FINANCIAL STABILITY REPORT

2017 / 2018

CNB CZECH NATIONAL BANK

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The Financial Stability Report 2017/2018 was discussed by the CNB Bank Board at its regular meeting on financial stability issues on 17 May 2018 and published on 12 June 2018. Except for a few exceptions, it contains information available as of 31 March 2018. It is available in electronic form on the CNB website, where the underlying data for the tables and charts used in this publication are also published. Here you can also find the list of abbreviations.

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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,

...

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.

Dear Readers,

Our main publication in the area of financial stability and macroprudential policy is the *Financial Stability Report*, which we have published every June since 2005. It is the key document for the regular spring Bank Board meeting on financial stability issues. The 14th Report – the **2017/2018** edition – is now at your disposal. I am sure you will welcome this opportunity to get again hold of information about this currently very important area of supervision and regulation. This year's FSR focuses mainly on the risks that may arise in connection with prices of risky assets in global markets, the environment of low interest rates and the financing of property purchases. Significant space is devoted to macroprudential capital buffers and instruments aimed at mitigating systemic risk arising in connection with mortgage lending.

According to the Act on the CNB, maintaining financial stability is one of our key objectives. In accordance with the Act, the CNB identifies, monitors and assesses risks jeopardising the stability of the financial system and, in order to prevent or mitigate these risks, contributes by means of its powers to the resilience of the financial system and the maintenance of financial stability. It is primarily employs macroprudential policy tools to do so.

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The CNB's aim with regard to financial stability is to ensure a degree of resilience of the system that minimises the risk of financial instability. To fulfil this aim, the CNB as an integrated supervisory and monetary 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.

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. If any risks to financial stability are identified, discussions are held regarding the possible use of regulatory, supervisory and other economic policy tools to suppress such risks or their potential effects.

The CNB is a member of the joint EU institution for the identification of systemic risks and macroprudential policy – the European Systemic Risk Board (ESRB). Together with three pan-European sectoral supervisory authorities (EBA, ESMA and EIOPA), the ESRB makes up the European System of Financial Supervision (ESFS). 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. In line with an ESRB recommendation, macroprudential policy focuses on the fulfilment of several intermediate objectives. These objectives include (a) to mitigate and prevent excessive credit growth and leverage; (b) to mitigate and prevent excessive maturity mismatch and market illiquidity; (c) to limit direct and indirect exposure concentrations; (d) to limit the systemic impact of misaligned incentives with a view to reducing moral hazard; and (e) to strengthen the resilience of the financial infrastructures. According to an ESRB assessment, the CNB is one of the most active authorities in the EU countries as regards the use of macroprudential policy at the national level.

The macroprudential policy tools we use include above all a set of prescribed capital buffers for credit institutions. We set a countercyclical capital buffer and a systemic risk buffer for systemically important banks at regular intervals. In recent years, we have dealt intensively with risks associated with property market developments and mortgage lending. To mitigate these risks, we use a set of recommendations regarding the provision of mortgage loans. We are also pushing for a legislative change in this area, aimed at effective prevention of the relevant risks.

The FSR is based on an advanced analytical and modelling framework and contains a set of stress tests of individual segments of the financial sector and sectors of the real economy. 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. 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. The results of the tests performed on the basis of this stress scenario are compared with the *Baseline Scenario*, which is based on the CNB's official January 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 five 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. The *Stress tests* section assesses the resilience of sectors on the basis of stress tests and sensitivity analyses. 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.

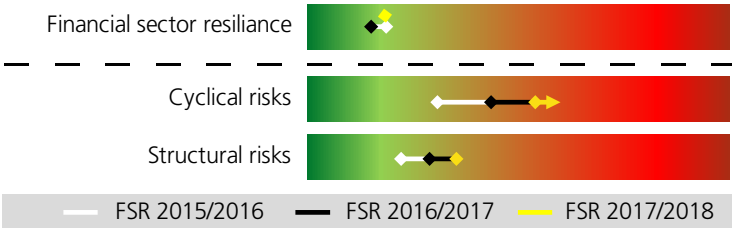
On behalf of the Czech National Bank

Jiří Rusnok
Governor

BOXES

PART I

OVERALL ASSESSMENT



The Czech financial sector has developed highly favourably since spring 2017. According to the CNB's aggregate assessment presented in the macroprudential dashboard,[1] it has maintained a high level of resilience to possible adverse shocks. This is being fostered mainly by the maintenance of sufficient capitalisation, stable funding sources and an extensive buffer in the form of quickly available liquidity. As regards potential sources of risks to financial stability in the future, the macroprudential dashboard indicates that the CNB overall identifies a slight increase in cyclical risks and an unchanged level of structural risks. Domestic risks of a cyclical nature are emerging due to increased investment optimism typical of a long period of good times, and the vulnerability of the banking sector is increasing as a result. This is linked to a large extent with persisting favourable conditions for the development of a spiral between property prices and property purchase loans. The CNB is responding to the increase in cyclical risks on an ongoing basis by configuring relevant macroprudential instruments, specifically the countercyclical capital buffer and the conditions for mortgage lending. The CNB's monetary policy is also currently helping to mitigate these risks. A major potential risk – whose source, however, lies outside the domestic economy – is a sudden and disorderly increase in risk premia on global financial markets, which might lead to high volatility on asset markets with an impact on the real economy.

DEVELOPMENTS IN 2017 AND 2018 Q1

Solid growth of the global economy was reflected in favourable developments in the domestic economy, which is above its potential output level

The growth of the world economy exceeded forecasts in 2017, and the strong dynamics are expected to continue this year. In 2017, the euro area outpaced the average rate of growth observed in previous years, and its growth outlooks for 2018 are optimistic as well. However, differences in economic growth between the member states persist. The economic recovery remains particularly subdued in countries with high levels of indebtedness. Annual growth of the Czech economy stood at

1 The logic used to construct the macroprudential dashboard is described in Box 5 of FSR 2015/2016.

4.6% in 2017 and, according to the available estimates, was above its potential. According to the CNB's forecast published in Inflation Report II/2018, domestic economic growth will be above 3% this year and the next. The growth was fuelled largely by household consumption and also by growth in private investment. Favourable domestic economic activity, optimistic income expectations of both households and non-financial corporations and low interest rates affected the conditions and activity on the domestic credit market. Despite having cooled slightly, credit growth in the non-financial private sector is still above its five- and ten-year averages and remains above-average by comparison with other EU countries. It is being driven mainly by loans to households for house purchase. The year-on-year rate of growth of bank loans to non-financial corporations was volatile in 2017 and slowed slightly overall.

Financial conditions remain very relaxed despite the monetary policy normalisation process started by some central banks

Monetary policy rates remain low or negative in Europe. The ECB is continuing to pursue unconventional monetary policy. The easy monetary conditions are leading some euro area countries to delay tackling their high debt levels. In other countries, these conditions are contributing to a shift into the growth phase of the financial cycle, characterised by rapid growth in loans and property prices. Following three hikes in 2017, the US Federal Reserve increased its monetary policy rate further to 1.75% in March 2018. The market expects another two increases by the end of 2018. In response to the performance of the Czech economy and inflation, the CNB also tightened the monetary conditions. It raised its key monetary policy rate twice in 2017 and increased it further to 0.75% at the start of 2018. The tightening of monetary policy by the CNB was reflected only partially in client interest rates. The CNB forecast in Inflation Report II/2018 assumes that market interest rates will be flat this year and start rising in late 2018/early 2019.

Rapid growth in households' income improved their financial situation and encouraged strongly optimistic expectations…

Unemployment in the domestic economy hit record lows. In line with this, the income situation of households improved. The observed economic developments coupled with low loan interest rates are encouraging the emergence of optimistic expectations and increasing households' willingness to finance their expenditure through debt. A risk scenario going forward is a situation in which some households start to consider the current income growth to be permanent and succumb to the illusion that it will be easy to service the rising debt. Debt servicing costs remain sustainable due to low interest rates and rising income. However, growth in interest rates, the probability of which is increasing due to the global situation, may give rise to repayment problems in some indebted households. The stress test indicates increased sensitivity mainly in low-income households with a debt-service-to-income ratio of over 40%.

…but also squeezed the profitability of non-financial corporations

Buoyant wage growth fostered an increase in wage costs and is squeezing the profitability of non-financial corporations. Firms dealt with the shortage of labour and the related rapid wage growth partially by investing more in machinery and equipment. The main risk scenario for the non-financial corporations sector is a combination of continued rapid wage growth and exchange rate appreciation not accompanied by

corresponding labour productivity growth. This would gradually erode exporters' competitiveness and reduce demand for their products.

Czech government bond yields went up, especially at short maturities

In line with the increases in the CNB's monetary policy rates, Czech government bond yields went up in 2017. Short-term bond yields rose the fastest, causing the government yield curve to flatten slightly. This was probably due to a shift in foreign investors' interest towards medium-term bonds. Non-residents' share in Czech government bond holdings remains significant and stood at 35% in 2018 Q1 according to Czech Ministry of Finance statistics. The potential risk of volatility in Czech government bond prices remains elevated, as non-residents tend to react more sensitively to negative economic or other factors than domestic investors. Nevertheless, the results of the stress test of domestic public finances showed that this risk does not pose an immediate threat to the sustainability of Czech public finances.

Residential property prices continued to rise

Transaction prices of housing in the Czech Republic grew at the fastest pace in the entire EU for most of 2017. The average year-on-year growth rate of apartment prices was almost 16% in the individual quarters of 2017. The year-on-year growth started to slow slightly in 2017 Q4, but remained relatively high. At the same time, apartment prices considerably outpaced wages, so the affordability of apartments deteriorated. The high prices in the capital Prague were due mainly to a low rate of construction of new apartments, reflecting the slow process of issuing building permits. Prices of prime commercial property also increased in 2017. The historically low yields observed last year declined further for some types of commercial property.

The developments recorded in the domestic financial sector were positive in 2017

The developments recorded in the Czech financial sector were positive in 2017. Continued growth in economic activity was positively reflected in profitability, sustained adequate capitalisation and favourable liquidity of the banking sector. Insurance companies are also well capitalised and most of them are maintaining stable profitability. Investment funds are continuing to show dynamic growth. The importance of pension funds as a household investment vehicle is also increasing.

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

Conditions for the development of a spiral between property prices and property purchase loans persist

Since 2016, the CNB has identified a continued spiral between property prices and property purchase loans as the most significant domestic risk. The total stock of housing loans increased by almost CZK 100 billion last year. The year-on-year growth rate of genuinely new mortgage loans accelerated to more than 30% in 2017 Q1. It started to slow in June 2017. However, this result partly reflected base effects of 2016, and the effect of frontloading before stricter recommended LTV limits take effect may also be playing a role. The amount of new mortgage loans remains very high. The volumes of genuinely new mortgage loans started to rise again in early 2018 (by 7% year on year on average in Q1). The CNB's model-based approach indicates that housing prices were overvalued by around 14% at the end of 2017. The degree of the property price

overvaluation may in some cases be higher than the level of over-collateralisation implied by the current recommended LTV limits. Overall, the current settings of the recommended LTV limits should be sufficient to cover the relevant risks for the time being.

A slight increase in risks can also be observed in commercial property financing

The CNB's model-based estimate suggested that some types of commercial property were also slightly overvalued at the end of 2017 Q4. The share of loans for financing commercial property provided by domestic banks in the total loan volume is limited and the volume of new loans is not increasing. For these reasons, despite some easing of credit standards for such loans, the risks associated with commercial property markets pose no major threat to the stability of the Czech banking system.

High financial asset prices may be a source of market risks and increased volatility on global and national financial markets

A sudden and disorderly increase in the risk premium, leading to high volatility on asset markets, is still the main global risk to financial stability. This risk is being fostered by an increase in prices of some global financial assets above levels consistent with fundamentals. Risky corporate bonds have recorded a decline in risk premia to the levels observed in the years before the financial crisis. Stock prices are high both in historical comparison and also relative to expected corporate earnings. Owing to the significant share of non-residents in domestic asset holdings, the risk of a sudden repricing of investment assets is also present in the domestic financial system. The CNB assessed the severity of this risk by means of a simple simulation. The results showed that a decline in prices of investment assets would not represent a major disruption to financial stability in terms of the impact on individual institutions, but in the event of considerable market uncertainty and limited market liquidity it could contribute to the creation or multiplication of systemic risk in the form of mass sales of assets.

The situation of the domestic banking sector remains favourable

The banking sector is displaying adequate capitalisation and profitability and low ratio non-performing loan loan (NPL) ratio. The overall capital ratio of domestic banks rose further due to an increase in capital and a decline in aggregate risk weights. This is linked mainly with an increase in banks' exposures to the CNB. For banks applying the advanced IRB approach, the decline was also due to favourable economic developments, which the parameters of internal models reflect. If this trend were to be sustained, the decline in risk weights might ultimately increase the vulnerability of banks to adverse shocks. Risk weights of mortgage loans fell further to 22.9% despite the potential overvaluation of property prices. This level can be assessed as fairly low in relation to the risk weights of banks using the standardised STA approach.

Credit risk for bank loans is probably close to bottoming out

Credit risk, which is the principal source of potential losses in the domestic banking sector, has decreased further in terms of the backward-looking NPL ratio. The structure of NPLs has also improved. The provisions created by banks at the aggregate level seem to be sufficient to cover the current expected loss given default. Credit risk as measured by the 12-month default rate was flat year on year in the case of households and decreased slightly to a new historical low in the non-financial corporations sector and reaching. According to the *Baseline*

Scenario of the macroprudential test, however, credit risk in the non-financial private sector is not likely to fall any further and is expected to increase gradually (non-financial corporations) or remain flat (households).

The profitability of the banking sector remains high and is being positively affected by incipient growth in interest margins and low impairment losses

The slight increase in interest rates in 2017 interrupted the long-running downward trend in interest rate margins on new loans and is positively affecting the profit of the banking sector. The increase in earnings was also fostered by growth in profit from foreign currency operations and by a continued decrease in impairment losses. The performance of banks may be negatively affected by a turnaround in the growth phase of the economic and financial cycle.

Investment products are growing in importance in the non-bank financial sector, thus increasing its sensitivity to financial market corrections

A shift from insurance-based investment products to investment fund products continued to be visible in the non-bank financial sector in 2017. However, the related dynamic growth in the investment funds segment is associated with increased sensitivity to potential financial market corrections and possible impacts on the resilience of investment funds and their investors. Growth in the assets of transformed and mandatory conservative pension funds was accompanied by weaker profitability due to growth in government bond yields and a decline in the capitalisation of such funds. Despite recording more subdued growth, the insurance sector is maintaining its profitability and resilience to adverse shocks for the time being.

The interconnectedness of financial institutions has not increased and the structural component of systemic risk remains stable

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. The potential for contagion is also being suppressed by the banking sector's large liquidity buffer. The structural component of systemic risk was unchanged year on year. The concentration of property exposures in banks' balance sheets remains high. Such exposures account for just under 60% of total loans to the private non-financial sector. A further increase in concentration combined with a decrease in the risk weights of these exposures would lead to a rise in structural risk.

The domestic financial system was subjected in stress tests to a very adverse scenario assuming a severe recession

The resilience of the domestic financial system was verified by means of stress tests on banks and pension management companies using alternative economic scenarios. The *Baseline Scenario* is based on the CNB's forecast published in Inflation Report I/2018 and is considered by the CNB to be very probable over the three-year testing horizon. The probability of the *Adverse Scenario* is conversely very low. Its configuration reflects a rule stating that a higher level of stress should be applied at times of favourable economic growth than, for instance, in periods of recession. The *Adverse Scenario* assumes a sizeable fall in domestic economic activity accompanied by deflationary pressures and a rise in unemployment. 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.

According to solvency and liquidity stress tests, banks are highly resilient

The stress test results demonstrate that the banking sector remains resilient to adverse scenarios. While largely flat credit risk is consistent with the *Baseline Scenario*, 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. The level of these losses is affected, among other things, by the application of the IFRS 9 accounting standard in the stress test methodology. The banking sector currently has an adequate capital buffer which enables it to absorb relatively strong adverse shocks and maintain its overall capital adequacy above the regulatory threshold of 8%. The banking sector is also highly resilient to liquidity shocks. This is due to its strong client deposit base and high capitalisation on the liabilities side and to a significant proportion of exposures to the CNB on the asset side. The solid liquidity position of the domestic banking sector was confirmed by a liquidity macro stress test.

The risks to pension management companies decreased year on year due in part to a change in portfolios towards safer assets

The risks to pension management companies assessed in the stress test decreased year on year. Assuming identical exposures as in the test conducted last year, the application of this year's scenario would result in a smaller decline in the total assets of transformed funds. The impacts of the stress scenario were also reduced compared to last year by a change in portfolios towards safer assets. Pension management companies remain naturally vulnerable to adverse financial market developments.

MACROPRUDENTIAL POLICY

The domestic economy shifted further upwards in the growth phase of the cycle in 2018 Q1, albeit at a slower pace

When setting the countercyclical buffer rate, the CNB assesses credit growth and other indicators associated with the effect of the financial cycle. In December 2017, given the shift in the financial cycle and a rise in the domestic banking sector's vulnerability, the CNB announced an increase in the countercyclical capital buffer (CCyB) rate to 1.25% with a duty to apply this rate to domestic exposures as from 1 January 2019. The dynamics of some indicators (such as credit growth and housing price growth) in 2018 Q1 suggest that the economy might be close to the peak of the financial cycle. However, financial conditions remain very relaxed as regards the levels of most indicators, the volumes of new loans being provided to households are still high and prices of housing and some other assets remain overvalued relative to fundamentals. Overall, the CNB assesses cyclical indicators as indicating that the domestic economy has shifted further upwards in the growth phase of the cycle since the last decision to increase the CCyB rate was made.

Consistent with the overall assessment of the cycle and the potential sources of banking sector vulnerability mentioned below is a further increase in the CCyB rate to 1.50%

The potential systemic risks connected with the effect of the business and financial cycle are rising further. When discussing the appropriate setting of the CCyB rate, the Bank Board accentuated the effect of the good times the economy is currently experiencing. They are characterised by exceptionally low asset impairment losses, which may not be sustainable. The same goes for the risk mark-up in interest margins on loans and for the level of risk weights for some types of loans. Although banks are showing high profitability in the current favourable environment, their

vulnerability to a turn for the worse in the cycle is increasing. That vulnerability is being potentially increased by one of the effects of the switch to the new IFRS 9 accounting standard. It was supposed to be beneficial to financial stability from a long-term perspective, as the expected loss concept means that it creates conditions for early and sufficient provisioning against losses. However, IFRS 9 may also have a significant procyclical effect, as pointed out in an ESRB report published in July 2017.[2] A CNB macro stress test shows that the application of the expected credit loss concept in the *Adverse Scenario* leads to temporarily stronger impacts on capital than under the previous IAS 39 methodology. Following a sudden change in economic conditions leading to a marked reassessment of macroeconomic fundamentals, banks need to create a large amount of new provisions. This sharp increase may in turn cause sizeable losses and a fall in capital and contribute to a credit crunch. This effect may be partly dampened by compensation for the rise in provisions in the amount of regulatory capital. The overall assessment of the available information by the Bank Board was that a further increase in the CCyB rate to 1.50% with effect from 1 July 2019 is consistent with the current cyclical developments and the above-mentioned potential sources of banking sector vulnerability.

The CNB's approach to setting the CCyB rate is forward-looking and flexible; it is ready to lower the buffer immediately or release it fully should financial market tensions increase and jeopardise the smooth provision of loans to the sound part of the economy

Most banks meet the overall capital requirement consisting of the minimum regulatory level in Pillar 1, the requirements based on supervisory review of risks in Pillar 2 and capital buffers. Assuming reasonable dividend policies, banks have sufficient space for any increase in the CCyB and growth in their credit portfolios on an aggregate level. The CNB's decision on the CCyB rate is made using a set of quantitative approaches. However, it is always based on a comprehensive assessment of systemic risks, not on mechanistic application of the result of these approaches. The CNB stands ready to increase the countercyclical buffer rate further in the event of continued rapid credit growth, increasing risks connected with property purchase financing, a strengthening of other cyclical sources of systemic risk and a rise in the vulnerability of the banking sector. On the other hand, the CNB is ready to immediately lower the buffer or release it fully and allow it to be used as a capital buffer to cover losses if the business and financial cycles reverse and financial market stress intensifies, jeopardising the smooth provision of loans to the sound part of the economy. In addition to growth in new loans, the CNB will use indicators of financial market stress and indicators of the general availability of (unsecured) financing to assess the need to release the countercyclical capital buffer. These indicators are able to indicate a significant change in market conditions without any delay.

2 See Financial stability implications of IFRS 9, ESRB, July 2017

In line with the conclusions of the discussion in the BCBS, the CNB temporarily regards a leverage ratio excluding exposures to the CNB from the denominator for the calculation as a more relevant leverage indicator; at the same time, it has temporarily raised the minimum leverage ratio from 3.00% to 3.75%

The CNB is paying systematic attention to the leverage ratio. It is reacting to the conclusions of the discussion at the BCBS regarding the national discretion allowing central bank reserves to be temporarily excluded from the denominator of the leverage ratio under exceptional macroeconomic circumstances and the minimum required leverage ratio to be simultaneously recalibrated upwards under exceptional macroeconomic circumstances. This discretion is related to banks' high exposures to the central bank. Such exposures arose in some countries in connection with monetary policy, specifically quantitative easing and the use of the exchange rate commitment as an additional monetary policy instrument. The size of these exposures in some banks lead to could lead to non-compliance with the minimum leverage ratio requirement. Given the CNB's use of an exchange rate commitment as additional monetary policy instrument in 2013–2017, this topic is relevant to the Czech Republic, where banks' exposures to the CNB have increased substantially. In line with the conclusions of the discussion in the BCBS, the CNB temporarily regards a leverage ratio excluding exposures to the CNB from the denominator of the leverage ratio as a relevant leverage indicator. This is accompanied by a temporary rise in the minimum leverage ratio requirement from 3.00% to 3.75%. The CNB will regularly assess whether the reasons for this change persist and inform institutions about this in its publications.

Risks associated with the provision of mortgage loans persist

In view of the risks presented in the previous Financial Stability Reports, the CNB published a Recommendation on the management of risks associated with the provision of retail loans secured by residential property (the "Recommendation"). It sets quantitative LTV limits and qualitative criteria for prudential provision of such loans, primarily in the area of assessing clients' ability to service loans. The CNB assesses the risks associated with mortgage lending and banks' compliance with the Recommendation twice a year. The assessment based on data on loans provided in 2017 as a whole reveals that despite the positive effects of the tighter LTV limits in effect since April 2017, credit financing is a source of systemic risks which must be addressed with macroprudential policy instruments.

Banks were mostly compliant with the recommended LTV limits as from July 2017

The CNB responded on an ongoing basis to the increasing overvaluation of property prices, high growth rates of new mortgage loans and the results of analyses of lenders' approaches to the valuation of collateral by gradually lowering the LTV limits in the Recommendation. The reduction of the LTV limits was consistent with the rise in the estimated overvaluation of apartment prices, which is increasing the riskiness of mortgage loans with higher LTVs for mortgage lenders using less conservative valuation techniques. The CNB recommended that lenders should not provide loans with LTVs of over 90% (individual limit) and should limit the volume of new loans with LTVs of 80%–90% to a maximum of 15% (aggregate limit). The recommended LTV limits were reduced in a forward-looking manner based on the estimated overvaluation of apartment prices, which is increasing the riskiness of mortgages for mortgage lenders. An assessment of detailed data on new loans reveals that numerous institutions were non-compliant with the aggregate LTV limit in 2017 Q2, but the situation started to improve

significantly in June 2017. Loans with LTVs of 80%–90% accounted for 15% and 12% of lending in 2017 Q3 and Q4 respectively. Loans with LTVs of over 90% accounted for around 4% of credit production in the two quarters.

The CNB positively assesses banks' reaction to the tighter recommended LTV limits and does not deem it necessary to change the LTV limits at the moment

Given the signs of slowing growth in housing prices and the favourable trend in household income, the CNB does not deem it necessary to further tighten the recommended LTV limits at present. Despite lenders' delayed compliance with the stricter recommended LTV limits, the CNB considers the effect of its measures targeted at the risk of a spiral between housing prices and property purchase loans to have been positive. The adjustment by lenders to the recommended limits has led to a sharp increase in the proportion of loans with LTVs of 70%–80% at the expense of loans with LTVs of 80%–90%, to which the aggregate limit is applied. The stricter LTV limits have also caused the rapid growth in new mortgages to halt and made loans with high LTVs more expensive. In 2017, there was also a larger increase in rates on loans with riskier characteristics in terms of LTI and LSTI ratios. In year-on-year comparison, lenders started to take more account of clients' risk characteristics when setting interest rates. It cannot be ignored, however, that lenders may in some cases have an incentive to reduce the LTV level through an optimistic assessment of a property's value in order to get just below the individual or aggregate limit. The CNB regards the existing LTV limits as the limit as regards prudential hedging of potential risks. It will therefore monitor compliance with the principle of conservative collateral valuation and will require lenders to report purchase price data and the estimated values of properties being purchased.

Institutions are providing a significant volume of mortgage loans with riskier characteristics as regards borrowers' ability to repay debt from their current income

In addition to the LTV ratio, the CNB monitors LTI (loan-to-income) and LSTI (loan service-to-income) ratios for new loans. Given the possibility of obtaining data on applicants' total debt and debt service, lenders should have started, in line with the Recommendation, to monitor the DTI (debt-to-income) and DSTI (debt service-to-income) ratios, set internal limits for them and prudently assess loan applications on their basis at the start of 2018. In FSR 2016/2017, the CNB identified loans with a DSTI ratio of over 40% and a DTI ratio of over 8 as highly risky. The share of loans with an LSTI ratio of over 40% and/or an LTI ratio of over 8 remained broadly stable in 2017. Almost 10% of the loans had both ratios concurrently above the said levels. When reducing the volume of loans with LTVs of 80%–90%, lenders did not significantly reduce the volume of loans that simultaneously had an LSTI ratio of over 40% or an LTI ratio of over 8. Loans with a high probability of default and a potentially large loss given default were thus not reduced.

The potential risks in the area of borrowers' vulnerability necessitate an extension of the scope of application of the CNB Recommendation

Housing prices in the Czech Republic have tended to grow faster than the disposable income of households in recent years. This is being reflected in an increase in the amounts of loans needed to purchase housing and hence in the relative indebtedness of borrowers. Borrowers are thus becoming more vulnerable. Given the current housing prices, the likelihood of problem applicants with lower risk aversion seeking loans to an increasing extent is meanwhile rising. In the event of shocks in the form of a rise in interest rates or a drop in income, borrowers with higher

indebtedness or debt service could run into repayment problems. The CNB is therefore extending the Recommendation to include upper limits on the DTI and DSTI ratios. Both ratios are of critical importance. The DTI ratio is designed primarily to mitigate risks associated with excessive household debt, while the DSTI ratio is targeted at risks connected with excessive debt service of households.

The CNB has set recommended upper limits on the DTI and DSTI ratios of 9 times and 45% of the applicant's net annual income respectively with effect from 1 October 2018

According to the CNB's analyses, many borrowers with loans with DTIs of over 8 and DSTIs of over 40% do not have a sufficient financial reserve to maintain their ability to service their loans in the event of adverse changes in their income situation or in the level of interest rates. To mitigate these risks while not reducing the availability of loans, the CNB is supplementing its warning about the riskiness of loans with these DTI and DSTI levels by setting upper limits on the DTI and DSTI ratios of 9 times and 45% of the applicant's net annual income respectively. However, applications for loans with DTIs of 8 and DSTIs of 40% should still be assessed with an increased degree of prudence. In countries which apply DTI and DSTI limits, the relevant limits are set at similar or stricter levels. The CNB respects the fact that a small proportion of credit cases have specific characteristics and that strict insistence on the application of the set caps could lead to excessive regulatory hardship. It therefore considers it admissible to exceed the limits on the two ratios in exceptional cases for a maximum of 5% of the total volume of loans provided. These limits on the two ratios in combination with the 5% exemption do not constitute a constraint for most of the loans provided to date.

The CNB recommends that lenders should assess clients' loan servicing capacity if lending rates increase by 2 pp

The CNB Recommendation contains a provision that institutions should assess clients' ability to service loans from their own resources under adverse conditions (i.e. they should stress-test clients' ability to service the loan). A standard risk which should be tested is that of a rise in interest rates, which can occur in the event of loan refixation or refinancing. Given the need for equal treatment, the CNB has reconfigured the rule for this test so that lenders use interest rate at least 2 pp above the planned contractual rate.

The CNB intensified microprudential supervision in the area of credit institutions' practices in the provision of consumer credit

In 2017, the CNB increased the intensity of microprudential supervision of prudent provision of secured and unsecured consumer credit by credit institutions and the management of intermediary networks by individual credit institutions. In November 2017, it published a *Supervisory benchmark on the provision of loans to households by credit institutions* summarising principles for prudent lending and management of associated risks. CNB microprudential supervision responds to risk profiles differing from the CNB Recommendation (the volume of risk) and/or insufficient risk management processes relative to the Supervisory Benchmark using an additional capital requirement under SREP. The CNB will also start to focus on identifying banks' DTI and DSTI monitoring practices and on how elevated levels of these ratios are reflected in assessments of loan riskiness.

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

Given the lower legal force of the Recommendation, the CNB – in cooperation with the Ministry of Finance of the Czech Republic and in

line with ESRB and IMF recommendations – is preparing a new legislative proposal giving it the power to set risk parameters for house purchase loans. It contains the possibility of setting upper LTV, DTI and DSTI limits under the Act on the CNB. The CNB will base such limits on an assessment of housing loans, indicators of the potential overvaluation of housing prices and indicators of the resilience of the banking sector and the economy as a whole to adverse economic shocks. The proposal will be based on a compromise wording incorporating proposed amendments approved in the parliamentary budget committee in 2017. It is being prepared primarily for preventive reasons, as foreign institutions not subject to CNB supervision may also start to provide mortgages to a much greater extent in future. The only way to ensure a level playing field on the market in this situation is to set universal conditions for all lenders by law. This would enable the CNB to respond directly and quickly to non-compliance with the rules by applying remedial measures to all types of lenders. It is also vital for the CNB to have access to data on loans provided, as this will enable it to conduct effective checks of compliance with the relevant rules.

Numerous national authorities are vested with statutory powers regarding credit ratios

Limits on credit ratios are currently applied in various forms in numerous EU countries. The LTV ratio, for example, is currently limited in one way or another in 15 EU countries. The possibility of limiting credit indicators has been enacted in a number of countries. In some EU countries, macroprudential authorities have the right to set ratios but have not exercised it yet due to low risks.

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

Since 2015, the CNB has been applying an internal methodology for reviewing and evaluating the risk of systemic concentration of sovereign exposures under Pillar 2. It considers credit institutions' exposures to the Czech government to be systemically important and concentrated even though the share of these exposures to the total assets of these institutions declined from about 8.5% to 7.8% between March 2017 and March 2018. A public finance stress test confirmed that the current fiscal situation in the Czech Republic did 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 pays attention to risks associated with the activities of systemically important institutions

To maintain high public and investor confidence in the stability of the Czech banking sector and the financial sector as a whole, it is particularly important to keep sufficient capital buffers in banks that are systemically important by dint of their position and character. The CNB prescribes a systemic risk buffer for five banks at present. The CNB is obliged to review the setting of this capital buffer every two years. This review will be conducted in 2018 H2. Following this review, the buffer rates will be confirmed or adjusted for individual banks with effect from the start of 2019.

The CNB as a resolution authority has set general thresholds serving as a guide to selecting the preferred approach to resolution.

The CNB as a resolution authority is continuing to work on the implementation of a relevant framework and preventive mechanisms establishing a foundation for effective crisis resolution. The main aim of this framework is to ensure continuity of critical functions, prevent

adverse impacts on financial stability and protect public funds and insured depositors. In its areas of responsibility, the CNB therefore prepares relevant resolution plans for institutions and groups, or is involved in their preparation within colleges in the case of cross-border entities. Having regard to the differences in the nature of their business, their shareholding structures, legal forms, risk profiles, sizes and interconnectedness to other institutions, and the scope and the complexity of their activities, it is obvious that different institutions and groups require different approaches. The CNB has set general thresholds serving as a guide to selecting the preferred approach to the resolution of specific institutions or groups.

The debate about systemic risk beyond banking, specifically in insurance companies and investment funds, is gaining in intensity at EU level

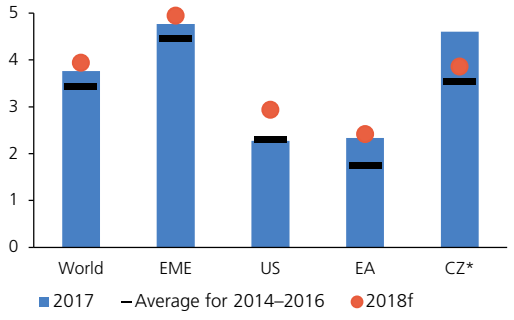
Documents were produced at EU level in 2017 presenting the main types of systemic risk in the insurance sector: fire sales, termination of the provision of economically vital insurance products and the interconnectedness of insurance companies with the rest of the financial sector. Consequently, a question arose as to how suitable the existing microprudential instruments in insurance are for reducing these risks and whether new macroprudential instruments need to be prepared. In the case of investment funds, the ESRB produced a set of recommendations for the European Commission and the ESMA. These recommendations are aimed at limiting asset and liability liquidity mismatches and credit financing of investment funds and improving the quality of stress tests conducted by investment funds. The CNB agrees that it is necessary to address systemic risk beyond banking. However, macroprudential instruments must reflect the specificities of the non-bank sector in EU Member States. Sufficient decision-making powers should be left with national authorities.

The CNB regards stabilisation of the EU regulatory framework and adequate powers of supervisory and macroprudential authorities at the national level as priorities

The CNB's long-term priorities for the regulatory area are the stabilisation of the EU regulatory framework and ensuring that national authorities have sufficient powers to respond to sources of risks in a timely and appropriate manner. As regards the review of the macroprudential policy framework in the EU, the CNB supports an increase in the flexibility of the use of capital buffers when reacting to systemic risks at the national level. The CNB and the Czech Ministry of Finance were heavily involved in discussions about changing the cap on the O-SII buffer. Like a number of other states, the Czech Republic is proposing that the general cap increase to at least 3% and that the subsidiary cap be abolished or, as a bare minimum, raised to at least 1.5% above the buffer of the parent. The CNB has consistently pointed out that a lower level would not be sufficient to cover the systemic risk that some large banks pose to the domestic economy.

CHART II.1

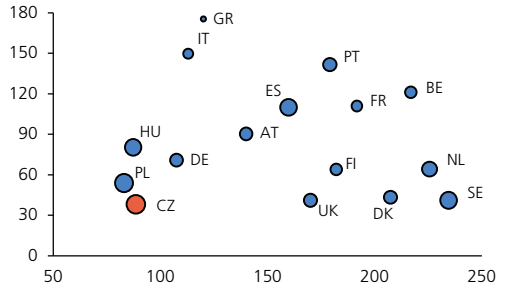
Economic growth in selected countries
(annual real GDP growth in %)



Source: IMF (World Economic Outlook, April 2018), CNB
Note: f = forecast; * The forecast for the Czech Republic is based on the CNB forecast published in Inflation Report II/2018.

CHART II.2

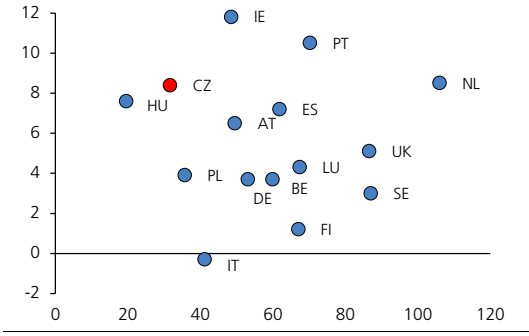
Private and government debt in selected EU countries in 2017
(% of GDP; x-axis: private debt; y-axis: government debt; size of bubble: average real GDP growth in 2015–2017)



Source: BIS, CNB
Note: Debt is the sum of all credit provided by domestic banks, nonbanks and non-residents. The private sector comprises non-financial corporations, households and NPISHs. The BIS debt calculation methodology may differ from the methodologies used by national authorities. For this reason, the data in the graph may differ from those reported by other institutions. The 2017 debt figure is as of 2017 Q3.

CHART II.3

Property price growth and household debt in selected EU countries in 2017
(x-axis: household debt in % of GDP; y-axis: year-on-year property price growth in %)



Source: Eurostat, BIS
Note: Property price growth as of 2017 Q4; household debt as of 2017 Q3.

2 THE REAL ECONOMY AND FINANCIAL MARKETS

2.1 THE MACROECONOMIC AND FINANCIAL ENVIRONMENT

The world economy is continuing to grow and the growth outlooks are also optimistic. Globally increasing optimism and ongoing loose financial conditions are encouraging increased risk-taking with regard to investment in financial assets and property, prices of which are still rising. In many countries, these prices have exceeded levels consistent with the ongoing improvement in macroeconomic conditions. For these and other reasons, the risk of a sudden repricing across financial assets remains high. The euro area economy also grew at a solid pace, with persisting differences across the euro area countries. The very relaxed financial conditions are pushing some euro area countries further into a growth phase of the financial cycle, while in other countries they are still postponing the impacts of high indebtedness and possibly also poor quality of banks' loan portfolios. Partly for this reason, the ECB's monetary policy remains highly accommodative.

The real growth of the Czech economy rose to 4.6% in 2017 and is above its potential. Since August 2017, the CNB has increased its key monetary policy rate in three steps to 0.75%. However, client interest rates have followed it only partially some time later. The financial conditions in the Czech economy remain relaxed, private sector debt has increased and prices of koruna financial assets have risen further. However, the results of a sensitivity analysis focused on the risk of asset repricing so far do not indicate a systemic dimension.

2.1.1 The External Environment

The world economy is developing favourably…

The world economy recorded robust economic growth in 2017 (see Chart II.1). The outlooks also remain optimistic. According to available forecasts, the annual growth rate of real GDP will accelerate to 4% globally and remain above 2% in advanced economies. GDP growth in the euro area reached 2.3% in 2017, up by 0.5 pp on a year earlier. A similar rate of growth is expected in 2018.

…but this holds truly only for part of the EU countries

Economic growth remains mixed across the EU countries.[1] The economic recovery is particularly weak in countries with high government and private debt levels (see Chart II.2). The different economic dynamics are reflected in different risks to financial stability in individual countries

1 Germany – the biggest euro area economy – grew by 2.2% in real terms in 2017. The three fastest-growing euro area economies were Ireland (7.8%), Malta (6.6%) and Slovenia (5.0%). By contrast, the three slowest-growing ones were Greece (1.4%), Italy (1.5%) and Belgium (1.7%). Eurostat: *Euro-indicators. News Release, 7 March 2018.* http://ec.europa.eu/eurostat/documents/2995521/8718257/2-07032018-AP-EN.pdf/99862cd5-dba6-49fa-bb2a-aa5395fa8b1b.

TABLE II.1

Table 1: Potential sources of risks to financial stability in selected countries from the perspective of national authorities

	BE	UK	DE	AT	DK	FI	SE	SK	NO	NL	CZ	HU	PL	ES	FR	IT
Bank profitability	H	M	M	M	L	L	L	M	L	L	L	L	M	M	M	H
Sovereign risk	M	M	L	L	L	L	L	L	L	L	L	L	M	M	M	H
Bank loan portfolio quality	L	L	L	L	L	L	L	L	M	L	L	M	L	L	L	M
Pension fund sector stability	L	L	L	L	L	L	L	L	M	M	M	L	L	L	L	L
Insurance company sector stability	L	M	M	L	L	L	L	M	M	M	L	L	L	M	M	L
Macroeconomic environment	L	M	L	L	L	L	M	M	M	L	L	L	L	L	M	M
NFC debt sustainability	L	L	L	L	L	M	M	M	M	L	L	L	L	L	M	M
Excessive credit growth	M	M	L	L	M	M	M	H	M	L	M	L	L	L	L	L
Residential property prices	H	M	M	M	M	M	H	H	H	M	M	L	L	L	L	L
Household debt sustainability	M	M	L	L	L	M	H	H	H	H	L	L	L	L	L	L

Level of risk: H High; M Moderate; L Low

Source: CNB
Note: The assessment is based on a qualitative evaluation of the relevant countries' latest financial stability reports. Where a risk is not mentioned in the report, the assessment is based on the indicators used in the ESRB Risk Dashboard. Information on the configuration of macroprudential instruments in European countries is presented in Table V.4 in this FSR. The ordering of countries and risks in the table is obtained using a visual contrast-optimising algorithm.

(see Table II.1). In some countries, still relaxed financial conditions are postponing the impacts of high indebtedness and possibly also poor quality of banks' loan portfolios. In other countries, they are contributing to a shift into the growth phase of the financial cycle, characterised by increased credit growth and rapid growth in property prices (see Chart II.3). In the first group of countries, a potential negative macrofinancial shock could interrupt the ongoing recovery process, while in the second group of countries it could cause the materialisation of risks that built up in the growth phase of the financial cycle.

The monetary conditions remain very easy…

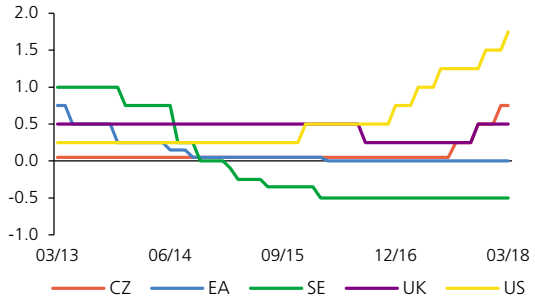
Monetary policy rates in Europe are still very low, even negative in some countries, including the euro area (deposit facility). With reference to the inflation outlook being markedly below the inflation target, the ECB announced in October 2017 that its asset purchase programme would continue at a monthly pace of EUR 30 billion until the end of September 2018. As a result of this programme, 24% of the euro-denominated government bonds of the euro area countries were held on ESCB balance sheets by March 2018. Eurosystem demand for government bonds is keeping yields low. This is reflected in a low level of interest rates on loans. Even in countries where monetary policy normalisation has already started (see Chart II.4), the increase in short-term money market rates has not been fully reflected in a corresponding increase in long-term yields and interest rates (see Chart II.5).

…and are contributing to global growth in asset prices…

The low interest rates are reducing issuers' debt service costs. However, they are also prompting non-financial corporations and households to take on greater risks. In an environment of investment optimism, risk premia have declined for some asset classes, leading to a rise in their

CHART II.4

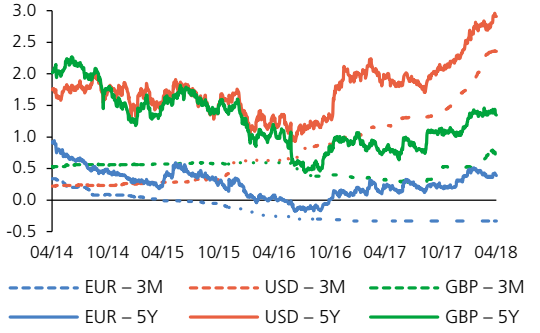
Main monetary policy rates of selected central banks
(%)



Source: Thomson Reuters

CHART II.5

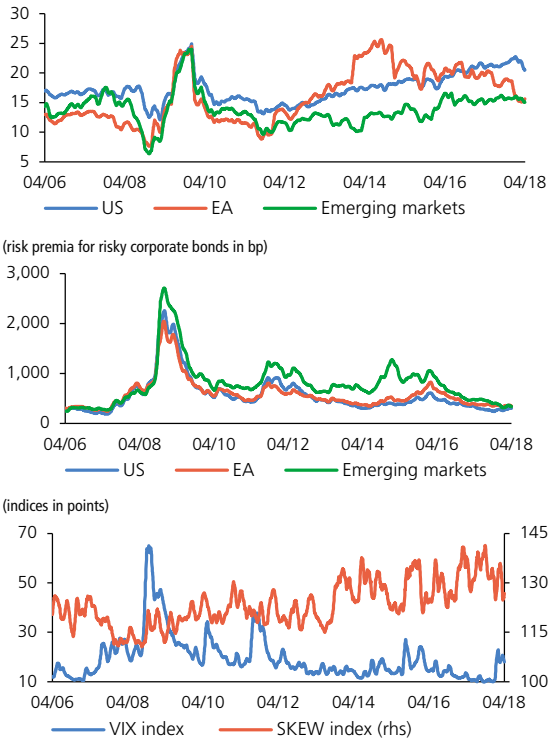
Long-term and short-term interest rates for selected currencies
(%)



Source: Bloomberg, CNB
Note: The three-month maturity is based on the money market rate. The five-year rate is based on interest rate swaps.

CHART II.6

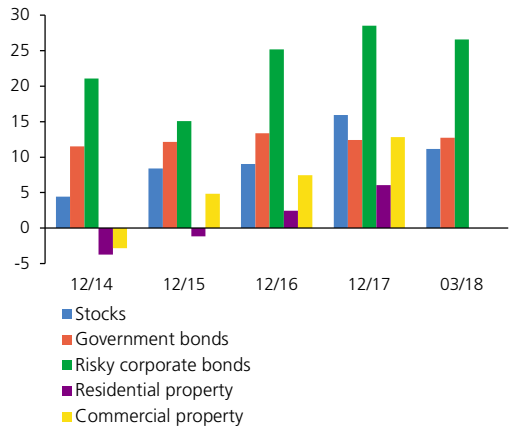
Indicators of stock and bond price adequacy and market volatility



Source: Bloomberg, CNB
Note: Stocks – SP500 for US, Euro Stoxx 50 for EA and MSCI Emerging for EM. Bonds – yield spread for speculative-grade bonds (BB+ or lower) vis-à-vis government bonds adjusted for any embedded options (option-adjusted spread). Smoothed by the 20-day moving average.

CHART II.7

Overvaluation of selected assets in the EU relative to long-term levels



Source: Bloomberg, ECB, Eurostat, CNB
Note: Risky corporate bonds are speculative-grade bonds (BB+ or lower). Overvaluation of bond prices is obtained by comparing yields with the long-term average since 2000 for a bond with five-year duration. Overvaluation of other types of assets is obtained from their prices using an HP filter with lambda = 10^7. The latest data available for residential and commercial property are for 12/17.

prices. In many countries, these prices have already exceeded levels consistent with fundamentals. Risky corporate bonds have recorded a further decline in risk premia to the levels observed in the years before the financial crisis (see Chart II.6). Stock prices are high not only in historical comparison, but also relative to expected corporate earnings.

…so the risk of a sudden drop in asset prices remains high

A sudden and disorderly repricing of risk premia on financial markets has been one of the biggest risks to financial stability in the EU in the last few years.[2] A short-lived but relatively significant drop occurred in early February 2018, with stock markets falling by 10.2% in the USA and 7.4% in the euro area between 26 January and 8 February. The drop was due to concerns about a faster and more forceful monetary policy tightening by the Federal Reserve and the Bank of England.[3] The value of the VIX index tripled in this period. Growing market concerns about a further sharp adjustment of market prices are indicated by the SKEW index. This index reflects investors' activity in hedging their portfolios against exceptionally adverse events *(tail risk)* and is now at high levels. In addition to expectations regarding monetary policy normalisation, a sudden and disorderly adjustment of market prices could be triggered by a number of other stimuli, such as adverse geopolitical events or changes in US trade policy.[4] If the value of global assets were to fall further, for example to their long-term average, the impact could be significant and probably also global (see Chart II.7). It could also adversely affect the Czech financial system (see Chart II.19) and domestic economic activity.

2.1.2 The Domestic Environment

The Czech economy is above its potential output level

Annual GDP growth in the Czech economy reached 4.6% in 2017 (see Chart II.1). This was mainly due to robust household consumption and fixed investment. According to available estimates, the Czech economy grew at a pace around 0.5–1.5 pp faster than that consistent with its potential growth. This was reflected above all on the labour market, where excess labour demand exerted upward pressure on wages and squeezed corporate profitability (see section 2.3 for details). Households' disposable income increased accordingly. The improvement in their financial situation was reflected most strongly in a rise in property prices (see sections 2.2 and 2.4).

The optimism of domestic economic agents is rising

The overheating Czech economy is boosting overall confidence in the sustainability of the current situation (see Chart II.8). However, the optimistic expectations could foster riskier behaviour by economic agents,

2 ESRB Risk Dashboard. https://www.esrb.europa.eu/pub/rd/html/index.en.html.
3 The US Fed increased its monetary policy rate three times during 2017 and then made an additional hike in March 2018. Markets expect two further increases to come before the end of the year, taking the rate to 2.1%. In 2017, the Bank of England raised its key policy rate to 0.50% and kept the stock of government and corporate bonds purchase unchanged.
4 ECB: Financial Stability Review, November 2017.

and prompt them to accept a higher level of debt or carry out riskier projects. The CNB's macroeconomic forecast[5] of May 2018 expects the growth of the Czech economy to moderate. However, it should continue to exceed 3% this year and the next.

The real convegence of the Czech economy is accelerating and the rising debt remains low relative to GDP…

Following quite a sharp drop in 2009–2012, the Czech economy returned to convergence towards the economic level of Germany in terms of GDP per capita at purchasing power parity (see Chart II.9). The real convergence of the Czech economy was accompanied by convergence towards the "European" level of private non-financial sector debt (see Charts II.10 and II.2). In 2017, the debt of the private non-financial sector in the Czech Republic reached almost 90% of GDP, up by 20 pp compared to 2007. This debt ratio is still very low relative to the euro area average (160%). The same goes when one compares the level of private non-financial sector debt in selected euro area countries when they were at a similar level of economic development as the Czech Republic is now (see Chart II.11).

…but is higher relative to national income

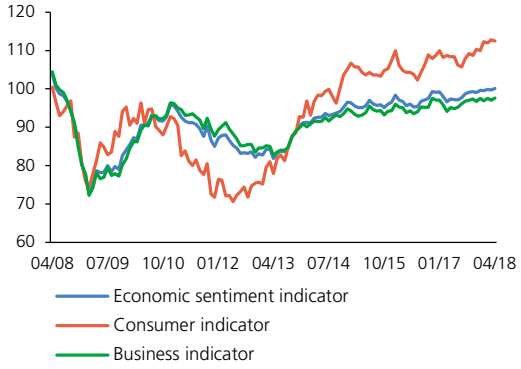
Compared to many other developed countries, the Czech economy has long had a primary income deficit vis-à-vis non-residents. In other words, part of the income generated in the Czech economy does not remain there. The ratio of gross national income to GDP is among the lowest in the EU (see Chart II.12). The debt-to-GNI ratio is thus higher than the debt-to-GDP ratio, although the gap has not been widening in recent years. If growth in debt in the Czech Republic is not accompanied in the future by commensurate growth in national income, the economy could become more vulnerable to price, income or interest rate shocks.

