of their debt securities holdings.

**TABLE IV.2**

**Summary of macroprudential instruments**

| Systemic risk | Key instruments | Specific risk | Existence of specific risk in CZ | Y-o-y change in intensity of specific risk | Applied in CZ | Detailed information |
|---|---|---|---|---|---|---|
| Excessive credit growth and leverage | Countercyclical capital buffer | Strong credit recovery accompanied by easing of credit standards | Yes | ↗ | Yes, since 2014, 0.5% since 2017 | section 4.2.2 |
| | Leverage ratio | Rising leverage, low aggregate risk weights, rising off-balance-sheet risk | Potential | → | Expected as from 2018 | section 3.1 |
| | Capital requirements by sector (in particular real estate exposure) | Elevated growth of loans and risks in specific sector | Potential | → | No increases as yet | section 4.3 |
| | Systemic risk buffer | Build-up of risks e.g. in area of type-specific exposures | Potential | → | Yes, but to address another source of systemic risk(see misaligned incentives) | section 4.2.3 |
| | LTV/LTI caps | Risk of spiral between property prices and property financing loans | Yes | ↗ | Yes, as from 2015 | section 4.3.1 |
| Excessive maturity mismatch and market illiquidity | Stable funding restrictions (e.g. NSFR, LTD) | Long-term liquidity risk | Potential | → | Expected in future | section 3.3 |
| | Liquidity coverage ratio (LCR) | Short-term liquidity risk | No | - | Yes, as from 2015; implementation of Article 460 of CRR | section 3.3 |
| | Additional requirements and administrative measures for addressing disparities in liquidity risk management | Specific liquidity risk | No | - | Not as yet | - |
| Exposure concentration | Large exposure restrictions and capital requirements (by counterparty, sector, geographic) | Sovereign exposure concentration | Yes | → | Yes, option of additional capital requirements, as from 2015 | section 3.4 |
| Misaligned incentives | SIFI capital surcharges (G-SII and O-SII buffer) | Potential impacts of problems in SIFIs on financial market stability and real economy | Yes | → | No, O-SIIs identified, different instrument used | - |
| | Systemic risk buffer | Ditto | Yes | → | Yes, for four banks since 2014 | section 4.2.3 |

Source: CNB
Note: The classification of risks and tools is based on the Flagship Report on Macro-prudential Policy in the Banking Sector (ESRB, 2014). The colour and slope of the arrows in the table illustrate the year-on-year change in the intensity of the specific risk. A higher slope means higher year-on-year growth in the specific risk. Black indicates that the risks are stable, orange indicates moderate growth in the specific risk and red indicates significant growth. The risk assessment is forward-looking.

**Despite having improved, credit risk requires close monitoring**

The economic growth recorded in 2015 was reflected in a reduction of credit risk in non-financial corporations and households. Credit risk is currently being suppressed by the relatively low debt levels of these sectors (see Chart IV.1 and Chart II.46) and by low interest rates on loans.[7] The favourable trend is also evidenced by growth in NPLs and loan loss provisions in the banking sector as a whole (see Chart IV.2). Exposures to non-financial corporations in some sectors (energy and construction) and some categories of clients (particularly small enterprises) are continuing to show an increased level of risk. Weakening growth in some emerging economies and escalating geopolitical risks are manifesting themselves in elevated riskiness of loans to non-residents and non-financial corporations with strong international links. Overall, despite having improved somewhat, credit risk continues to require increased monitoring.

**The countercyclical capital buffer rate must react to the shift of the economy in the financial cycle**

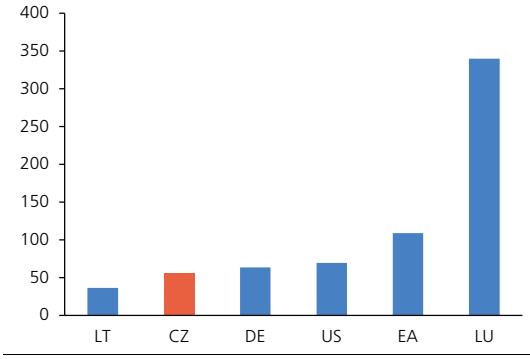
The environment of very low interest rates and the increasing expectations that this environment will persist for a long time are becoming a key source of systemic risks. The very low interest rates are fuelling demand for new loans and increasing the incentives for banks to offer more loans under "softer" conditions. The CNB reacted to the shift of the domestic financial cycle into a phase of stronger recovery in December 2015 by setting the countercyclical capital buffer rate at 0.5% of domestic exposures with effect from January 2017. When setting the countercyclical buffer rate in future quarters, the CNB will assess credit growth and other indicators of the financial cycle so as to ensure that the capital buffers are consistent with the level of systemic risk (see section 4.2.2).

**The environment of very low interest rates calls for the observance of prudent credit standards**

The CNB has been conducting a quarterly bank lending survey since 2012 and six-monthly monitoring of credit institutions' lending policies for loans secured by residential property since 2015. The overall credit conditions have been relaxed significantly during the last two years, but credit standards remain predominantly conservative, at least by international comparison. The same goes for loans for house purchase. In this case, however, the approaches are diverse across institutions, and efforts to provide loans with riskier profiles can be seen in some institutions. In an environment characterised by more optimistic expectations among households and firms, low interest rates and rising property prices, observance of standards and policies for property exposures is crucial. Given the continuing shift of the economy into a more expansionary phase of the financial cycle, the CNB will also carefully

CHART IV.1

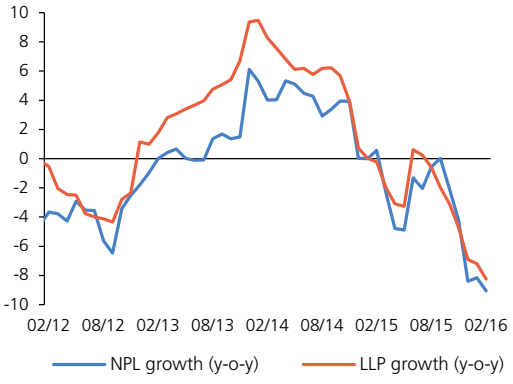
**Ratio of debt of non-financial corporations to GDP**
(%; 2015 Q2)




Source: ECB, White Book
Note: LT and LU are the countries with the lowest and highest figures in the EU.

CHART IV.2

**Growth of NPLs and loan loss provisions**
(year-on-year change in %)

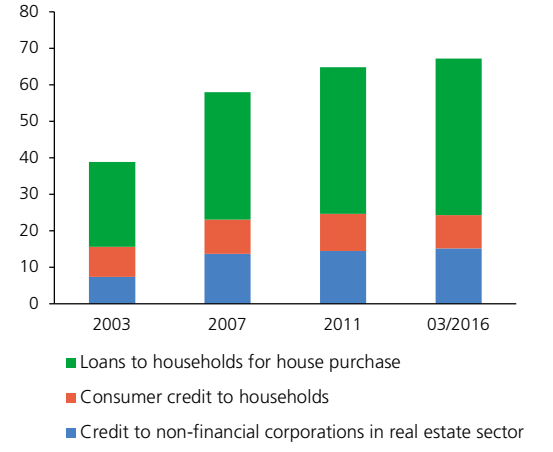



Source: CNB
Note: Exposures of Česká exportní banka and Českomoravská záruční a rozvojová banka are excluded.

7 The sharp decline in loan interest rates has been reflected in a decreasing amount of interest paid to non-financial corporations and households since 2012. For households in particular, this has been counteracted in the last two years by growth in credit commitments.

CHART IV.3

**Shares of selected credit categories in total credit to the private non-financial sector**
(%)




Source: CNB
Note: In the banking statistics, the OKEČ sector classification of economic activity was replaced by the CZ-NACE classification on 31 January 2009. As a result of this change, a proportion of loans (amounting to around CZK 19 billion) in the real estate category (NACE L) were moved into the construction category (NACE F).

assess the evolution of credit standards applying to loans to non-financial corporations.

**The CNB will apply preventive tools to counteract growth in risks in the area of financing of residential property purchases**

The CNB does not currently assess the risk of emergence of a spiral between property prices and property purchase loans as acute. However, it regards the potential for the emergence of this risk as rising. Given the increasing significance of loans provided to households for house purchase and loans to non-financial corporations active in the real estate sector (see Chart IV.3), the CNB regards it as essential to set the preventive tools used in this area conservatively. In light of the increase in the estimated overvaluation of residential property and the rapid growth in genuinely new mortgage loans, it is appropriate to consider tightening the LTV parameter in the recommendations on management of risks associated with providing loans secured by residential property (see section 4.4). It is also essential to evaluate the potential application of the other instruments set out in CRD IV/CRR for preventing sources of systemic risk (see Table IV.2).

**The CNB will pay a high degree of attention to changes in EU financial regulation and the banking union project**

Within the European supervisory authorities, the CNB is actively involved in the preparation and implementation of the regulatory tools and measures required by the CRD IV framework; within the Financial Stability Board (FSB) and the Basel Committee on Banking Supervision (BCBS) it participates in discussions on the development of standards for the banking sector; and within the ESRB it is involved in designing macroprudential policies. The CNB's general priorities for the regulatory area in future years are stabilisation of the EU regulatory framework and enhancement of national authorities' powers to respond to sources of systemic risk in a timely and adequate manner. The CNB's activities in the regulatory area stem from the fact that proposals for new regulations in the EU do not always take account of the features of the financial sectors of non-euro area countries and do not always suit the comparatively small and conservative Czech financial sector. One example is the Bank Recovery and Resolution Directive (BRRD), especially the minimum requirement for own funds and eligible liabilities (MREL). The CNB has therefore been actively involved in the debate on the parameters of this tool (see section 4.4.3). Another important area where the needs of the euro area could generate risks for non-euro area countries is regulation of sovereign exposures (see section 4.4.4).

## 4.2 MACROPRUDENTIAL CAPITAL BUFFERS

### 4.2.1 OVERVIEW OF CAPITAL BUFFERS

The new bank regulatory framework defined in CRD IV/CRR contains capital buffers, which are "stacked" on top of the required 8% minimum and the Pillar 2 requirements (see section 4.2.4). The CNB currently applies three of these capital buffers (see Table IV.3) to increase the resilience of individual banks and the banking sector as a whole to any adverse developments. The buffer rates[8] reflect the cyclical and structural characteristics of the Czech banking sector.

The capital conservation buffer is used to absorb losses in adverse phases of the cycle. It has applied to all banks in the Czech Republic since 2014 at a rate of 2.5%.[9] This rate will not change over time. The countercyclical capital buffer is intended to reduce the risks associated with excessive credit growth and leverage. Information on the countercyclical capital buffer rate, along with an analysis of cyclical risks, is given in section 4.2.2. The systemic risk buffer can be used to suppress various sources of risks to banking sector stability. The CNB uses this buffer to mitigate the structural risks associated with the existence of systemically important banks. This buffer was set for four banks as from the end of 2014. Within two years of its introduction, the CNB is required to review whether there are grounds for changing the buffer rate applying to individual banks or whether this buffer should be imposed on other institutions. Information on the systemic risk buffer rate is given in section 4.2.3. The legislation also allows the CNB to apply a buffer for other systemically important institutions (O-SIIs). At the end of 2015, the CNB published a list of institutions on a consolidated basis which, under EBA guidelines,[10] must be identified as O-SIIs. However, it has not so far required banks that are members of those institutions on a consolidated basis to hold a capital buffer for O-SIIs. Information on O-SIIs is also given in section 4.2.3.

TABLE IV.3

**Summary of capital buffers in the Czech Republic**
(%)

| Capital buffer | Rate | Year of effect |
|---|---|---|
| Capital conservation buffer | 2.5 | 2014 |
| Countercyclical capital buffer | 0.5 | 2017 |
| Systemic risk buffer | 1–3 | 2014 |
| Buffer for other systemically important institutions | - | - |

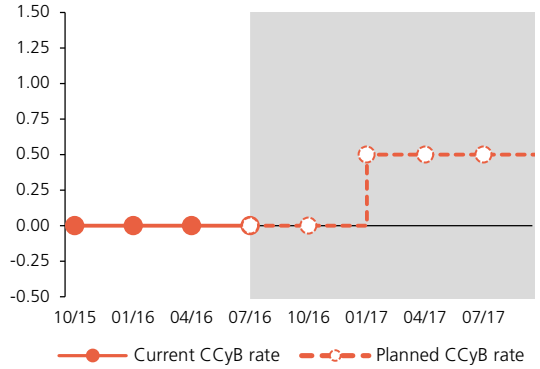
Source: CNB

### 4.2.2 THE COUNTERCYCLICAL CAPITAL BUFFER

The countercyclical capital buffer (CCyB[11]) is a pure macroprudential tool.[12] It is designed to increase the resilience of the financial system to risks associated with the behaviour of the banking sector over the financial cycle, and especially with large fluctuations in lending, which amplify cyclical swings in economic activity. If a delegated

CHART IV.4

**Current and announced CCyB rate in the Czech Republic**
(% of total risk exposure)

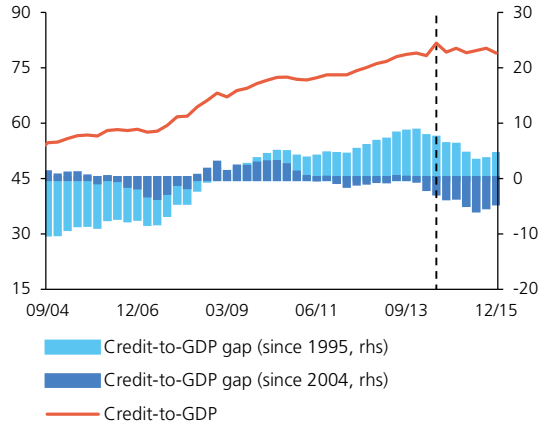



Source: CNB

8 More detailed information about buffer rates and other macroprudential policy tools in the Czech Republic can be found on the CNB website: http://www.cnb.cz/en/financial_stability/macroprudential_policy/index.html.
9 The buffer rate is expressed as the ratio of best-quality capital (Common Equity Tier 1) to the total risk exposure.
10 EBA (2014): *Guidelines on criteria to assess other systemically important institutions (O-SIIs)*.
11 In previous Reports, the countercyclical capital buffer was abbreviated as "CCB". This has been replaced by "CCyB" due to the international community's preference for the latter abbreviation to avoid confusion with the capital conservation buffer.
12 FAQs (in Czech only) on the countercyclical capital buffer can be found on the CNB website: https://www.cnb.cz/cs/faq/proticyklicka_kapitalova_rezerva.html.

CHART IV.5

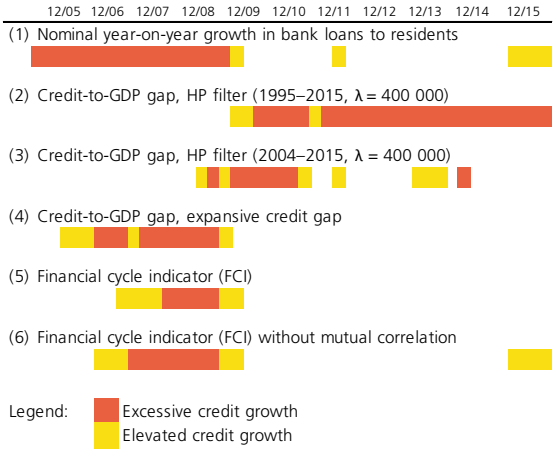
**Growth in loans to the private non-financial sector**
(left-hand scale: ratio in %; right-hand scale: gap in pp)




Source: CNB
Note: The dashed line denotes when the CCyB rate was set for the first time in the Czech Republic. To the left of the dashed line is an assessment of the gap ex post and to the right is an assessment in real time. The long-term trend is determined on the basis of the HP filter with a smoothing parameter of 400,000. The standard and additional gap correspond to indicators 2 and 3 in Table IV.1, respectively.

TABLE IV.4

**Identification of excessive borrowing and accumulation of risks according to various indicators**




**For indicator 1:** y-o-y growth > 5 pp for elevated growth, > 10 pp for excessive growth. **For indicators 2–3:** credit-to-GDP gap > 2 pp for excessive growth, > 0.7 pp for elevated growth. **For indicator 4:** expansionary credit gap > 2 pp for elevated growth, > 3 pp for excessive growth. **For indicator 5:** excessive growth for FCI > 0.4, elevated growth for FCI > 0.2. **For indicator 6:** excessive growth for sum of FCI components > 0.5, elevated growth for sum of FCI components > 0.3.

Source: CNB
Note: The current bounds of indicator 1 reflect statistical base effects from past years and changes in the inflation rate during various periods.

macroprudential policy authority concludes that the cyclical part of systemic risk is increasing, it should ensure that capital accumulates in the banking sector through the creation of buffers that increase its resilience. Conversely, in a period of cyclical decline accompanied by elevated financial stress and rising credit losses, the capital buffer should be released and used to cover losses. The CCyB can help curb rapid growth in loans, especially those with a riskier profile reflected in higher capital requirements. However, this is only a possible side-effect, not the primary purpose of the CCyB. The CNB sets the CCyB rate on a quarterly basis. It was announced for the first time on 1 October 2014. The CCyB rate becomes legally binding on the institutions concerned upon the issuance of a provision of a general nature.[13]

### The CNB set the buffer rate at 0.5% in December 2015

The CNB set a higher-than-zero CCyB rate for the first time at the end of last year. With effect from the start of 2017, it set the buffer rate for exposures located in the Czech Republic at 0.5% (see Chart IV.4). Its main reason for setting a non-zero rate was a strengthening of sources of systemic risk as a result of a shift of the Czech economy within the financial cycle to a phase of stronger credit recovery accompanied by an easing of credit standards. In March 2016, the CNB confirmed the buffer rate at this level with effect from April 2017.

### The deviation of the credit-to-GDP ratio from the HP trend is not a reliable guide for the Czech Republic

According to an ESRB recommendation, the deviation of the ratio of total credit provided to the private sector to GDP from its long-term trend – the credit-to-GDP gap – should serve as a starting point for determining the CCyB rate.[14] The CNB publishes this gap on a quarterly basis together with the corresponding CCyB reference rate. In 2015 Q4, the ratio of credit to GDP stood at 79.0% and the gap was 4.3 pp (see Chart IV.5 and Table IV.4, line 2). This gap would imply a CCyB reference rate of 0.75%. As the calculation of the gap is based on a time series that includes the late 1990s, when bad loans were removed from banks' balance sheets, the CNB considers the information value of this indicator for the Czech Republic to be limited. In line with the ESRB recommendation, the CNB therefore also regularly calculates an "additional" credit-to-GDP gap based on a shorter time series starting in 2004. The additional gap was -4.4 pp in 2015 Q4, implying a zero CCyB

13 Their texts are available on the CNB website: http://www.cnb.cz/en/financial_stability/macroprudential_policy/countercyclical_capital_buffer/index.html.

14 According to an ESRB recommendation (*Recommendation (ESRB/2014/1) on guidance to EU Member States for setting countercyclical capital buffer rates*) and BCBS documents, this deviation is a good overall indicator of the build-up of cyclical financial risks in the economy. In line with the ESRB recommendation, the CNB calculates total credit as total loans (i.e. not only bank loans) to the private sector (i.e. households, non-financial corporations and non-profit institutions serving households) plus debt securities issued. The CNB has not yet incorporated changes associated with the switch to new standards and the new BPM6 balance of payments manual into the total credit time series (hence it does not reflect the switch in the reporting of cross-border intercompany loans from a net basis to a gross basis, which increases the original stock of total credit by more than CZK 500 billion).

reference rate (see Chart IV.5 and Table IV.4, line 3). The two gaps have given rise to conflicting recommendations for the CCyB rate ever since the tool was introduced in 2014 (see Chart IV.5). The CNB has long maintained that the approach based on calculating the aforementioned gap does not provide a sufficiently reliable guide for decisions on the CCyB rate in the case of the Czech Republic. In accordance with the legislation in force and the ESRB recommendation, the CNB therefore takes into account the overall evolution of the financial cycle, credit growth in the Czech Republic and other indicators of systemic risk when setting the CCyB rate.

### The deviation of the credit-to-GDP ratio from a differently calculated trend signals rising credit activity

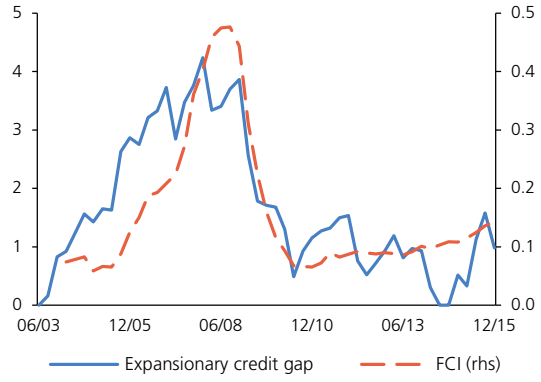
For numerous reasons,[15] the long-term trend in the ratio of total credit to GDP calculated using the HP filter may not be a suitable basis for obtaining robust information. However, the credit-to-GDP ratio itself may contain useful information. Analysis of local extremes in the time series offers a simple way of extracting this information.[16] The difference between the current ratio and the minimum ratio attained in past quarters can be used to reveal extremes indicating credit expansion. This calculation method among other things eliminates the problem of the removal of old loans from banks' balance sheets after the late-1990s crisis and, unlike the HP filter, is not subject to revision as new observations arrive (with the exception of retrospective revision of underlying data). The gap calculated in this way, which can be labelled as the expansionary credit gap, indicates a noticeable credit cycle recovery (see Chart IV.6 and Table IV.4, line 4) and is also consistent with the conclusions based on the assessment of the aggregate financial cycle indicator presented below.

### The aggregate financial cycle indicator points to gradual growth in risks, with faster dynamics in some components

The CNB uses an aggregate financial cycle indicator (FCI) to assess the current position of the Czech economy in the financial cycle. The FCI combines signals of cyclical risks from various segments of the economy. These signals cover both supply and demand factors.[17] The aggregate FCI is rising gradually from its 2010 trough and was fluctuating in 2015 Q4 at levels comparable with the first half of 2006 (see Chart IV.7 and Table IV.4, line 5). However, a closer look at the components of the FCI reveals that some segments are seeing significant growth in cyclical risks. The contribution of new loans to households to the total FCI is currently close to a historical high (see Chart IV.7). The speed of household borrowing relative to income has been increasing continuously since the

CHART IV.6

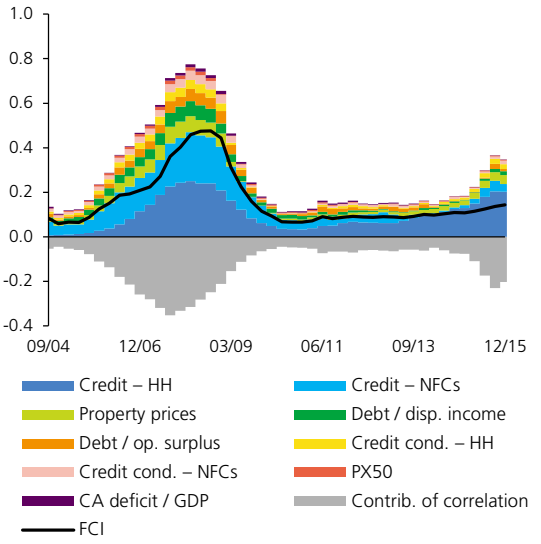
**Alternative credit-to-GDP gap (expansionary credit gap)**
(left-hand scale: gap in pp; right-hand scale: FCI, 0 minimum, 1 maximum)




Source: CNB, CZSO
Note: Only bank loans are considered in the credit-to-GDP ratio. The expansionary credit gap is calculated as the difference between the present credit-to-GDP ratio and the minimum ratio in the last four quarters.

CHART IV.7

**The FCI and its decomposition**
(0 minimum, 1 maximum)

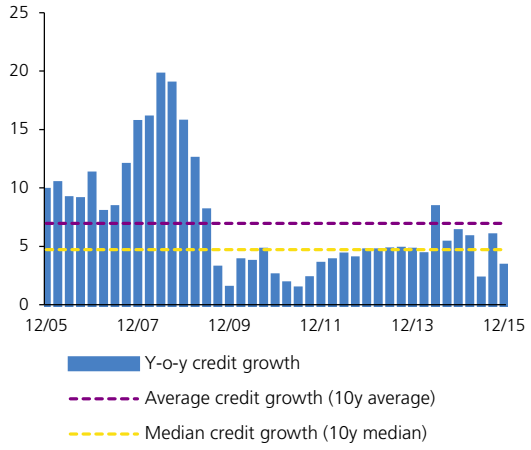



Source: CNB and CZSO data
Note: The negative contribution of the cross-correlation structure to the FCI value (the loss due to imperfect correlation of the subindicators) is due to the difference between the current FCI value and the (potential) upper bound which assumes perfect correlation between all indicators. Highly negative contributions indicate a generally weak correlation between the subindicators.

15 These reasons were described in the last two Financial Stability Reports.
16 This type of analysis is based on the definition of the cycle proposed in Burns and Mitchel (1946): *Measuring Business Cycles*, NBER Books (1946).
17 These factors include credit growth, property prices, the speed of private sector borrowing and interest rate spreads. The FCI methodology is described in detail in the thematic article *An Indicator of the Financial Cycle in the Czech Economy* published in FSR 2013/2014.

CHART IV.8

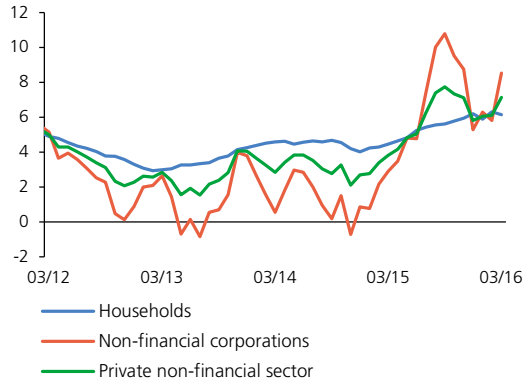
**Growth in credit provided to the private non-financial sector**
(%)




Source: CNB
Note: Under the BCBS methodology, total credit to the private non-financial sector contains loans to the private non-financial sector and debt securities issued. The private non-financial sector consists of non-financial corporations, households and non-profit institutions serving households.

CHART IV.9

**Year-on-year growth in bank loans to the private non-financial sector**
(%)




Source: CNB
Note: Households include data for non-profit institutions serving households.

end of 2014 and was only just below the ten-year average in 2015 Q4.[18] The intensifying growth in cyclical risks is also being fostered by residential property prices, whose growth rate exceeded the ten-year average in the second half of last year (4.5%). Credit standards are also having a significant procyclical effect. They have been easing since the start of 2014, although the latest Bank Lending Survey indicates a slowdown in this trend (see Chart II.11 in section 2.1). The faster growth in the aforementioned components in aggregate terms has so far manifested itself to only a limited extent because of the low correlation between the components of the indicator in 2015 (see Chart IV.7). If, however, a sharper upswing becomes apparent in the remaining components, the correlation will increase and the aggregate indicator will also rise as a result. Abstracting from the correlation between segments, the FCI indicates stronger growth from the second half of 2015 onwards (see Table IV.4).

### Total credit growth remains subdued, but growth in bank loans is elevated

Given the limited information value of the credit-to-GDP gap, the CNB regards credit growth as the starting point in guiding decisions on the CCyB rate. Total credit provided to the private sector rose by 3.3% in 2015. This can be labelled as a relatively subdued rate of growth in historical terms (see Chart IV.8). A halt in growth in bond issuance by non-financial corporations in 2015 H2 contributed significantly to suppressing the rate of growth of total credit (see section 2.3). By contrast, year-on-year growth in the main component of total credit – bank loans – picked up to 5.8% in 2015. In 2016 Q1 it reached 7.1% (see Chart IV.9). Underlying this trend is increased credit activity in both the household sector and the non-financial corporations sector. Total bank loans provided to households went up by 6.2% in 2015, the highest rate of growth since 2012 Q1. The pace of growth in 2016 Q1 was almost unchanged at 6.1%. The stock of bank loans provided to non-financial corporations increased by 5.3% in 2015. After slowing slightly in 2015 Q4 (see Chart IV.9) the rate of growth increased further to 8.5% in 2016 Q1, well above the ten-year average of 6.3%. The rate of growth in loans to households and non-financial corporations in the Czech Republic ranks among the four highest in the whole of Europe.[19]

### New bank loans to households are rising very rapidly

The rate of growth of the stock of loans yields valuable information about the evolution of overall leverage. To assess whether credit growth is excessive it is also important to analyse newly provided loans (see Box 6). The year-on-year rate of growth in new bank loans to

18 Non-financial corporations also saw a slight upswing in the speed of borrowing in 2015 Q3, but this did not continue into Q4.
19 Based on the year-on-year rates of credit growth in January 2016. Only Sweden and Slovakia (in the case of households) and Poland (in the case of non-financial corporations) have higher rates of growth. For more details, see the *ESRB Risk Dashboard*, March 2016 (p. 14).

households (as measured by the three-month moving average[20]) reached 9.6% in 2016 Q1 and is thus well above the ten-year average of 6.1%. After recording sharp increases in early 2015, new bank loans to non-financial corporations started to decline in 2015 Q3. The year-on-year rate of growth of new loans to non-financial corporations (as measured by the three-month moving average) stood at -21.6% in 2016 Q1 (see Chart IV.10) and was thus far below the ten-year average of 6.1%. The evolution of *genuinely* new loans was in line with that of new loans in both segments.[21] In the case of households the amount of genuinely new loans has been growing by more than 20% on average since January 2015, whereas in the case of non-financial corporations it started to decrease in September 2015 (see Chart IV.11). The high rates of growth of genuinely new loans to households are due mainly to growth in loans for house purchase (17.0% in 2016 Q1), although growth in consumer credit also began to go up at the start of 2016 (26.5% in 2016 Q1). The negative growth in new loans to non-financial corporations was due primarily to a decline in short-term financial loans (-39.7% in 2016 Q1), while longer-term investment loans continued to show buoyant growth (29.7% in 2016 Q1).

**The Czech economy is in an upward phase of the financial cycle…**

Overall, the CNB's assessment of the indicators is that the Czech economy is continuing in an upward phase of the financial cycle. This is characterised by rapid growth in loans in a number of credit segments. The strong growth in new loans to households is increasing the vulnerability of the entire sector to sudden economic swings and is simultaneously fostering growth in residential property prices, which the CNB currently assesses as being slightly overvalued. The combination of economic recovery and very low lending interest rates, which is being reflected in a rise in investor optimism, is also affecting the commercial property segment. The aforementioned assessment implies a need to create a countercyclical capital buffer for exposures located in the Czech Republic.

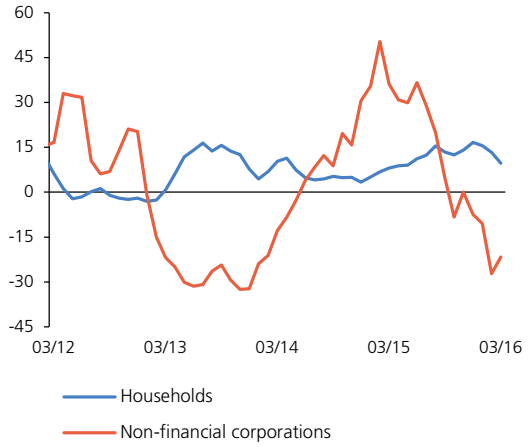
**…which does not yet require an increase in the countercyclical capital buffer**

As there has been no significant change in cyclical risks indicating growth in systemic risk since the last CCyB rate decision was made in March 2016, it is possible to keep the buffer rate at the current level of 0.5 % for the time being. However, if credit growth remains high, credit standards ease further and investor optimism continues to grow, the CNB will stand ready to increase this buffer rate further.

CHART IV.10

**Year-on-year growth in new koruna loans to the private non-financial sector**

(%)

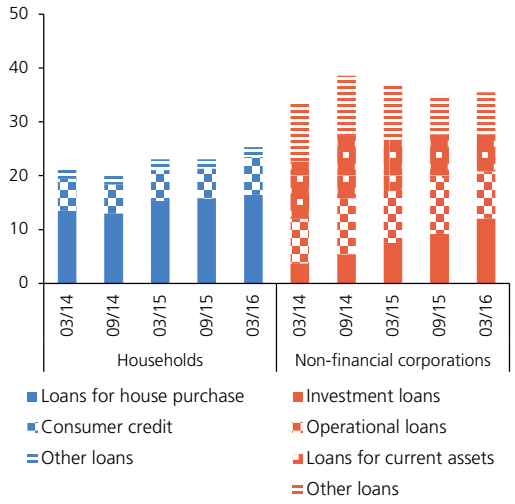



Source: CNB
Note: The data for households also include data for non-profit institutions serving households. Loans to households consist of loans for house purchase, consumer credit and refixed and refinanced loans. Year-on-year rates of growth are smoothed by the 3-month moving average.

CHART IV.11

**Amounts of genuinely new loans to the private non-financial sector**

(CZK billions)



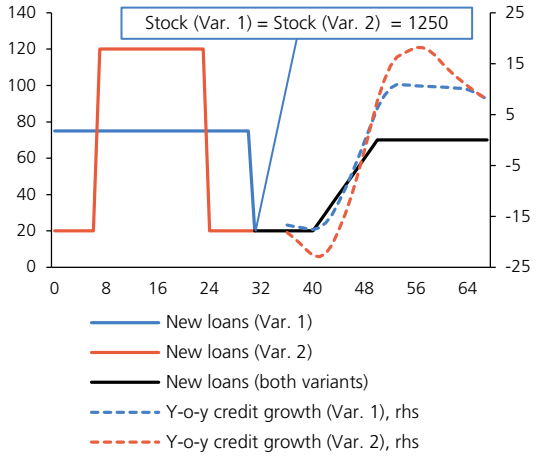

Source: CNB
Note: Genuinely new loans also include increases in existing loans.

20 The three-month moving average is used due to high month-on-month volatility in the rate of growth of new loans.

21 Despite the term "new loans" used in the published statistics, such loans are not always genuinely new. A loan is reported as new in cases where the existing loan conditions are changed under a new agreement signed by the contracting parties, even though in reality it is the same (previously provided) loan. It is therefore necessary to monitor genuinely new loans, which consist solely of newly concluded loan agreements and agreements to increase existing loans.

CHART IV.1 BOX

**Impact of different new loan histories on credit growth**
(x-axis: quarters; left-hand y-axis: rate of growth in %; right-hand y-axis: flow of new loans




Source: CNB
Note: A constant interest rate of 4% and a constant credit repayment period of 8 years over the entire period shown is assumed. Total credit is identical in the two economies (Variant 1 and Variant 2) at the time of the joint decline in new loans to 20.

## BOX 6: IS THE RATE OF GROWTH OF THE STOCK OF CREDIT THE RIGHT INDICATOR FOR ASSESSING CREDIT GROWTH AND ASSOCIATED RISKS?

Greater attention has started to be paid after the crisis to the impacts of excessive credit growth on financial stability. One of the main indicators that macroprudential authorities take into account in their assessments of cyclical sources of systemic risk is (year-on-year) credit growth. The aim of this Box is to draw attention to the limited information value of this indicator when used in isolation to evaluate excessive credit growth.

Change in the stock of credit – credit growth – depends on two main factors: the amount of newly provided loans and the rate of repayment of existing debt. The influence of the latter is often underestimated in the assessment of credit growth. It is useful to realise what determines the debt repayment rate. At the aggregate level, the total amount of repayments is derived from the history of newly provided loans, which tends to be longer than the period over which the rate of growth is measured. Credit growth is thus affected not only by current developments, but also by (cyclical) developments in the relatively distant past.[22] The growth figures themselves therefore cannot be assessed correctly without taking account of the history of newly provided loans. Two economies[23] can show very different credit growth despite having the same current total credit stock and the same future trajectory of newly provided loans. If, for example, one economy experienced a credit boom in the past, implying significantly higher current repayments, its credit growth rate can differ by tens of per cent in some periods compared with an economy that did not experience such a boom. Chart IV.1 Box illustrates the effects of a different past for newly provided loans on credit growth. The opposite implication also applies, i.e. two economies with identical total credit growth may, from the perspective of the rate of credit creation, show completely different risk characteristics and be in a different phase of the credit cycle. For this reason, total credit growth is just one indicator for assessing excessive credit growth. Greater attention should be paid to newly provided loans and their level of risk.

Another potentially problematic area is the comparison of credit growth with economic growth (GDP growth). In the financial stability context, the relationship between credit and GDP is used to complete the picture on excessiveness of credit growth,[24] but it

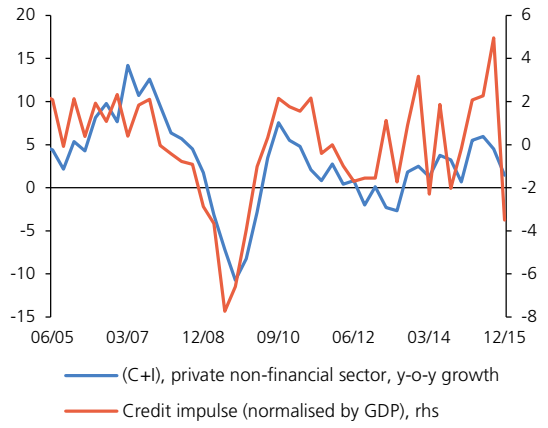
22 The extent to which the distant past affects the credit growth rate depends on the (average) loan maturity.
23 Or a single economy in different time periods.
24 Where the rate of growth of the stock of credit is lower than the rate of growth of GDP, credit growth is often regarded as subdued and therefore implicitly low-risk.

also influences the outlook for banking sector profitability and its sustainability. From the macroprudential policy perspective, it can gain in importance when a need arises to reduce shortages on the credit supply side and boost lending to the real economy.

However, mechanical comparison of the credit growth (a stock variable) and GDP growth (a flow variable) can give rise to erroneous or debatable conclusions, for example that the relationship between economic activity and credit is very weak, that the economic and credit cycles are of different lengths, or that creditless recoveries have occurred after crises. Attention was first drawn explicitly to this fact in a series of articles written by German economists (see, for example Biggs, Mayer and Pick, 2010, and Biggs and Mayer, 2013[25]). These authors demonstrate that GDP growth is not linked primarily with total credit growth (i.e. with the increase in debt, the first difference of the stock of credit) but with the rate of growth of new credit (i.e. with the acceleration in debt, the second difference of the stock of credit, which the authors call the credit impulse).[26] A credit-driven economic recovery can therefore occur even if the credit stock is declining constantly – the only thing that is needed for an economic recovery in reality is for the decline to slow (a positive second difference, i.e. a positive credit impulse). If this fact is not taken into account, the relationship between GDP and credit can be significantly distorted. This distortion manifests itself most strongly in assessments of developments after crises. Chart IV.2 Box and Chart IV.3 Box illustrate this situation for the Czech economy.[27] These charts reveal that while credit growth remained low in the post-crisis period, the credit impulse corresponded with economic activity as expected. This information is again intended to demonstrate that year-on-year credit growth should be used with great caution in the assessment of credit dynamics.