The monetary policy tightening by the CNB was only partly reflected in client rates

The CNB increased its key monetary policy rate twice in 2017. It continued to normalise monetary policy in early 2018, raising its key rate to 0.75% on 2 February 2018 (see Chart II.4). The CNB forecast published in Inflation Report II/2018 assumes that the monetary policy rate will rise further from late 2018/early 2019 onwards, although its growth may be slowed by continued very accommodative ECB policy. However, client interest rates and yields on securities remain low in the Czech economy (see Chart II.13) and have followed the growth in the key policy rate only partially some time later (see Chart II.14). The biggest reaction to the changes in monetary policy rates (growth of 70 bp) between 30 June 2017 and 31 March 2018 was recorded for government bonds (the five-year government bond yield rose by 90 bp). By contrast, the change in rates on loans to households for house purchase and loans to non-financial corporations was only modest in this period (growth of 26 bp and 30 bp respectively).

CHART II.8

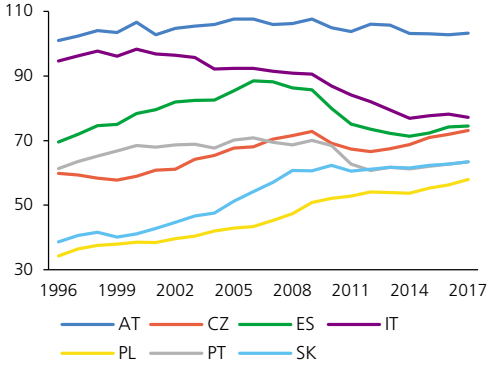
Confidence indicators for consumers and non-financial corporations
(basic index to the average of 2005)



Source: CZSO

CHART II.9

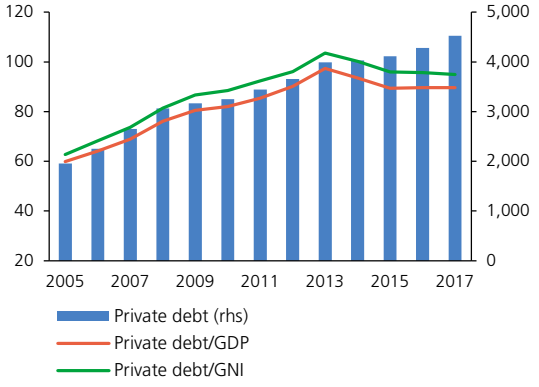
Real convergence of selected countries towards Germany
(GDP per capita at purchasing power parity; DE = 100)



Source: Eurostat, CNB
Note: The figure for 2017 is estimated using the unit of purchasing power parity for 2016.

CHART II.10

Private non-financial sector debt in the Czech Republic
(%; right-hand scale: CZK billions)



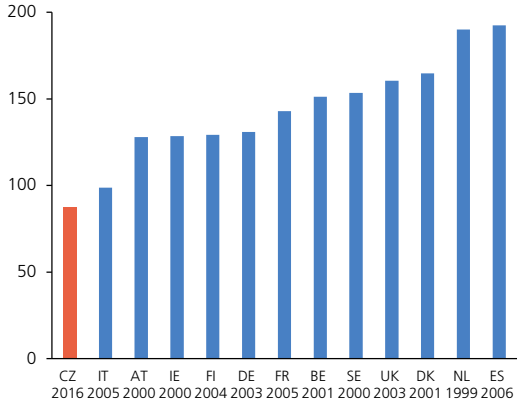
Source: CNB, CZSO, CNB
Note: The private sector comprises households, non-financial corporations and NPISHs.

5 CNB: Inflation Report II/2018, May 2018.

CHART II.11

Private non-financial sector debt-to-GDP ratios for similar levels of economic development

(%)



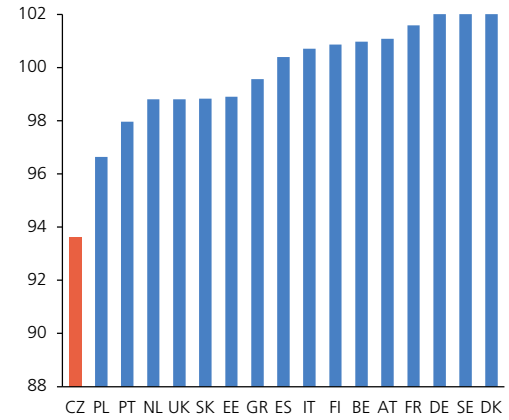
Source: Eurostat, BIS, CNB

Note: The chart shows the private non-financial sector debt ratio in the year when the given country first attained the same GDP per capita level as the Czech Republic in 2016 (USD 25,600 in PPS). The year in which that level was reached is given below countries' names.

CHART II.12

GNI-to-GDP ratios in selected European countries in 2016

(%)

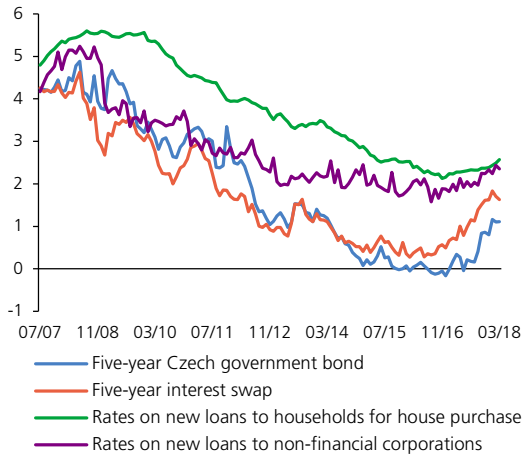


Source: Eurostat, CNB

CHART II.13

Interest rates in the Czech Republic

(monthly averages in %)

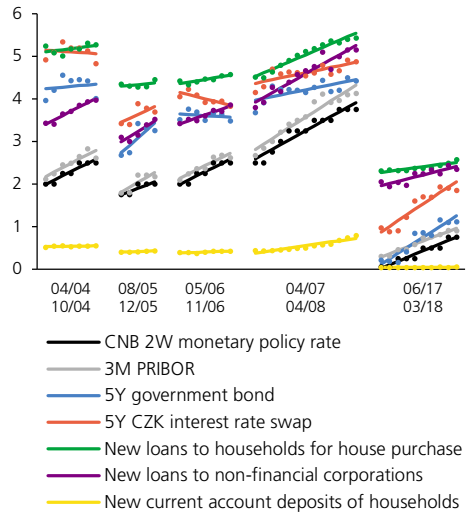


Source: Bloomberg, CNB

CHART II.14

Selected interest rates and yields during periods of growth in the CNB's policy rate

(%)



Source: CNB

Note: The x-axis shows the periods in which the CNB changed its monetary policy rate. In addition to the month in which the rate was changed, the two months before and after the rate change are presented in order to take expectations and the gradual pass-through of the rate change into account. The lines show the trend fits of the yields and rates (the dots). Month-end values are used except for client rates, where monthly averages are used instead.

Yields on Czech government bonds of all maturities have turned positive again

In 2017, yields on Czech government securities were affected, in addition to the change in the CNB's policy rates, mainly by expectations regarding the exit from the exchange rate commitment. The government bond yield curve moved upwards by 97–180 bp during 2017. In the first few months of 2018, however, the increase halted and at the end of March yields ranged between 0.44% (1Y) and 2.33% (15Y). The onset of monetary policy normalisation led to a rise in the risk-neutral yield and the term premium[6] for yields of all maturities. The portfolio component reflected a shift in foreign investors' interest from short-term to medium-term bonds. For this reason, the one-year government bond yield rose the fastest of all maturities (see Charts II.15 and II.16).

The CNB assesses the potential impacts of a change in yields using stress tests

According to the CNB's *Baseline Scenario* (see section 2.1.3), the monetary policy rate and market rates should continue to go up over the next three years in line with the macroeconomic forecast published in Inflation Report I/2018 (see Chart IV.23). Five-year interest rate swaps and Czech government bond yields are expected to rise accordingly (see Chart II.17). The *Adverse Scenario* for the Czech economy assumes a return to recession and a decline in monetary policy rates accompanied by a drop in interest rate swaps. As regards Czech government bonds, however, growth in their yields is consistent with the *Adverse Scenario*, as an outflow of foreign holders of Czech government bonds and a related marked repricing of risk premia is assumed. The assumed decrease in the risk-neutral yield reflecting the decline in monetary policy rates would be outweighed by growth in the other components of the overall yield.

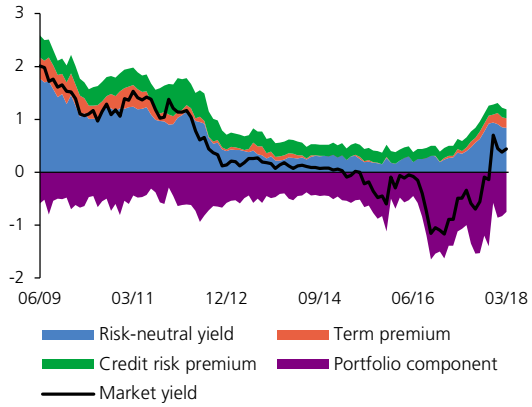
Domestic financial institutions are exposed to a risk of a price correction on financial markets…

In line with global developments, the relaxed domestic financial conditions and financial market optimism led to further growth in asset prices in 2017 (see also section 2.1.1). The low interest rate environment meanwhile prompted financial institutions to reallocate part of their funds from government bonds to riskier assets such as corporate bonds, shares and property (see Chart II.18). The combination of these two effects thus gives rise to a risk of a correction of financial asset prices stemming from repricing of risk premia, even in the Czech environment.

6 The methodology used to decompose the Czech government bond yield is described in detail in the article *Decomposition of the Czech government bond yield curve* in Financial Stability Report 2016/2017. The yield is decomposed into four components. (1) The risk-neutral yield reflects expectations about future monetary policy and economic developments. (2) The term premium relates to the maturity of the bond and is compensation for interest rate risk. (3) The credit risk premium reflects the risk that bond coupons and principal will not be paid on time and/or in full. (4) The portfolio component is the residual (the yield minus the previous three components) and mainly reflects demand for bonds as an investment asset.

CHART II.15

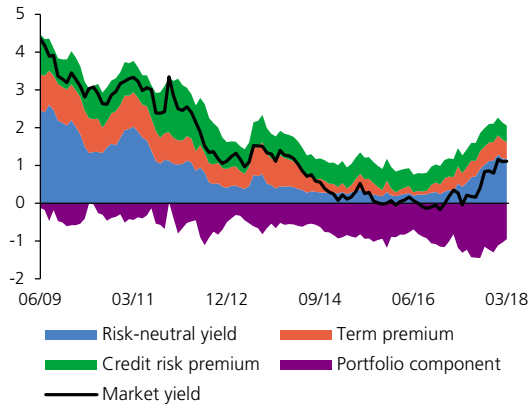
One-year Czech government bond yield decomposition



Source: CNB

CHART II.16

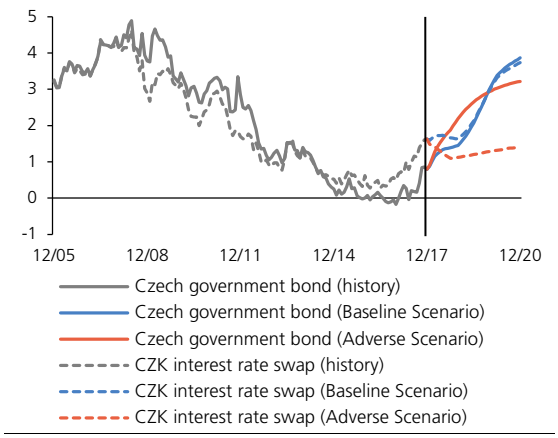
Five-year Czech government bond yield decomposition



Source: CNB

CHART II.17

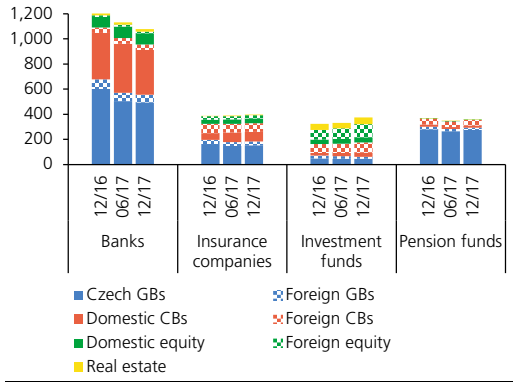
Scenarios for five-year yields



Source: CNB

CHART II.18

Investment assets of domestic financial institutions
(CZK billions)



Source: CNB
Note: GBs = government bonds. CBs = corporate bonds including mortgage bonds. The look-through approach was applied directly or by means of approximation in the case of shares in investment funds. This means that these shares were assigned to financial asset categories (bonds, shares and other equity, real estate) depending on the asset composition or investment orientation of the investment fund concerned.

TABLE II.2

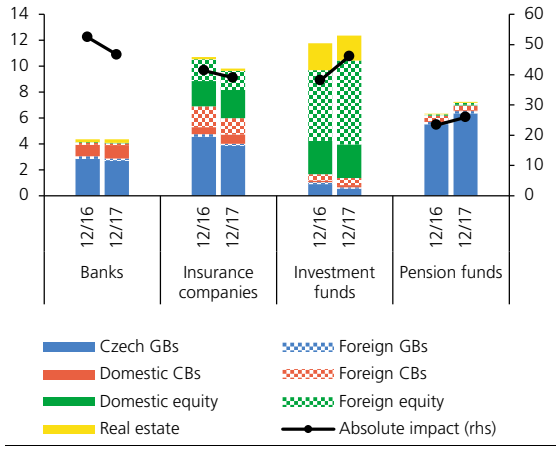
Parameters of the sensitivity analysis

	CNB sensitivity analysis		ECB analysis (2017)	
	CZ	Other countries	DE/EU	US
Equities (fall in prices in %)	23	23	30	23
1Y GB yield (rise in bp)	85	31	68	22
10Y GB yield (rise in bp)	159	113	89	162
CB credit premium (rise in bp)	59	59	80	-
Real estate (fall in prices in %)	14	14	12	-

Source: CNB, ECB
Note: GB = government bond, CB = corporate bond. The parameter values used in the ECB (Financial Stability Review, November 2017) sensitivity analysis are given for comparison.

CHART II.19

Impacts of potential repricing
(% of total investment assets; right-hand scale: CZK billions)



Source: CNB
Note: GBs = government bonds. CBs = corporate bonds including mortgage bonds. The look-through approach was applied directly or by means of approximation in the case of shares in investment funds.

…pertaining to all segments and investment asset classes

Banks are the biggest domestic institutional investors. However, the share of security and share holdings in the banking sector's total assets stands at 15%. In the case of other institutional investors, securities and other investment assets account for the bulk of their balance sheets (around 80%). The investment assets of banks, insurance companies and pension funds consist mainly of government and corporate bonds. In the case of investment funds, equity and real estate exposures also play an important role (see Chart II.18). Marketable share portfolios are made up mainly of foreign instruments, which are regarded as overvalued (see Chart II.7). As for government bonds, domestic securities dominate balance sheets. Although yields on Czech government securities increased in 2017 (see Charts II.15 and II.16), the risk of a repricing of their risk premia and a related drop in prices remains significant. The main reason is still non-residents' relatively high share in Czech government bond holdings (which stood at 35% as of 31 March 2018 according to Ministry of Finance statistics). The risk premia repricing risk also pertains to corporate bonds, whose importance in investment portfolios rose further during 2017 (see Chart II.18).

The CNB assessed the impacts of a sudden repricing using a sensitivity analysis

A sensitivity analysis was carried out to quantify the potential impact of a price correction on financial markets. The analysis goes beyond the traditional stress tests of selected financial institutions (see section 4) and focuses on prices of bonds, equities, investments in investment funds and property held by all domestic institutional investors (see Table II.2).[7] The decrease in equity prices considered in the analysis corresponded to 1.5 times the estimated global overvaluation (see Chart II.7). A return of prices to their equilibrium levels followed by a further drop owing to high risk aversion on markets is therefore assumed. For bond yields, the sensitivity analysis assumes a modest rise in average expected monetary policy rates, a return of the term premium to average levels and a rise in the credit premium. For Czech government bonds, an increase in the portfolio component of yields due to a partial outflow of foreign investors was additionally assumed. For real estate, the sensitivity analysis assumed a drop in prices corresponding to the estimated overvaluation (see section 2.2).

The price correction would not cause systemic risks to emerge

According to the sensitivity analysis, the impact of repricing on the balance sheets of the sub-sectors of the domestic financial market as of

7 In the case of banks, the analysis only covered assets marked to market, with the exception of property exposures, which were included regardless of their marketability. For other segments, all investment assets were included. As for investment fund shares, the look-through approach was applied directly or indirectly to the calculation of investment assets through approximation. This means that shares were assigned to financial asset classes (bonds, shares and other equity, property) depending on the asset structure or investment orientation of each investment fund. The analysis did not account for exchange rate movements, the effect of hedging and changes to insurance company technical provisions. The sensitivity analysis aimed to identify the most vulnerable segments and asset classes, not to quantify exactly the impacts of potential shocks.

the end of 2017 would be between CZK 26 billion (pension funds) and CZK 47 billion (banks). That would mean a relative decrease in the value of investment assets of 4.3% for banks, 7.2% for pension funds, 9.8% for insurance companies and 12.3% for investment funds (see Chart II.19). In terms of the impact on individual institutions, the decline in the prices of the assets tested would not alone represent a major disruption to financial stability. In the event of considerable market uncertainty and limited market liquidity, however, such a decline could contribute to the creation or multiplication of systemic risk in the form of mass sales of assets (see section 3.4).

The repricing would have the largest effect on the value of share portfolios and Czech government bond portfolios

The stock market slump would have the biggest effect on the assets of investment funds (a drop of CZK 34 billion), which are the biggest domestic investors in shares (see Chart II.18). The equity repricing would also hit domestic insurance companies hard. The rise in Czech government bond yields would have the largest impact on insurance companies and pension funds, partly due to the longer average residual maturity of their Czech government bond portfolios (more than seven years; see Chart II.20) compared to investment funds and banks (four to five years).[8] The repricing of domestic corporate bonds would hit banks the hardest given their large holdings and relatively long residual maturity. The repricing of foreign corporate bonds would have a similar effect on insurance companies and pension funds. The repricing of property would have a material impact on investment funds, which would lose CZK 7.1 billion on their real estate investments as a result of the shock. In year-on-year comparison, the relative impact increased for investment and pension funds. In the case of investment funds, the stronger impact was due to a further rise in the importance of shares in their portfolios. For pension funds, the larger effect of the repricing in year-on-year terms was linked with greater sensitivity of the Czech government bond portfolio due to a rise in its average residual maturity.

2.1.3 Alternative Economic Scenarios

In the *Baseline Scenario* the growth in economic activity continues…

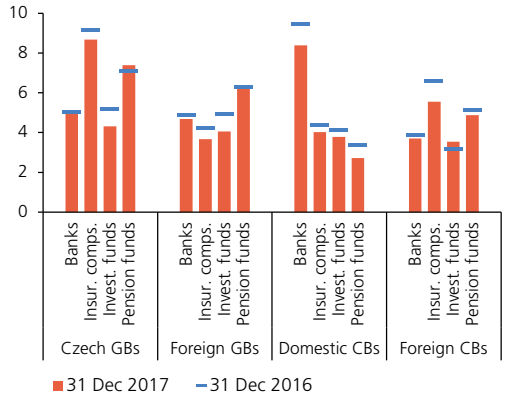
A *Baseline Scenario* based on the CNB's macroeconomic forecast published in Inflation Report I/2018[9] was prepared for the stress tests contained in this Report. This forecast expects economic growth of 3.6% this year. Annual GDP growth will continue to exceed 3% in the next two

8 The distribution of average residual maturity in the financial sector is consistent with the distribution of the duration used in the calculation of the impacts of bond portfolio repricing.

9 In its first two years, the *Baseline Scenario* of the stress tests of banks is based on the CNB's official macroeconomic forecast published in Inflation Report I/2018, which was approved by the CNB Bank Board on 8 February 2018. The *Baseline Scenario* for the third year and the *Adverse Scenario* were created solely for the purposes of stress testing the banking sector. Therefore, neither the *Baseline Scenario* beyond the horizon of the forecast published in Inflation Report I/2018, nor the *Adverse Scenario* is an official forecast of the CNB.

CHART II.20

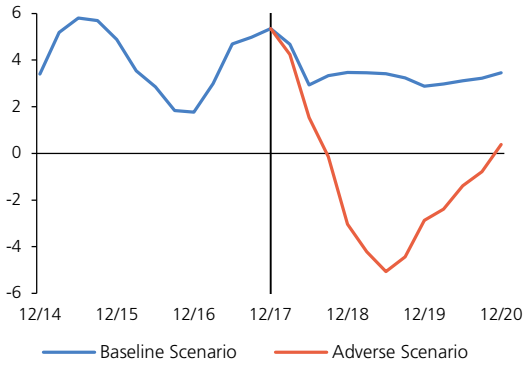
Average residual maturity of bond portfolios
(years)



Source: CNB
Note: Note: GBs = government bonds. CBs = corporate bonds including mortgage bonds (MBs). The high average residual maturity of Czech CBs held by banks is due to the high volume of long-maturity MBs held by banks in domestic financial groups.

CHART II.21

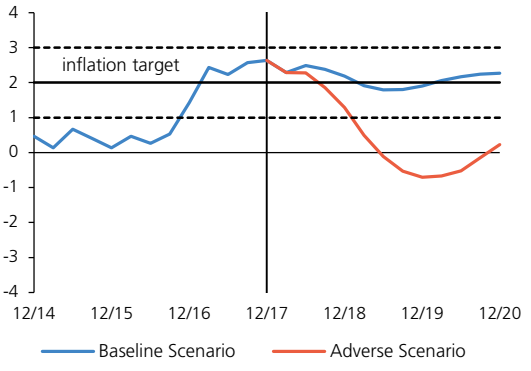
Alternative scenarios: real GDP growth
(year-on-year in %)



Source: CNB

CHART II.22

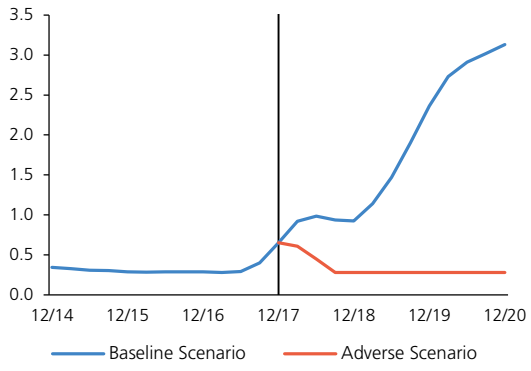
Alternative scenarios: inflation
(year-on-year in %)



Source: CNB

CHART II.23

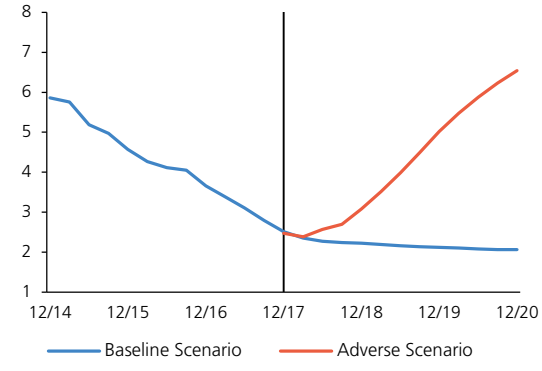
Alternative scenarios: 3M PRIBOR
(%)



Source: CNB

CHART II.24

Alternative scenarios: unemployment
(%)



Source: CNB

years. Increasing investment and continued economic growth will be accompanied by rising wages, and the general unemployment rate will remain at the current low levels over the entire the scenario horizon. Inflation will be around the 2% inflation target. Consistent with the forecast is a rise in market interest rates.

…while in the *Adverse Scenario* the Czech economy gets into a V-shaped recession

The *Adverse Scenario* assumes a marked drop in economic activity in Europe. The export-oriented Czech economy falls into a recession owing to a decrease in external demand. This causes pessimistic expectations about future economic developments, a downturn in household consumption and deferral of investment by non-financial corporations. The combination of a downturn in external demand and then also in domestic demand causes a sizeable and long-lasting decline in economic activity in the Czech Republic and results in a V-shaped recession. The recession – lasting nine quarters – leads to a drop in annual real GDP growth from the current 5% to -5%. A debt deflation scenario simultaneously materialises, with deflation leading to real growth in private sector debt as a result of declining economic activity, rising unemployment and falling wages. In this adverse economic situation, the funds of households and non-financial corporations are gradually exhausted. Coupled with a rise in real debt, this causes their debt servicing ability to worsen significantly. The problems in the real economy also affect the financial sector, which records considerable credit losses and a marked drop 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 rise to a much higher level also due to an increase in long-term interest rates. The rise in debt service together with the other impacts of the recession increase the default rate on loans to both households and non-financial corporations.

Charts IV.21–24 show the evolution of the main macroeconomic indicators of the *Baseline Scenario* and the *Adverse Scenario*. The stress scenario represents very tough but still plausible adverse developments. Box 4.1 focuses on the approach of the CNB and some other central banks to setting the main parameters of the adverse scenario and the degree of stress.

2.2 THE PROPERTY MARKET

Growth in residential property prices slowed slightly at the end of 2017. However, apartment prices outpaced wages throughout the year, so the affordability of housing deteriorated further. In line with this, the estimated overvaluation of apartment prices went up as well. The future evolution of prices will depend mainly on household expectations regarding further growth in the value of property, changes in credit terms and conditions, and the pace of new construction. Commercial property saw a slight fall in prime yields expected by investors. The volume of transactions remained at the elevated levels recorded the previous year.

Growth in residential property prices slowed slightly at the year-end but remains high

Transaction prices of housing grew by 8.4% year on year in 2017 Q4, moving significantly further above the pre-crisis level of 2008 (see Chart II.25). The pace of growth of these prices, which had been the highest in the EU in the first three quarters of 2017, slowed slightly. Apartment prices, which have long displayed the strongest response to cyclical developments, showed the fastest growth. The slowdown of these prices recorded at the end of 2017 was accompanied by flat or falling growth in transaction prices of building plots and family houses. The dynamics of apartment transaction prices were roughly the same in Prague and the rest of the Czech Republic (see Chart II.26). Apartment asking prices, which may foreshadow the evolution of transaction prices, grew more moderately in Prague in 2018 Q1. In the rest of the Czech Republic, by contrast, these prices recorded faster growth after previous slowdowns.

According to CNB estimates, the overvaluation of apartment prices is rising…

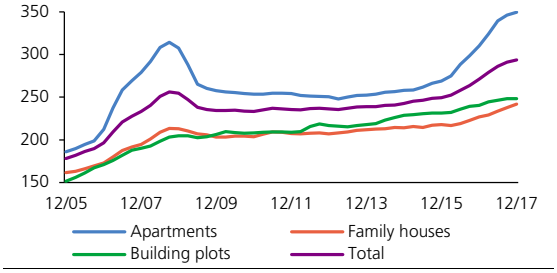
Despite the observed robust growth in household income and persisting low interest rates on housing loans, the CNB model indicates growing divergence of apartment transaction prices from macroeconomic fundamentals. The model-based estimate of the equilibrium level of apartment prices taking into account the CNB's macroeconomic forecast indicates that apartment prices in the Czech Republic were overvalued by around 14% at the end of 2017 Q4 (see Chart II.27). Apartment prices in the capital were overvalued to about the same extent. Current apartment asking prices are significantly above economic fundamentals. If transaction prices were to start converging quickly towards the current level of asking prices, the degree of overvaluation would increase significantly further.

…and reducing the affordability of buying apartments on credit

The observed evolution of apartment price overvaluation is reflected in the housing affordability indicators. At the end of 2017 Q4, the affordability of apartments was down by 5% year on year from the point of view of the price-to-income (PTI) ratio and by 7% in terms of the loan service-to-income (LSTI) ratio (see Chart II.28). The deterioration in the affordability of apartments may deter some households from debt

CHART II.25

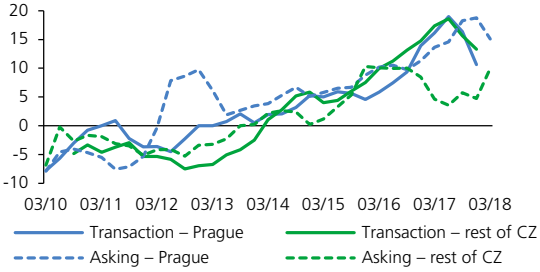
Transaction prices of residential property
(1999 Q1 = 100)



Source: CZSO, HB index, CNB
Note: The data for 2017 are calculated from alternative sources of data on transaction prices (transaction prices of older apartments from a CZSO survey, the HB index and the CZSO House Price Index).

CHART II.26

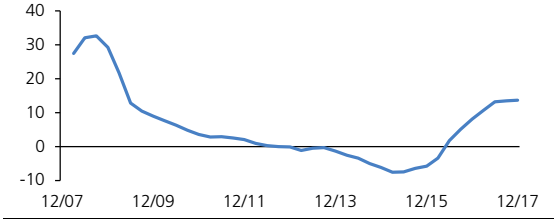
Growth in apartment transaction and asking prices
(year-on-year change in %)



Source: CZSO, CNB
Note: Transaction prices from CZSO survey.

CHART II.27

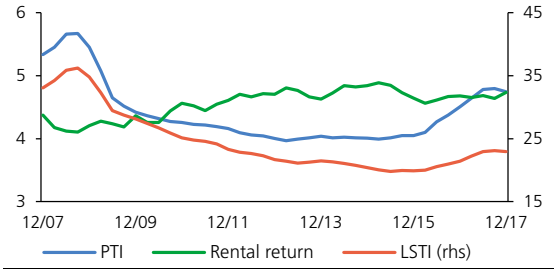
Estimated overvaluation of apartment prices
(%)



Source: CNB

CHART II.28

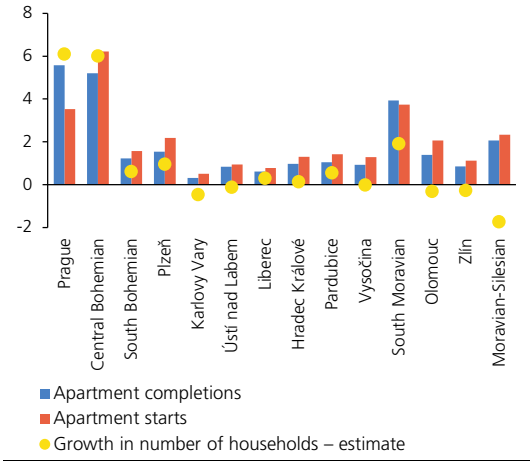
Apartment affordability indicators
(PTI in years; yields in %; right-hand scale: %)



Source: CZSO, CNB
Note: PTI and LSTI are obtained as the ratio of, respectively, the price of and monthly instalment on a 68 m2 apartment to the moving average of the annual and monthly wage. A loan with an LTV of 77% and a repayment period of 20 years was considered for the LSTI calculation.

CHART II.29

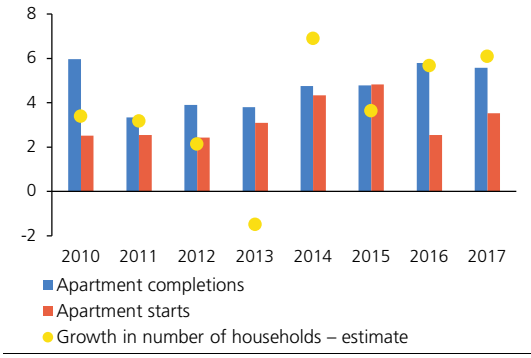
Apartment construction and population growth in regions in 2017
(x-axis: regions; y-axis: thousands)



Source: CZSO, Eurostat, CNB
Note: Growth in the number of households estimated as population growth divided by the average household size in the Czech Republic in the relevant year according to Eurostat.

CHART II.30

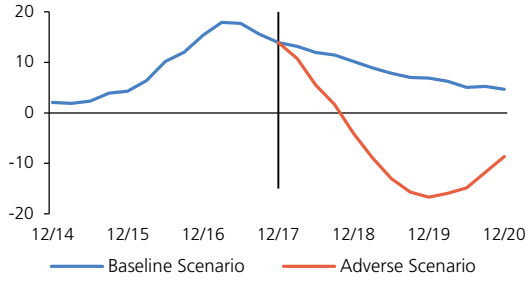
Apartment construction and population growth in Prague
(thousands)



Source: CZSO, Eurostat, CNB
Note: Growth in the number of households estimated as population growth divided by the average household size in the Czech Republic in the relevant year according to Eurostat.

CHART II.31

Year-on-year property price growth
(%)



Source: CNB

financing property purchases and indirectly foster a slowdown in apartment price growth. Banks refusing clients with excessively risky values of the above affordability ratios may have a similar effect. However, the overall price dynamics will depend on other factors as well.

New apartment construction remains a significant factor for prices going forward…

Given the longevity of real estate, new construction should depend primarily on demographics and other stable demand-side factors (such as temporary migration for work or study). To some extent, however, it is also determined by the cyclicality of apartment prices, with growth in prices providing an incentive for developers to construct apartments (see Charts II.29 and II.30). In comparison with other regions, apartment construction in Prague did not increase in line with growth in the number of households[10] in 2016 and 2017 (see Chart II.29). This suggests constraints on construction work in the capital caused by current regulations and practices as regards issuing building permits. The last two years have also seen a decrease in the number of apartment starts relative to apartment completions in Prague (see Chart II.30). This signals continued apartment supply constraints in the next few years, exerting further upward pressure on apartment prices.

…but the pace of growth of property prices is expected to slow in the coming years

In addition to the factors described above, the future evolution of property prices will depend on households' expectations regarding future growth in those prices and on foreign demand. In the *Baseline Scenario* of the stress test, the rate of property price growth slows gradually and drops below 5% at the test horizon (see Chart II.31). This reflects, among other things, the impact of macroprudential measures. If macroeconomic conditions were to follow the *Adverse Scenario*, property prices would record a sharp correction and their year-on-year dynamics would turn significantly negative and stay there until the end of the three-year test horizon (risks associated with loans secured by residential property are described in more detail in section 5.3.1).

Optimistic expectations prevail in the commercial property market…

Prime yields on office and retail property declined further in 2017 H2 and, like those on industrial property, were below their pre-crisis levels (see Chart II.32).[11] Given also the current growth in rents,[12] all types of prime commercial properties recorded growth in prices. The observed price growth was accompanied by high volume of transactions in 2017,

10 Growth in the number of households is estimated as population growth divided by the average household size in the Czech Republic in the relevant year according to Eurostat. The average household size in regions is not available. However, if the average number of persons per household were lower in Prague than in the Czech Republic as a whole, the real growth in the number of households in Prague in 2010–2017 would be higher.
11 Prime commercial property prices are obtained as "capital values" from Jones Lang LaSalle. The prices are calculated using the rents and yields demanded by investors.
12 Office rents went up by 5% and industrial and retail rents by more than 10% year on year in 2017 Q4.

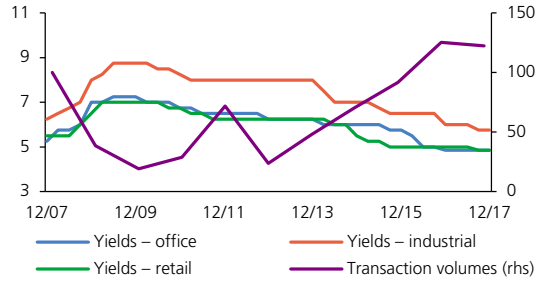
which almost equalled the previous year's record level (see Chart II.32). At the end of 2017, the CNB model was indicating slight overvaluation of prime commercial property (see Chart II.33). Compared with a year earlier, the overvaluation of industrial property increased, that of retail property was unchanged and that of office property decreased.

…but those expectations may be partially dampened by a lower pace of construction

Compared with the previous year, when only a very low level of construction had been recorded, 2017 saw a significant increase in the stock of completed premises. The figure for office property was close to the pre-crisis high (80% of the 2008 level). The office vacancy rate dropped further in second half of the year, as did the industrial vacancy rate, which was very low (see Chart II.34; see section 5.3.2 for risks associated with loans secured by commercial property).

CHART II.32

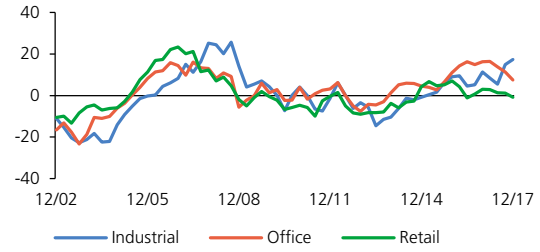
Yields and volumes of commercial property transactions
(%; right-hand scale: 2007 = 100)



Source: Jones Lang LaSalle
Note: Prime yields. Transaction volumes in annual frequency.

CHART II.33

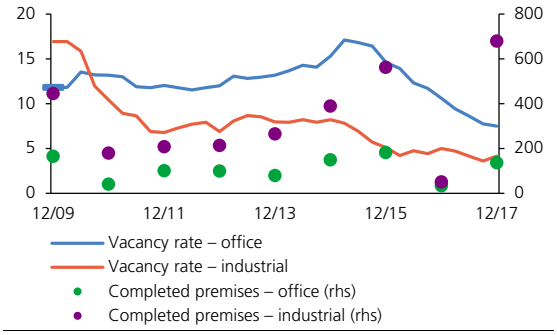
Estimated overvaluation of commercial property prices
(%)



Source: Jones Lang LaSalle, Datastream, Eurostat, Bureau of Economic Research (US), CNB
Note: Overvaluation as estimated by panel regression on a sample of Central and Eastern European countries (CZ, SK, PL, HU and RO) and also DE.

CHART II.34

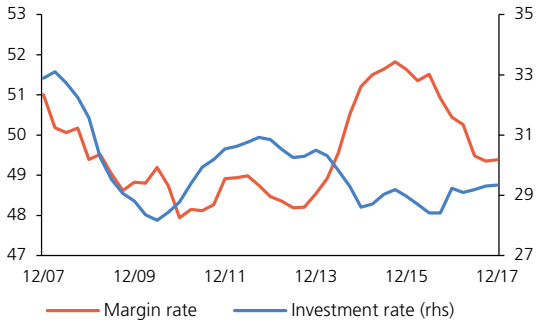
Stock of completed premises and vacancy rates for commercial property
(%; right-hand scale: thousands of m2)



Source: Jones Lang LaSalle
Note: Stocks of completed premises in annual frequency.

CHART II.35

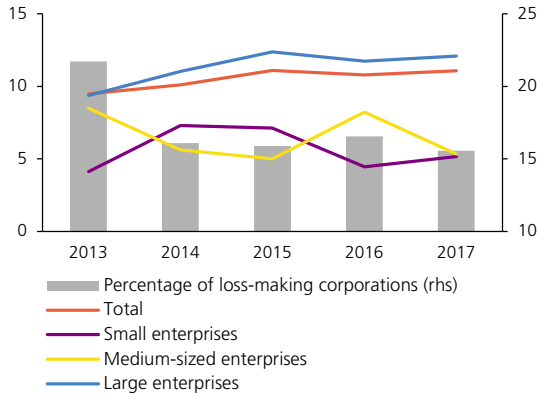
Margin rate and investment rate
(% of gross value added of sector; annual moving totals)



Source: CZSO
Note: The margin rate is the ratio of gross operating surplus to the gross value added of the sector. The investment rate is the ratio of gross fixed capital formation to the gross value added of the sector.

CHART II.36

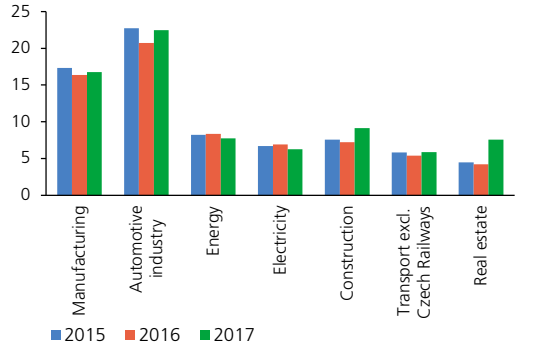
After-tax RoE by enterprise size and percentage of loss-making corporations
(%)



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

CHART II.37

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



Source: CZSO, CNB
Note: Energy comprises electricity, gas, heat and air-conditioned air. The results are based on a sample of non-financial corporations. The property development sector is included under construction.

2.3 NON-FINANCIAL CORPORATIONS

Despite the favourable economic developments in 2017, there was continued downward pressure on profits in the non-financial corporations sector due to rapid growth in personnel costs. A situation of wage growth combined with an appreciating koruna not accompanied in the long term by corresponding labour productivity growth would constitute a major threat to the sector's financial condition. The riskiness of loans provided to non-financial corporations, as measured by the default rate, decreased but has probably now bottomed out. The materialisation of credit risk, as measured by the share of non-performing loans in total loans, decreased in line with credit risk developments. The rate of growth of bank loans to non-financial corporations slowed slightly, while foreign currency loans recorded higher growth rate than total bank loans. This trend is linked mainly with natural hedging of firms against exchange rate risk and is therefore not a source of systemic risk. Following the exit from the exchange rate commitment, the level of hedging generally increased. This was supported by hedging through derivatives.

Rapid wage growth caused the sector's profitability to fall

The overall production of the non-financial corporations sector increased by 7.5% year on year in 2017 Q4. However, the growth in production was not reflected in the sector's profitability, which, depending on the measurement method used, declined further or remained flat (see Charts II.35 and II.36). Firms are finding it increasingly difficult to fill vacancies despite persisting solid growth in the number of employees, which, combined with further growth in the minimum wage, is being reflected in accelerating wage growth. For this reason, growth in overall compensation of employees also accelerated (to 8.5% year on year). In line with the tight labour market, the CNB's macroeconomic forecast expects wage growth to remain strong in 2018.[13] This may increase the pressure for a further drop in the sector's profitability. Return on equity (RoE) recorded mixed trends as regards firm size in 2017: large and small enterprises recorded moderate growth, while medium-sized enterprises saw quite a significant decrease (see Chart II.36). From the branches of activity perspective, RoE mostly followed favourable trends, with financial condition improving most significantly in construction and real estate, where profitability was supported by a steep rise in transaction prices (see Chart II.37). As usual, however, RoE is highest in manufacturing and, within it, the automotive industry.

Investment in the sector should continue to rise

The investment rate has started to rise slowly again over the past two years, suggesting growing optimism among non-financial corporations. According to the results of a statistical survey of non-financial corporations conducted by the CNB and the Confederation of Industry of the Czech Republic for 2018 Q1, around a third of firms expect a net

13 CNB: Inflation Report II/2018.

rise in investment expenditure in the next 12 months. Similarly, the Bank Lending Survey indicates a further rise in demand for investment loans, partly due to the need to boost productivity given the limited resources in the labour market.

Lower competitiveness and external demand developments may worsen the sector's financial condition

Given the sector's strong dependence on the performance of export-oriented industries, favourable developments in the external environment remain a key factor for keeping non-financial corporations in good financial condition. The rapid economic growth recorded by the Czech Republic's biggest trading partners in 2017 should continue into 2018 according to the CNB forecast.[14] The positive trend in the external environment is confirmed by overall export growth of 5.9%. Nonetheless, exports slowed in late 2017 and the first few months of 2018 (recording a year-on-year decline of 1.0% in February). The main risk scenario for the non-financial corporations sector is a combination of continued rapid wage growth and exchange rate appreciation not accompanied by corresponding labour productivity growth. In such case, exporters will gradually lose their competitiveness. If the worsening competitiveness were to be joined by a slump in external demand, there would be a strong negative shock to profitability and the overall risk profile of non-financial corporations, which would gradually spread to the whole economy. However, given the favourable outlooks for major trading partner countries, the probability of a strongly negative scenario remains low.

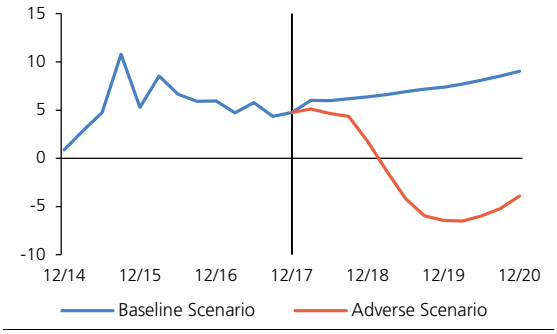
Growth in bank loans weakened slightly, but the *Baseline Scenario* expects it to pick up again

The year-on-year rate of growth in bank loans to non-financial corporations was volatile in 2017 and slowed slightly overall. In December 2017, credit growth stood at 4.8% (see Chart II.38). Despite slowing somewhat, the growth in lending remained relatively high in the context of the medium-term tendencies and by international comparison (see section 5.2 for more details). Loans to non-financial corporations grew fastest in the hotels and restaurants and transport segments. The strong growth in the real estate industry slowed slightly, but the amounts of loans granted remained high. The sector's total debt was also influenced by growth in debt securities issuance. Their amount increased by 7.1% year on year in 2017 after two years of negative growth. With debt securities outpacing bank loans, the share of bonds in total funding sources increased slightly (by 0.2 pp). According to the *Baseline Scenario* of the current round of stress tests, the growth rate of bank loans to non-financial corporations will increase in the quarters ahead and year-on-year credit growth should reach around 9% at the three-year test horizon. If the *Adverse Scenario* were to materialise, the credit growth rate would be positive only in the first year and there would be a sizeable credit contraction in the following years.

14 See section II.1 of Inflation Report II/2018 for more details.

CHART II.38

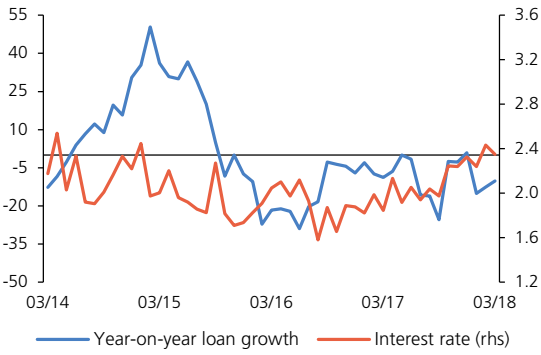
Year-on-year growth in bank loans to non-financial corporations



Source: CNB

CHART II.39

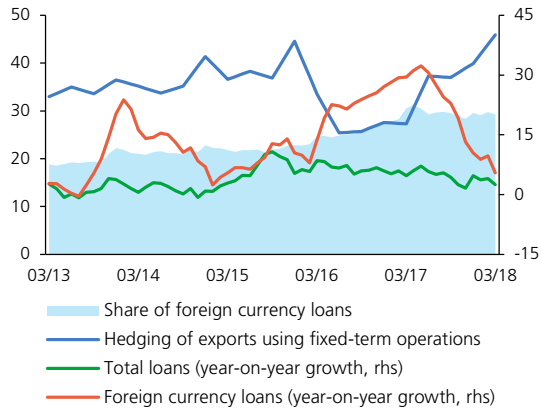
Growth of new koruna loans and the average interest rate



Source: CNB
Note: The year-on-year growth is smoothed by the 3-month moving average.

CHART II.40

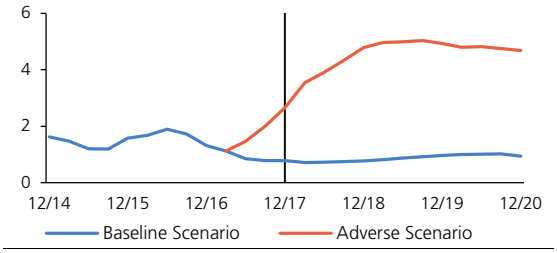
Selected characteristics of foreign currency loans and currency hedging of exports



Source: CNB
Note: Foreign currency loans are smoothed by the 3-month moving average. The monthly figures for hedging of exports using fixed-term operations are obtained by linear interpolation of quarterly data.

CHART II.41

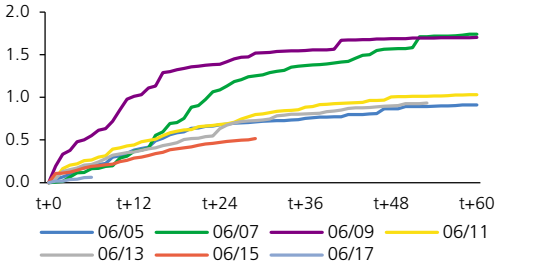
12-month default rate on bank loans to non-financial corporations
(%)



Source: CNB

CHART II.42

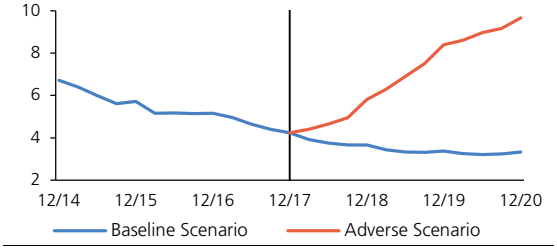
Riskiness of loans to non-financial corporations by date of provision
(cumulative default rate in %)



Source: CNB
Note: The initial slope of the curve provides a relatively reliable signal about the subsequent evolution of the riskiness of loans provided in the given period.

CHART II.43

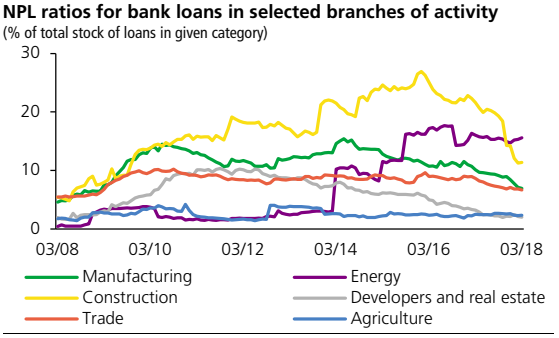
NPL ratio for bank loans to non-financial corporations
(%)



Source: CNB

CHART II.44

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



Source: CNB
Note: The developers category comprises NACE 411 (Development of building projects) and NACE 68 (Real estate activities).

New bank loans decreased, but the interest rate on new loans rose steadily

The amount of new koruna bank loans fell by 7.5% year on year in 2017. The decline started to accelerate at the start of 2018 (the year-on-year change in March 2018 was -10.1%; see Chart II.39). The average interest rate on new loans rose steadily in 2017, reaching 2.3% in March 2018. Despite that, the sector's debt service developed positively, as net interest payments on bank loans decreased in total by around CZK 400 million (-1.59% in relative terms).

Foreign currency bank loans are maintaining their share in total loans, while the share of hedging is rising

Growth in foreign currency loans fell significantly year on year, but is still slightly higher than growth in domestic currency loans (5.4% in March 2018; see Chart II.40). The share of foreign currency loans in the sector's total bank loans stabilised at around 30%. As usual, the share of the foreign currency loans of the 1,000 largest exporters was higher, accounting for more than half of their loan portfolio. Exporters use foreign currency loans as a natural hedge against exchange rate risk. As well as natural hedging, non-financial corporations increasingly used derivatives to hedge exchange rate risks. According to a CNB statistical survey, the level of hedging at the one-year horizon reached 46% of the export volume, the highest figure since records began. A rise in the coverage of exports by imports of around 2 pp also helped reduce exchange rate risk.

Credit risk decreased and is close to bottoming out according to the *Baseline Scenario*

Credit risk as measured by the forward-looking 12-month default rate decreased to a new historical low in 2017 (see Chart II.41). The favourable credit risk trend is also evidenced by low riskiness of loans provided in the recent period – the default rate of loans provided in June 2017 was around half of that of loans provided in June 2015 (see Chart II.42). The backward-looking indicator of the ratio of non-performing loans (NPLs) to the sector's total loans, which reflects the materialisation of credit risk accepted in the past, also decreased (see Chart II.43). The *Baseline Scenario* expects the default rate to be flat in 2018 and rise very slowly in the following years. This is consistent with a further drop in the NPL ratio in the first two years and a bottoming out in 2020. If the *Adverse Scenario* were to materialise and a return to recession were to happen, the default rate would rise sharply to 5% in the first two years and then fall very slowly. The NPL ratio would also rise significantly (see Charts II.41 and II.43).

Turning to non-financial corporations, credit risk decreased in most industries but remains elevated in construction and energy

The materialisation of credit risk decreased in most industries (see Chart II.44). The energy sector recorded the highest NPL ratio in 2017. The construction industry saw a positive NPL trend: its NPL ratio fell by 11.5 pp compared to January 2017, although it remains high. The NPL ratio for the 1,000 largest exporters increased due to the collapse of several engineering firms in 2016 and stood at 5.1% at the beginning of 2017. The NPL ratio of the largest exporters declined to 2.6% during 2017, returning to its long-term trend.

2.4 HOUSEHOLDS

The income situation of households continued to improve on the back of continued economic expansion and a record low unemployment rate. The income growth coupled with low loan interest rates was reflected in robust consumption growth and high investment in property. This is creating conditions for strongly optimistic expectations of households and is increasing their willingness to finance their expenditure through debt. The main risk in the household sector is therefore a scenario in which some households start to consider the current income growth and interest rate level to be sustainable and succumb to the illusion that it will be easy to service an ever-increasing volume of loans. Credit risk as measured by the default rate remained low, in line with the observed economic situation, but a shift to even lower levels is unlikely. Credit risk materialisation, as measured by the share of non-performing loans in total loans, also recorded a favourable trend in the period under review.

The economic growth helped improve the income situation of households

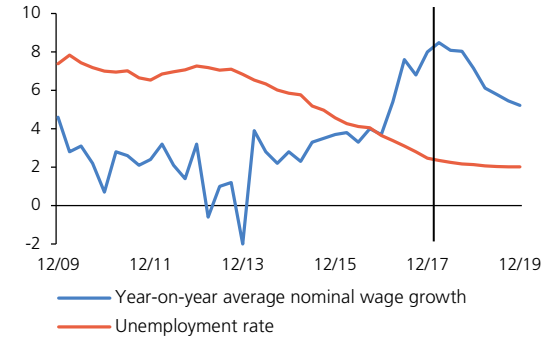
From the perspective of households, the labour market situation improved further in 2017 and early 2018. In February, the general unemployment rate stood at 2.4%, a historical low. In line with this trend, total employment was also favourable, the number of employed people rising by 73,000 year on year in February. The excess labour demand is being reflected in rising wage growth (see Chart II.45), which is accounting for the lion's share of the growth in households' total income (see Chart II.46). Year-on-year growth in gross nominal wages is currently running at 8%. According to the CNB's official macroeconomic forecast,[15] wages should maintain brisk, albeit gradually slowing growth in 2018. Like in the previous year, wages of lower-income households went up faster, as the median wage outpaced the mean wage.

The rising incomes and favourable economic situation are giving rise to optimistic expectations

The favourable financial situation of households is being reflected in optimistic perceptions of the state of economy (see Chart II.8 in section 2.1.2) and rising expenditure. Household consumption showed robust growth in real terms (a year-on-year growth rate of over 4%). Investment in property was also high in the period under review (see Chart II.47). This was accompanied by an increasing willingness to finance expenditure through debt. Thanks to the accelerating income growth, however, the total debt ratio increased only slightly (see Chart II.46). A risk scenario going forward is a situation in which some households start to consider the current income growth to be permanent and, due to over-optimistic expectations, succumb to the illusion that it will be easy to service ever-increasing debt levels.

CHART II.45

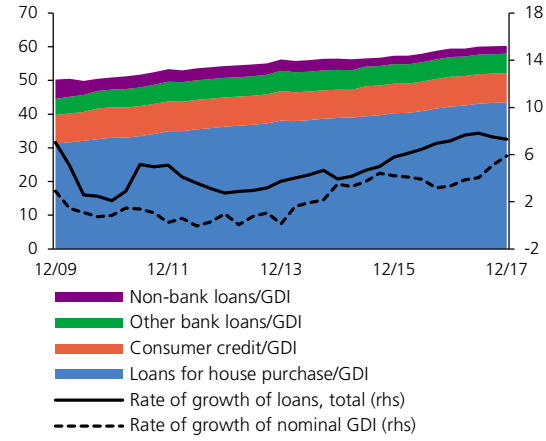
Labour market indicators
(%)



Source: CNB, CZSO
Note: The unemployment rate is seasonally adjusted. The vertical line divides the observed values and the official macroeconomic forecast in Inflation Report II/2018.

CHART II.46

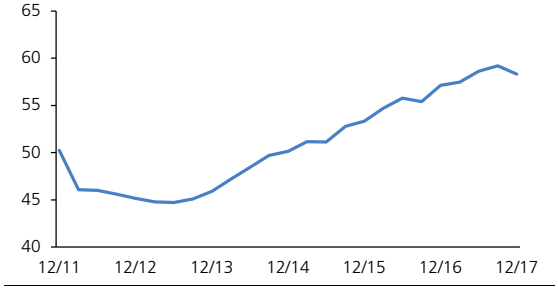
Household indebtedness and income indicators
(ratios in %; right-hand scale: year-on-year in %)



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

CHART II.47

Gross capital formation – household sector
(CZK billions)

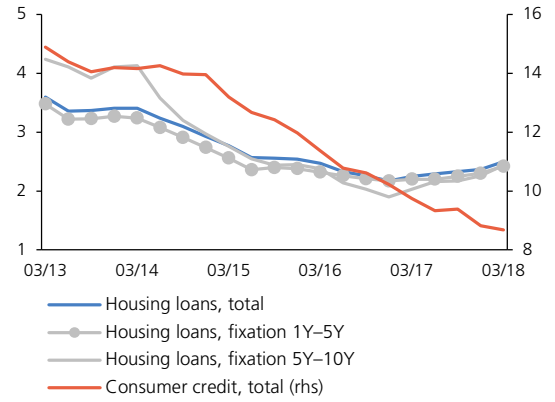


Source: CZSO
Note: Gross capital formation consists almost solely of investment by households in housing.

15 See Inflation Report II/2018.

CHART II.48

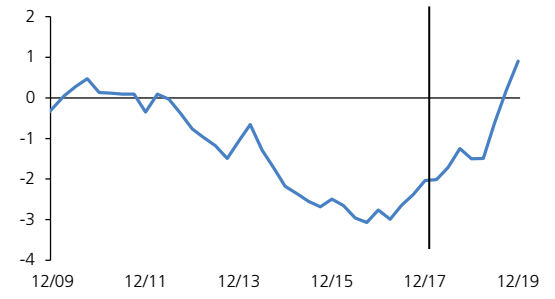
Interest rates on new bank loans to households
(%)



Source: CNB

CHART II.49

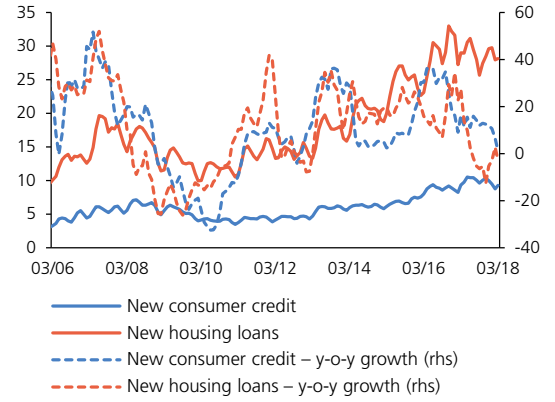
Difference between the current rate on a new (refixed) housing loan and the same rate five years ago
(pp)



Source: CNB
Note: The rate is that for the purchase of residential property with a fixation period of 5–10 years. The vertical line separates the observed values from the values based on the official macroeconomic forecast published in Inflation Report I/2018.

CHART II.50

New koruna bank loans to households
(CZK billions per month; right-hand scale: year-on-year in %)



Source: CNB
Note: The data are smoothed using 3-month moving averages. New loans also include refinanced and refixed loans.

Apart from the income trend, the low interest rate level is supporting the impression of easy debt servicing

Despite gradual increases in monetary policy rates, interest rates on new loans rose only moderately, or – in the case of consumer loans – fell even further, due to fiercer competition (see Chart II.48). Taking into account wage inflation, real rates are significantly negative. This may further boost the optimistic expectations of some households regarding easy long-term debt servicing. Under these conditions, a major risk is the use of loans that would be difficult to service if interest rates and income growth returned to their usual long-term levels (see also section 4.3). Materialisation of these risks does not pose an immediate risk to the economy, since households when refixing are currently able to get interest rates that are 2 pp lower on average than the fixed rates offered five years ago.[16] If the CNB's macroeconomic forecast materialises, a return to higher rates compared with past refixation can be expected in the second half of 2019 (see Chart II.49).

In an environment of low interest rates and rising income growth, credit growth remains strong…

Despite having slowed somewhat in recent months, credit growth remains strong, thanks mainly to persisting interest in mortgages. The volume of new bank loans for house purchase has remained close to historical highs over the past year. New bank consumer credit recorded a similar trend in 2017 (see Chart II.50).[17] Easier availability of bank consumer credit may have been the cause of lower interest in non-bank loans, which, by contrast, stagnated last year and did not contribute to the rising pace of borrowing.

…and robust growth is expected over the next few years as well

According to the *Baseline Scenario*, bank loans to households should continue to show robust growth in the coming years (see Chart II.51). Credit growth will fluctuate just below 7% over the three-year stress test horizon. Its gradual weakening is due to base effects. If the conditions of the *Adverse Scenario* were to materialise, the economic downturn would lead to a significant reduction in credit financing and to a decline in credit growth to negative figures.

An increasing proportion of assets in households' balance sheets are subject to the risk of a downward price correction

Households' interest in buying property is giving rise to a high share of real estate in the sector's total assets (around 40%). At the same time, households are investing increasingly in collective investment funds and favouring investment products with non-guaranteed returns (see section 3.3 for details). In the case of both property (see section 2.2) and the above-mentioned financial assets, the CNB considers current prices to be overvalued from the long-term perspective. This is generating

16 A fixation period of around 5 years is the most common for house purchase loans.
17 New loans also include refixed and refinanced loans. In the case of consumer credit, refinancing involves, for example, consolidation of previous loans. New loans net of refixation and refinancing are at lower levels, but are showing broadly similar trends.

risks linked with a potential price correction back to equilibrium levels (see section 2.1). A reduction in wealth caused by a sharp drop in the market value of asset holdings amid an unchanged level of nominal debt could force some households to reduce their consumption. The risk of a *balance-sheet recession* scenario, with economic agents responding to the wealth shock by trying to repay their debts rather than consume, is therefore rising and could foster a future slowdown in economic performance.

The credit risk of households remains low at present…

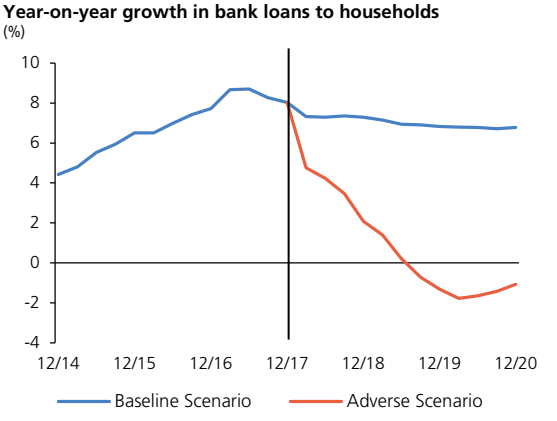
The level of credit risk, as measured by the forward-looking 12-month default rate on bank loans to households, was virtually unchanged in year-on-year comparison (see Chart II.52). At the end of 2017, the default rate was 2.2%, reflecting a slight fall in the riskiness of housing loans and a simultaneous modest increase in the rate of default on consumer credit. The continued favourable trend in credit risk was again due to the improving income situation of households and the currently low debt servicing costs. In line with the observed economic situation and robust credit growth, the ratio of non-performing loans (NPLs) to total loans, which measures the materialisation of credit risk assumed in the past, declined as well. At the end of 2017, the NPL ratio was down by 2.5 pp for consumer credit and by 0.25 pp for housing loans.

…but is not likely to fall any further

Consistent with the *Baseline Scenario* of the stress test is a further stagnation of households' credit risk amid similar risk trends for housing loans and consumer credit. If, on the other hand, the assumptions of the *Adverse Scenario* materialise, credit risk will start to rise sharply and the 12-month default rate will be around three times the current level at the scenario horizon.

CHART II.51

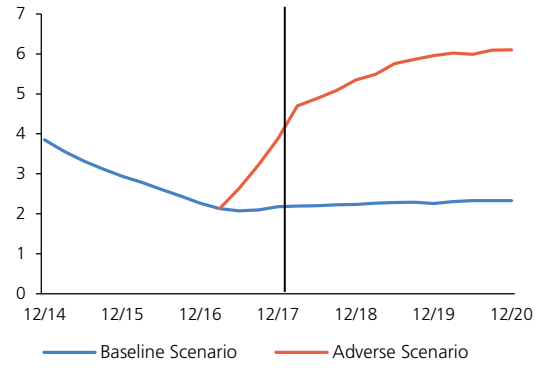
Year-on-year growth in bank loans to households



Source: CNB

CHART II.52

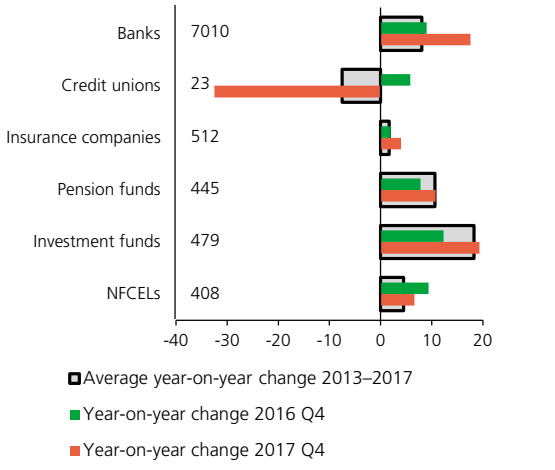
12-month default rate on bank loans to households



Source: CNB

CHART III.1

Rates of growth of segments of the financial sector
(%; as of 2017 Q4)



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 2017 in CZK billions.

3 THE FINANCIAL SECTOR

3.1 DEVELOPMENTS IN THE FINANCIAL SECTOR

The favourable trends seen in the domestic financial sector in previous years continued into 2017. The banking sector is showing its highest-ever levels of capital, profitability and liquidity. The sector is also moving close to the lowest recorded level of non-performing loan ratio. The insurance sector continued to grow and maintained good profitability. Persisting dynamic growth in pension and investment funds is being supported by growth in real incomes.

The main risk scenario for the financial sector is still a contraction in economic activity accompanied by growth in credit and market risk. The expected gradual increase in monetary policy interest rates will reduce the risks associated with the environment of exceptionally low interest rates. However, it will require high-quality management of market risks by financial institutions in all segments of the financial sector. A continued downward trend in the risk weights set by banks using internal models for loans secured by residential property may amplify the risks associated with current developments in the residential property market in the future. However, stress test results demonstrate that the current capitalisation, liquidity and profitability levels of the most important segments of the financial sector guarantee a high degree of resilience to the shocks assumed.

The financial sector's assets continue to rise, with investment funds recording the fastest growth

All segments of the financial sector except credit unions saw year-on-year growth in total assets in 2017 Q4 (see Chart III.1). The total assets of the financial sector grew by 15.7% year on year to CZK 8.9 billion, equivalent to 176.2% of GDP. The banking sector, which accounts for almost 80% of the financial sector's assets, recorded the largest growth in total assets in absolute terms as well as a very high rate of growth (of CZK 1,048 billion, or 17.6%). This was due mainly to a rise in non-residents' koruna deposits with domestic banks in 2017 Q1 related to the expected exit from the exchange rate commitment. However, the banking sector's total assets increased at a high rate even when adjusted for exposures to the CNB (by CZK 545 billion, or 13.0%). Investment funds recorded the fastest growth in total assets (of CZK 78 billion, or 19.3%) for the fifth consecutive year. This meant they exceeded the asset size of pension funds, whose assets also rose at a high rate (of CZK 43 billion, or 10.8%). The total assets of credit unions declined significantly year on year (by CZK 11 billion, or 32.5%), due mainly to the conversion of the largest credit union into a bank.

3.2 THE BANKING SECTOR AND CREDIT UNIONS

3.2.1 Capital

Banks' capitalisation increased in 2017…

The total regulatory capital in the domestic banking sector rose by CZK 30.7 billion in 2017, reaching CZK 460.6 billion.[1] The overall capital ratio increased by 0.8 pp to 19% (see Chart III.2) and the Tier 1 capital ratio rose by 0.8 pp to 18.5%. Strong credit growth reducing the capital ratio (-2.9 pp) was offset by a rise in capital from profit[2] (+1.3 pp) and a renewed drop in aggregate risk weights (+2.4 pp). For the domestic banking sector, Tier 1 has long been almost identical to Common Equity Tier 1, i.e. the highest-quality component of capital.

…and its level still allows banks' balance sheets to grow…

The overall capital requirement consists of the minimum level of regulatory capital in Pillar 1 (8%), a requirement based on the supervisory review and evaluation process in Pillar 2 (an average of 1.7% on aggregate) and capital buffers. The capital of most banks sufficiently exceeds the overall capital requirement. The capital surplus of systemically important banks amounts to CZK 55.4 billion (3.2 pp) and that of other banks to CZK 45.8 billion (6.8 pp; see Table III.1). Together with the profitability achieved, it creates good conditions for lending to the real economy.

…although this space may decrease…

Under the conservative assumptions of a constant level of risk weights and the Pillar 2 requirements, and taking into account the already known decisions on the countercyclical buffer rate, the capital surplus would decline from CZK 101.1 billion (4.2 pp) at the end of 2017 to around CZK 92.7 billion (3.4 pp) at the end of 2018 according to banks' plans for future capital and loan amounts[3] (average credit growth of 6.4% a year; see Chart III.2). Systemically important banks would record a drop of CZK 7.6 billion to CZK 47.8 billion (2.4 pp) and other banks the decrease of CZK 0.8 billion to CZK 45 billion (5.9 pp). In this model situation, banks should have sufficient space overall for any increase in the countercyclical buffer (see section 5.2.2) and credit growth, assuming reasonable dividend policies. However, this space would decrease if profitability were to fall.

…and may not be sufficient for some banks in an adverse phase of the financial cycle

The overall impact of the *Adverse Scenario* of the CNB's stress tests (see section 4.1) on the banking sector reveals that the total capital ratio does

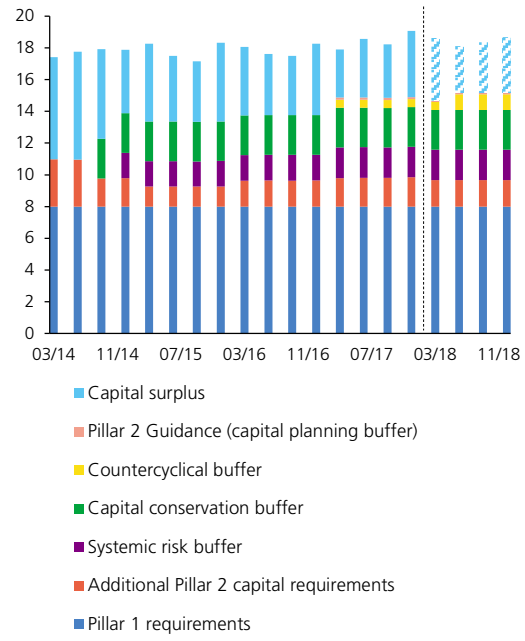
1 The Czech Export Bank and the Czech-Moravian Guarantee and Development Bank are excluded from the analysis of the capital of the banking sector as a whole in the entire section 3.2.1. This is because these banks are wholly owned by the Czech state (providing implicit state guarantees for their liabilities) and have different business models and volatile credit portfolios.

2 After-tax profit amounted to CZK 75.9 billion in 2017, of which CZK 46.4 billion would be paid in dividends if last year's payout ratio was maintained.

3 The data are from the statement "Bank financing plans" (FPSIFE10).

CHART III.2

Structure of the capital ratio in the domestic 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. The capital surplus prediction (patterned fill) assumes constant risk weights. Risky exposures are calculated on the basis of banks' assumptions about future loans, which banks report in the statement "Bank financing plans" (FPSIFE10).

TABLE III.1

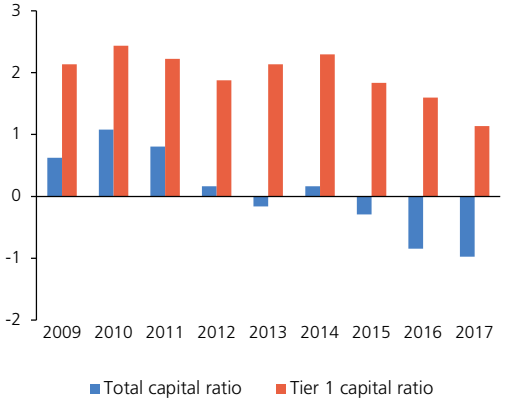
Capital surpluses against various capital requirements and reserves as of the end of 2017
(CZK billions; pp in parenthesis)

	Banks, total (excl. CEB + CMGDB)	Domestic systemically important banks	Other banks (excl.CEB + CMGDB)	CEB + CMGDB
Pillar 1 requirements	268.1	184.6	83.5	8.8
	(11.1)	(10.6)	(12.3)	(29.9)
Pillar 1 + 2 requirements	220.3	154.2	66.1	6.7
	(9.1)	(8.8)	(9.8)	(22.8)
Pillar 1 + 2 + Systemic risk buffer	173.7	107.7	66.1	6.7
	(7.2)	(6.2)	(9.8)	(22.8)
Pillar 1 + 2 requirements + Systemic risk buffer + Capital conservation buffer	101.1	55.4	45.8	5.8
	(4.2)	(3.2)	(6.8)	(19.8)
Number of banks	22	5	17	2

Source: CNB
Note: Institutions that had a systemic risk buffer set as of 1 January 2018 are deemed domestic systemically important banks.

CHART III.3

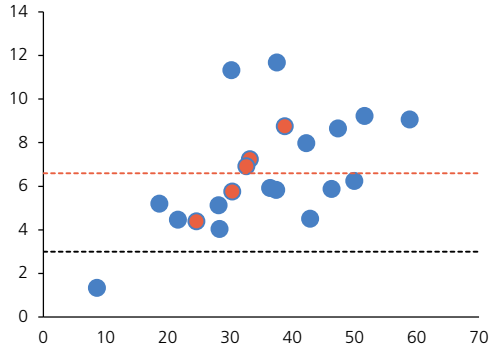
Difference between the capital ratio of domestic banks and the EU average
(pp; average of country ratios for EU)



Source: IMF
Note: Capital data are available only as of 2017 Q3 for BE, RO, and UK and only as of 2016 Q2 for FR and IT. Owing to a different data source, the capital ratios for the domestic banking sector differ slightly from the CNB figures.

CHART III.4

Leverage ratios and risk weights for domestic banks as of the end of 2017
(x-axis: risk weight in %; y-axis: leverage ratio in %)



Source: CNB, EBA
Note: The black horizontal line depicts the minimum leverage ratio of 3%. The red horizontal line depicts the average leverage ratio in the domestic banking sector as of 2017 Q4. Red dots indicate domestic systemically important banks. Implicit risk weights are shown on the x-axis. These are calculated as the weighted value of the exposure divided by the original value of the exposure under the European COREP reporting framework.

not fall below the Pillar 1 and Pillar 2 capital requirements. In individual cases, however, it implies that some banks might not be able to satisfy the requirement in the scenario. A total of 14 banks would fall below its threshold. The CNB takes stress test results into account in the assessment of capital adequacy in the SREP.

The CNB's approach to introducing some capital buffers was historically affected by an international comparison of the capital ratio at the total capital level

The CNB introduced the capital conservation buffer and the systemic risk buffer in full in 2014 (see section 5.2.1) without using the phase-in option. Domestic banks reported sufficient capital surpluses above the Pillar 1 and Pillar 2 capital requirements and the economy moved into a favourable phase of the financial cycle. Given the weaker capital position after the crisis, the macroprudential and supervisory authorities of some EU Member State applied transitional provisions enabling them to phase in these capital buffers.[4] In recent years, the overall capital requirement in the domestic banking sector has increased only in response to the current evolution of systemic risk, particularly its cyclical component (increases in the CCyB rate), and Pillar 2 risks. The use of capital surpluses to cover Pillar 1 capital requirements related to higher lending activity in the Czech Republic then led to only a slight increase in the capital ratio in the Czech Republic compared to other countries. The Tier 1 capital ratio of domestic banks remains moderately above the EU average, while the total capital ratio is below it (see Chart III.3).

The leverage ratio deteriorated slightly

The leverage ratio of the banking sector, defined as the ratio of Tier 1 capital to total exposures, dropped by 0.5 pp year on year to 6.6% in 2017 (see Chart III.6.6). The favourable effect of capital growth (+0.5 pp) was offset by growth in total exposures (-1.0 pp), mostly to the CNB. Except for one institution, whose lower ratio reflects a specific business model, the leverage ratios of all banks are above 3% (see Chart III.4).

All banks are compliant with the limit of 3.75% for the leverage ratio adjusted for exposures to the central bank

The information value of the leverage ratio may have been affected by the banking sector's high exposures to the central bank resulting from the use of monetary policy instruments such as quantitative easing and the exchange rate commitment to pursue the price stability objective. The size of these exposures in some banks in some countries could lead to non-compliance with the minimum leverage ratio requirement. Proposals presented by the Basel Committee (BCBS; the Basel III reform package; see section 5.4.2) at the end of 2017 therefore contain a national discretion allowing banks' reserves at the central bank to be temporarily excluded from the denominator of the leverage ratio calculation and the minimum required leverage ratio to be simultaneously recalibrated

4 Including the buffer for other systemically important institutions (O-SIIs).

upwards under exceptional macroeconomic circumstances.[5] Such discretion is relevant to the Czech Republic given the use of the exchange rate commitment in 2013–2017. The exchange rate commitment policy was reflected – through interventions in the foreign exchange market – in a significant increase in the CNB's international reserves. Their counterpart is sizeable growth in banks' exposures to the CNB, which currently account for almost one-third of banks' assets. In line with the conclusions of the discussion in the BCBS, the CNB temporarily regards a leverage ratio excluding exposures to the CNB from the denominator of the formula for calculating the leverage ratio as a more relevant leverage indicator. At the same time, it temporarily considers as relevant a minimum required leverage ratio of 3.75%. The CNB will regularly assess whether the reasons for this change persist and inform institutions about this in its publications. The leverage ratio excluding exposures to the central bank rose by 0.8 pp year on year to 10.0% (see Chart III.7). In this case, the increase in the leverage ratio was due to a decrease in adjusted total exposures (+0.2 pp) coupled with growth in the sector's capital (+0.6 pp). All banks are well above the 3.75% limit (see Chart III.5).

The aggregate risk weights for exposures under both the IRB and STA approaches fell, due in part to forex interventions before the exit from the CNB's exchange rate commitment

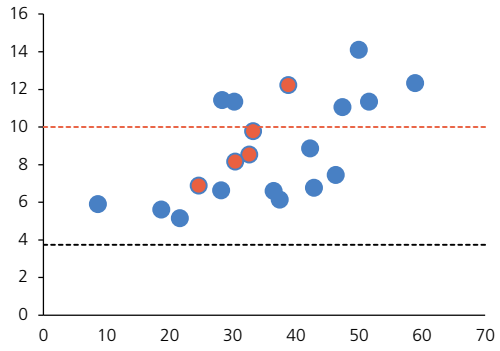
The aggregate risk weights[6] for exposures under the standardised approach to setting risk weights (STA; CZK 2.0 trillion) dropped by 7.9 pp to 29.1% in 2017. The aggregate risk weights of exposures whose risk weights are set using internal models (IRB; CZK 4.8 trillion) fell by 5.4 pp to 29.4% in the same period (see Chart III.6). Roughly one-half of the drop for exposures under the IRB approach and almost the entire fall for exposures under the STA approach was due to a change in the ratios of the individual exposure categories in banks' assets. In both cases, the most significant change in structure was growth in exposures to the CNB, which amounted to almost CZK 1 trillion for the banking sector as a whole in 2017. This growth was due mainly to specific market conditions in the period around the exit from the CNB's exchange rate commitment[7] and subsequently also the increase in the CNB's two-week repo rate. The reasons why risks weights under the STA and IRB approaches cannot be compared directly are discussed in Box 3.1.

The average risk weights for IRB banks fell in all the main exposure categories

A drop in average risk weights was observed across all the major exposure categories. Exposures to institutions fell by 4.3 pp to 16.8%, exposures to central governments and central banks by 1.0 pp to 2.4%,

CHART III.5

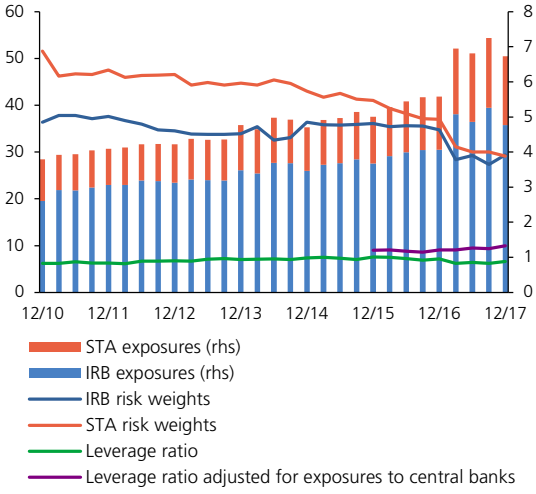
Leverage ratios adjusted for exposures to the CNB and risk weights for domestic banks as of the end of 2017
(x-axis: risk weight in %; y-axis: leverage ratio in %)



Source: CNB
Note: The black horizontal line depicts the minimum leverage ratio of 3%. The red horizontal line depicts the average leverage ratio adjusted for exposures to the CNB in the domestic banking sector as of 2017 Q4. Red dots indicate domestic systemically important banks. Implicit risk weights are shown on the x-axis. These are calculated as the weighted value of the exposure divided by the original value of the exposure under the European COREP reporting framework.

CHART III.6

Aggregate risk weights, the leverage ratio and the size of banks' credit exposures
(%; right-hand scale: CZK trillions)



Source: CNB
Note: Data are not available for the Basel III leverage ratio until the start of 2014. Until 2013 (inclusive), the leverage ratio is proxied by a simplified leverage ratio calculated as Tier 1 capital / total assets. In contrast to the Basel III leverage ratio, the simplified leverage ratio does not take into account off-balance-sheet items.

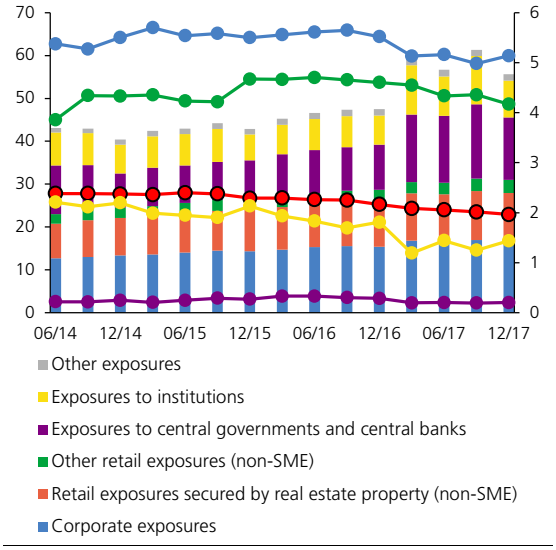
5 For these reasons, the UK excluded selected exposures to the central bank from the calculation of the leverage ratio last year. It simultaneously increased the minimum leverage ratio from 3% to 3.25% to offset this change. See PRA. 2017. Policy Statement 21/17: Consultations by the FPC and PRA on changes to the UK leverage ratio framework relating to the treatment of claims on central banks.

6 The analysis of risk weights uses data on implicit risk weights. These are calculated as the weighted value of the exposure divided by the value of the exposure under the COREP single European reporting framework.

7 Exposures to the CNB rose by CZK 915 billion in 2017 Q1. For comparison, the CNB's international reserves grew by CZK 1,125 billion in the same period.

CHART III.7

Average risk weights and the size of the main categories of exposures under the IRB approach
(%; right-hand scale: CZK trillions)



Source: CNB
Note: The points connected by lines denote the level of the risk weights for individual categories of exposures (left-hand scale). The height 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.

other retail exposures (non-SME)[8] by 5.1 pp to 48.6%, retail exposures secured by real estate property (non-SME)[9] by 2.3 pp to 22.9% and corporate exposures by 4.5 pp to 60.0% (see Chart III.7). Despite continued growth in property prices and house purchase loan volume,[10] their risk weights declined further. Concentration of property market-related loan exposures remains high at 58% of total loans to the private non-financial sector. The fall in the risk weights of IRB banks is linked with the long-running favourable economic situation. This is associated with a low default frequency, as values from the post-crisis period are starting to dominate the input data of banks' internal models.[11] This could lead to a lower capital requirement and increase the banking sector's vulnerability to certain extent if risks were to materialise during an economic downturn.[12] To limit this risk, a minimum risk weight level for mortgage loans has been set in some countries. Box 3.2 presents a short analysis of the potential impacts on capital if this approach was applied in the Czech Republic.

BOX 3.1 DIFFERENCES IN THE CAPITAL INTENSITY OF THE STA AND IRB APPROACHES NOT REFLECTED IN THE LEVEL OF RISK WEIGHTS

The aggregate risks weights calculated implicitly as the ratio of risk-weighted exposures to total exposures show substantial heterogeneity across the sector. They range between 10% and 80% for individual STA banks and 15% and 45% for individual IRB banks. The risk weights calculated in this way are often compared in practice by analysts and by banks themselves. The purpose of the first section of this box is to explain why such a direct comparison is actually impossible and why the risk weight ratio under the STA and IRB approaches may not correspond directly to the ratio of capital intensity to the otherwise identical original gross carrying amount of a credit exposure (original exposure value). The second section proposes an alternative capital intensity indicator aimed at eliminating as many as possible of the differences stemming from the STA and IRB approaches not captured in the risk weight level.

8 This category of exposures consists mainly of consumer credit.
9 This category of exposures consists mainly of mortgage loans.
10 The risks associated with the property market and housing loans are described in detail in sections 2 and 5.3.
11 The IRB approach assumes that banks use through-the-cycle (TTC) parameter values, i.e. take the entire business cycle into account. Regulatory authorities (the Basel Committee and the EBA) responded to the above-mentioned prolongation of the favourable phase of the business cycle. In the future (from 2020), they will require adequate representation of data from a period of economic contraction in the data sets used for calibrating IRB parameters; see https://www.eba.europa.eu/regulation-and-policy/model-validation/guidelines-on-pd-lgd-estimation-and-treatment-of-defaulted-assets.
12 The expected credit losses should in reality be covered primarily by provisions. The sum of the capital requirement and the provisions intended to cover both expected and unexpected credit losses is what matters from the perspective of prudential regulation (see the alternative capital intensity indicator in Box 3.1).

THE PROCESS OF SETTING CAPITAL REQUIREMENTS AND THE ROLE OF RISK WEIGHTS

Aggregate risk weights cannot be compared directly across banks (regardless of the approach applied) due to the different risk profiles and resulting different structures of banks' credit portfolios. Comparison of risk weights at the level of individual credit exposure categories is limited by the different definitions of these categories under the two approaches.[13] In addition to these obstacles, there are other technical differences between the STA and IRB approaches which are not directly captured in the level of risk weights despite affecting the level of capital required for the original exposure value (see Chart III.1 Box).

The process of setting the capital requirement for the original exposure value (under the STA or IRB rules) consists of several steps, only some of which are reflected in the level of risk weights (see Chart III.1 Box, marked with a green arrow). Nonetheless, the other steps in this process also have their own specifics under the STA and IRB approaches. The actual capital intensity relative to the original exposure value derived from the approach used to set risk weights is thus determined not only by the risk weights applied and the corresponding capital requirement (as a percentage of risk-weighted exposures), but also by other adjustments, including those for provisions and reserves, credit risk mitigation techniques (CRMTs) and conversion factors for off-balance sheet exposures.

Under the STA approach, the original exposure value is first reduced by provisions for balance sheet credit exposures and reserves for off-balance credit exposures. Moreover, the part of the total original exposure value in excess of the regulatory LTV limit[14] is subtracted from this value and then transferred to the relevant category of unsecured exposures (see Chart III.1 Box, step 1). The IRB approach applies none of these adjustments.

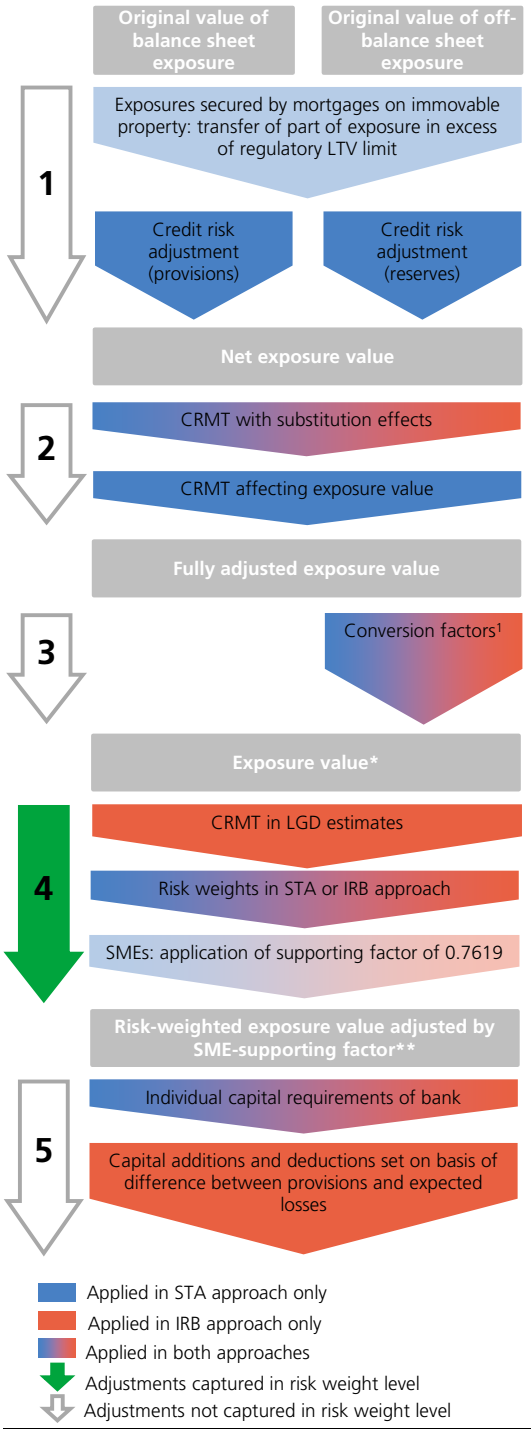
In the next step, the exposure value is adjusted for CRMTs (see Chart III.1 Box, step 2). They are divided into CRMTs with substitution effects, CRMTs affecting the exposure value and CRMTs in LGD estimates. CRMTs with substitution effects are

13 Under the IRB approach, the category of corporate exposures, for example, contains all exposures to firms, while under the STA approach, exposures secured by property are excluded from these exposures and reported in a separate category. Another example is the category of exposures in default, which under the IRB approach are reported together with non-default exposures in the given category, while under the STA approach they are again reported in a separate category.

14 The LTV for exposures secured by residential property is 80% and that for exposures secured by commercial property is 50% or 60%.

CHART III.1 BOX

Diagram of the process of calculating capital requirements for the original exposure value under STA and IRB



Source: CNB

Note: Lighter shades underlying adjustments in steps 1 and 4 of the diagram indicate that those adjustments relate only to a particular category of exposures (exposures secured by mortgages on immovable property and exposures to SMEs respectively).

1) The method for calculating conversion factors differs between the STA and IRB approaches.

applied in both approaches and serve to transfer parts of credit exposures between individual exposure categories so that the final risk corresponds to the correct category.[15] CRMTs affecting the exposure value are applied only in the STA approach and CRMTs in LGD estimates only in the IRB approach.

Conversion factors are then applied to off-balance sheet exposures under both approaches. They should reflect the probability of an off-balance sheet exposure being transferred to the balance sheet (see Chart III.1 Box, step 3). This probability is approximated by fixed regulatory coefficients in the STA and FIRB approaches, whereas in the AIRB approach banks' internal models are used to estimate it.[16]

After the adjustments described above have been made, the exposure value (see Chart III.1 Box, marked *) is assigned either the regulatory risk weight corresponding to the relevant category under the STA approach or a risk weight based on PD estimates and LGD estimates or regulatory levels,[17] entered in the regulatory formula derived from the ASRF model,[18] under the IRB approach. In addition, a supporting factor of 0.7619 is applied to exposures to small and medium-sized enterprises (SMEs; see Chart III.1 Box, step 4). The size of the risk weights thus captures only this part of the process of setting the capital requirement for the credit exposure.

The resulting absolute capital requirement for the credit exposure is set by applying the bank's relevant percentage capital requirement to the risk-weighted value of the exposure after adjustment by the SME-supporting factor. Under the IRB approach, the total amount of provisions is additionally compared with the total expected credit loss. If the resulting difference between the provisions and the expected credit loss is positive, it is added to the bank's Tier 2 capital up to 0.6% of the bank's risk-weighted exposures. If the difference is negative, it is deducted from the bank's CET 1 capital (see Chart III.1 Box, step 5).[19]

15 If part of an exposure is secured by, for example, a personal guarantee, the bank can apply the risk weight corresponding to the guarantor under the STA approach or the risk parameters corresponding to the guarantor under the IRB approach to this part of the exposure.
16 The AIRB and FIRB approaches differ mainly in the estimation of LGD and conversion factors. Under the FIRB approach, regulatory LGD levels and conversion factors are used (for banks that do not have credible estimates of their own). Under the AIRB approach, LGD parameters and partially also conversion factors are estimated using internal models.
17 LGD captures the relevant CRMTs.
18 Asymptotic Single Risk Factor model – see Gordy, M. B. (2003): *A Risk-Factor Model Foundation for Ratings-based Bank Capital Rules*, Journal of Financial Intermediation 12(3), pp. 199–232.
19 In the case of the STA approach, part of the provisions created (general credit risk adjustments) up to 1.25% of the bank's risk-weighted exposures can be included in Tier 2

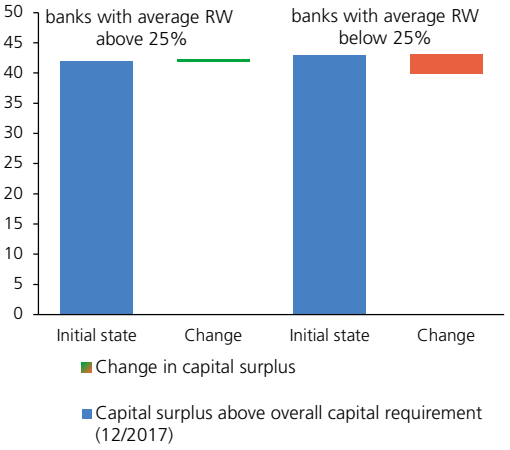
The described adjustments not captured in the level of risk weights can lead to a different ratio of required capital to the original exposure value than that indicated by the risk weights. The ratio of risk weights under the STA approach and under the IRB approach may thus not correspond to the capital intensity ratios of the two approaches.

AN ALTERNATIVE INDICATOR ALLOWS FOR BETTER COMPARISON OF THE CAPITAL INTENSITY OF THE STA AND IRB APPROACHES FOR EXPOSURES SECURED BY REAL ESTATE PROPERTY.

The purpose of the indicator presented below is to eliminate as many as possible of the differences described above for the STA category of "exposures secured by mortgages on immovable residential property" and the IRB category of "retail exposures secured by real estate property (non-SME)". Only non-default exposures, i.e. exposures whose potential default risk has not materialised yet, were chosen for the purposes of comparison. For the categories to be comparable, the STA exposures first had to be adjusted for non-retail exposures and then for retail exposures to SMEs. The IRB exposures had to be adjusted for exposures in default. An Alternative Capital Intensity Indicator (ACII) was then designed along the lines of Arroyo et al., 2012.[20] Its aim is to provide a more accurate comparison of the ratio of required capital to the credit exposure between the STA and IRB approaches. Changes arising from CRMTs with substitution effects were also removed from the exposure value (see Chart III.1 Box, marked *) in both approaches. In the case of the STA approach, changes arising from CRMTs affecting the exposure value were removed from the exposure value. Provisions and reserves (adjusted for conversion factors) were added back to the exposure value. The *comparable exposure value (CEV)* calculated in this way was compared with the sum of the risk-weighted exposure value (*RWEV*, see Chart III.1 Box, marked **) and the relevant provisions created for non-default exposures (*P*) multiplied by the coefficient 1/ percentage capital requirement of bank (*PCRB*). This coefficient expresses the amount by which the impact of provisioning on capital exceeds the impact of the risk-weighted value of the exposure for each bank. The ACII[21] is thus defined for each bank as:

CHART III.4 BOX

The impact of setting risk weights for mortgages at 25% on banks' capital surplus
(CZK billions)



Source: CNB
Note: RW = risk weight.

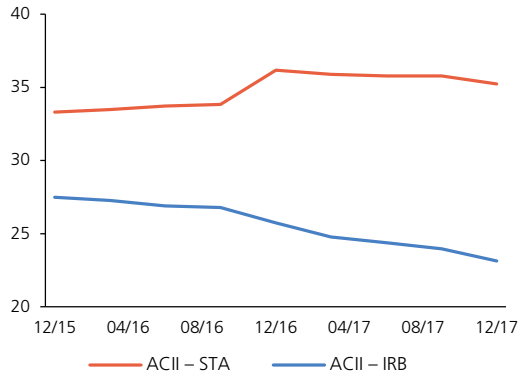
capital. However, these general adjustments for credit risk were practically abolished by an EBA opinion upon the introduction of the new IFRS 9 accounting standard on 1 January 2018 – see https://www.eba.europa.eu/-/eba-publishes-opinion-on-transitional-arrangements-and-credit-risk-adjustments-due-to-the-introduction-of-ifrs-9 .

20 Arroyo J., Colomer I., García-Baena R. and González-Mosquera L. (2012): *Comparing Risk-weighted Assets: The Importance of Supervisory Validation Processes*, Estabilidad Financiera 22, pp. 9–29.

21 Even the proposed ACII does not erase all the difference between the STA and IRB approach not captured in the risk weight level. The differences stemming from the

CHART III.2 BOX

Aggregate ACII under the STA and IRB approaches for the category of retail exposures secured by immovable property (non-SME)
(%)



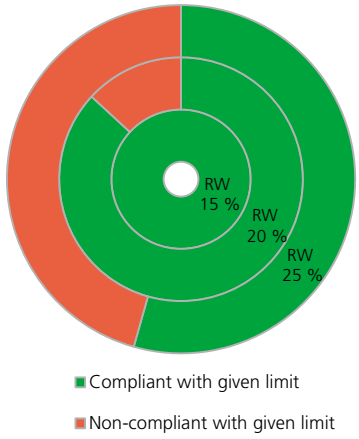
Source: CNB
Note: ACII = Alternative Capital Intensity Indicator.

$$ACII = \frac{RWEV + P \times \left(\frac{1}{PCRB}\right)}{CEV}$$

The comparison of the time series of the aggregate ACII for the category of exposures defined above in the STA and IRB approaches reveals that under the IRB approach, capital intensity (like risk weights themselves) has long been decreasing, whereas under the STA approach it has been stable at a significantly higher level (see Chart III.2 Box). The difference between the two approaches is thus increasing in the long term.[22] In reality, the ratio of capital intensity between the two approaches is even less favourable for the STA approach, because under the STA approach the part of the exposure in excess of the regulatory LTV limit is assigned risks weights corresponding to an unsecured loan (75% in the case of retail exposures).[23] These factors could play a role in the setting of the output floor, i.e. the lower limit for risk weights under the IRB approach, which has been extensively discussed in the Basel Committee in previous years (see Box 5.3 in section 5.4.2).

CHART III.3 BOX

Compliance with alternative minimum risk weights for mortgages as of 31 December 2017
(market share)



Source: CNB
Note: RW = risk weight. The chart shows the market shares of banks that were compliant with the given minimum risk weight at the end of 2017 and of banks for which the given limit would become a constraint.

BOX 3.2: ANALYSIS OF THE IMPACT OF SETTING REGULATORY RISK WEIGHTS FOR MORTGAGES

The purpose of this analysis is to estimate the impact that setting minimum risk weights for mortgages at 25%[24] would have on the capital surpluses of IRB banks. Under the current rules for the STA approach, and from the perspective of mortgages only, this level would be roughly in line with the proposed lower limit for risk weights under the IRB approach, i.e. the "output floor" contained in the Basel III reform package presented at the end of 2017.[25] The Basel III reforms propose to set this lower limit for total risk-

exclusion of the part of the exposure in excess of the regulatory LTV limit under the STA approach from the category of exposures secured by mortgages on immovable property, the different approach to conversion factors, and the regulatory capital additions and deductions stemming from the different treatment of provisions in the two approaches also remain in the ACII. These differences could not be eliminated using the available data.

22 On the other hand, the IRB approach implies higher regulatory requirements for risk management and reporting.

23 The estimated share of existing loans secured by residential and commercial property with an LTV above 80% and 50% respectively is very low under the STA approach. This indicates that the error caused by omitting this specific feature of the STA approach from the ACII calculation is negligible.