CHART IV.2 BOX

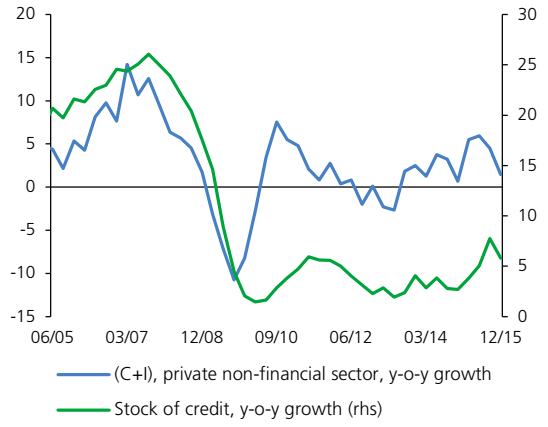
**Comparison of economic growth and the credit impulse of the private non-financial sector (second differences in stocks)**
(year-on-year growth in %)




Source: CNB, CZSO
Note: C = Consumption, I = Investment.

CHART IV.3 BOX

**Comparison of economic growth and growth in total credit provided to the private non-financial sector**
(year-on-year growth in %)




Source: CNB, CZSO
Note: C = Consumption, I = Investment.

25 *Credit and Economic Recovery: Demystifying Phoenix Miracles*, 2010, and *Bring Credit Back into the Monetary Policy Framework*, 2013, respectively.
26 The credit impulse is normalised by GDP. To study the relationship between credit and economic activity in more depth, the authors derived a simple model that implies the following equation for GDP growth: *a·credit impulse + b·credit stock growth*, where $a \gg b$ in normal economies. For ease of interpretation, the model contains a number of simplifying assumptions, but its main conclusions still apply for more complex models.
27 The charts illustrate the relationship between credit and GDP on data for the Czech economy, but similar conclusions have been demonstrated for a whole range of other economies, including those of the USA and the euro area.

### 4.2.3 CAPITAL BUFFERS OF SYSTEMICALLY IMPORTANT INSTITUTIONS

**The systemic risk buffer**

CRD IV gives EU Member States the option of applying a systemic risk buffer (SRB) as a relatively flexible tool primarily for preventing non-cyclical risks.[28] The CNB uses the SRB to prevent systemic risk arising from the potential destabilisation of systemically important banks. The destabilisation of any of these banks could undermine confidence in the banking sector's ability to provide its services effectively, which, in turn, could have serious repercussions for the financial system and the entire Czech economy. According to ESRB data, another ten EU Member States currently apply an approach similar to that of the CNB.

The CNB's decisions on which banks will be required to maintain an SRB, and at what rate, are based on an estimate of the systemic importance of each bank. This estimate draws on a range of indicators describing four key parameters of the bank: size, complexity, substitutability for the economy and interconnectedness with other financial institutions.[29] The CNB set SRB rates for the first time in 2014, specifically for the four systemically most important banks: 3% of risk-weighted exposures for Česká spořitelna and ČSOB, 2.5% for Komerční banka and 1% for UniCredit Bank.

The CNB is required by law to review its reasons for setting the SRB once every two years. The CNB has therefore assessed the systemic importance of domestic banks according to the end-2015 data. Based on the results of this assessment, it will inform the relevant banks and authorities during the course of this year about whether it will be confirming or changing the existing SRB rates or introducing new ones for banks that have not previously been required to create an SRB.

**The capital buffer for other systemically important institutions**

As from 2015, the CNB is required by law to identify other systemically important institutions (O-SIIs). To do so, it must use the harmonised methodology set out in the relevant guidelines of the European Banking Authority (EBA).[30] The CNB follows those guidelines to the full when setting the criteria for identifying O-SIIs. It calculates scores governing the designation of entities as O-SIIs for all relevant institutions at the highest consolidation level. As a result, only regulated consolidated groups, not directly banks that are members of such groups, may be designated as

28 Article 133 of Directive 2013/36/EU states that Member States should have the option of requiring certain institutions to maintain, in addition to the capital conservation buffer and the countercyclical capital buffer, a systemic risk buffer in order to prevent and mitigate long-term non-cyclical systemic or macroprudential risks in the meaning of a risk of disruption in the financial system with the potential to have serious negative consequences to the financial system and the real economy in a specific Member State.

29 See the thematic article *An Additional Capital Requirement Based on the Domestic Systemic Importance of a Bank* in FSR 2012/2013.

30 Guidelines on the criteria to determine the conditions of application of Article 131(3) of Directive 2013/36/EU (CRD) in relation to the assessment of other systemically important institutions (O-SIIs).

O-SIIs.[31] This consolidation may cover banks and selected non-banks, including subsidiaries in other countries. The EBA guidelines also allow investment firms to be exempted from the calculation. The CNB makes use of this option because the investment firms segment does not play a sufficiently significant role in the Czech financial system.

The following regulated consolidated groups were identified as O-SIIs at the end of last year in the first O-SII identification process based on mid-2015 data: Československá obchodní banka, Komerční banka, Česká spořitelna, UniCredit Bank Czech Republic and Slovakia, Jakabovič & Tkáč (relevant entity of the regulated consolidated group: J&T banka), PPF FH B.V. (relevant entity of the regulated consolidated group: PPF banka) and Raiffeisenbank.

The CNB will update the list of O-SIIs each year on 1 December at the latest. It will therefore publish an updated list of O-SIIs by 1 December 2016.

Under the Act on Banks, an additional capital requirement can be imposed on a bank that is a member of a regulated consolidated group designated as an O-SII. However, the CNB does not regard this as necessary at the moment. Since 1 October 2014, banks with a high level of domestic systemic importance have been required to maintain a systemic risk buffer. Depending on developments in European legislation, however, this buffer may in the future be converted into a buffer for O-SIIs.

O-SII identification has been compulsory for all EU countries since 2015. A total of 173 institutions have been designated as O-SIIs. With seven O-SIIs, the Czech Republic is close to the average in the EU, where the number of O-SIIs in individual Member States ranges from 2 to 16.[32] Besides the CNB, the authorities in several other EU countries have decided not to set a capital buffer for O-SIIs in their jurisdiction (at least for the time being).

### 4.2.4 THE INTERACTION OF THE PILLAR 1, PILLAR 2 AND BUFFER REQUIREMENTS AND STRESS TEST RESULTS IN THE DETERMINATION OF BANK CAPITAL REQUIREMENTS

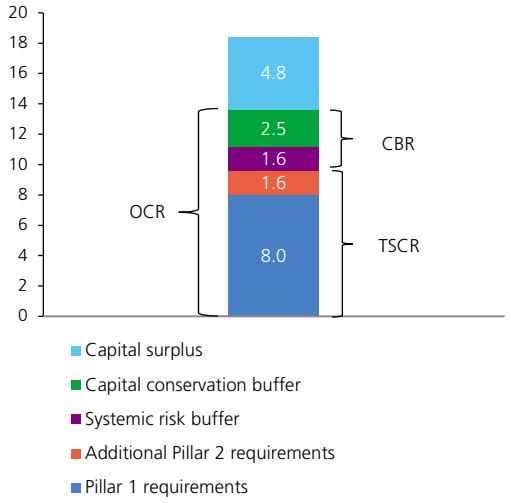
The CRD IV/CRR regulatory framework defines rules for determining Pillar 1 capital requirements and capital buffers. It also lays down supervisory powers for determining additional capital requirements under Pillar 2. They are elaborated in the *Guidelines on common procedures and methodologies for the supervisory review and evaluation process*

31 In this respect, the methodology for identifying O-SIIs differs fundamentally from the methodology the CNB uses to identify the set of institutions (banks, not regulated consolidated groups) which the CNB requires to fulfil the systemic risk buffer.

32 The European Banking Authority published a list of the O-SIIs in each country on its website (http://www.eba.europa.eu) on 25 April 2016.

CHART IV.12

**Structure of bank capital requirements in the Czech Republic**
(weighted average for sector as of end of 2015)




Source: CNB

TABLE IV.5

**Rules for determining distributions (MDA)**
(%)

| CET1 capital on top of total Pillar 1 + Pillar 2 capital requirement | Maximum distributable amount (MDA) |
|---|---|
| 75–100 | 60 |
| 50–75 | 40 |
| 25–50 | 20 |
| 0–25 | 0 |

Source: CRD IV

*(SREP)*,[33], which include an approach to accounting for the effect of the economic cycle. The text below discusses the interaction of the aforementioned components in the determination of the minimum capital ratio that banks are required to observe.

### The total and overall capital requirements

In addition to the Pillar 1 requirements, the CNB may determine an additional Pillar 2 capital requirement as a result of a supervisory review and evaluation process (SREP). This requirement covers risks that are not covered by Pillar 1 or the other capital requirement components (such as capital buffers). The sum of the Pillar 1 requirements and the additional Pillar 2 capital requirements is called the total SREP capital requirement (TSCR). Banks should meet the TSCR at all times, including in an adverse phase of the economic cycle.

On top of the TSCR, banks must meet a combined buffer requirement (CBR). This consists of the requirements for the capital conservation buffer, the systemic risk buffer, the capital buffer for other systemically important institutions and the countercyclical capital buffer. The designated (macroprudential) authority must coordinate with the competent (supervisory) authority to determine how to address them in the SREP when evaluating the impact of the cycle. The sum of the Pillar 1 requirements, the additional Pillar 2 requirements and the combined buffer requirement forms the overall capital requirement (OCR; see Chart IV.12).

### Capital conservation measures and restrictions on distributions

Where a bank is unable to cover its combined buffer requirement[34] with CET1 capital, it is subject to restrictions on the distribution of profits and the payment of dividends (distributions).[35] In such case, the bank is obliged to prepare a capital restoration plan (pursuant to Article 12m(4) of the Act on Banks) in the structure set out in Article 70 of Decree 163/2014 and submit it to the CNB. The maximum distributable amount (MDA) is derived from the capital coverage of the combined buffer requirements (see Table IV.5).

### The effect of stress test results on capital requirements

Banks must meet the total capital requirement (TSCR) given by the sum of the Pillar 1 requirements and the additional Pillar 2 requirements at all times. If the supervisory authority decides that a bank cannot use one of the capital buffers to absorb a stress test shock, its total requirement is increased by the amount of that buffer. In this form it is referred to as the other relevant capital requirement. The CNB considers it appropriate to define the other relevant capital requirement as the sum of the TSCR and

33 EBA/GL/2014/13 *Guidelines on common procedures and methodologies for the supervisory review and evaluation process (SREP)*.
34 *Opinion of the European Banking Authority on the interaction of Pillar 1, Pillar 2 and combined buffer requirements and restrictions on distributions* specifies that the combined capital buffer is determined as the amount of capital that is not used to meet the Pillar 1 and Pillar 2 requirements.
35 Generally the distributions set out in Article 141 of the CRD.

the systemic risk buffer. This is because the purpose of the systemic risk buffer is to prevent long-term non-cyclical systemic risks, not to absorb the losses of individual banks in adverse phases of the economic cycle.

Supervisory stress testing is used to evaluate whether a bank has sufficient capital to meet the total requirements. Whether or not the total capital requirement will be breached is determined by the impact of the adverse scenario of the stress test. If the relevant capital requirement will be breached, the bank must submit a capital plan[36] containing a capital planning buffer. This is meant to ensure that the amount of capital following the absorption of the shock in the adverse scenario of the supervisory stress test does not fall below the relevant level.

Chart IV.13 illustrates the hypothetical situation in which the capital surplus and capital conservation buffer of the bank are sufficient to cover the decrease in capital caused by the impact of the adverse stress scenario. In this situation, the relevant capital requirement is not breached.

Chart IV.14 depicts the hypothetical situation where the capital surplus and capital conservation buffer of the bank are not sufficient to fully absorb the decrease in capital caused by the impact of the adverse stress scenario. In this case, a capital planning buffer equal to the amount by which the decrease in capital in the adverse scenario breaches the relevant capital requirement is required.

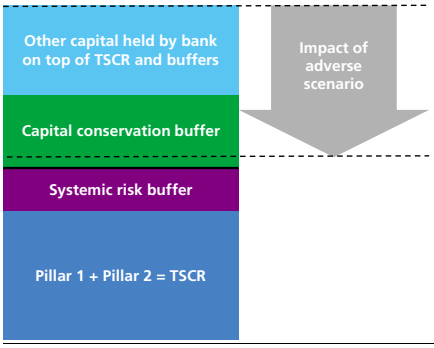
Chart IV.15 shows how fulfilment of the relevant capital requirement would look if the impact of the *Adverse Scenario* of the macro-stress test described in section 3.2 on the banking sector as a whole were to be factored in. The capital surplus and the capital conservation buffer would together be sufficient to cover the decrease in capital in the *Adverse Scenario*.

When determining the minimum capital requirements for banks in the supervisory review and evaluation process (SREP), the CNB will take account of both the interaction of the Pillar 1 requirements, the additional Pillar 2 capital requirements and the combined buffer requirements and the effect of the economic cycle.

36 This capital plan differs from the capital conservation plan that a bank must prepare if it fails to meet the combined buffer requirement. Unlike the capital conservation plan, the capital plan is determined on the basis of the impact of the hypothetical adverse scenario of the supervisory stress tests and is intended to determine the adequacy of the bank's capital to cover volatility over the economic cycle (see section 7.7 of EBA/GL/2014/13 *Guidelines on common procedures and methodologies for the supervisory review and evaluation process (SREP)*).

**CHART IV.13**

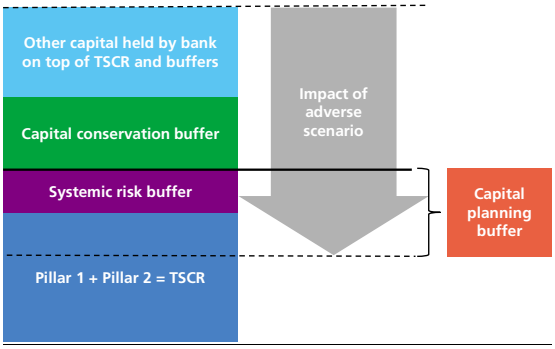
**Impact of test is fully absorbed by capital surplus and capital conservation buffer: capital planning buffer = 0**




Source: CNB
Note: The illustration assumes a zero countercyclical buffer.

**CHART IV.14**

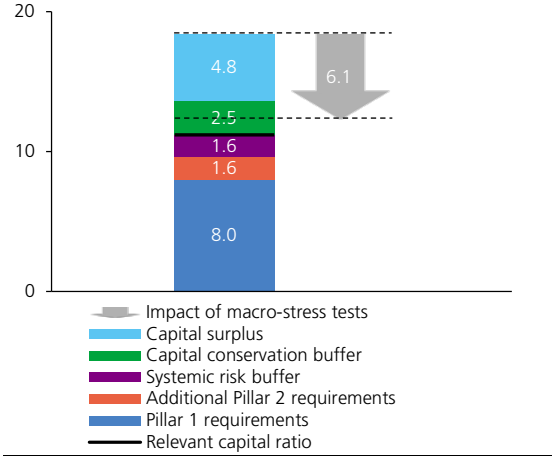
**Impact of test is not fully absorbed by capital surplus and capital conservation buffer: capital planning buffer > 0**




Source: CNB
Note: The illustration assumes a zero countercyclical buffer.

**CHART IV.15**

**Impact of macro-stress tests**
(weighted average for sector as of end of 2015)




Source: CNB
Note: The illustration assumes a zero countercyclical buffer.

## 4.3 RISKS ASSOCIATED WITH THE RESIDENTIAL AND COMMERCIAL PROPERTY MARKETS

*Experience from advanced countries shows that periods of rapid credit growth accompanied by rising property prices can be followed by sharp shocks to the property market and, in turn, to the banking sector. The systemic problems of the banking sector then often cannot be resolved by applying resolution tools at the individual bank level (using the funds of shareholders and creditors) and it may also be necessary to deploy public funds, i.e. taxpayers' money, at least temporarily. If a crisis is preceded by strong growth in household debt, adverse shocks often have large negative impacts on households' financial situation and consumption and, in turn, on overall economic growth. The potential for the emergence of a price spiral between property prices and housing loans also exists in the Czech Republic. The CNB is therefore paying increased attention to house purchase loans in its analyses of systemic risks. Given that the environment of very low interest rates fostering growth in house purchase loans and property prices in Europe may persist for a long time, this is a priority area for the CNB at present. This section describes developments in the area of loans secured by property and assesses the risks associated with this kind of loan. It evaluates in detail the evolution of credit standards applied to new loans secured by residential property. In light of the risks identified, some standards are starting to appear insufficiently strict. The CNB therefore deems it necessary to recommend that institutions reduce their maximum LTV values.*

### 4.3.1 ASSESSMENT OF COMPLIANCE WITH THE CNB'S RECOMMENDATION ON THE MANAGEMENT OF RISKS ASSOCIATED WITH NEW LOANS SECURED BY RESIDENTIAL PROPERTY

In previous years, when monitoring credit institutions' lending policies for loans secured by residential property, the CNB identified growing diversity between banks' approaches and increasing provision of riskier loans for house purchase. In June 2015, the CNB therefore issued a *Recommendation on the management of risks associated with the provision of retail loans secured by residential property* (the "Recommendation") directed against potential growth in risks in the area of new loans secured by residential property ("loans"). The Recommendation set quantitative LTV limits and qualitative criteria, observance of which should ensure that credit standards comply with the criteria of sufficient tightness and prudence.

**The CNB assessed compliance with the Recommendation in the second half of last year**

In last year's Report, the CNB stated that it would regularly assess compliance with the Recommendation and would stand ready to tighten the parameters of individual recommendations if increased risks were identified. To evaluate the amount and riskiness of new loans, the CNB conducts surveys of the credit characteristics of new loans secured by residential property. More detailed data for the second half of 2015

enabled it to perform its first check of compliance with the quantitative and qualitative criteria contained in the Recommendation and to monitor the credit characteristics of the loans identified in it.

**Not all banks are fully compliant with the LTV limits…**

Recommendation A states that institutions should not provide loans with an LTV (loan-to-value, i.e. the ratio of the loan amount to the value of collateral) exceeding 100%. However, loans with an LTV of over 100% accounted for 4% of all new loans provided in 2015 Q3 and Q4 (see Chart IV.16).[37] In 2015 Q4, ten institutions were not fully compliant with the Recommendation. Three of those institutions accounted for 95% of the loans in excess of the limit. Recommendation A also stipulates that the share of new loans with an LTV of 90%–100% should not exceed 10% of the amount of new loans in any given quarter. The share of loans with an LTV of 90%–100% dropped year on year in 2015 Q3 and Q4, accounting for 9% of all new loans. However, some institutions exceeded the 10% limit and the loans provided by them in excess of the limit made up 3% of all new loans in each quarter. In 2015 Q4, eight institutions were not compliant with the limit, and three of them accounted for 82% of loans in excess of the limit.

**…but the provision of unsecured consumer credit does not suggest that these limits are being circumvented by institutions concurrently providing that secured credit**

Recommendation A also states that institutions should not circumvent the LTV limits by concurrently providing unsecured consumer credit. According to information from banks, the amount of such loans provided since the Recommendation took effect to clients with secured loans with LTVs of 80%–90% and 90%–100% from the same institution was negligible. The risk of circumvention of LTV limits by concurrent financing thus seems low. However, the possibility of a borrower taking out other unsecured loans from other financial institutions to part-finance a mortgage loan remains a risk factor.

**The collateral valuation level may increase the risks associated with loans with higher LTVs**

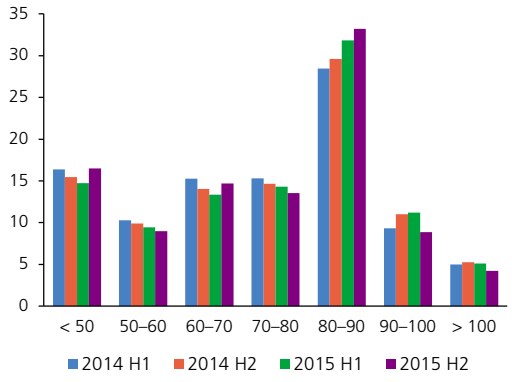
Recommendation A also specifies that institutions should proceed with caution when determining collateral value for the purposes of calculating LTV. Among other things, they should take into account the cyclical position of the economy and any overvaluation of property prices. When assessing compliance with the Recommendation, the CNB examines whether collateral value solely reflects property prices or whether it also takes account of the behaviour of bank clients or banks themselves. For this purpose, quarterly data on average loan size and collateral value were compared. Collateral value rose more slowly than loan size but

37 The Recommendation states that, to calculate the LTV ratio, a client's deposit with the same institution may be subtracted from the client's debt provided that the deposit is part of the collateral for the loan. For the purposes of assessing compliance with the Recommendation, the value of the collateral was therefore defined as the sum of the value of the residential property pledged as collateral and the value of any other types of collateral eligible for the calculation of capital adequacy.

## Recommendation A: LTV limits for new loans

CHART IV.16

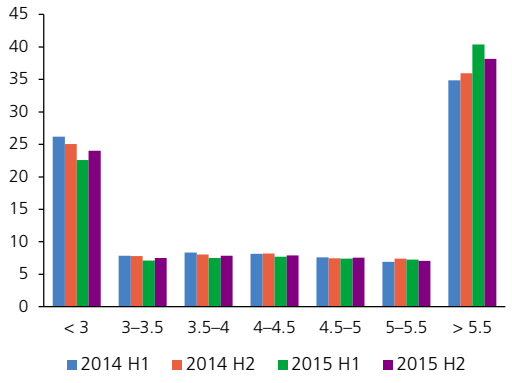
**LTV distribution of new loans**
(x-axis: LTV in %; y-axis: share of loans in %)




Source: CNB

CHART IV.17

**LTI distribution of new loans**
(x-axis: LTI; y-axis: share of loans in %)




Source: CNB

faster than property prices in 2015 Q3 and Q4.[38] In the 80%–90% and 90%–100% LTV categories, where there is an incentive to influence collateral value, the average collateral value rose by about 10% year on year and the average loan size by 13%. The results can thus be seen as an indication that collateral value may in some cases be estimated deliberately with the purpose of achieving lower LTV.

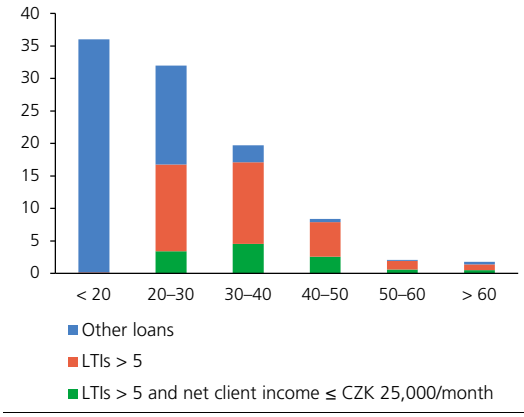
## Recommendation B: Assessment of clients' ability to service loans from their own resources

**Lower incomes pose a risk for loans with high LTIs and DSTIs…**

Recommendation B states that institutions should, when providing loans, prudently assess indicators of clients' ability to service loans from their own resources and set internal limits for such indicators. They can do so by, for example, using LTI (loan-to-income, i.e. the ratio of a client's debt to net annual income) or DSTI (debt service-to-income, i.e. the ratio of the monthly loan instalment to net monthly income). Data on loans provided in the past reveal that the NPL ratio rises in line with the LTI ratio. Loans with LTIs of higher than 5 ("high LTIs") can be considered risky.[39] As for DSTI, the risky values are those higher than 40% ("high DSTIs").[40] Data on loans provided in the past also indicate that the highest NPL ratio pertains to the category of clients with net monthly income of less than or equal to CZK 25,000 ("low net income"). Data on new loans show that the proportion of loans with high LTIs increased modestly year on year in the second half of 2015, reaching 45% (see Chart IV.17). The share of new loans with both high LTIs and high DSTIs reached 11% (see Chart IV.18). A total of 33% of loans with these characteristics were granted to clients with income of less than CZK 25,000 (see Chart IV.22). The high concentration of such loans among clients with low income implies an increased risk of default on those loans in the event of an adverse shock, because the lower absolute amount of money left after property-related costs are deducted may not be enough for such clients to cover other essential expenditure, which is to some extent fixed.

CHART IV.18

**DSTI distribution of new loans**
(x-axis: DSTI in %; y-axis: share of loans in %)



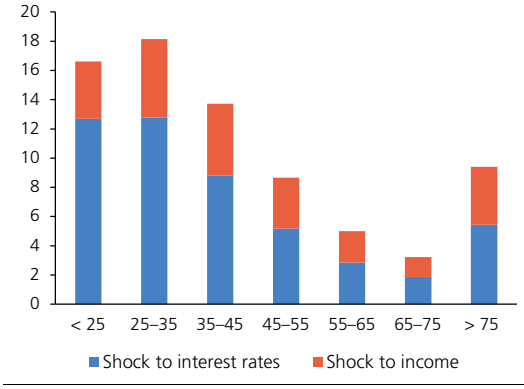

Source: CNB

**…which is increased by the chance of adverse economic developments…**

Recommendation B also states that institutions should, when providing new loans, assess clients' ability to service their loans under adverse conditions. Besides the current costs of living typical of the client's household and the expenditure arising from all its financial obligations, they should also take into account growth in interest rates and a potential drop in income. An example of such an adverse scenario would be, for example, a rise in interest rates of 3 pp and a fall in income of 30% (for example because one of two clients applying jointly for a loan loses his or her income or because the client takes up a job with a

CHART IV.19

**Share of new loans with property-related costs exceeding 40% of income in the stress broken down by income category**
(x-axis: net monthly income in CZK thousands; y-axis: share of loans in %)




Source: CNB
Note: The stress assumes a rise in interest rates of 3 pp and a fall in income of 30%. The costs associated with the underlying property comprise principal and interest payments plus 1% of the loan amount as the property maintenance cost per year.

38 However, if property prices rise faster than incomes, the average loan size usually increases faster than prices.
39 The average DSTI for loans with an LTI of higher than 5 granted in the second half of 2015 was 37%. The average size of new loans with an LTI of higher than 5 was more than CZK 2.6 million. The average net monthly income of clients applying for such loans was slightly less than CZK 44,000. Such loans were provided with an average maturity of 28 years and at an interest rate of 2.2%.
40 A DSTI of 40% corresponds to a loan with an LTI of 5 assuming an interest rate of 5% and a maturity of 20 years.

substantially lower wage). Assuming linear repayment of loans, and after adding 1% of the loan amount as the property maintenance cost per year, the costs associated with the underlying property would exceed 40% of net income for half of new loans in the event of the said rise in interest rates (see Chart IV.19). If income simultaneously dropped by 30%, the figure would rise to three quarters. Increased riskiness of new loans is also indicated by an alternative stress simulation using CZSO data on the average essential costs of living of households with a mortgage loan broken down by income group. After loan instalments are deducted from income, the proportion of new loans in respect of which clients' funds would fall below the level needed to cover essential costs would be 11% after the shock to interest rates and 52% given the simultaneous drop in income (see Chart IV.20). For clients with low net income, such risky loans would account for 37% and 93% respectively of the loans provided to them. The shares of such loans in loans with DSTIs of higher than 40% would be 63% and 96% respectively (see Chart IV.21). The stress used in the aforementioned simulations is highly implausible and abstracts from the possibility that the client's household has several sources of income. The vulnerability of both credit institutions and households is also partly reduced by the predominant longer interest rate periods (77% of new loans were provided with fixation periods of five years or more in the second half of 2015; see section 2.4).

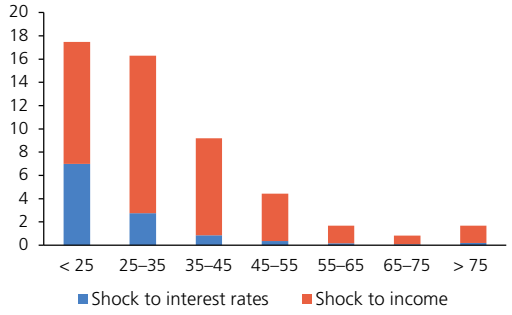
### …and more frequent occurrence in the case of loans with higher LTV ratios

Another risk factor is the fact that the highest share of loans with both high LTIs and high DSTIs in the second half of 2015 was recorded for loans in the 80%–90% LTV category (30% of new loans with these characteristics; see Chart IV.22). This LTV category also contains by far the highest share of loans to clients who also have low income (28% of new loans with these characteristics). With the LTV ratio increasing, the probability/rate of coverage of outstanding principal by the sale of collateral in the event of default decreases.

CHART IV.20

**Share of potentially impaired new loans in the stress broken down by income category**

(x-axis: net monthly income in CZK thousands; y-axis: share of loans in %)

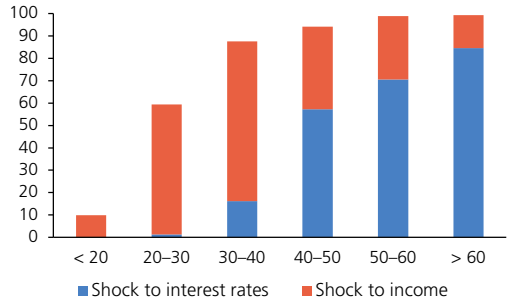



Source: CZSO, CNB, CNB calculation
Note: The stress assumes a rise in interest rates of 3 pp and a fall in income of 30%. Potentially unrepaid loans comprise those which for funds would fall below the level needed to cover essential costs after loan instalments are deducted from income. For these assumed the CZSO data on average essential costs for households with a mortgage broken down by income category.

CHART IV.21

**Share of potentially impaired new loans in the stress broken down by DSTI category**

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

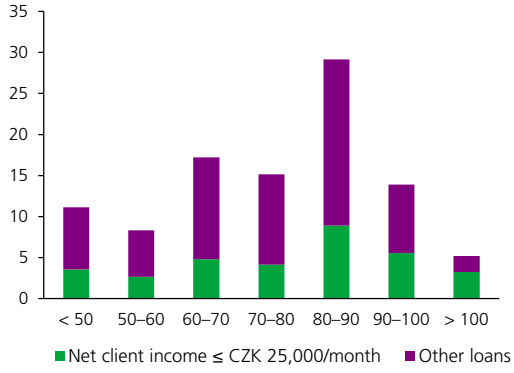



Source: CZSO, CNB, CNB calculation
Note: The stress assumes a rise in interest rates of 3 pp and a fall in income of 30%. Potentially unrepaid loans comprise those which for funds would fall below the level needed to cover essential costs after loan instalments are deducted from income. For essential costs, the CZSO data on average essential costs for households with a mortgage broken down by income category were used.

CHART IV.22

**LTV distribution of new loans with both high LTIs and high DSTIs**

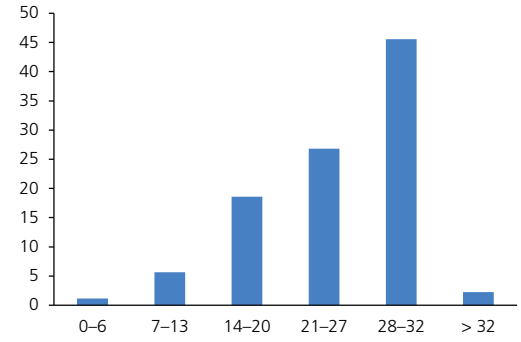
(x-axis: LTV in %; y-axis: share of loans in %)




Source: CNB
Note: LTIs of higher than 5 and DSTIs of higher than 40% are considered high values.

CHART IV.23

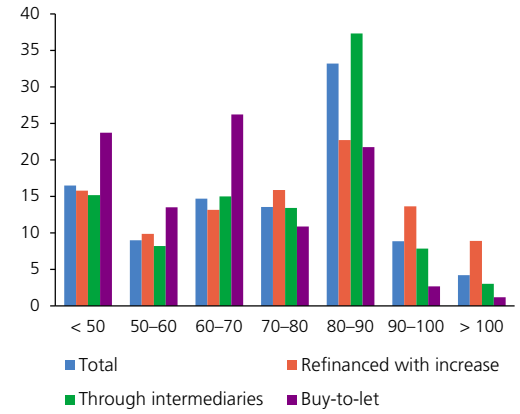
**Distribution of new loans by number of years between provision and repayment**
(x-axis: number of years; y-axis: share of loans in %)




Source: CNB

CHART IV.24

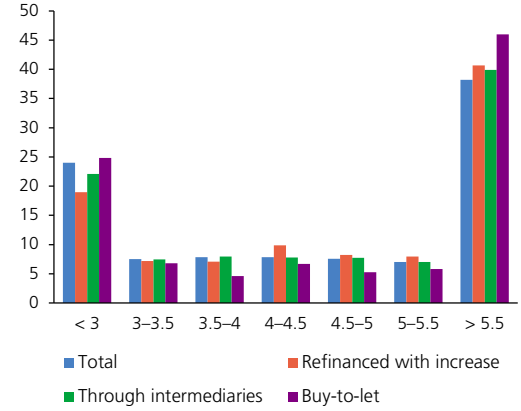
**LTV distribution of new loans from various perspectives**
(x-axis: LTV in %; y-axis: share of loans in %)




Source: CNB

CHART IV.25

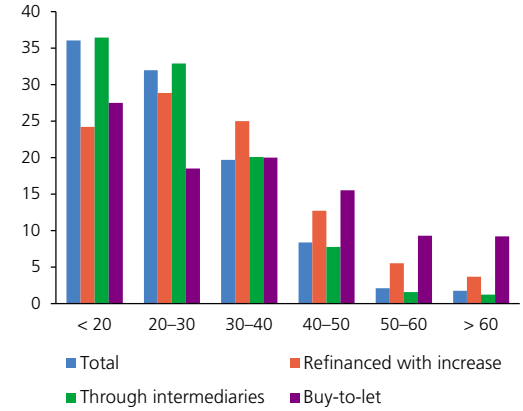
**LTI distribution of new loans from various perspectives**
(x-axis: LTI; y-axis: share of loans in %)




Source: CNB

CHART IV.26

**DSTI distribution of new loans from various perspectives**
(x-axis: DSTI in %; y-axis: share of loans in %)




Source: CNB

**A long average repayment period favourably affects the DSTI ratio**

Recommendation C states that the term of a loan should not exceed the expected remaining period of economic activity of the client or the lifetime of the property. As a rule, it should not exceed 30 years. The average repayment period of new loans provided in the second half of 2015 was 24 years and thus overlapped with most of the whole period of economic activity of the client. The majority of new loans are to be repaid by the end of the 32nd year after they were provided (see Chart IV.23).[41] However, there are institutions in respect of which a significant proportion of new loans have been provided for more than 30 years.[42] Long loan repayment periods reduce households' annual debt service costs. However, many loans are provided with high DSTIs despite having long maturity (11% of loans with maturity of around 30 years or more were provided with a DSTI of higher than 40%). Such loans are particularly subject to the risk of default in the event of a rise in interest rates or a fall in income.

**Recommendation C: Loan term and repayment schedule**

**Refinanced loans have riskier characteristics**

Recommendation D states that institutions should separately monitor credit risk on new refinanced loans with an increase in outstanding principal of more than 10% or CZK 200,000 and compare that risk with that on other loans. Refinanced loans with the said increase in outstanding principal accounted for about 6% of new loans in the second half of 2015 and were granted much more frequently with an LTV of more than 90% and also with high DSTIs (see Charts IV.24 and IV.26). This suggests that such loans are potentially more risky.

**Recommendation D: Approach to increasing loans when refinancing**

**Intermediaries are a dominant source of new loans**

Recommendation E states that institutions should also separately monitor credit risk on new loans negotiated by intermediaries and compare it with that on other loans. Loans provided by intermediaries accounted for 60% of new loans in the second half of 2015. The LTV, LTI and DSTI distributions of these loans are similar to those of loans provided directly by banks (see Charts IV.24, IV.25 and IV.26).

**Recommendation E: Lending through intermediaries**

**Buy-to-let loans are not significant yet**

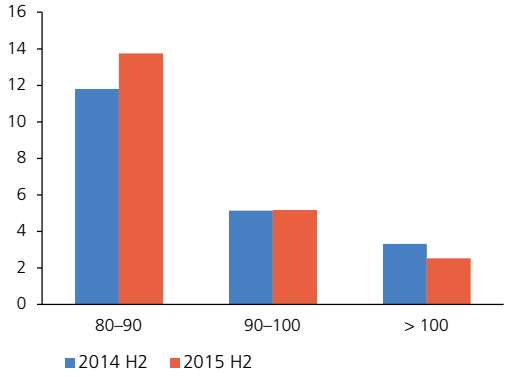
According to Recommendation F, institutions should separately monitor the characteristics of owner-occupied and buy-to-let loan portfolios. Loans of the latter type accounted for just 4% of new loans according to data provided by banks. Such loans much more often had an LTV of less than 80% (see Chart IV.24) and high LTIs and DSTIs (see Charts IV.25 and IV.26). Loans with very high DSTIs (of higher than 60%) are concentrated in the categories of monthly income of more than CZK 80,000 (78% of such loans) and LTVs of less than 70% (90% of such loans).

**Recommendation F: Financing buy-to-let purchases of property**

41 Repayment may start some time after the loan was provided due to delayed drawdown.
42 For the reason given in the previous footnote it is impossible for some loans to determine exactly from the data whether their maturity exceeds 30 years.

CHART IV.27

**Risk-weighted amount of new loans with the highest LTV values**
(x-axis: LTV in %; y-axis: risk-weighted amount of loans in CZK billions)




Source: CNB
Note: The *risk-weighted amount of new loans* was obtained by multiplying (*LTV + price overvaluation as estimated by the CNB*) by the share of loans with an LTI of more than 5 and by the amount of new loans in the given LTV categories.

**The assessment of compliance with the Recommendation reveals growing risks on loans with an LTV of 80%–90%**

*An indicator of the risk-weighted amount of new loans secured by residential property* has been compiled for the purposes of performing an overall assessment of the risks associated with new loans secured by residential property.[43] The risk-weighted amount of new loans increased substantially in the second half of 2015 in the case of loans with an LTV of 80%–90% (see Chart IV.27). Loans with high LTIs and DSTIs, which are often granted to clients with low income, are also concentrated in this LTV category. It is also the most frequently represented category among newly provided loans (33% of loans provided in the second half of 2015) in which the average collateral value recorded the highest growth. The CNB therefore deems it necessary to modify the Recommendation by lowering the maximum LTV levels.

**Potentially growing risks must be taken into account in the tightening and expanding of the Recommendation**

The CNB does not assess the aforementioned risks as an acute market overheating giving rise to a direct risk to financial stability. However, the assessment of compliance with the Recommendation indicates that credit standards are highly relaxed and that some institutions may be taking on significantly increased risks. The CNB also observes that the environment of very low interest rates is starting to be reflected in growth in the indebtedness of households, including those with lower and less stable income. The CNB also draws attention to the fact that the perceived profitability of buying residential property on credit may partly be an illusion. This is the case when low interest rates and softer credit standards are fostering growth in property prices, which is then reflected in the size of the loans needed to finance property purchases. At the same time, the growth in residential property prices may not be fully grounded in fundamentals. The ultimate result may be excessive growth in debt relative to income and vulnerability of households to income and interest rate shocks.

**Recommendation A is being tightened**

In light of the aforementioned assessment of compliance with the Recommendation and the risk of growth in the overvaluation of apartment prices, the upper LTV limit of 100% recommended up to now will be reduced to 95% as from 1 October 2016 and to 90% as from 1 April 2017. This transition period will enable banks to adjust their internal business and risk management processes. The current recommended limit of 10% of new loans with an LTV of 90%–100% will change to a limit of 10% of new loans with an LTV of 85%–95% as

43 The *indicator of the risk-weighted amount of new loans secured by residential property* was obtained by multiplying the share of loans with an LTI of more than 5 by *(LTV + price overvaluation as estimated by the CNB)* and by the amount of new loans in the given LTV categories. It thus combines information about risk characteristics indicating an increased risk of loan default, collateral with regard to the current overvaluation of residential property prices as estimated by the CNB (the percentage margin, or insufficient collateral to cover the existing principal in the event of a drop in property prices to their equilibrium level and the sale of collateral; see section 2.2) and the amount of such loans.

from 1 October 2016. The limit will be set at 15% of new loans with an LTV of 80%–90% as from 1 April 2017. At the same time, the CNB will assess collateral valuation procedures in individual institutions from the perspective of both internal methodologies and practices.

**Recommendation F on the provision of buy-to-let loans is being extended**

The amount of buy-to-let loans reported by institutions is low, but indications from the market suggest that the true volume of such transactions is considerably higher.[44] Certain risk characteristics of such loans, together with the evolution of market prices, have led the CNB to extend Recommendation F by including a recommendation to improve the quality of risk management in this area as regards correctly identifying the purpose of a loan. Institutions should use all available information to determine whether a loan is being used to finance owner-occupied housing or as an investment. If an investment loan shows a combination of characteristics with a higher risk level, they should apply an LTV of 60% at most.

**The economic nature of the lending activities of building societies is crucial for assessing compliance with the Recommendation**

Bridging loans from building societies accounted for 54% and 42% of loans in excess of the limit with an LTV of 90%–100% and more than 100% respectively.[45] However, the average term of these loans is comparable to that of mortgage loans – ranging from 14 to 29 years across building societies. According to survey data, bridging loans also differ little from mortgage loans in terms of interest rate level (the average bridging loan and mortgage loan interest rate was 2.2% and 2.8% respectively in the second half of 2015). In addition, bridging loans show riskier characteristics than mortgage loans (more frequent concurrence of loans with high LTVs and DSTIs and low net income). The CNB will therefore analyse loans provided by building societies in detail from the point of view of their economic nature, although some differences in their business model may arise from a legal framework for building savings schemes.

**The CNB sees increased risks to the debt servicing ability of clients with low income**

In view of the high share of new loans provided to clients with low income, the CNB will prepare for the introduction of quantitative LTI and DSTI recommendations in 2018 at the latest. This plan is in accordance with the consumer credit law that is currently in the legislative process, specifically with the part relating to the assessment of the creditworthiness of loan applicants. Binding LTV, LTI and DSTI limits are applied in a number of EU countries. According to ESRB data, LTV limits were being applied in 16 EU countries and LTI/DSTI limits in nine Member States at the end of 2015 by means of regulations with various degrees

44 Some commercial sources say that the actual figure is as high as 15% of loans.
45 Building societies only reported bridging loans and building savings loans as new secured loans.

of legally binding effect and in various forms. Regulation of these limits was enacted in the law on loans for house purchase in Slovakia at the end of 2015.

**Enactment of the quantitative part of the Recommendation is the CNB's priority**

In accordance with ESRB recommendations,[46] the CNB will seek enactment of the power to set LTV, LTI and DSTI limits and, where appropriate, other risk parameters for house purchase loans.[47] The consumer credit law appears to be the most suitable statute for this purpose. It would enable the CNB to apply unified rules to the entire market for house purchase loans and thus avoid the risk of loans spilling over to non-bank providers. The CNB's powers in this area would be preventive in nature. They should enable the CNB to respond effectively to emerging risks to financial institutions and consumers which might arise from excessive softening of credit standards. The alternative would be strong measures in the area of institutions' capital, which could be more costly from the perspective of the national economy.

**The CNB stands ready to use other instruments as well**

If credit growth accelerates and systemic risks increase, it may be necessary to use other instruments in the area of capital requirements. These include an increase in the countercyclical buffer rate (see section 4.2.2) and the potential application of additional Pillar 2 or systemic risk buffer requirements.

### 4.3.2 RISK WEIGHTS OF HOUSE PURCHASE LOANS SECURED BY RESIDENTIAL PROPERTY AND THEIR POTENTIAL INCREASE UNDER THE CRR

The long-running growth in house purchase loans secured by residential property, along with its accelerating growth rate and its significant share in total loans, represents a source of systemic risk for the Czech banking sector. In such a situation, it is essential to evaluate whether this gives rise to a need to apply regulatory instruments targeting the risk weights (RWs) on property exposures.

46 The ESRB recommends Member States to assess, in cooperation with the macroprudential authorities, whether the macroprudential instruments, currently under the direct control or recommendation powers of the latter, are sufficient to effectively and efficiently pursue the ultimate objective of macroprudential policy, and if the assessment indicates that the available instruments are not sufficient, to consider, in cooperation with the national macroprudential authorities, additional macroprudential instruments that should come under the direct control or recommendation powers of the latter (*ESRB recommendation on intermediate objectives and instruments of macroprudential policy of 4 April 2013* (ESRB/2013/1)). This recommendation is elaborated in the recitals of Directive 2014/17/EU on credit agreements for consumers relating to residential immovable property (MCD), particularly recitals 55 and 56. Recital 55 of the MCD states among other things that "Member States should be able to issue additional guidance on those or additional criteria and on methods to assess a consumer's creditworthiness, for example by setting limits on loan-to-value or loan-to-income ratios". Such discretion has not been applied in the Czech Republic as yet.

47 This recommendation is also included in article 11 of the concluding statement of the 2016 IMF mission. For details see *Czech Republic: Concluding Statement of the 2016 Article IV Mission* available at www.imf.org.

**In addition to microprudential instruments, three macroprudential instruments are available…**

The options for regulating RWs can basically be divided into two groups. The first group comprises macroprudential instruments that can be applied to individual banks. They include assessment of the adequacy of credit risk capture by internal approaches (Article 101 of the CRD) and the option of applying supervisory measures to banks with similar risk profiles (Article 103 of the CRD). The second group contains macroprudential instruments that can be applied universally to all banks. They are defined in Articles 124 and 164 of the CRR and their application lies in the power of the supervisory authority. They pertain to RWs and loss given default (LGD) on property exposures. The macroprudential authority may also apply Article 458 of the CRR in the event of growth in macroprudential or systemic risk.[48]

Article 124 allows competent authorities to adjust the minimum RW for banks using the standardised approach to measuring credit risk (STA) if the RW of 35% on loans for house purchase is not appropriately based on the loss experience, forward-looking property market developments or any other risks in the financial stability area. This measure has been applied in various ways in Luxembourg, Ireland and the UK.

Article 164 enables competent authorities to modify the minimum LGD value for banks using internal models for measuring credit risk (IRBs) after assessing the loss experience and demonstrating that the LGD value is not sufficient to guarantee financial stability in the future. Article 164 has been applied by Norway, which raised the RW for mortgage loans by setting a minimum LGD of 20%.

The effects of the measures under Articles 124 and 164 differ for the two groups of banks. Article 124 directly regulates the minimum RW in the same way for all STA banks. Article 164 sets a minimum LGD value for IRB banks, which will affect the final RWs differently depending on the probability of default (PD). RWs will be higher for banks with riskier credit portfolio profiles, but may also be affected by a more conservatively configured PD.

Article 458 enables authorities to respond to emerging macroprudential or systemic risk using various measures. These include setting minimum RWs for STA and IRB banks. However, the macroprudential authority must prove the existence of systemic risk and also the fact that microprudential instruments (Articles 101 and 103 of the CRD), macroprudential instruments (Articles 124 and 164 of the CRR) and

48 The conditions for the application of Article 124 and Article 164 are stipulated for the time being in a consultation paper published on the EBA website on 6 July 2015. However, this is not the final version, so the conditions may change. Moreover, the conditions for applying these instruments can be expected to serve only as non-binding recommendations. The conditions for the application of Article 458 are set forth in the CRR regulation.

TABLE IV.6

**Selected indicators relating to the property market**
(%)

| | BE | SE | LU | UK | IE | SK | CZ | AT | IT | FI | FR | DE | NL | EE | PT | ES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mortgage loans (2010=100) | 171 | 161 | 147 | 128 | 70 | 207 | 137 | 133 | 128 | 128 | 124 | 113 | 109 | 104 | 89 | 84 |
| Property prices (2010=100) | 109 | 138 | 126 | 125 | 99 | 104 | 105 | 132 | 86 | 107 | 101 | 118 | 90 | 156 | 94 | 75 |
| Price-to-income (2010=100) | 105 | 114 | 112 | 107 | 93 | 93 | 98 | 117 | 87 | 96 | 96 | 116 | 83 | 117 | 95 | 74 |
| Price to rent (2010=100) | 101 | 120 | 116 | 106 | 87 | 102 | 93 | 108 | 82 | 98 | 93 | 121 | 76 | 82 | 85 | 74 |
| Household debt-to-GDP | 59 | 84 | 57 | 86 | 74 | 30 | 31 | 51 | 43 | 67 | 57 | 54 | 111 | 17 | 78 | 69 |

Source: ECB, OECD, Eurostat, BIS
Note: The position on the colour scale for the given country denotes the level of risks associated with the relevant indicator (green lower, red higher) relative to its values in the other countries. The data on mortgage loans are as of the end of 2015, property prices and household debt-to-GDP as of 2015 Q3 (as of the end of 2014 for household debt in Estonia and Slovakia) and price-to-income and price-to-rent as of 2015 Q2 (as of the end of 2014 in Belgium and as of 2015 Q1 in Germany).

capital buffers (Articles 133 and 136 of the CRD)[49] are not sufficient to mitigate these risks. The application of the measures set out in Article 458 is materially and administratively very demanding and requires discussion in a number of EU bodies. This measure is currently applied only by Belgium, which has maintained 5 pp higher risk weights on residential property for IRB banks since 2014.[50]

**…the conditions for their application are difficult to meet in the Czech Republic at present**

Table IV.6 shows selected indicators relating to the property market in the Czech Republic and EU countries. The first part focuses on the five countries which have adopted direct measures to increase RWs. The second part shows the countries which have not adopted such measures yet.

With the exception of Ireland, where the property market bubble burst in late 2007 and early 2008, all countries in the first group have experienced growth in mortgage loans and some increase in property prices since 2010 amid relatively high household debt levels. The Czech Republic has also recorded relatively high growth in mortgage loans since 2010. The other indicators that can be used to assess the option of applying the aforementioned articles of the CRR do not indicate elevated risks:

1. The loss expectation for house purchase loans[51] secured by residential property with an RW of 35% should be below or equal to 1.5% for STA banks. The loss expectation for all STA banks, IRB banks and building societies in the Czech Republic is well below this level.

49 Articles 133 (the systemic risk buffer, SRB) and 136 (the countercyclical capital buffer, CCyB) of the CRD are not addressed in this analysis as they are instruments that regulate capital buffers, not risk weights.
50 The RWs on the mortgage loans of Belgian banks are at around 15%, including a 5% add-on pursuant to Article 458. Such low RWs may be due to the fact that Belgium has not experienced a property market crisis for quite some time. Models may therefore not reflect the true PD and LGD.
51 The loss expectation is the percentage ratio of expected losses on loans that have gone into default in the past six months to total exposures secured by property in the Czech Republic. The limit is set for the time being in a consultation paper published on the EBA website on 6 July 2015.

2. RWs are generally lower for IRB banks than for STA banks (see section 3.1). RWs on mortgage loans of domestic IRB banks are among the highest in Europe, but their absolute level cannot be described as high. They stayed at around 28% over the past two years and fell by 0.9 pp year on year to 26.7% at the end of 2015.[52] For IRB banks the PD level, and hence also the RW level, is most affected by the LTV level (see Chart IV.28). The LTI ratio has only a limited impact. This is because a certain minimum income level is a general measure of a client's creditworthiness, but the PD level is not significantly affected by LTI.

3. Domestic IRB banks show an LGD of around 25%.[53] The CNB's April 2015 survey of NPL recovery rates indicates that this LGD level has been sufficient so far. However, the *Adverse Scenario* of the macro-stress tests (see section 3.2) assumes an LGD of 40%. The current LGD level would not be sufficient if that scenario materialised.

Table IV.7 summarises the conditions for the application of macroprudential measures and the fulfilment thereof. The RW level is currently relatively high in the EU context, while the PD and LGD settings are mostly prudent and the current loss experience is low. The risks on the property market are growing but still cannot be described as excessive. Application of the aforementioned macroprudential instruments is not therefore justifiable in the current situation. However, it should be noted that the analysis based on the presented indicators is only partial and does not allow for sufficient capture of all potential systemic risks.

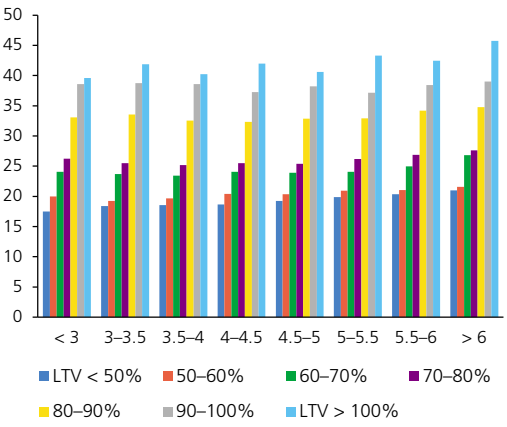
### 4.3.3 RISKS ASSOCIATED WITH THE PROVISION OF LOANS SECURED BY COMMERCIAL PROPERTY

**Activity on commercial property markets is increasing…**

High demand from Czech and foreign investors for commercial property in the Czech Republic is creating potential for price overvaluation in some market segments (see section 2.2). Although part of this demand is financed from abroad and from non-bank sources, the risk associated with exposures to these segments may increase for banks in the Czech Republic. Given the signs of increased activity on the commercial property market, the fast-growing volume of loans to finance purchases of such property and the lack of granular data from standard reports, the CNB started to conduct surveys on new loans secured by commercial property[54] provided in the second half of 2014 and in 2015. The surveys

CHART IV.28

**Risk weights on loans for house purchase broken down by LTV and LTI level as of 31 December 2015**
(x-axis: LTI in %; y-axis: risk weights in %)




Source: CNB
Note: Average risk weights on retail loans secured by property (non-SMEs) at selected banks participating in joint CNB stress tests.

TABLE IV.7

**Criteria for the application of macroprudential measures and fulfilment thereof**

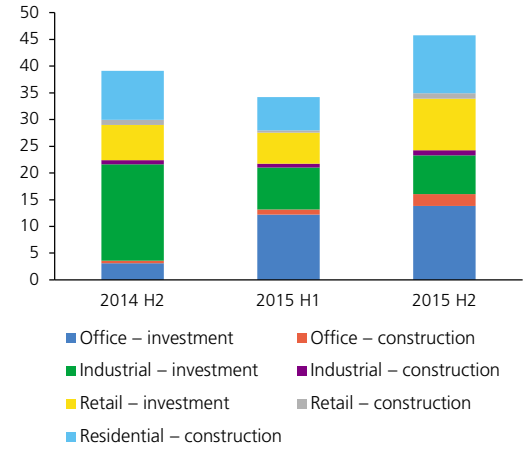
| | Article 124 | Article 164 | Article 458 |
|---|---|---|---|
| Loss experience | No evidence of risk | No evidence of risk | - |
| Stability of property market | Moderate evidence of risk | Moderate evidence of risk | Moderate evidence of risk |
| RW | - | No evidence of risk | No evidence of risk |
| LGD | - | Low evidence of risk | - |
| Assessment of applicability of other measures | - | - | No evidence of risk |
| Activation recommendation | No | Conditional | No |

Source: CNB

52 This is a weighted average for the banking sector as a whole, where the weights are the total amounts of retail exposures secured by residential property.
53 However, two banks have LGDs of less than 15%.
54 The survey concerned eight banks covering about 70% of the market as of 30 June 2015.

CHART IV.29

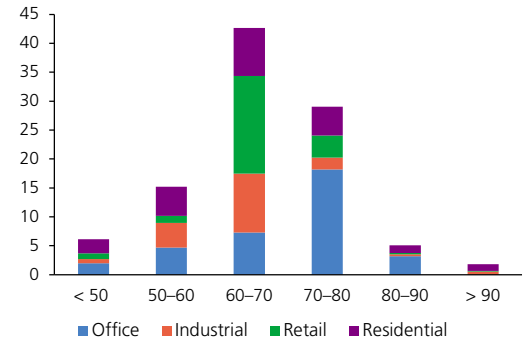
**Amount of new loans secured by commercial property**
(CZK billions)




Source: CNB

CHART IV.30

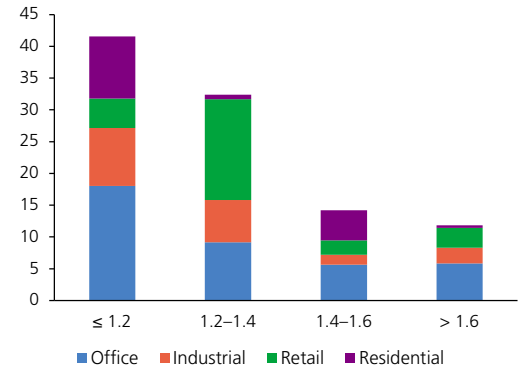
**LTV distribution of new loans broken down by collateral segment**
(x-axis: LTV in %; y-axis: share of loans in %)




Source: CNB

CHART IV.31

**DSCR distribution of new loans broken down by collateral segment**
(x-axis: DSCR in %; y-axis: share of loans in %)




Source: CNB

cover new loans for investment in existing and new commercial property.[55]

### …demand for loans to finance commercial property purchases is rising…

According to data from the survey, the amount of new loans secured by commercial property rose by 17% year on year in the second half of 2015 (see Chart IV.29). The largest amount of loans was provided for investment in office and retail property and construction of residential property. The largest year-on-year growth was recorded for loans for investment in office property and the biggest year-on-year decline for loans for investment in industrial property.

### …and credit standards may be relaxing

More than 35% of loans covered by the survey were provided with an LTV of higher than 70% (see Chart IV.30). The share of such loans for office property exceeded 60%. More than 40% of loans from the survey were provided with a debt service coverage ratio[56] (DSCR) of less than or equal to 1.2, which can be considered low (see Chart IV.31). The highest share of such loans (again more than 60%) was for the construction of residential property. The higher riskiness of loans granted with a higher LTV is not often offset by a higher DSCR. Loans covered by the survey with an LTV of more than 70% and a DSCR of less than or equal to 1.2 accounted for 24% of the production of the banks surveyed. In the case of office property and residential development projects, the figures were 35% and 27% of new loans respectively (see Chart IV.32). The concurrence of these two characteristics increases the risk associated with such loans, as the property used as collateral also tends to be the only source of income for debt repayment. A drop in property prices accompanied by a fall in incomes in individual segments could thus easily give rise to a higher default rate and simultaneously a lower recovery rate in the case of subsequent sale of collateral in those segments.

### Loans for financing office property and residential development projects were identified as having the highest risks

A *riskiness indicator* was used to comprehensively assess the risk characteristics of new loans secured by commercial property. The indicator was created using data on LTV and DSCR values in individual categories, weighted by the share of loans in those categories.[57] A comparison of this indicator across commercial property segments reveals that loans for financing office property are potentially the most risky (see Chart IV.33). New loans for financing industrial property and residential development projects may be similarly risky from this point of

55 Residential development projects were also treated as commercial property.
56 The debt service coverage ratio is defined as the ratio of income on the property used as collateral to the client's annual debt service associated with the loan.
57 The *indicator of the riskiness of new loans secured by commercial property* is a weighted average across the joint distribution of LTV ratios and the inverse values of the DSCR. Higher values of this indicator signify higher loan riskiness. Conversely, higher DSCR values mean lower loan riskiness. For this reason, inverse values of the DSCR were used to construct the indicator.

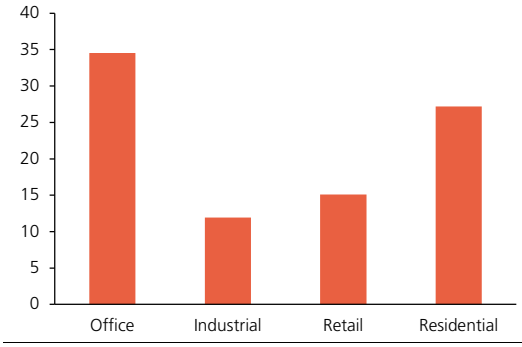
view. The riskiness of loans secured by office property and residential development projects may be further increased by the high office vacancy rate and potential overvaluation of asking prices of apartments in Prague (see section 2.2). By contrast, a low and further decreasing vacancy rate is reducing the riskiness of loans secured by industrial property. However, it is difficult to perform an exact assessment of the risks associated with the commercial property market due to the substantial influence of demand from abroad, not enough data on which is available.

### The loss expectation for banks' current portfolio of loans secured by commercial property is low

For loans secured by commercial property (like for exposures secured by residential property; see section 4.3.2), Articles 124 and 164 of the CRR specify the option of applying, respectively, preferential risk weights of 50% for STA banks and a minimum LGD value of 15% for IRB banks. According to regulatory technical standards, a condition for the application of preferential risk weights by STA banks[58] is a loss expectation[59] of less than 2% for such loans. The Czech banking sector's aggregate loss expectation for loans secured by commercial property stood at 0.4% for STA and IRB banks together as of 30 December 2015 and was thus well below this level. The CNB therefore cannot increase the preferential risk weights for STA banks and the minimum LGD value for IRB banks.

CHART IV.32

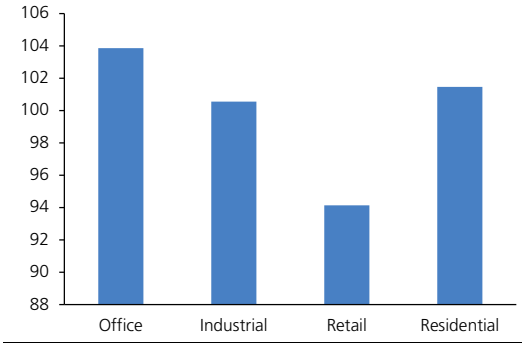
**Share of loans with an LTV of more than 70% and a DSCR of less than or equal to 1.2 broken down by collateral segment**
(%)




Source: CNB

CHART IV.33

**Indicator of the riskiness of new loans secured by commercial property broken down by collateral segment**
(average = 100)




Source: CNB
Note: The indicator of the riskiness of new loans secured by commercial property was created using data on LTV and DSCR values in individual categories, weighted by the share of loans in those categories.

58 Article 164 of the CRR states that the appropriateness of application of the minimum LGD value by IRB banks should be assessed on the basis of the loss experience and loss expectation for loans secured by commercial property and also on the basis of financial stability considerations.
59 The loss expectation is the percentage ratio of losses to total exposures. The limit is set for the time being in a consultation paper published on the EBA website on 6 July 2015.

## 4.4 MACROPRUDENTIAL POLICY AND THE REGULATORY ENVIRONMENT IN THE EU

### 4.4.1 MACROPRUDENTIAL POLICY IN THE EU

Macroprudential authorities in EU countries at present mostly use instruments designed to ensure fulfilment of intermediate objectives aimed at preventing misaligned incentives and curbing excessive credit growth. Non-euro-area countries are more active in applying macroprudential instruments.[60] Table IV.8 summarises the application of such instruments in the European countries under review (the EU plus Norway) as of January 2016.[61]

Misaligned incentives are prevented mainly by means of the systemic risk buffer (SRB). As in the Czech Republic, it is used in most cases to mitigate risks associated with domestic systemically important banks. The SRB rate is no more than 3% in the countries under review. Although some Member States have identified global systemically important institutions (G-SIIs), none has introduced a non-zero G-SII buffer in advance. The identified G-SIIs will start to fill up the buffer this year and the buffer should reach full capacity corresponding to their systemic importance by 2019. Member States were obliged to identify other systemically important institutions (O-SIIs) by the end of 2015. The CNB has met this requirement (see section 4.2.3). Only a few national authorities have set an O-SII buffer.

Most Member States, including the Czech Republic, have introduced the capital conservation buffer at the maximum rate. The rest will make it up by the end of 2018. Given the credit market situation, some countries are applying the countercyclical buffer (CCyB). Member States have been obliged to set this buffer since the start of 2016. Of the European countries under review, non-zero CCyB rates have been introduced in Sweden, Norway and the UK as well as the Czech Republic (see section 4.2.2). The regulations introduce automatic recognition of CCyB rates among EU Member States up to a level of 2.5% (see section 4.4.2).

Further measures to curb excessive credit growth are currently focused on the property market. They are applied mainly to exposures to residential property. They can be divided into measures to increase the resilience of banking institutions (by regulating risk weights) and measures to strengthen the resilience of debtors (by setting limits on the risk characteristics of exposures – LTV, LTI or DSTI) (see section 4.3). The most frequently used measure is an upper limit on the LTV ratio. It is supplemented by LTI or DSTI limits in some cases. Other frequently used instruments relating to the property market include a maximum maturity for house purchase loans, usually 30 years, and a requirement to repay loan principal.

60 See, for example, *Macroprudential Bulletin*, Issue 1/2016, published on the ECB website, or *Review of Macroprudential Policy in the EU in 2015*, March 2016, published on the ESRB website.

61 ESRB (2016): *National measures in the EU/EEA notified to the ESRB, or of which the ESRB is aware, and that are of macro-prudential interest (January 2016)*, https://www.esrb.europa.eu/mppa/html/index.en.html

TABLE IV.8

**List of active macroprudential instruments in the EU and Norway**
(as of 31. 1. 2016)

| Risk | Measure | AT | BE | BG | CY | CZ | DE | DK | EE | ES | FI | FR | GR | HR | HU | IE | IT | LT | LU | LV | MT | NL | NO | PL | PT | RO | SE | SI | SK | UK | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Excessive credit growth and leverage | Capital conservation buffer | | | • | • | • | | • | • | | • | | | • | | | • | • | • | • | • | | • | • | • | • | • | | • | • | 19 |
| | Countercyclical capital buffer (CCyB) | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | 29 |
| | Leverage ratio | | | | | | | | | | | | | | | | | | | | | | | | | | | | | • | 1 |
| | Loan-to-value (LTV) | | | | • | • | | • | • | | | | | | • | • | | • | | • | • | • | • | • | | • | • | | • | | 15 |
| | Debt-service-to-income (DSTI) | | | | • | | | | • | | | | | | • | | | • | | | | | | | • | | • | | | • | | 7 |
| | Loan-to-income (LTI) | | | | | | | | | | | | | | | • | | | | | | | | | | | | | | • | 2 |
| | Loss-given-default (LGD) | | | | | | | • | | | | | | | | | | | | | | | • | | | | | | | | 2 |
| | Risk weights | | • | | | | | | | | | | | • | | • | | | • | | | • | • | | | • | • | | | • | 9 |
| Misaligned incentives | Systemic risk buffer (SRB) | • | | • | | • | | • | • | | | | | • | | | | | | | | • | • | | | | • | | • | | 10 |
| | Global systemically important institution buffer (G-SII buffer) | | | | | | • | | | • | | • | | | | | • | | | | | • | | | | | • | | | • | 7 |
| | Other systemically important institution buffer (O-SII buffer) | | • | | • | •* | • | • | •* | • | • | • | • | • | • | • | • | • | • | •* | • | • | • | | • | • | • | • | • | •* | 26 |
| Liquidity | Liquidity ratio | | | | | | | | | | | | | | • | | | • | | | | | | • | | | • | | | | 4 |
| | Loan-to-deposit (LTD) | | | | | | | | | | | | | | | | | | | | | | | | | | | • | | | 1 |
| Other | Pillar II | | • | | • | | | • | | | | | | | | | | • | | | • | | | | | | • | • | | | 7 |
| | Loan amortisation | | | | | | | | | | | | | | | | | | | | | • | • | | | | | | • | | 3 |
| | Loan maturity | | | | | | | | • | | | | | | | | | • | | | | | | • | | • | | | • | | 5 |
| | Stress test | | | | • | | | | | | | | | | | • | | • | • | | | | • | | | • | | | • | • | 8 |
| | Other measures | | | | | • | | | | | | | | | | • | | | | | | | | • | | | • | | • | | 5 |
| **Total** | | **2** | **4** | **3** | **7** | **6** | **3** | **7** | **7** | **3** | **3** | **3** | **2** | **5** | **5** | **7** | **4** | **9** | **5** | **4** | **5** | **7** | **9** | **7** | **3** | **8** | **10** | **4** | **10** | **8** | **160** |

Source: ESRB, adapted by CNB
Note: The table is derived from the overview of macroprudential measures published on the ESRB website. It is a simplified list of measures.
(1) O-SIIs identified, no reserve set.

The CNB monitors the activities, risk assessment approaches and measures of foreign macroprudential authorities. It also analyses their possible cross-border effects in connection with the framework for mutual recognition of macroprudential measures (see section 4.4.2).

The current levels of buffers, overall capital requirements and other instruments in the Czech Republic are set depending on the evolution of cyclical and structural parameters of the domestic credit market. In some European countries, buffers reflecting the systemic importance of banks are set at a higher level than in the Czech Republic, but only for banks that are much bigger relative to the country's GDP than those in the Czech Republic. Unlike the Czech Republic, some countries have implemented measures aimed at increasing risk weights on mortgage loans. However, even after the application of those measures, the risk weights in those countries remain lower than in the Czech Republic. The CCyB is currently only at a non-zero level in countries experiencing rapidly rising residential property prices and high household debt (Norway, Sweden, Switzerland and the UK). However, introduction of the CCyB is being considered in other countries that are only experiencing rising credit growth, similarly as in the Czech Republic.

### 4.4.2 RECIPROCITY OF MACROPRUDENTIAL MEASURES

In the single EU financial market, national authorities cannot pursue macroprudential policy in isolation. Macroprudential policy measures are automatically applied to institutions established under national law. However, they may not apply, for example, to foreign bank branches in the relevant country and to foreign banks providing services directly in the Member State concerned. Such measures may also influence the activities of domestic institutions in other Member States, usually via their foreign branches. This may result in the application of different macroprudential requirements to the same type of exposure in the same Member State depending on the legal form and registered address of the financial services provider. This may reduce the effectiveness of national authorities' macroprudential policy and lead to circumvention of their measures through cross-border leakages and regulatory arbitrage. An example would be a situation where a national authority introduces limits on the provision of a certain type of loan and, in response, foreign bank branches start providing this type of loan under the original terms and conditions to an increased extent.

A partial solution to this risk is mutual cross-border recognition of national macroprudential measures (reciprocity). Reciprocity is binding to various degrees under current European law. It is binding for some measures and voluntary for others. For some measures, however, it is not regulated at all (see Table IV.9).

TABLE IV.9

**Regulation of reciprocity in European law**

| Macroprudential measure | Legal basis for measure | Reciprocity under EU law |
|---|---|---|
| Regulation of risk weights for STA banks | 124 of CRR | Mandatory |
| Regulation of risk weights for IRB banks | 164 of CRR | Mandatory |
| Countercyclical buffer | 130, 135-140 of CRD IV | Mandatory up to 2.5% |
| Systemic risk buffer | 133-134 of CRD IV | Voluntary |
| National macroprudential measures | 458 of CRR | Voluntary |
| Other systemically important institution buffer | 131 of CRD IV | Not regulated |
| Pillar II measures | 103 of CRD IV | Not regulated |

Source: CNB
Note: STA Banks use the standardised approach to credit risk management and thus determine the risk weight for each exposure according to values laid down by law. IRB banks use internal models to determine risk weights.

Experience shows that national macroprudential measures are rarely reciprocated voluntarily.[62] The ESRB has therefore prepared a draft framework for voluntary reciprocity. This framework is designed to ensure that macroprudential measures for which reciprocity is not mandatory by law are effective. In this respect, macroprudential measures can be divided into two main categories according to their importance for reciprocity. The first involves measures that respond to cyclical or structural risks arising in the national economy. In this case, the expectation of reciprocity is strong. The other contains measures that respond to risks relating to one or more banks in the national banking system. In this case, the need for reciprocity must be carefully assessed. The systemic approach to reciprocity based on the nature of the macroprudential instrument is summarised in Chart IV.34.

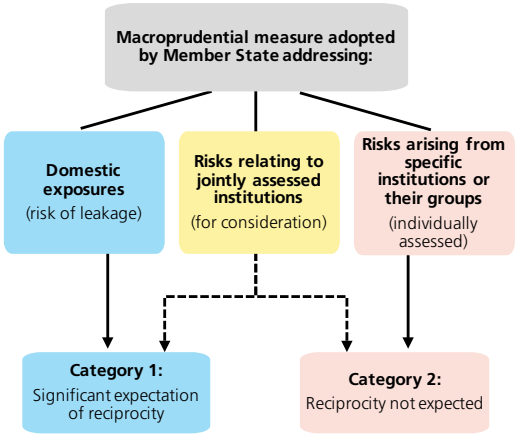
The ESRB has a central position in the reciprocity framework (see Chart IV.35). National macroprudential authorities notify it of new measures. Such notifications include a request for reciprocation together with an explanation of why it is needed. The ESRB assesses the notification and issues a final recommendation. This is communicated to EU macroprudential authorities, which make the recommendation legally binding either automatically or after assessing the suitability of the request (depending on national law in this area).[63] Given the voluntary nature of reciprocity, Member States are entitled to refuse the recommendation but are required to explain the refusal (the "comply or explain" principle). If the recommendation is applied, the national authority is responsible for communication to financial institutions in the country concerned.

To ensure awareness at national level, the CNB has since June 2016 been publishing information about measures that are binding on financial institutions in the Czech Republic under reciprocity in the relevant section of the CNB website.[64] The information covers both obligatory reciprocity and measures recognised by the CNB under voluntary reciprocity. Voluntary recognition will not be automatic as suggested by the ESRB document. The CNB will assess the significance and relevance of recommended measures for financial institutions and the financial market in the Czech Republic. This approach may be revised in the future as a result of the possible adoption of an extended EU legislative framework in a revision of the CRD, as recommended by the ESRB.

62 For details see the ESRB website at https://www.esrb.europa.eu/national_policy/html/index.en.html.
63 The ESRB recommends that national law be amended to allow automatic reciprocity of ESRB recommendations. This would enhance the effectiveness of the framework and reduce the administrative workload at national level. Reciprocity is to be supported by standardisation of macroprudential measures and extension of the current CRD/CRR legislative framework.
64 For details see the financial stability – macroprudential policy section of the CNB website.

CHART IV.34

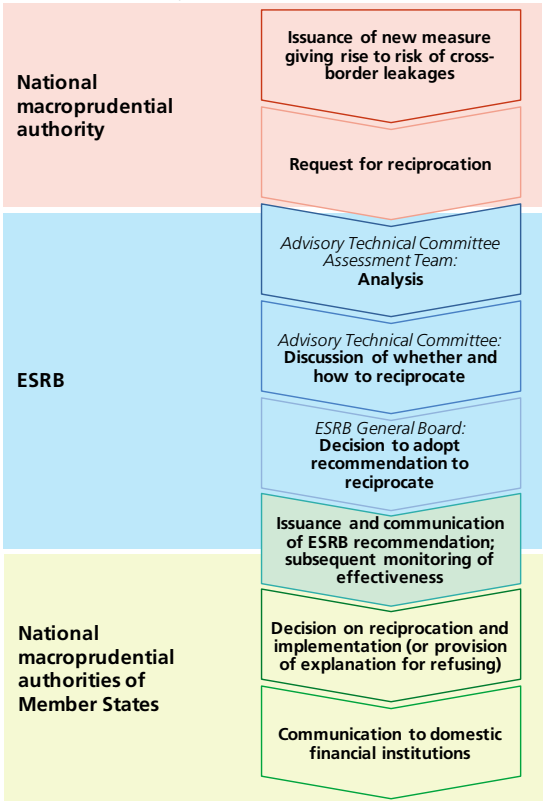
**Macroprudential instruments broken down by importance for reciprocity**




Source: ESRB, adapted by CNB
Note: The chart shows the breakdown of macroprudential policy instruments primarily in the context of voluntary reciprocity. Measures subject to mandatory reciprocity can be generally included in Category 1.

CHART IV.35

**Scheme of reciprocity process**




Source: ESRB, adapted by CNB

### 4.4.3 THE CNB'S RESOLUTION TASKS

Pursuant to the Recovery and Resolution Act, the CNB is the resolution authority in the Czech Republic. As from 1 January 2016, this law vested the CNB, among other things, with exclusive power to create plans for resolution of banks, credit unions and some investment firms. One of the main objectives of the new resolution framework is to provide for fast and effective resolution with minimum risk to financial stability while maintaining any systemically important functions of the institutions concerned.