24 Article 458 of CRR allows its use as a temporary macroprudential measure under certain conditions.

25 See section 5.4.2 for more details about the Basel III reform.

weighted exposures (minimum risk weights) for exposures under the IRB approach at 72.5% of the limit set for the STA approach.[26] Among the EU countries, limits on the risk weight for mortgages were set in Sweden in 2014 (25%)[27] and in Finland in 2017 (15%).[28]

Of the seven banks using the IRB approach to determine risk weights for mortgages, a limit of 25% would be a constraint for four institutions, whose share of the mortgage market exceeds 45% (see Chart III.3 Box). Alternative minimum risk weights were examined in a sensitivity analysis. A limit of 15% would not be a constraint for any bank and a limit of 20% would be a constraint for two with a combined market share of less than 15%.

The analysis of the impact of setting regulatory risk weights for mortgages at 25% assumes that even the internal models of IRB banks whose risk weights are currently above 25% could lead to lower risk weights in a continued favourable economic situation. Hence, even risk weights of these banks can reach the considered level. The impact of such regulatory risk weights on the capital of the domestic banking sector would be limited (see Chart III.4 Box). At the aggregate level, the capital surplus of the banking sector would drop by CZK 2.9 billion (i.e. 0.6% of the banking sector's total capital) due to higher capital requirements.[29] The capital surpluses held by banks at the end of 2017 in excess of their overall capital requirements would be sufficient to cover this change.

3.2.2 Credit Risk

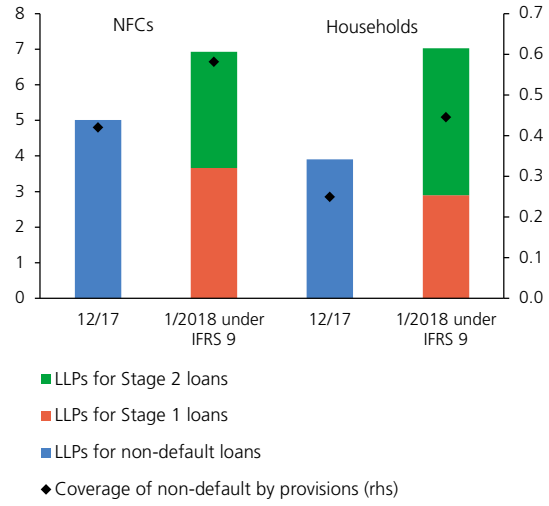
The NPL ratio has dropped further and the NPL structure has improved since the end of 2016

The ratio of non-performing loans (NPLs) to total loans went down by another 0.6 pp in 2017, reaching 3.1% in December (see Chart III.8).[30] The NPL ratio thus again neared the historical low recorded in 2007

26 The Basel III reform package also presents a proposal for changes in the determination of risk weights under the STA approach. According to this proposal, which is described in more detail in Box 5.3, the new risk weights for mortgage loans under the STA approach will be set depending mainly on an LTV.
27 The original Swedish measure was a Pillar 2 instrument: http://www.fi.se/en/published/news/2014/capital-requirements-for-swedish-banks/. With effect from 31 December 2018, the original measure will be replaced by a new one applying Article 458 of CRR: https://www.fi.se/contentassets/11fa1b82c138409b8a0d6c66e954b17c/remisspromemoria-artikel458-hela-eng2.pdf.
28 http://www.esrb.europa.eu/pub/pdf/other/esrb.notification_other170627_Finland.en.pdf.
29 If the risk weights for banks exceeding this limit did not decrease to 25% and only the risks weights of the four banks not compliant with this limit increased, the aggregate impact on the sector's capital requirement would be CZK 3.2 billion.
30 The figure includes both resident and non-resident loans. The Czech Export Bank and the Czech-Moravian Guarantee and Development Bank are excluded from the analysis of credit risk in the entire section 3.2.2.

CHART III.6 BOX

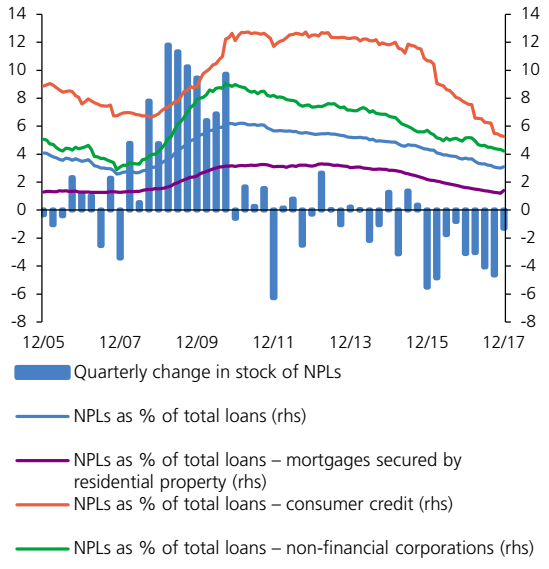
Changes in provisions and coverage of non-default loans
(CZK billions; right-hand scale: %)



Source: CNB
Note: LLPs = loan loss provisions. Aggregate data for the domestic banking sector. The changes may have been partly due to changes in banks' loan portfolios unrelated to IFRS 9.

CHART III.8

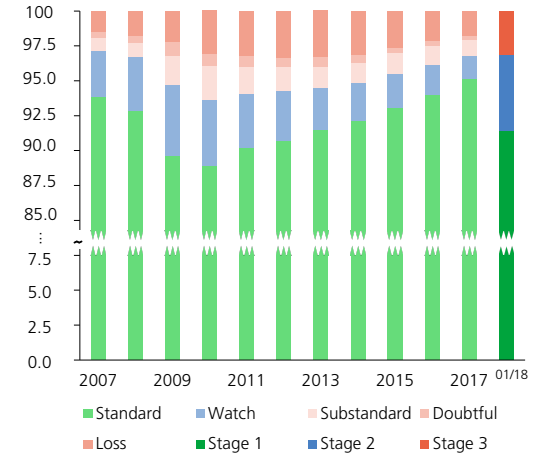
Client NPLs in the domestic banking sector
(CZK billions; right-hand scale: %)



Source: CNB

CHART III.9

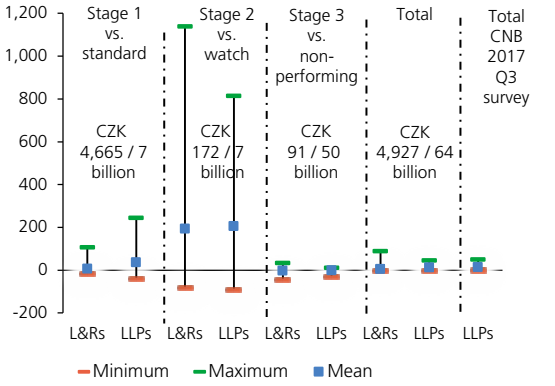
Loan structure by categorisation
(%)



Source: CNB
Note: Standard loans are bank receivables in respect of which there is no doubt that they will be repaid (loans usually no more than 30 days past due). Watch loans are bank receivables in respect of which repayment is highly probable (loans usually 30–90 days past due). Substandard loans are receivables in respect of which repayment in full is uncertain (loans usually 91–180 days past due). Doubtful loans are receivables in respect of which repayment is very improbable (loans usually 181–360 days past due). Loss loans are receivables with the highest risk rate, in respect of which repayment is practically impossible (loans usually more than 360 days past due). The Stage 1, Stage 2 and Stage 3 categories correspond to the IFRS 9 exposure classification.

CHART III.5 BOX

Changes in loan exposure classification and the corresponding provisions due to the introduction of IFRS 9
(%)



Source: CNB
Note: L&Rs = loans and receivables; LLPs = loan loss provisions. Changes between 12/2017 and 1/2018 under IFRS 9. Excluding branches of foreign banks. Figures in text fields express the aggregate L&P and LLP volumes of domestic banks in each category as of 1/2018. The changes may have been partly due to changes in banks' loan portfolios unrelated to IFRS 9. Outliers stemming from the fact that some banks had no/almost no LLPs under IAS 39 for their standard and/or watch loan portfolios as of 12/2017 are excluded from the results.

(2.6%). The decrease in the NPL ratio was achieved through a combination of growth in total loans (30%) and a decline in NPLs, which was the more significant factor (70%). Turning to the sectoral breakdown, the NPL ratio dropped by 0.9 pp to 4.2% for non-financial corporations, by 2.4 pp to 5.3% for consumer credit and by 0.2 pp to 1.4% for mortgage loans. The NPL ratio of non-resident loans increased by 0.6 pp to 6.2%. The NPL structure also improved, as the NPL ratio[31] in the highest-risk "loss" category dropped slightly in favour of loans in the two lower-risk categories (see Chart III.9).

IFRS 9 introduces new terms in classifying loans by credit risk

Under the new IFRS 9 accounting standard, loans were classified into three categories by credit risk stage as from 1 January 2018: Stage 1 – no significant increase, Stage 2 – significant increase and Stage 3 – credit impairment. As of January 2018, 91.4% of loans were classified as Stage 1, 5.5% as Stage 2 and 3.1% as Stage 3.[32] The proportion of Stage 3 loans thus roughly corresponds to the NPL category used earlier (see Chart III.9, red shades).

BOX 3.3: THE ONE-OFF EFFECT OF THE INTRODUCTION OF IFRS 9 ON PROVISIONING

IFRS 9 is a new international accounting standard, effective from 1 January 2018, governing the recognition, derecognition, classification and valuation of financial assets and hedge accounting. Compared to the previously used IAS 39 accounting standard, it introduces significant changes in the area of impairment of financial assets and loan loss provisions. Its introduction meant a shift from the concept of incurred losses to the concept of expected losses. This should prevent a recurrence of the situation recorded during the financial crisis where credit losses were reported too little, too late. The new concept of expected credit losses divides financial assets into three stages according to the level of credit risk. To classify a financial asset to one of these stages, banks should evaluate all relevant indicators. Assets whose credit risk has recorded no significant increase since their initial recognition should be assigned to Stage 1, assets whose risk has increased significantly should be categorised in Stage 2, and credit-impaired assets should be classed in Stage 3.

The introduction of the expected loss concept was associated with expectations of a one-off increase in provisions (for more details see FSR 2016/2017, section 5.4.2). In September 2017, the CNB conducted a survey of the impacts of the introduction of IFRS 9, in which all domestic banks (except foreign bank branches)

31 NPLs comprise substandard, doubtful and loss loans.
32 See Box 3.3 for more information about the IFRS 9 standard and the links between the previous loan classification and the new one.

participated. According to the survey results, institutions were expecting to assign default exposures to Stage 3, to use a range of indicators (most often the transfer of an exposure to the "watch" category – more than 30 days past due) to assign exposures to Stage 2 and to class their remaining exposures in Stage 1. The respondents also reckoned that the introduction of IFRS 9 would have an impact on total provisions of between -0.6% and +49.6%, or 13.7% on average. This was due mainly to expectations that they would have to create additional provisions for loans newly classified in Stage 2.

The data actually reported for January 2018 confirmed the survey results. Since the introduction of IFRS 9, the provisions of domestic banks had changed by between -3.0% and 45.0%, or 12.9% (CZK 0.3 billion) on average (see Chart III.5). The data also reveal that provisions for loans newly classified in Stage 3 had changed only marginally compared to provisions for NPLs as of the end of 2017. As expected, the main reason for the changes is additional provisioning for non-default loans, specifically loans in Stage 2. These loans are also the most heterogeneous across institutions in terms of both the size of the change in the loan amount now included in this stage compared to the initial category of watch loans and the size of the change in the corresponding provisions (see Chart III.5 Box).

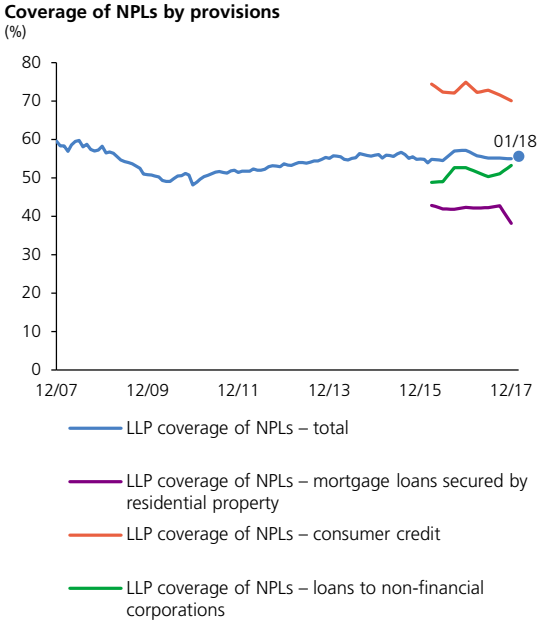
There are also slight differences in the changes in provisions across exposure types due to IFRS 9. At the level of the domestic banking sector, provisions for non-default loans increased by 38% to CZK 6.9 billion in the case of exposures to non-financial corporations and by 79% to CZK 7.0 billion in the case of exposures to households. The coverage of non-default loans by provisions thus increased from 0.42% to 0.58% in the case of exposures to non-financial corporations and from 0.25% to 0.45% in the case of exposures to households (see Chart III.6 Box). While provisions for non-default loans in Stage 1 slightly predominate among exposures to non-financial corporations (53% of total provisions for non-default loans), provisions for non-default loans in Stage 2 are dominant in the case of households (59% of total provisions for non-default loans). This might be due to the generally longer maturity of exposures to households. In the case of Stage 2, where credit losses are recognised to maturity, this implies higher provisions.

NPL coverage by provisions seems sufficient

The overall coverage of NPLs by provisions stood at 55.0% in December 2017, down by 2.2 pp from the end of 2016. (See Chart III.10). The ratio of provisions to total loans fell by 0.5 pp to 2.0% in the same period (see Chart III.11). A sectoral analysis revealed that the average NPL coverage ratio was 53.3% for loans to non-financial corporations, 38.1% for mortgage loans and 70.0% for consumer credit as of 31 December 2017. In all cases, the ratio seems sufficient for the current NPL loss

CHART III.10

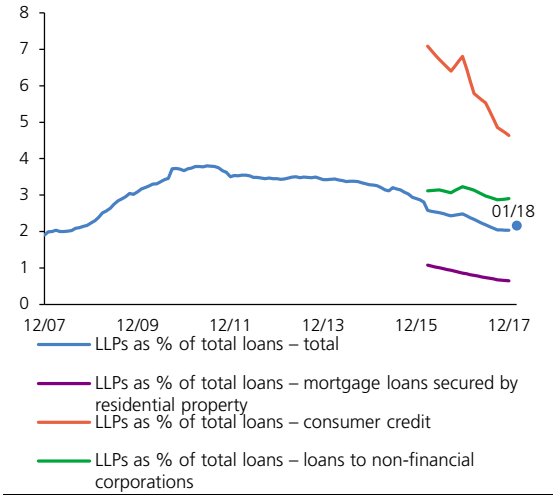
Coverage of NPLs by provisions



Source: CNB
Note: LLP = loan loss provision. Data for the sectoral breakdown of the coverage of NPLs by provisions are available only from 2016 Q1.

CHART III.11

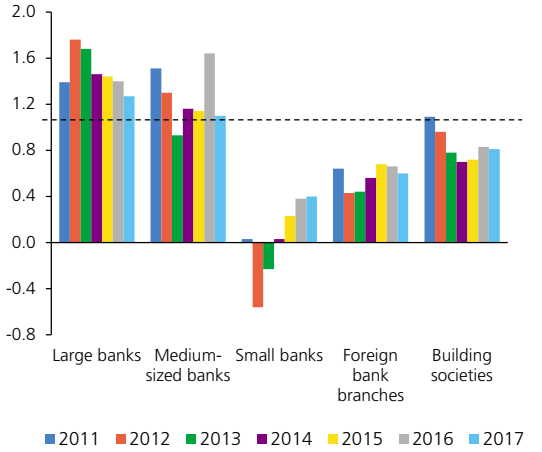
Ratio of provisions to total client loans
(%)



Source: CNB
Note: LLPs = loan loss provisions. Data for the sectoral breakdown of the ratio of LLPs to gross loans are available only from 2016 Q1.

CHART III.12

Return on assets (RoA)
(%)



Source: CNB
Note: The classification of banks by asset size is according to the CNB methodology valid since 2016. The horizontal line depicts the RoA value for the banking sector as a whole for the end of 2017.

rate,[33] which is 25.9% for loans to non-financial corporations, 21.4% for mortgage loans and 54.0% for consumer credit. If the *Adverse Scenario* of the macroprudential stress tests – where the loss given default (see section 4.1) reaches 58% for non-financial corporations, 55% for mortgages and 67% for consumer credit – were to materialise, the coverage ratio would only be sufficient for consumer credit.

The introduction of IFRS 9 led to moderate growth in coverage at the end of January 2018

NPL coverage by provisions increased by 0.6 pp to 55.6% and the ratio of provisions to total loans rose by 0.2 pp to 2.2% in January 2018 following the switch to the new IFRS 9 accounting standard.[34] The absolute growth in provisions in the sector was CZK 5.2 billion. This relatively low growth could indicate that at certain stages of the financial and business cycle IFRS 9 may not lead to significantly higher provisioning compared to the previously used approaches. Some of the expectations regarding the countercyclical effect of IFRS 9 (timely and sufficient provisioning) may thus not fully materialise in time. On the contrary, some studies[35] point to a potential risk of IFRS 9 being procyclical. The main aspect of this risk consists in potential restriction of lending activity by banks connected with the need to create large amounts of provisions after they receive unexpected information indicating a weakening of the aggregate economic conditions (the "cliff effect"). This would result in an even greater deterioration of the economic situation. The above thus increases the importance of timely application of the countercyclical buffer to make the banking sector resilient to adverse economic developments well before the expected loss models used under IFRS 9 lead to higher provisioning.

3.2.3 Profitability

The profitability of the banking sector remains high…

The banking sector turned in a profit of CZK 75.9 billion at the end of 2017, a rise of 2.7% on a year earlier. Return on assets fell by 0.2 pp to 1.1% but rose further when adjusted for the significant increase in exposures to the CNB. Large differences persist across the groups of banks (see Chart III.12). Large banks have long been showing the highest return on assets.

33 The NPL loss rate is calculated from the results of a recovery rate survey conducted among the nine systemically most important banks and building societies in March 2017. In this survey, banks state their actual and expected NPL recovery rates broken down into several categories of loans to corporations and households. For the purposes of the sectoral analysis of NPL coverage by provisions, the NPL loss level is calculated as (1 - the recovery rate).

34 Box 3.3 presents a more detailed analysis of the effect of the switch to IFRS 9 on selected categories of exposures. Section 4.1 describes the effect of IFRS 9 in the event of adverse economic developments.

35 For example, ESRB (2017): Financial stability implications of IFRS 9, European Systemic Risk Board, July 2017, available at https://www.esrb.europa.eu/news/pr/date/2017/html/esrb.pr170717.en.html.

… main component has long been interest profit, which is starting to grow…

Interest profit remains the main source of profitability (see Chart III.13). Interest income recorded year-on-year growth (of 2.8%) after a two-year fall. It was favourably affected by client loans, which rose by 5.7% year on year. Growth in interest costs (of 5.2%), due mainly to growth in client deposits (of 9.2%), had the opposite effect. Interest profit went up by 2.0% year on year (see Chart III.14). Profit from fees and commissions fell for the sixth consecutive year in year-on-year terms, reflecting persisting competitive pressure in the domestic banking market. Profit from foreign currency operations (year-on-year growth of 44.6%), where business opportunities in the area of hedging against non-financial corporations' currency risk of opening up for banks after the exit from the exchange rate commitment, may be a longer-term contributor to growth in profitability (the hatched area in Chart III.13, profit from financial revaluation, see Box 3.4 for details).

due in part to a rising interest margin on new loans

The margin on new loans rose by 0.08 pp to 3.1 pp at the end of 2017, interrupting an eight-year downward trend (see Chart III.15). In 2017, only new consumer credit recorded a drop in interest margins – of 1.36 pp year on year. Margins on new mortgage loans rose by 0.24 pp year on year and margins on new loans to non-financial corporations by 0.33 pp. Any further increase in monetary policy rates may foster growth in interest margins. Given the ample liquidity in the banking system, the reaction of the growth in margins will be conditional mainly on how the growth in monetary policy rates is reflected in client deposit and loan rates. The growth in monetary policy rates is also increasing interest income on exposures to the central bank. They may make up at least partly for the still low interest income on government bond holdings (see Chart III.16).

BOX 3.4: PROFIT FROM FOREIGN CURRENCY OPERATIONS (FX PROFIT) OF BANKS

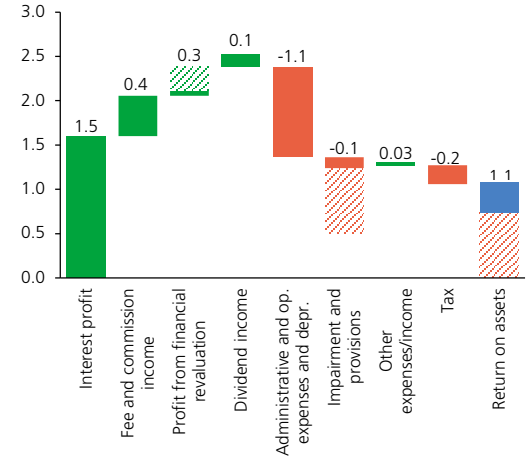
The share of FX profit in total profit from financial and operating activities before tax was usually between 5% and 7% in 2007–2016 (see Chart III.7 Box). FX profit thus accounted for a relatively stable proportion of the total pre-tax profit of most banks, the only exceptions being a few medium-sized and small banks. Given the low exchange rate risk[36] and low FX profit volatility when the exchange rate commitment was in place (see Chart III.8 Box), it can be assumed that most of it came from client operations (profit from different buying and selling prices) and only a minority came from trades on banks' own accounts.

36 As signalled by the relatively low capital requirement for exchange rate risk of CZK 0.5 billion as of 31 December 2017.

CHART III.13

Decomposition of return on assets

(%)



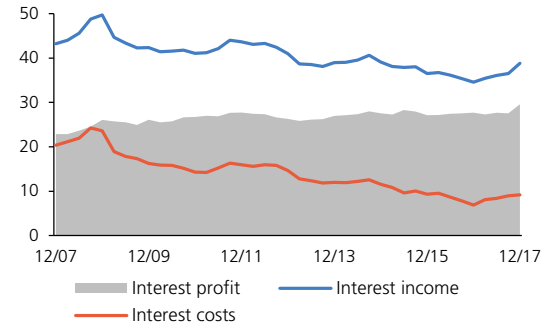
Source: CNB

Note: The given value represents the ratio of the given type of income/expense to the level of assets. The red hatching represents the level of impairment as of 2009 Q4 (the highest impairment level in the period under review) and its potential impact on return on assets in 2017 Q4. The green hatching denotes the ratio of foreign currency operations to total assets.

CHART III.14

Decomposition of interest profit

(quarterly contributions in CZK billions)

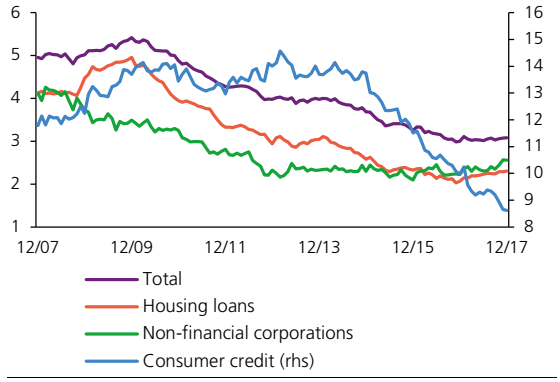


Source: CNB

CHART III.15

Czech banks' interest margins on new loans

(pp)

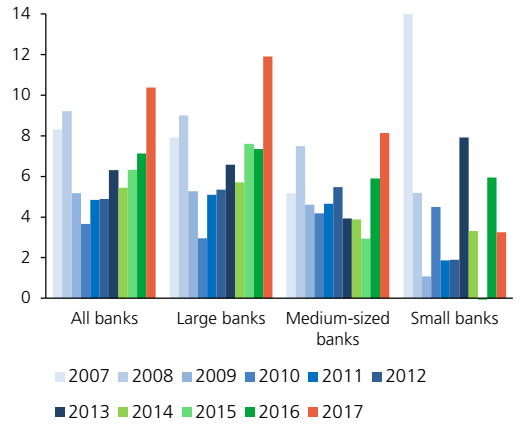


Source: ARAD, CNB calculation

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

CHART III.7 BOX

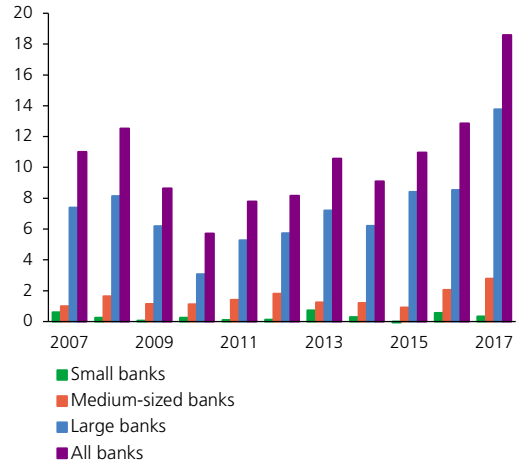
Share of FX profit in profit from financial and operating activities
(%)



Source: CNB
Note: Blue colour captures the development before the exchange rate commitment, green colour during that period and red after the exchange rate commitment.

CHART III.8 BOX

Cumulative FX profit for the given year
(CZK billions)



Source: CNB

THE SHARE OF FX PROFIT INCREASED IN CONNECTION WITH THE EXIT FROM THE EXCHANGE RATE COMMITMENT

FX profit has been above the historical average of recent years since the start of 2017. This trend continued for the rest of the year after the exit from the exchange rate commitment (see Chart III.7 Box). The highest month-on-month growth was recorded in April, when some large banks posted monthly FX profits three to five times above the monthly average for the period of the exchange rate commitment (2014–2016).[37] In the months that followed, the levels returned to the averages observed in 2017 Q1. Nevertheless, they remained above the average recorded during the exchange rate commitment. The continuation of this trend for the rest of the year meant that the sector's pre-tax FX profit went up by CZK 5.7 billion year on year to CZK 18.6 billion and the share of FX profit in total pre-tax profit rose by 3.3 pp to 10.4 pp. FX profit thus contributed significantly to the improvement in the banking sector's profitability, as stated in section 3.2.3. Large and medium-sized banks recorded a positive FX profit trend (year-on-year growth of 61% and 35% respectively), whereas small banks saw their FX profit fall 43% year on year.

A FREE EXCHANGE RATE REGIME NATURALLY CREATES OPPORTUNITIES, BUT ALSO INCREASES THE RISKS TO BANKS' PROFITABILITY AND CAPITALISATION

For both the banking sector and non-financial corporations, the exit from the exchange rate commitment means a return to the earlier risk levels associated with greater exchange rate volatility. It simultaneously increases the importance of FX operations for banks' profitability. This raises questions about the quality of banks' exchange rate risk management and the sustainability of the higher FX profits. The available data on capital requirements for exchange rate risk (a proxy for the size of the risk) on an aggregate basis are comparable with historical ones. They did not fundamentally change when the exchange rate commitment was activated, when it was in place or after it ended. This means that the exchange rate commitment and the exit from it have not yet led to any major change in banks' perceptions and acceptance of the size of exchange rate risk. The higher profits are in line with the increased activity on financial markets. Given the large koruna positions built by foreign capital during the exchange rate commitment, banks' FX profits can be expected to remain at the elevated levels observed in 2017 in the near future.

37 The exchange rate commitment was discontinued on 6 April 2017.

A change in the phase of the business and financial cycle poses a risk…

Banks' profitability is also being favourably affected by a continued decline in impairment losses (see Chart III.18), which is linked with the phase of the business cycle and the falling share of NPLs (see Chart III.8) and provisions (see Chart III.17). Asset impairment losses are thus currently at very low levels (see Chart III.18), which may not correspond to the real long-term risks. A turn in the business and financial cycle would lead to growth in asset impairment losses, although not necessarily on the same scale as in 2008. The CNB is responding to the risks associated with the upward phase of the business and financial cycle by gradually raising the countercyclical capital buffer rate (see section 5.2.2 for details).

…which would lead to growth in impairment losses and a drop in profitability

Impairment losses represented just 0.1% of the banking sector's assets at the end of 2017.[38] In the same period of 2009, this item had stood at 0.7% of assets. If the ratio of impairment losses to assets was the same as in 2009 Q4, return on assets would drop from the current 1.1% to 0.3% (see Chart III.13). The evolution of impairment losses over the cycle will also be affected by the new IFRS 9 accounting standard. As expected, its introduction led to a one-off increase in provisions (see Box 3.3 for more details). However, the current level of credit risk and the results of the incorporation of IFRS 9 into the bank solvency macro-stress tests (see section 4.1 for more details) indicate that provisions can be expected to grow much faster than in the previous accounting frameworks in the event of adverse economic developments. This "cliff effect" (see section 3.2.2) is thus a new factor to be considered when setting the countercyclical buffer rate (see section 5.2.2).

3.2.4 Liquidity

The liquidity position of banks has improved further

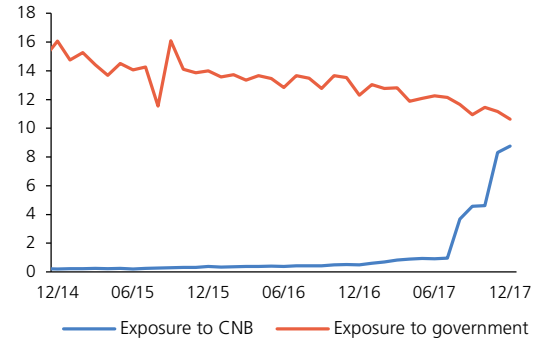
The ratio of quick assets to total assets rose by 7.2 pp year on year to 41.6% at the end of 2017 (see Chart III.19), due mainly to growth in exposures to the CNB. Domestic banks deposited non-residents' koruna deposits at the CNB and exposures to the central bank thus increased substantially. This situation may last for some time. A shift away from government bonds due to their negative yields last year and growth in exposures to the central banks has significantly changed the structure of the banking sector's quick assets. The share of government bonds in quick assets was 33% at the end of 2016 but had dropped to just 19% a year later. By contrast, the share of exposures to the CNB in quick assets grew from 62% to 81% in the same period. The ratio of client deposits to loans went up by 7.4 pp year on year to 135.1% (see Chart III.16). The good liquidity position is also illustrated by the liquidity coverage ratio

38 After adjustment of total assets for exposures to the CNB, the ratio of impairment losses to assets is 0.2%.

CHART III.16

Share of interest income on exposures to the government and the CNB in total interest income

(%)

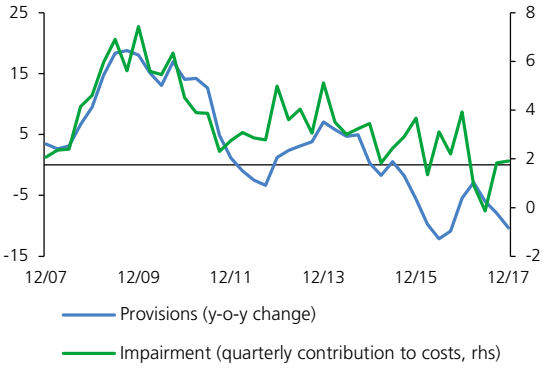


Source: CNB

CHART III.17

Provisions and impairment losses

(CZK billions)

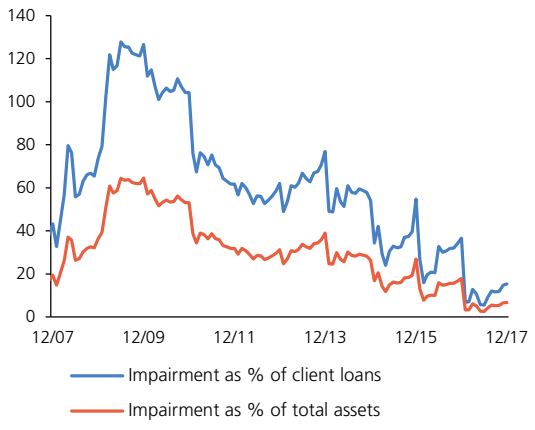


Source: CNB
Note: The data are adjusted for the Czech Export Bank (CEB) and the Czech-Moravian Guarantee and Development Bank (CMGDB).

CHART III.18

Asset impairment losses

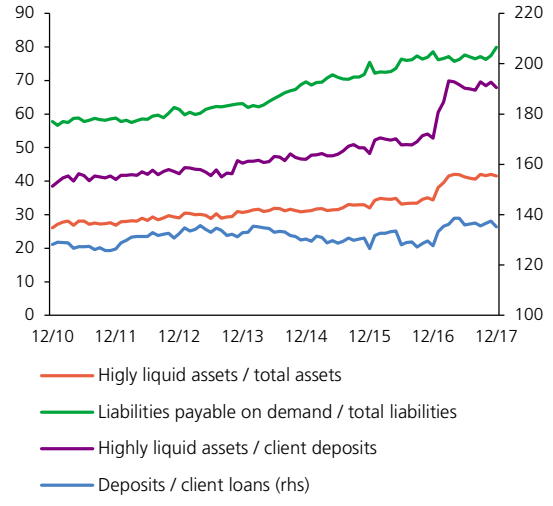
(bp)



Source: CNB

CHART III.19

Liquidity indicators in the banking sector
(%)



Source: CNB
Note: Highly liquid assets comprise cash, claims payable on demand (including bank deposits) and government bonds.

TABLE III.2

Selected indicators of credit unions compared to banks
(%)

	2016 Q4			2017 Q4	
	Credit Unions		Banks	Credit Unions	Banks
	incl. CREDITAS	excl. CREDITAS			
Assets (CZK billions)	34.2	22.4	5,960.2	23.1	7,009.6
Client NPL ratio	24.2	30.4	4.9	25.3	4.0
Highly liquid assets/total assets	14.9	14.3	25.3	16.9	30.3
Coverage of NPLs by provisions	19.5	14.7	49.1	12.8	49.1
Tier 1 capital ratio	16.6	17.5	17.9	18.7	18.7
RoE	-0.8	-0.4	17.3	-0.4	16.6

Source: CNB
Note: The accounting period is not unified across the credit union segment, so the relevant data were annualised for some institutions. Any inconsistency with figures in other parts of this section is linked with different approaches to the inclusion of the figures for CEB and CMGDB.

(LCR). The LCR fell by 6.5 pp year on year to 182.8% at the end of 2017, but remains well above the regulatory requirement of 100% (see section 4.2 for details).

3.2.5 Credit Unions

Conditions in the credit union segment have stabilised and its importance continues to wane

Total assets dropped significantly, by about one-third, to CZK 23.1 billion at the end of 2017 (see Table III.2.2). This was due to the conversion of the largest credit union CREDITAS into a bank. The assets of the remaining credit unions increased modestly year on year (by CZK 0.7 billion). The NPL ratio declined by 5.1 pp, while the ratio of liquid assets to total assets and Tier 1 capital adequacy both increased (by 2.6 pp and 1.2 pp respectively). NPL coverage by provisions decreased (by 1.9 pp). As in 2016, the credit union segment recorded a loss. Return on assets (RoA) was flat year on year at -0.4%. Despite some improvement, the credit union segment lags behind banks in all the indicators monitored. The segment will undergo further changes due to the entry into effect of Act No. 333/2014 Coll., which limits a credit union's assets to CZK 5 billion, among other things. The largest institution, accounting for around 44% (CZK 10.2 billion) of the segment's total assets, will have to convert into a bank or reduce its assets below CZK 5 billion. This, however, further reduces the importance of the segment, which in its current form cannot be a source of systemic risk.

3.3 THE NON-BANK FINANCIAL SECTOR

The importance of non-bank investment products is growing…

Interest in both domestic and foreign non-bank financial products increased in 2017. The importance of non-bank segments of the domestic financial sector grew as a result (see Chart III.1). The total value of households' investment fund units exceeded CZK 400 billion. Investment fund units thus became the third most important category of financial assets in Czech households' balance sheets behind bank deposits and directly held financial instruments. The importance of investment fund units in Czech households' assets has been increasing since 2012 (see Chart III.20). This in part reflects growth in households' wealth and, since 2014, a drop in the value of insurance products held by households. Insurance-based investment products are thus being gradually replaced by collective investment products. Funds deposited in pension funds also continued to record steady growth in 2017.

…which may lead to emergence of new channels for spreading systemic risk

The increased interest in investment products mostly with no guaranteed returns entails a shift in investment risk from financial institutions to households. Households may respond to any correction on the financial markets and growth in risk aversion by exiting investment and pension funds, terminating insurance-based investment products or selling off direct investments. In the event of growth in withdrawals, funds and insurance companies may not be able to satisfy clients' claims from their existing liquidity reserves (cash and bank deposits) and may therefore be forced to sell investment assets. Depending on market liquidity, this would exacerbate the initial drop in asset prices and lead to a spiral between withdrawals and asset price falls with a potentially systemic dimension. Similar risks have been accumulating in a number of EU countries. The ESRB has therefore been working intensively on macroprudential instruments in this area (see section 5.4.5).

Interest in insurance-based non-investment products continues to rise

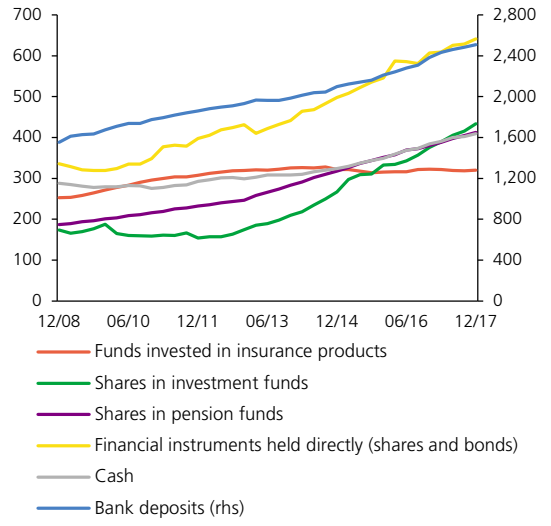
Gross premiums written for non-life insurance products continued to grow in 2017, rising by CZK 5.4 billion year on year to CZK 95.3 billion (see Chart III.21). In the case of life insurance, by contrast, gross premiums written fell further (by CZK 2.2 billion to CZK 56.1 billion). This reflected the persistently low attractiveness of life insurance products with an investment component (both products with a guaranteed return and unit-linked products) to both clients and insurance companies. Nevertheless, interest in the risk component of life insurance rose slightly in 2017.

The systemic risk of fire sales by insurance companies is being affected by contrary factors

From the systemic risk perspective, insurance companies can contribute to spreading and exacerbating financial asset sell-offs (fire sales) in the event of growth in uncertainty on the financial markets (see section 5.4.5). In the case of the domestic financial sector, this risk is

CHART III.20

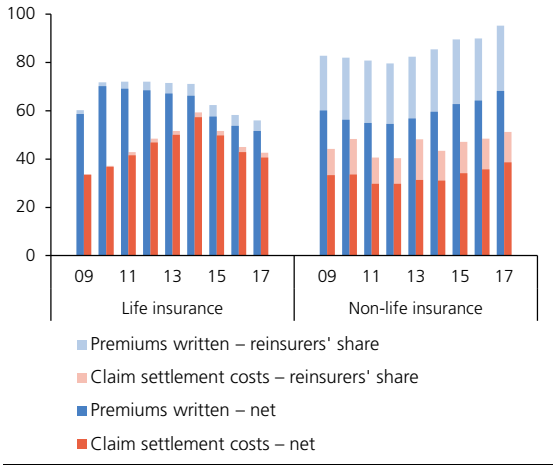
Financial assets of households
(CZK billions)



Source: CNB
Note: The figures comprise exposures to domestic and foreign entities.

CHART III.21

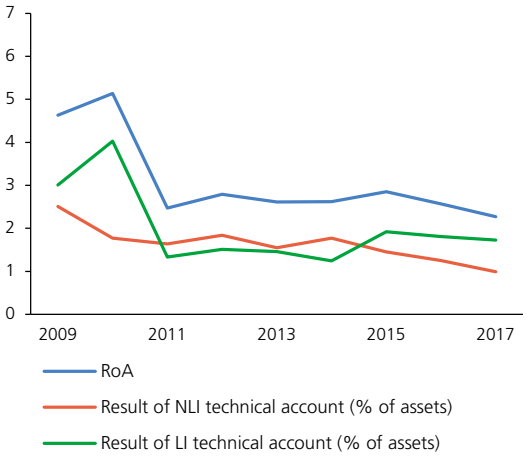
Developments in the insurance sector
(CZK billions)



Source: CNB
Note: The Export Guarantee and Insurance Corporation is excluded from the calculation.

CHART III.22

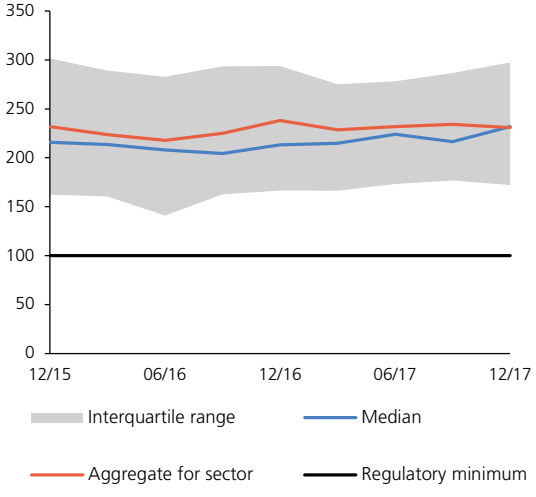
Profitability of the insurance sector
(%)



Source: CNB
Note: LI = life insurance, NLI = non-life insurance. The Export Guarantee and Insurance Corporation is excluded from the calculation.

CHART III.23

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



Source: CNB
Note: The Export Guarantee and Insurance Corporation is excluded from the calculation.

associated mainly with Czech government bonds (see section 3.4). However, their volume in insurance companies' balance sheets[39] has dropped (by CZK 12 billion year on year to CZK 151.7 billion in 2017; see Chart II.18 in section 2.1.2). The systemic risk connected with such fire sales has thus decreased. By contrast, the upward trend in corporate bond holdings continued in 2017 (year-on-year growth of CZK 20.4 billion to CZK 147.1 billion). However, the impact on insurance companies of a potential increase in corporate bond yields would not be significant for now given their relatively short average maturity (see section 2.1.2).

The ability of the domestic insurance sector to provide critical insurance products is not at risk

The systemic risk of the insurance sector is also linked with critical insurance functions (see section 5.4.5.). The domestic insurance sector continues to be able to provide critical insurance functions and is sufficiently resilient to potential adverse factors. It maintained good profitability in 2017 (see Chart III.22). The unfavourable trend in the technical account for non-life insurance is due to competition in motor vehicle third party liability insurance, which entails a risk of insufficient premiums. Nevertheless, this risk does not have a systemic dimension at present. The insurance sector as a whole was sufficiently capitalised in 2017, as most entities maintained eligible own funds sufficiently high above the solvency capital requirement (see Chart III.23).

Stress tests confirmed the resilience of the domestic insurance sector

A joint stress test was conducted by the CNB and insurance companies in the Czech Republic in 2017.[40] The results confirmed that the domestic insurance sector remained sufficiently capitalised even after the impact of relatively significant shocks. A joint stress test will also be conducted in 2018. The CNB will publish its results in a separate report in the second half of 2018. Some domestic insurance companies will also take part in the stress test organised by the European Insurance and Occupational Pensions Authority (EIOPA) through their financial groups in 2018.[41]

Investment funds continue to grow apace

The assets managed by domestic investment funds rose by 19.3% to CZK 479.5 billion in 2017. Of this total, CZK 314 billion were assets in collective investment funds (year-on-year growth of 22%) and CZK 166 billion were assets in funds for qualified investors (year-on-year growth of 13%). As in previous years, investment funds were thus the fastest growing segment of the domestic financial sector (see Chart III.1). By international comparison, domestic investment funds are still a less

39 The presented values of insurance companies' investment portfolios pertain only to domestic entities, i.e. they do not cover branches of foreign insurance companies.
40 Detailed results are published on the CNB website:
http://www.cnb.cz/en/financial_stability/stress_testing/stress_testing_insurance_sector.html
41 The progress with and results of the EIOPA stress test will be published on the EIOPA website: https://eiopa.europa.eu/Pages/Financial-stability-and-crisis-prevention/Stress-test-2018.aspx.

significant segment of financial intermediation, so there is potential for growth in future years (see Chart III.24). Investment funds' aggregate portfolio has long consisted mainly of equity, investment fund units and corporate bonds, which together accounted for 70% of the portfolio at the end of 2017 (see Chart II.18 in section 2.1.2). A significant overvaluation of prices of these instruments is considered in a sensitivity analysis (see section 2.1.2), so the potential impact of a correction on the financial markets on investment funds and their investors could therefore be relatively substantial.

Their contribution to systemic risks remains low

A correction on financial markets could cause an exit of investors from open-end investment funds,[42] exhaustion of liquidity reserves and subsequent fire sales. Domestic investment funds hold mostly foreign assets (64% of assets as of 31 December 2017; see Chart II.18 in section 2.1.2), the prices of which are rather insensitive to potential fire sales by domestic investment funds due to the high liquidity and the depth of foreign markets. The multiplication rate of an adverse market shock through fire sales of domestic investment funds' assets is thus low at the aggregate level. Investment funds' liquidity buffer dropped further year on year (by 3 pp to 27%) and their credit financing ratio increased to 5.3% as of 31 December 2017 (see Chart III.25). A continuation of these trends would increase the systemic risk of investment funds. The CNB has therefore been actively addressing the nature of investment funds' systemic risk and the options for managing it (see section 5.4.5).

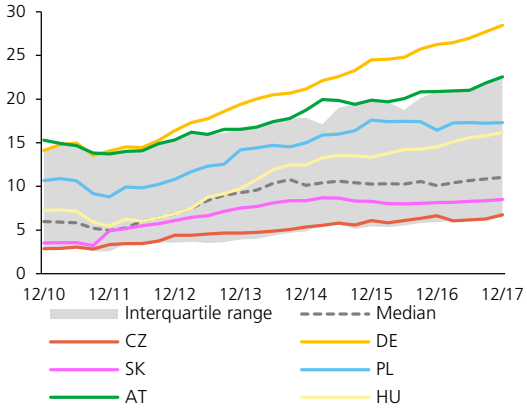
The assets of pension funds continue to rise despite a falling number of participants

The total assets administered by pension management companies (PMCs) grew by 10.8% year on year to CZK 445 billion, despite a year-on-year drop in the number of participants of 1.5% to 4.5 million. The growth in asset value was also due to higher inflows into funds than sums paid out (the difference is CZK 29 billion). The use of cross-currency repos to hedge against funds' exchange rate risk has increased the funds' total assets by a further CZK 19 billion since March 2017. The value of fund assets adjusted for these two effects would be 1% lower. Market developments – growth in bond yields – was therefore unfavourable for transformed funds (TFs) and obligatory conservative funds, which hold most of their portfolios in Czech government bonds, in the given period. The departure from the environment of exceptionally low yields on safe koruna assets and the option of achieving positive yields on government bonds should positively affect pension funds' financial results going forward.

CHART III.24

Comparison of the ratios of investment fund financial assets to bank financial assets

(% of banking sector financial assets)

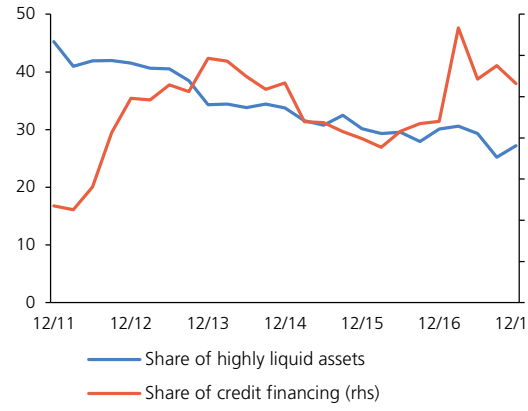


Source: ECB, CNB calculation
Note: The grey area represents the interquartile range from a sample of 23 EU countries; BG, DK, HR, SE and UK are excluded due to data unavailability.

CHART III.25

Liquidity mismatch and share of credit financing of investment funds

(%)

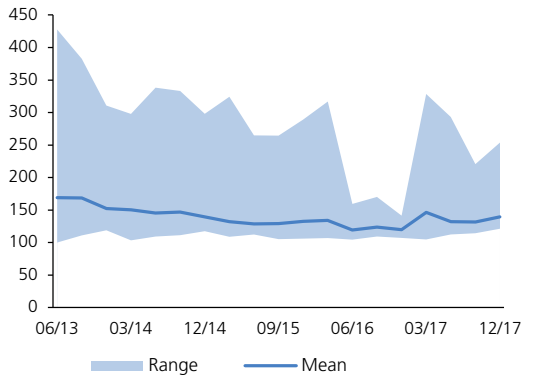


Source: CNB
Note: Highly liquid assets comprise cash, claims payable on demand (including bank deposits) and government bonds. The share of quick assets relates to collective investment funds while the share of credit financing relates to all investment funds.

42 Open-end investment funds (including funds in the SICAV legal form) managed 88% of the segment's assets as of the end of 2017. Open-end investment funds are obliged to pay out to the investor an amount equal to the current value of his share on request.

CHART III.26

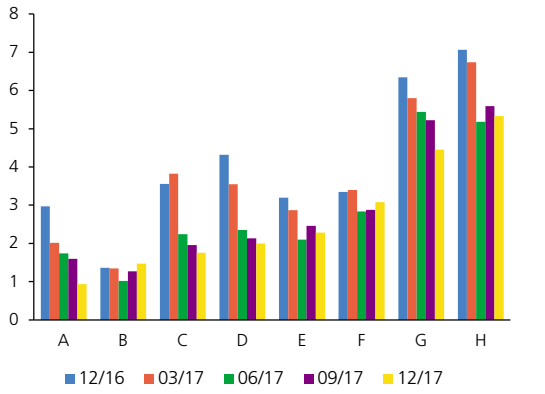
Capital ratio of pension management companies
(%)



Source: CNB
Note: Capital ratio is computed as the ratio between capital and capital requirement.

CHART III.27

Combined capital surplus of pension management companies
(% of transformed funds' total assets)



Source: CNB
Note: The letters denote individual pension management companies (PMCs). Sum of capital surplus (i.e. difference between capital and capital requirement) of PMCs and capital (i.e. difference between assets and liabilities) of transformed funds (TF). Positive values indicate a surplus and negative values a deficit. A positive value can be interpreted as the percentage size of the shock to the assets of the TF which would lead to a fall in the capital of the PMCs to the capital requirement level.

The changes in monetary policy are beginning to be reflected in a slight rebalancing of portfolios towards safer assets

TFs naturally focus on bonds with low credit and exchange rate risk. The amount of koruna government bonds in their portfolios was 1.9% lower than at the end of 2016 despite purchases made in 2017 Q4. At the end of 2017, the amount stood at CZK 273.5 billion, or 66.1% of total assets. The average duration of the bonds lengthened from 4.6 to 4.9 years. TFs, which invested part of their assets in bank deposits in an environment of low yields before the exit from the exchange rate commitment, are taking advantage of a drop in prices to buy longer-term bonds again. Holdings of equity instruments and corporate bonds in TFs' portfolios fell to 12.8% of total assets. Their average rating did not deteriorate. The share of foreign currency securities dropped to 14.5% of total assets. The amount and share of Czech government bonds in participation funds' balance sheets are considerably lower and their duration is markedly shorter (1.2 years for obligatory conservative participation funds and 3.4 years for other participation funds). Other participation funds are traditionally more exposed to exchange rate risk, as they already hold more than 23% of their assets in foreign units and shares.

The capital ratio of pension management companies went up after the second pension pillar was discontinued…

The discontinuation of the second pillar led to an overall decline of CZK 1.25 billion in PMCs' capital requirement. The requirement for the capital of PMCs participating in the second pillar was set CZK 250 million higher than that for the other PMCs. The total capital requirement thus dropped by 13.5% at the end of the year despite a 7.7% increase in TFs' risk-weighted assets. This was the main reason why PMCs' capital ratio (the ratio of capital to capital requirements) increased from 119.9% to 139.7% at the end of 2017 (see Chart III.26).

…but pension management companies' resilience decreased year on year

When assessing PMCs' resilience, it is necessary to monitor not only the capital ratio, but also the difference between TFs' assets and liabilities (TFs' "capital" in simple terms). TFs' "capital" serves as the first line of defence of PMCs against TFs' market losses. If TFs' assets still exceed their liabilities after incurring market losses, PMCs' capital does not show any decline while TFs' "capital" does. It is therefore desirable to monitor PMCs' *combined capital surplus*. The combined capital surplus consists of PMCs' capital surplus (the difference between PMCs' capital and capital requirements) and the capital administered by TFs (the difference between TFs' total assets and liabilities).[43] By measuring the combined capital surpluses with TFs' assets, one obtains the relative drop in TFs' assets which would lead to the exhaustion of both capital surpluses and a drop in PMCs' capital adequacy below the minimum level. The evolution of the combined capital surpluses over time shows the drawdown of those surpluses and the accompanying decline in PMCs' resilience (see Chart III.27).

43 PMCs' capital surplus made up just 20.2% of the combined capital surplus at the end of 2017.

The upward trend in pension funds' assets will continue

The upward trend in the share of clients with employer contributions continued. This share stood at 30.4% at the end of 2017, as against 22.8% in March 2013. Average contributions from planholders and employers also increased. However, they are still very low relative to wages. Inclusive of steak support, the contributions stood at 4.4% of the net average wage in 2017. This ratio was flat year on year. Contributions and the sector's assets can both be expected to continue to rise apace owing to rising wage growth and the large difference between the average wage and the pension paid from the first pension pillar. The market share of transformed funds, which no new planholders may enter as of 2013, remains dominant (92%), so the risks to PMCs associated with TFs' rising assets with guaranteed non-zero yields persist.

The market share and riskiness of loans from non-bank lenders is little changed

The total loans provided by non-bank financial corporations engaged in lending (NFCELs) increased by 7.2% to CZK 293 billion at the end of 2017 (see Chart III.28). Loans to non-financial corporations, which grew by CZK 20 billion (or 9.7%) year on year, were the main source of growth. NFCELs' market share in loans provided to non-financial corporations rose by 0.7 pp to 18.4% thanks to this increase. By contrast, loans to households for consumption dropped by CZK 1.4 billion to CZK 52 billion. This led to a year-on-year decline in NFCELs' market share of this segment of 1.1 pp to 19.7%. The riskiness of loans, as expressed by the three-month default rate, decreased by 15 bp to 3.21% for loans to households (see Chart III.29), but compared with banks remains significantly higher in the long run. The riskiness of loans provided to non-financial corporations rose by 20 bp to 0.52%, comparable with the level in the banking sector. The low degree of risk of loans to non-financial corporations is due to the fact that around 87% of them are secured leasing loans.

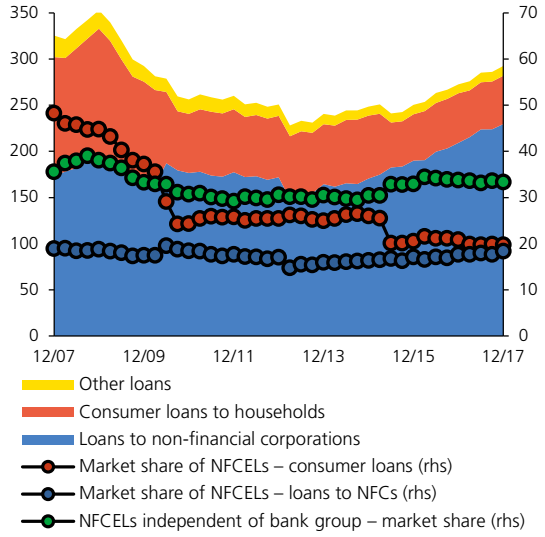
Non-bank consumer credit providers are to provide their services under a CNB licence

Article 169(1) of Act No. 257/2016 Coll., on Consumer Credit, imposed a duty on non-bank consumer credit providers to obtain non-bank consumer credit provider licences from the CNB. In this connection, the CNB had received 108 applications from previously active non-bank providers as of 30 April 2018.[44] These applicants are authorised to provide consumer credit in the transition period before the licence is granted on the basis of their existing trade licences until the CNB decides on the application, or by 1 June 2018, whichever is the earliest. The CNB also assessed six applications from non-bank providers which had not previously provided consumer credit. The CNB assesses applicants' compliance with statutory duties. The quality of applicants' internal regulations, especially those regarding risk management, plays an important role in the assessment process. Shortcomings mostly concerned regulations on the assessment of creditworthiness, remuneration and rules of conduct towards consumers in default. The completion of the licensing process is a significant step towards establishing a transparent market environment for consumer credit and improving management of the related credit risks.

CHART III.28

Loans provided by non-bank financial corporations engaged in lending

(CZK billions; right-hand scale in %)

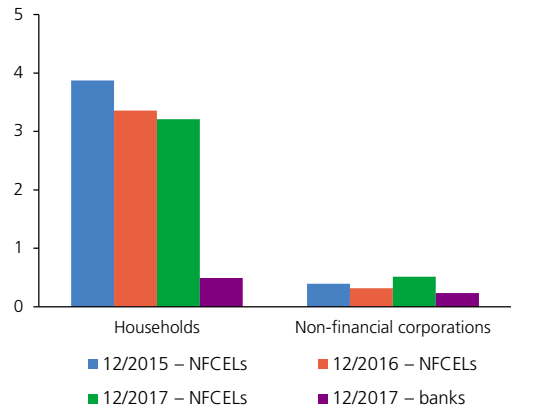


Source: CNB
Note: Market share of NFCELs in total loans provided to residents by banks and NFCELs combined. The market share of independent NFCELs relates solely to loans to residents provided by all NFCELs.

CHART III.29

3M default rate on loans provided by NFCELs and banks

(%)

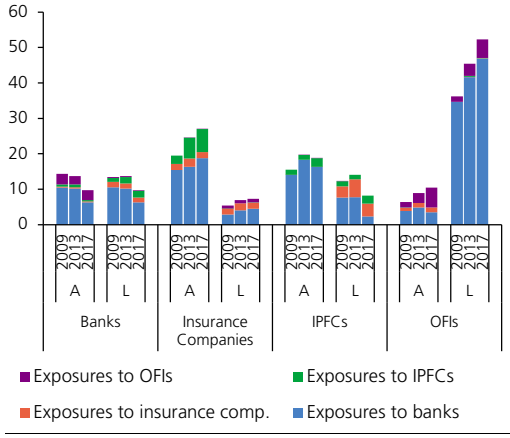


Source: CBCB, CNCB, SOLUS, CNB
Note: The default rate on loans provided to households by NFCELs is calculated as the average of the data from the NRCI and SOLUS. Only the NRCI is used for loans to non-financial corporations. Loans for consumption in the case of households.

44 A total of 37 licences had been issued for these applications as of 30 April 2018.

CHART III.30

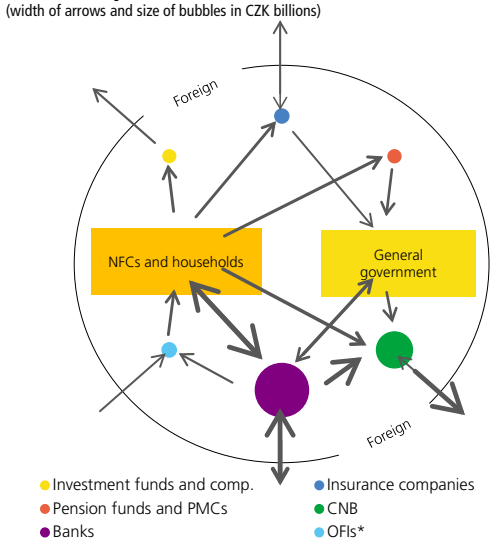
Share of exposures to domestic financial counterparties
(% financial assets and liabilities of segments)



Source: CNB
Note: A = assets, L = liabilities. IPFCs = investment and pension funds and companies. The segment of other financial intermediaries (OFIs) comprises NFCELs and non-bank security dealers. Year-end values.

CHART III.31

Interconnectedness of the domestic financial sector and the real economy
(width of arrows and size of bubbles in CZK billions)



Source: CNB
Note: The chart illustrates the links between segments with a value exceeding CZK 100 billion. Arrows going outside the circle indicate a foreign relationship. The size of the arrows corresponds to a range of CZK 100 billion (the smallest arrows) to CZK 3,534 billion (the largest arrow from non-financial corporations and households to banks). The size of the bubbles corresponds to the size of the segments' financial assets, which ranges between CZK 400 billion (investment funds and companies) and CZK 6,923 billion (banks). OFIs* stands for other financial intermediaries in a broader sense; it includes NFCELs, non-bank security dealers and financial auxiliaries.

3.4 INTERCONNECTEDNESS OF THE FINANCIAL SECTOR

Direct balance-sheet interconnectedness remains stable

Domestic financial entities' claims on domestic banks, including interbank relations, are the most important component of the balance-sheet interconnectedness[45] of the domestic financial sector (see Chart III.30). These claims consist mostly of bank deposits and long-term debt securities. They amounted to CZK 673 billion at the end of 2017, of which 65% were claims on the interbank market. This is a natural element of interconnectedness corresponding to financial institutions' transaction and liquidity needs. Banks also remain the largest counterparty for the real economy and vis-à-vis non-residents (see Chart III.31). In addition, they represent a major provider of debt and equity financing, especially within domestic bank groups. This interconnectedness is significant in relation to other financial intermediaries (OFIs, mostly NFCELs), on which domestic banks had claims in the form of loans and bonds worth CZK 164 billion at the end of 2017. Moreover, domestic banks held CZK 31.8 billion in shares and other equity in OFIs. Total exposures to domestic banks thus represented 47% of OFIs' total liabilities. Banks have a smaller share in the financing of the other segments of the financial market (insurance companies, investment funds and pension funds). In total, it was below 5% of the total assets of these segments at the end of 2017. Given that aggregate balance-sheet interconnectedness is not rising, the structural component of systemic risk and the risk of the emergence and spread of financial distress across segments remains stable.

Indirect interconnectedness through joint exposures on the Czech government bond market has decreased

The risk of fire sales of financial assets by a large number of domestic entities and a subsequent drop in asset prices represents an indirect channel for the spread of systemic risk. Among domestic assets, Czech government bonds are the most important portfolio item. A sudden repricing of those bonds combined with an exodus of foreign bond holders and revaluation of risk premia could cause domestic financial institutions to incur losses (see section 2.1.2). Those institutions could respond to the losses and growth in clients' withdrawals by selling off more Czech government bonds, which would amplify the initial price drop. However, the importance of Czech government bonds in the portfolios of domestic financial institutions declined in 2017 (see Chart II.18 in section 2.1.2). The systemic risk associated with indirect interconnectedness thus fell slightly.

45 The analysis of interconnectedness covers banks, insurance companies, pension funds, pension management companies, investment funds, investment companies and other financial intermediaries (mainly NFCELs and non-bank security dealers). Other segments of the domestic financial sector (the central bank, captive financial institutions and financial auxiliaries) are not included, as by nature they are not entities through which a financial shock could be transmitted.

Banks are in a net creditor position in their ownership groups…

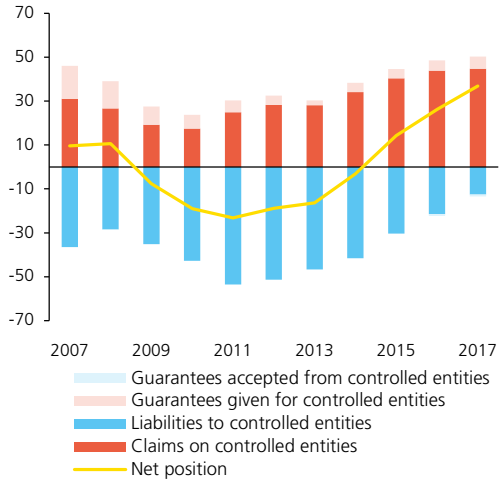
The trend seen in bank groups' balance-sheet interconnectedness in previous years continued (see Chart III.32). Banks increased their net creditor position. Their net claim on controlled entities rose by CZK 39.4 billion to CZK 119.8 billion (up by 10.8% of total regulatory capital to 27.5%). The source was both growth in claims of CZK 14.2 billion and a drop in liabilities of CZK 25.1 billion. NFCELs were the largest debtor within bank groups (around 69.1% of all claims, down by 3.8 pp year on year). By contrast, liabilities consist mostly of liquidity from building societies (80%, down by 3 pp year on year). The overall creditor position of banks within their groups increased slightly, while the concentration of exposures to NFCELs declined modestly. However, given the nature of the transactions (mostly secured leasing and factoring transactions) the high concentration of claims on NFCELs does not give rise to increased risks.

…and the net debtor position of banks vis-à-vis non-residents strengthened further

The net debtor position of banks vis-à-vis foreign parent institutions grew by CZK 104 billion year on year to minus CZK 204 billion in 2017 (see Chart III.33). It thus contributed partially to a strengthening of the net debtor position of the banking sector vis-à-vis non-residents, which increased to minus CZK 1,082 billion. This was due a sizeable rise non-residents' deposits in 2017 Q1 connected with the expected exit from the exchange rate commitment. Nevertheless, this situation does not give rise to increased risks to the banking sector or the real economy, as banks place the excess liquidity linked with non-residents' deposits at the CNB (see Chart IV.13 in section 4.2)

CHART III.32

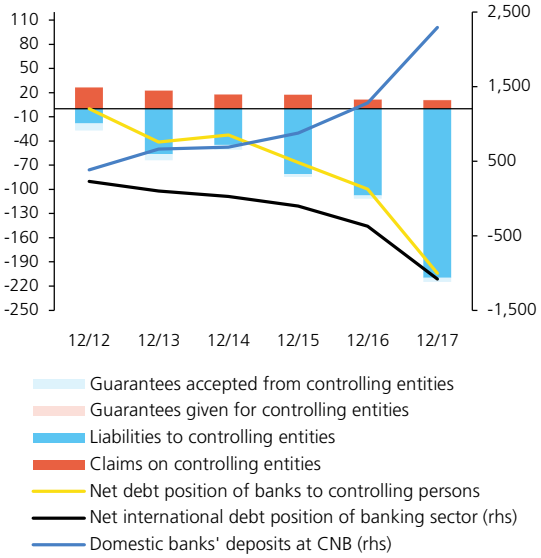
Credit interconnectedness in domestic bank groups
(% of regulatory capital of domestic parent banks)



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

CHART III.33

Credit interconnectedness vis-à-vis non-residents
(CZK billions)



Source: Obligatory information to be disclosed pursuant to Decree No. 123/2007 and Decree No. 163/2014; banks' annual reports; CNB
Note: The chart depicts the aggregate credit interconnectedness of the five largest domestic banks vis-à-vis their parent companies. The net debt position of the banking sector represents the overall net position of all banks vis-à-vis all nonresidents excluding shares and other equity.

4 STRESS TESTS

4.1 SOLVENCY STRESS TESTS OF BANKS AND PENSION MANAGEMENT COMPANIES

The stress test results demonstrate that the banking sector as a whole remains resilient even in the event of an adverse shock. Despite the impacts of the implementation of a forward-looking provisioning concept under the new IFRS 9 standard, banks have a large enough capital buffer to absorb adverse shocks and maintain their overall capital ratio above the regulatory threshold of 8% even under a very adverse scenario. The schedule for the joint stress tests conducted by the CNB and selected banks (the supervisory stress tests) was moved simultaneously with the change in concept. This year, for the first time, their results are therefore not included in this section but will be published separately in the second half of 2018. The pension management company sector has long been sensitive to interest rate volatility. A decline in prices of Czech government bonds could adversely affect its profitability and solvency.

4.1.1 Solvency Stress Tests of Banks

The resilience of banks was tested in solvency macro tests using the likely *Baseline Scenario* and a hypothetical *Adverse Scenario* (see section 2.1).[1] Box 4.1 focuses on the approaches of the CNB and some foreign central banks to setting the main parameters of adverse scenarios and the degree of stress. This year, the developments represented by the *Adverse Scenario* are not extended using additional sensitivity analyses. This is because we see no major year-on-year change in the level of the risks previously analysed[2] and their potential impact on the sector's capitalisation. More space is devoted to the results of the implementation of the principles of the IFRS 9 financial reporting standard into the stress test methodology.

The bank solvency stress test methodology was extended to include the impacts of IFRS 9

A new financial reporting standard IFRS 9 came into force on 1 January 2018. The main goal of this standard, which is based on the expected loss concept, was to enhance the stability of financial institutions with timely and sufficient provisioning (this issue is discussed in Box 3.3 in this FSR and section 5.4.2 of FSR 2016/2017). The solvency stress test methodology incorporates the framework defined in the standard.[3] First,

1 In its first two years, the *Baseline Scenario* of the stress tests of banks is based on the CNB's official macroeconomic forecast published in Inflation Report I/2018, which was approved by the CNB Bank Board on 8 February 2018. The *Baseline Scenario* for the third year and the *Adverse Scenario* were created solely for the purposes of stress testing. Neither the *Baseline Scenario* beyond the horizon of the forecast published in Inflation Report I/2018 nor the *Adverse Scenario* is an official forecast of the CNB.

2 The sensitivity analyses in FSR 2016/2017 covered losses arising from operational risks and concentration risk.

3 The CNB's approach to incorporating IFRS 9 into its macro stress testing models is based on the general framework of the standard. It will be further developed and refined in the

a model estimate was made of loan volume development in Stage 1 and Stage 2 characterising the structure of loans in terms of credit risk level.[4] A newly developed model was then used to calibrate the risk parameters, taking into account 12-month expected credit losses for Stage 1 loans and lifetime expected credit losses for Stage 2 loans. The estimated loan volumes and relevant risk parameters were then used to model loan impairment for both stages under the *Baseline Scenario* and the *Adverse Scenario*. This impairment was reflected in the stress test results. No other substantial methodological changes were made. As usual, the other test parameters were estimated using satellite models, which were calibrated using time series updated as of the end of 2017.

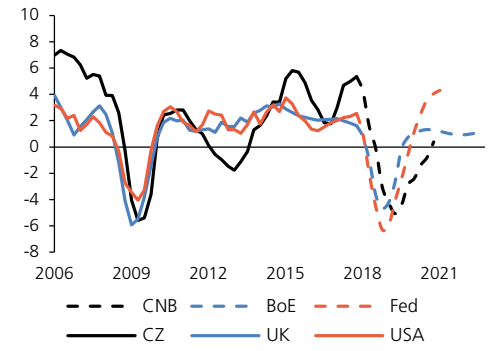
BOX 4.1: A COMPARISON OF ADVERSE ECONOMIC SCENARIOS IN MACRO STRESS TESTS OF BANKS IN THE CZECH REPUBLIC, THE UK AND THE USA

Most institutions responsible for the stability of their domestic banking sector conduct stress tests. The key component of the tests is a scenario of adverse economic developments (adverse scenario), which usually differs not in the economic variables modelled, but in the depth and length of the adverse scenario (shock) and the intensity of its pass-through to banks' financial results.[5] In FSR 2016/2017 (Box 2), we showed that the intensity and length of the shock, as measured by a contraction of GDP, which significantly affects the paths of other variables, in the CNB's stress tests do not differ much from those observed during banking crises (see Chart IV.2 in FSR 2016/2017). We now extend this analysis to include a direct comparison between other significant variables in the CNB's *Adverse Scenario* used in FSR 2017/2018 and the adverse scenarios applied this year by the Bank of England (BoE, *Annual Cyclical Scenario*) and the Federal Reserve System (Fed, *Severely Adverse Scenario*). In the second part, we compare the path of GDP in the adverse scenarios analysed in terms of crisis depth and length. We conduct the comparison in a broader context of crises in OECD countries.

In its stress test, the CNB assumes that an external shock stemming from a contraction in economic activity in EU countries spills over to the domestic economy, causing real GDP to fall and the unemployment rate to rise. The CNB's scenario covers the 12 quarters from 2018 Q1 to 2020 Q4, with a total crisis length of nine quarters. The BoE assumes a deep recession running simultaneously in the UK and the global economy, accompanied

CHART IV.1 BOX

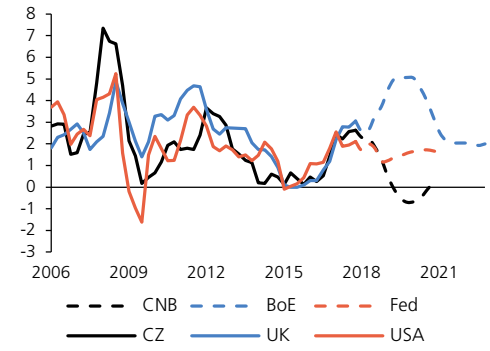
Year-on-year change in real GDP



Source: CNB, BoE, Fed

CHART IV.2 BOX

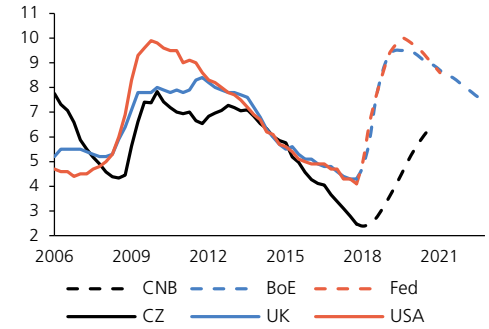
Inflation (CPI)



Source: CNB, BoE, Fed

CHART IV.3 BOX

Unemployment rate



Source: CNB, BoE, Fed

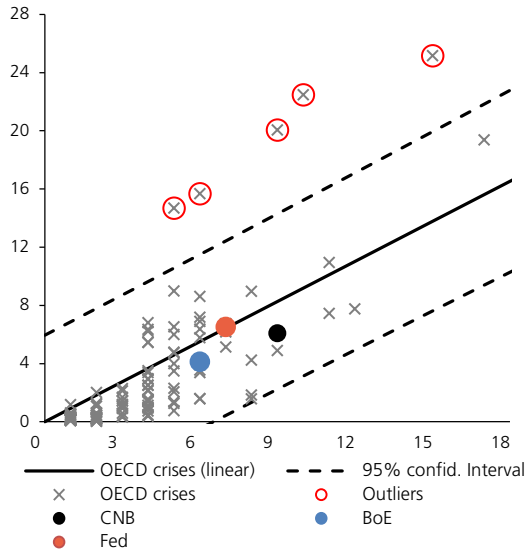
future based on research and analysis of the practical application of the approaches and methods used by banks and on data available from statistical and other CNB surveys.

4 The terms "Stage 1" and "Stage 2" are explained in Box 3.3.

5 The scenario is usually reflected mostly in provisioning and an increase in the capital requirements for credit risk.

CHART IV.4 BOX

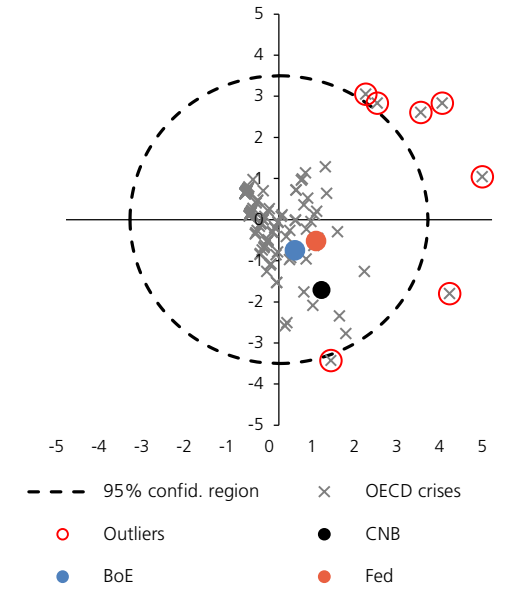
OECD comparison – regression analysis
(x-axis: length of crisis; y-axis: depth of crisis)



Source: CNB, BoE, Fed, OECD

CHART IV.5 BOX

OECD comparison – principal component analysis
(x-axis: component 1; y-axis: component 2)



Source: CNB, BoE, Fed, OECD

by a sharp drop in prices of financial assets and property. The scenario covers the 20 quarters from 2018 Q1 to 2022 Q4, with a total crisis length of six quarters (BoE, 2018).[6] The Fed assumes a severe global recession accompanied by global aversion to long-term fixed-income assets, leading to a steepening of the yield curve. The scenario covers 13 quarters from 2018 Q1 to 2021 Q1, with a total crisis length of seven quarters (Fed, 2018).[7]

In all the scenarios, the initial path of GDP is characterised by a sharp fall. In the case of the BoE and the Fed, the crisis peaks in 2018 Q4 with a year-on-year contraction of 4.7% in the UK and 6.3% in the USA. In the case of the CNB, the onset of the crisis is rather more gradual, owing among other factors to robust growth in the second half of 2017, and peaks in mid-2019 with a year-on-year contraction of 5.1%. Furthermore, the CNB's scenario is characterised by a slightly slower economic recovery. So, in the BoE and Fed scenarios the crisis is over before the end of 2019, while in the CNB scenario it continues almost until the end of the period modelled (see Chart IV.1 Box).

The path of inflation (CPI) shows large differences. Despite a weakening of the Czech koruna, the CNB assumes a fall into deflation, with a return to levels around zero at the very end of the period modelled. The BoE, by contrast, assumes a sizeable rise in inflation to levels around 5%. This is due to marked depreciation of the British pound, as higher import prices are reflected in an increase in both inflation and inflation expectations (BoE, 2018). Inflation then returns towards the inflation target from above in the scenario. In its scenario, the Fed models a relatively firm US dollar and low inflation volatility. Following a modest initial decrease, inflation stabilises around 1.5% over the rest of the stress scenario (see Chart IV.2 Box).

The rise in the unemployment rate in absolute terms is 4 pp in the CNB scenario, 5.2 pp in the BoE scenario and 5.9 pp in the Fed scenario. Further differences can be identified in the course of the shock, which reflects the path of real GDP and in the case of the Czech Republic additionally starts from a very low initial level. So, in the BoE and Fed scenarios unemployment peaks together with the end of the crisis before the end of 2019, while in the CNB

6 BoE (2018): Stress Testing the UK Banking System: Key Elements of the 2018 Stress Test, Bank of England, March 2018, available at https://www.bankofengland.co.uk/news/2018/march/key-elements-of-the-2018-stress-test.
7 Fed (2018): 2018 Supervisory Scenarios for *Annual Stress Tests* Required under the *Dodd-Frank Act Stress Testing Rules and the Capital Plan Rule*, Federal Reserve System, February 2018, available at https://www.federalreserve.gov/publications/2018-february-supervisory-scenarios-for-annual-stress-tests.htm.

scenario it does not peak until the end of the period modelled (see Chart IV.3 Box).

Using real GDP data from the OECD database, we can assess where the scenarios under comparison rank in terms of crisis length and depth (severity) compared with crises in the OECD countries in 1993–2017. We measure crisis length by the number of consecutive quarters in which real GDP contracted year on year. We measure crisis depth by the area between the x-axis and the real GDP curve in the relevant months.[8] The average crisis length in the OECD data set is around four quarters and the average depth is 3.1. The crisis depth is 6.0 in the CNB scenario, 4.1 in the BoE scenario and 6.5 in the Fed scenario. In all cases, therefore, the crisis is slightly deeper than the OECD average, which is consistent with a prudent approach to stress testing.

The data set can be analysed using linear regression tools, for example (see Chart IV.4 Box). The analytically derived 95% confidence intervals for values around the regression line running through the origin suggest that none of the scenarios analysed can be regarded as an outlier in the context of crises in OECD countries. Principal component analysis offers a different view of the data (see Chart IV.5 Box). The advantage of this approach is that such suitably transformed observations have a number of favourable statistical properties that can be used to easily identify outliers. The sample 95% confidence region confirms the findings of the regression analysis.

The crisis considered by the CNB in FSR 2017/2018 does not differ markedly from those considered by the BoE and the Fed in terms of its severity, length or course. All the hypothetical crises analysed are deeper than the above-mentioned OECD average, but none of the statistical methods applied suggests that they are extremely unlikely to happen. The above is consistent with the philosophy of seeking "severe but plausible" stress testing scenarios.[9] By contrast, the individual scenarios differ in their approach to the modelling of inflation. Precise and rigorous identification of the key fundamentals that in reality govern the final shape, severity and length of a crisis, which would in turn help further improve the scenarios modelled, thus remains the main open problem.

TABLE IV.1

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

	Actual Value	*Baseline Scenario*			*Adverse Scenario*		
	2017	2018	2019	2020	2018	2019	2020
Macroeconomic variables							
GDP (y-o-y %)	4.5	3.6	3.2	3.2	0.7	-4.1	-1.0
Inflation (%)	2.5	2.3	1.9	2.2	1.9	-0.2	-0.3
Unemployment (%)	3.0	2.3	2.2	2.1	2.7	4.3	6.0
Nominal wage growth (%)	6.7	7.2	5.1	4.5	5.8	0.7	-2.1
Effective GDP growth in euro area (%)	2.7	2.4	2.1	1.8	0.0	-3.3	-0.7
Credit growth (%)							
Total	6.3	6.2	6.4	6.8	3.4	-1.8	-2.8
NFCs	4.9	6.1	7.0	8.4	4.0	-4.5	-5.4
Households	8.4	7.3	7.0	6.8	3.6	-0.1	-1.5
Default rate (PD. %)							
NFCs	0.9	0.7	0.9	1.0	4.1	5.0	4.8
Loans for house purchase	1.5	1.5	1.6	1.8	4.1	4.9	5.3
Consumer credit	4.7	4.9	5.1	5.1	8.5	9.5	9.4
Loss given default (LGD. %)							
NFCs	45	45	45	45	51	60	53
Loans for house purchase	22	22	22	22	30	48	59
Consumer credit	55	55	55	55	56	62	69
Asset markets (%)							
3M PRIBOR	0.4	0.9	1.7	2.9	0.4	0.3	0.3
5Y GB yield	0.3	1.3	2.3	3.6	1.7	2.7	3.1
3M EURIBOR	-0.3	-0.3	-0.1	0.3	-0.3	-0.1	0.3
5Y EUR GB yield	-0.3	-0.1	0.4	0.9	-0.5	-0.4	0.2
Change in residential property prices	16.3	11.7	7.7	5.3	3.5	-13.6	-12.8
Banks' earnings							
Adjusted operating profit (y-o-y %)	-1.3	-0.5	0.3	-0.7	-8.0	-18.1	-23.7

Source: CNB, BRCI

8 No loss = 0; the higher the value, the higher the loss; the area was approximated numerically using the midpoint Riemann sum.

9 Breuer, T., Jandacka, M., Rheinberger, K. and Summer, M. (2009): *How to Find Plausible, Severe and Useful Stress Scenarios,* International Journal of Central Banking, 5(3), pp. 205–224.

TABLE IV.2

Impact of the alternative scenarios on the banking sector

	Baseline Scenario			*Adverse Scenario*		
	2018	2019	2020	2018	2019	2020
Provisions for non-performing loans (credit losses)						
CZK billions	-17.2	-19.6	-23.2	-59.8	-92.6	-93.3
% of assets	-0.2	-0.3	-0.3	-0.8	-1.3	-1.4
Provisions for performing loans						
CZK billions	-7.2	-3.0	-8.5	-69.8	-1.8	-24.6
% of assets	-0.1	0.0	-0.1	-1.0	0.0	0.4
Profit/loss from market risks						
CZK billions	-3.5	-7.9	-4.4	-4.7	-3.2	-1.4
% of assets	0.0	-0.1	-0.1	-0.1	0.0	0.0
Earnings for covering losses (adjusted operating profit)						
CZK billions	73.7	73.9	73.3	68.1	55.8	42.6
% of assets	1.0	1.0	0.9	1.0	0.8	0.6
Pre-tax profit/loss						
CZK billions	45.8	43.3	37.2	-66.2	-42.6	-27.5
% of assets	0.6	0.6	0.5	-0.9	-0.6	-0.4
Capital ratio at end of period in %						
Total	**19.8**	**18.7**	**17.9**	**15.8**	**12.0**	**10.9**
Tier 1	**19.2**	**18.2**	**17.4**	**15.3**	**11.6**	**10.5**
Capital injections						
CZK billions		0.4			26.9	
% of GDP		0.0			0.5	
No. of banks below 8% capital ratio		1			12	

Source: CNB
Note: Losses and provisions are presented with minus signs. Provisions for non-performing loans are the same as expected credit losses in the model.

In the *Baseline Scenario* credit risks and profit stagnate and the sector's return on assets falls

In the *Baseline Scenario*, the continuing economic growth is reflected in a growing ability of non-financial corporations and households to service their debts (see sections 2.3 and 2.4). The default rate, which is the key indicator of credit risk, is currently at its trough from the CNB's point of view. Thus, it rises marginally at the horizon of the *Baseline Scenario* for both non-financial corporations and households (see Table IV.1), causing credit losses to rise in a situation of continuing credit growth. The assumed rise in government bond yields in the Czech Republic and other EU countries leads to market losses due to a decline in the value of these debt instruments (see Table IV.2). Competition in the banking sector causes banks' traditional interest income to stagnate despite rising monetary policy interest rates. The *Baseline Scenario* therefore assumes a decrease in RoA from 1.0% to 0.9% at the test horizon owing to an increase in banking sector assets.[10]

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

The banking sector remains resilient and has sufficient capital reserves (see Table IV.2). The sector's aggregate capital ratio falls to 17.9% at the three-year horizon, staying well above the regulatory minimum of 8%. The Tier 1 capital ratio is only about 0.5 pp below the total capital ratio, illustrating the high quality of the capital structure. Nevertheless, one bank (accounting for only a marginal share of the sector's assets) gets into a situation of insufficient capital adequacy in the *Baseline Scenario*. This could imply a need to adjust its business model or top up its capital.[11]

The introduction of IFRS 9 has no major impact on the results in the *Baseline Scenario*

Following the introduction of the IFRS 9 standard, provisioning for non-default loans is generally higher than under the previous IAS 39 standard (see Box 3.3). According to the CNB's model, banks would create provisions totalling CZK 5.4 billion[12] for existing non-default loans due to the switch to the new standard as of 1 January 2018 – the "one-off effect" (see Chart IV.1).[13]

10 Adjusted operating profit, which is used to calculate RoA, 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.
11 Banks may also get into a situation of an insufficient capital ratio because the stress test methodology assesses their business model as unsustainable even if this is not necessarily true. This is because the methodology is based on a universal bank model and may not be entirely accurate for specialised banking institutions. The CNB therefore takes institutions' specific characteristics into account when assessing the test results.
12 The actual observed one-off increase in provisions in the banking sector is almost identical – see section 3.2.2.
13 The impact of IFRS 9 in the macro stress tests does not involve any transitional period for inclusion in capital (Regulation (EU) 2017/2395 of the European Parliament and of the Council, https://eur-lex.europa.eu/legal-content/EN/TXT/ELI/?eliuri=eli:reg:2017:2395:oj).

The *Adverse Scenario* would imply significant 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 rise in EU government bond yields. Since this negative shock would result in a contraction of the domestic economy over almost the entire test horizon (see also Chart IV.1 Box), debt repayment by the real sector would deteriorate. This would be reflected in a substantial rise in the default rate and loss given default. Credit and market losses, coupled with a decline in operating profit and provisioning, would result in banks incurring sizeable losses (see Table IV.2).

…partly amplified by the introduction of IFRS 9…

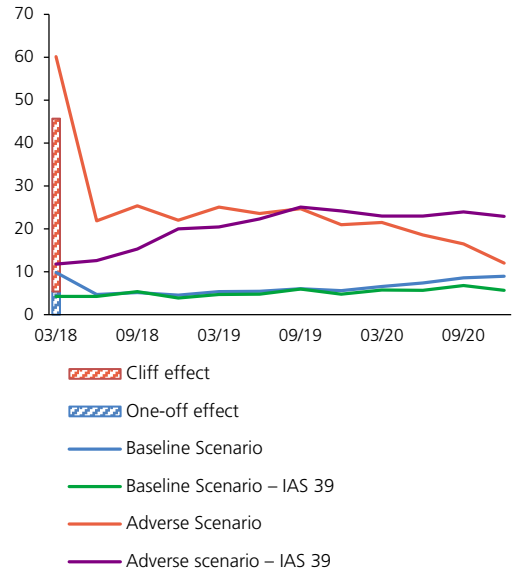
The stress test model assumes perfect foresight, i.e. that all future economic developments are known accurately at the beginning of the test. This is reflected in the provisioning under IFRS 9. As a result, a high volume of provisions, linked with the expected higher probability of default and loss given default, are created in the first year of the *Adverse Scenario*.[14] Compared to the *Baseline Scenario*, the model assumes in the *Adverse Scenario* an additional jump in provisions for non-default loans of CZK 40.3 billion as of 1 January 2018. This jump, called the "cliff effect" (see Chart IV.1), shows how the new financial reporting standard changes the time path of provisioning. However, the intensity of the effect depends on banks' approaches to modelling future developments and may be weakened in practice by adaptive behaviour of banks over time ("imperfect" foresight may instead be more probable).[15] In the last year of the test, thanks to an improvement in the economic situation and outlook, provisions for non-default loans have a positive effect on the performance of the banking sector (provisions for non-default loans totalling CZK 24.6 billion are released).

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

Although the aggregate capital ratio stays sufficiently above 8% in the *Adverse Scenario* (see Chart IV.5), twelve banks – representing about 16% of the sector's assets – record a fall in the capital ratio below the regulatory minimum of 8% and have to top up their capital. The necessary capital injections total around CZK 26.9 billion, i.e. 0.5% of GDP (see Table IV.2, second column). Relative to the size of the banking sector, this figure is not large enough to jeopardise its stability.[16] The banking sector's stability is based on its high capital ratio[17] and on its ability to generate income to cover losses even in the event of highly

CHART IV.1

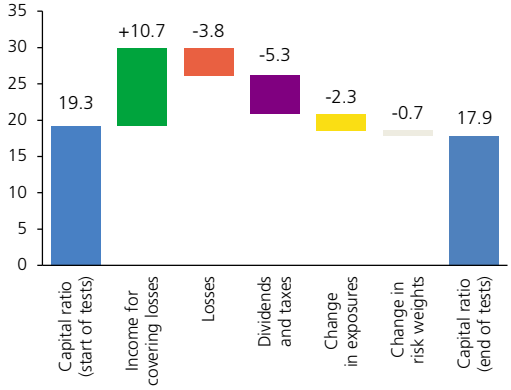
Quarterly creation of total provisions
(CZK billions)



Source: CNB
Note: For IAS 39 the model assumes constant coverage of performing loans by provisions. For IFRS 9 and IAS 39 provisions for non-performing loans equal credit losses. The one-off and cliff effects capture the change between 31 December 2017 and 1 January 2018.

CHART IV.2

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

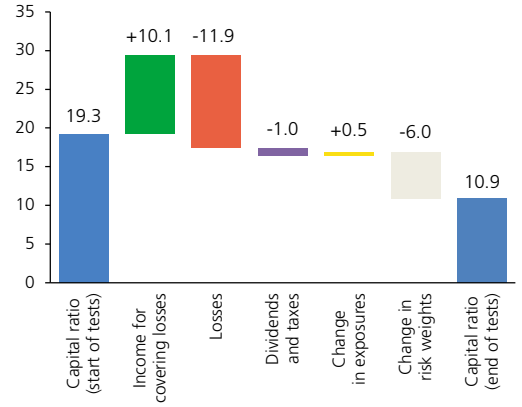


Source: CNB

14 The practical application of the perfect foresight assumption can lead to markedly different results between institutions. This is also signalled by the observed data. See Box 3.3.
15 By definition, a tightening of the parameters based on actual developments will always take place with a lag. The gap between the provisions reported by institutions and the provisions under the assumption of perfect foresight can serve as a guide to the potential "output gap" in different model predictions of the future.
16 Banks posted after-tax profits of more than double this figure in 2017 (see section 3.2).
17 The capital ratio rose by 0.8 pp to 19.3% as of the end of 2017.

CHART IV.3

Decomposition of the change in the capital ratio of the banking sector in the Adverse Scenario
(%)



Source: CNB

adverse developments. Nonetheless, the stronger impact of the stress compared to the tests published in previous Financial Stability Reports illustrates the importance of creating a countercyclical capital buffer in the current upward phase of the business and financial cycle.

The capital ratio falls only slightly in the *Baseline Scenario*…

A decomposition of the change in the capital ratio clearly illustrates the impacts of the main factors (see Chart IV.2). In the *Baseline Scenario*, income would increase the capital ratio by as much as 10.7 pp over the test horizon.[18] However, most of this income would be used to cover expected credit and market losses (-3.8 pp) and to pay dividends and taxes (-5.3 pp). A rise in banks' exposures (-2.3 pp) and a change in risk weights due to a gradual rise in the default rate (-0.7 pp) would eventually reduce the capital ratio to 17.9%.

…but falls significantly in the *Adverse Scenario* mainly because of high losses and a sharp rise in risk weights

Overall, the income generated (enabling the capital ratio to be increased by 10.1 pp) would not be sufficient to fully cover all the losses over the test horizon (-11.9 pp). A rise in the default rate and LGD would – together with the application of IFRS 9 – lead to growth in provisions, which would increase the losses and, in turn, the need for capital.[19] The model indicates that provisioning under IFRS 9 alone contributes 0.9 pp to this decrease in the capital ratio. For IRB banks, this impact may be partly mitigated up to 0.6 pp due to the current regulatory treatment of provisions (see Box 3.1). Dividends and taxes, paid mainly from profits for 2017, would still make a negative contribution to the capital ratio of 1.0 pp.[20] In addition to paying out lower dividends, banks would react to the worse situation by lowering the amount of loans, which reduces the fall in the capital ratio by 0.5 pp. The deterioration of the economic environment and the materialisation of credit risk would increase the risk weights, fostering a marked drop in the banking sector's capital ratio of 6.0 pp to 10.9% at the end of the test (see Chart IV.3). So, even the use of profits from previous years to absorb the impacts of the expected adverse economic developments in the first year of the test, brought about by the model's application of the expected credit loss concept under IFRS 9, would not help to reduce the impact of the stress test compared to the previous IAS 39 methodology. This could confirm some of the conclusions about IFRS 9 being procyclical (see section 3.2.2).

18 The income used to cover losses includes profits for 2017 and expected income in 2018, 2019 and 2020.
19 Again, we abstract from the possibility of distributing the impact of IFRS 9 on capital over time, i.e. we use the *fully loaded* approach focusing on the capital ratio after all transitional periods end.
20 Without the IFRS 9 effect, however, banks could pay dividends of almost triple that amount (1.6 pp) in 2018.

The CRR/CRD capital regulatory framework increases the minimum capital ratio for the assessment of stress test results and the amount of the necessary capital injection

Following the introduction[21] of the new capital regulatory framework for EU banks, the stress tests must also consider a minimum capital ratio above 8% which should not be breached by the impact of the stress test. This ratio takes into account the interaction between the additional Pillar 2 requirements and the combined capital buffers (see section 4.2.4 of FSR 2015/2016). The additional capital requirements may change in the years ahead, but they remain constant in the stress tests.

The effect of the stress test results on the capital requirements

Banks must meet the total SREP capital requirement (TSCR) given by the sum of the Pillar 1 requirements and the 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 (ORCR). The CNB defines the ORCR as the sum of the TSCR and 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.

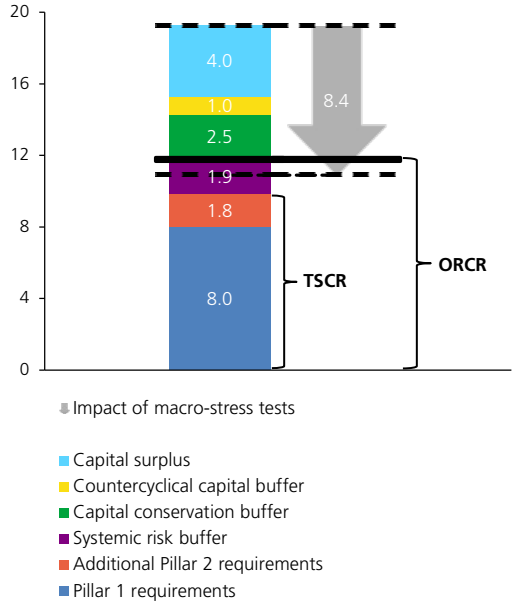
Chart IV.4 shows how fulfilment of the relevant capital requirement would look if the impact of the *Adverse Scenario* of the macro-stress test on the banking sector as a whole were to be factored in. The capital surplus, the countercyclical capital buffer and the capital conservation buffer would together be insufficient to cover the decrease in capital in the *Adverse Scenario*. At the macro level, this situation signals that it will be necessary to assess carefully in the SREP process whether individual banks have sufficient capital to meet the relevant capital requirement. At the individual bank level, supervisory stress testing in the SREP process is used for this purpose.

The path of the capital ratio (see Chart IV.5) in the *Adverse Scenario* is affected by the new approach under IFRS 9 causing the above-mentioned "cliff effect". Assuming perfect foresight of the adverse shock, the model predicts the creation of a large volume of provisions at the start of the test, leading to a decline in capital. By contrast, at the end of the test period, as the crisis fades, the model risk parameters improve and the expected credit loss therefore declines. Owing to a release of provisions, the capital ratio of the banking sector thus does not fall any further. When IFRS 9 is applied in the stress test methodology, the results suggest high sensitivity to early identification and to the estimate of the course of the crisis (length and depth). The CNB will therefore carefully assess banks' IFRS 9 implementation practices. The findings can then be applied in the further development of the stress test methodology.

21 The stricter threshold for passing the tests in this section is based on the implementation of the EBA SREP guidelines, which is now under way in EU supervisory structures.

CHART IV.4

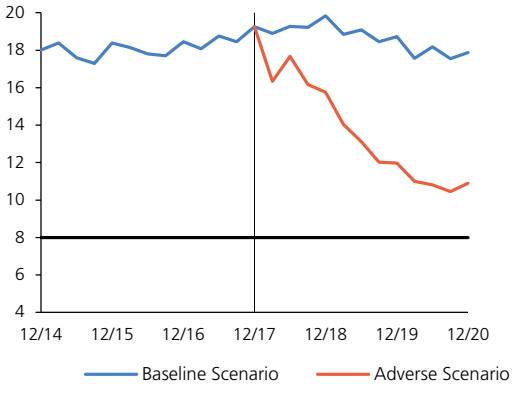
Structure of bank capital requirements in the Czech Republic and impact of macro stress tests
(average for sector as of end of 2017)



Source: CNB
Note: The illustration assumes a full countercyclical capital buffer, even though it has only been in effect since mid-2018.

CHART IV.5

Impact of the alternative scenarios on the capital ratio of the banking sector
(%)



Source: CNB
Note: Black horizontal line represents 8% minimal capital ratio threshold

TABLE IV.4

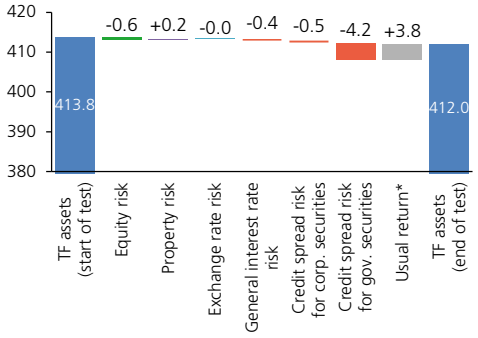
Results of the stress tests of PMCs

		Baseline Scenario	*Adverse Scenario*
PMC equity (start of test)	CZK billions	9.0	9.0
Capital ratio (start of test)	%	139.7	139.7
Change in TF asset value - general interest rate risk	CZK billions	-0.4	2.6
	% of TF assets	-0.1	0.6
Change in TF asset value - credit spread risk for corporate securities	CZK billions	-0.5	-1.4
	% of TF assets	-0.1	-0.3
Change in TF asset value - credit spread risk for government securities	CZK billions	-4.2	-15.2
	% of TF assets	-1.0	-3.7
Change in TF asset value - exchange rate risk	CZK billions	0.0	0.0
	% of TF assets	0.0	0.0
Change in TF asset value - equity risk	CZK billions	-0.6	-2.8
	% of TF assets	-0.1	-0.7
Change in TF asset value - property risk	CZK billions	0.2	-0.1
	% of TF assets	0.0	0.0
Total impact of risks on TF assets	CZK billions	-5.6	-16.8
	% of TF assets	-1.3	-4.1
Profit of transformed funds	CZK billions	3.3	1.6
PMC equity (end of test)	CZK billions	8.5	2.6
Capital ratio (end of test)	%	133.0	42.4
Capital injection	CZK billions	0.4	4.2

Source: CNB
Note: Start of test: end of 2017; end of test: end of 2018. TF stands for transformed funds.

CHART IV.6

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



Source: CNB
Note: * The assumed rise in value that would occur even without market repricing of assets in the *Baseline Scenario*. It represents dividend income, bond coupons and the return on the HTM portfolio. A usual return of 1% 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. Changes in the value of foreign-currency liabilities (cross-currency repos) is accounted for when considering exchange rate risk.