This objective is served by both planning (the CNB draws up resolution plans for banks and other institutions) and the resolution financing arrangement. A Resolution Fund, to which all relevant institutions contribute, has been set up in connection with the new rules. It is one of a wide range of harmonised resolution instruments and processes available to the CNB.

The resolution processes and instruments are focused primarily on individual institutions, but they also have systemic impacts. Over the next few years, those impacts will relate mainly to the requirements for the creation of eligible liabilities and to a lesser extent to contributions to the Resolution Fund.

The requirements for the creation of eligible liabilities are based on one of the most important resolution instruments, the bail-in.[65] The aim of this new instrument is to transfer the costs and losses of resolution of an institution to its shareholders or creditors and thus minimise resolution expenditure from the public purse. However, for a bail-in to be viable, the institution must have enough liabilities, which the CNB will order the institution to convert or amortise in the event of a crisis.

The purpose of eligible liabilities is therefore to provide sufficient capacity for loss absorption and possible recapitalisation of a failing institution so that financial stability is not disrupted, systemically important functions are not discontinued and public funds are not used in the resolution process. The CNB sets a minimum requirement for eligible liabilities (MREL) for individual institutions taking into account their resolution strategy. The MREL level is not yet known, as the interpretation of legislation and standards has not yet been unified in the EU. It can be assumed that the MREL requirement for institutions of low systemic importance will be close to the current capital adequacy requirement and will be used primarily to absorb losses. Given the aspect of recapitalisation, the MREL requirement for systemically important institutions may be double the capital adequacy requirement. Banks will have until the end of 2019 to comply with this new obligation.

65 For details see FSR 2014/2015, Box 7, pp. 100–104.

The systemic impact of the contribution to the Resolution Fund should not be all that important, because its introduction is being accompanied by a decrease in the contribution to the Deposit Insurance Fund (DIF). This is because the current amount of assets in the DIF exceeds the minimum laid down in the relevant directive and the Financial Market Guarantee System is continuing to collect only a "maintenance contribution" to the DIF. This of course applies if the DIF will not have to repay deposits.

To sum up, of the said impacts of the new resolution framework (contributions to resolution funds, resolution plans and eligible liabilities) it is the MREL which will have the biggest effect on banks' behaviour and business models.

### 4.4.4 THE DEBATE ABOUT CHANGING THE REGULATORY APPROACH TO SOVEREIGN EXPOSURES

The CNB dealt in detail with the regulation of sovereign exposures in its previous two Financial Stability Reports. Given the importance of these exposures in domestic financial institutions' balance sheets, this is one of the CNB's priority topics. Following the publication of the ESRB report in spring 2015,[66] a working group on this issue was set up at the Economic and Financial Committee (EFC)[67] level. The aim of this working group, of which the Czech Republic is a member,[68] is to present proposals in 2016 for changes to the regulatory treatment of sovereign exposures in the EU financial sector, especially the banking sector. A similar working group has been established at the Basel Committee on Bank Supervision. Its report and proposals cannot be expected to be issued until 2017.

The prevailing view in the debate among EU countries so far is that government bonds cannot be treated unconditionally as risk-free assets. The main argument is that during financial crises, the close links between banks and governments through sovereign exposures may become a source of amplification. However, the Member States differ in their views of how the regulation of sovereign exposures should be changed. The debate is complicated by different impacts of the proposed changes across EU economies due to differences in fundamentals relating to the sovereign risk of each country (such as the level of government debt and the currencies in which government bond issues are denominated). There are also disagreements about the very definition of sovereign exposures and in particular about the extent of sovereign credit and liquidity risk sharing among euro area Member States.

There are several variants of the proposed changes in bank regulation (CRR/CRD IV). Under Pillar 1, the introduction of limits on holdings of sovereign exposures, non-zero risk weights or a combination is being

66 *ESRB report on the regulatory treatment of sovereign exposures*, March 2015.
67 The EFC is an advisory body to the EU Council. It was set up to promote policy coordination among the Member States for the functioning of the internal market.
68 The Czech representative is an expert from the Czech Ministry of Finance. He is supported in the working group by CNB experts.

discussed. However, there is also a proposal to maintain the current Pillar 1 regulatory framework or strengthen Pillar 2 supervisory powers and Pillar 3 bank transparency.

Some euro area countries favour the introduction of unexceedable concentration limits on holdings of a specific government's bonds by individual banks. From their perspective, large exposures of banks to their own governments are a major source of systemic risk. Some of the countries advocating such limits therefore demanded at the start of the debate that a limit of 25% of capital be applied to sovereign exposures to a specific issuer, i.e. the same limit as that applied to exposures to private entities. This would make it possible to prevent systemic crises more effectively, or at least reduce their intensity, as at low exposure levels a bank's capital would be able to cover all the risks arising from sovereign exposures, or at least a large part of them.

However, this measure is hard to introduce even from the medium-term perspective given the large accumulation of sovereign exposures in banks' balance sheets across EU countries. Preliminary impact studies indicate that setting the limit at 25% of capital would mean that banks throughout the EU would have to "reallocate" holdings of government bonds exceeding 16% of total public debt (around EUR 2 trillion).[69] This reallocation might partly take the form of purchases by banks whose government bond holdings are currently below this limit. However, even given this very optimistic assumption,[70] part of the excess holdings would have to be reallocated to other types of EU financial institutions or outside the EU financial sector. It is likely that the very announcement of such a plan would result in significant financial market volatility, which could have a huge impact on economic activity in the EU. Another strong argument against hard limits at low levels is the role of high-quality government bonds in balance-sheet liquidity risk management by banks. The liquidity requirements in the current EU regulations imply that banks' liquidity buffer should consist of high-quality government bonds denominated in the currency in which their liabilities are mostly denominated (see section 3.3). Any change in the regulation of credit or concentration risks associated with sovereign exposures should not conflict with the regulation of liquidity. Following the quantification of the impacts of, and potential risks associated with, very low concentration limits, the original proponents have this year started to concede that limits might be set at levels above 25%.

In the discussions to date, the Czech Republic has always supported the view that maintaining the existing regulations makes it possible to treat government bonds as risk-free assets and ignore the evident risks associated with them. The CNB therefore supports proposals to mitigate

69 The impact of this measure on the Czech Republic would be even larger in relative terms. The local banking sector would be forced to "reallocate" more than 29% of Czech public debt, representing 85% of their holdings and almost 11% of their total assets.

70 Government bonds of different EU countries are not perfect substitutes in practice. For example, banks may not be willing to purchase government bonds of lower credit quality due to their risk management processes.

credit risk in Pillar 1, i.e. the introduction of non-zero risk weights for sovereign exposures. The CNB also agrees that the regulatory framework should take sovereign exposure concentration risk into account, for example by increasing the risk weight for exposures above certain thresholds. This approach is already part of the CNB's internal methodology for managing sovereign exposure concentration under Pillar 2.[71] However, the CNB flatly rejects the introduction of concentration limits at any level. There are several reasons for this. The higher concentration of domestic government debt in Czech financial institutions' balance sheets is partly natural, as the Czech financial sector is small relative to the financial sectors of other EU countries.[72] Moreover, high-quality government bonds issued in Czech koruna are almost exclusively government bonds of the Czech Republic. They are thus currently a vital liquidity risk management instrument for banks operating in the Czech Republic.

In the debate in the working group, the CNB will continue to support moderate proposals reflecting the specific position of government bonds in the financial market. It will also advocate that banks must have enough room to hold high-quality domestic currency government bonds for managing their liquidity, and it will reject proposals with disproportionately negative impacts on non-euro-area EU states. The CNB also cannot accept regulations that would disrupt government financing and adversely affect financial stability and economic growth.

### 4.4.5 REGULATORY CHANGES UNDER PREPARATION BY THE BASEL COMMITTEE

In 2015, the Basel Committee for Banking Supervision (BCBS) dealt, among other things, with proposals for changes in the international regulatory framework aimed at enhancing the consistency and comparability of the calculation of capital requirements. Of particular importance from the financial stability perspective are its proposals regarding revisions to the standardised (STA) and model-based (IRB) approach to credit risk management and the leverage ratio.

The BCBS published a second consultative document on revisions to the STA approach in December 2015.[73] The main aim is still to partly replace the use of external credit ratings for determining risk weights with risk assessments based on selected risk drivers (for details see FSR 2014/2015, p. 81). In contrast to the first consultative document issued in December 2014, the new document retains the use of external credit ratings for exposures to banks and corporates. The recommendation on the risk drivers that can be used for determining the risk weight on house purchase loans has been changed. A higher risk weight has also been

71 See FSR 2014/2015, Box 6, pp. 92–94.
72 The financial sector's assets stand at around 158% of GDP in the Czech Republic, compared to 240% in Italy and more than 300% in most other Western European countries (372% in France, 395% in Germany and 2010% in Ireland).
73 Bank for International Settlements (2015): *Revisions to the Standardised Approach for credit risk – second consultative document*, December 2015.

proposed for loans where repayment is materially dependent on the cash flows generated by the property securing the exposure

A consultative document on changes to the IRB approach was published in March 2016.[74] It contains a proposal to remove the option to use the IRB approach for certain exposures – to banks and other financial institutions, large corporates, equities and specialised lending. Risk weights (or capital requirements) for such exposures would be determined on the basis of the STA approach, i.e. using generally applicable rules rather than internal models. This change is due to the difficulty of estimating statistically reliable PD and LGD values for these portfolios. The IRB approach would continue to be used for portfolios with a large number of individual exposures, as they allow for more reliable model-based determination of risk weights. However, PD and LGD floors would be set for certain exposures (selected corporate and retail exposures). For other types of exposures where no direct restrictions are prescribed, it is proposed to set variables that banks would use to estimate the model parameters entering the risk weight calculation.

The proposed revisions to the STA approach result in greater risk-sensitivity of risk weights, while the proposed changes to the IRB approach aim to end the use of internal models for certain portfolios and reduce variability in the model-based approach by setting binding rules. The recommendations thus lead to some convergence of the two approaches. The final form of the proposed changes to the approaches to credit risk management should be available by the end of 2016.

The BCBS has issued a consultative document on the leverage ratio containing changes to the methodology for determining total exposures and the minimum leverage requirement.[75] The proposed changes to total exposures concentrate mainly on revisions to the treatment of derivatives for the purposes of calculating the leverage ratio and revisions to the conversion factors determining the effect of the off-balance sheet on total exposures. In addition, it is now recommended that a higher minimum requirement should be set for the leverage ratio for G-SIIs compared to other institutions. For details on the importance of the leverage ratio and its complementary relationship with the capital ratio, see the thematic article *The Role of the Leverage Ratio in Capital Regulation of the Banking Sector* in this Report.

74 Bank for International Settlements (2016): *Reducing variation in credit risk-weighted assets – constraints on the use of internal model approaches – consultative document*, April 2016.

75 Bank for International Settlements (2016): *Revisions to the Basel III leverage ratio framework – consultative document*, April 2016.

# PART II – THEMATIC ARTICLES

## COULD THE CZECH INSURANCE SECTOR BE A SOURCE OF SYSTEMIC RISK?

Michal Dvořák, Marcela Gronychová, Václav Hausenblas, Zlatuše Komárková

*A debate about the systemic dimension of the insurance sector and its role in the stability of the financial system has been going on within the European System of Financial Supervision for months now. This article assesses (i) the function of this sector in the financial system and in relation to the rest of the economy, (ii) the risks which insurance companies face and which shape their business, and (iii) developments in the regulation of insurance companies (Solvency II) from the financial stability perspective. We argue that Czech insurers are not a significant source of systemic risk in the Czech Republic thanks to their focus on traditional insurance products, limited mismatch between the durations of their assets and insurance obligations, and the conservative composition of their investment portfolios. The article nonetheless identifies a number of areas where they could contribute to financial instability.*

### 1. MAIN CHARACTERISTICS OF THE INSURANCE SECTOR

The insurance sector fulfils a specific role in the economy by providing protection against all sorts of risks. In their core function, insurance companies take on the idiosyncratic risks of individual economic agents (such as the risk of damage to property or the risk of financial losses in non-life insurance and the risk of death in life insurance) and thereby reduce overall uncertainty in the economy. They contribute to smoothing of the consumption of households and the net income of firms, to the functioning of various industries (e.g. air and sea transport) and to the execution of transactions (such as mortgage lending). The stable long-term household savings that life insurers manage can act as a source of long-term financing for the economy. As major institutional investors, insurers thus enhance the efficiency of financial markets.

The assets of Czech insurance companies[1] amount to 12% of GDP, which is low compared with the EU average of around 60%. As in other EU countries, however, insurers form the second-largest financial sector in the Czech Republic, with assets totalling CZK 479 billion. Life insurance accounts for almost three-quarters of this figure and non-life insurance for the rest. This view, however, understates the importance of non-life insurance to the economy. Non-life insurance accounts for over half (55%) of total annual premiums in the Czech Republic.[2] In EU countries, however, life insurance dominates even in terms of premiums paid (up to 60% of the total). Life insurance makes up 6% of the financial assets of Czech households, well below the EU level of around 30%. This ratio has been flat in recent years in the Czech Republic and the EU alike.[3] The size of the life insurance sector and insurance penetration are also greatly influenced by the supply of substitute products from other financial institutions (e.g. pension companies and investment funds), by pension system legislation and by tax policy. The more significant is the pay-as-you-go pension system and the greater are the tax incentives applying to insurance products in a country, the more significant is life insurance there (Gollier, 2015). The significance of non-life insurance is influenced by the general orientation of the economy and by natural conditions, i.e. by the importance of sectors with high demand for insurance, such as agriculture and sea transport.

The key aspect of insurers' business model lies in setting the right premium rate. The rate must make the product attractive to customers while guaranteeing that the insurer is ceaselessly able to meet its insurance obligations and make a profit. In the case of non-life insurance, the company must be able to pay claims even if its loss experience turns out to be worse than expected (for example due to more frequent insured events, above-average losses or repeated natural disasters). In other words, premiums are set on the basis of expected losses and the insurer is exposed to premium risk, i.e. the risk that the premiums it receives will not cover its losses and related costs. The insurer uses premiums not paid out in the current year to create and manage technical provisions for use in

1 In this article, the term "Czech insurance companies" refers to insurance companies headquartered in the Czech Republic.

2 The asset size view differs from the premium size view because of the different nature of provisions in the two insurance segments. In non-life insurance, premiums are used mostly to settle current-year claims. Only a small proportion are used to create technical provisions, mainly for protection against an adverse loss experience. In life insurance, by contrast, most of the premiums go into technical provisions to be ready for claims coming later (sometimes even after several decades).

3 The stagnation of life insurance in the Czech Republic is also evidenced by a 25% fall in the number of life insurance policies since 2008.

future years to meet its policy obligations. However, the size and timing of fulfilment of these obligations is not known in advance. The risk of insufficient technical provisions is therefore another major insurance risk. The main insurance risks in life insurance are mortality risk, longevity risk, morbidity risk and lapse risk.

Insurance companies invest their technical provisions primarily in financial assets, which make up almost the entire asset side of their balance sheet (see Chart 1). The main investment instruments are debt securities, which account for around 60% of the assets of Czech insurers and 45% of those of European insurers. Insurance companies invest more than banks in corporate bonds, equities and mutual funds in relative terms. Investment in equity securities accounts for around 20% of assets in the Czech Republic. Despite growth in recent years, this is still below the European average of over 30%. Investment in less liquid assets such as real estate and direct lending to firms[4] are relatively low – around 8% in the EU and well below 1% in the Czech Republic.

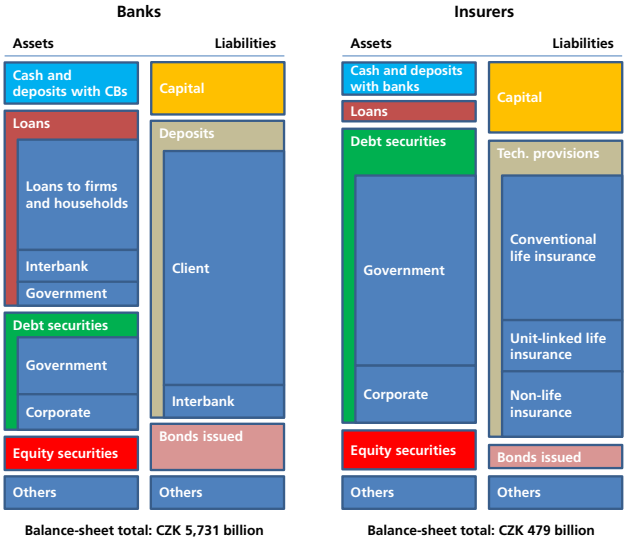
Investment by insurers is typified by a strong emphasis on safety and market liquidity. Nonetheless, insurers are exposed to investment risks: market risk and credit risk (including concentration risk). The main market risks are interest rate risk and equity risk. It is clear from the proportion of government bonds in their portfolios that insurers have high concentrations of sovereign credit risk. They are also exposed to credit risk due to credit derivative holdings, exposures to reinsurers and claims on policyholders. For some insurance products, both policyholders and insurers are exposed to investment risk. Two types of life insurance with a saving component are usually offered – unit-linked and conventional, or a combination of the two. In unit-linked life insurance, the investment risk is borne not by the insurer, but by the policyholders, who participate directly in the gains and losses on invested assets covering insurers' technical provisions. In conventional life insurance, claims are guaranteed in the form of a minimum or fixed return. This sort of guarantee can be viewed as an embedded option linked to the liability side of the insurer's balance sheet. For this type of insurance, the policyholder is protected against investment risk by the insurer.

Insurers face interest rate risk on both sides of the balance sheet. In the case of traditional life insurance, it is therefore vital for them to manage their net interest position well and to set a sufficiently prudent guaranteed rate of return. A drop in market interest rates reduces their future interest margins, so the returns on newly invested assets may be low relative to the guaranteed benefits agreed in the past. Reinvestment risk will rise if the low-interest-rate environment persists. Conversely, a rise in market interest rates may lead to increased cancellation rates as more attractive investment opportunities become available elsewhere, especially for policies with a much lower guaranteed return than the current market rate.[5]

It is clear from the above that the risk exposures of insurers and banks differ considerably (see Chart 1). Insurers have significant risk exposures on both sides of the balance sheet (investment risk on the asset side and insurance risks and interest rate risk on the liability side), while banks face risks primarily on the asset side. There is also a substantial difference in balance-sheet liquidity risk. Insurers' liabilities

**CHART 1**

**COMPARISON OF BANKING AND INSURANCE SECTOR BALANCE SHEETS IN THE CZECH REPUBLIC**



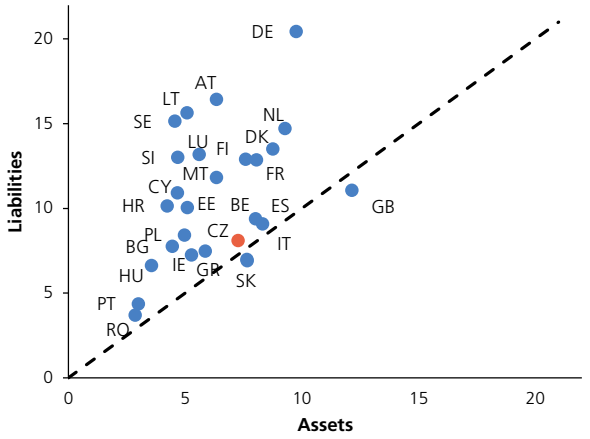

Source: CNB
Note: To make the chart readable the proportions of the individual asset and liability classes are depicted only approximately. Corporate bonds are bonds of financial institutions and non-financial corporations. Mortgage bonds make up 75% of the corporate bonds held by banks and 33% of the corporate bonds held by insurers. Equity securities consist of shares and units. Balance-sheet totals as of 30 September 2015.

4 Czech insurance companies do not currently provide loans to firms.

5 This risk can be reduced by setting regulations that penalise policyholders for terminating policies prematurely. In the Czech Republic, contributions originally exempted from tax are taxed if, for example, policyholders cash in their savings early or cancel their policies. Tax benefits received in the last ten years must also be returned if life insurance contributions were claimed as tax deductible in the past.

CHART 2

**DURATION MISMATCH OF ASSETS AND LIABILITIES OF EUROPEAN INSURERS**
(average duration in years)




Source: EIOPA Stress Test Report 2014, CNB, authors' calculations

have a longer average duration (around seven and half years in the Czech Republic; see Chart 2) due to the long-term nature of life insurance policies, whereas banks' liabilities are very short and dominated by demand deposits (see section 3.1 of this Report). Banks are therefore more sensitive to funding risk.

## 2. SOURCES OF SYSTEMIC RISK IN THE INSURANCE SECTOR

A financial institution can generally contribute to the formation of systemic risk[6] through procyclical behaviour (the cyclical component of systemic risk) or through interconnectedness with other financial institutions (the structural component of systemic risk).[7] However, the relationship between the insurance sector's behaviour and systemic risk is less direct than in the case of the banking sector. Thanks to their very long-term obligations, life insurers are less vulnerable to short-term swings in market prices and thus less sensitive to temporary systemic liquidity crises. The insurance sector can also act countercyclically in the financial system and absorb short- to medium-term shocks to some extent. In certain conditions, however, it can contribute to a build-up (and, in extreme cases, materialisation) of systemic risk. Insurers can influence the real economy indirectly through the asset side of their balance sheets due to their interconnectedness with other financial institutions. They can have a direct influence through the liability side, which consists mainly of liabilities to households and non-financial corporations.

Insurers may act procyclically with their investment allocation. This is driven by herding behaviour stemming from similar balance sheet and business model structures, similar rules and regulations, and mechanical reliance on benchmarks (such as the UFR; see section 3 of this article) and credit ratings. A typical example of insurers amplifying price bubbles is "search for yield". In such situations, insurers that are obliged to achieve a guaranteed yield try to make up for generally low returns on safe assets by searching for riskier investment opportunities (such as equities, real estate and long-duration bonds). Such behaviour can drive up the prices of those assets and contribute to a systemic build-up of equity or credit spread risk. A large and unexpected drop in asset prices may conversely motivate insurers to sell off their risky assets en masse, thereby magnifying the fall in prices and increasing the financial stress. Procyclical behaviour by insurers may also be amplified by the specific products they provide within the financial system, such as security loans, bank deposits and secured financing. Insurers' willingness and ability to provide liquidity (in the form of deposits or repos) and the amount of available collateral rise in the upward phase of the financial cycle and fall in the downward phase (Dingová et al., 2014).

Insurers can also act procyclically in the pricing and underwriting of insurance itself. This is especially true of credit insurance, which can cause policyholders to underestimate credit risk and, in the case of mortgage insurance, real estate risk. This increases the optimism of creditors and borrowers in the upward phase of the credit cycle. As soon as the cycle turns, with property prices falling and the probability of default rising, insurers may exacerbate the downward phase by raising their premium rates or cutting the supply of credit insurance. The same applies to the sale of credit default swaps.[8] With such products, insurers have to pay out if the issuer of the debt security that is the underlying asset of the derivative

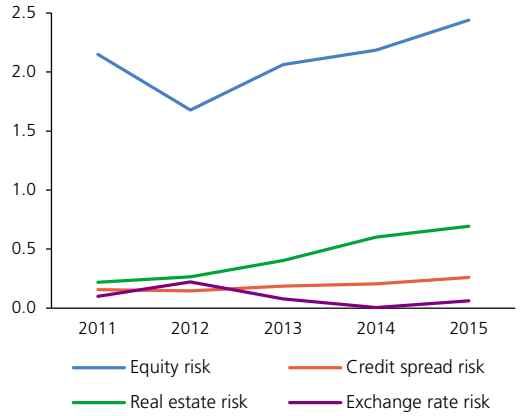
6 The basic definition of systemic risk is the risk of disruption in the financial system with the potential to have negative consequences for the internal market and the real economy (ESRB, 2015).

7 Systemic risk has two main dimensions: time and cross-sectional. The time dimension reflects the build-up of systemic risk over time and its source is procyclicality in the behaviour of financial institutions. The cross-sectional dimension reflects the existence and distribution of systemic risk at any given moment in time and its source lies in mutual and chained exposures among financial situations. For more on systemic risk, see Frait and Komárková (2011).

8 Czech insurers do not currently have any credit default swaps.

**CHART 3**

**RESULTS OF THE JOINT STRESS TESTS CONDUCTED BY SELECTED INSURERS AND THE CNB FOR SELECTED RISKS SINCE 2011**
(decrease in % of total assets due to shocks to asset prices)




Source: CNB, authors' calculations
Note: The results were calculated for the same shock values over time to ensure comparability. The selection of results was therefore limited to risks for which results could be back-calculated. Assumed shocks to asset prices: equities -40%, real estate -20%, CZK/EUR +13%, corporate bonds -0.2% to -7.7% depending on rating and residual maturity. The data cover the ten insurers participating in the CNB's joint stress tests, representing 80% of the sector's assets.

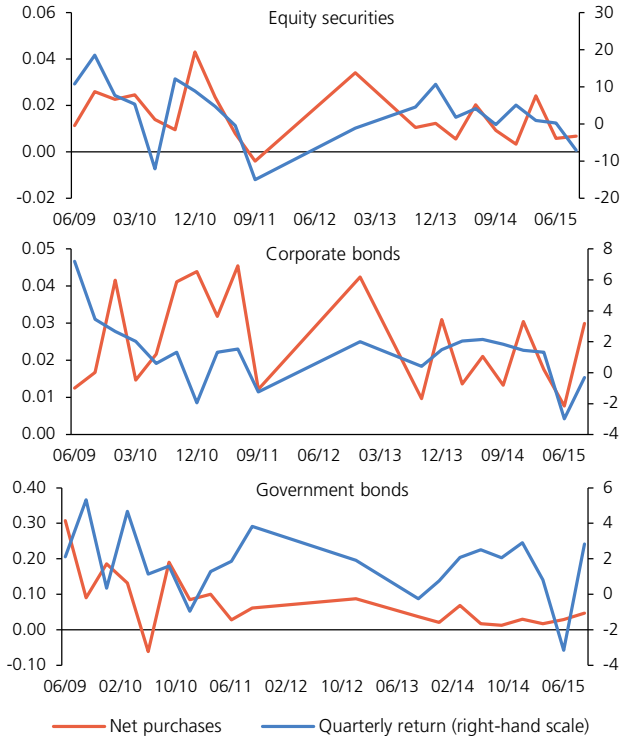
defaults. In providing credit insurance, insurers are exposed to a risk that is strongly correlated with the economic cycle. Faced with increased payouts due to materialisation of credit risks, insurers may start reacting on financial markets as described in the previous paragraph, reinforcing the downward phase of the credit cycle.

Analyses by the Bank of England (2014) and Duijm and Bisschop (2015) have found evidence of procyclical behaviour by some insurers after the dotcom bubble or after the financial crisis of 2008 and the subsequent euro area debt crisis. We can also see some procyclicality in the behaviour of the Czech insurance sector since about 2012, when market interest rates fell sharply. The sustained environment of very low or even negative yields on safe assets (see section 2.1 of this Report) is motivating insurers in the Czech Republic to gradually reallocate their portfolios in favour of equities, real estate and corporate bonds (see Chart 3).[9]

To test for procyclicality in the allocation of financial assets by domestic insurers, we looked at the relationship between

**CHART 4**

**INVESTMENTS OF CZECH INSURERS FOR SELECTED ASSET CLASSES IN RELATION TO RATES OF RETURN**
(in % of total investments; right-hand scale in %)




Source: Bloomberg L.P., CNB, authors' calculations
Note: Net purchases represent the difference between purchases and sales of the given type of security at book value. Cases where bonds mature and disappear from the balance sheet are classed as sales transactions. Bonds represent debt securities and therefore include Treasury bills.

the return on investment in securities and the net value of transactions in those securities. All transactions in equity securities and corporate and government debt securities in the period from March 2009 to September 2015 were analysed.[10] The resulting time series are shown in Chart 4. The correlation coefficient and the linear regression results indicate a statistically significant relationship between the equity index return and the value of transactions in equity securities (which include fund units as well as shares). However, the economic significance of this relationship is quite small, as a 10% month quarterly rise in the value of shares gives rise to an increase in net purchases of equity securities of just 0.006% of insurers' total investments on

9 Czech insurers have also long been cutting the supply of traditional insurance products with long-term yield guarantees and focusing more on products with declared guarantees, where the insurer adjusts the guaranteed return at regular intervals, and unit-linked life insurance products. The share of unit-linked life insurance (as a percentage of investments) has risen from 14% in 2011 to around 17% at present.

10 In these three categories, the values of the transactions in the previous quarter were summed so that transactions resulting in an increase in the number of the security in the portfolio entered with a positive sign and transactions leading to a reduction entered with a negative sign. The resulting sum was normalised by the total period-end value of the investments. The return on each asset class was approximated by the quarterly increment in financial indices.

average. The value of those assets meanwhile rises by 0.013% of the value of total investments on average in the same period. For the other two asset categories, we observed no statistically significant relationship in the whole period under review. The results for individual insurers and for a limited time period also show a relationship for these types of assets, albeit a negative one in some cases. For example, the return on investment on bonds issued by Czech entities declined in 2009–2011 as a consequence of the European debt crisis. However, many Czech insurers (and banks) bought such assets in that period and thus showed countercyclical investment behaviour.

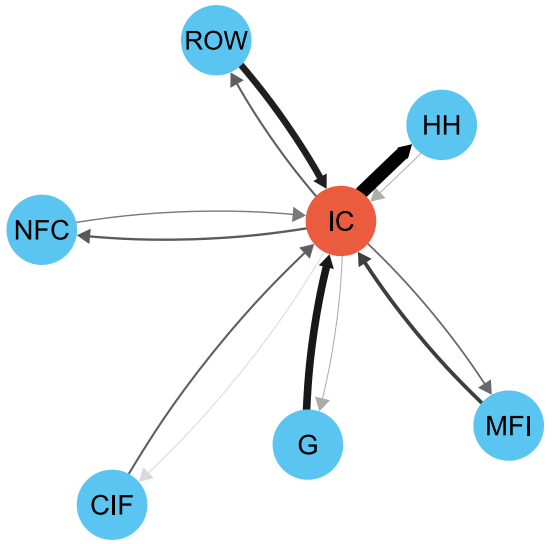
Insurers can also contribute to structural systemic risk, which stems primarily from their systemic importance, their interconnectedness and concentration of their business (Komárková et al., 2012). Contagion of any problems experienced by insurers depends on the strength of the specific linkages inside and outside the system and on the systemic importance and number of counterparties affected (see Chart 5). Where an insurer is a dominant service provider inside the system, its failure can cause policyholders, creditors and shareholders to incur large losses and hence pose a risk to the smooth functioning of the system with knock-on effects on the real economy. This situation is often linked with the case of a small number of insurers offering complex products falling into the area of investment banking, for which it is difficult to estimate all the associated risks and hence also the level of premiums (an example being the American insurer AIG as regards the sale of credit default swaps).

An insurer's business can become concentrated as a result of aggressive pricing gradually driving its competitors out of the market for specialised insurance products. Failure of a price-aggressive insurer can disrupt the provision of some types of commercial insurance, which, in turn, can have impacts on the real economy. Some types of insurance are vital or even mandatory, especially in the transport and construction industries. The likelihood of this scenario depends on the speed and ease with which competitors can pick up the interrupted business of the failed insurer. Complex regulatory and institutional conditions (such as a long licensing process) and/or exacting staff specialisation requirements in certain insurance segments may act as barriers. However, given the constant high demand for mandatory insurance, profitability can also play a role in attracting new players.

In Europe, higher concentration levels can generally be seen in the non-life insurance market. Concentration is highest

**CHART 5**

**INTERCONNECTEDNESS OF INSURERS IN THE CZECH FINANCIAL SYSTEM**
(decrease in % of total assets due to shocks to asset prices)




Source: CNB
Note: IC – insurance companies, HH – households, G – government, NFC – non-financial corporations,CIF – collective investment funds, MFI – monetary financial institutions, ROW – rest of the world. Arrows indicate the direction from the borrower to the creditor. The width of the arrows corresponds to the size of the exposure. Insurers' assets consist of deposits, securities, loans and reinsurance claims. Insurers' liabilities comprise insurance obligations (technical provisions). Of the insurers' claims on the rest of the world, investments account for CZK 143 billion and claims on reinsurers for CZK 37 billion. Data as of 30 September 2015.

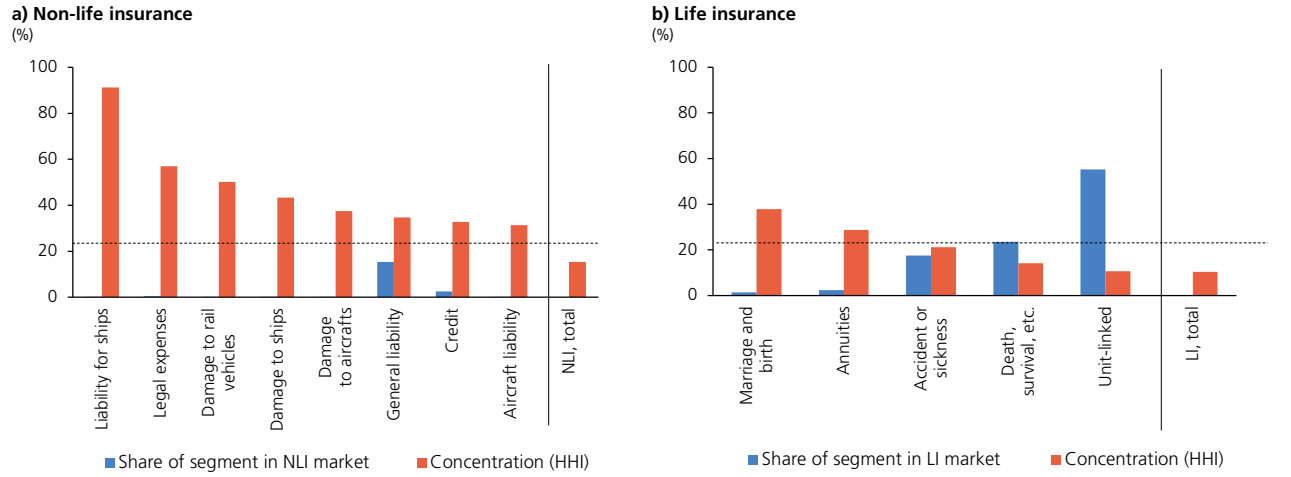
for credit products (ESRB, 2015).[11] The non-life insurance segment is more concentrated in the Czech Republic, too. This is apparent for several products (see Chart 6a). However, the shares of those products in the total non-life insurance market are relatively small. Among segments with higher concentration levels, general liability insurance (for example insurance against damage resulting from operating activities) and credit insurance have the largest shares. For other products, representing more than 80% of the market, elevated concentration levels were not identified. On the life insurance market, increased concentration can be seen only in the marriage and annuities segments. However, they are not systemically important either (see Chart 6b).

Insurers can theoretically also spread financial contagion indirectly through the sell-off of assets covering technical provisions. On markets where trading activity is low in relation to the size of insurers' holdings, such sell-offs can cause a sharp drop in prices. This, in turn, can further

11 Credit products comprise policies offered to debtors to secure their ability to service a loan (e.g. a mortgage) and policies offered to creditors to protect loans granted (e.g. trade credits) against non-performance.

**CHART 6**

**CONCENTRATION IN SELECTED SEGMENTS OF THE CZECH INSURANCE MARKET**




Source: CNB, authors' calculations
Note: Concentration as measured by the Herfindahl–Hirschman index (HHI), expressing the sum of the squares of market shares based on gross premiums written. The selection only includes categories with the highest concentration. The dashed line indicates the 25% level symbolising excessive concentration threshold.

worsen the situation of insurers and increase the risk of them failing, but it can also induce problems in other financial institutions. The overall vulnerability of insurers to investment risks can be reduced by portfolio diversification. In times of financial crisis, however, prices of financial instruments tend to be correlated and any diversification towards riskier assets will tend to generate large losses. Large swings on financial markets can give rise to increased capital volatility via market revaluation of assets in insurers' balance sheets, and sustained massive contractions can even cause insufficient coverage of technical provisions and lead to insolvency (examples being German life insurer Mannheimer Lebens-versicherung with its high proportion of equities, and California's Executive Life with its investments in risky corporate bonds).

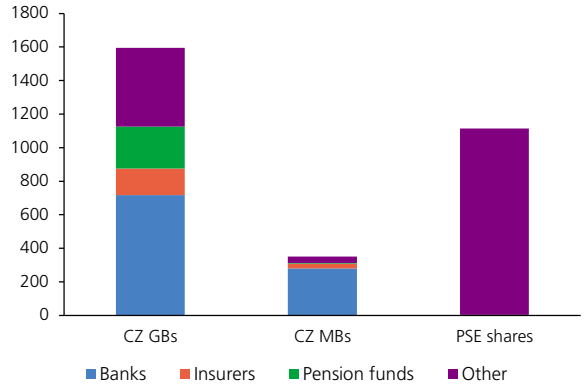
The European insurance sector has very strong links to the sovereign sector and other financial institutions. Insurers operating in the Czech Republic hold almost 11% of Czech government bonds in their balance sheets (MFCR, 2016, Chart 7). If they were to start selling off those bonds, they could, under certain circumstances, significantly affect the entire financial system via revaluation losses and increased funding costs, especially for the government. The impact via equity securities or the corporate bond market would be substantially smaller. However, their importance in insurers' balance sheets is growing slightly. Insurers are also interconnected directly with the banking sector through deposits. In Europe, bank deposits make up around 8% of insurers' assets. In the Czech Republic, the figure is about 5%. The share of insurance company deposits in total bank deposits is small – only around 1% in the Czech Republic and around 3% in the euro area. These credit lines are closed very quickly at times of market stress. Banks therefore do not regard them as a stable source of financing and assign high outflow weights to them in their liquidity risk management processes (Komárková et al., 2016).

A more likely scenario than the failure of a single important insurer is the outbreak of serious collective problems in insurers with similar risk exposures. The resilience of the sector as a whole is therefore regularly assessed in stress tests. The European Insurance and Occupational Pensions Authority (EIOPA, 2014) tests the resilience of European insurers to a "double-hit" scenario. This feared scenario assumes that shocks hit both sides of insurers' balance sheet simultaneously. A typical example is a decrease in asset prices in insurers' portfolios coupled with an increase in the book value of technical provisions for life insurance due to the very low interest rates used to price them.[12] For non-life insurance companies, a decrease in asset prices is combined with repeated natural disasters. The CNB has been using similar scenarios to stress test Czech insurers since 2010

12 The reason why sustained low rates cause liabilities to rise in value is linked with the valuation technique. The estimated value of future benefits guaranteed in policies is discounted by the current risk-free rates of return. A decrease in rates thus leads to an increase in the present value of the benefits. In other words, at lower rates of return it is more costly for the insurer to fulfil its future obligations.

CHART 7

**SHARES OF THE CZECH FINANCIAL SECTOR IN HOLDINGS OF CZECH SECURITIES**
(CZK billions; as of 30 September 2015)




Source: CNB, MF CR, PSE, CNB calculations
Note: Czech insurers hold 1.8 billion, banks 578 million and pension funds 346 million of the shares listed on the Prague Stock Exchange (PSE). The "other" item includes non-financial corporations and non-residents as well as other Czech financial institutions.

(Komárková and Gronychová, 2012). It assesses asset and liability management from both the microprudential and macroprudential perspectives. The tests conducted to date indicate that the sector as a whole is highly resilient to the simulated shocks (see the Financial Stability Reports from 2009 onwards).

## 3. FINANCIAL STABILITY AND SOLVENCY II

The EU's Solvency II directive (SII) entered into force in January 2016. SII aims to introduce a harmonised, risk-oriented regulatory framework for European insurance companies. One of the main changes in the quantitative area (i.e. in Pillar 1) is the derivation of the capital requirement from the insurer's risk profile. The previous framework (Solvency I) derived the capital requirement solely from the amount of premiums written and technical provisions, whereas the new one also takes account of risks arising from investments and the riskiness of the insurance business. This is meant to ensure that insurers facing higher investment risk hold higher capital.

A second major change is the abolition of national authority requirements regarding the composition of insurers' investment portfolios.[13] Insurers can now invest freely subject to the "prudent person principle". In other words, they may only assume investment risk that they can manage and cover with sufficient capital.

A third significant change concerns the method for valuing assets and liabilities. Market-consistent revaluation of the insurer's entire balance sheet, i.e. including obligations arising from insurance policies, is now required for regulatory purposes.[14] Market-consistent valuation enables an insurer's current position to be assessed in the event of a need to realise its assets and liabilities. However, this change may lead to higher volatility of the insurer's regulatory and available capital and amplify the procyclicality in its business, since even a temporary decline in asset prices will be fully reflected in a decrease in its solvency, which could lead to the sector reacting in the ways described in the previous section. SII therefore introduces several measures to mitigate these unintended consequences (ESRB, 2015a). Of particular note are the method for constructing the risk-free yield curve and the Long-Term Guarantee Package.

### 3.1 Concept of the risk-free yield curve and the Ultimate Forward Rate

The SII approach to creating technical provisions consists in calculating a best estimate of the present value of obligations arising from insurance policies and a risk margin. A single reference risk-free yield curve compiled and published monthly by EIOPA is used to discount the estimated cash flows associated with insurance obligations. The curve is derived from market prices, although during its construction emphasis was placed on maximum adjustment for the market risk premium. Given the possible non-zero premium for the risk of low market liquidity, a basket of financial instruments whose markets satisfy strict requirements for sufficient depth, liquidity and transparency was put together in cooperation with national authorities. Koruna interest rate swaps with maturities of 1–15 years were selected to instrument the reference yield curve for the Czech koruna.[15] Owing to a lack of liquid instruments for most currencies (including the Czech koruna) the curve is extrapolated for the purposes of discounting cash flows at longer maturities using a single method proposed by EIOPA.

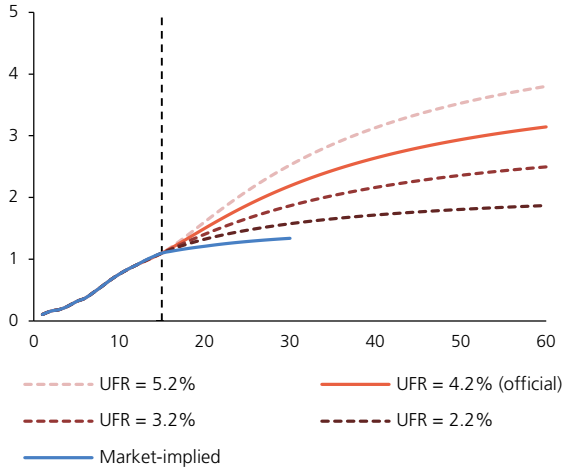
13 In the Czech Republic, those requirements were governed by CNB Decree 434/2009. For example, investments in listed shares were not allowed to exceed 10%, investments in real estate, listed municipal bonds and bonds issued by non-financial corporations 20%, investments in bank deposits and listed bonds issued by banks (including mortgage bonds) 50% and investments in government bonds 100% of the value of technical provisions.

14 As of December 2015, Czech insurance companies' portfolio valued on a non-market basis (at amortised cost) stood at CZK 65 billion, which is equivalent to 30% of their total bond portfolio.

15 The CNB was involved along with other national authorities in selecting the basket of instruments from the liquidity perspective in a DLT assessment coordinated by EIOPA. 11Y, 13Y and 14Y swaps were disregarded in the resultant selection due to an absence of trades (EIOPA, 2015).

**CHART 8**

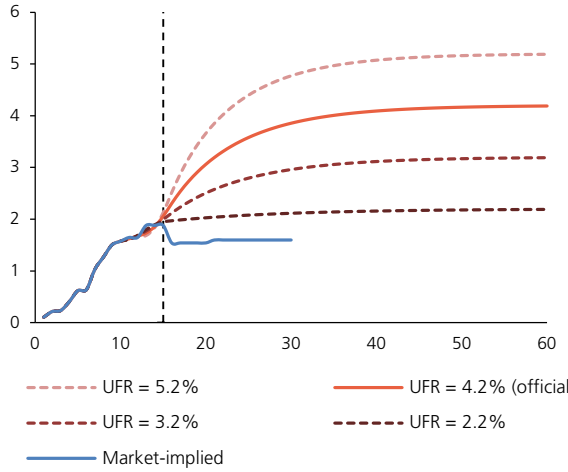
**COMPARISON OF THE CZK REFERENCE CURVE FOR VARIOUS UFRS**
(x-axis: maturity in years, y-axis: %; data as of 30 October 2015)




Source: EIOPA, Bloomberg L.P., CNB calculations
Note: The vertical dashed line denotes the last maturity that was taken from the market in all cases (the LLP; 15 years). The red curves are constructed according to the EIOPA methodology. The "market-implied" curve uses traded maturities up to 30 years, with constant forward rates assumed for the individual intervals between traded maturities (the Fama-Bliss method). Consistently with the reference curve, the input quotations are lowered by 10 bps (CRA) to address interbank market credit risk.

**CHART 9**

**COMPARISON OF THE ONE-YEAR FORWARD CURVE IMPLIED BY THE CZK REFERENCE CURVE FOR VARIOUS UFRS**
(x-axis: maturity in years, y-axis: %; data as of 30 October 2015)




Source: EIOPA, Bloomberg L.P., CNB calculations
Note: The vertical dashed line denotes the last maturity that was taken from the market in all cases (the LLP; 15 years). The red curves are constructed according to the EIOPA methodology. "Market-implied" represents the curve using traded maturities up to 30 years, with constant forward rates assumed for the individual intervals between traded maturities (the Fama-Bliss method). Consistently with the reference curve, the input quotations are lowered by 10 bps (CRA) to address interbank market credit risk.

The extrapolation method is based on a basic assumption of a flat forward curve from 60 years maturity onwards. At this horizon, the forward curve is fixed at the "Ultimate Forward Rate" (UFR). For the Czech koruna and most other European currencies, including the euro, the UFR is set by expert judgement at 4.2%. This figure is based on the average long-term real interest rates of selected key currencies observed over the last 50 years (2.2%) and on the expected inflation rate (the ECB's inflation target of close to 2%).

Although the UFR describes the behaviour of the reference curve in the very distant future, according to CNB estimates the entire reference curve is highly sensitive by construction to the choice of UFR level (see Charts 8, 9 and 10). At maturities of 15–60 years, the curve converges quite quickly to the UFR and the calculation even slightly affects the liquid part of the curve at maturities of up to 15 years (see Chart 9). The level of the UFR has a non-negligible impact on the value of the liabilities of insurers operating in the Czech Republic. A higher UFR increases the discount rate and hence reduces the present value of estimated future insurance obligations. In other words, if the actual rate of return on risk-free assets was lower in the future than the rate of return given by the reference yield curve, the technical provisions would be undervalued. This gives rise to a risk that the insurer will not be able to meet its obligations, especially in an environment of sustained low returns.

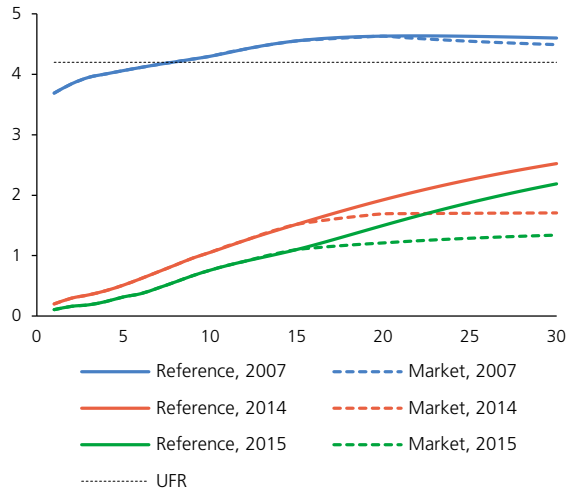
Charts 8 and 9 show the effect of the UFR level (and hence of a potential error in the set UFR parameter) and the overall koruna yield curve. Chart 11 illustrates the effect of the choice of UFR on the present value of Czech insurers' insurance obligations. It is clear that the size of this risk is not critical at the moment in the case of Czech insurers, as the value of Czech life insurers' insurance obligations with residual maturity of over 15 years is low relative to the values in other European economies (see Chart 2). However, it can be expected that this state of affairs is only temporary and the life insurance market in the Czech Republic will continue to converge gradually towards the markets of Western European economies as the length of life insurance policies increases.

Given the ongoing discussion about this methodology, EIOPA is to review the UFR level and may thus change it in the future. However, it has stated that it will leave it at the current level at least until the end of 2016.

**CHART 10**

**COMPARISON OF THE CZK REFERENCE AND MARKET CURVES OVER TIME**

(x-axis: maturity in years, y-axis: %; October of relevant year)



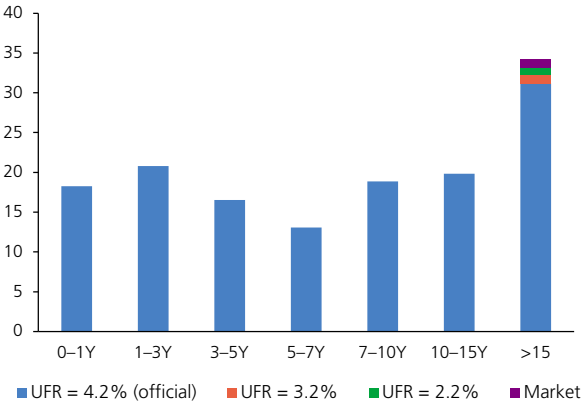

Source: EIOPA, Bloomberg L.P., CNB calculations

Note: UFR Denotes the spot rate to which the reference curves converge. The "reference" curves are constructed in accordance with the EIOPA methodology with an official UFR = 4.2. The "Market" curve uses traded maturities up to 30 years, with constant forward rates assumed for the individual intervals between traded maturities (the Fama-Bliss method). Consistently with the reference curve, the input quotations are lowered by 10 bps (CRA) to address inter-bank market credit risk.

**CHART 11**

**MATURITY PROFILE OF LIFE INSURANCE OBLIGATIONS IN THE CZECH REPUBLIC AND THE EFFECT OF THE UFR**

(x-axis: residual maturity in years, y-axis: CZK billions; data as of 31 December 2014)




Source: CNB

Note: Values on the y-axis represent the present value of future obligations falling into the relevant maturity basket using the various risk-free curves depicted in Chart 8. The choice of UFR has a minimal effect on the maturity basket up to 15 years, so the effect of the UFR is visible only for the maturity basket above 15 years. The data cover the ten insurers participating in the CNB's joint stress tests, representing 80% of the sector's assets. Unit-linked life insurance is excluded.

### 3.2 Long-Term Guarantee Package

As for asset-side valuation, under Solvency I insurers were able to value debt securities held to maturity on a non-market basis, at amortised cost.[16] In the case of Czech insurers, this concerned government bonds issued by the Czech Republic or by countries with an equal or higher rating. In SII, though, this option has been abolished for regulatory purposes. Instead, the European implementation of SII contains other measures to mitigate the sensitivity of insurers' balance sheets to certain market risks. These measures, referred to jointly as the Long-Term Guarantee Package, include a matching adjustment (MA) and a volatility adjustment (VA).

The MA protects insurers against market price volatility by allowing them to adjust the risk-free yield curve in selected parts of their balance sheets so that it better reflects the yields on assets used to cover their liabilities (life insurance technical provisions). Application of the MA is subject to prescribed criteria on expected cash flows from the insurer's relevant assets and liabilities and must be approved by the national supervisory authority.

The VA likewise allows insurers to adjust the risk-free yield curve so that it reflects developments on markets in the financial assets used to cover technical provisions. The VA is derived from the spread between the yield of the risk-free curve used and the yield on a reference portfolio representing the overall composition of the investments made by insurers in a given Member State (EIOPA, 2015). Unlike the MA, therefore, it is common to all insurance companies in a given country with a given currency. The adjusted risk-free curve is calculated and published each month by EIOPA.

However, this method for making additional adjustments to the regulatory rules may give rise to new specific risks. In particular, the VA may, by construction, have a unilateral impact on the capital position of insurers. As the VA-adjusted reference yield curve is almost always higher than the unadjusted curve, the adjustment tends to release available capital at times of economic contraction (when risk premia are increasing and hence the spread between yields on risky and risk-free assets and thus the VA itself are also rising) without reducing available capital in a corresponding way at times of economic growth. On average, therefore, insurers will be able to hold less capital through the cycle than without this measure.

16 Valuation at amortised cost involves determining the effective interest rate at the time of the purchase which, when used for discounting, causes the purchase price to equal the present value of the cash flows (coupons and principal) generated by the instrument. The book value of the instrument then rises (or fall) at this rate. Realised outgoing cash flows will then be deducted from this value. The effective interest rate reflects market conditions at the time the instrument is purchased but not changes in market conditions over its lifespan.

Another potential unintended consequence of the VA is distortion of insurers' investment strategies as a result of efforts to use the VA to optimise profits. As the VA is computed as the spread between the average yield on the portfolio of the entire insurance sector and the risk-free yield, individual insurers may maximise the capital relief arising from the VA when their portfolios are maximally conservative relative to the aggregate portfolio of the sector as a whole. This is because an insurer in such a situation achieves the same gain as its competitors from the difference between the true market value of its liabilities and the value obtained when applying the VA, but unlike its competitors it has its assets invested more safely and therefore has lower capital requirements. In this case, however, the VA does not really reflect the volatility in the prices of that insurer's assets and thus does not perform its original function. If multiple insurers pursue this strategy, this distortion in decision-making may theoretically lead to a significant deviation from the originally optimal allocation of financial assets. Although a conservative investment structure is generally positive from the perspective of financial stability and supervision, it would probably constitute an unintended consequence from the perspective of the regulator.

The third debatable element is the option of applying internal models for estimating the VA one year ahead. Given that internal models for determining the solvency capital requirement generally work with an assumption of a decline in the prices of financial assets, the VA will in most cases be higher one year ahead.[17] And since a higher VA implies a lower value of technical provisions, the use of such models gives insurers an opportunity to systematically reduce their capital requirements by comparison with those applying the standard formula.

## 4. MACROPRUDENTIAL MEASURES

The introduction of the new SII regulatory framework has significantly reduced the room for national authorities to apply discretion. Under the previous approach (SI), national authorities were able to influence insurers by means of (1) investment limits, (2) obligatory provisioning to cover risks related to low interest rates, (3) a ceiling on the technical interest rate used for valuation, (4) the choice of a valuation method that does not require revaluation based on market developments and (5) an increase in the minimum capital requirement. Some countries (the USA, Switzerland, and six EU countries) have used these tools in the last ten years (ESRB, 2015a). National authorities are now losing the option of applying them both on the microprudential level and for supporting financial stability.

The national supervisory authority is supposed to check whether the risks undertaken by an insurer are appropriately reflected in the capital requirement calculated using the standard formula. If not, the supervisory authority may order the introduction of an internal model or apply an additional capital requirement for the institution. However, SII – even in Pillar 2 – does not allow this additional capital requirement to be created to cover systemic risks.

Besides the potential lack of scope for discretionary measures from the macroprudential policy point of view, this situation was identified by the ESRB as a risk of regulatory arbitrage. For example, in financial groups containing banks and insurers there could be undesirable transfers of risky assets to the insurance sector. Macroprudential tools to help mitigate systemic risks (see section 2 of this article) and risks of regulatory arbitrage in the insurance sector are therefore being proposed in the European supervisory authorities. These include tools to raise capital above the microprudential requirements (such as the SIFI buffer and the CCyB), restriction or ring-fencing of non-traditional business activities, enhanced liquidity monitoring and the introduction of a single recovery and resolution regime. These proposals more or less copy the macroprudential tools already applied in the banking industry but are currently at an early stage of development (ESRB, 2015).

## 5. CONCLUSION

The insurance sector takes on the idiosyncratic risks of individual economic agents, thereby reducing overall uncertainty in the economy and contributing to economic development on the general level. Unlike some of the innovative risky activities of insurers (such as the sale of credit default swaps), the activities of insurers based on traditional insurance business models do not themselves represent a major source of systemic risk. Under certain circumstances, however, homogeneous behaviour by insurers may be procyclical, especially as regards investment allocation in periods of sustained very low or even negative interest rates. Another possible source of risk is high

17 A decrease in the price of risky financial assets implies an increase in the required returns on those assets due to growth in the risk premium. In the internal model, therefore, there is a further increase in the difference between required returns on risky assets and the risk-free return and hence also growth in the VA.

concentration in certain segments of the insurance market, as any disruption in the provision of some types of mandatory commercial insurance could have a serious impact on the real economy. Our analyses reveal that Czech insurers are not currently a significant source of systemic risk. This is mainly because of their focus on traditional insurance products, limited mismatch between the duration of their assets and insurance obligations and the relatively conservative composition of their investment portfolios. Turning to the portfolios of individual institutions, insurers are trying to make up for the generally low returns on safe assets in the current environment of low interest rates by changing their product structure and searching for higher-yield but riskier investment opportunities. A potential downturn in the prices of those assets combined with an increase in the value of liabilities (as a result of sustained low interest rates or repeated natural disasters) could have a negative impact on their finances. Resilience to such scenarios is regularly assessed in stress tests conducted by the CNB and EIOPA. The tests conducted to date indicate that the Czech insurance sector as a whole is highly resilient to the simulated shocks. These tests also serve as a tool for testing the impact of ongoing regulatory changes, in particular changes in asset and liability valuation, and their unintended consequences.

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# THE RELATIONSHIP BETWEEN LIQUIDITY RISK AND CREDIT RISK IN THE CNB'S LIQUIDITY STRESS TESTS

Zlatuše Komárková, Marek Rusnák, Hana Hejlová

*This article describes an extension to the bank liquidity stress test methodology used by the CNB. The new test has been lengthened to a one-year stress period. Shocks are generated using the CNB's macro-stress scenario and bank solvency macro-stress test results. The test concept is based on the principles of the European LCR and NSFR liquidity standards. By changing its liquidity test methodology the CNB is responding to the need to incorporate the impact of credit risk into the liquidity position of Czech banks and to monitor their liquidity position over a longer stress period. The presented methodology is then applied to a sample of Czech banks. This allows us to monitor the sensitivity of their liquidity position to the combination of shocks under consideration.*

## 1. INTRODUCTION

Asset and liability maturity mismatch is one of the key features of banking business. Limiting that mismatch to a reasonable level, or at least covering it with enough liquid assets, is currently one of the main aims of European regulations. The Capital Requirements Regulation (CRR) introduced two requirements to strengthen bank liquidity management: a liquidity coverage ratio (LCR) and a net stable funding ratio (NSFR).[1] Both are based on assumptions about liquidity inflow and outflow rates, asset quality and liquidity, and funding source stability over a given period. Methodologies and calculation parameters for the two requirements are laid down in directly effective EU regulations.[2] However, those acts should be viewed by supervisory authorities as harmonised minimum standards that do not necessarily reflect all the national specificities of the banking sector.[3] For this and other reasons, the CNB is continuing to stress test the Czech banking sector for liquidity risk using its own methodology, as it has done since 2007 (FSR 2007).

The CNB's current liquidity stress test considers a single maturity band for inflows and outflows and is applied with a short stress period. Given the heterogeneity in the sensitivity to liquidity risk of the banks tested, stress periods of one and three months are used.[4] The two-round test methodology presented in FSR 2010/2011 (based on the model of Van den End, 2008) has been gradually modified and refined (Komárková et al., 2011; Geršl et al., 2016; FSRs 2009/2010 to 2014/2015). Liquidity risk and credit risk are tested separately in the CNB's current stress-testing framework. However, there are interactions between solvency and liquidity which should not be ignored even in the conservative Czech banking sector. The correlation between credit risk and liquidity risk, however, is not easy to model. Credit risk builds up slowly in the system and has a gradual impact on banks' liquidity, whereas liquidity shocks occur suddenly and have a rapid impact on solvency.

The concept of banking sector liquidity and its interaction with solvency has been analysed extensively in the literature, especially since the fall of Lehman Brothers. Researchers have examined the interaction between the deposit outflow rate and the probability of default (Wong and Hui, 2009) and profitability (Komárková et al., 2011), among other things. Close interlinkages have also been found between various solvency indicators and the rating of a bank and its funding costs (BIS, 2015). A few supervisory authorities (e.g. the Austrian, Canadian and Norwegian central banks) use more advanced liquidity stress tests in integrated stress-testing frameworks combining credit, market and liquidity risk models. In this way, the effect of a credit shock generated by a macro-financial scenario on a bank's liquidity or funding sources is tested (see, for example, Gauthier and Souissi, 2010). A decrease in liquidity inflows due to growth in NPLs or the credit spread in the case of bonds is considered most often. Some models also test the reverse linkage where increased funding costs and/or losses

1 The LCR represents a requirement to hold sufficient liquid assets to cover net liquidity outflows over a 30-day period. The NSFR represents a requirement to limit excessive maturity mismatches in balance sheets due to unstable funding sources with maturities of one year or less.

2 The relevant act for the LCR is Commission Delegated Regulation (EU) 2015/61 of 10 October 2014 to supplement Regulation (EU) No 575/2013 of the European Parliament and the Council with regard to liquidity coverage requirement for Credit Institutions. The directly effective EU regulation for the NSFR is still under preparation owing to the later date of effect of this requirement. Publication is planned for late 2016/early 2017.

3 See Article 98 of the CRD and also EBA (2014): Guidelines on common procedures and methodologies for SREP (12/2014).

4 The three-month test is conducted primarily because of the low sensitivity of customer deposits in building societies to some liquidity shocks over a one-month period.

on fire sales of assets affect the solvency of banks via their profit and loss accounts (Cetina, 2015; Puhr and Schmitz, 2014; Schmieder et al., 2012). Systemic feedback effects caused by banks' reactions (e.g. Van den End, 2012), including interbank contagion (e.g. Bank of Korea, 2012; Gauthier and Souissi, 2010), are thus an integral part of advanced tests.

For these reasons, the CNB's original liquidity stress-testing framework has been partially modified. The stress period has been lengthened to one year, with a gradual impact of a credit shock on banks' liquidity position. The impacts of the individual types of shocks will help the CNB better assess the sensitivity of the liquidity of the Czech banking sector over a longer period. It may also use them to perform its own LCR/NSFR parameterisation for the Czech banking sector in the future.

This article sets out to present the extended bank liquidity stress test methodology. It is divided into two main parts. In the first we describe the methodology[5] and in the second we present illustrative examples of the application of the methodology based on data for the Czech banking sector.

## 2. THE CONCEPT OF THE APPROACH

The presented approach is based on the CNB's original liquidity risk test (see FSRs 2009/2010 to 2014/2015). The methodology still covers the interaction between balance-sheet liquidity (a bank's ability to raise funds) and market liquidity (its ability to monetise its assets at a set price) and the banking sector's reactions. The model remains a two-round one and we still consider three successive steps. The banking system is first hit by scenario-defined exogenous shocks which banks react to under certain conditions. Those reactions then increase the reputational risk of each reacting bank and the systemic risk in the banking sector as a whole (endogenous shocks).

The main changes compared with the original test are as follows: (i) the liquidity test is linked to the CNB's solvency macro-stress tests, (ii) four three-month maturity bands are included, extending the stress period to one year,[6] and (iii) the main features of the LCR requirement (calculation of the ratio) and the NSFR requirement (the maturity mismatch profile and the stress period) are included. Banks have a limited ability to increase their balance-sheet totals over the entire test period. For example, they cannot raise additional funds by issuing securities or borrowing from central banks,[7] and funds are not deposited back in the bank once they have been withdrawn.

The approach focuses on testing whether a bank holds a sufficient buffer of liquid assets in relation to its maturity mismatch. To assess banks' resilience to liquidity risk we use a liquidity indicator (IL) defined as the ratio of the liquidity buffer to net expected liquidity outflows, i.e. the difference between liquidity outflows and inflows. The calculation of the IL (see below) is analogous to that of the LCR requirement, with two main differences. First, for the IL, unlike the LCR, the expected inflow is not capped (at 75% or 90% of the total outflow depending on the type of inflow),[8] but is included in full. Second, the IL is used to test whether the liquidity buffer is sufficient to meet accumulated net outflows across four three-month maturity bands. Unlike the LCR requirement with its one-month stress period, the IL with its one-year period allows us to take into account the rate of accumulation of maturity mismatch in the bank's balance sheet.

The test can be summarised as follows. Exogenous shocks are applied to selected types of balance-sheet or off-balance-sheet items, outflows and inflows in each maturity band (see the Appendix for examples). In the second to fourth maturity bands, the items included in the liquidity buffer are additionally subjected to endogenous shocks caused by banks' reactions. These reactions are determined by the difference between the liquidity outflow and inflow in each bank in the monitored bands. Three situations can arise: (A) the bank does not react because it has a low/zero mismatch and/or a high proportion of stable funding sources,[9] so outflows are covered by inflows, (B) the bank

5 We should point out that the methodology presented in this article may change in the future due to changes in the business models of Czech banks or in the amount and type of information reported.

6 Put simply, the test uses quarterly data and maturity bands of 0–3 months (Q1), 3–6 months (Q2), 6–9 months (Q3) and 9–12 months (Q4).

7 The liquidity stress test forms part of the microprudential supervisory policy toolkit. As central bank tools are an element of lender-of-last-resort policy, application of those tools is not considered in the tests.

8 Compliance with the LCR requirement is required at the end of the stress period, i.e. the net outflow assessed over a 30-day period is compared with the liquidity buffer for the same period. The aim of capping the inflow in the LCR calculation is to increase the emphasis on maintaining a stable liquidity buffer and to prevent the LCR from being met using suitably timed one-off inflows. By contrast, the results of the CNB test for the one-year period are continuously monitored at the end of each successive quarter. For this reason, a cap on inflows is regarded as unnecessary.

9 It is natural for banks to have asset and liability maturity mismatches, hence it is essential to assess the stability of funding sources as well. These sources consist largely of demand deposits, which for banks have

has a sufficient liquidity buffer and reacts by using it to cover net outflows, (C) the bank reacts by deploying its liquidity buffer, which, however, does not cover its net expected outflows due to excessive maturity mismatch in a balance sheet dominated by unstable funding sources. The liquidity buffer is deemed sufficient if the bank can meet its accumulated net outflows (across the four maturity bands) over a one-year period. A sufficient IL thus takes a minimum value of one.

In the first step of the stress test, we simulate three different types of exogenous shock expressed in terms of a haircut on the asset value (*h*), a haircut on the expected liquidity inflow (*p*) and a liquidity outflow rate (*r*). The maximum haircut/outflow rate is 100%. The liquidity indicator can then be expressed as:

$$IL_{Q1}^{b} = \frac{\sum_i LA_{Q1i}^{b} \cdot (1 - h_{Q1i}^{b})}{NetOUT_{Q1}^{b}}, \quad (1)$$

where, in the numerator, the liquidity buffer of each bank (*b*) is computed as the sum of the book values of liquid assets (*LA*) after application of the haircut (*h*). Among liquid assets (*i*) we include cash, claims on the central bank excluding minimum reserves, unencumbered debt securities and equities and collateral accepted. In the denominator is the net liquidity outflow (*NetOUT*) in the relevant maturity band (*Q*, where *Q*1 is the first maturity band of 0–3 months), which can be expressed by the following relation:

$$NetOUT_{Q}^{b} = \sum_k OUT_{Qk}^{b} \cdot r_{Qk}^{b} - \sum_l IN_{Ql}^{b} \cdot \left(1 - p_{Ql}^{b}\right). \quad (2)$$

Among outflows ($OUT_k$) we include liabilities due in the given band (e.g. deposits and debt securities), credit line drawdowns and new loans.[10] The rate of individual outflows is given by parameter (*r*). Projected inflows ($IN_l$) comprise claims due in the given band, for some of which an inflow of only a part thereof is assumed (*1 – p*).

The asset types included in the liquidity buffer match the definition of the liquidity buffer for the LCR regulatory requirement, although in the case of debt securities the conditions of inclusion differ. For the LCR requirement debt securities are strictly differentiated in terms of credit quality, whereas in the CNB's approach their initial credit risk is not taken into consideration[11] and all unencumbered tradable debt securities are recognised.

The haircuts on the liquid portfolio (*h*) reflect the fall in market prices of such assets and the lower proceeds that would come from selling/pledging them if they had to be monetised to cover a liquidity outflow. The haircuts are applied in the form of an interest rate shock to debt securities that are not held to maturity and as an equity shock. Cash and claims on the central bank are not subject to haircuts. The impact of the materialisation of general interest rate risk[12] on the value of debt securities is computed separately for the portfolio of debt securities issued by domestic/foreign government, credit institutions and other corporations, with differentiation of the currency of issue. The size of the haircut on each portfolio depends on the projected paths of the koruna/euro government yield curves in the macro-stress scenario[13] and on the average residual maturity of the banking book. It generally holds that larger haircuts are applied in the case of higher growth in the yield curve or longer residual maturities.

The size of the haircut applied to the expected inflow (*p*) reflects the risk of the bank not receiving the full expected inflow. The haircuts are therefore derived from the quality and collateralisation of claims. Inflows from due mortgage loans and other inflows from due unsecured claims on households, non-financial corporations, credit institutions and other financial institutions are subject to other haircuts. The haircut applied to the inflow from unsecured loans to households and non-financial corporations is a function of the probability of default (PD) and the expected loss given default (LGD[14]). PD and LGD are modelled using satellite models in bank solvency macro-stress tests. In those models, PD and LGD are a function of macroeconomic variables (for a detailed description, see Geršl et al., 2012). Claims on other banks are not subject to a haircut, as failure of the bank is implicitly assumed even in the event of partial default on such claims.

the advantage of being available in the long term. In addition, payments and deposits on such accounts converge at a given time.

10 Outflows include new loans, which are assumed to have maturities over one year. The credit growth assumption is computed using satellite models in solvency macro-stress tests (Geršl et al., 2012).

11 This simplification can be made thanks to the very low occurrence of low-quality debt securities in Czech banks' balance sheets. This assumption will have to be changed if the credit risk of the bond portfolio increases.

12 At the time of publication of this article, the method for defining scenarios for the specific interest rate shock was undergoing revision. For this reason, the size of this shock – like the equity shock – had to be set by expert judgement.

13 For the adverse scenario, we assume a shock to the five-year government bond rate as a result of growth in global risk aversion and reassessment of the safety of certain assets. Other rates (other maturities, IRS) are then modelled consistently with the five-year government bond using a dynamic factor model (Diebold et al., 2006).

14 LGD may not be 100% where the test considers the sale of due claims.

The outflow parameter (*r*) reflects the fact that due liabilities or credit commitments do not always lead to an outflow to the full extent. The value of credit lines, debt securities issued by the bank and selected deposits is multiplied by this parameter. In the case of credit line drawdowns, the rate of outflow is set by expert judgement due to a shortage of detailed data. Debt securities issued by the bank and due in the given band are included in the liquidity outflow to the full extent, i.e. their rate of outflow is equal to one. In simple terms, it is assumed in the model that this source will not be restored in the next period. So, all issued debt securities with maturities of up to one year gradually mature over the test horizon.

In determining the deposit outflow rate, account is taken of the type of provider and the stability of this funding source. The model is based on the same assumption as the Basel LCR and NSFR standards, under which longer-term, more stable and easier-to-restore sources are subject to a lower outflow rate. The lowest rate is applied to insured retail deposits and the highest to unsecured liabilities to other banks. In the test, the deposit outflow rate is composed of two values. The first is a benchmark derived from the outflow factors for the relevant liabilities applied in the LCR requirement. The second is an add-on linked to the capital ratio results from bank solvency macro-stress tests. The larger the decline in the overall capital ratio in the given quarter recorded by the bank, the larger the add-on to the outflow rate in the relevant maturity band. It is assumed that a larger decline in the capital ratio reflects larger losses or a higher overall level of risk, exposing the bank to larger liquidity outflows.

In the next step, the banks concerned are assumed to react to the exogenous shocks. A reaction is triggered if the net liquidity outflow is positive. The bank tries to close the gap between outflows and inflows by using some sort of asset from its liquidity buffer. To raise liquidity, the bank either reduces the buffer (cash, claims on the central bank, available-for-sale securities) or pledges it (held-to-maturity debt securities). The model assumes minimisation of transaction losses. The bank therefore uses more liquid assets with smaller market haircuts first.[15]

Two cases can arise when the bank reacts. In the first case, the liquidity buffer (*LB*) is sufficient to cover the net outflows. The bank's reaction (*R*) is thus smaller than or equal to its liquidity buffer (situation B):

$$R_{Qi}^{b} \leq LR_{Qi}^{b}, \text{ if } LR_{Qi}^{b} \geq NetOUT_{Q}^{b}. \tag{3}$$

In the second case, where the bank is hit more seriously by a wave of exogenous shocks, its liquidity buffer is not sufficient to cover the net outflow in the given maturity band. In such a situation, the bank's reaction is equal to the liquidity buffer. The entire liquidity buffer is exhausted, i.e. the bank has a deficit liquidity position[16] (situation C):

$$R_{Qi}^{b} = LR_{Qi}^{b}, \text{ if } LR_{Qi}^{b} < NetOUT_{Q}^{b}. \tag{4}$$

A situation may occur where banks are able to meet the liquidity outflow with a liquidity inflow. In such case, the bank's reaction is not considered (situation A):

$$R_{Qi}^{b} = 0, \text{ if } NetOUT_{Q}^{b} < 0. \tag{5}$$

On the one hand, the reaction may mitigate the impact of the shock on balance-sheet liquidity, but on the other it increases each reacting bank's reputational risk as well as raising systemic risk via the simultaneous reaction of banks on financial markets. Systemic risk rises if banks exert excessive unilateral pressure on the financial market (for example, if all banks try to sell the same type of bond), leading to a fall in market liquidity. Reputational risk consists in the signalling of problems with a bank's liquidity. The growth in these two risks then feeds back in the form of a second-round shock to banks' balance sheets. The third step therefore involves calculating and applying the feedback effect in the form of an additional market shock caused by banks' reactions. This endogenous systemic shock manifests itself as an additional haircut on the asset (*q*) held in the liquidity buffer. We differentiate between the impact of systemic risk on non-reacting banks ($q^{bnon}$) and that of systemic risk plus reputational risk on reacting banks ($q^{breac}$):

$$q_{Qi}^{bnon} = h_{Qi}^{*b} \cdot \sum_b B^{\frac{(1+\sum_b R_{Qi}^{b})/(\sum_i \sum_b R_{Qi}^{b}) \cdot s}{\sum_b B}}, \tag{6}$$

where $q \in \langle h^*, 1 \rangle$ and $h*$ reflects the market liquidity risk associated with the asset (see below), *s* is a market

15 In reality, the bank may first try to sell off or pledge lower quality assets even though they are subject to large market haircuts. The assumption of minimum transaction losses was chosen because the CNB's approach is aimed at testing the adequacy of a bank's liquidity buffer in relation to the maturity mismatch in its balance sheet.

16 The liquidity position can be improved by accepting a short-term loan from another bank. Such "assistance" is not considered in the test given the assumption of a limit on the increase in funds. This does not apply to banks in a liquidity subgroup.

conditions indicator and *B* is a parameter equal to one if the bank is a reacting bank and zero if it is a non-reacting bank.

For parameter *h**, the model uses one of three haircuts: the original haircut applied in the previous round of the test (*h*), or, if *h* is zero, the haircut applied to the asset type in the LCR or the haircut applied in the NSFR requirement.[17] The size of the additional haircut depends on the number of reacting banks ($\sum_b B$) and the size and similarity of their reaction ($\sum_b R_{Qi}^b$). It is assumed that a larger number of similarly reacting banks causes greater market stress and hence a larger additional market shock.

The market conditions indicator (*s*) in the model expresses risk aversion. This indicator is derived from the standardised distribution of risk aversion indicators using implied stock price volatility and bond spreads as proxies (Van den End, 2008). The indicator takes values in the range of $\langle -1, 1 \rangle$ in normal market conditions and up to 3 at times of high market stress. A higher market stress indicator magnifies the effect of the simultaneous reaction of banks. It is set by expert judgement based on knowledge of volatility and liquidity in the market concerned.

Reacting banks face reputational as well as systemic risk. In their case, the additional haircut is thus larger. This type of risk (like systemic risk) is expressed using a market conditions indicator, since the signalling effect of reacting banks has a large feedback effect in the event of market stress.

$$q_{Q1i}^{breac} = q_{Q1i}^{bnon} \cdot \sqrt{s}. \qquad (7)$$

In a crisis, illiquid financial institutions – due to either prudential (liquidity-hoarding) or speculative (predatory)[18] motives – are driven out of private credit markets or are granted liquidity at punitive rates.