4.1.2 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 transformed funds (TFs) managed by PMCs at the one-year horizon.[22] Besides the Baseline Scenario, the sector's resilience to the Adverse Scenario was also tested; this variant captures adverse economic developments coupled with a drop in asset prices in financial markets (see section 2.1).

The PMC stress-testing methodology underwent further changes…

The PMC stress test methodology saw three main changes in 2018. First, as from this year's test, the held-to-maturity portfolio is treated as insensitive to credit spread risk in order to make the test more realistic. In previous rounds of stress testing, 20% of the size of the shock had been applied to this portfolio. Most of the held-to-maturity portfolio consists of Czech government bonds, for which default at the one-year horizon,[23] connected with a write-down of the exposure, is not assumed even in the *Adverse Scenario*. To maintain the prudent nature of the test, the potential impact of market repricing on the value of this portfolio will be monitored in a sensitivity analysis. The impact of this change can be assessed on the basis of Table IV.5. Second, the discontinuation of the second pension pillar has been taken into account. This reduces the capital requirements for the PMCs that had participated in it. Third, the methodology takes into account hedging against exchange rate risk using cross-currency repos, which some PMCs started to use in March 2017.

…and PMCs were informed of the test results

In this year's round of stress tests, PMCs were for the first time informed of their test results before publication of this Report. In this way, the CNB is satisfying demand from the tested companies and complying with the general principles of predictability and information openness. In addition, this further enhances control in the stress testing processes.

Transformed funds are mainly sensitive to interest rate risk…

The effect of the risks considered on the results of transformed funds (TFs) managed by PMCs is summarised in Table IV.4 and Charts IV.6 and IV.7. As TFs mostly invest in high-quality government bonds, general interest rate risk and credit spread risk for government bonds have the most significant effect. A rise in swap curves leads to a decline in total assets of 0.1% in the *Baseline Scenario*, whereas a decrease in swap rates in the *Adverse Scenario* causes the value of assets to increase by 0.6%. An increase in the credit spread for government bonds results in a drop in assets of 1.0% in the *Baseline Scenario* and 3.7% in the *Adverse Scenario*. Credit spread risk for corporate bonds leads to a decrease in assets not exceeding 0.3% in either scenario. TFs holding a large

22 Participation funds were not tested, as their market losses affect the funds' clients and not PMCs. They account for 8% of the sector's total assets.
23 See also the favourable result of the public finance stress test in section 4.4.

proportion of their assets in fixed-rate koruna bonds with longer durations are hit hardest by the materialisation of credit spread risks. TFs reduce the impact of a potential interest rate shock by holding bonds to maturity[24] (36% of the bond portfolio) and investing in floating-rate bonds (a further 25% of the bond portfolio[25]). By contrast, TFs apply derivative hedging against credit risk to a minimal extent.

…and other types of risk have a limited impact

As in previous rounds of stress tests, losses due to equity and real estate risk remain insignificant in volume. Shares and units account for just 1.7% of TF assets; moreover, their holdings fell by 6.5% year on year. Gains and losses due to exchange rate risk also remain insignificant, as TFs hedge their foreign currency investments against exchange rate risk. TFs hold 12.9% of their assets in foreign currency, down from 16.1% a year earlier.

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

PMCs guarantee non-negative returns for the clients of their TFs by law. If a TF's assets decline below its liabilities, the relevant PMC has to top up the TF's assets. This is the case for three PMCs in the *Baseline Scenario*. As a result of topping up the TFs' assets, the capital adequacy[26] of one PMC falls below the required level. The PMC owners would have to inject capital of CZK 0.4 billion in order for this PMC to meet the capital adequacy requirement. In the *Adverse Scenario*, seven out of eight PMCs have to top up the assets of their TFs. As a result of the top-up, the capital adequacy of five PMCs falls below the required level, leading to negative capital for four of them. The owners would have to inject capital of CZK 4.2 billion in order for these PMCs to satisfy the capital adequacy requirement.

The risks to PMCs decreased year on year, but PMCs remain vulnerable to exceptionally adverse market developments

The impact of the *Adverse Scenario* on PMCs was lower this year than last year. This is due to a combination of methodological changes, different stress scenarios, the evolution of PMC's capital adequacy and developments in TF portfolios. Assuming identical exposures as last year, the application of this year's scenario would result in a 1.5 pp smaller decline in total assets of TFs (see Table IV.5). The change in portfolios also fostered a 1.0 pp smaller decline in total assets. By contrast, the lower capitalisation this year (see the combined capital surplus described in section 3.3) would require CZK 1 billion more in capital injections by PMC owners amid a smaller decline in assets in this year's test. The test results

TABLE IV.5

Year-on-year comparison of the PMC stress test results in the *Adverse Scenario*

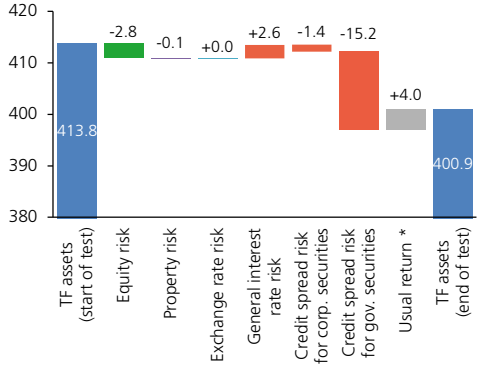
Test methodology	Last year's (FSR 2016/2017)	This year's	This year's	**This year's**
Scenario	Last year's (FSR 2016/2017)	Last year's (FSR 2016/2017)	This year's	**This year's**
Data on capital and exposures to	31 Dec 2016	31 Dec 2016	31 Dec 2016	**31 Dec 2017**
Fall in TF asset value due to shocks considered (%)	7.1	6.6	5.1	**4.1**
Injections by owners to meet capital requirements (CZK billions)	9.9	6.5	3.2	**4.2**
Number of AMCs needing capital injections to meet capital requirements	8	7	5	**5**

Source: CNB

CHART IV.7

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

(CZK billions)



Source: CNB

Note: *The assumed rise in value that would occur even without market repricing of assets in the *Adverse Scenario*. It represents dividend income, bond coupons and the return on the HTM portfolio. A usual return of 1% 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. Changes in the value of foreign-currency liabilities (cross-currency repos) is accounted for when considering exchange rate risk.

24 In the case of market repricing of all bonds regardless of their accounting classification, in the *Adverse Scenario* total assets fell from 4.1% by a further 2.8% and the size of the capital injection by PMC owners rose by CZK 10.1 billion.

25 Floating-rate bonds held to maturity are not included in this 25%.

26 The capital adequacy of a PMC is defined as the ratio of capital to the capital requirement. The capital requirement rises with an increase in the amount of assets in all managed funds, the share of riskier asset types in the TF and overheads. At the end of 2017, the capital requirement for risks of TFs accounted for 86% of the total capital of PMCs.

can be assessed as meaning that although the risks to PMCs decreased year on year, their vulnerability to exceptionally adverse developments remains elevated.

Pension fund risks are analysed by international institutions but do not currently pose a threat to financial stability in the Czech Republic

Pension funds in the EU, like life insurance companies, are being adversely affected by the sustained environment of low interest rates. That is one of the reasons why they are part of analyses conducted by international institutions.[27] The results of a stress test of 130 defined benefit pension funds and hybrid funds[28] from 16 countries conducted by the EIOPA in 2017[29] revealed that these funds already lacked 3% of total assets to cover liabilities at the start of the test. Under the adverse scenario, this shortfall rises to 21% of total assets, i.e. EUR 301 billion. However, the test impacts differ significantly across countries. Pension funds from the Czech Republic did not participate in the EIOPA tests. Pension fund risks to financial stability in the Czech Republic are low by European comparison for three reasons. First, pension funds in the Czech Republic are not defined benefit schemes and therefore do not guarantee returns on their contributions for their clients. Second, the types of pension funds currently dominant in the Czech Republic invest mostly in safe and liquid assets, for which high losses are unlikely. Third, the pension fund sector in the Czech Republic is still too small to be a source of major risks to financial stability.

27 For example the *Report on European Private Pension Schemes* by the FSB Regional Consultative Group for Europe: http://www.fsb.org/2017/10/report-on-european-private-pension-schemes-functioning-vulnerabilities-and-future-challenges/

28 According to the EIOPA definition, a hybrid pension scheme has both a defined benefit component and a defined contribution component. Such funds therefore offer a guarantee of investment returns on contributions via their defined contribution component.

29 https://eiopa.europa.eu/Publications/Reports/2017%20IORP%20Stress%20Test%20Report.pdf

4.2 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 net stable funding ratios indicate that domestic banks are highly resilient to liquidity shocks. This is due to their strong client deposit base and high capitalisation on the liabilities side and to a significant proportion of exposures to the CNB on the asset side. Exposures to the CNB increased further in 2017, mainly in the context of high interest of non-residents in koruna assets, including short-term deposits with domestic banks. Despite the changes in the structure of their balance sheets, the liquidity position of domestic banks remained stable and strong.

The liquidity coverage ratio confirms the banking sector's high resilience to short-term liquidity risk…

Resilience to a short-term liquidity shock is regularly tested using the liquidity coverage ratio (LCR). The aggregate LCR for the banking sector as a whole was 181% at the end of 2017[30] and all domestic banks were compliant with the regulatory limit of 100% required as from 2018 (see Chart IV.8). Despite an increase in the liquidity buffer, the aggregate LCR fell by 8 pp year on year owing to an increase in expected outflows. Given the one-month horizon of the stress considered, the highest aggregate LCR was achieved as usual by building societies, which, compared to the other groups of banks, had a significantly lower share of deposits included in the expected outflows (see Table IV.6). Domestic banks continued to hold almost all their assets from the LCR liquidity buffer in the form of claims on the CNB and government bonds (around 96% of the buffer), to which no haircuts are applied. The share of claims on the CNB rose significantly during 2017. While it had been 58% of the liquidity buffer at the end of 2016, it reached 76% at the end of 2017. No increased balance-sheet liquidity risk currently arises from the change in the structure of the liquidity buffer.

…and the net stable funding ratio confirms sufficient stable funding

The aggregate net stable funding ratio (NSFR[31]) for the domestic banking sector as a whole was 126% at the end of 2017 (see Chart IV.8). This figure illustrates sufficient available stable funding stemming from a strong base of client deposits and solid capitalisation (see Chart IV.9). The fulfilment of the NSFR above the threshold of 100% is also due to the structure of assets. Claims on the CNB with a zero need to be covered by stable funds account for a significant share of the balance sheet of

30 The LCR in other currencies declined year on year owing to the euro liquidity buffer falling from 75% at the end of 2016 to 31% at the end of 2017; the dollar value dropped from 41% to 19% over the same period. No regulatory limit on the LCR in other currencies is now set for domestic banks.

31 A general stable funding requirement has been in effect in the EU since 2016 (Article 413(1) of the CRR). A minimum standard specifying the calculation of the NSFR in the EU will be introduced by an amendment of the CRR (CRR2) currently under discussion. This cannot be expected to take effect before 2020.

TABLE IV.6

The LCR for groups of banks

(% of total assets of individual groups of banks as of 31 December 2017; rates in %)

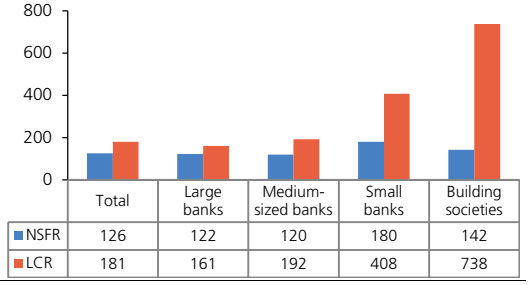
	Banks			Building societies	Total
	Large	Medium-sized	Small		
Liquidity buffer	36	28	44	22	32
Liquid assets	36	28	44	22	33
Weighted average rate of eligibility after application of haircuts*	100	100	100	99	100
Expected outflows	26	18	14	4	21
Balances of outflows	96	81	93	25	85
Weighted average rate of outflow*	27	22	15	14	25
Expected inflows	4	4	3	1	3
Balances of inflows	27	26	37	4	25
Weighted average rate of inflow*	13	13	8	17	25
LCR	161	192	408	738	181

Source: CNB
Note: *The extent to which items subject to haircuts, outflows or inflows in the stress period are represented in balance sheets. The results take liquidity subgroups into account and exclude state-owned banks.

CHART IV.8

Regulatory indicators of bank balance-sheet liquidity

(%; as of 31 December 2017)

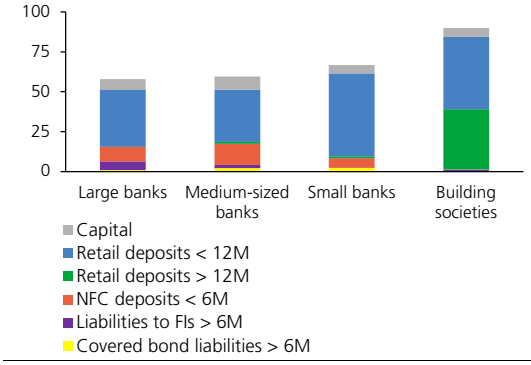


Source: CNB
Note: The LCR is the ratio of the liquidity buffer to the net liquidity outflow of banks over a 30-day stress horizon as defined by EC Regulation 2015/61. The NSFR is the ratio of available stable funding to required stable funding as defined by Basel III. The results take liquidity subgroups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

CHART IV.9

Structure and amount of items ensuring stable funding

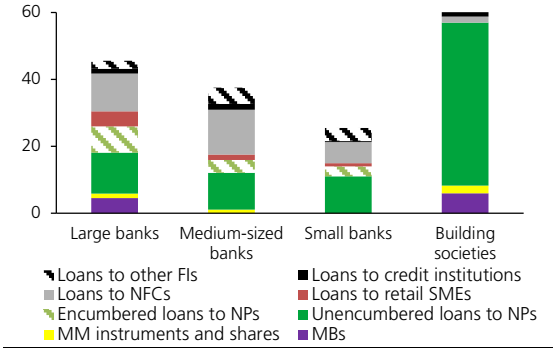
(% of balance sheet as of 31 December 2017)



Source: CNB
Note: The chart contains items whose weights exceed 2% in any of the groups of selected banks. M: month; FIs: financial institutions; NFC: non-financial corporations.

CHART IV.10

Structure and amount of items requiring stable funding
(% of balance sheet as of 31 December 2017)



Source: CNB
Note: The chart contains items whose weights exceed 2% in any of the groups of selected banks. MBs: mortgage bonds; NPs: natural persons; NFCs: non-financial corporations; MM: money market; FIs: financial institutions, SME: small and medium-sized enterprises.

TABLE IV.7

Scenario type and shock size in the liquidity stress test
(v %)

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	0.2	-0.1	-0.1	0.0
5Y GB yield	0.4	0.4	0.2	0.3
1Y EURIBOR	0.3	0.0	0.0	0.0
5Y EUR GB yield	0.0	-0.2	-0.2	0.0
1.2 Haircuts from value of capital instrument	39.0	-	-	-
2. Inflows	**Size of deduction from expected inflow**			
2.1 Secured claims	0.2	0.3	0.3	0.4
2.2 Unsecured claims due**				
on NPs	1.1	1.2	0.3	1.3
on NFCs and retail SMEs	0.4	0.4	0.5	0.7
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	4.8	3.3	3.7	3.1
others	9.5	6.3	7.4	6.3
3.4 Liabilities to NFCs				
secured	19.0	12.6	14.9	12.5
others	47.5	31.6	37.2	25.0
3.5 Liabilities to FIs				
secured	19.0	12.5	14.9	12.5
others	47.5	31.6	37.2	31.3
3.6 Growth in new loans, of which***				
secured claims	0.0	2.1	1.3	0.6
due to NPs	0.0	1.8	0.1	0.7
due to NFCs and retail SMEs	3.3	1.3	1.7	0.0

Source: CNB
Note: The parameter values are the averages to those applied to individual banks. M: month, Y: year, NPs: natural persons, NFCs: non-financial corporations, FIs: financial institutions, GB: government bonds, SME: small and medium-sized enterprises.
* 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 I n this scenario. *** The credit growth assumption is calculated using satellite models in macro stress tests of bank solvency.

domestic banks. Items with a higher weight of required coverage by stable funds are dominated by loans to natural persons and non-financial corporations (see Chart IV.10). As usual, building societies had the largest share of stable funds. Deposits with a contractual maturity of over one year, which are considered 100% stable, accounted for 37% of their total liabilities. In other groups of banks, client deposits with shorter maturity accounted for the dominant share of stable funds. Client and corporate deposits with small banks increased in 2017, contributing to a year-on-year increase in the share of stable funds of around 15 pp. In large and medium-sized banks, the share of stable funding remained at the usual level of around 60%.

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

Besides assessing short-term balance-sheet liquidity, the CNB conducts its own macro stress test.[32] The sufficiency of a bank's liquid buffer relative to the net liquidity outflow, i.e. the difference between expected outflows and inflows of liquidity, is tested over a one-year horizon (four maturity bands).[33] Their level is derived from bank's funding stability and the maturity mismatch in its balance sheet. The model thus incorporates the main features of the LCR and NSFR regulatory requirements. The model is a two-round one and takes into account the links between balance-sheet and market liquidity and the feedback reaction of the banking sector. The banking sector is first hit by scenario-defined exogenous shocks, which banks react to under certain assumptions. Those reactions then change the reputational risk of each reacting bank and the systemic risk in the banking sector as a whole (endogenous shocks). Banks have a limited ability to increase their balance-sheet totals over the entire test period. Compared to the LCR or NSFR, the liquidity macro stress test allows for better testing of the impact of scenarios with lagged pass-through of the adverse economic situation to the quality of banks' loan portfolios and to the financial markets.

The stress test was applied to 21 banks having their registered offices in the Czech Republic using the *Adverse Scenario* (see section 2.1 and Table IV.1) and the end-2017 data.[34] In the first round of stress, a liquidity outflow was generated for each maturity band by increasing lending (see Table IV.7, lines 3.1 and 3.6) and reducing funding (lines 3.2–3.5). At the same time, the inflow of expected liquidity (lines 2.1 and 2.2) for the relevant maturity band was lowered and the value of some assets in the liquidity buffer[35] (lines 1.1 and 1.2) was reduced. The second round of stress captures the consequences of the

32 For details see the thematic article in FSR 2015/2016: *The Relationship between Liquidity Risk and Credit Risk in the CNB's Liquidity Stress Tests*.
33 The expected inflows of liquidity are limited from above so that the minimum net outflow is 30% of the expected outflow.
34 State-owned banks, which have a specific business model, were not included in the stress test. The test takes liquidity subgroups into account.
35 Two liquidity buffer levels are monitored in the stress test. The level 1 liquidity buffer is defined as the sum of cash, claims on the CNB (excluding minimum reserves) and government bonds. The level 2 liquidity buffer additionally includes unencumbered corporate marketable securities.

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.

…which confirmed their high resilience even over a longer stress period

The test results reveal that the banking sector as a whole would withstand the simulated stress and would be able to cover a net outflow of liquidity lasting even one year (see Chart IV.11). 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 (a decline of more than 80%; see Chart IV.11), with a higher net outflow relative to their liquidity buffers. This year, building societies also recorded a relatively high impact (around 65%). As usual in their case, the stress in the form of higher outflows of liquidity manifested itself only from the second maturity bucket (3–6 months) upwards, but the composition of the sector's liquidity buffer is riskier and was subject to larger haircuts over the entire stress period. Three banks would exhaust their entire buffer during the test, doing so already in its second quarter. This was mainly due to their relatively low or riskier liquidity buffer, which was not sufficient in relation to the maturity mismatch in their balance sheets and their funding stability and consequently was not enough to cover the outflows generated. However, this balance-sheet liquidity risk does not have a systemic dimension, as the assets of the banks that exhausted their liquidity buffers accounted for 3% of the total assets of all the banks tested.

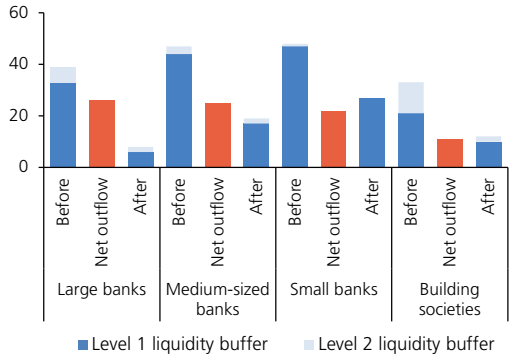
Domestic banks' balance-sheet structure changed partially…

The CNB's monetary policy actions resulted in an increase in koruna liquidity,[36] held largely by non-resident banks. Non-residents' interest rose sharply in early 2017 as expectations of an exit from the CNB's exchange rate commitment intensified (see Chart III.33, section 3.4). Non-resident banks with no access to CNB facilities usually placed korunas in Czech government securities (see section 4.4, Table IV.9 and Chart IV.24) or in short-term deposits with domestic banks (see Charts IV.12 and IV.13). The high interest of non-resident banks in koruna assets was reflected in an increase in their share in the financing of domestic banks and a rise in their share in holdings of Czech koruna government bonds. This led to a change in the structure of liquid assets held by domestic banks. Their holdings of unencumbered Czech government securities decreased and the encumbrance of these assets increased (see Chart IV 12). Domestic banks deposited their growing free koruna liquidity with the CNB (see Chart IV.13).

36 The CNB used the exchange rate as a monetary policy instrument between the start of November 2013 and the start of April 2017 (see http://www.cnb.cz/en/monetary_policy/bank_board_minutes/2017/170406_prohlaseni.html).

CHART IV.11

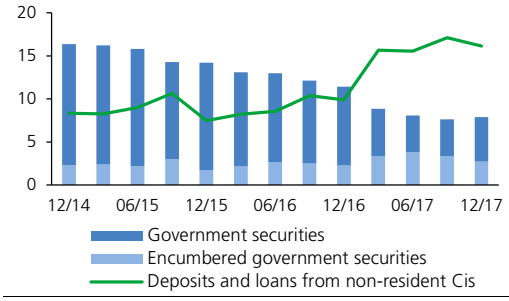
Results of the bank liquidity stress test
(% of total assets of individual groups of banks as of 31 December 2017)



Source: CNB
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 taking the liquidity inflow into account. The inflows are limited from above, i.e. a minimum net outflow of 30% of the expected outflow is assumed.

CHART IV.12

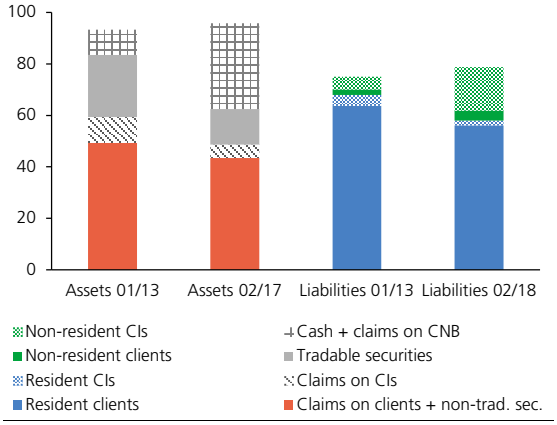
Share of government securities and loans from non-resident banks
(% of balance sheet of domestic banks)



Source: CNB
Note: CIs: credit institutions.

CHART IV.13

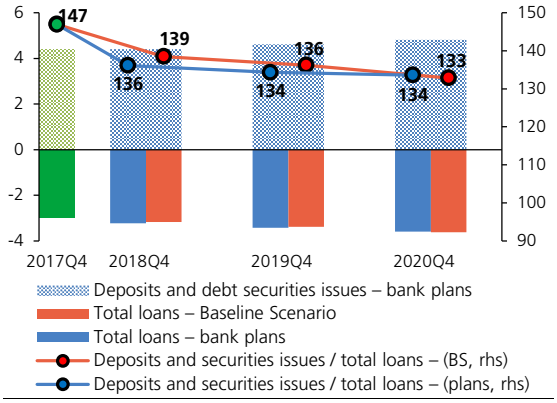
Selected balance-sheet items of the domestic banking sector
(% of balance sheet)



Source: CNB
Note: CIs: credit institutions.

CHART IV.14

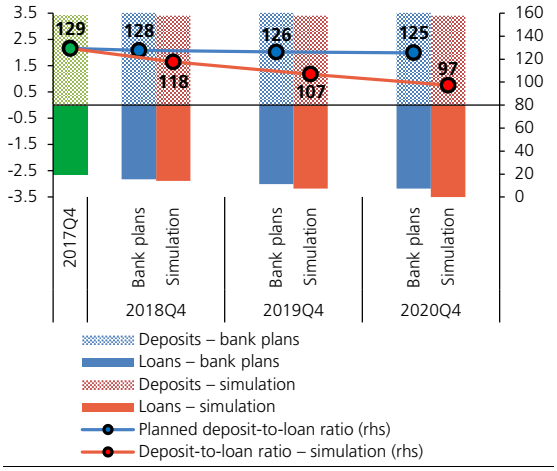
Funding plans of domestic banks
(CZK trillions; right-hand scale: %)



Source: CNB
Note: Includes loans and deposits to the private sector defined as households, non-financial corporations and financial institutions. Also includes debt securities with maturities equal to or more than three years. The green columns denote the position as of 2017 Q4; positive values are deposits and negative values are loans. BS as baseline.

CHART IV.15

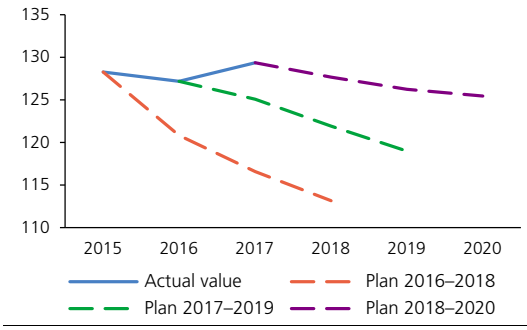
Comparison of planned and encumbered client deposits and loans
(CZK trillions; right-hand scale: %)



Source: CNB
Note: Clients comprise households and non-financial corporations. The simulation involves 10% year-on-year growth in loans and unchanged deposits. The green columns denote the position as of 2017 Q4; positive values are deposits and negative values are loans.

CHART IV.16

Planned and actual coverage of loans by primary funds
(%)



Source: CNB

…affecting certain indicators of systemic liquidity risk…

The changes in banks' balance-sheet structure led to a slight worsening of certain indicators of systemic liquidity risk. In the banking sector, the systemic indicators include for example the systemic asset encumbrance ratio, the net cash outflow ratio, the short-term commercial funding ratio and the foreign currency funding ratio. The asset encumbrance ratio, as measured by the ratio of the sum of encumbered assets and collateral received to the sum of total assets and collateral available for encumbrance, stood at 10% as of 31 December 2017 (7% as of 31 December 2016). A similar year-on-year increase (from 7% to 10%) was also recorded for the ratio of short-term wholesale funding to total assets. The net cash outflow ratio, defined as the LCR net cash outflows to total assets, and the ratio of foreign currency funding to total liabilities excluding own funds both went up by 1 pp in the period under review, reaching 11% and 3% respectively.

…the liquidity position of domestic banks remained stable and strong

Despite the changes in balance-sheet structure, the liquidity position of the domestic banking sector remained stable and strong. This was due mainly to an increasing share of liquid assets in balance sheets and a large excess of client deposits over client loans (excluding financial institutions; see Chart IV.13). Loans from non-resident credit institutions rose from 5% of total assets (January 2013) to almost 17% (February 2018). However, this type of funding source for domestic banks was deposited with the CNB. Claims on the CNB grew from 10% to around 33% of the total assets of the banking sector. Before the CNB's exchange rate commitment was introduced, client loans had accounted for around 49% of the balance sheet (January 2013) and client deposits for about 64%. Client loans accounted for 43% and client deposits for more than 56% of the balance sheet at the end of February 2018. However, the ratio of client deposits to loans remained high at a level exceeding 130% (see section 3.2.4, Chart III.19) and above the EU average (around 104%).

According to banks' plans, coverage of loans by primary funds will remain high in the future

In their end-2017 funding plans, domestic banks expect loans to the private sector to increase on average by 5.9% year on year, from CZK 3 trillion to around CZK 3.6 trillion at the three-year horizon (see Chart IV.14). They are planning to increase private sector deposits and issuance of debt securities with maturities of at least three years on average by almost 2.8% year on year, from CZK 4.4 trillion to CZK 4.8 trillion. The planned funds of banks would sufficiently exceed their planned loans and would even cover credit growth over the entire three-year horizon in the *Baseline Scenario* (see section 2.1, Table IV.1 and Chart IV.14). The three-year outlook for the ratio of client deposits to loans, i.e. the coverage of loans by primary funds, also remains high (see Chart IV.15), although banks are planning to lower it in the medium term (see Chart IV.16). This ratio would drop below 100% assuming slightly higher-than-planned growth in client loans (10%) and unchanged client deposits. These developments would force banks to cover the higher growth in loans using other, potentially less stable, funds.

4.3 THE HOUSEHOLD STRESS TEST

The share of overindebted households decreased compared to last year in both the Baseline Scenario and the Adverse Scenario due to the favourable economic situation. The higher sensitivity of low-income households and borrowers with a DSTI ratio of over 40% to adverse economic shocks and an increase in loan rates remains a risk.

The household stress test is based on an *Adverse Scenario* simulating the situation of 2008–2009

The household stress test[37] focuses on the risks of household overindebtedness, whose potential debt service problems could transform into financial sector credit risk. Household overindebtedness here means an increased probability that a household will fall into arrears with its debt servicing obligations. It is defined with the aid of the "financial reserve", which represents households' net monthly income minus essential expenditures and loan instalments. A household is referred to as overindebted if its financial reserve is negative after the chosen scenario is applied. The pre-and post-shock shares of overindebted households are calculated for individual income groups.[38]

The household stress test is annual and static. A slightly different *Adverse Scenario* than the one used for the banking sector stress test for the three-year horizon is therefore considered. Historical values were used to construct an *Adverse Scenario* analogous to the situation in 2008–2009, when in the space of one year the general unemployment rate increased by 3 pp (from 4.3% in 2008 Q3 to 7.4% in 2009 Q3), annual nominal wage growth decreased by 8.5 pp (from 10.7% in 2008 Q1 to 2.2% in 2009 Q1) and annual consumer price inflation dropped to zero (0.2% in 2009 Q3). Both the *Adverse Scenario* and the *Baseline Scenario* assume flat interest rates; the sensitivity of households to an interest shock is analysed separately below (see Table IV.8).

The share of overindebted households is relatively low in both the *Baseline Scenario* and the *Adverse Scenario* due to the favourable economic situation and outlook

Compared to last year's household stress test (see FSR 2016/2017), the share of overindebted households is lower across all income groups. The share of overindebted households is relatively low in the *Adverse Scenario*

37 The household stress test is conducted using data for individual households from the Household Budget Statistics. The methodology is described in detail in CNB Working Paper 2/2014. Examples of the practical application of the CNB household stress test in macroprudential policy decisions are presented in IFC Bulletin No. 46, BIS, December 2017.

38 The CZSO Household Budget Statistics (HBS), which are the main data source for the household stress test, have a lag of almost 18 months at the time of publication of the FSR. For that reason, it is necessary to take into account the changes in household overindebtedness that occurred between the end of 2016 and the end of 2017, to which the impact of the scenarios for 2018 is linked. Publicly available macroeconomic data were used for this purpose (see CNB Working Paper 2/2014 for details). Due to the "rundown" of the current HBS survey system, the reporting set was significantly reduced in 2016 (from around 3,000 households to 1,600). The analysis is therefore conducted on a merged 2015 and 2016 data file in which the changes in household overindebtedness between 2015 and 2016 are treated in the same way as those between 2016 and 2017.

TABLE IV.8

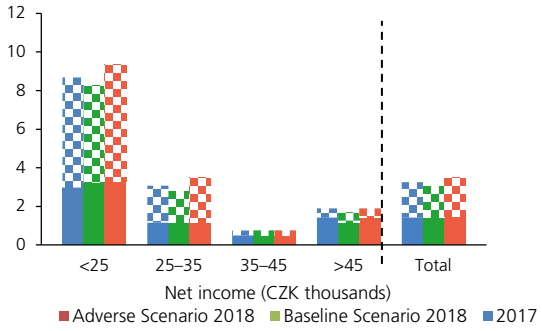
Key variables in the individual scenarios of the household stress tests
(values in Q4 of the year)

	2017	2018 Baseline Scenario	2018 Adverse Scenario
General unemployment rate (%)	2.5	2.2	5.6
Nominal wage growth (y-o-y, %)	7.8	6.2	-0.6
Inflation (y-o-y, %)	2.6	2.2	0.2
Interest rate on mortgage loans (%)	2.5	2.5	2.5
Interest rate on consumer credit (%)	10.9	10.9	10.9
Interest rate on other loans (%)	3.6	3.6	3.6
Share of refixed mortgage loans (%)	35	35	35

Source: CNB
Note: The 35% refixation rate corresponds approximately to the percentage of mortgage loans with a residual fixation period of up to and including one year. Interest rates correspond to rates on koruna loans provided by banks to residents of the Czech Republic on stocks of loans.

CHART IV.17

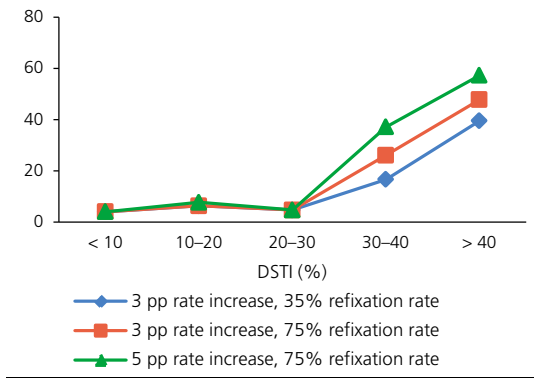
Shares of overindebted households by income group
(%; averages in individual income groups)



Source: CNB, CZSO Household Budget Statistics 2016
Note: Shares of households with loans. The solid part denotes the share of overindebted households with mortgages and the patterned part the share of overindebted households with loans other than mortgages.

CHART IV.18

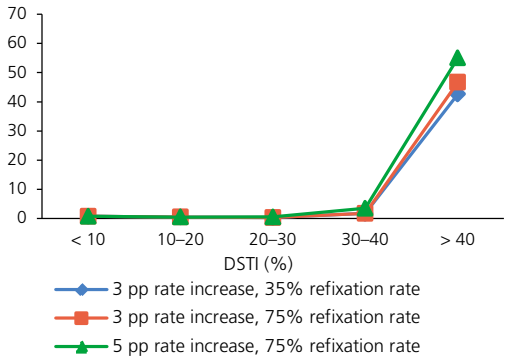
Shares of overindebted households with net income below CZK 25,000 by DSTI ratio
(%)



Source: CZSO Household Budget Statistics 2015 and 2016, CNB
Note: Shares of households with loans.

CHART IV.19

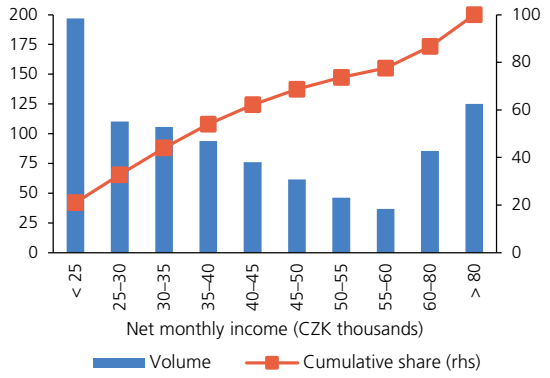
Shares of overindebted households with net income over CZK 25,000 by DSTI ratio
(%)



Source: CZSO Household Budget Statistics 2015 and 2016, CNB
Note: Shares of households with loans.

CHART IV.20

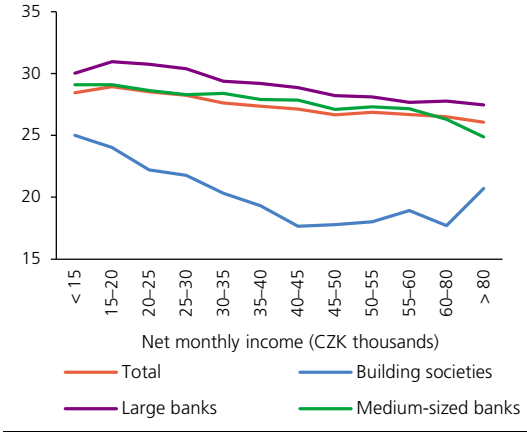
Loans secured by residential property by income group
(CZK billions; right-hand scale: %; as of 31 December 2016)



Source: CNB, data from surveys among individual banks

CHART IV.21

Risk weights of loans secured by residential property by income group and bank group
(%; as of 31 December 2016)



Source: CNB, data from surveys among individual banks
Note: The risk weights are calculated as a weighted average, where the weight is the volume of loans in each group. Building societies: CMSS, MPSS, SSCS; large banks: CS, KB, UCB; medium-sized banks: HB, MMB, RBCZ.

as well (see Chart IV.17). The difference is due to the favourable macroeconomic developments in 2017 and the positive outlook for 2018. Households with mortgages make up almost half of all overindebted households, and this share increases with increasing income. While households with mortgages account for around 35% of overindebted households in the lowest income group, in the highest income group the figure is about 75%. Despite this, the share of overindebted households with mortgages is relatively high in the lowest income group (around 3%, as compared to around 0.5%–1.5% in all other income groups). This means that low-income households fall much more often into overindebtedness due to problems servicing consumer credit and other loans, i.e. loans with a lower value than mortgages. The high share of overindebted households in the lowest income group is due mainly to a low or zero pre-stress financial reserve.

The higher sensitivity of low-income households to an increase in loan rates also remains a risk

As stated in the FSR 2016/2017[39], households with a DSTI ratio of over 40% are highly sensitive to financial stress across all income groups. This Report therefore devotes some space to analysing the sensitivity of Czech households to an interest shock. The analysis is based on the *Baseline Scenario*, enabling investigation of the impact of rising interest rates with an optimistic wage growth outlook and low unemployment. The sensitivity of households is tested against three alternatives in which loan rates go up by 3 pp or 5 pp and the mortgage portfolio is refixed at a rate of 35% or 75%.[40]

The analysis results confirm the high sensitivity of households with a DSTI of over 40% to increased financial stress (see Charts IV.18 and IV.20). At the same time, it turns out that in the lowest income group (below CZK 25,000 a month) the share of overindebted households is already significantly increased at a DSTI ratio of between 30% and 40%. The share of this group in the total volume of mortgages issued is not insignificant. About 21% of the total volume of loans secured by residential property was provided to households with net monthly income below CZK 25,000, and another 12% or so was provided to households with net monthly income of between CZK 25,000 and CZK 30,000 (see Chart IV.20). Despite the fact that low-income households are significantly more sensitive to adverse economic developments and interest rate growth, the level of net income has only a limited impact on risk-weight setting by banks (see Chart IV.21). This is due to the fact that a certain minimum income is a general measure of a client's creditworthiness but does not enter the capital requirements calculation itself.

39 Financial Stability Report 2016/2017, section 4.3, pages 69–70.
40 The 35% refixation rate corresponds approximately to the percentage of mortgage loans with a residual fixation period of up to and including 1 year; the 75% refixation rate corresponds approximately to the percentage of mortgage loans with a residual fixation period of up to and including 5 years. Other types of loans are subject to a 100% refixation rate.

4.4 THE PUBLIC FINANCE STRESS TEST

The CNB assessed credit institutions' exposures to the Czech government as systemically important. However, given the favourable results of the Czech public finance stress test, the CNB will not require credit institutions to meet an additional capital requirement to cover the risk of concentration of these exposures over a three-year horizon.

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

Since 2015, based on its internal methodology, the CNB has been annually reviewing and evaluating the risks of concentration of exposures to sovereign issuers in the balance sheets of credit institutions having their registered offices in the Czech Republic.[41] In its *Financial Stability Reports* it informs the market about which sovereign exposures it has identified as systemically important and whether it will require relevant credit institutions to meet an additional capital requirement to cover the risk of concentration of these exposures at a three-year horizon. The methodology defines an important sovereign exposure as an exposure to a sovereign issuer with a minimum ratio of 100% to the credit institution's eligible capital. It becomes systemic if the assets of credit institutions with important sovereign exposures exceed 5% of the total assets of all the credit institutions, including branches of foreign banks. It is indicated that an additional capital requirement must be met if the three-year outlook for the credit risk indicator of the sovereign issuer (sovereign risk indicator, ISR) exceeds one of its thresholds.[42] The CNB requires additional capital where the credit institution holds exposures in excess of the limit and this above-limit exposure is not already sufficiently covered by capital.[43]

Exposures to Czech government debt were assessed as systemically important…

The CNB assessed domestic credit institutions' investments in Czech government securities as a systemically important sovereign exposure. Although the value of these exposures recorded a year-on-year drop of CZK 102 billion at the end of 2017, at around CZK 485 billion it still accounted for 7.7% of these institutions' total assets and around 102% of their total capital. The assets of institutions with above-limit exposures accounted for 47% of the total assets of credit institutions and branches, as against 59.8% a year earlier. Exposures to other governments, the EU and the EIB did not reach systemic importance.

41 The internal methodology is described on the CNB website and in FSR 2014/2015.

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

43 The above-limit part of a sovereign exposure is determined using the ISR where the ISR 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%.

TABLE IV.9

Public finance stress test

	2017	*Adverse Scenario* 2018	2019	2020		critical limit
Macroeconomic variables						
Real GDP growth (%)	4.5	0.7	-4.1	-1.0	<	-2.3
Current account balance (% of GDP)	1.1	0.3	-3.6	-5.0	<	-1.8
Gross national savings (% of GDP)*	27.5	27.5	27.5	27.5	<	19.3
External debt (% of GDP)*	86.5	86.5	86.5	86.5	>	99.6
Difference between real GDP growth and real 10Y GB yield (pp)	-5.5	-0.5	7.3	4.7	>	6.3
Fiscal variables						
Government debt (% of GDP)	34.7	34.1	38.4	44.0	>	64.7
Primary balance (% of GDP)	2.4	1.4	-0.8	-2.7	<	-3.2
10Y government bond yield (%)	1.5	2.1	2.9	3.4	>	10.8
Government debt maturing within one year (% of GDP)	6.5	6.8	6.6	6.6	>	19.0
Share of government debt maturing within one year (%)	18.8	20.0	17.1	15.0	>	21.7
Share of foreign currency debt (%)	14.5	11.8	11.3	9.4	>	27.1
Share of non-residents in debt holdings (%)*	45.8	45.8	45.8	45.8	>	34.9
Institutional variables						
Government effectiveness (WGI score)*	1.1	1.1	1.1	1.1	<	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	=	Yes
Past sovereign defaults*	No	No	No	No	=	Yes
Sovereign risk indicator (ISR, %)	**-**	**0.12**	**0.90**	**0.30**		

Source: CNB, CZSO, ECB, World Bank
Note: The symbol > (< or =) denotes that a higher (lower or equal) value means breaching of the critical limit and indication of increased risk. The figures are rounded. Indications of breaching of the critical limit are based on unrounded figures. Where the limit is breached, the relevant variables are further indicated in red. * Variable not modelled; last known value assumed in projection.

…but their riskiness did not exceed the thresholds

The ISR was estimated for systemically important exposures. Its three-year outlook was 0.3% (see Table IV.9) and did not exceed the supervisory thresholds of 5% and 8%. The CNB will therefore not require the credit institutions concerned to meet an additional capital requirement to cover the risk of concentration of exposures to the Czech government.

Few of the variables under review exceeded the critical limit…

Of the variables included in the ISR, the critical limit was exceeded in 2019 not only by rule of law and the share of foreign holders of government debt, but also by real GDP growth, the current account balance and the difference between the real government bond yield and the rate of GDP growth (see Chart IV.22). The combination of a decline of the domestic economy and growth in government bond yields resulted in the ISR peaking at 0.9% in 2019. However, a slowdown in the decline in GDP to 1% in 2020 meant that the estimates of this indicator and the difference between the yield and GDP returned below the critical limit. The estimated ISR went down to 0.3% in 2020, roughly in line with the result of last year's round of stress tests. The total government debt increased to 44% of GDP at the three-year test horizon. This deterioration in government finances primarily reflected lower tax revenues during the strong recession assumed in the *Adverse Scenario* (see section 2.1.3 and Table IV.9). The deterioration in public finances was also due to the reaction of financial markets in the form of growth in nominal yields on Czech government bonds, especially at the longer end of the koruna yield curve. The ten-year government bond yield rose to 3.4% at the three-year test horizon. However, the higher debt service costs had a relatively limited effect on growth in total government debt due to its relatively low initial level.

…and the low ISR level was also due to more favourable evolution of Czech government finances

Czech government debt recorded a year-on-year decline at the end of 2017. In relative terms, it has been decreasing since 2013, from 44.9% of GDP to less than 35% in 2017. Since 2014 this decrease has been fostered by economic growth and in 2017 also by a further decrease in debt service costs. The favourable trends in these variables reduced the impacts of the stress scenarios (see Chart IV.23) and were reflected in the three-year outlook for the ISR. For the first time since 2014, this year's round of stress tests showed no decline in the primary balance even in the stress scenario below -3.2% of GDP, which the CNB considers risky.[44] Czech government CDS spreads, which should reflect market perceptions of its credit risk, also decreased to historical lows.

44 This is due in part to the high GDP deflator used in the stress scenario. The *Adverse Scenario* is thus less severe for public finances than it was in previous years.

The share of non-residents in debt holdings is the only fiscal variable with values in the critical range

Viewed in terms of the ISR indicator, long-lasting exceptionally adverse macroeconomic developments and political risk are currently the biggest risks to public finance sustainability. Fiscal variables – the public debt and its structure and the public budget balances – do not indicate much risk. Unlike in previous rounds of the stress test, non-residents' debt holdings are the only fiscal variable exceeding the critical limit. These holdings increased at the time of the exchange rate commitment, and a return to the pre-crisis levels is being hindered mainly by a persisting positive interest rate differential against the euro area. Non-residents hold the majority of koruna government securities at shorter maturities (see Chart IV.24). Any materialisation of risks on global markets (see section 2.1) leading to a disorderly outflow of foreign short-term investors might be adversely reflected in a surge in government debt servicing costs. However, the results of the public finance stress test showed that this scenario would currently pose no risk to public finance sustainability.

The government sector is resilient despite a high ratio of short-term debt

In previous Financial Stability Reports, the CNB noted a gradual decrease in average koruna government debt maturity. The average maturity of koruna government securities reached a low of 4.4 years in August 2017. By the end of 2017 it had risen to 5.1 years, roughly the same level as at the start of 2017. In April 2018, the Czech Republic was among the EU countries[45] with the shortest average government debt maturity, at 2.5 years below the EU average. Koruna government debt with maturity of up to one year accounted for 18.8% of total government debt at the end of 2017. A short-term debt ratio exceeding 21.7% is perceived as risky in the ISR. The Ministry of Finance of the Czech Republic has set a limit of 20% for the medium term in its Funding and Debt Management Strategy.[46] Short debt maturity increases the sector's vulnerability to growth in interest expenses in the event of government securities being issued in adverse market conditions. However, the government sector should not be exposed to any major refinancing risk in the short term, since the buffer against this risk was strengthened in 2017 by increasing the Treasury account balance to CZK 240 billion.

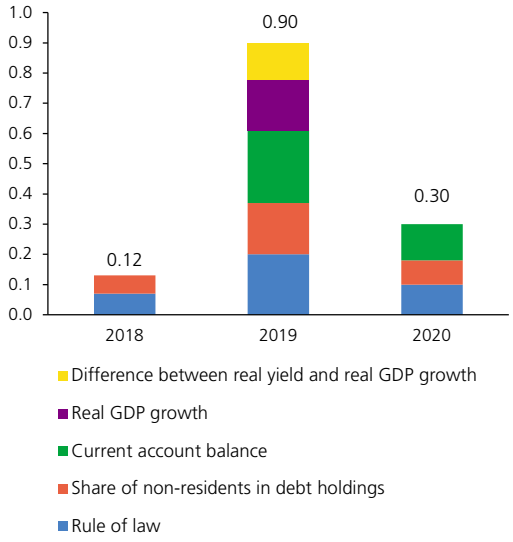
Regulation of exposures to sovereign issuers remains part of the international debate

The international debate about the regulation of banks' exposures to sovereign issuers continued within the BIS in 2017. The BCBS published a discussion paper in December 2017 in which it discusses possible changes to Pillars 1, 2 and 3 in relation to such exposures. The major proposed changes included (i) the removal of the national discretion to apply a

CHART IV.22

Decomposition of the sovereign risk indicator in the *Adverse Scenario*

(pp)

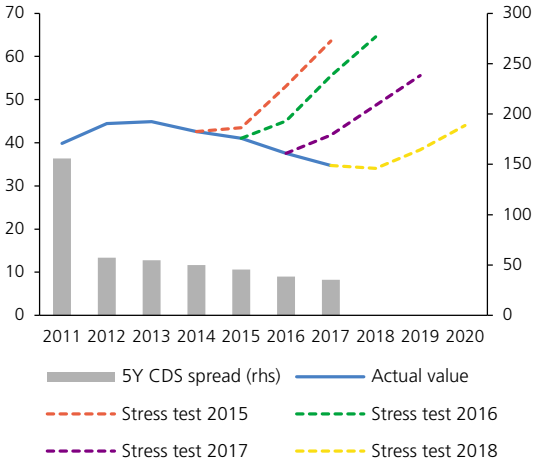


Source: CNB, World Bank

CHART IV.23

Comparison of the paths of government debt in the public finance stress tests

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



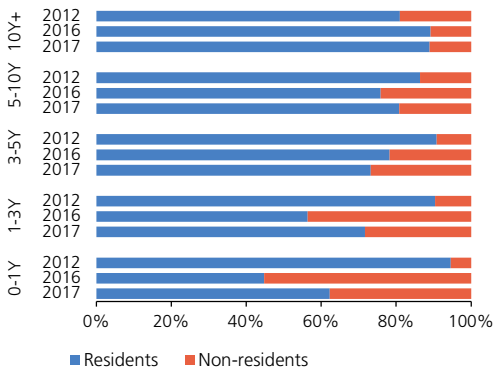
Source: CNB, Thomson Datastream
Note: Year-end data.