It is assumed in the methodology that the impacts of the shocks applied to the first maturity band and the subsequent reactions of banks will pass through to connected bands in the individual steps of the test (*Q* = 2, 3, 4). Here again, we consider an exogenous wave of shocks that affects the value of the assets held in the liquidity buffer and the size of the liquidity flows via *h*, *r* and *p*. Additionally, however, we take into account the bank's liquidity position in the previous quarter (*NetIN*) and the market stress caused by reacting banks (*q*).[19] The liquidity indicator thus changes as follows:

$$IL_Q^b = \frac{\sum_i LA_{Qi}^b \cdot (1 - h_{Qi}^b - q_{Q-1i}^b) + NetIN_{Q-1}^b}{NetOUT_Q^b}. \qquad (8)$$

The net inflows generated by the bank in the previous maturity band are added to the liquidity buffer in the next period. This assumption is based on the expected behaviour of financial institutions in a liquidity crisis (Heider et al., 2015). In the second phase of a crisis, a bank generally hoards liquidity due to fears that it will be hit by a liquidity shock (e.g. excessive growth in the risk premium) in the next phase of the crisis. It therefore makes decisions on the assumption that it would be forced into a fire sale, which would be costly for it. The motive to hoard liquidity is increased by gradual growth in the parameter reflecting the difference in market liquidity in different periods.

It is clear that the model has limitations that prevent it from fully capturing the liquidity risk that the Czech banking sector may face. For instance, it fails to take in consideration that the provision and repayment of loans are closely bound up with the creation and termination of deposits. In the test, the liquidity position of banks is improved by loan repayments (inflow) but no longer shows up as deposit termination (outflow). The model also fails to take account of direct interbank contagion and hence the potential domino effect. The scenario considers only a simplified general interest rate shock based on the evolution of government yield curves, and only in two currencies. Interest rate spread risk, or specific interest rate risk, is captured only endogenously through banks' reaction functions. Exchange rate risk and real estate risk are not considered at all. The liquidity stress test needs further refinement in these areas.

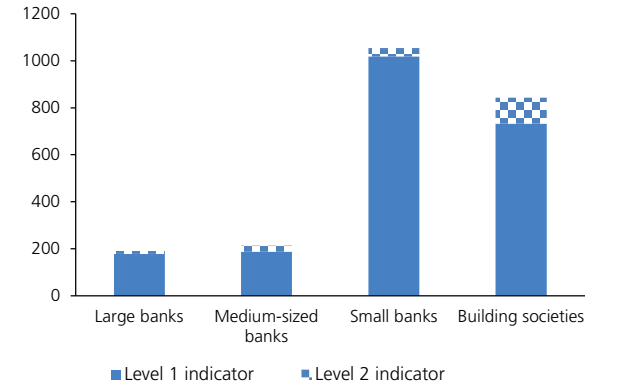
17 The haircut on government bonds in the LCR requirement is zero.

18 This is a speculative motive based on the assumption that high demand for cash implies low asset prices. In a crisis, when some banks are in a difficult liquidity situation, liquid banks may use their market strength and curb the provision of liquidity to illiquid banks or raise the price of that liquidity for purely strategic, healthy competitive reasons. If loan rates are too high, an illiquid bank is forced to sell off its assets, often at very attractive prices (i.e. it falls prey to predators).

19 The additional haircut is applied to available-for-sale assets in the portfolio. In the case of held-to-maturity bonds, the additional haircut is only applied to the part used as collateral.

**CHART 1**

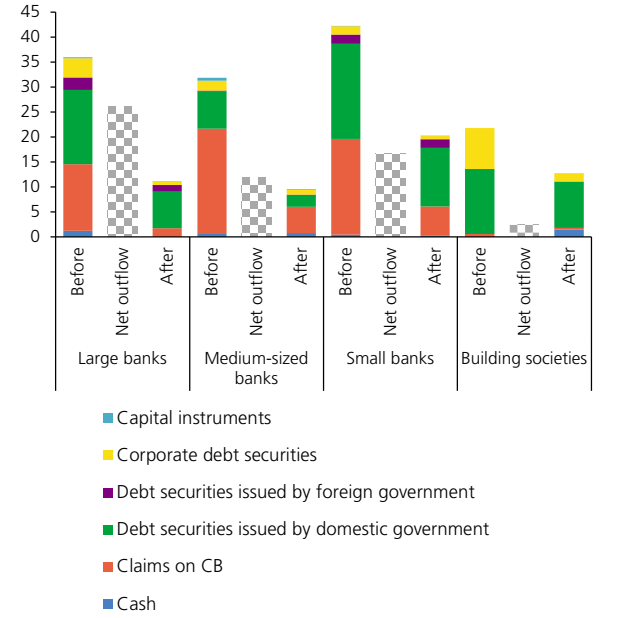
**POST-STRESS LIQUIDITY INDICATORS**
(%; one-year stress period)




Source: CNB, CNB calculations

**CHART 2**

**BANK POST-SHOCK LEVEL 2 LIQUIDITY BUFFERS OF VARIOUS BANK TYPES**
(% of balance-sheet total of bank type)




Source: CNB, CNB calculations
Note: CB stands for central bank.

## 3. APPLICATION OF THE APPROACH TO SELECTED CZECH BANKS

The methodology described above was applied to a representative sample of 21 banks domiciled in the Czech Republic, with various business models and bank sizes represented. The main objective was to monitor the sensitivity of the liquidity position of selected banks to a combination of shocks under the given methodology. We did not set out to assess the overall resilience of the Czech banking sector to liquidity risk, as this would require a more complex analysis (see section 3.3 of this Report). The application was conducted on end-2015 Q3 data for the banks under review. The CNB's November 2015 macro-stress scenario and macro-stress test results (CNB, 2015) were used to simulate the bulk of the exogenous shocks. The parameters of the shocks, including the endogenous ones, are summarised in Table 1 in the Appendix. We opted for a single market indicator ($s$) of 1.5, implying low market liquidity (Van Den End, 2008).

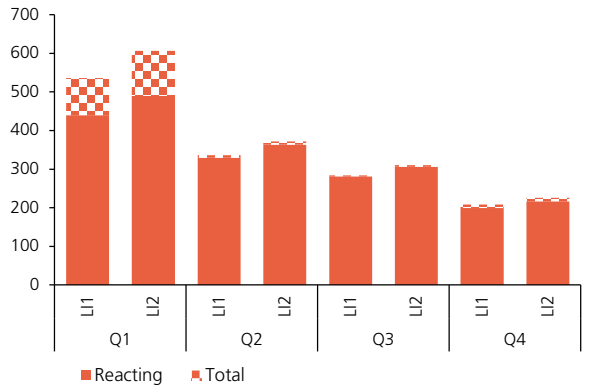
We use two liquidity buffer levels in the test to monitor the diversification and credit quality of the liquidity buffer. Level 1 is the sum of cash, claims on the central bank (excluding minimum reserves) and debt securities issued by domestic and foreign government. Level 2 additionally includes other freely transferable assets such as capital instruments and corporate debt securities excluding those held in credit portfolios.[20] We distinguish between the Level 1 and Level 2 liquidity indicator according to the liquidity buffer level used in the calculation.

On the aggregate level, the indicator stayed high for all the bank types after the shocks were applied. Small banks had the highest indicator and building societies the second-highest (see Chart 1).[21] For building societies this was due to very low net outflows, while for small banks it was due to a relatively high initial liquidity buffer (see Chart 2). Universal banks – represented mainly by large banks – recorded the largest decline in the overall liquidity buffer over four quarters (around 70%). This decline was caused primarily by large net outflows, as their liquidity buffer is made up mainly of high-quality liquid assets, which are subject to small or zero haircuts.

20 Collateral accepted was not included in the buffer because at the time of publication of the article the CNB did not have access to data on it from all the banks under review.
21 Only banks which did not fully exhaust their liquidity buffers over the one-year test period were included in the aggregate liquidity indicator values for that period.

**CHART 3**

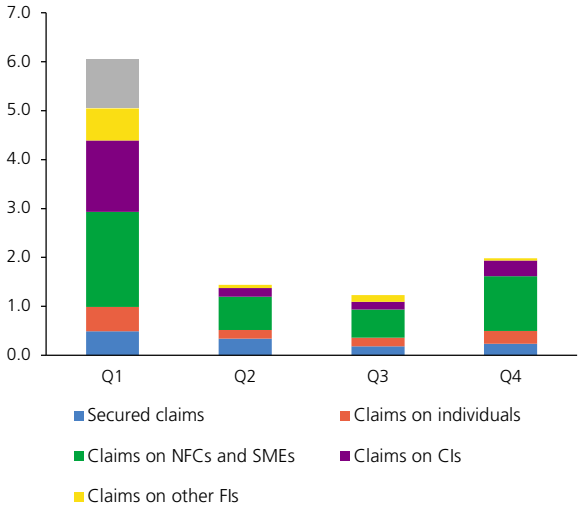
**LIQUIDITY INDICATOR PROFILES OVER THE TEST PERIOD**
(x-axis: liquidity indicator in %)




Source: CNB, authors' calculations
Note: LI1 and LI2 stand for the Level 1 and Level 2 liquidity indicators respectively.

**CHART 4**

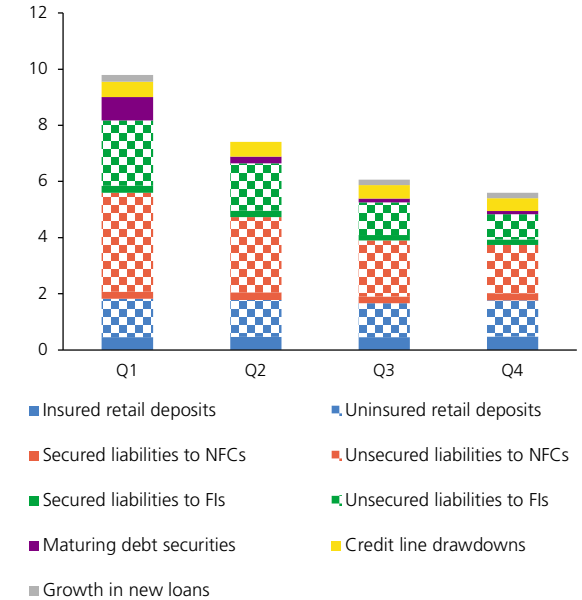
**LIQUIDITY INFLOW STRUCTURE**
(% of balance-sheet total of bank type; x-axis: maturity band)




Source: CNB, authors' calculations
Note: NFCs = non-financial corporations, SMEs = small and medium-sized non-financial corporations, CIs = credit institutions, Q = maturity bands: of 0–3 months, 3–6 months, 6–9 months and 9–12 months.

**CHART 5**

**LIQUIDITY OUTFLOW STRUCTURE**
(% of balance-sheet total of bank type; x-axis: maturity band)




Source: CNB, authors' calculations
Note: NFCs = non-financial corporations, FIs = financial institutions, Q = maturity bands: of 0–3 months, 3–6 months, 6–9 months and 9–12 months.

A few banks exhausted their entire buffers during the test, although the earliest this occurred was in the second quarter. However, some of those banks specialise intentionally in a particular product type. They rely mostly on funding sources within their financial groups and hold hardly any liquidity buffers. However, the methodology also indicated that some universal banks have less stable sources in relation to their liquidity buffers.

In the case of banks that did not exhaust their liquidity buffers, the liquidity indicator gradually decreased as the maturity bands increased in length (see Chart 3). However, these banks are more than sufficiently compliant with the required indicator level despite the fact that most of them had to use their liquidity buffers to cover net liquidity outflows from the very first round of the test.

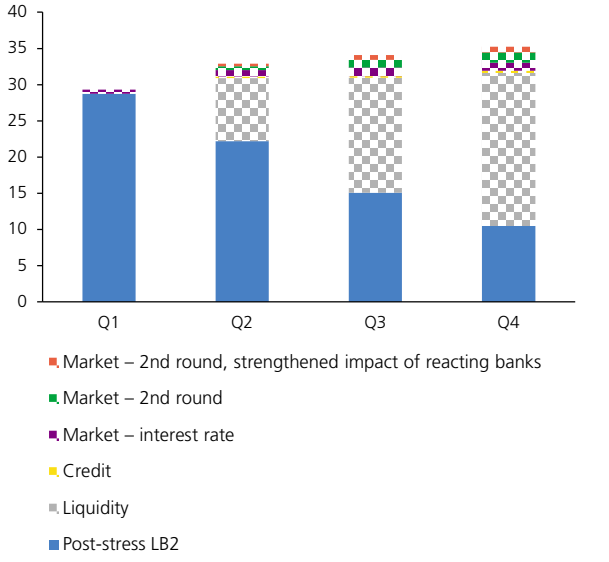
The source of resilience of most of the banks under review is their sufficient Level 1 liquidity buffer, which consists mostly of zero-haircut claims on the central bank and debt securities issued by domestic government. For the most part, they are subject not to the interest rate shocks but only to the additional haircuts in the second round of shocks, since a large proportion of the banks under review hold them to maturity (see Chart 2).[22] The buffer is fairly homogeneous across the banking sector, a property that may magnify the drop in its value if it is used by a large set of banks. Paradoxically, the overall endogenous shock in the

22 In the case of held-to-maturity bonds, the additional haircut is only applied to the part used as collateral.

**CHART 6**

**SENSITIVITY OF THE LEVEL 2 LIQUIDITY BUFFER TO INDIVIDUAL SHOCK TYPES**

(% of balance-sheet total of bank type; x-axis: maturity band)




Source: CNB, authors' calculations
Note: The individual shock types reduce the attainable liquidity buffer level in each quarter to its "post-stress" level. Q = maturity bands: of 0–3 months, 3–6 months, 6–9 months and 9–12 months; LB2 = the Level 2 liquidity buffer.

form of the additional haircut on domestic government bonds may thus be large by comparison with riskier assets with lower shares in the buffer. On the one hand, a more diversified portfolio could mitigate this type of systemic risk. On the other hand, most market prices of assets are highly correlated during a crisis, so only cash or near-cash assets (such as claims on the central bank) can offer real hedging against such risk.

A more detailed breakdown reveals that claims on non-financial corporations, which banks usually provide with shorter maturities, make up the largest part of the inflows in all maturity bands. They therefore significantly exceed claims on individuals and credit institutions in maturities of one year or less. Due to their very short maturities, inflows from claims on credit institutions are relevant only in the first maturity band of 0–3 months. By contrast, inflows from claims on households grow in importance with increasing maturity length. However, the one-year test period was too short for the simulated credit shocks to have a major impact via these claims (see Chart 4).

Uninsured retail deposits and unsecured liabilities to non-financial corporations and financial institutions dominate outflows at the aggregate level (see Chart 5). Outflows from relations with non-financial corporations far exceed those from other relations. There are two main reasons for this. The banks under review fund themselves primarily by accepting deposits from households and non-financial corporations rather than by obtaining loans from other banks in money markets. Compared to retail financing, however, corporate (wholesale) financing is considered a less stable funding source, so a relatively high outflow rate is applied to it. Banks whose sources consist mostly of corporate deposits therefore undergo severe stress in this test. Their liquidity buffers should thus be larger than those of banks with predominantly retail sources.

The cash flow characteristics and liquidity buffer structure described above, combined with our estimates of the impacts of individual shocks,[23] also reveal that the application of liquidity risk in the form of an outflow of funding sources had the biggest impact on the liquidity position of the banks under review. However, those banks were also sensitive to market risk via a reduction in the value of liquid assets in both the first and second rounds of stress. The impact of credit risk was found to be limited for most of the banks under review (see Chart 6).

## 4. CONCLUSION

This article presents major changes made to the methodology used by the CNB to stress test the liquidity of Czech banks. By making these changes, the CNB was responding to the need to take into account the interaction between liquidity risk and credit risk, to monitor the liquidity position of Czech banks over a longer period of market stress, and to take on board new developments in European liquidity regulation.

The output of the new stress test is a liquidity indicator which, analogously to the LCR, expresses the coverage of the net expected liquidity outflow with liquid assets subject to haircuts. The indicator level is deemed adequate if it maintains a minimum value of one over a one-year period.

The stress test methodology was applied to a representative sample of 21 banks domiciled in the Czech Republic, with various business models and bank sizes represented. The

23 The impacts of the individual types of shock were estimated by stepwise elimination, i.e. by setting the values of the relevant stress parameters equal to 0 and comparing the results with and without the shock. In this way, shocks were progressively eliminated in the opposite order to that in the test, i.e. market risk was the first to be omitted from the second rounds, followed by market – interest rate risk, then credit risk and finally liquidity risk.

sole aim of the analysis – based on real data – was to present the methodology and monitor the sensitivity of the liquidity position of selected banks to the combination of shocks considered over a longer period. For this reason, the presented stress test results do not provide information on the true current resilience of the banking sector. That would require a more comprehensive analysis.

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## APPENDIX

**TABLE 1**

**SUMMARY OF PARAMETER SETTINGS WITH USE OF THE NOVEMBER 2015 MACRO-STRESS SCENARIO**
(%)

| Balance-sheet item | Parameterisation source | Parameter value for maturity band | | | | Shock type |
|---|---|---|---|---|---|---|
| | | ≤3M | >3M–6M | >6M–9M | >9M–12M | |
| **Inflows (*p*)** | | | | | | |
| Secured claims | solvency macro-stress test | 0.33 | 0.40 | 0.55 | 0.50 | credit |
| Claims due* | | | | | | |
| on individuals | solvency macro-stress test | 1.35 | 1.44 | 1.54 | 1.59 | credit |
| on non-financial customers and retail SMEs | solvency macro-stress test | 0.56 | 0.70 | 0.69 | 0.69 | credit |
| **Liquidity buffer** | | | | | | |
| Interest rate shock to debt securities (*h*) held in AFS or trading portfolio issued by: | | | | | | |
| Domestic government in CZK | macro-stress scenario | 4.31 | 2.96 | 4.43 | 1.06 | market – interest rate |
| Foreign government in CZK | macro-stress scenario | 7.05 | 4.79 | 7.19 | 1.71 | market – interest rate |
| Domestic CIs in CZK | macro-stress scenario | 4.15 | 2.79 | 4.18 | 0.99 | market – interest rate |
| Foreign CIs in CZK | macro-stress scenario | 1.45 | 0.94 | 1.41 | 0.33 | market – interest rate |
| Domestic corporates in CZK | macro-stress scenario | 2.10 | 1.38 | 2.07 | 0.49 | market – interest rate |
| Foreign corporates in CZK | macro-stress scenario | 0.68 | 0.38 | 0.57 | 0.14 | market – interest rate |
| Domestic government in foreign currency | macro-stress scenario | 0.84 | 0.76 | 1.19 | 0.63 | market – interest rate |
| Foreign government in foreign currency | macro-stress scenario | 0.81 | 0.69 | 1.09 | 0.57 | market – interest rate |
| Domestic CIs in foreign currency | macro-stress scenario | 0.69 | 0.62 | 0.97 | 0.51 | market – interest rate |
| Foreign CIs in foreign currency | macro-stress scenario | 0.37 | 0.25 | 0.40 | 0.21 | market – interest rate |
| Domestic corporates in foreign currency | macro-stress scenario | 0.79 | 0.76 | 1.18 | 0.62 | market – interest rate |
| Foreign corporates in foreign currency | macro-stress scenario | 0.88 | 0.78 | 1.22 | 0.65 | market – interest rate |
| Endogenous market liquidity shocks (r/n) | | | | | | |
| Capital instruments (*h*) | liquidity stress test | 61.24 / 50 | 78.3 / 63.93 | 77.94 / 63.64 | 61.24 / 50 | market – systemic and reputational |
| Capital instruments (*q*) | liquidity stress test | 11.24 / 0 | 28.3 / 13.93 | 41.87 / 29.83 | - / 30.59 | market – systemic and reputational |
| Debt securities of domestic government (*h*) | liquidity stress test | 16.44 / 13.43 | 9.48 / 7.74 | 9.38 / 7.66 | 10.4 / 8.49 | market – systemic and reputational |
| Debt securities of domestic government (*q*) | liquidity stress test | 11.44 / 8.43 | 12.91 / 11.37 | 16.71 / 14.1 | 22.25 / 18.24 | market – systemic and reputational |
| Debt securities of foreign government (*h*) | liquidity stress test | 38692.00 | 7.9 / 6.45 | 8.14 / 6.65 | 8.37 / 6.84 | market – systemic and reputational |
| Debt securities of foreign government (*q*) | liquidity stress test | 36861.00 | 2.9 / 1.45 | 5.07 / 3.18 | 7.21 / 5.28 | market – systemic and reputational |
| Debt securities of domestic CIs (*h*) | liquidity stress test | 62.36 / 50.92 | 47.8 / 39.03 | 47.03 / 38.4 | 51.53 / 42.07 | market – systemic and reputational |
| Debt securities of domestic CIs (*q*) | liquidity stress test | 32.36 / 20.92 | 38.72 / 30.55 | 46.97 / 39.95 | 59.87 / 52.46 | market – systemic and reputational |
| Debt securities of foreign CIs (*h*) | liquidity stress test | 63.09 / 51.51 | 46.82 / 38.23 | 46.79 / 38.2 | 49.42 / 40.35 | market – systemic and reputational |
| Debt securities of foreign CIs (*q*) | liquidity stress test | 33.09 / 21.51 | 44.12 / 29.74 | 46.53 / 39.45 | 57.36 / 49.25 | market – systemic and reputational |
| Debt securities of domestic corporates (*h*) | liquidity stress test | 63.17 / 51.58 | 46.86 / 38.26 | 46.88 / 38.28 | 49.52 / 40.43 | market – systemic and reputational |
| Debt securities of domestic corporates (*q*) | liquidity stress test | 33.17 / 21.58 | 38.43 / 30.45 | 46.72 / 39.63 | 57.64 / 50.07 | market – systemic and reputational |
| Debt securities of foreign corporates (*h*) | liquidity stress test | 36.74 / 30 | 46.75 / 38.17 | 46.83 / 38.24 | 49.44 / 40.36 | market – systemic and reputational |
| Debt securities of foreign corporates (*q*) | liquidity stress test | 6.74 / 0 | 16.75 / 8.17 | 25 / 16.86 | 35.84 / 27.78 | market – systemic and reputational |
| **Outflows (*r*)** | | | | | | |
| Credit line drawdowns** | expert judgement | 5.00 | 5.00 | 5.00 | 5.00 | liquidity |
| Maturing debt securities | non-restoration of source assumed | 100.00 | 100.00 | 100.00 | 100.00 | liquidity |
| Retail deposits | | | | | | |
| insured | solvency macro-stress test, capital adequacy | 3.75 | 3.75 | 3.13 | 3.75 | liquidity |
| other | solvency macro-stress test, capital adequacy | 7.50 | 7.50 | 6.25 | 7.50 | liquidity |
| Liabilities to NFCs | | | | | | |
| secured | solvency macro-stress test, capital adequacy | 15.00 | 15.00 | 12.50 | 15.00 | liquidity |
| other | solvency macro-stress test, capital adequacy | 30.00 | 30.00 | 25.00 | 30.00 | liquidity |
| Liabilities to FIs | | | | | | |
| secured | solvency macro-stress test, capital adequacy | 15.00 | 15.00 | 12.50 | 15.00 | liquidity |
| other | solvency macro-stress test, capital adequacy | 37.50 | 37.50 | 31.25 | 37.50 | liquidity |
| Growth in new loans | | | | | | |
| of which secured claims | solvency macro-stress test | 0.40 | 0.00 | 1.50 | 0.90 | credit |
| of which due vis-à-vis individuals | solvency macro-stress test | 0.00 | 0.00 | 0.00 | 0.00 | credit |
| of which due vis-à-vis non-financial customers and retail SMEs | solvency macro-stress test | 1.20 | 0.00 | 0.00 | 0.60 | credit |

Source: CNB
Note: r/n stands for reacting/non-reacting bank, h for the haircut on a liquid asset, p for the size of the haircut on the expected inflow, r for the size of the outflow, AFS for available for sale, SMEs for small and medium-sized non-financial corporations, CIs for credit institutions, FIs for financial institutions and NFCs for non-financial corporations. The parameter values are the average parameter values applied to individual banks. * Due claims on financial institutions were not subject to haircuts in this scenario. ** The CNB does not have more detailed information on this off-balance-sheet item at the moment. The stock of credit lines as of the test date was multiplied by the value of this parameter. CIs = credit institutions, FIs = financial institutions.

# THE ROLE OF THE LEVERAGE RATIO IN CAPITAL REGULATION OF THE BANKING SECTOR

Lukáš Pfeifer, Libor Holub, Zdeněk Pikhart, Martin Hodula[1]

*Basel III responded to the financial crisis by redefining and expanding the capital requirements for risk-weighted assets and by proposing the introduction of a leverage ratio setting a minimum level of capital for banks in relation to total exposures. The capital requirement is being increased primarily through the active use of macroprudential capital buffers. As a result, there have been proposals that the leverage ratio requirement should also take into account the level of capital buffers and thus become a macroprudential policy tool. One argument in support of such proposals is that if the level of capital buffers is not taken into account, the leverage ratio may not create a sufficient constraint on the size of banks' exposures and hence not fulfil its intended purpose. This article examines the relationship between the capital and leverage ratios and discusses the options for, and effects of, introducing a macroprudential leverage ratio. We find that the capital and leverage ratios complement each other and that the introduction of a macroprudential leverage ratio could, under certain circumstances, enhance the effectiveness of macroprudential policy.*

## 1. INTRODUCTION

The general objective of capital regulation is to increase banks' resilience to unpredictable losses and to ensure that any losses they do incur are borne by their owners. This should ultimately curb risky behaviour by banks and hence also reduce the likelihood of crises in the banking sector. The CRD IV regulatory framework extends capital regulation to include macroprudential capital buffers, the application of which increases the banking sector's resilience to systemic risks. However, experience has shown that capital based on risk-weighted assets may not be a sufficient guarantee of stability if the banking sector is excessively leveraged. The Basel Committee on Banking Supervision (BCBS) therefore came up with the concept of the leverage ratio. It abstracts from the various credit risk levels of different asset classes and links Tier 1 capital to total exposures, comprising total assets plus selected off-balance-sheet items.

In late 2010, the BCBS recommended a methodology for calculating the leverage ratio.2 The BCBS preliminarily set the minimum ratio (referred to here as the microprudential leverage ratio) at 3%, which limits the leverage of total exposures to 33.3 times Tier 1 capital. However, this may not be the final level, as the BCBS and the European Banking Authority (EBA) together with the European Commission (EC) have been tasked with reviewing the calibration of the microprudential leverage ratio by 2017. The microprudential leverage ratio is not a binding regulatory tool at the moment. However, the EU aims to make the leverage ratio a binding regulatory and supervisory tool as from 2018 (recitals 93–96 of the CRR).

There have also been proposals that the leverage ratio requirement should take into account the level of capital buffers and thus become a macroprudential policy tool. The European Systemic Risk Board (ESRB) mentions a macroprudential leverage ratio3 as a possible instrument for preventing excessive credit growth and leverage in one of its recommendations (ESRB, 2013) and describes it in more detail in ESRB (2015).

This article deals with the relationship between the leverage and capital ratios and the role of the leverage ratio in capital regulation of the banking sector.4 We begin by examining the nature of, and relationship between, the leverage and capital ratios. We then describe a possible setting of the macroprudential leverage ratio and its effect on the effectiveness of macroprudential policy. We go on to analyse the relationships between the two tools and selected financial indicators using data for types of Czech banks in 2002–2015. We end by assessing the impact of the level of, and changes to, risk weights on the leverage and capital ratios.

1 Lukáš Pfeifer and Libor Holub: CNB. Zdeněk Pikhart: University of Economics Prague. Martin Hodula: VŠB Technical University of Ostrava.
2 The rules were later revised and are described in detail in BIS (2016a).
3 It has been introduced into national legislation for example in the UK (BoE, 2015).
4 This article does not set out to recommend a calibration or form of legislation for the leverage ratio.

## 2. THE RELATIONSHIP BETWEEN THE CAPITAL AND LEVERAGE RATIOS

Neither the form nor the calibration of the leverage ratio as a binding regulatory tool has been set definitively yet. The examples given in this article therefore serve to illustrate the importance of the leverage ratio as a supplementary tool in capital regulation of the banking sector and are based on the preliminary form described in ESRB (2015). Table 1 summarises the terms used in this article relating to the two capital regulation tools.[5]

### 2.1 The capital ratio and the leverage ratio

The **capital ratio** is a capital regulation tool that reflects the riskiness of assets. It is based on the capital requirement,[6] which is a function of the regulatory minimum capital ratio, the amount of assets and the risk weights of the relevant asset classes:

$$RWR = K^{RWR}/RWA, \quad (1)$$

$$RWA = RW \cdot TA, \quad (2)$$

which gives this formula for the capital requirement:

$$K^{RWR} = (RW \cdot TA) \cdot RWR \quad (3)$$

where *RWR* is the total capital ratio (%), $K^{RWR}$ is the capital requirement implied by the total capital ratio, *RWA* are risk-weighted assets, *RW* is the average risk weight across all asset classes and *TA* are total assets.

The main advantage of the capital ratio is that it takes into account the riskiness of assets in relation to the bank's business model. A bank that invests in higher-risk assets, which are generally associated with higher returns, should hold more capital than one that invests in less risky assets. CRD IV allows risk weights – and hence the riskiness of an asset – to be determined using either a standardised approach (STA) or an internal rating based approach (IRB). Banks applying the STA approach determine risk weights according to values laid down by law,[7] whereas those using the IRB approach determine them using internal models. The main risk characteristics which determine the risk weights in banks' IRB models are the probability of default of the credit exposure (PD) and the loss given default (LGD).[8]

The IRB approach is generally used to measure credit risk by large banks. Its advantages include greater sensitivity of the capital requirement to the risk structure of the bank's assets. It tends to produce a lower risk weight for a given asset class than the STA approach.[9] Given the complexity of the IRB approach, therefore, concerns have been expressed about the risk of insufficiently strict models, or "model risk" (Leslé and Avramova, 2012). Aikman et al. (2014a) assert that financial systems are better characterised by existing uncertainty than by assessment of frequently unpredictable risk. For this reason, they believe that complex approaches

**TABLE 1**

**TERMS RELATING TO CAPITAL REGULATION TOOLS**

| | |
|---|---|
| Capital ratio | Ratio of capital to total risk exposures that bank actually holds (in %) |
| Minimum capital ratio | Ratio of regulatory minimum capital to total risk exposures (in %) |
| Macroprudential capital buffers | Add-ons to minimum capital ratio depending on evolution of systemic risk (in %) |
| Total capital ratio | Sum of minimum capital ratio and macroprudential capital buffers (in %) |
| Leverage ratio | Ratio of Tier 1 capital to total exposures that bank actually holds (in %) |
| Microprudential leverage ratio | Minimum prescribed leverage ratio (in %) |
| Macroprudential leverage ratio | Add-on to leverage ratio above its microprudential level depending on evolution of systemic risk (in %) |
| Total leverage ratio | Sum of microprudential and macroprudential leverage ratios (in %) |
| Capital requirement | Absolute amount of capital implied by total capital or leverage ratio (in CZK) |
| Capitalisation | Absolute amount of capital that bank actually holds (in CZK) |

Source: Compiled by authors

5 These terms are for reference only and should not be taken as binding, as some of them have yet to be incorporated into legislation because the regulatory process is still ongoing.

6 In this article we do not concern ourselves with the capital requirements for market risk and operational risk, which are based on other types of risks than credit risk. This is a simplification, as we work solely with the capital requirement for credit risk, which accounted for 87% of the total capital requirement as of 30 September 2015. We also use total risk exposures rather than risk-weighted exposures.

7 Under the STA approach, the asset class, its external rating and any collateral are taken into account when determining the risk weight. As of the end of 2015, the STA approach was being used to determine risk weights for 27.8% of total assets, so the IRB approach to determining credit risk was dominant.

8 Other variables enter the equation for the calculation of risk weights. For details, see Articles 153–154 of the CRR.

9 This is true for Czech banks (FSR 2014/2015, pp. 42–45).

should be complemented with simple yet comprehensive ones. The leverage ratio is an example of the latter.

The **leverage ratio** is a function of Tier 1 capital and total exposures, comprising total assets plus selected off-balance-sheet items:[10]

$$LR = K^{LR}/TE, \quad (4)$$

This gives us the following capital requirement calculation:

$$K^{LR} = TE \cdot LR, \quad (5)$$

where *LR* is the total leverage ratio (%), $K^{LR}$ is the capital requirement implied by the total leverage ratio and *TE* are total exposures[11] for the leverage ratio calculation.

The leverage ratio is therefore a (currently non-binding) capital regulation tool that does not reflect the riskiness of assets. Experience with the consequences of the recent financial crisis has shown that banks can record large losses even on assets that are generally regarded as low risk and have been assigned the highest rating (securitised assets and government bonds). Such assets have low risk weights and the capital requirement for them is therefore relatively low. Furthermore, a change in balance-sheet structure towards such assets allows banks to lower their capital requirements. However, the leverage ratio tool sets the capital requirement regardless of the riskiness of assets and thus defines the minimum absolute capital requirement. The risk of insufficient capital can therefore be mitigated by setting it at the right level. Introducing the microprudential leverage ratio implies setting the maximum leverage level. Juselius and Drehmann (2015) state that leverage, together with debt burden, is the main driver of the financial cycle. The main objective of introducing the leverage ratio is therefore to increase banks' resilience to less likely losses due to credit risk and to reduce the probability and size of future financial crises. An improvement in financial stability thanks to the introduction of the leverage ratio is mentioned, for example, by Bair (2015) and Grill et al. (2015).

10 Besides total assets, total exposures partially include the values of derivatives and add-ons for counterparty credit risk of repurchase transactions, securities or commodities lending or borrowing transactions, long settlement transactions and margin lending transactions. Other off-balance-sheet items are adjusted by the relevant coefficient. For details, see BIS (2016a) or ESRB (2016a).

11 To better explain the role of the leverage ratio in capital regulation, we abstract from off-balance-sheet exposures and use a simplified leverage ratio defined as the ratio of Tier 1 capital to total assets. In other words, we assume that total assets equal total exposures.

**TABLE 2**

**COMPLEMENTARITY OF THE LEVERAGE AND CAPITAL RATIOS**

| | | |
|---|---|---|
| **Leverage ratio** | **Pros** | (1) Increases resilience to less likely but highly correlated losses<br>(2) Simple tool comparable across institutions and countries<br>(3) Countercyclical |
| | **Cons** | (1) Increases risk of transfer of assets into riskier, higher-yield assets<br>(2) Can be major regulatory change for banks specialising in low-risk assets |
| **Capital ratio** | **Pros** | (1) Reflects level of risk of assets and thus reduces incentive to allocate resources into riskier, higher-yield assets<br>(2) Allows for more effective management of credit risk (IRB models) |
| | **Cons** | (1) Reliant on risk assessment of all types of assets – model risk (IRB models)<br>(2) Low capitalisation for less risky assets<br>(3) Complex and insufficiently comparable |

Source: Compiled by authors

Table 2 summarises the pros and cons of the capital and leverage ratios[12] and illustrates their **complementary relationship**, with the pros of one offsetting the cons of the other and vice versa. The leverage ratio to some extent mitigates the weaknesses of the capital ratio, such as modelling method complexity, model risk and procyclicality, which can lead to a lower capital requirement. Conversely, the capital ratio reduces the risk of funds being moved into riskier, higher-yield assets – a real risk if only the leverage ratio is in force.

Setting a risk-weight floor in the IRB approach – currently under discussion in ongoing preparations to revise the approaches to determining risk weights (BIS, 2016b) – would have a similar effect as introducing a microprudential leverage ratio. This option may be more appropriate where model risk or systemic risk is associated with a specific asset class or sector. However, if those risks cannot be ruled out for other asset classes and other sectors, it may be simpler and more effective to use a leverage ratio than set risk-weight floors for multiple asset classes (for details, see ESRB, 2015, pp. 23–25).

12 For details on the costs and benefits of introducing the leverage ratio, see Fender and Lewrick (2015).

**TABLE 3**

**MINIMUM CAPITAL REQUIREMENT GIVEN A MICROPRUDENTIAL LEVERAGE RATIO OF 3% AND A RISK-WEIGHTED CAPITAL REQUIREMENT OF 8.5%**

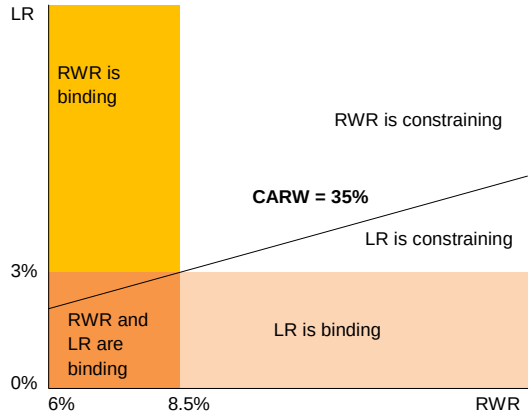
| Asset class (100) | STA regulatory risk weights of banks (in %) | Capital | |
|---|---|---|---|
| | | Leverage ratio requirement | Risk-weighted requirement |
| Central governments | 0 | 3.0 | 0.0 |
| Financial institutions | 20 | 3.0 | 1.7 |
| Retail – mortgage loans | **35** | **3.0** | **3.0** |
| Retail – consumer loans | 75 | 3.0 | 6.4 |
| Corporate sector | 100 | 3.0 | 8.5 |

Source: Authors' calculations

Note: As an example we chose an exposure of CZK 100,000 and assumed a microprudential leverage ratio of 3% and a minimum capital ratio of 8.5%. Using the formula for computing capital requirements, we calculated the capital requirements based on the leverage and capital ratios (last two columns, in CZK thousands).

**CHART 1**

**CONSTRAINING EFFECT OF THE LEVERAGE AND CAPITAL RATIOS GIVEN A CONSTANT CARW**




Source: Fender and Lewrick (2015), compiled by authors

Note: LR denotes the total leverage ratio and RWR the total capital ratio. If the LR is identified as constraining, the bank must hold more capital under the leverage ratio requirement. If the RWR is constraining, it must hold more capital based on the regulatory capital ratio. The area denoted as binding is the area associated with a breach of the regulatory requirement in our illustrative example.