45 This refers to government debt for 27 EU countries. Data for Estonia are not recorded in the ECB's database.

46 https://www.mfcr.cz/assets/en/media/The-Czech-Republic-Funding-and-Debt-Management-Strategy-for-2018.pdf

CHART IV.24

Holdings of Czech government securities by non-residents
(% of koruna issuance of respective residual maturity)



Source: ECB, BCPP, MFCR, CNB
Note: As of the end of the year.

preferential (in practice zero) risk weight for exposures to the domestic sovereign issuer; (ii) adjustments to the risk weights in the standardised approach so that even the safest sovereign issuer is subject to a positive risk weight; (iii) prohibition of the use of internal models to set capital requirements owing to the difficulty of modelling sovereign defaults robustly, and (iv) the introduction of risk weight add-ons to mitigate high concentrations of a bank's exposures to a specific sovereign issuer. The CNB generally supports these proposals, especially risk weight add-ons for concentration risk.[47] There is no cross-country consensus on the regulation of sovereign exposures and it is not clear which proposals the BCBS is going to advocate.

An ESRB Task Force, in which the CNB was represented, published a feasibility study in January 2018 regarding the proposal to create sovereign bond-backed securities of EU Member States issued in euros (SBBS[48]), which are classed as structured assets. The study states that the current capital and liquidity regulation of banks treats the proposed SBBS product less favourably than individual sovereign bonds without taking into account its specifics and true risks. According to the study, this represents a significant obstacle to the demand-led emergence of SBBS. In the second quarter of 2018, the European Commission should propose a legislative change reflecting the riskiness of the new product to a greater extent. Like many other countries, the CNB is sceptical about the emergence of SBBS, as it sees three main risks. The first is the potential threat of distortion of bond and other markets if SBBS unjustifiably received more favourable treatment than sovereign bonds of Member States. The second is the high costs associated with changing the existing regulation of the financial sector and with the emergence of a separate market (the maintenance of constantly high liquidity while ensuring steady and abundant simultaneous demand from various types of investors). The third is the potential adverse impact on sovereign debt issuers and managers. They would be forced to significantly change their issuing policy strategy, which could lead to additional debt management costs.

47 The CNB's reply to the discussion paper is available on the CNB website: http://www.cnb.cz/en/supervision_financial_market/legislation/cnb_opinions/download/bcbs_regulatory_treatment_of_sovereign_exposures_cnb_opinion.pdf.
48 https://www.esrb.europa.eu/pub/task_force_safe_assets/html/index.en.html.

5 MACROPRUDENTIAL POLICY

The aim of this section is to describe the main risks to financial stability and to provide information about risk mitigation instruments. To this end, the text evaluates 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 analyses for the settings of the CNB's macroprudential policy instruments. The first part of this section briefly introduces the intermediate objectives of macroprudential policy and places the macroprudential policy instruments available for fulfilling those objectives into context with the conclusions of the assessment of the relevant risks. The second part describes the settings of the capital buffers used to enhance the resilience of the Czech banking sector. The third part provides detailed information about risks relating to property exposures and describes current and potentially applicable instruments for mitigating those risks. The final, fourth part describes macroprudential policy developments in the EU and developments in the national and international regulatory environment.

TABLE. V.1

Summary of macroprudential instruments in the banking sector

Intermediate objectives	Key instruments	Specific risk	Existence of specific risk in CZ	Y-o-y change in intensity of specific risk	Applied in CZ	Detailed information
Mitigate excessive credit growth and leverage	Countercyclical capital buffer	Sizeable credit recovery accompanied by easing of credit standards	Yes	→	Yes, 0.5% since 2017; 1% from 2018; 1.25% and 1.5% from 2019	section 5.2.2
	Macroprudential leverage ratio	Rising leverage, low aggregate risk weights, rising off-balancesheet risk	Potential	→	Microprudential limit introduced in 2018	section 3.1
	Sectoral capital requirements (in particular real estate exposure)	Elevated growth of loans and risks in specific sector	Potential	→	Not as yet; CNB uses other instruments to respond to real estate exposure risks	section 5.3
	LTV caps	Risk of spiral between property prices and property financing loans	Yes	→	Yes, since 2015, tightened in 2016 and 2017	section 5.3
	LTI, DTI, DSTI caps	Risk of excessive household indebtedness and debt service	Yes	→	DTI and DSTI yes, since 2018	section 5.3
Mitigate excessive maturity mismatch and illiquidity	Macroprudential NSFR	Long-term liquidity risk	Potential	→	Microprudential component introduced in 2016	section 4.2
	Macroprudential LCR	Short-term liquidity risk	No	→	Microprudential component introduced in 2015	section 4.2
Limit exposure concentrations	Systemic risk buffer	Property exposure concentration	Potential	→	Not as yet, CNB reacts to property exposure risks with other instruments	sections 3.1 and 5.3
	Public finance stress test	Sovereign exposure concentration	Yes	→	Yes, option of additional capital requirements in event of elevated since 2015	section 4.4
Limit 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 applied	section 5.2.3
	Systemic risk buffer		Yes	→	Yes, since 2014 for four banks, since 2017 for five banks	section 5.2.3
Strengthen resilience of financial infrastructures	Margin and haircut requirements on CCP clearing	Counterparty default risk, interconnectedness of financial infrastructures	No	→	No	-
	Increased disclosure				No	-
	Systemic risk buffer				No	-

Source: CNB

Note: The classification of intermediate objectives and instruments is based on Recommendation of the ESRB of 4 April 2013 on intermediate objectives and instruments of macro-prudential policy (ESRB/2013/1). The macroprudential component of some instruments has not yet been incorporated into the legislation. The microprudential component of these instruments has been activated.

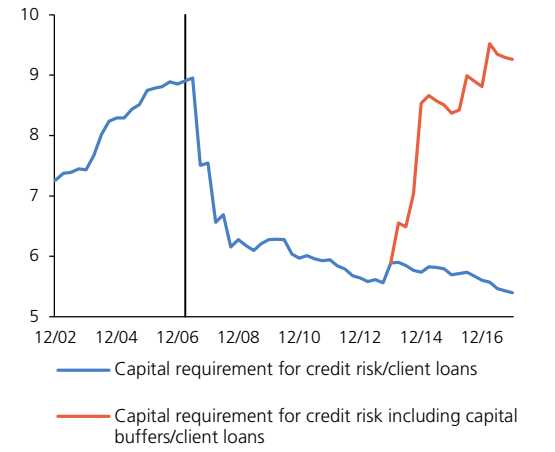
GRAPH V.1

Risk weights and the capital ratio
(v %)

Source: CNB
Note: The vertical line marks the start of the switch of banks to the IRB approach.

GRAPH V.2

Ratio of the capital requirement for credit risk (including capital buffers) to non-risk-weighted client loans
(%)



Source: CNB
Note: The vertical line marks the start of the switch of banks to the IRB approach.

5.1 THE CNB'S MACROPRUDENTIAL POLICY OBJECTIVES AND INSTRUMENTS

Pursuant to Article 2 of the Act on the CNB, the CNB maintains financial stability and sees to the sound operation of the financial system in the Czech Republic. To achieve these objectives, it conducts macroprudential policy. To this end, it uses a number of macroprudential instruments focused mainly on the banking sector, which is the largest sector in the Czech financial system. The current settings of these instruments in the banking sector and their objectives are summarised in Table V.1. The growing importance of investment and pension funds, in particular, also highlights the importance of forming a basis for conducting macroprudential policy outside the banking sector (see section 5.4.4 for details).

5.2 MACROPRUDENTIAL CAPITAL BUFFERS

5.2.1 Overview of Capital Buffers

The bank regulatory framework defined in CRD IV/CRR includes capital buffers, which are "stacked" on top of the required 8% capital minimum, and the Pillar 2 requirements. The capital requirement is risk-weighted and the minimum amount of capital is therefore derived from the level of the risks undertaken. These risks are determined on the basis of the level of risk-weighted exposures, i.e. on the volume of exposures and risk weights. The capital ratio is thus directly proportional to capital and indirectly proportional to the volume of exposures and risk weights (see Chart V.1).

Credit risk is the most important source of systemic risk for the domestic banking sector. Banks using the IRB approach (see section 3.2.1 for details) use internal models to set capital requirements (or rather implicit risk weights) for credit risk. Large domestic banks started to switch to the IRB approach in 2007 Q1. A decline in risk weights and a related increase in the capital ratio of the banking sector as a whole has been visible since then (see Chart V.1). On the other hand, as risk weights have declined, the ratio of the capital requirement for credit risk to the amount of non-risk-weighted client loans (the risky part of the exposures) has also fallen (see Chart V.2). This indicator is a modified version of the leverage ratio. After the completion of the switch of large banks to the IRB approach, the decline in risk weights and the ratio of the capital requirement (excluding capital buffers) to credit risk for client loans slowed, but it still persists. Initially, it was driven by the switch of other entities (and in some cases only parts of portfolios) to the IRB approach, which generally fosters a decrease in credit risk, as it is a tool for better managing individual and portfolio risks. In recent years, however, the decline in risk weights may also have been linked with the upward phase of the business and financial cycle, in which internal models allow capital

requirements to be reduced given the currently low risks.[1] A decline in risk weights to very low levels may become a source of systemic risk, especially its cyclical component. Sustained concurrence of these factors could therefore adversely affect the resilience of the banking sector. Capital buffers – especially the countercyclical capital buffer – allow the macroprudential authority to respond to these risks.

The CNB currently applies three capital buffers (see Table V.2) to increase the resilience of individual banks and the banking sector as a whole to any adverse developments. The buffer rates[2] 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%.[3] This rate will not change over time. The countercyclical capital buffer is intended to reduce the risks associated with excessive credit growth and leverage. The CNB set the countercyclical capital buffer rate at 0.5% at the end of 2015 and has increased it twice since then. At the time of publication of this FSR, the countercyclical capital buffer rate applied to exposures in the Czech Republic is 0.5%. It will move to 1.0% as from July 2018, 1.25% as from January 2019 and 1.5% as from July 2019 (see section 5.2.2 for details on the setting of the rate). The systemic risk buffer can be used to suppress various sources of non-cyclical risks to banking sector stability. The CNB uses this buffer to mitigate the risks associated with the existence of systemically important banks. Since 2017, five systemically important banks have been required to maintain a non-zero buffer, with rates ranging between 1% and 3% (see section 5.2.3 for details on the setting of the rate). The legislation favours the application of a buffer for other systemically important institutions (O-SIIs) to mitigate risks connected with systemic importance of banks. However, this buffer can be set at a maximum of 2%, which may not be sufficient in the case of the Czech Republic.[4] The CNB therefore does not actively apply the O-SII buffer. However, it updates the list of other systemically important institutions every year (see section 5.2.3 for details).

Activation of macroprudential capital buffers fosters an increase in the overall capital requirement for credit risk. At the end of 2017, the requirement was at roughly the same level in relation to client loans as at the end of 2006, i.e. before the introduction of the IRB approach (see Chart V.2).

TABLE V.2

Summary of capital buffers in the Czech Republic
(%)

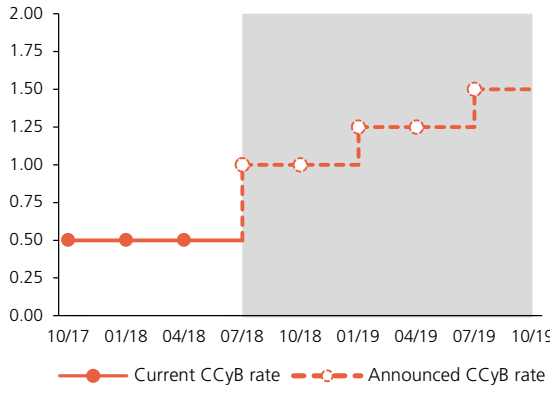
Capital buffer	Rate	Year of effect	Rate applied at time of publication of FSR
Capital conservation buffer	2.5	2014	2.5
Countercyclical capital buffer	1.5	2019	0.5
Systemic risk buffer	1–3	2014	1–3
Buffer for other systemically important institutions	–	–	–

Source: CNB

1 For details on the risk of procyclicality of risk weights under the IRB approach, see Brož, V.; Pfeifer, L.; Kolcunová, D. (2017): *Are the Risk Weights of Banks in the Czech Republic Procyclical? Evidence from Wavelet Analysis*. CNB WP No. 15/2017.
2 More detailed information about buffer rates and other macroprudential policy instruments in the Czech Republic can be found on the CNB website: http://www.cnb.cz/en/financial_stability/macroprudential_policy/index.html.
3 The buffer rate is expressed as the ratio of best-quality capital (Common Equity Tier 1) to the total risk exposure.
4 See Skořepa, M., Seidler, J. (2013): *An Additional Capital Requirement Based on the Domestic Systemic Importance of a Bank,* thematic article,FSR 2012/2013.

GRAPH V.3

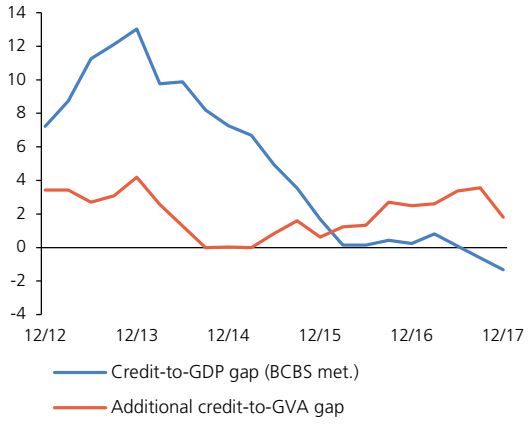
Current and announced CCyB rate in the Czech Republic
(% of total risk exposure)



Source: CNB

GRAPH V.4

Credit-to-GDP gap and additional gap
(pp.)



Source: CNB
Note: In the case of the standard deviation, the trend is estimated on the basis of the HP filter (lambda = 400,000) over the entire time series. The additional gap – the expansionary credit gap – is calculated as the difference between the ratio of bank loans to the gross value added (GVA) of the non-financial private sector and the moving minimum over the last eight quarters.

5.2.2 The Countercyclical Capital Buffer

The countercyclical capital buffer (CCyB) is designed to protect the banking sector against risks arising from its behaviour over the financial cycle, especially excessive growth in lending, which creates systemic risks and increases the potential for sharp swings in economic activity. The CCyB rate is set every quarter (see Chart V.3) using an approach based on several sequential steps (see Figure V.1). The rate becomes legally binding on the institutions concerned upon the issuance of a provision of a general nature. Methodological information summing up the CNB's approach to the setting of the buffer rate was presented in detail in a thematic article published in FSR 2016/2017.[5] An assessment of the relevant indicators, on the basis of which the Bank Board made a further decision on the CCyB rate in May 2018, is provided below.

An upward shift in the financial cycle and a rise in the domestic banking sector's vulnerability last year led to an increase in the CCyB rate

At its December meeting on financial stability issues, the CNB Bank Board decided to raise the CCyB rate to 1.25% with effect from 1 January 2019. It did so not only with regard to the upward shift of the economy in the growth phase of the financial cycle, but also on the basis of some banking sector vulnerability indicators. In March 2018, the CNB Bank Board confirmed the CCyB rate at 1.25%, stating that the CNB stood ready to increase the CCyB rate further in the event of continued rapid credit growth, increasing risks connected with property purchase financing, a strengthening of other cyclical sources of systemic risk and a rise in the vulnerability of the banking sector.

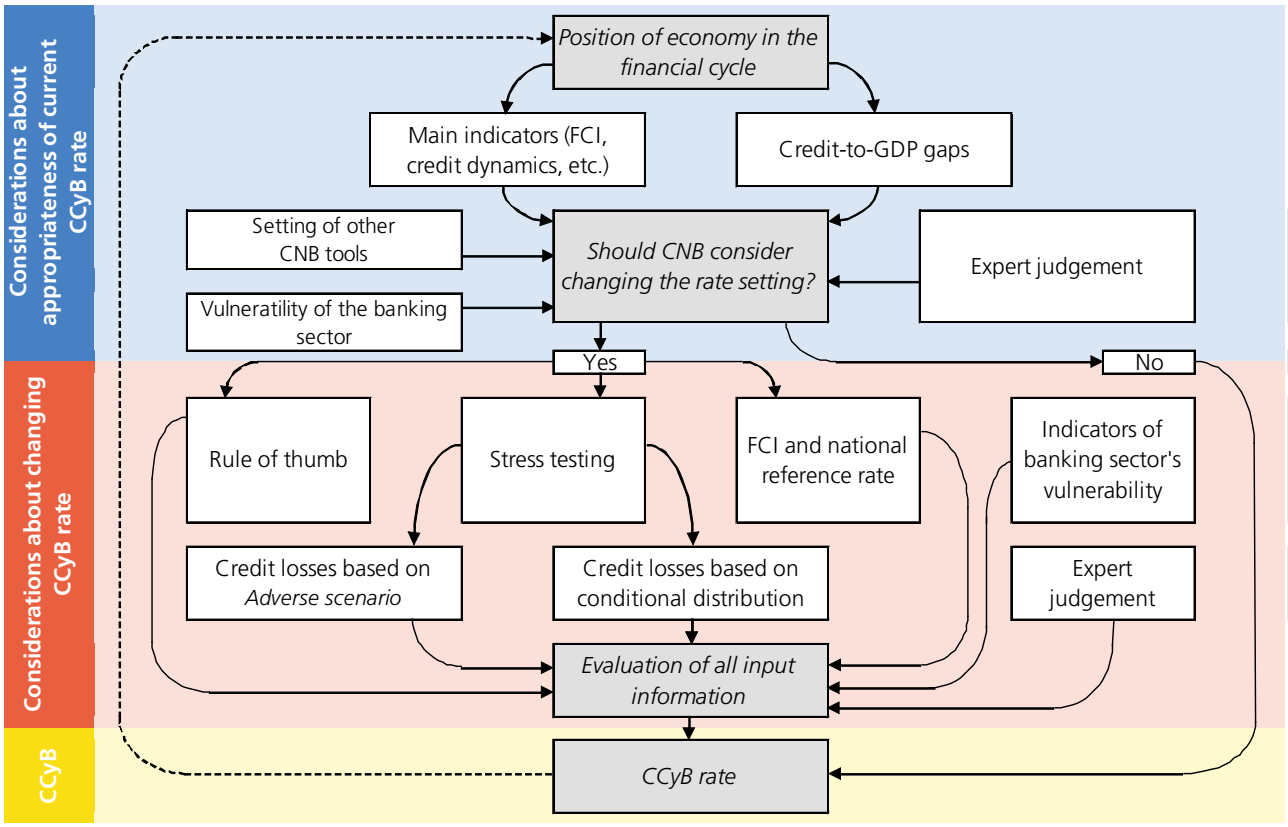
The deviation of the credit-to-GDP ratio from its trend remains an unreliable financial cycle indicator for the Czech Republic

On the basis of an ESRB Recommendation,[6] the CNB regularly publishes the ratio of total credit to the non-financial sector to GDP and the corresponding deviation of this ratio from its long-term trend. At the end of 2017, the ratio was 89.5% and the corresponding gap -1.3 pp. This value would indicate that the economy is in a downward phase of the financial cycle (see Chart V.4). However, the CNB considers this indicator to be unsuitable for converging economies with short time series containing structural breaks. The additional gap (the expansionary credit gap) indicated gradual growth in cyclical risks during 2017, but fell to 1.8 pp in Q4. This indicator must also be viewed as a very rough way of assessing the position in the financial cycle. Moreover, the picture provided by the two types of gaps is strongly affected by the surge in economic growth recorded in recent years, which is cyclical to a large degree. Consequently, these indicators do not provide a reliable guide for decisions on the CCyB rate.

5 Hájek, J., Frait, J., Plašil, M. (2017): *The Countercyclical Capital Buffer in the Czech Republic*, thematic article, FSR 2016/2017.
6 For details, see *Recommendation (ESRB/2014/1) on guidance to EU Member States for setting countercyclical capital buffer rates*.

FIGURE V.1

The CNB's approach to setting the CCyB rate



Source: CNB

The aggregate financial cycle indicator increased slightly in 2017

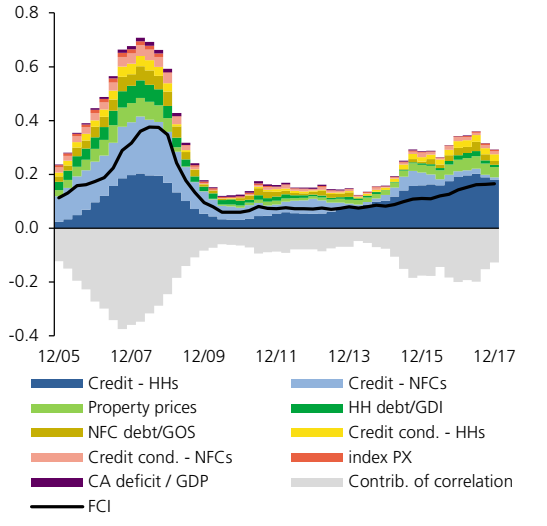
The aggregate financial cycle indicator (FCI), which combines signals of cyclical risks from various segments of the economy, showed a slight increase in 2017 (see Chart V.5). This was due mainly to the situation on the residential property market, where housing prices kept rising apace and new loans for house purchase remained elevated from a historical perspective. The growth in the FCI was also fostered by a higher correlation between the sub-indicators. This means that an increasing number of sub-indicators are jointly indicating a rise in cyclical risks. By contrast, weaker growth in new loans to non-financial corporations acted towards a decrease in the indicator compared to 2016.

Bank loans to the private sector grew faster than total loans

Growth in total loans to the private non-financial sector (comprising all loans plus bonds issued) accelerated year on year, reaching 6.0% in 2017 Q4. The growth rate of bank loans was slightly higher at 6.5% (see Chart V.6). As in previous years, this trend was driven by households' demand for debt financing (see Chart V.7). House purchase loans to households are recording the largest increases (8.6% in March 2018). Consumer credit to households has also maintained solid growth (4.6% in March 2018). In both segments, credit growth was above the relevant three- and five-year averages (see Chart V.8). By contrast, growth in lending to non-financial corporations slowed somewhat. The annual

GRAPH V.5

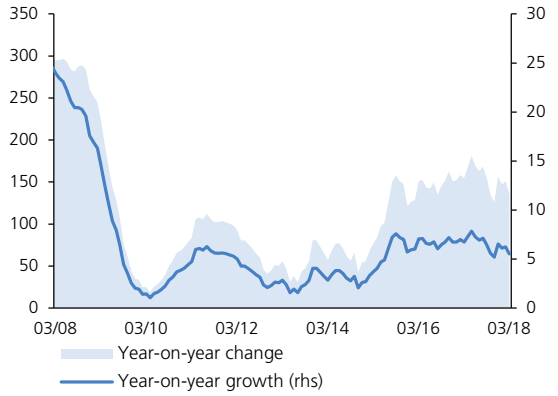
Decomposition of the financial cycle indicator
(0 minimum, 1 maximum)



Source: CNB, CZSO
Note: GDI = gross disposable income of households, GOS = gross operating surplus of non-financial corporations. 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. Weak correlation between the subindicators is reflected in growth in the negative contribution to the overall FCI value.

GRAPH V.6

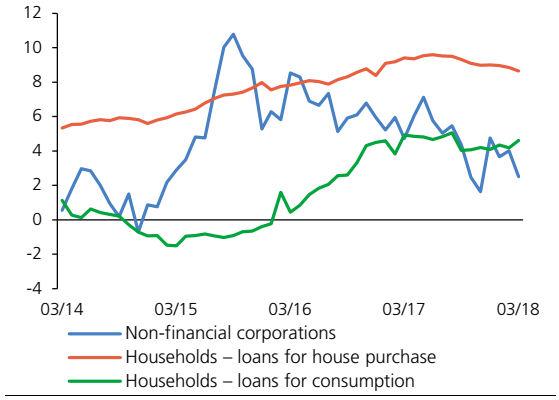
Absolute year-on-year differences and growth in bank loans to the private non-financial sector
(CZK billions; right-hand scale: %)



Source: CNB

GRAPH V.7

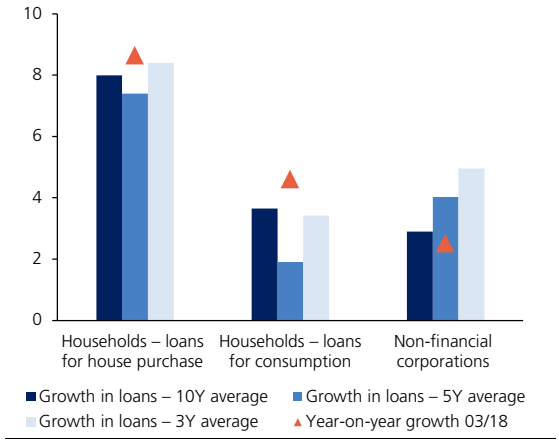
Year-on-year growth in bank loans to the private sector
(%)



Source: CNB

GRAPH V.8

Average and current growth in bank loans to the private non-financial sector
(%)



Source: CNB

growth rate of loans to non-financial corporations was still above the five- and ten-year averages in late 2017 (4.8% at the end of 2017), but fell to 2.5% in 2018 Q1. This can be partly explained by some non-financial corporations moving to bond-based funding. In a statistical survey conducted by the CNB and the Confederation of Industry of the Czech Republic, non-financial corporations are indicating a higher level of investment expenditure. The banking sector's expectations regarding growth in demand for investment loans are in line with this. Growth in bank loans to non-financial corporations can therefore be expected to accelerate again during 2018.

Growth in new bank loans was driven by the household sector

The higher lending activity is also evidenced by the evolution of new koruna bank loans (see Chart V.9). Genuinely new loans to households adjusted for refinanced and refixed loans were flat year on year in March 2018, owing to mixed trends in the housing and consumption segments (as measured by the three-month moving average of growth rates). Genuinely new loans to households for house purchase rose by 1.9% year on year in March 2018, whereas genuinely new consumer credit dropped by 2.6%. The strong growth has thus been cooling gradually, but the volumes of loans provided remain high. Genuinely new loans to non-financial corporations fell by 5.5%. This can be explained largely by some non-financial corporations shifting towards foreign currency and intra-company loans, which are not included in the statistics on new koruna bank loans. A higher degree of bond financing of non-financial corporations is having a similar effect.

The domestic economy recorded a further shift into a growth phase of the business and financial cycle…

The cyclical indicators presented above can be assessed overall as meaning that the domestic economy has shifted further upwards in the growth phase of the cycle, albeit at a slower pace. Despite partially tightening credit standards (see Chart V.13), higher lending activity can be observed in many credit segments. This activity is focused mainly on loans for house purchase. Optimistic expectations regarding income and the future evolution of housing prices, negative real interest rates on new loans for house purchase (taking into account wage inflation) and an undersupply of new apartments in cities are being reflected in a rise in residential property prices. The CNB currently considers these prices to be overvalued, and the estimated degree of overvaluation increased gradually during 2017 (see section 2.2). Despite the active application of macroprudential measures aimed at mitigating risks relating to the residential property market (see section 5.3), conditions are still in place for a spiral between property prices and property purchase loans. The potential systemic risks connected with the growth phase of the business and financial cycle are thus rising further owing to the cumulative effects of rising debt and asset prices and the high level of investment optimism.

Quantitative approaches confirm a need to create a CCyB for domestic exposures

Overall, the above-mentioned developments imply a need to create a CCyB for exposures located in the Czech Republic. The CNB uses a set of analytical approaches to obtain an indication of the CCyB rate.[7] The first approach is based on the FCI. According to the conversion applied by the CNB, its current level of just over 0.16 corresponds to a CCyB rate of 1.0% (see Chart V.10 and Table V.3). According to the CNB's analyses, the Czech economy is in the third year of the expansionary phase of the financial cycle. According to a rule of thumb which states that the CCyB rate should be increased by 0.5 pp in each year of the expansionary phase of the financial cycle, this roughly corresponds to a CCyB rate of 1.5%.[8] An approach based on the conditional loss distribution in a macro stress test of banks, which aligns modelled (unexpected) future credit losses with the capital buffer sufficient to cover them, indicates a need for a CCyB rate of 0.75%. To determine the final setting of the CCyB rate, banking sector vulnerability indicators need to be taken into account in addition to recommendations obtained from quantitative approaches (see Figure V.1).

The exceptionally low level of asset impairment losses may not be sustainable

Asset impairment losses remain exceptionally low (see Chart V.12). The risk mark-ups in interest rate margins are still very low as well. The ratio of the average interest rate margin to provisions created per unit of credit, which reliably captures cyclical developments in the banking sector, has also been rising since 2014 (see Chart V.11). Owing to the good shape of the economy and the favourable evolution of credit risk materialisation, aggregate risk weights are also continuing to fall. In the case of banks using the STA approach this fall is due to a change in portfolio structure (growth in exposures to the central bank), but in the case of IRB banks it also partly reflects the favourable economic developments, which are currently affecting the outcomes of the risk models applied (see Chart V.12).[9]

The potentially procyclical effects of the switch to IFRS 9 are increasing banks' vulnerability

In a document *Risks to financial stability and their indicators – January 2018* published on 31 January 2018, the CNB pointed out that risk perceptions and risk pricing by banks may be becoming overly optimistic in the current favourable phase of the business and financial cycle. The exceptionally low asset impairment losses are enabling banks to report higher profitability in the current interest rate environment. If banks were to interpret the very low level of asset impairment losses as

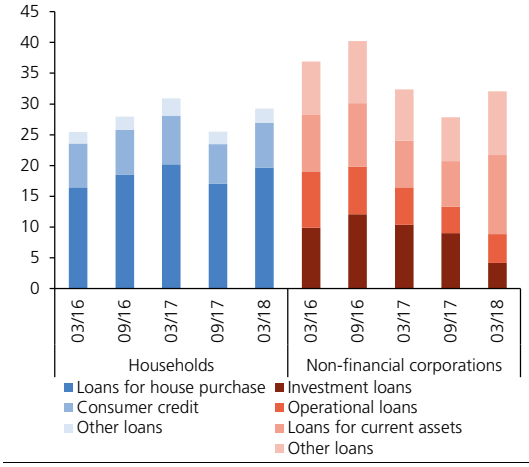
7 Hájek, J., Frait, J., Plašil, M. (2017): *The Countercyclical Capital Buffer in the Czech Republic*, thematic article, FSR 2016/2017.

8 The domestic economy entered the expansionary phase in 2015 Q4 (see *Provision of a general nature on setting the countercyclical capital buffer rate* No. IV/2015 of 3 December 2015). If the rapid growth in lending continues, the economy will enter the fourth year of the expansionary phase at the end of 2018.

9 See section 3.2.1 for details.

GRAPH V.9

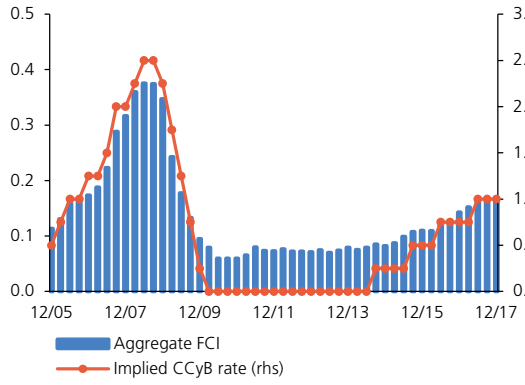
Amounts of net new loans to the private non-financial sector
(CZK billions)



Source: CCR, CNB
Note: Net new loans also include increases in existing loans.

GRAPH V.10

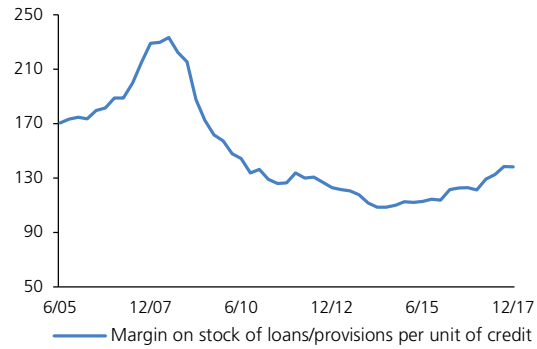
The FCI and the implied CCyB rate
(0 minimum, 1 maximum; rhs: % of total risk exposure)



Source: CNB

GRAPH V.11

Ratio of the interest rate margin to provisions per unit of credit
(%)



Source: CNB
Note: The margin on the stock of loans is the difference between the client lending rate and the client deposit rate.

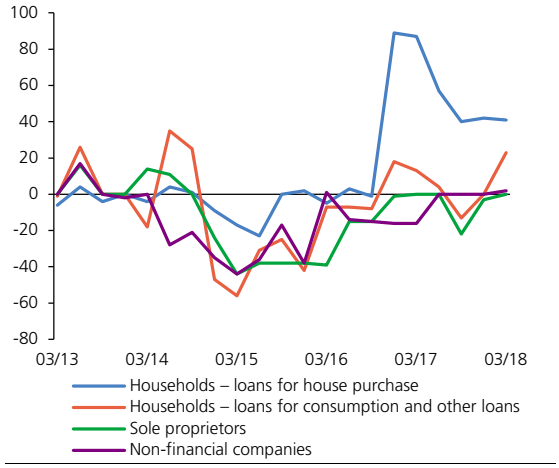
GRAPH V.12

Aggregate risk weights and asset impairment losses
(%; right-hand scale: bp)

Source: CNB

GRAPH V.13

Credit standards in the Czech Republic
(net percentages)



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

entirely non-cyclical, they might underestimate the amount of capital consistent with the systemic component of risks in the long run. One of the implications of the switch to the IFRS 9 accounting standard is now becoming an additional source of vulnerability. IFRS 9 was conceived to be beneficial to financial stability from the long-term perspective, because unlike the previous IAS 39 it creates conditions for early and sufficient provisioning against losses. However, the results of the current round of macro stress tests of banks support the view that IFRS 9 may have a procyclical effect in certain conditions (see section 4.1). Among others, an ESRB report[10] also draws attention to this effect. In the *Adverse Scenario*, the application of expected credit losses under IFRS 9 leads to temporarily stronger impacts on capital than under the previously applied IAS 39 methodology. These impacts are concentrated in the initial period of the adverse shock. Following a sudden change in economic conditions leading to a marked reassessment of macroeconomic fundamentals, banks need to create a large amount of new provisions. This sharp increase may in turn cause sizeable losses and a fall in capital and contribute to a credit crunch.[11] This effect may be partly dampened by compensation for the rise in provisions in the amount of regulatory capital.[12]

This source of vulnerability increases the importance of the CNB's forward-looking reaction

The switch to the new IFRS 9 reporting standard thus increases the need for the macroprudential authority to react in time to cyclical risks so that sufficient resilience of the banking sector to adverse economic shocks is achieved. More specifically, it is necessary from the macroprudential perspective to build a sufficient capital buffer before the models of expected losses used under IFRS 9 lead to increased provisioning that could ultimately result in the credit supply to the sound part of the real economy being restricted.[13] Given the uncertainty about some longer-term aspects of the implementation of IFRS 9, this effect should be reflected cautiously and gradually in the capital buffers. Based on the experience with the implementation of IFRS 9, the CNB will consider whether the extent of the coverage needs to be adjusted in either direction in subsequent years.

The CNB decided to increase the countercyclical capital buffer rate to 1.5% with effect from July 2019

As a result of the above assessment, the CNB Bank Board decided at its meeting on 17 May 2018 to increase the CCyB rate to 1.5% with effect from 1 July 2019. The CNB stands ready to increase the CCyB rate further in the event of continued rapid credit growth, increasing risks connected with property purchase financing, a strengthening of other cyclical

10 See ESRB: Financial stability implications of IFRS 9, July 2017.
11 See section 3.2.2 for details.
12 Up to 0.6 pp for banks using the IRB approach, due to the current regulatory approach to provisions (see Box 3.1).
13 The ESRB report *Financial stability implications of IFRS 9* states on page 6 and page 47 that the CCyB is one of the tools that could be use to mitigate risks associated with these effects.

sources of systemic risk and a rise in the vulnerability of the banking sector. On the other hand, the CNB is ready to immediately lower the buffer or release it fully and allow it to be used as a capital buffer to cover losses if the business and financial cycles reverse and financial market stress intensifies, jeopardising the smooth provision of loans to the sound part of the economy. In addition to growth in new loans, the CNB will use indicators of financial market stress and indicators of the general availability of (unsecured) financing (OIS and PRIBOR rates and OIS-PRIBOR spreads) to assess the need to release the CCyB. These indicators are able to indicate a significant change in market conditions without any delay.

The CNB considers the neutral level of the CCyB rate to be higher than zero

Ever since the CCyB was introduced, macroprudential authorities have been discussing how to approach it conceptually and how high the CCyB rate should be in the individual phases of the financial cycle. Some macroprudential authorities view the CCyB as a tool that should only be applied in a strongly expansionary phase of the financial cycle when systemic risks are already clearly visible. Other macroprudential authorities, among them the CNB, prefer a more prudential approach under which the macroprudential authority should begin creating the CCyB right at the start of the credit recovery when conditions are "normal". This means a situation where the financial sector exhibits neither elevated stress nor a higher propensity to take on risks. The concept of a non-zero CCyB rate in neutral conditions is applied, for example, by the Financial Policy Committee (FPC) in the UK.[14] The CNB will discuss this issue and take into account a whole range of factors, including the impacts of the implementation of IFRS 9 in the domestic banking sector, when setting the appropriate neutral rate.

Other European countries also responded to the shifts in the financial cycle with changes in CCyB rates…

As of April 2018, a total of eight European countries had announced non-zero CCyB rates (see Chart V.14). In five of them, a non-zero rate is now being applied. In five countries, an increase within a time scale of one year has also been announced. The main arguments for increasing the CCyB rate were a further shift into the expansionary phase of the financial cycle, strong growth in loans to the private non-financial sector, high indebtedness of this sector and rising property prices.

…the CCyB rate on domestic exposures is in line with rates in countries with a similar level of cyclical risks

The CNB sets the CCyB rate in line with the standard practice applied in most European countries (see Chart V.15). The rate announced in the Czech Republic is not overly strict compared to other countries. From the perspective of medium-term growth in credit and property prices, the

14 The FPC recommends maintaining the CCyB rate at 1% after the impacts of excessive stress have abated, even if systemic risks are at a normal level, i.e. neither elevated nor subdued. According to the FPC, a CCyB rate in this region, combined with other elements of the capital framework, provides sufficient capital to withstand a severe stress.

TABLE V.3

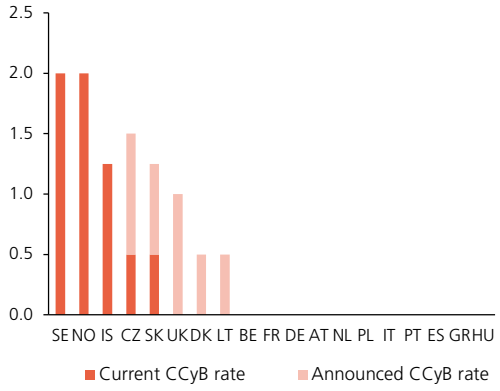
The implied CCyB rate based on various approaches
(% of risk-weighted assets)

Approach	Implied CCyB rate
Conversion based on FCI values	1.00%
Conditional distribution of future credit losses	0.75%
Duration of expansionary phase of cycle	1.50%

Source: CNB

GRAPH V.14

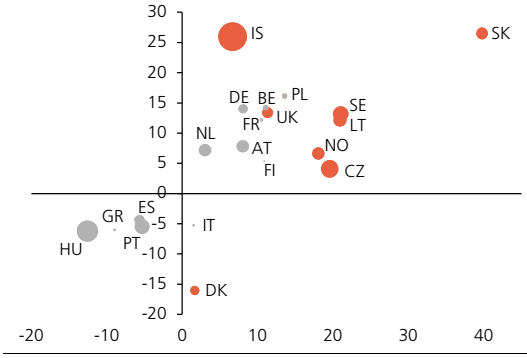
CCyB rates in selected European countries
(% of total risk exposure)



Source: ESRB

GRAPH V.15

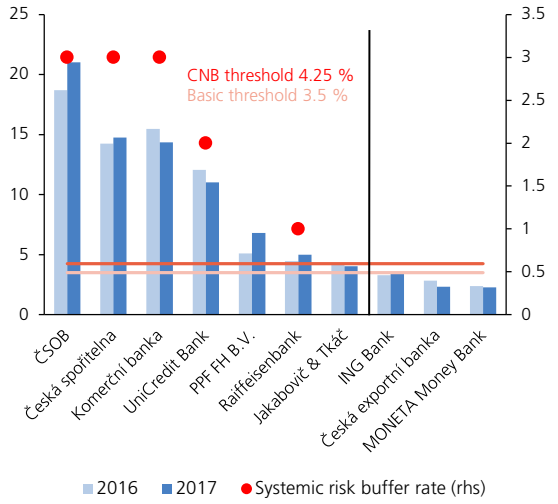
Cyclical risks in Europe
(x-axis: households three-year growth in stock of loans in %; y-axis: non-financial corporations three-year growth in stock of loans in %; size of bubble: deviation of property prices from 3-year average)



Source: BIS, Eurostat, NBS, NBI
Note: Countries with a non-zero announced CCyB rate are marked in red. With the exception of Greece (BIS), the source of the property price indices is Eurostat.

GRAPH V.16

Comparison of O-SIIs' scores as of mid-2016 and mid-2017
(%)



Source: CNB
Note: The black vertical line separates institutions included in the list of O-SIIs.

Czech economy is at a similar level to Norway, which applies a CCyB rate of 2%.[15] On the other hand, differences in the setting of CCyB rates can also be observed across Europe. Denmark is an example of a more prudent and stricter authority. In Poland and Belgium, by contrast, the CCyB rate remains at zero despite strong and broad-based growth in credit to the whole private non-financial sector.

5.2.3 Capital Buffers of Systematically Important Institutions

The systemic risk buffer rate remains will be revised

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.[16] 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 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.

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.[17]

The CNB set non-zero SRB rates for the first time in 2014, specifically for four systemically important banks. The CNB is required by law to review its reasons for setting the SRB once every two years.[18] The first review was conducted in 2016, using end-2015 data. On the basis of the review, the CNB increased the number of banks subject to the SRB to five and increased the buffer for two banks. With effect from 1 January 2017, the SRB is 3% for Česká spořitelna, ČSOB and Komerční banka, 2% for UniCredit Bank and 1% for Raiffeisenbank. The second review will be conducted in 2018, using end-2017 data. Based on the results of this assessment, the CNB will inform the relevant banks and authorities during the course of 2018 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 maintain an SRB.

15 The 2% CCyB rate in Norway has been effective since the end of 2017.
16 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.
17 See Skořepa, M., Seidler, J. (2013): *An Additional Capital Requirement Based on the Domestic Systemic Importance of a Bank*, thematic article, FSR 2012/2013.
18 In the event of potentially significant changes in the structure of the banking sector, the CNB stands ready to conduct a review immediately.

The list of other systemically important institutions is unchanged

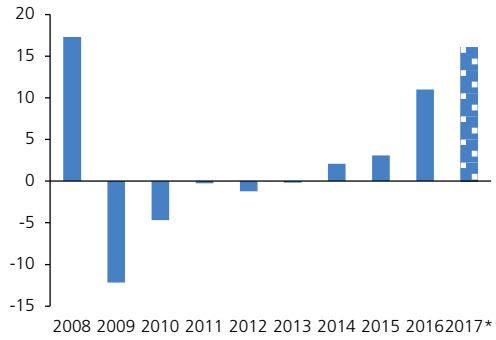
According to the CNB's evaluation, there are still seven other systemically important institutions (O-SIIs) in the domestic financial sector, so the list of O-SIIs for 2018 is unchanged (see Chart V.16). Since the first evaluation in 2015, the methodology has been based fully on EBA guidelines (EBA/GL/2014/10, hereinafter the "Guidelines").[19] Besides maintaining the highest possible degree of homogeneity of the O-SII group, the CNB intends to maintain stability in the case of institutions recording values close to the threshold. For this reason, one of the O-SIIs was not excluded from the list immediately after its score fell below the threshold set by the CNB (4.25%). It could only have been excluded if the decline in its systemic importance had been longer-lasting and its score had fallen below the cut-off of 3.5% stipulated in the Guidelines. The EBA, the European Commission and the ESRB were notified of the result of the evaluation on 28 November 2017.

The CNB still does not consider it necessary to set an additional capital requirement for banks that are members of the relevant regulated consolidated groups due to their designation as O-SIIs. The CNB continues to apply the systemic risk buffer (SRB) to mitigate the structural component of systemic risk linked with the existence of systemically important institutions, even though the O-SII buffer should primarily be used for this purpose. The CNB has long pointed out in international forums that the use of the SRB as an alternative to the O-SII buffer is due to legislative restrictions on the latter. At present, the O-SII buffer cannot be higher than 2% (the "general cap"). If a bank is a part of a foreign group designated as an O-SII or G-SII, the buffer cannot exceed that of the parent bank, or 1% (the "subsidiary cap"). As the parent institutions of all systemically important domestic banks are either O-SIIs or G-SIIs, the subsidiary cap represents a significant contrasint on the conduct of macroprudential policy in the Czech Republic. The planned review of the European macroprudential policy framework includes a change in the cap on the O-SII buffer. The Czech Republic, together with a number of other states, has proposed that the general cap be increased to at least 3% and that the subsidiary cap be abolished or, as a bare minimum, raised to at least 1.5% above the buffer of the parent. In the negotiation process there is strong pressure to set the subsidiary cap around 1% above the buffer of the parent. The CNB has intensively and consistently opposed this, as such a level would not be sufficient to cover the systemic risk that some large banks pose to the domestic economy.

19 More details on the evaluation methodology are available on the CNB website (*CNB > Financial stability > Macroprudential policy > List of other systemically important institutions*). The main methodological difference (in addition to slightly different thresholds) is that the EBA methodology for O-SIIs works with data for consolidated groups containing banks and (selected) non-bank entities, including foreign subsidiaries, whereas the CNB methodology for setting the SRB rate uses data for individual banks on an individual basis.

GRAPH V.17

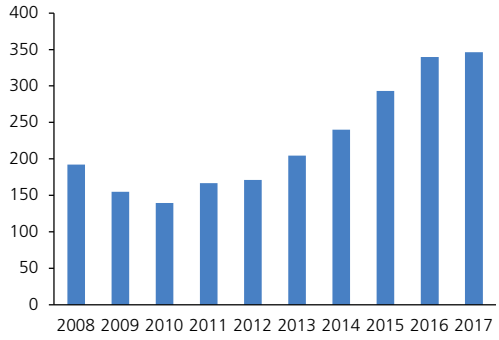
Apartment price growth rate
(year-on-year growth in %)



Source: CZSO, CNB calculation
Note: Average growth in transaction prices of apartments in individual quarters of the year according to tax returns (CZSO). * For 2017 calculated from quarterly changes in transaction prices of older apartments from a survey and from asking prices (CZSO).

GRAPH V.18

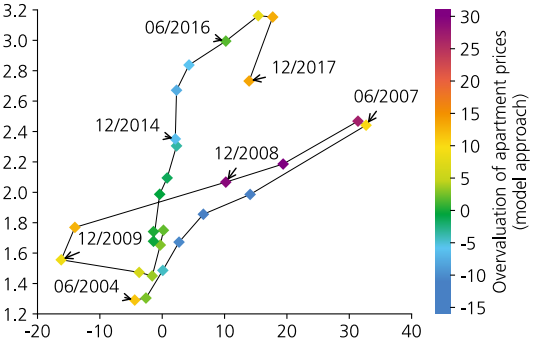
New housing loans
(yearly totals in CZK billions)



Source: CNB
Note: The data also include refixed and refinanced loans.

GRAPH V.19

The spiral and apartment price overvaluation
(x-axis: Growth in apartment transaction prices y-o-y in %; y-axis: New loans in relation to wages)



Source: CNB
Note: The spiral is derived on the basis of apartment price growth and the amount of new housing loans in relation to the level of wages.

5.3 RISKS ASSOCIATED WITH PROPERTY MARKETS

5.3.1 Risks Associated with Residential Property Markets

The overvaluation of housing prices increased further

Transaction prices of housing in the Czech Republic grew at the fastest rate in the entire EU for most of 2017. The average year-on-year growth rate of apartment prices in the individual quarters of 2017 was almost 16% (see Chart V.17).[20] The year-on-year growth rate started to slow somewhat in 2017 Q4, but it remained relatively high. The CNB's model-based approach indicates that housing prices were overvalued by around 14% at the end of 2017 (see section 2.2). The degree of property price overvaluation may thus in some cases be higher than the level of over-collateralisation implied by the current LTV limits.

The volume of new housing loans reached a new record

Banks provided almost CZK 350 billion in new housing loans in 2017, a new all-time high (see Chart V.18). The warnings of market participants in spring 2017 that the CNB's measures would cause the market to slump thus did not materialise. Year-on-year growth in new housing loans came to a halt in mid-2017. However, the monthly volumes of such loans remain very high (around CZK 28 billion in 2018 Q1). The total stock of bank loans for housing increased by almost 10% (around CZK 100 billion) last year, reaching CZK 1,150 billion in March 2018. The stock of housing loans recorded an year-on-year increase of 8.6% (or 9.4% in the case of mortgage loans) in 2018 Q1.[21]

The spiral between property prices and house purchase loans ceased to develop…

In FSR 2016/2017, the CNB identified a continued spiral between property prices and property purchase loans as the most significant domestic risk. Charts V.19 and V.20 show the position of the economy in the spiral using half-yearly data from 2004 to the end of 2017. As regards apartment prices, the economy is not currently as far into the spiral as it was in the pre-crisis years, but as regards the volume of new loans it is much higher. The indicators in both charts started to return to less risky levels in the second half of 2017, due in part to faster income growth. These indicators can be interpreted overall as meaning that the nature of the current expansion in the property market differs from the previous episode in stronger credit growth. The colours of the points in Chart V.20 clearly show the financial stability paradox: the NPL ratio is very low at the times of strongest expansion. This tends to be interpreted

20 Chart V.17 shows that before the crisis, apartment prices lept by 17% in 2008 compared to 2007. However, apartment prices then recorded year-on-year declines for several years. Year-on-year price growth was renewed in 2017 and gradually gathered pace.

21 There are those who believe that a 9% growth rate is not high, as the pace of growth of housing loans exceeded 30% in the middle of the decade preceding the crisis. However, base effects must be taken into account: 9% growth would mean an increase of more than CZK 100 billion in the total stock of loans in 2018, CZK 65 billion in 2011, CZK 33 billion in 2007 and only CZK 14 billion in 2004.

as evidence of low risks. In reality, the risks are usually increasing invisibly in the background in such a situation.