## 2.2 The constraining effect of the capital and leverage ratios

The complementary relationship between the two tools suggests that they have different effects on a bank's capital requirement (see Table 3). To illustrate those different effects, we chose the same settings of the two tools as in ESRB (2015), i.e. a total capital ratio expressed in terms of Tier 1 capital[13] of 8.5% (a minimum requirement of 6% plus a 2.5% capital conservation buffer[14]) and a microprudential leverage ratio of 3%. We then chose individual asset classes and corresponding regulatory risk weights based on the STA approach. The different effects of the leverage and capital ratios are clear from the last two columns of the table. A focus by banks on riskier assets is associated with a higher capital requirement based on the total capital ratio, whereas a focus on less risky assets is associated with a higher requirement based on the microprudential leverage ratio.

It can be seen in Table 3 that, given relevant settings of the two tools, the microprudential leverage ratio (3%) leads to the same capital requirement (CZK 3,000) as the total capital ratio (8.5%) at an average risk weight of 35%. With the said settings of the two tools, a risk weight of 35% therefore represents the critical average risk weight (CARW), which we obtain by dividing the total leverage ratio by the total capital ratio (3/8.5).[15] The CARW is therefore the average risk weight at which the bank is equally constrained by the two capital regulation tools, or at which the bank must maintain the same capital requirement to comply with both tools.

$$CARW = LR/RWR. \tag{6}$$

It also holds that

$$\mathrm{K^{LR}} = \mathrm{K^{RWR}}, \text{ if } \mathrm{CARW} = \mathrm{RW}, \tag{7}$$

$$\mathrm{K^{LR}} > \mathrm{K^{RWR}}, \text{ if } \mathrm{CARW} > \mathrm{RW}, \tag{8}$$

$$\mathrm{K^{LR}} < \mathrm{K^{RWR}}, \text{ if } \mathrm{CARW} < \mathrm{RW}. \tag{9}$$

So, if both tools apply, the bank will be constrained by at least one of them at any given moment in time, depending on which capital requirement is higher: that based on the leverage ratio or that based on the capital ratio. The constraining effect of the specific capital regulation tool depends, in addition to its setting, on the bank's business model or risk weight. Given the above settings of the two tools, if the bank has an average risk weight above 35%, it will be constrained by the capital ratio. Conversely, if the

13 The leverage ratio is also expressed in terms of Tier 1 capital for now.

14 Although the capital conservation buffer is commonly classed as a macroprudential tool, it is in essence a newly defined element of the traditional microprudential capital requirements.

15 If we did not abstract from off-balance-sheet items for the leverage ratio, the equation would be: CARW = (LR/RWR)·(TE/TA).

risk weight is below 35%, the leverage ratio will be constraining (see Chart 1). The CARW level therefore determines the constraining effect of the two tools.

If changes in the settings of the two tools are equal in percentage terms, the CARW level will not change (see Chart 1 and the CARW expressed as a line). If they change differently, the CARW will also change. An increase in the total capital ratio – for example in the form of the introduction of, or an increase in, macroprudential capital buffers – would lead to a decrease in the CARW and hence also in the constraining effect of the leverage ratio. There have therefore been proposals that the leverage ratio requirement should take into account the level of capital buffers and thus become a macroprudential policy tool.

## 3. THE MACROPRUDENTIAL LEVERAGE RATIO

Macroprudential capital buffers usually fulfil two macroprudential policy objectives: to prevent misaligned incentives for financial institutions (structural dimension of systemic risk) and to prevent excessive credit growth and leverage (cyclical dimension of systemic risk). In this section, we will look at possible ways of linking them to the macroprudential leverage ratio and its objective. We will therefore assume that the microprudential leverage ratio is in force as a capital regulation tool.

### 3.1 The structural and countercyclical macroprudential leverage ratios

To mitigate the structural dimension of systemic risk, CRD IV allows the application of a broadly defined systemic risk buffer (SRB). This buffer is currently usually applied to systemically important institutions and has the same objective as those for global and other systemically important institutions (G-SIIs and O-SIIs respectively).[16] These buffers are meant to increase the resilience of systemically important institutions, whose failure could impair the stability of the entire financial system. ESRB (2015) describes the option of linking the above buffers to a "structural macroprudential leverage ratio", the application of which would simultaneously increase the total leverage ratio.

In periods of excessive credit growth and leverage, which are associated with an elevated risk of future losses, CRD IV provides for the application of a countercyclical capital buffer[17] (CCyB; for details see section 4.2.2 of this Report). The objective of the CCyB is to reduce the risk of excessive credit growth and the effect of the cycle on capital requirements. In booms, the risk weights of IRB banks[18] can move procyclically (Aikman et al., 2014b) due to procyclicality in the components used to calculate them, as PD and LGD (see section 2 of this article) are derived from measures[19] that tend to be lower in booms and higher in recessions. Given the recurring expansion and contraction phases of the economic and financial cycle, the economy can be expected to slow after a period of strong growth.[20] The CCyB is therefore applied during a boom so it can later be released during a contraction. This should lead to greater resilience of banks and lower amplitude of the credit cycle. ESRB (2015) describes the option of linking the CCyB to a "countercyclical macroprudential leverage ratio". Brei and Gambacorta (2014) find that the leverage ratio is a more countercyclical capital regulation tool than the capital ratio.

### 3.2 The setting of the macroprudential leverage ratio

**The impact of (non-)introduction of the macroprudential leverage ratio**

In section 2 we followed the lead of the ESRB (2015) by using a CARW of 35%. However, the CARW can vary depending on the settings of the total leverage and capital ratios (see Table 4). The CARW is lowered among other things by the introduction of macroprudential capital buffers without simultaneous introduction of a macroprudential leverage ratio. This lowers the risk weight indicating the minimum absolute capital requirement and reduces the constraining effect of the leverage ratio.

If, for example, the SRB is introduced for systemically important institutions and the structural macroprudential leverage ratio is not simultaneously activated, the CARW for those institutions will decrease, because the total capital ratio will rise while the total leverage ratio will remain unchanged. The CARW will thus be lower and the leverage ratio less constraining for systemically important institutions than for the rest of the sector. Conversely, if the structural

16 The systemic risk buffer is governed by Article 133 of the CRD and the G-SII and O-SII buffers by Article 131 of the CRD.

17 The countercyclical capital buffer is governed by Article 136 of the CRD.

18 At the moment, procyclical movement in the components of risk weights can pose a risk to IRB banks. If risk triggers are introduced in the STA approach (BIS, 2015) a similar risk could apply to STA banks.

19 PD is derived from the ratio of NPLs to total loans in the investment portfolio and LGD from the rate of recovery of a given NPL.

20 In a contraction phase of the financial cycle, by contrast, PD, LGD and hence also risk weights tend to be overestimated even though they are often falling due to investments being moved into less risky assets. This could constrain lending activity and hinder economic recovery.

**TABLE 4**

**EFFECT OF THE SETTING OF THE TOTAL CAPITAL RATIO ON THE CARW**

(%)

| Items included in total capital ratio | Total capital ratio | Microprudential leverage ratio | CARW |
|---|---|---|---|
| Tier 1 | 6.0 | 3.0 | **50** |
| Tier 1+Tier 2 | 8.0 | 3.0 | **38** |
| Tier 1+CCoB | **8.5** | **3.0** | **35** |
| Tier 1+Tier 2+CCoB | 11.5 | 3.0 | **26** |
| Tier 1+Tier 2+CCoB+CCyB | 14.0 | 3.0 | **21** |
| Tier 1+Tier 2+CCoB+CCyB+SRB | 17.0 | 3.0 | **18** |

Source: Compiled by authors

Note: Tier 1 = original capital, Tier 2 = supplementary capital, CCoB = capital conservation buffer, CCyB = countercyclical capital buffer, SRB = systemic risk buffer.

macroprudential leverage ratio is introduced simultaneously, the total leverage ratio will be higher and the maximum leverage level lower for systemically important institutions than for the rest of the sector.

If the countercyclical macroprudential leverage ratio is not activated at the same time as the CCyB, the constraining effect of the leverage ratio will decrease during an expansion phase of the financial cycle. The risk weight indicating the minimum absolute capital requirement will fall as the CARW decreases. Conversely, if the countercyclical macroprudential leverage ratio is simultaneously applied, the maximum leverage level will fall in an expansion phase of the financial cycle.

A rise in the macroprudential capital buffers without a corresponding increase in the macroprudential leverage ratio therefore always leads to a fall in the CARW and a decrease in the constraining effect of the leverage ratio. If, despite the fall in the CARW, the average risk weight remains lower than the CARW for some banks, an increase in the macroprudential capital buffers will not have a constraining effect on those banks. The capital requirement based on the microprudential leverage ratio would remain higher than the capital requirement based on the total capital ratio (see section 2.2). These banks would thus continue to be constrained by the microprudential leverage ratio, and their capital requirement would not take into account the increase in systemic risk. The introduction of the macroprudential leverage ratio could therefore have a positive effect on the attainment of macroprudential policy objectives, especially in a situation where systemic risk is rising and the risk weights of banks with significant market shares are below the CARW. This is because the macroprudential leverage ratio has a similar objective as the macroprudential capital buffers, the only difference being that it constrains banks with risk weights below the CARW, on which macroprudential capital buffers do not have a constraining effect.

According to ESRB (2015), for the purposes of setting the macroprudential leverage ratio it is possible to make some changes to it in line with the evolution of systemic risk or to apply a fixed rule that automatically keeps the CARW constant over time, which implies a constant constraining effect of the two capital regulation tools. In other words, they can use a fixed rule to ensure that the risk weight indicating the minimum capital requirement does not change. However, each of these options has its pros and cons.[21]

We will not deal any further with minor adjustments to the macroprudential leverage ratio, as they can differ from case to case. We will concentrate on clarifying how the fixed rule is applied.

**The setting of the macroprudential leverage ratio using the fixed rule with an initial CARW of 35%**

We start with the example of setting the countercyclical macroprudential leverage ratio[22] using a fixed rule keeping the CARW constant at 35%. Then we look at the effect of a different initial CARW on the macroprudential leverage ratio when the fixed rule is applied.

Charts 2a and 2b depict three different scenarios, all of them continuing to assume a microprudential leverage ratio of 3% and a total capital ratio of 8.5%. In the initial scenario A, macroprudential buffers are not added to the total capital ratio and the CARW is therefore 35% (3/8.5). In scenarios B and C, the maximum CCyB of 2.5% is introduced. However, these scenarios differ in the introduction of the countercyclical macroprudential leverage ratio. In scenario B, the macroprudential leverage ratio is not introduced and the total leverage ratio remains at 3%. The CARW therefore falls to 27% (moving from point A to point B in Chart 2b). With this shift, the constraining effect of the capital ratio increases at the expense of that of the leverage ratio. In scenario C, the 2.5% CCyB is incorporated into the total leverage ratio so that the CARW stays constant at 35% (the fixed rule mentioned above). The total leverage ratio therefore rises to 3.9%, while the

21 For details, see ESRB (2015, pp. 29–30).

22 The situation is more complicated for the structural macroprudential leverage ratio, as it only applies to certain institutions.

countercyclical macroprudential leverage ratio is 0.9% (point C in Chart 2b). As the CARW is kept constant, the constraining effect of the two capital regulation tools remains the same as before the introduction of the CCyB. By definition, however, the minimum capital requirement increases and conversely the maximum possible leverage for banks decreases as the total leverage ratio rises.

**The effect of the CARW level on the macroprudential leverage ratio when the fixed rule is applied**

When the fixed rule is applied, the initial CARW level has an effect on the macroprudential leverage ratio in addition to the setting of the constraining effect of the two tools, as it holds that:

$$\Delta LR = CARW \cdot \Delta RWR \qquad (10)$$

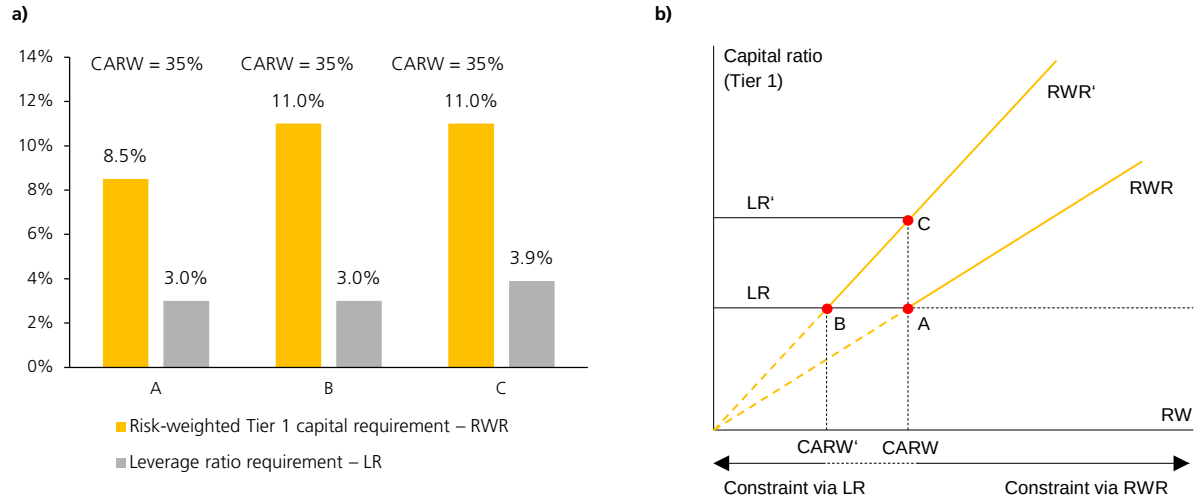
where $\Delta LR$ is the change in the total leverage ratio and $\Delta RWR$ is the change in the total capital ratio.

The initial CARW ranges between 26% and 50% (see Table 5), which, for example, given the introduction of the maximum CCyB and keeping the CARW constant, leads to a macroprudential leverage ratio in the range of 0.7%–1.3%.

CHART 2

**EFFECT OF INTRODUCING A MACROPRUDENTIAL LEVERAGE RATIO ON THE CARW AND THE CONSTRAINING EFFECT OF THE TWO CAPITAL REGULATION TOOLS**

(%)




Source: Authors' calculations

TABLE 5

**EFFECT OF THE MINIMUM CAPITAL REQUIREMENT LEVEL ON THE CARW AND THE MACROPRUDENTIAL LEVERAGE RATIO**

(%)

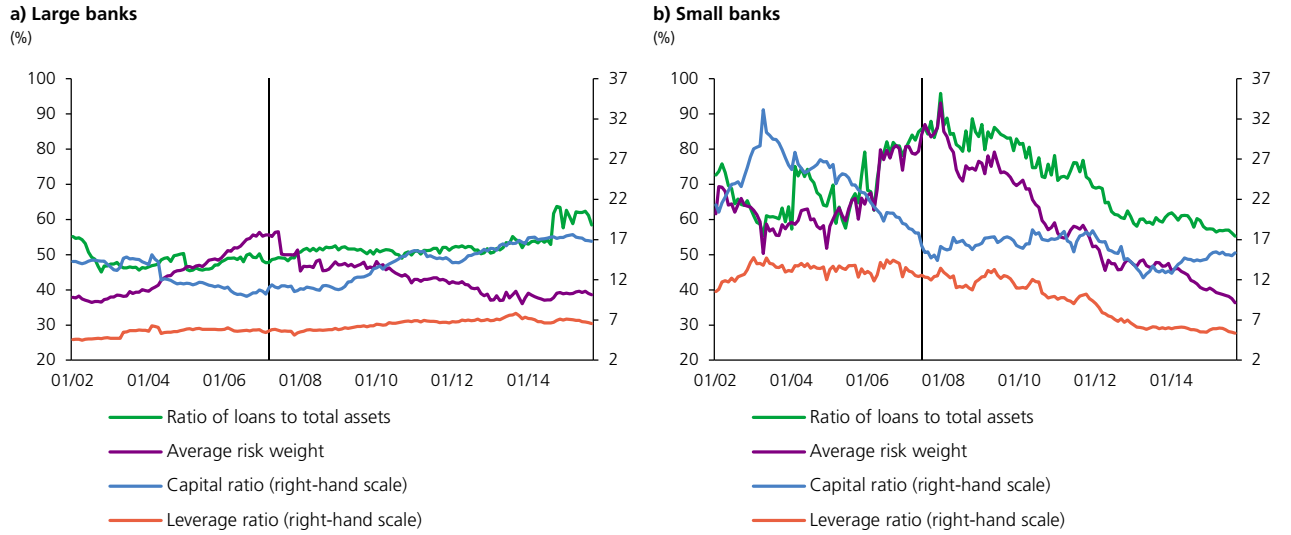
| Items included in total capital ratio | Total capital ratio | Microprudential leverage ratio | CARW | Makroobezřetnostní pákový poměr | | |
|---|---|---|---|---|---|---|
| | | | | CCyB = 2.5 % | SRB = 3 % | CCoB = 2.5% |
| Tier 1 | 6.0 | 3.0 | 50 | **1.3** | **1.5** | **1.3** |
| Tier 1+Tier 2 | 8.0 | 3.0 | 38 | **0.9** | **1.1** | **0.9** |
| Tier 1+CCoB | 8.5 | 3.0 | 35 | **0.9** | **1.1** | **-** |
| Tier 1+Tier 2+CCoB | 11.5 | 3.0 | 26 | **0.7** | **0.8** | **-** |

Source: Compiled by authors

Note: Tier 1 = original capital, Tier 2 = supplementary capital, CCoB = capital conservation buffer, CCyB = countercyclical capital buffer, SRB = systemic risk buffer. The macroprudential leverage ratio, given in the final three columns of the table, is computed as the CARW multiplied by the relevant macroprudential capital buffer.

CHART 3

INDICATORS RELATING TO CAPITAL REGULATION – LARGE BANKS




Source: CNB
Note: The vertical line denotes the start of gradual migration to the IRB approach to measuring credit risk, which concerned all large banks and some medium-sized banks and building societies (in the majority of their portfolios). All small banks, however, still use the STA approach.

## 4. EMPIRICAL ANALYSIS

In this section, we first analyse the relationship between the two capital tools and selected financial indicators for small and large banks[23] in the Czech Republic in the period 2002–2015. These two bank types were chosen to illustrate the different relationships of these indicators for IRB and STA banks.[24] Large banks started to migrate to the IRB approach to measuring credit risk in the second half of 2007 (shown by a vertical line in Charts 3a and 3b). Small banks still use the STA approach. Given the significant role of risk weights, we then use a simple vector autoregression (VAR) model to assess the different impacts of the level of, and changes to, risk weights on the leverage and capital ratios.

The data are not available in a long enough time series for us to compute the denominator of the leverage ratio. In what follows, therefore, we use a simplified leverage ratio calculated as the simple ratio of Tier 1 capital to total assets (instead of total exposures), i.e. excluding off-balance-sheet items. Czech banks are currently characterised by a relatively conservative business model focusing on lending to non-financial corporations and providing loans for house purchase. The Czech banking sector's off-balance sheet is therefore relatively small, justifying the above simplification. Risk weights are calculated as the ratio of risk-weighted assets to total assets.

Charts 3a and 3b illustrate the evolution of the leverage and capital ratios, risk weights and ratio of loans to total assets on the example of small and large banks. Under both approaches, the risk weights are affected by the asset structure, which changes over time as a result of change not only in the ratio of loans to total assets, but also in the credit portfolio structure. However, the financial indicators used in the charts do not capture change in the credit portfolio structure. In the case of the IRB approach, the risk weights are also affected by the cyclicality of the components used to calculate them (especially PD; see sections 2.1 and 3.1 of this article).

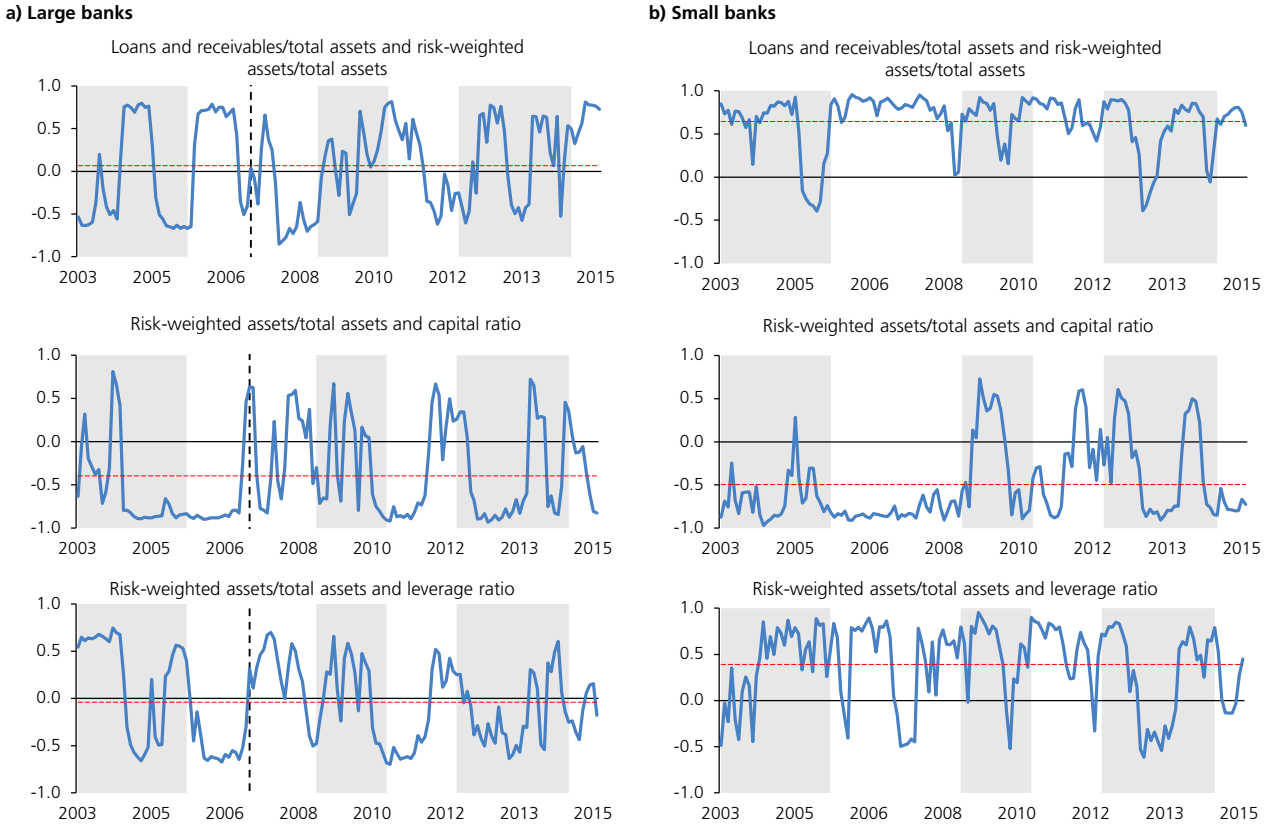
It is apparent from Charts 3a and 3b that the risk weights for large banks started falling simultaneously with the switch to the IRB approach, while those for small banks started to go down six months later. In the case of small banks, this change and the subsequent decline can be

23 We divide banks into large banks, medium-sized banks, small banks and building societies in accordance with the methodology in force at the end of 2015. We therefore classify banks by size according to their total assets. Large banks have total assets of over CZK 250 billion, medium-sized banks total assets of CZK 50–250 billion and small banks total assets of less than CZK 50 billion.

24 While all large banks now use the IRB approach in the majority of their portfolios, all small banks apply the STA approach. In medium-sized banks and building societies, some institutions use the IRB approach and others the STA approach. In the case of building societies, the relationships between the indicators of interest are also affected by their specific business model.

CHART 4

**DYNAMIC CORRELATIONS BETWEEN FINANCIAL INDICATORS FOR LARGE AND SMALL BANKS**




Source: CNB, authors' calculations

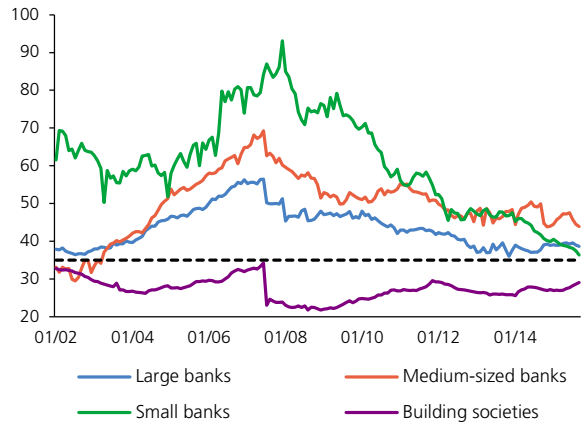
Note: The horizontal red line represents the average dynamic correlation, the grey areas indicate periods when the GDP gap was negative, and the vertical black line for large banks marks the start of migration to the IRB approach.

explained by a fall in the ratio of loans to total assets and a rise in the ratio of less risky mortgage loans to total loans. The ratio of loans for property purchase to total loans has increased by 34.1 pp in small banks and 9.7 pp in large banks since 2007. The ratio of loans to total assets in large banks has meanwhile tended to rise. The fall in risk weights in large banks cannot be explained solely by a change in asset structure, so migration to the IRB approach also played a role.

For a more detailed analysis, we employ an estimate of the integrated model of the dynamic conditional correlation, which allows us to analyse the relations between selected financial indicators and their time-varying nature (Engle, 2002). We view this approach as appropriate since it can be assumed that the tested correlations have changed as a result of structural changes (such as the financial crisis and changes to the regulatory methodology). The results show that there is a strong positive correlation between the ratio of loans to total assets and the risk weight for small banks (see Chart 4b). A moderately strong negative correlation is apparent between the capital ratio and the risk weights for both small and large banks. For both types of banks, the correlation between these two indicators is very different before and after the global financial crisis. The weakening of the correlation between risk weights and the capital ratio was due to the onset of the financial crisis combined with a change in the balance-sheet structures of individual bank types and regulatory changes. In large banks, it was also due to migration to the IRB approach, as evidenced by a weakening of the correlation between the two indicators starting in 2007. This did not happen in small banks until 2009. The correlation between risk weights and the leverage ratio is positive and much stronger again for small banks, although it weakened slightly at the end of the period under review.

CHART 5

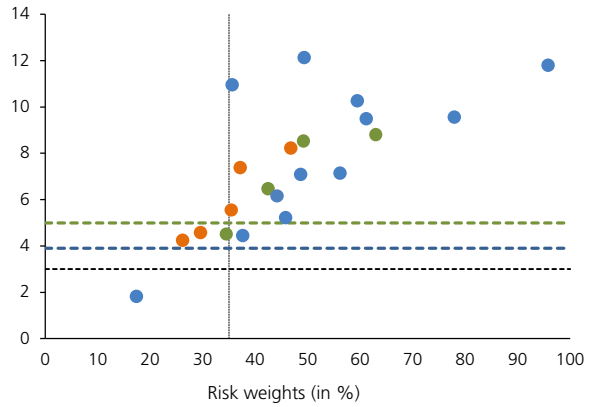
**RISK WEIGHTS FOR BANK TYPES IN THE CZECH REPUBLIC**
(%)




Source: CNB
Note: The average risk weight is calculated as the ratio of risk-weighted assets to total assets. The dashed line denotes a CARW of 35%.

CHART 6

**LEVERAGE RATIOS AND RISK WEIGHTS ACROSS BANKS AS OF 30 SEPTEMBER 2015**
(y-axis: leverage ratio in %)




Source: CNB
Note: In this case, the leverage ratio calculation includes the effect of the off-balance sheet. Red dots depict building societies, green dots systemically important banks and blue dots small and medium-sized banks. The vertical line illustrates a CARW of 35%. The black horizontal line illustrates a microprudential leverage ratio of 3%, the blue line additionally a cyclical macroprudential leverage ratio of 0.9% and the green line additionally a structural macroprudential leverage ratio for systemically important institutions of 1.1%.

### 4.1 The effect of the risk weight on the relationship between the capital and leverage ratios

In section 2.2 we stated that the CARW level determines the intensity of effect of the individual capital regulation tools in the banking sector. By comparing the CARW and the average risk weights we can determine which of the capital regulation tools has a constraining effect on a specific bank.

For the purposes of explaining the relationship between the leverage and capital ratios we have so far worked with a CARW of 35%, as in ESRB (2015). At this CARW level, the leverage ratio would represent a constraint for building societies in the Czech Republic, as for this type of bank the capital requirement based on the leverage ratio would be higher than that based on the capital ratio over the entire period under review (see Chart 5). However, a substantial decline in risk weights is visible for all the other types of banks in recent years as well.

Chart 6 depicts the risk weights and leverage ratios for specific banks. One bank would currently be non-compliant with a microprudential leverage ratio of 3%. If we were to take into account the setting of the macroprudential leverage ratio in the scenario highlighted in Table 5 (as also used by ESRB, 2015), i.e. a maximum countercyclical component of 0.9% and a structural component of 1.1%, another one bank would be non-compliant with the maximum total leverage ratio. For those two institutions and another two building societies, the leverage ratio would be constraining, as their risk weight is below 35%.

A simple VAR model is used to analyse the effect of a change in the risk weight on the leverage ratio and to compare it with the effect of a change in risk weights on the capital ratio.[25] The relationship between the variables is illustrated using impulse response functions (IRFs), which express the response generated by an unexpected shock (impulse) to the current value and future values of the explained variables. We simulated the standard deviation response to a shock among the endogenous variables in the model in the 5% and 32% significance interval, a method described in more detail in Pesaran and Shin (1998). The analysis was conducted separately for each bank type using the leverage and capital ratios, risk weights and ratio of loans and receivables to total assets (endogenous variables) and the output gap of the euro area economy (exogenous control variable).[26]

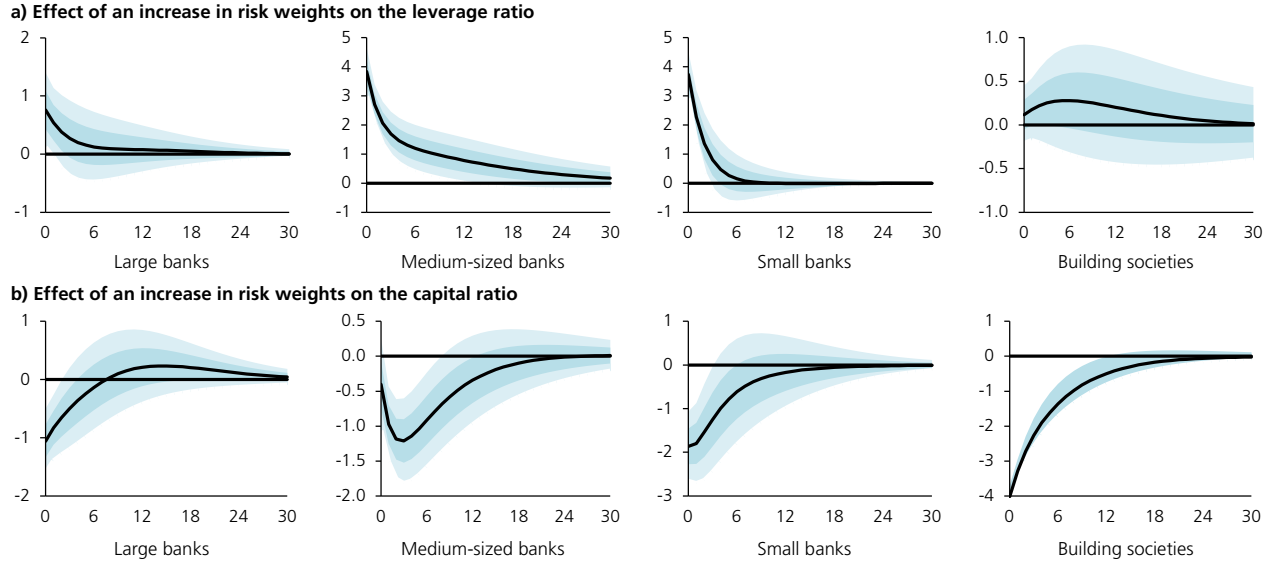
The leverage ratio rose and the capital ratio fell as the risk weights increased. Banks reacted to the growth in risks by topping up their capital, which led to an increase in the

25 No additional structural constraints were added to the models. All time series were seasonally adjusted. The VAR model does not display autocorrelation of residuals.
26 The output gap over the entire time series and the capital measures, which are available since 2014 at quarterly frequency only, were interpolated to monthly frequency using quadratic decomposition. Stationarity was ensured by converting the variables to year-on-year growth.

CHART 7

**EFFECT OF AN INCREASE IN RISK WEIGHTS**

(%; x-axis: in months)




Source: CNB, authors' calculations

Note: The charts present the impulse responses. The x-axis shows the number of months after the shock and the y-axis the strength of the response to the shock generated as a single variance. The continuous line indicates the mean response and the blue fields show the confidence intervals at the 95% and 68% confidence levels.

leverage ratio. However, the rise in capital was smaller than the rise in risk-weighted assets, so the capital ratio decreased. When the risk-weighted assets decreased, by contrast, the capital ratio rose and the leverage ratio fell. This shows that the two capital tools are complementary.

The response to a change in risk weights differed across bank types in the period under review (see Chart 7). The effect of a change in risk weights on the leverage ratio was particularly strong for small and medium-sized banks. It was insignificant for building societies, probably due to their specific business model and relatively stable risk weights.

By contrast, the effect of a change in risk weights on the capital ratio was particularly significant for building societies. This can be explained by their low risk weights, which imply a lower capital requirement, i.e. a lower numerator in the capital ratio. An increase in its denominator, or risk-weighted assets, then causes a larger decline in the capital ratio. Conversely, an increase in the total capital ratio, for example in the form of the introduction of a macroprudential capital buffer, will not necessarily increase the capital requirement significantly in a situation of low risk weights.

To sum up, the current decline in the risk weights of the individual bank types (see Chart 5) during the ongoing economic recovery is increasing the relevance of the introduction of the leverage ratio. A change in balance-sheet structure towards less risky assets is making banks more vulnerable to less probable losses.

## 5. CONCLUSION

This article provided evidence of a complementary relationship between the leverage and capital ratios. Using a simple vector autoregression model, this relationship was documented on Czech data by showing the different responses of the two tools to a change in the risk weight.

If the leverage ratio were to be incorporated into the legislation as a regulatory tool, it could be useful to introduce it as a supplementary capital regulation tool in the banking sector. The introduction of a microprudential leverage ratio increases banks' resilience to less risky exposures. The setting of a macroprudential leverage ratio could also have a positive effect on macroprudential policy effectiveness in terms of mitigating cyclical and structural risks, especially if systemic risk arises at a time when risk weights are below the CARW for a large number of institutions with large market shares. To set the macroprudential leverage ratio, it may be appropriate to apply a fixed rule that keeps the CARW constant for all

banks over time and hence also keeps the constraining effect of the two capital regulation tools stable and predictable. However, it is also possible to make one-off changes to its setting in line with the evolution of systemic risk, or to use a combination of the two.

Dynamic correlation results for the Czech Republic point to a weakening of the correlation between the capital ratio and risk weights, linked with a decline in risk weights for individual types of banks. In the case of large banks, the weakening of this correlation coincided with their migration to the IRB approach to measuring credit risk. In the case of small banks, it happened around two years later, when the global financial crisis broke out. This, coupled with a continued decline in risk weights and a change in the balance-sheet structures of individual types of Czech banks towards less risky assets is increasing the relevance of the microprudential leverage ratio and subsequently also the macroprudential leverage ratio as a supplementary capital regulation tool.

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## GLOSSARY

**Bank Lending Survey (BLS)**

A survey of bank lending conditions for non-financial corporations and households in the Czech Republic, the pilot round of which took place in 2012 Q1. The survey aims to obtain qualitative information on current perceptions of the situation on both the supply and demand side of the credit market.

**Balance-sheet liquidity**

The ability of an institution to meet its obligations in a corresponding volume and term structure.

**Balance-sheet recession**

A situation caused by the efforts of market participants to reduce their debt, a resulting drop in demand for loans, and a limited ability to stimulate economic activity through monetary policy. The onset of a balance-sheet recession usually follows a sharp decline in asset prices, when the balance sheets of market participants can record negative equity, i.e. the value of assets is lower than that of balance-sheet liabilities. A typical example is the period following the bursting of the stock and property bubble in Japan during the 1990s.

**Basel III**

A new regulatory framework issued by the Basel Committee on Banking Supervision in 2010 which sets standards for capital adequacy of banks and now also for their liquidity. Overall, Basel III introduces stricter rules than the previous framework and came into existence mainly as a reaction to the financial crisis.

**Breakdown of banks by total assets**

In some charts and tables in the FSR, banks are assigned to groups based on the amount of their total assets. The breakdown of banks into groups is revised at the end of each calendar year. In 2007 and 2008, banks having total assets of over CZK 150 billion were regarded as large banks, banks having total assets of over CZK 50 billion and up to CZK 150 billion were regarded as medium-sized banks and banks having total assets of less than CZK 50 billion were regarded as small banks. In 2009 the total amount of assets necessary for inclusion in the group of large banks was increased to CZK 200 billion and the range for medium-sized banks was changed to CZK 50 billion–CZK 200 billion. The range for small banks was unchanged. As from 2012, the breakdown of banks by total assets is as follows: large banks have total assets of over CZK 250 billion, medium-sized banks have total assets of over CZK 50 billion and up to CZK 250 billion and small banks have total assets of less than CZK 50 billion.

**Capital ratio**

The ratio of regulatory capital to total risk-weighted assets. The Tier 1 capital ratio is the ratio of Tier 1 capital to total risk-weighted assets (see also Tier 1).

**Capital requirement**

The capital requirement is the amount of capital a bank has to hold so as to cover all the risks it undertakes.

**Collective investment funds (CIFs)**

Mutual and investment funds whose sole business activity is collective investment, i.e. collecting funds from investors and investing them. CIFs are broken down by investor type into funds intended for the public (dominated by open-ended mutual funds) and funds for qualified investors, and by asset risk into money market, bond, equity, mixed and real estate funds and funds of funds. Sometimes the category of funds of funds is not listed

separately, but is included in the other categories according to the type of funds in which they invest.

**Common Reporting Framework (COREP)**

A common reporting framework in the EU, prepared by the European Banking Authority (EBA) for data reporting in accordance with prudential requirements (under CRR). It covers the areas of capital, capital adequacy, risk exposures, operational risk, market risk and credit risk.

**Countercyclical capital buffer**

A macroprudential tool designed to increase the banking sector's resilience to cyclical risks associated with fluctuations in lending.

**Debt deflation** A situation where the real value of the debt of corporations and households rises as a result of falling prices and incomes. This happens primarily in a situation where the decrease in nominal interest rates is insufficient to offset the fall in the rate of growth of incomes.

**Debt-service-to-income (DSTI)**

The ratio of debt service to the net income of the loan applicant.

**Default** Default is defined as a breach of the debtor's payment discipline. The debtor is in default at the moment when it is probable that he will not be able to repay his obligations in a proper and timely manner, without recourse by the creditor to settlement of the claim from the security, or when at least one repayment (the amount of which deemed by the creditor to be significant) is more than 90 days past due.

**Default rate** The 12-month default rate is the ratio between the volume of liabilities of debtors which defaulted over a 12-month reference period and the volume of liabilities of all entities existing at the start of that period. The default rate can also be defined analogously in terms of the number of entities which defaulted over the reference period.

**Deleveraging** A process consisting in the reduction of leverage, i.e. the reduction of indebtedness, which decreases the profitability of economic agents, but also the degree of risk associated with them.

**Eligible collateral** An asset accepted to ensure fulfilment of an obligation to the central bank.

**Financial Reporting Framework (FINREP)**

A common reporting framework in the EU, prepared by the European Banking Authority (EBA) for data reporting in accordance with prudential requirements (under CRR). It covers the area of financial data of individual institutions, in particular the balance sheet and the profit and loss account.

**Gross government borrowing requirement**

The net government borrowing requirement plus redemptions and repurchases of government bonds maturing in the given year, repayments of EIB loans, repurchases and exchanges of government bonds maturing in future years, and revaluation of funding reserves.

**Herfindahl-Hirschman index (HHI)**
The sum of the squares of the market shares of all entities operating on a given market. It expresses the level of concentration in the market. It takes values between 0 and 10,000. The lower the HHI, the less concentrated the market.

**Household insolvency** A situation where a household is unable to cover its current expenditures by its current income and the sale of its asset holdings. Insolvency is defined in legal terms in Act No. 182/2006 Coll., on Insolvency and Methods of Resolution Thereof.

**Institutional investor** Either (a) a bank executing trades in investment instruments on its own account on the capital market, a management company, an investment fund, a pension fund or an insurance company, or (b) a foreign entity authorised to carry on business in the same fields in the Czech Republic as the entities listed under (a).

**Interest rate spread** Also interest rate differential; the spread between the interest rate on a contract (deposit, security) and a reference interest rate.

**Interest rate transmission channel**
One of the channels of the monetary policy transmission mechanism. It acts such that, for example, an increase (decrease) in monetary policy interest rates leads first to an increase (decrease) in interest rates on the interbank market. Consequently, there is an increase (decrease) in the interest rates announced by banks for the provision of loans and the acceptance of deposits. The result is a downturn (upturn) in investment activity as a part of aggregate demand and ultimately a decrease (increase) in inflation pressures.

**Leverage** See Leverage ratio.

**Leverage ratio** The new CRD IV/CRR rules define the leverage ratio as capital to risk-weighted assets. The term leverage is also often used in financial economics. There, however, capital is the denominator in the ratio (e.g. assets/capital or debt/capital). When we say that a bank has high leverage, we generally refer to the definition consistent with the assets/capital ratio. However, such a bank has a low leverage ratio.

**Loan-to-income (LTI)** The ratio of the amount of a loan to the net income of the loan applicant.

**Loan-to-value (LTV)** The ratio of the amount of a loan to the value of collateral.

**Loss given default (LGD)** The ratio of the loss on an exposure in the event of counterparty default to the amount owed at the time of default.

**Macroprudential policy** A key component of financial stability policy. It focuses on the stability of the financial system as a whole. Its main objective is to help prevent systemic risk.

**Market liquidity** The ability of market participants to carry out financial transactions in assets of a given volume without causing a pronounced change in their prices.

**Mortgage refinancing** The process whereby a mortgage debtor accepts a new loan from a different lender than the one from which he received the original loan and uses it to repay the original loan. He thus becomes a debtor of the other lender, but usually under more favourable conditions. This is usually possible only at the end of the original loan's fixation period.

**Mortgage refixation** The process whereby at the end of the fixation period of a mortgage loan the debtor selects the length of the new fixation period and negotiates new conditions for this period with the creditor. In this case, the identity of the creditor does not change.

**Natural population increase** The difference between the number of live births and the number of deaths in the same period of time in a given area.

**Net financial assets** The difference between the sum of financial assets and the sum of liabilities.

**Non-performing loans** A loan is non-performing if at least one of the following two situations occurs: a) the debtor is unlikely to pay its credit obligations in full without recourse to actions such as realising security, b) the debtor is past due more than 90 days on a credit obligation. For details, see Article 178 of Regulation (EU) No 575/2013 of the European Parliament and of the Council. Non-performing loans are broken down into substandard, doubtful and loss loans. Also called loans in default or default loans.

**Pillar 1** The first part of the CRD directive, focused on the determination of minimum capital requirements for all credit institutions to cover credit, market and operational risks.

**Pillar 2** The second part of the CRD directive, requiring credit institutions to assess whether the Pillar 1 capital requirement is sufficient to cover all the risks to which they are exposed. This assessment process is reviewed by the supervisory authority under the supervisory review and evaluation process (SREP). The supervisory authority then can apply a wide range of instruments, including setting an additional capital requirement, for example to cover concentration risk.

**Prague InterBank Offered Rate (PRIBOR)**
The reference interest rate on the interbank deposit market for deposit sales. Reference banks quoting the PRIBOR must be important participants in the interbank market.

**Price-to-income (PTI)** The ratio of the price of an apartment (68 $m^2$) to the sum of the annual wage in a given region over the last four quarters.

**Price-to-rent (PR)** The ratio of the price of an apartment to the annual rent. The price-to-rent ratio is the inverse of the rental return.

**Property asking prices** Property sale asking prices in estate agencies. Asking prices should be higher than transaction prices. Property asking prices in the Czech Republic are published, for example, by the CZSO and the Institute for Regional Information (which also publishes data on market rent supply prices).

**Property developers/developments**
Companies/projects whose aim is to build a complex of residential and commercial property. Property developers' work includes choosing an appropriate site, setting up a project, obtaining the necessary permits, building the necessary infrastructure, constructing the buildings and selling the property. Developers also often organise purchase financing for clients and frequently lease or manage the property once it is built (especially in the case of commercial property). Given the combination of construction activity and speculative property purchases, developers' results are strongly dependent on movements in property prices.

**Property price gap** The deviation of the price of property from its estimated equilibrium value.

**Property transaction prices** Prices of actual transactions on the property market, which should be the closest to actual market prices. The CZSO has been publishing two types of data on property transaction prices since 2011. Prices based on Ministry of Finance statistics from property transfer tax returns and published by the CZSO are the older source. These data contain time series from 1998 and are available in a relatively detailed breakdown (by region, degree of wear and tear and type of property). On the other hand, they do not include transactions which are not subject to property transfer tax (i.e. primarily transactions in new property) and the index is published with a lag of at least half a year. The second, new source of data on property transaction prices is data from CZSO surveys in estate agencies. They cover new property, but are not available in such a long time series and such a detailed breakdown.

**Quantitative easing** A method for implementing monetary policy in a situation where the central bank is no longer able to lower its monetary policy rate because it has already reduced it almost to zero. Quantitative easing involves the central bank buying assets from commercial banks and thereby creating a sizeable stock of free reserves with those banks. The purpose of this type of policy is to strengthen the balance-sheet and market liquidity of the banking system and minimise the risk of growth in interest rates due to insufficient liquidity. In the past ten years, quantitative easing has been applied in Japan and the USA. A similar policy is now being pursued, for example, by the ECB.

**Rental return** The ratio of the annual supply rent to the asking price of the apartment. It is the inverse of the price-to-rent ratio.

**Return on equity (RoE)** The ratio of net profit to equity of a firm.

**Return on assets (RoA)** The ratio of pre-tax profit and interest to total assets of a firm.

**Risk premium** The risk premium an investor demands on investments in riskier financial instruments.

**Search for yield** A situation where economic agents attempt to make up for generally low asset yields by seeking riskier-than-usual investments that yield a premium in return for the increased risk. Such behaviour may increase the future risks to the financial system.

**Secondary market** The market on which existing securities are traded.

**Solvency** Solvency in the insurance sector is the ability of an insurer to meet its insurance obligations, i.e. to settle eligible insurance claims arising from insured losses. Solvency II – a new regulatory framework prepared by the European Commission – is a set of rules for European insurance companies and reinsurers laying down quantitative requirements, qualitative requirements, prudential rules, compliance with market discipline and disclosure duties.

**Solvency ratio** The ratio of the own funds of an insurance company to the minimum capital requirement necessary to cover all the risks it undertakes.

**Sovereign risk** The risk that a government will default on its obligations, leading to national bankruptcy or restructuring of government debt.

**Systemic risk** The risk of the entire financial system or market collapsing.

**Technical interest rate** The interest rate used by insurance companies to calculate premiums in life insurance. The technical interest rate represents the increase in the value of life insurance provisions to

which the customer is entitled under the policy (the guaranteed share in the returns on financial investment). The maximum technical interest rate is laid down in a decree.

**Tier 1** The highest quality and, for banks in the Czech Republic, also the most significant part of regulatory capital. The dominant components of Tier 1 are equity capital, retained earnings and mandatory reserve funds.

**Yield spread** Also yield differential; the spread between the yield on a bond and the yield on a reference ("benchmark") bond.

## ABBREVIATIONS

| | |
|---|---|
| AFS | available-for-sale (financial assets in the "available for sale" accounting category) |
| ASF | available stable funding |
| BCBS | Basel Committee on Banking Supervision |
| BIS | Bank for International Settlements |
| BoE | Bank of England |
| bp | basis point |
| BRCI | Bank Register of Client Information operated by Czech Credit Banking Bureau |
| BRRD | Bank Recovery and Resolution Directive |
| CARW | critical average risk weight |
| CB | central bank |
| CBR | Combined Buffer Requirement |
| CCoB | Capital Conservation Buffer |
| CCyB | Countercyclical Capital Buffer |
| CCR | Central Credit Register operated by the CNB |
| CET1 | Common equity Tier 1 |
| CNB | Czech National Bank |
| CRD | Capital Requirements Directive |
| CRR | Capital Requirements Regulation |
| CZK | Czech koruna |
| CZSO | Czech Statistical Office |
| DSCR | debt service coverage ratio |
| DSTI | debt service-to-income |
| EA | euro area |
| EAD | exposure at default |
| EBA | European Banking Authority |
| EC | European Commission |
| ECB | European Central Bank |
| EGAP | Export Guarantee and Insurance Corporation |
| EIB | European Investment Bank |
| EIOPA | European Insurance and Occupational Pensions Authority |
| EME | Emerging Market Economies |
| ESA 95/2010 | European System of Accounts (Eurostat methodology) |
| ESRB | European Systemic Risk Board |
| EU | European Union |
| EUR | euro |
| EURIBOR | Euro InterBank Offered Rate (reference interest rate on the interbank market) |
| FCI | financial cycle indicator |
| Fed | Federal Reserve System |
| FOMC | Federal Open Market Committee |
| FSB | Financial Stability Board |
| FSR | Financial Stability Report |
| GB | government bond |
| GDI | gross disposable income |
| GDP | gross domestic product |
| G-SII | global systemically important institution |
| HB index | Hypoteční banka property price index |
| HBS | Household Budget Statistics |
| HHI | Herfindahl-Hirschman index |

| | |
|---|---|
| HP filter | Hodrick-Prescott filter |
| HTM | Held-to-Maturity |
| ICAAP | Internal Capital Adequacy Assessment Process |
| IL | liquidity indicator |
| ILO | International Labour Organisation |
| IMF | International Monetary Fund |
| IRB | Internal Rating Based Approach, a Basel II bank capital adequacy approach |
| IRF | impulse-response function |
| IRI | Institute for Regional Information |
| IRS | interest rate swap |
| ISR | sovereign risk indicator |
| LCR | liquidity coverage ratio |
| LGD | loss given default |
| LI | life insurance |
| LLP | loan loss provision |
| LR | leverage ratio |
| LTD | loan-to-deposit |
| LTI | loan-to-income |
| LTV | loan-to-value |
| MA | matching adjustment |
| MBs | mortgage bonds |
| MDA | maximum distributable amount |
| MF CR | Ministry of Finance of the Czech Republic |
| MREL | Minimum Requirement for Own Funds and Eligible Liabilities |
| NACE | General Industrial Classification of Economic Activities |
| NBP | Narodowy Bank Polski (Polish central bank) |
| NFC | non-financial corporation |
| NFCEL | non-bank financial corporation engaged in lending |
| NLI | non-life insurance |
| NPISH | non-profit institution serving households |
| NPL | non-performing loan |
| NRCI | Non-bank Register of Client Information |
| NSFR | net stable funding ratio |
| OCR | overall capital requirement |
| OECD | Organisation for Economic Cooperation and Development |
| OFIs | other financial intermediaries |
| OLS | ordinary least squares |
| OPEC | Organization of the Petroleum Exporting Countries |
| O-SII | other systemically important institution |
| p.a. | per annum |
| P2P | peer-to-peer lending |
| PD | probability of default |
| PMC | pension management company |
| pp | percentage point |
| PRIBOR | Prague InterBank Offered Rate (reference interest rate on the interbank market) |
| PSE | Prague Stock Exchange |
| PTI | price-to-income |
| QA | quick assets |
| QE | quantitative easing |
| rhs | right-hand side |
| RoA | return on assets |
| RoE | return on equity |

| | |
|---|---|
| RSF | required stable funding |
| RW | risk weight |
| RWA | risk-weighted assets |
| RWR | total capital ratio |
| STA | standardised approach to credit risk |
| SII | Solvency II Directive |
| SILC | Survey of Income and Living Conditions |
| SMEs | small and medium-sized enterprises |
| SMP | Securities Markets Programme |
| SRB | Systemic Risk Buffer |
| SREP | Supervisory Review and Evaluation Process |
| TA | total assets |
| TF | transformed fund |
| TLTRO | Targeted Longer-Term Refinancing Operations |
| TSCR | total supervisory capital requirement |
| UFR | ultimate forward rate |
| USA | United States of America |
| USD | US dollar |
| VA | volatility adjustment |
| VAR | vector autoregression |
| WB | World Bank |
| WGI | Worldwide Governance Indicators |

**COUNTRY ABBREVIATIONS**

| | | | |
|---|---|---|---|
| AT | Austria | IS | Iceland |
| AU | Australia | IT | Italy |
| BE | Belgium | JP | Japan |
| BG | Bulgaria | KO | Korea |
| BR | Brazil | LT | Lithuania |
| CA | Canada | LU | Luxembourg |
| CL | Chile | LV | Latvia |
| CN | China | ME | Mexico |
| CY | Cyprus | MT | Malta |
| CZ | Czech Republic | NL | Netherlands |
| DE | Germany | NO | Norway |
| DK | Denmark | NZ | New Zealand |
| EE | Estonia | PL | Poland |
| ES | Spain | PT | Portugal |
| FI | Finland | RO | Romania |
| FR | France | RU | Russia |
| GR | Greece | SE | Sweden |
| HR | Croatia | SI | Slovenia |
| HU | Hungary | SK | Slovakia |
| CH | Switzerland | TR | Turkey |
| IE | Ireland | UK | United Kingdom |
| IN | India | US | United States |

**FINANCIAL STABILITY INDICATORS – PART 1**

| | | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 Jan. | 2016 Feb. | 2016 Mar. | 2016 Apr. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Macroeconomic environment** | | | | | | | | | | | |
| ME.1 | Real GDP growth (year on year, %) | 2.1 | 2.0 | -0.8 | -0.5 | 2.0 | 4.3 | | | | |
| ME.2 | Consumer price inflation (average annual index growth, %) | 1.5 | 1.9 | 3.3 | 1.4 | 0.4 | 0.3 | 0.6 | 0.5 | 0.3 | 0.6 |
| ME.3 | Public finance deficit / surplus / GDP (%) | -4.4 | -2.7 | -3.9 | -1.3 | -1.9 | -0.4 | | | | |
| ME.4 | Public debt / GDP (%) | 38.2 | 39.9 | 44.7 | 45.1 | 42.7 | 41.1 | | | | |
| ME.5 | Trade balance / GDP (%) | 1.0 | 1.9 | 3.1 | 4.1 | 5.2 | 4.7 | | | | |
| ME.6 | External debt in % of banking sector external assets | 153.9 | 165.8 | 162.6 | 149.4 | 148.8 | 134.2 | | | | |
| ME.7 | Balance of payments current account / GDP (%) | -3.6 | -2.1 | -1.6 | -0.5 | 0.2 | 0.9 | | | | |
| ME.8 | Monetary policy 2W repo rate (end of period, %) | 0.75 | 0.75 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 |
| **Non-financial corporations*** | | | | | | | | | | | |
| NC.1 | Return on equity (%) | 8.4 | 7.9 | 7.0 | 6.9 | 8.5 | 9.0 | | | | |
| NC.2 | Debt (% of total liabilities) | 50.3 | 51.3 | 53.1 | 55.0 | 54.7 | 53.7 | | | | |
| NC.3 | Credit indebtedness (% of GDP) | 37.3 | 37.3 | 37.7 | 37.8 | 35.3 | 33.2 | | | | |
| NC.4 | – loans from Czech banks (% of GDP) | 19.6 | 20.6 | 20.8 | 21.3 | 20.5 | 20.6 | | | | |
| NC.5 | – loans from Czech non-bank financial corporations (% of GDP) | 4.6 | 4.9 | 6.1 | 6.7 | 4.0 | 4.2 | | | | |
| NC.6 | – other (including financing from abroad, % of GDP) | 13.1 | 11.9 | 10.9 | 9.8 | 10.8 | 8.4 | | | | |
| NC.7 | Interest coverage (pre-tax profit + interest paid/interest paid, %) | 9.0 | 9.1 | 8.4 | 9.5 | 10.6 | 13.1 | | | | |
| NC.8 | 12M default rate (%) | 4.3 | 3.0 | 1.9 | 1.9 | 1.6 | 1.5 | | | | |
| **Households (including sole traders)** | | | | | | | | | | | |
| H.1 | Debt / gross disposable income (%) | 51.4 | 54.2 | 55.5 | 57.2 | 57.5 | 59.4 | | | | |
| H.2 | Debt / financial assets (%) | 30.9 | 31.0 | 30.4 | 29.9 | 28.8 | 28.6 | | | | |
| H.3 | Net financial assets (total financial assets – total liabilities, % of GDP) | 61.0 | 63.1 | 67.9 | 72.0 | 77.0 | 78.7 | | | | |
| H.4 | Debt / GDP (%) | 28.8 | 29.8 | 31.1 | 32.2 | 32.5 | 32.9 | | | | |
| H.5 | – loans from Czech banks to households (% of GDP) | 24.3 | 25.0 | 26.2 | 27.5 | 28.2 | 29.2 | | | | |
| H.6 | – loans from Czech non-bank fin. corporations to households (% of GDP) | 1.6 | 1.7 | 1.7 | 1.7 | 1.7 | 1.2 | | | | |
| H.7 | – loans from Czech banks to sole traders (% of GDP) | 1.0 | 0.9 | 0.9 | 0.9 | 0.9 | 0.8 | | | | |
| H.8 | – loans from Czech non-bank fin. corporations to sole traders (% of GDP) | 0.4 | 0.3 | 0.3 | 0.2 | 0.2 | 0.2 | | | | |
| H.9 | – other (including financing from abroad, % of GDP) | 1.4 | 1.8 | 2.1 | 1.9 | 1.5 | 1.5 | | | | |
| H.10 | Net interest expenses / gross disposable income (%) | 1.9 | 1.9 | 1.9 | 1.9 | 1.7 | 2.0 | | | | |
| H.11 | 12M default rate (%, excluding sole traders) | 5.0 | 4.4 | 3.9 | 3.6 | 3.4 | 2.9 | | | | |
| **Financial markets** | | | | | | | | | | | |
| FM.1 | 3M PRIBOR (average for period, %) | 1.3 | 1.2 | 1.0 | 0.5 | 0.4 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 |
| FM.2 | 1Y PRIBOR (average for period, %) | 1.9 | 1.8 | 1.5 | 0.7 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| FM.3 | 10Y government bond yield (average for period, %) | 3.9 | 3.7 | 2.8 | 2.1 | 1.6 | 0.6 | 0.6 | 0.5 | 0.4 | 0.4 |
| FM.4 | CZK / EUR exchange rate (average for period, %) | 25.3 | 24.6 | 25.1 | 26.0 | 27.5 | 27.3 | 27.0 | 27.0 | 27.1 | 27.0 |
| FM.5 | Change in PX stock index (% year on year, end of period) | 9.6 | -25.6 | 14.0 | -4.8 | -4.3 | 1.0 | -3.6 | -16.1 | -12.9 | -10.7 |
| **Property market** | | | | | | | | | | | |
| PM.1 | Total change in residential property prices (transaction prices, % year on year) | -0.4 | 0.9 | 0.4 | 1.1 | 1.0 | 4.5** | | | | |
| PM.2 | Change in apartment prices (asking prices according to CZSO, % year on year) | -1.6 | 0.2 | -1.4 | 0.8 | 2.1 | 6.6*** | | | | |
| PM.3 | Apartment price / average annual wage | 4.1 | 4.0 | 3.8 | 3.9 | 3.9 | 4.0 | | | | |
| PM.4 | Apartment price / annual rent (according to IRI) | 21.9 | 21.7 | 21.3 | 21.6 | 20.7 | 21.5 | | 21.9 | | |

* To maintain temporal consistency, the data for the debt indicators of non-financial corporations are still reported under the ESA 95 methodology. The most recent figures may thus differ from the currently published data, which are now compiled in accordance with ESA 2010.
** Estimate based on CZSO transaction prices and house price index.
*** Estimate based on CZSO transaction prices.
Note: Owing to data revisions, some historical values of the indicators may not be comparable to those published in previous FSRs.

**FINANCIAL STABILITY INDICATORS – PART 2**

| | | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 Jan. | 2016 Feb. | 2016 Mar. | 2016 Apr. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Financial sector** | | | | | | | | | | | |
| FS.1 | Financial sector assets / GDP (%) | 135.9 | 142.3 | 148.0 | 160.5 | 160.0 | 157.9 | | | | |
| FS.2 | Shares of individual segments in financial sector assets (%) | | | | | | | | | | |
| FS.3 | banks | 77.4 | 78.1 | 77.2 | 78.1 | 77.8 | 77.4 | | | | |
| FS.4 | credit unions | 0.4 | 0.5 | 0.7 | 0.5 | 0.5 | 0.5 | | | | |
| FS.5 | insurance companies | 7.9 | 7.6 | 7.8 | 7.3 | 7.1 | 6.8 | | | | |
| FS.6 | pension management companies and funds | 4.3 | 4.3 | 4.6 | 4.7 | 4.9 | 5.3 | | | | |
| FS.7 | investment funds* | 3.1 | 2.9 | 3.6 | 3.8 | 4.3 | 4.8 | | | | |
| FS.8 | non-bank financial corporations engaged in lending | 6.5 | 6.2 | 5.8 | 5.3 | 5.2 | 4.9 | | | | |
| FS.9 | investment firms | 0.5 | 0.4 | 0.4 | 0.4 | 0.3 | 0.3 | | | | |
| **Banking sector** | | | | | | | | | | | |
| BS.1 | Bank assets / GDP (%) | 106.0 | 111.3 | 115.5 | 127.4 | 126.1 | 122.3 | | | | |
| BS.2 | Assets structure (%, end of period) | | | | | | | | | | |
| BS.3 | loans to central bank | 9.4 | 8.7 | 8.3 | 12.9 | 8.8 | 11.4 | | | | |
| BS.4 | interbank loans | 11.3 | 10.4 | 10.0 | 9.1 | 5.7 | 4.6 | | | | |
| BS.5 | client loans | 50.6 | 50.5 | 50.0 | 49.8 | 50.7 | 51.8 | | | | |
| BS.6 | bond holdings | 21.1 | 21.9 | 24.0 | 21.7 | 22.8 | 21.0 | | | | |
| BS.7 | – government bonds | 14.9 | 16.3 | 18.2 | 15.7 | 16.2 | 14.1 | | | | |
| BS.8 | – Czech government bonds | 13.8 | 15.1 | 16.8 | 14.5 | 14.8 | 12.5 | | | | |
| BS.9 | other | 7.5 | 8.4 | 7.7 | 6.5 | 12.1 | 11.2 | | | | |
| BS.10 | Liabilities structure (%, end of period) | | | | | | | | | | |
| BS.11 | liabilities to central bank | 0.0 | 0.1 | 0.2 | 0.0 | 0.1 | 0.2 | | | | |
| BS.12 | interbank deposits | 10.7 | 11.2 | 8.9 | 11.3 | 10.5 | 7.6 | | | | |
| BS.13 | client deposits | 67.3 | 65.9 | 68.3 | 67.2 | 66.9 | 66.4 | | | | |
| BS.14 | bonds issued | 8.4 | 8.4 | 8.0 | 8.3 | 8.6 | 11.9 | | | | |
| BS.15 | other | 13.5 | 14.4 | 14.5 | 13.1 | 13.9 | 13.8 | | | | |
| BS.16 | Client loans / client deposits (%) | 75.2 | 76.6 | 73.2 | 74.1 | 75.7 | 78.0 | | | | |
| BS.17 | Sectoral breakdown of total loans (%) | | | | | | | | | | |
| BS.18 | non-financial corporations | 35.9 | 35.9 | 35.4 | 34.5 | 33.2 | 33.1 | 33.3 | 33.2 | 33.8 | |
| BS.19 | households | 44.2 | 43.8 | 44.3 | 43.4 | 43.3 | 44.4 | 44.0 | 44.1 | 43.9 | |
| BS.20 | sole traders | 1.9 | 1.7 | 1.5 | 1.5 | 1.3 | 1.3 | 1.2 | 1.2 | 1.2 | |
| BS.21 | others (including non-residents) | 18.1 | 18.6 | 18.8 | 20.6 | 22.1 | 21.2 | 21.4 | 21.5 | 21.1 | |
| BS.22 | Growth in loans (%, end of period, year on year): | | | | | | | | | | |
| BS.23 | total | 3.5 | 6.0 | 2.4 | 6.5 | 4.8 | 5.6 | 5.9 | 6.5 | 6.9 | |
| BS.24 | non-financial corporations | -0.3 | 6.1 | 0.9 | 3.8 | 0.9 | 5.3 | 6.3 | 5.8 | 8.5 | |
| BS.25 | – real estate activity (NACE L) | 6.0 | 11.5 | 0.7 | 6.3 | 3.6 | 5.6 | 9.0 | 10.3 | 12.7 | |
| BS.26 | households | 7.0 | 5.0 | 3.6 | 4.5 | 4.5 | 8.2 | 7.9 | 8.4 | 8.2 | |
| BS.27 | – loans for house purchase | 6.4 | 6.1 | 4.8 | 5.2 | 5.6 | 8.0 | 7.5 | 7.8 | 7.8 | |
| BS.28 | – consumer credit | 7.3 | -1.6 | -0.7 | 0.4 | -0.6 | 8.9 | 9.0 | 11.0 | 9.7 | |
| BS.29 | sole traders | -5.4 | -5.5 | -5.0 | 1.0 | -4.0 | 0.0 | 0.1 | 0.6 | 0.2 | |
| BS.30 | Non-performing loans / total loans (%): | | | | | | | | | | |
| BS.31 | total | 6.2 | 6.0 | 6.0 | 5.9 | 6.1 | 5.8 | 5.7 | 5.7 | 5.5 | |
| BS.32 | non-financial corporations | 9.0 | 8.2 | 7.4 | 7.2 | 6.7 | 5.7 | 5.5 | 5.4 | 5.2 | |
| BS.33 | households | 5.0 | 4.9 | 5.1 | 5.0 | 4.7 | 4.0 | 4.0 | 4.1 | 3.8 | |
| BS.34 | – loans for house purchase | 3.2 | 3.2 | 3.4 | 3.3 | 3.1 | 2.6 | 2.5 | 2.5 | 2.4 | |
| BS.35 | – consumer credit | 11.7 | 11.3 | 12.3 | 12.2 | 12.0 | 11.1 | 11.1 | 11.6 | 10.1 | |
| BS.36 | sole traders | 12.4 | 12.4 | 13.7 | 13.0 | 12.6 | 11.0 | 10.9 | 10.8 | 10.0 | |
| BS.37 | Coverage of non-performing loans by provisions (%) | 48.3 | 51.5 | 53.8 | 55.0 | 55.6 | 54.6 | 54.5 | 53.4 | 52.1 | |
| BS.38 | Aggregate LTV for housing mortgages | 56.3 | 57.0 | 58.7 | 59.4 | 54.6 | 55.8 | | | | |
| BS.39 | Capital ratio (%) | 15.5 | 15.3 | 16.4 | 17.0 | 17.9 | 18.4 | | | | |
| BS.40 | Tier 1 capital ratio (%) | 13.9 | 14.0 | 15.6 | 16.5 | 17.4 | 17.9 | | | | |
| BS.41 | Leverage (assets as a multiple of Tier 1) | 14.4 | 14.3 | 13.7 | 13.1 | 12.4 | 12.1 | | | | |
| BS.42 | Leverage ratio (approximation of Basel III definition, Tier 1 / exposures) | n.a. | n.a. | n.a. | n.a. | 7.2 | 7.6 | | | | |
| BS.43 | Return on assets (%) | 1.3 | 1.2 | 1.4 | 1.3 | 1.2 | 1.2 | 0.7 | 0.9 | 1.0 | |
| BS.44 | Return on Tier 1 (%) | 22.5 | 19.6 | 21.7 | 18.5 | 16.7 | 16.8 | 0.0 | 0.0 | 0.0 | |
| BS.45 | Quick assets / total assets (%) | 26.1 | 26.9 | 29.1 | 30.6 | 31.0 | 32.0 | 34.3 | 34.8 | 34.6 | |
| BS.46 | Quick assets / client deposits (%) | 38.8 | 40.8 | 42.5 | 45.6 | 46.4 | 48.2 | 52.2 | 52.9 | 52.5 | |
| BS.47 | Net external position of banking sector (% of GDP) | 4.3 | 3.9 | 6.1 | 3.1 | 1.6 | -1.1 | | | | |
| BS.48 | Banking sector external debt / banking sector total assets (%) | 11.9 | 12.2 | 10.1 | 12.3 | 14.0 | 15.4 | | | | |

* Act No. 240/2013 Coll., on management companies and investment firms, which introduced the term investment funds, was passed in 2013. Investment funds comprise collective investment funds and funds for qualified investors.
** The calculation does not include CEB and CMGDB loans.
Note: Owing to data revisions, some historical values of the indicators may not be comparable to those published in previous FSRs.

**FINANCIAL STABILITY INDICATORS – PART 3**

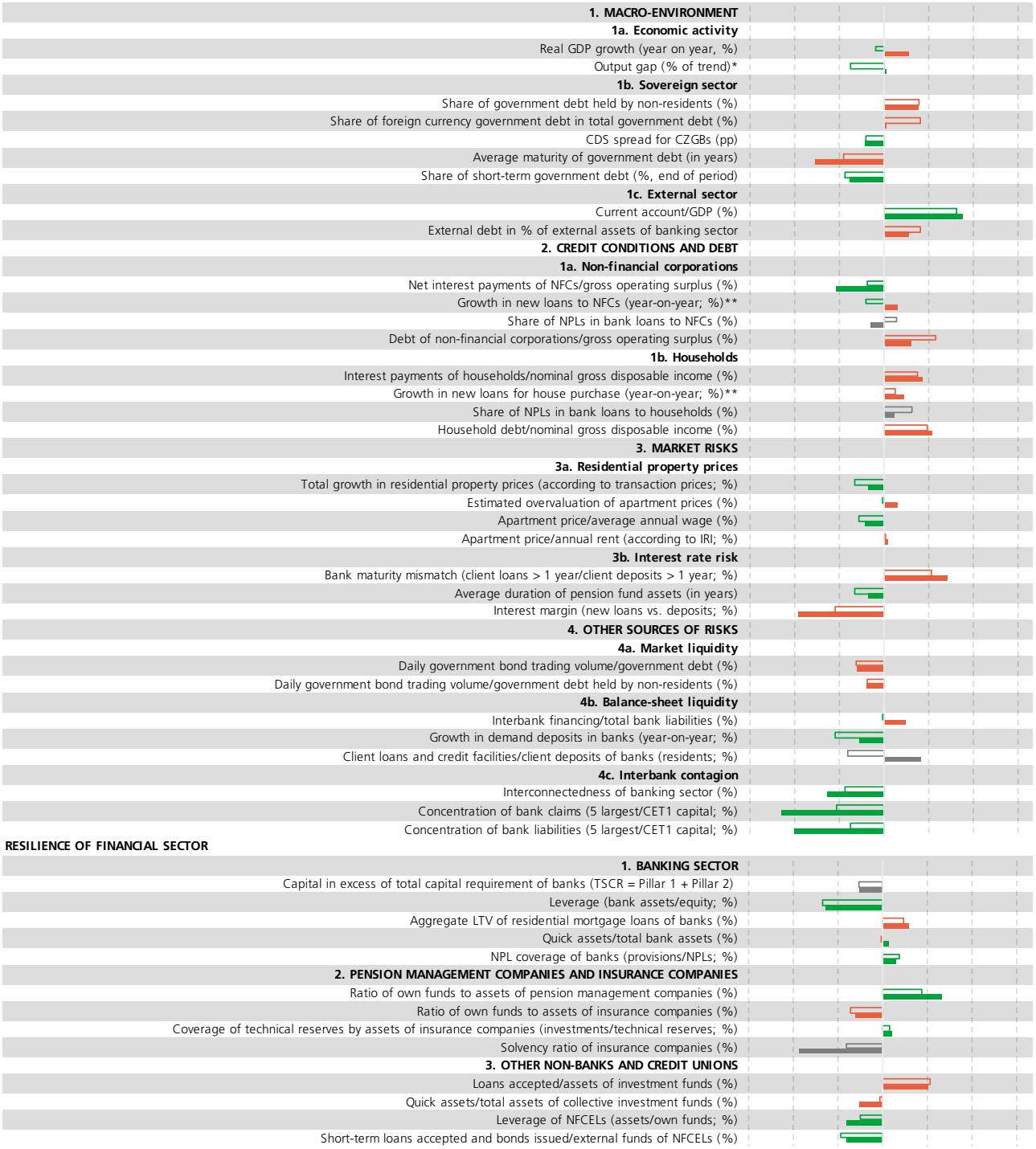
| | | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 Jan. | 2016 Feb. | 2016 Mar. | 2016 Apr. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Non-bank financial corporations** | | | | | | | | | | | |
| NI.1 | Share in financial sector assets (%) | 21.8 | 21.1 | 21.7 | 21.0 | 21.5 | 21.8 | | | | |
| | **Insurance companies*** | | | | | | | | | | |
| NI.2 | Premiums written / GDP (%) | 3.7 | 3.6 | 3.6 | 3.6 | 3.5 | 3.2 | | | | |
| NI.3 | Solvency ratio: life insurance (%) | 354 | 302 | 313 | 308 | 290 | 338 | | | | |
| NI.4 | Solvency ratio: non-life insurance (%) | 353 | 331 | 401 | 422 | 379 | 319 | | | | |
| NI.5 | Change in financial investment of insurance companies (%) | 3.5 | 1.6 | 5.2 | 1.9 | 3.2 | -2.5 | | | | |
| NI.6 | Return on equity of insurance companies (%) | 34.1 | 13.0 | 18.0 | 14.7 | 8.6 | 13.3 | | | | |
| NI.7 | Claim settlement costs / net technical provisions (life, %) | 14.8 | 16.3 | 16.9 | 18.2 | 20.6 | 19.0 | | | | |
| NI.8 | Claim settlement costs / net technical provisions (non-life, %) | 68.6 | 61.7 | 57.6 | 66.0 | 59.0 | 63.7 | | | | |
| | **Pension management companies (PMCs) and PMC funds** | | | | | | | | | | |
| NI.9 | Change in assets of funds managed by PMCs (%) | 7.7 | 6.5 | 10.4 | 8.4 | 14.6 | 10.0 | | | | |
| NI.10 | Nominal change in value of assets of PMC funds** | 1.3 | 0.8 | 7.0 | -0.1 | 3.7 | 1.0 | | | | |
| | **Investment funds** | | | | | | | | | | |
| NI.11 | Growth in net assets (= equity; year on year, %) | 13.1 | -3.1 | 17.1 | 19.4 | 19.0 | 17.1 | 14.7 | 12.7 | 11.2 | |
| | **Non-bank financial corporations engaged in lending** | | | | | | | | | | |
| NI.12 | Growth in loans from non-bank financial corporations engaged in lending (%):*** | | | | | | | | | | |
| NI.13 | total | -12.4 | 1.5 | -3.6 | -4.1 | 3.3 | 0.1 | | | | |
| NI.14 | households | -41.9 | 6.5 | -2.5 | -2.3 | 5.0 | -28.3 | | | | |
| NI.15 | non-financial corporations | 6.8 | 0.5 | -3.1 | -4.4 | 3.7 | 11.1 | | | | |

* The indicators cover domestic insurance companies only.
** Change in the assets of pension funds adjusted for contributions and benefits. Funds accepted do not include returns credited to clients.
*** The classification of loans provided by non-bank financial corporations engaged in lending was changed in 2010.
The change in the amount of loans provided to households by non-bank financial corporations engaged in lending in 2015 was due to the conversion of one of these lenders into a foreign bank branch.
Note: Owing to data revisions, some historical values of the indicators may not be comparable to those published in previous FSRs.

## INDICATORS ENTERING THE MACROPRUDENTIAL DASHBOARD

(distance from benchmark expressed as number of standard deviations)

**SOURCES OF RISKS**




**RESILIENCE OF FINANCIAL SECTOR**




Note: Unfilled (filled) values are for 2014 (2015). Green (red) indicates a need to consider looser (tighter) macroprudential policy; grey signifies no clear indication in either direction in the current situation. The benchmarks for the indicators are estimates of the trend values or the averages since 2002 (or later, depending on data availability). The indicators are unweighted, so the same values for different indicators can mean different contributions to total systemic risk. The dashed lines denote distances of 1, 2 and 3 standard deviations from the average. * Average of the values calculated using the Kalman filter and production function. ** 3M moving average

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