…but the conditions for setting the spiral in motion persist

The CNB is limiting the systemic risks relating to the property market expansion using macroprudential policy instruments and microprudential supervisory tools. These are based on its Recommendation on the management of risks associated with the provision of retail loans secured by residential property (the "Recommendation"). It sets quantitative LTV limits and qualitative criteria for prudential provision of such loans, primarily in the area of assessing clients' ability to service loans. The CNB assesses the risks associated with mortgage lending and banks' compliance with the Recommendation twice a year. The assessment based on data on loans provided in 2017 as a whole reveals that despite the positive effects of the tighter LTV limits in effect since April 2017, credit financing remains a source of systemic risks. The conditions for financing housing purchases on credit remain attractive. Interest rates on loans for house purchase are well below the long-term average and, accounting for wage inflation, are still negative in real terms. The tightening of monetary policy through three increases in the monetary policy rate and the communications hinting at a further increase have so far only resulted in a slight increase in rates on client loans (see Chart II.14). Given the observed growth in household income, the incentive for credit financing may remain strong for some households. At the same time, households remain optimistic about how easy loans will be to repay and about property purchase prices continuing to rise in the long term.

Growth in residential property prices was accompanied by an increase in the average size of new loans for house purchase

According to data from the Survey of new loans secured by residential property (referred to below as the "Survey" and "loans" respectively), the average size of loans granted rose further in 2017 H2 (see Chart V.21). This is consistent with the continued growth in housing prices and households' willingness to finance property purchase using debt. Although the total volume of new loans slowed slightly in H2, it remains at levels that can be labelled as very high in historical terms (see Chart V.21)

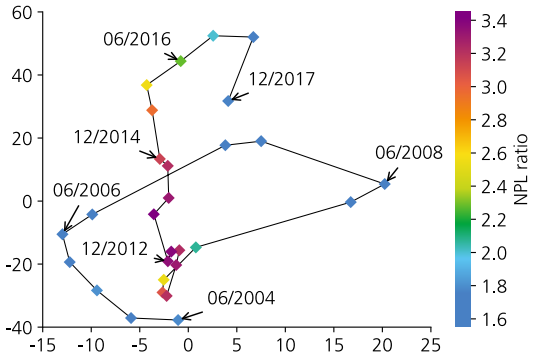
The CNB responded on an ongoing basis to risks associated with the property market

The existence of conditions for a spiral between property prices and property purchase loans identified in FSR 2016/2017 necessitated an appropriate response from the CNB. Tighter recommended limits for the LTV ratio therefore took effect at the start of 2017 Q2. They prevent the provision of individual loans with LTVs of over 90% (the "individual limit") and limit the provision of loans with LTVs of 80%–90% to a maximum of 15% of new loans in the quarter (the "aggregate limit"). In June 2017, the CNB recommended that lenders should monitor the DTI and DSTI ratios, set internal limits for them and prudently assess loan applications based on them. The CNB also defined levels for the DTI (debt-to-income) ratio and the DSTI (debt-service-to-income) ratio above

GRAPH V.20

The spiral and the NPL ratio

(x-axis: Overvaluation (price to income) in %; y-axis: New loans in relation to wages (deviation from mean) in %)

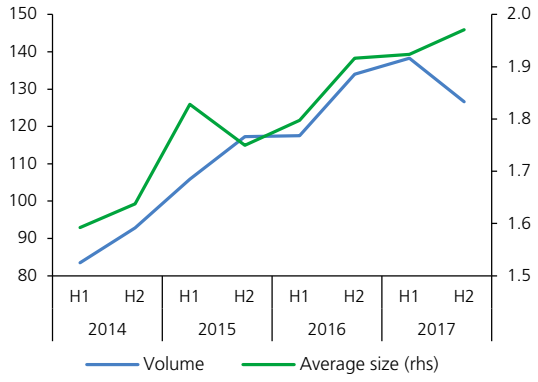


Source: CNB
Note: The spiral is derived on the basis of apartment price overvaluation and the gap in the amount of new housing loans in relation to the level of wages.

GRAPH V.21

Volume and average size of new loans

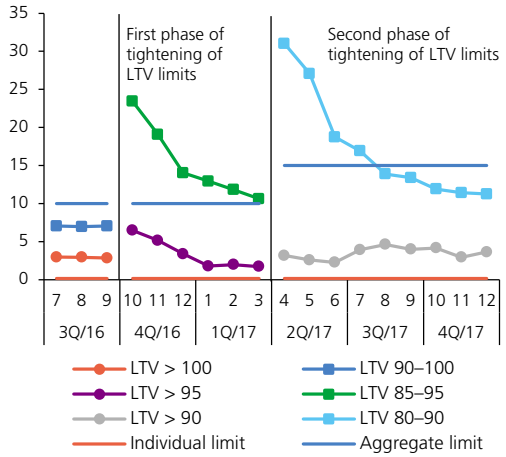
(CZK billions; right-hand scale: CZK millions)



Source: CNB

GRAPH V.22

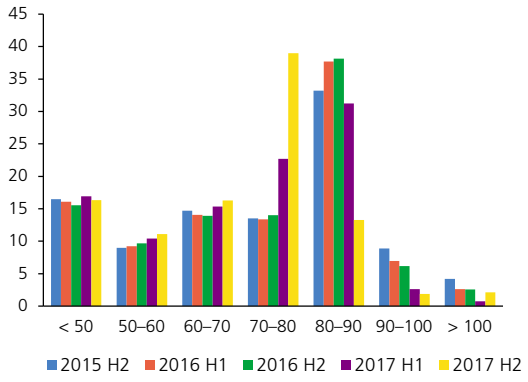
Fulfilment of the recommended LTV limits
(x-axis: LTV in %; y-axis: share of loans in %)



Source: CNB

GRAPH V.23

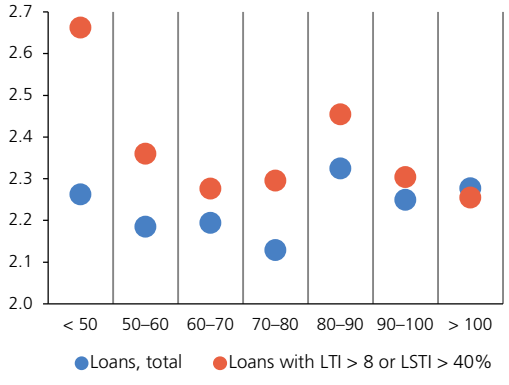
LTV distribution of new loans
(x-axis: LTV in %; y-axis: share of loans in %)



Source: CNB

GRAPH V.24

Average interest rates by loan characteristics
(x-axis: LTV in %; y-axis: %)



Source: CNB

which lenders should particularly prudently assess loan applications. The CNB also extended the scope of application of the Recommendation to other loans provided to clients who already have a loan secured by residential property and also to all lenders. In November 2017, the CNB published a Supervisory benchmark on the provision of loans to households by credit institutions summarising prudential lending principles for banks. CNB microprudential supervision responds to risk profiles differing from the CNB Recommendation (the volume of risk) and/or insufficient risk management processes relative to the Supervisory Benchmark using an additional capital requirement under SREP.

Institutions' compliance with the stricter recommended LTV limits improved…

Data from the Survey for 2017 H2 indicated gradual convergence between banks' lending practices and the tighter recommended LTV limits. Despite a delayed start, the institutions concerned were broadly compliant with the Recommendation in force as regards LTV limits at the end of 2017. Loans with LTVs of 80%–90% accounted for 15% and 12% of lending in 2017 Q3 and Q4 respectively and were thus compliant with the maximum recommended ratio of 15% at the aggregate level (see Chart V.22). Loans with LTVs of over 90%, which, under the Recommendation, should not be provided at all, accounted for around 4% of credit production in the two quarters. Although institutions exceeded the individual limit quite frequently, in most of them the proportion of loans in excess of the limit did not go over 5% of credit production.

…and changes in the LTV distribution of new loans affected interest rates

The adjustment by institutions to the recommended limits led to a significant increase in the proportion of loans with LTVs of 70%–80% at the expense of loans with LTVs of 80%–90%, to which the aggregate limit is applied (see Chart V.23). The LTV distribution of new loans was almost unchanged from 2017 H1. Institutions reflected the aggregate limit for loans with LTVs of 80%–90% in higher interest rates in that category (see Chart V.24). Those rates also recorded the biggest year-on-year increase across all LTV categories (see Chart V.25). In 2017, there was also higher growth in rates on loans with riskier LTI (loan-to-income) and LSTI (loan service-to-income) ratios. In year-on-year comparison, lenders thus started to take more account of clients' risk characteristics when setting interest rates.

Formal compliance with the recommended limits may not imply an absence of risk in all cases…

The shift towards lower LTV levels in response to the stricter LTV limit (see Chart V.23) can generally be interpreted as a reduction of risks on the side of lenders. However, the effectiveness of LTV limits in limiting systemic risks also depends on how the collateral value of property is determined and on compliance with the principle of conservative property valuation by lenders. In some cases, lenders may have an incentive to reduce the LTV level through an optimistic assessment of a property's value in order to get just below the individual or aggregate

limit. The data presented in Box 5.1 suggest that this may be happening in some cases. The CNB will therefore monitor compliance with the principle of conservative collateral valuation and will require consistent reporting by lenders of purchase price data and the estimated values of properties being purchased.

…and some practices may be non-compliant with the Recommendation in force

For the recommended LTV limits to be effective, it must likewise be ensured that they are not circumvented through concurrent provision of unsecured (consumer) loans used to part-finance property purchases, which would not be in line with to the Recommendation. The CNB now has data on mortgages in respect of which clients took out an unsecured loan from any financial institution a year before or after the mortgage was provided (see Chart V.26). The data do not enable it to determine whether the taking out of an unsecured loan is linked directly with the part-financing of property. Despite the relatively low volume of concurrently provided unsecured loans, however, the increase in such loans recorded at the time the stricter LTV limits took effect prompts a need to address this issue and take action to prevent circumvention of the Recommendation in this way.

BOX 5.1: ASSESSMENT OF PROPERTY PRICE VALUATION BY BANKS

The LTV caps contained in the Recommendation[22] are an important instrument for reducing systemic risks associated with credit financing of housing and property market developments. To assess the effectiveness of this instrument and its configuration, it is important to monitor how banks determine the value of underlying property[23] in the denominator when calculating the LTV ratio (the "value", "estimated value" or "valuation") and whether the effectiveness of LTV limits is being weakened by modifications to the valuation methods. According to the Recommendation, providers *"should determine collateral value for the purposes of calculating the LTV ratio in a conservative manner, taking into account the risk of property price overvaluation"* (Article IV(4) of the Recommendation).[24] They should thus respond to excessive property price growth by

22 The Recommendation published as Official Information of the Czech National Bank of 16 June 2015, 14 June 2016 and 13 June 2017. LTV limits are discussed in *Recommendation A: Compliance with LTV limits for new retail loans secured by residential property* (Article IV). For the setting of LTV limits see also Hejlová, H., Holub, L., Plašil, M (2018): *The introduction and calibration of macroprudential tools targeted at residential real estate exposures in the Czech Republic,* thematic article in this Report.

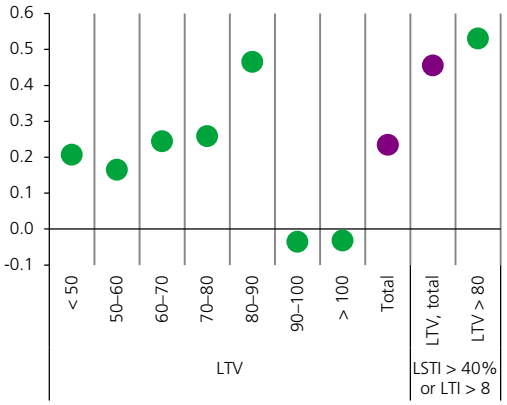
23 One or more properties used to secure a loan.

24 The collateral value means the estimated value of the property as determined by a prudent assessment of the future marketability of the property by taking into account long-term sustainable aspects of the property, the normal and local market conditions, the current use and alternative appropriate uses of the property (Article III(8) of the Recommendation).

GRAPH V.25

Year-on-year changes in average interest rates by loan characteristics

(x-axis: LTV in %; y-axis: changes in pp; 2017 H2)

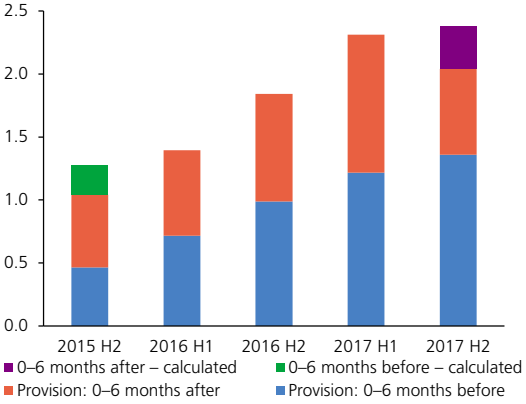


Source: CNB

GRAPH V.26

Parallel provision of an unsecured loan and a mortgage

(x-axis: half-year in which mortgage was provided; y-axis: unsecured loans in CZK billions)

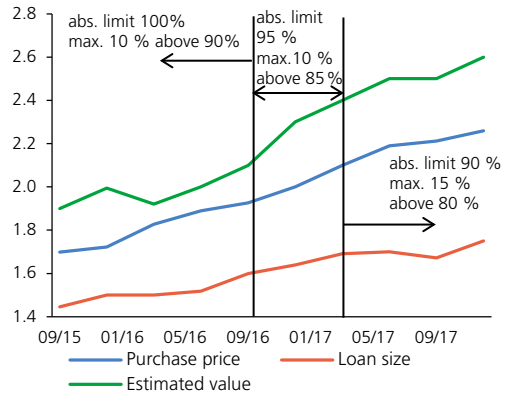


Source: CNB

Note: The terms "before" and "after" relate to the time of provision of the mortgage. For the first and last period under review, the data are calculated for the whole period, as the known data do not cover the entire six months. The data for the time ranges of one year before and one year after provision of the mortgage offer a similar picture.

GRAPH V.1 BOX

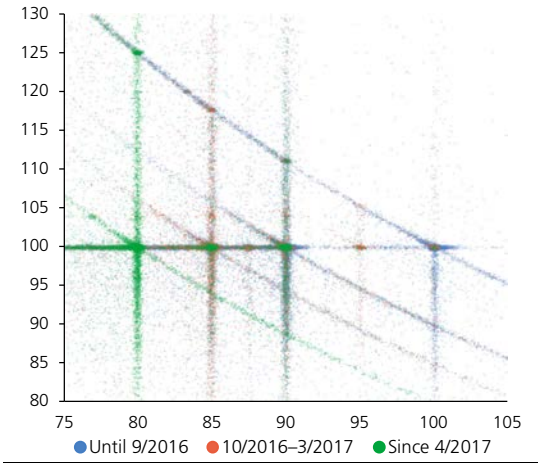
Comparison of the median purchase price, the loan size and the estimated property value from the Survey
(CZK millions)



Source: CNB
Note: For new loans excluding refinanced loans with a non-zero purchase price available. The vertical lines separate the periods when the various LTV limits were in effect.

GRAPH V.2 BOX

Comparison of the relationship between the LTV ratio and the ratio of the estimated value to the purchase price
(x-axis: LTV in %; y-axis: Ratio of estimated value to purchase price in %)



Source: CNB
Note: For new loans excluding refinanced loans with a non-zero purchase price available. The colours indicate the periods when the various LTV limits were in effect.

reducing the estimated value of the underlying property relative to the purchase price.

The data sources used by the CNB to assess banks' approaches to determining the estimated value include figures obtained from the Survey. In addition to the LTV ratio and the estimated collateral value, banks also state the property purchase price for about one-third of loans.[25] These figures show that they set the estimated value higher than the purchase price on average (see Chart V.1 Box). The estimated value remains set at the purchase price level for the bulk of new loans (the estimated value was set to the purchase price for 44% of loans with the specified purchase price in the period from April 2017 to the end of 2017). The growth in the median estimated value was meanwhile 3.8 pp higher than the increase in the median purchase price in the period of 2015 Q3–2017 Q4. The faster growth in the median estimated value than the median purchase price may mean that for some loans, compliance with the LTV limits might have been achieved by increasing the estimated value. Since the increase in the median purchase price was in line with the growth in official property price indices, the approach of some banks to valuing property used as collateral may in some cases not be in conformity with the relevant provision of the Recommendation. If this approach proved to be dominant, the macroprudential authorities would have to consider lowering the LTV cap.

In a growth phase of the financial cycle, characterised by property prices rising above levels consistent with fundamentals, it is important as regards reducing systemic risks to ensure that size of mortgages does not grow at the same pace. The data show that the median purchase price rose by 10 pp more than the median loan size in 2015 Q3–2017 Q4. The increase in the gap between the median estimated value and the median loan size may be banks' response to the gradual lowering of the LTV cap.

To assess how the introduction of LTV limits affected banks' property price valuations, the relationship between the LTV ratio (the horizontal axis) and the ratio of the estimated value to the purchase value for individual new loans is shown in a chart (see Chart V.2 Box)[26]. Different colours are used for the points to differentiate between the periods of effect of the LTV limits. The chart reveals a gradual decrease in LTVs for new loans. It also

25 For example, the property price tends not to be given where the loan is for the construction of a new property rather than the purchase of an existing one. Similarly, the price is usually not available where an existing loan is being refinanced. Refinanced loans account for 23% of the total number of loans in the Survey. Loans with a price make up 39% of new loans.
26 The jittering method was used, i.e. small random noise was added to data in order to prevent overplotting.

shows concentrations of points (loans) along parallel lines reflecting different types of behaviour of mortgage applicants and providers. As mentioned above, in most cases the estimated property value is set at or close to the purchase price level, i.e. the property purchase price is seen as a benchmark. This is expressed by the horizontal line at the 100% level. After the property transfer tax payer was changed (on 1 November 2016[27]), a faint horizontal line at 104% can be observed in the chart. This might imply that in some cases the estimated property value is increased to include the 4% tax.

Another visible relationship is the inverse proportion between the LTV ratio and the ratio of the estimated value to the property purchase value (the downward sloping curves). This may be due to the fact that when negotiating the loan, the applicant only knows the purchase price, not the estimated property value, and is thus applying for a loan expressed as a percentage of the purchase price. If the size of the loan is not altered after the assessment, an inverse relationship arises between the LTV ratio and the ratio of the estimated value to the purchase price.[28]

The last relationship identified occurs when the loan size depends primarily on the estimated property value (the vertical line). This situation may arise for various reasons, the common feature of which is applicants trying to obtain credit right up to the maximum LTV. This may involve them trying to raise additional cash when the estimated property value is unfavourable for them (for example through consumer credit) or to make use of the possibility of obtaining relatively cheap funds for household equipment or other outgoings indirectly related to the property purchase. A common feature of such loans is that their size depends not on the property purchase price but on the estimated value and the LTV limit in effect. This behaviour is represented in the chart by vertical lines at the LTV limits in effect in the given time periods (i.e. 80%, 85%, 90% and 100%).[29]

27 Under Act No. 357/1992 Coll., "the payer of the property transfer tax shall be the assignee of the right to real property" (Article 1(1)). Before 31 October 2016, the payer of this tax was usually the assigner of the right to real property.

28 If the size of the loan is set proportionally to the purchase price, i.e. as $U=LTV_{limit}*P$, where U is the loan size, LTV_{limit} is the LTV limit in effect (i.e. 80%, 85%, 90% or 100% in individual years) and P is the property purchase price, the following holds for the resulting ex-post LTV: $LTV= LTV_{limit}*P/V= LTV_{limit}/(V/P)$. The relationship between the ratio of the estimated value and the purchase price V/P and the LTV ratio is thus an inverse proportion. So, for example, if the value of the underlying property turns out to be higher than the purchase price, or if the borrower provides additional collateral increasing the collateral value, the reported LTV ratio decreases.

29 The green line corresponds to the LTV limit of 80% in effect since April 2017, the red line to the 85% limit in effect from October 2016 to March 2017 and the blue line to the limit in effect until September 2016. Lines for the absolute LTV limits (90%, 95% and 100%) are also partially visible.

The parts of the vertical lines where the ratio of the estimated value to the purchase price is higher than 100 % can be interpreted favourably in terms of financial stability as situations where banks require additional collateral from a loan applicant where the applicant hits the LTV limit, thereby reducing their loss given default (LGD). A ratio of the estimated value to the purchase price of over 100% may also arise when the purchase price does not correspond to the actual property value, such as in a sale between relatives connected with probate proceedings or when a combined loan is provided for the purchase and renovation of an old property. However, a ratio of the estimated value to the purchase price of over 1 may also reflect circumvention of the LTV limit by setting the estimated property value so that the loan falls into a category with a lower LTV ratio.

The results of the analysis should not be interpreted as meaning that banks responded to the gradual lowering of the LTV cap by being less prudent when providing mortgage loans. Most loans are negotiated for 80% of the purchase price, and the estimated property value is mostly in line with the purchase price. Nevertheless, the share of loans for which the estimated value exceeds the purchase price is not negligible, even after the CNB tightened the rules for the provision of loans secured by residential property in April 2017. Loans with an estimated property value of more than 110% of the purchase price account for around 11% of loans with LTVs of over 70%. Part of the data also contain information on whether only the estimated value of the property being purchased, i.e. unaffected by any additional collateral, was used for the loan.[30] Even in this category of loans, the share of loans with an estimated value of more than 110% of the purchase price also accounted for around 11% of loans with LTVs of over 70%.

The CNB responded to the risk of a price spiral by tightening the LTV limits

The CNB responded on an ongoing basis to the increasing overvaluation of property prices, the high growth rates of new loans and the significant share of new loans with a combination of high LTV, LTI and LSTI levels by gradually lowering the LTV limits in the Recommendation. The CNB assesses the effect of the stricter LTV limits and some other parameters of the Recommendation as positive. They have caused year-on-year growth in new mortgages to halt and made loans with high LTVs more expensive. The tightening of the LTV limits has so far been consistent

30 According to the available data, additional property was used as collateral for less than 20% of loans for which the estimated value of only the property being purchased was given.

with the rise in the estimated overvaluation of apartment prices, which is increasing the riskiness of mortgages for mortgage lenders. Given the current estimated overvaluation of housing prices, the existing LTV limits are at their border values from the point of view of prudential hedging of potential risks. However, given the signs of slowing growth in housing prices and the favourable trend in household income, the CNB does not deem it necessary to further tighten the recommended LTV limits at present.

The CNB is not changing the Recommendation regarding buy-to-let loans and views standardisation of this product by lenders as the appropriate solution

One of the existing recommendations is that the LTV ratio should not exceed 60% for certain categories of buy-to-let loans. Such loans accounted for less than 4% of new loans in 2017 H2 and have long been reported at low levels in the Survey. Information from the market often indicates that the actual share is much higher. The provision of such loans under the recommended conditions for financing owner-occupied residential property may lead to incomplete or distorted assessment of the related risks. The CNB therefore believes that extending banks' product ranges to include specific loans for buy-to-let purchases, which would also include detailed master credit standards, would help increase the transparency of the credit market and improve the system for managing the relevant risks. The long-term objective should be to cultivate a credit market where buy-to-let loans are financed mostly by credit products fully reflecting the nature of such loans and their risks.

Institutions are providing a substantial amount of mortgages with risky characteristics in terms of borrowers' debt servicing capacity

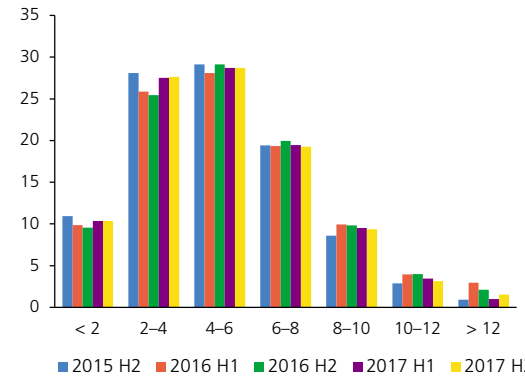
In FSR 2016/2017, the CNB identified loans with a DSTI ratio of over 40% and an LTI ratio of over 8 as risky. Lenders should be particularly prudent when assessing applications for loans with these or worse values. This applies especially when the recommended LTV limits are also exceeded. The results of the Survey indicate that loans with simultaneously risky LTV, LTI and LSTI levels continue to be provided to a significant extent. The share of loans with an LSTI ratio of over 40% and/or an LTI ratio of over 8 remained broadly stable in 2017 (see Charts V.27 and V.28). When reducing the volume of loans with LTVs of 80%–90%, institutions did not significantly reduce the volume of loans that simultaneously had an LSTI ratio of over 40% or an LTI ratio of over 8. Loans with a high probability of default and a potentially large loss given default were thus not eliminated. Almost 10% of loans had both ratios above the said levels. The percentage of risky loans in the category of loans with LTVs of over 80% and that in total loans remained roughly the same. From this perspective, the results do not indicate that lenders were stricter in approving risky loans with higher LTV ratios.

The financial reserve may be decreasing for applicants for new loans

Despite a gradual increase in the average size of new loans, the LTI and LSTI distribution remains stable over time (see Chart V.30), due in part to the fact that as the loan size increases, the amount of net income

GRAPH V.27

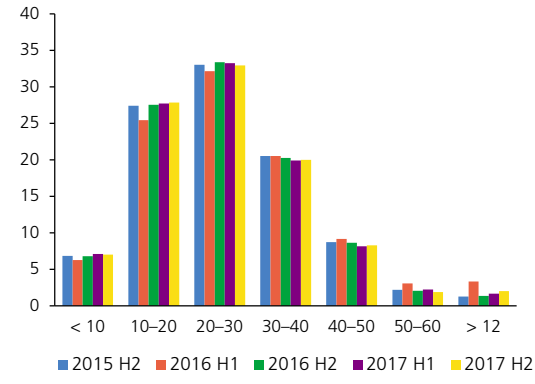
LTI distribution of new loans
(x-axis: LTI in years; y-axis: share of loans in %)



Source: CNB

GRAPH V.28

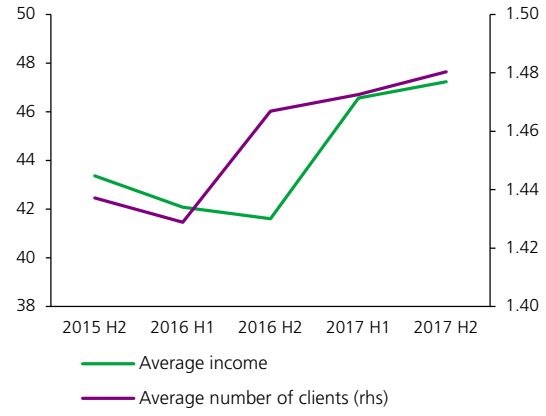
LSTI distribution of new loans
(x-axis: LSTI in %; y-axis: share of loans in %)



Source: CNB

GRAPH V.29

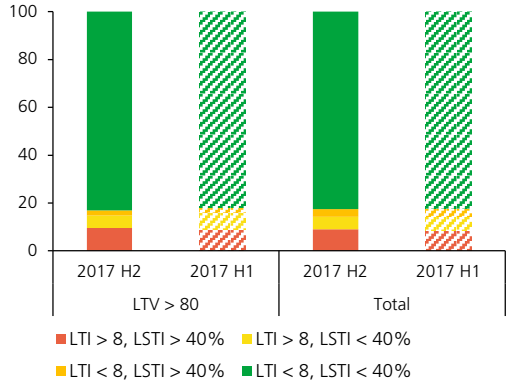
Average documented income and number of clients included
(CZK thousands; right-hand scale: in units)



Source: CNB

GRAPH V.30

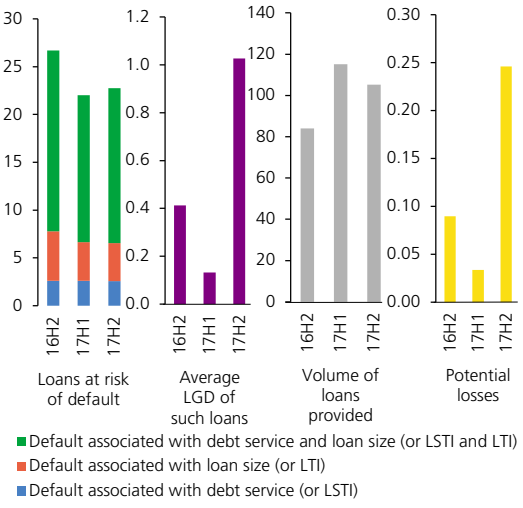
Breakdown of the riskiness of loans by LTV category in the Recommendation
(x-axis: LTV in %; y-axis: share of loans in %)



Source: CNB

GRAPH V.31

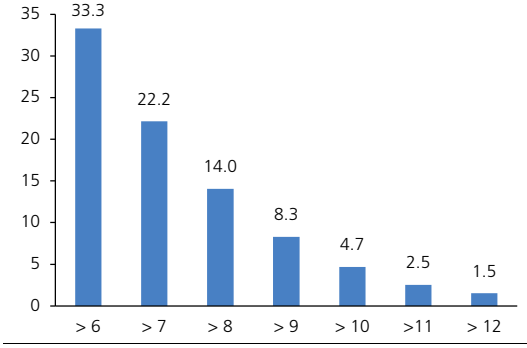
Indicator of potential losses on new loans and its components
(%; %; CZK billions; CZK billions)



Source: CNB

GRAPH V.32

LTI distribution of new loans
(x-axis: LTI in years; y-axis: share of loans in %; 2017 H2)



Source: CNB

declared in the loan application also rises. Although this can be partly explained by the improving income situation of households, the higher declared income is also partly due to a rising average number of applicants included in the documented income (see Chart V.29). This tendency may indicate that for a growing number of clients, documenting only one person's income is not sufficient to obtain a loan of the required size.

The CNB continues to regard loans with DSTIs of over 40% and DTIs of over 8 to be risky

The CNB regularly assesses the riskiness of loans according to their LSTI and LTI ratios using data on individual loans from the Survey (for details see the thematic article The introduction and calibration of macroprudential tools targeted at exposures secured by residential property in the Czech Republic in this Report). The results of analyses conducted for loans provided in 2017 H2 and the stress tests of households (see section 4.3) confirm that loans with LSTIs of over 40% and LTIs of over 8 can still be assessed as risky. The stress tests also show that loans with DSTIs at 30% may be a major risk for households with relatively low income. Exceeding these limits significantly increases the probability of loan applicants being exposed to an increased risk of default in the future (see Charts 3 and 4 in the above-mentioned thematic article).

The risks associated with the provision of new loans increased slightly overall in 2017 H2

The summary indicator of potential losses on new loans, which assesses the risks associated with the provision of housing loans in terms of financial stability, rose slightly compared with previous rounds of the Survey (see Chart V.31).[31] This is due mainly to a rising estimate of the average loss given default, which reflects increasing overvaluation of housing prices in relation to the LTV limits in effect. However, the component of the indicator that assesses the risks associated with borrowers' loan servicing capacity is also rising moderately. Conversely, a slight decline in the total volume of new loans reduced the growth in absolute potential losses for the banking sector.

The potential risks in the area of borrowers' vulnerability necessitate an extension of the scope of application of the CNB Recommendation

Housing prices in the Czech Republic tend to grow faster than the disposable income of households. This is being reflected in an increase in the loan amounts needed to purchase housing and hence in the relative indebtedness of borrowers. Borrowers are thus becoming more vulnerable. Given the current housing prices and optimistic income expectations, the likelihood of problem applicants with lower risk

31 The methodology relating to the construction and logic of the indicator is described in Hejlová, H., Holub, L., Plašil, M. (2018): *The introduction and calibration of macroprudential tools targeted at exposures secured by residential property in the Czech Republic,* thematic article in this Report.

aversion seeking loans to an increasing extent is meanwhile rising. Based on a risk assessment, the CNB considers it necessary to further extend the Recommendation in this area to include instruments targeted at risks which lenders as a whole are exposed to indirectly through borrowers' balance sheets and their potential reaction to worsening economic conditions.

Given the growing risks in the areas of household debt and debt service, the Recommendation has been extended to include DTI and DSTI caps…

Based on the finding that a significant percentage of loans are displaying risky characteristics in terms of applicants' income (see Charts V.32 and V.33), the CNB is extending the Recommendation to include the setting of upper DTI and DSTI limits. Both recommended ratios are of critical importance. The DTI ratio is designed primarily to mitigate risks associated with excessive household debt, while the DSTI ratio is targeted at risks connected with excessive debt service of households. The indicator of potential losses proves the importance of setting limits on these ratios (see Chart V.31). It shows that risks associated with borrowers' ability to repay loans are elevated and the share of potentially endangered loans in respect of which repayment problems may occur is high.

…which may also have a favourable effect on the fulfilment of the LTV limits

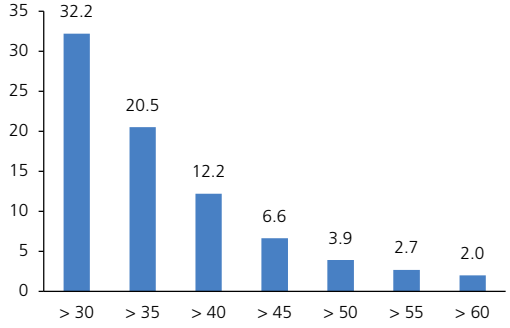
Compliance with the DTI and DSTI limits by lenders can reduce the risks associated with loans with high LTV levels where loan applicants reduce their financial reserves in order to bring the LTVs for their loans below the recommended limits. Loans with high LTVs also bear the highest interest rates, which increases the debt service of these applicants. Setting DTI and DSTI caps will reduce the risk of circumvention of the LTV limits through the parallel provision of other consumer loans (see Chart V.26). Previously, when additional loans were provided by a lender other than the mortgage-providing bank, the provider of the additional loan did not formally breach the rules set out in the Recommendation. Under the new rules, however, such lenders will be bound by the recommended DTI or DSTI limits. An additional loan should not be provided if it would cause one or both ratios to increase above the recommended levels.

The upper limit on the DTI ratio is set at 9 times and that on the debt-service ratio at 45% of the applicant's net annual income with effect from 1 October 2018

According to CNB analyses conducted using LTI and LSTI data, many clients do not have a sufficient financial reserve. Such a reserve is important for maintaining their ability to service their loans in the event of adverse changes in their income situation or in the level of interest rates. To mitigate these risks while not reducing the availability of loans, the CNB is supplementing its warning about the riskiness of loans with DTIs of 8 and DSTIs of 40% by setting upper limits on the DTI and DSTI ratios of 9 times and 45% of the applicant's net annual income respectively. However, applications for loans with DTIs of 8 and DSTIs of 40% should still be assessed with an increased degree of prudence. In

GRAPH V.33

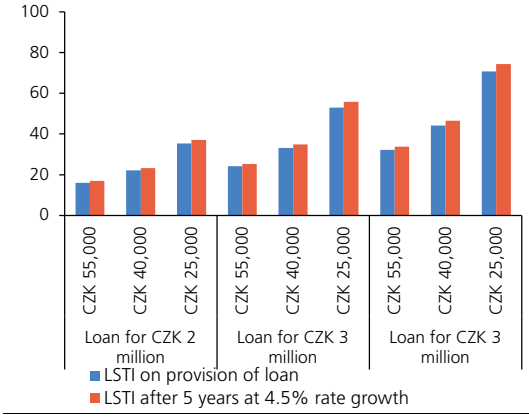
LSTI distribution of new loans
(x-axis: LSTI in %; y-axis: share of loans in %; 2017 H2)



Source: CNB

GRAPH V.34

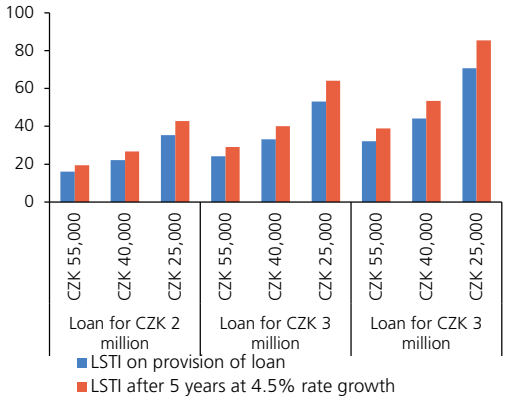
LSTI on the provision and refixation of loans as a function of income and interest rates (rising income)
(%; x-axis: net monthly income)



Source: CNB
Note: The interest rate on provision of the loan corresponds to interest rates on new loans to households for housing in 2017 Q4 (2.37%). Loan maturity considered: 25 years. Five-year income growth considered: 15%.

GRAPH V.35

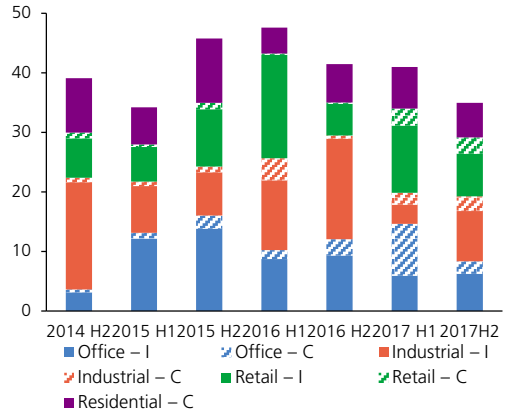
LSTI on the provision and refixation of loans as a function of income and interest rates (constant income)
(%; x-axis: net monthly income)



Source: CNB
Note: The interest rate on provision of the loan corresponds to interest rates on new loans to households for housing in 2017 Q4 (2.37%). Loan maturity considered: 25 years.

GRAPH V.36

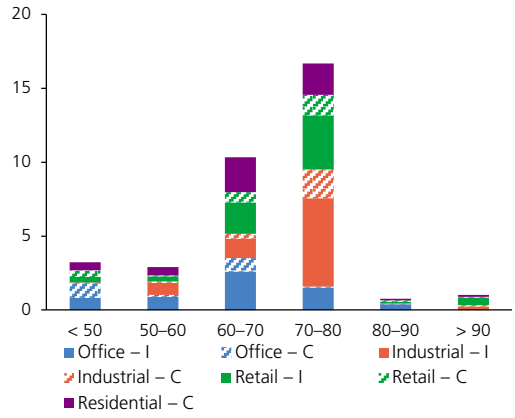
Amount of new loans secured by commercial property
(CZK billions)



Source: CNB
Note: I: investment in commercial property, C: construction of commercial property.

GRAPH V.37

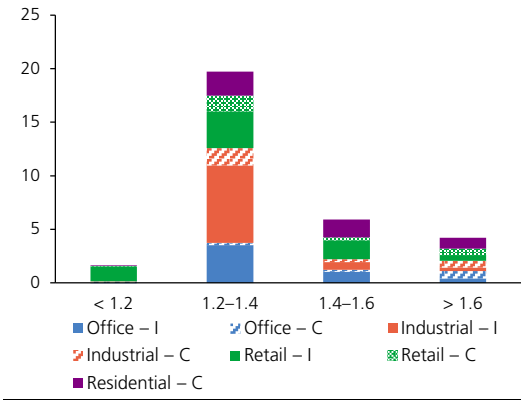
LTV distribution of new loans in 2017 H2
(x-axis: LTV in %; y-axis: CZK billions)



Source: CNB
Note: I: investment in commercial property, C: construction of commercial property.

GRAPH V.38

DSCR distribution of new loans in 2017 H2
(x-axis: DSCR; y-axis: CZK billions)



Source: CNB
Note: I: investment in commercial property, C: construction of commercial property.

countries which apply DTI and/or DSTI limits, the relevant limits are set at similar or stricter levels.[32]

It is admissible to exceed the limits on the two ratios for a maximum of 5% of the total volume of loans provided

The CNB respects the fact that a small proportion of credit cases have specific characteristics and that strict insistence on the application of the set caps could lead to excessive regulatory hardship. Lenders are hence given the option to cover these specific cases under a 5% exemption. Charts V.32 and V.33 show that even if the DTI and DSTI ratios exceed the reported LTI and LSTI levels, the set limits for both ratios in combination with the 5% exemption should cover most previously provided loans.

Lenders should assess clients' loan servicing capacity if lending rates increase by 2 pp

Since 2015, the CNB Recommendation has contained a provision that institutions should assess clients' ability to service loans from their own resources under adverse conditions (i.e. they should stress-test clients' ability to service the loan). A standard risk which should be tested is that of a rise in interest rates, which can occur in the event of loan refixation or refinancing. Given the need for equal treatment, the CNB has reconfigured the rule for this test so that lenders use an interest rate at least 2 pp above the planned contractual rate. This rule also responds to the finding that there is a still significant share of loans with a high LSTIs. Some borrowers may reach risky DSTI levels even with a relatively small increase in interest rates (see Chart V.34), especially in the event of an adverse change in their income (see Chart V.35).

The CNB will again seek the statutory power to set upper LTV, DTI and DSTI limits for mortgages

An amendment to the Act on the CNB containing these powers was in the legislative process in 2017. Owing to the end of the parliamentary term of the Chamber of Deputies, however, it was not finalised. The new draft that the CNB and the Czech Ministry of Finance will put into the legislative process this year will be based on a compromise wording incorporating proposed amendments approved in the parliamentary budget committee in 2017. Its objectives include ensuring a level playing field on the market and prevent unfair competition among lenders. Banks currently fear losing market share to other institutions observing the Recommendation to a lesser extent. Banks and building societies suspect non-banks of providing part-financing of loans and encumbering clients with excessive debt and high interest payments. Foreign institutions not be subject to CNB supervision may also start to provide mortgages to a much greater extent in the future. The only way to ensure a level playing field on the market in this situation is to set universal conditions for all lenders by law. This would enable the CNB to respond directly and

32 In Norway, for example, the DTI ratio is set at 6–7 depending on the borrower's income. There is also a DSTI limit in Switzerland in the form of self-regulation by the Swiss Bankers Association. The maximum DSTI is set at 33% of gross income (just under 45% when converted to net income).

quickly to non-compliance with the rules by applying remedial measures to all types of lenders. It is also vital for the CNB to have access to data on loans provided, as this will enable it to conduct effective checks of compliance with the relevant rules. The CNB will base the setting of LTV, DTI and DSTI caps on an assessment of housing loan developments, indicators of potential overvaluation of housing prices and indicators of the vulnerability of the banking sector and the household sector to adverse economic shocks.

Numerous national authorities are vested with statutory powers regarding credit ratios

Limits on credit ratios are applied in various forms in numerous EU countries. The LTV ratio, for example, is currently limited in one way or another in 15 EU countries. The possibility of limiting credit ratios has been enacted in a number of countries. In Slovakia, the central bank may limit LTV, DSTI and loan maturity. In some EU countries, macroprudential authorities have the right to set ratios but have not exercised it yet due to low risks. In Austria, a law allowing limits to be put on LTV, DTI, DSTI, maximum maturity and the loan repayment method was adopted in 2017. Legislative processes are ongoing in other EU countries. In Luxembourg, for example, lawmakers are debating a bill containing the power to limit LTV, LTI, DTI and DSTI and to set the initial regular loan instalment.

5.3.2 Risks Associated with Commercial Property Markets

The volume of new loans secured by commericial property provided by banks in the Czech Republic did not increase

In 2017 H2, loans secured by commercial property provided by banks in the Czech Republic[33] amounted to around CZK 35 billion, i.e. almost 30% of new loans secured by residential property, and thus remained slightly below the levels observed in 2017 H1 and 2016 H2 (see Chart V.36). The various types of commercial property were represented quite evenly in the financing structure.

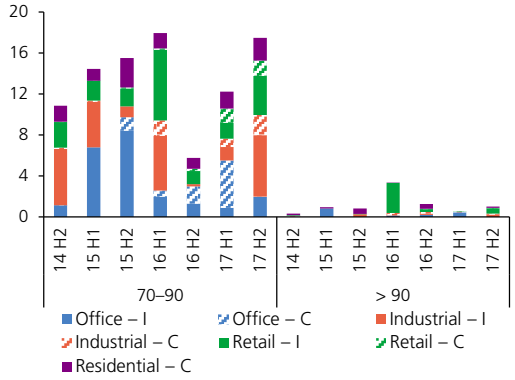
Credit standards eased in 2017…

Most of the new loans were provided with LTVs of 70%–80% and DSCRs of 1.2–1.4 (see Charts V.37 and V.38). Compared to previous half-years, the current amount of new loans with LTVs of over 70% is close to that observed in 2016 H1, which was the easiest to date in terms of credit standards (see Charts V.39 and V.40 The volume of loans with a combination of very risky characteristics as regards loan security and the ability to generate income to cover debt was limited in 2017 H2: loans with LTVs of over 70% combined with a DSCR of below 1.2 accounted for less than 3% of new loans (see Chart V.41. However, the determination of DSCR values entails estimating the future income arising from the construction or possession of property and is thus subject to subjective assessment by the lender. Perceptions of property market developments tend to be strongly procyclical. For example, expected

33 According to data from a regular survey of eight banks covering around 70% of the market as of 30 June 2015.

GRAPH V.39

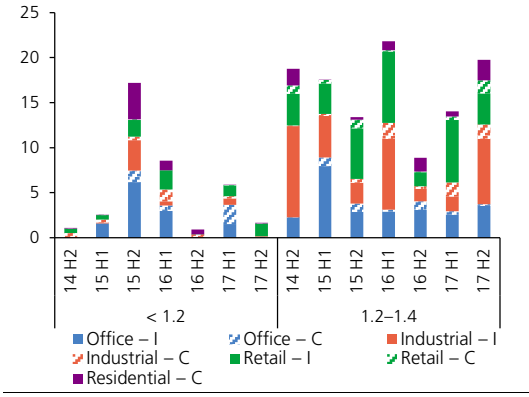
LTV distribution of new loans over time
(x-axis: LTV in %; y-axis: CZK billions)



Source: CNB
Note: I: investment in commercial property, C: construction of commercial property.

GRAPH V.40

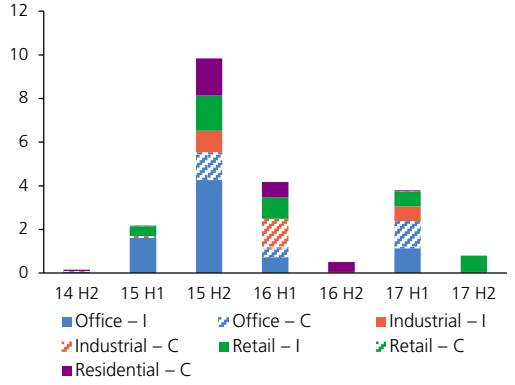
DSCR distribution of new loans over time
(x-axis: DSCR; y-axis: CZK billions)



Source: CNB
Note: I: investment in commercial property, C: construction of commercial property.

GRAPH V.41

Amount of new loans with an LTV of more than 70% and a DSCR of less than 1.2 in 2017 H2
(CZK billions)

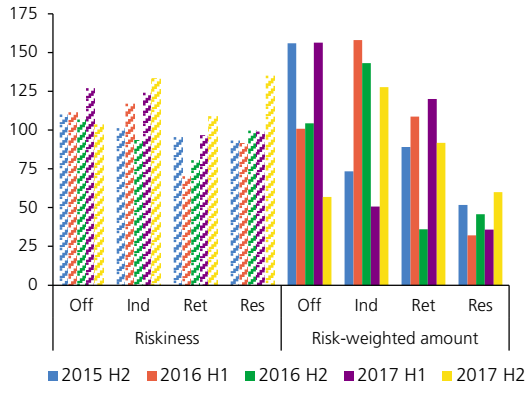


Source: CNB
Note: I: investment in commercial property, C: construction of commercial property.

GRAPH V.42

Indicator of the riskiness and risk-weighted amount of new loans

(average across property types in 2015 H2 = 100)



Source: CNB

Note: Off: office property, Ind: industrial property, Ret: retail property, Res: residential property. The indicator of the riskiness of new loans secured by commercial property was created using data on the estimated overvaluation of prices for each property type and the LTV and DSCR of loans in the individual categories of values, weighted by the share of loans in those categories. The indicator of the risk-weighted amount of new loans was created by multiplying the previous indicator by the amount of new loans.

property rental income or the future vacancy rate may be set on the basis of currently high levels.

…and the riskiness of new loans increased

As growing optimism prevailed in the commercial property market in the period under review (see section 2.2),[34] loans provided with the same credit ratios may currently be riskier than loans provided in previous half-years. Taking into account the estimated degree of property price overvaluation (see Chart II.33in section 2.2), the riskiness of new loans provided in 2017 H2 was the highest in the period under review for all types of property except office property. This is suggested by both indicators of the riskiness of new loans secured by commercial property (see Chart V.42. The risks of these loans are partially reduced relative to previous half-years by a lower volume of loans granted (except for loans for the construction of residential property; see Chart V.42.

The Czech Republic mostly exports risks associated with commercial property markets

The limited share of exposures secured by commercial property in the balance sheets of banks in the Czech Republic is one of the reasons why risks associated with commercial property markets do not pose an immediate threat to the financial stability of the Czech banking system. The risks associated with the systemic importance of exposures secured by commercial property and the potential spillovers of negative developments in the commercial property market to other parts of the Czech economy were also assessed by the ESRB as being negligible in 2018. In 2018, it conducted a statistical assessment of a series of ratios across EU states for four categories of risks using data available at the end of 2017, or 2016 in the case of commercial property. In the Czech Republic, collateral value was assessed as being a medium risk, while debt financing and the ability to generate income to service loans were classed as low risks.

34 See, for example, ARTN (2018). *Trend Report 2018*, available at http://artn.cz/trend-report/tr-2018/.

5.4 MACROPRUDENTIAL POLICY AND THE REGULATORY ENVIRONMENT IN THE EU

5.4.1 An Overview of Macroprudential Measures in the EU

Macroprudential authorities in EU countries mostly use instruments to prevent misaligned incentives and curb excessive credit growth and risks in the property market. Non-euro-area countries are more active in applying macroprudential instruments. The CNB ranks among the most active macroprudential authorities in the EU. Table V.4 summarises the application of the instruments as of the end of 2017 and any tightening of the settings of macroprudential policy in the European countries under review (the EU plus Norway). Fewer measures (38 in total) – most of them directed towards tightening macroprudential policy – were notified in the EU as a whole in 2017 compared to 2016 (54 in total). The number of measures was lower mainly because the ESRB did not issue any recommendations for reciprocation in 2017. Western and Southern European countries generally adopted a lower number of measures. This may be due to lower risks or higher macroprudential policy risk tolerance, or to a tendency to put off necessary measures (inaction bias). See Table II.1 in section 2 for details on risks in selected Member States.

Most Member States, including the Czech Republic, have introduced the capital conservation buffer at the highest permissible rate. The remaining countries will make it up by the end of 2018. Four countries (CZ, SK, UK and LT) increased the countercyclical buffer rate. This indicates perceptions of an upward shift in the phase of the financial cycle in some economies. Norway, Sweden and Iceland also have non-zero CCyB rates. Macroprudential authorities adopt national CCyB decision-making methodologies based on a number of indicators other than the credit-to-GDP ratio.[35]

Misaligned incentives can be prevented by means of a buffer for O-SIIs or the SRB. All Member States completed the process of identifying systemically important institutions back in 2016. There were 202 systemically important institutions in 2017, twelve of which were global systemically important institutions (G-SIIs). Two of these are parent banking groups of domestic systemically important banks.[36] The CNB drew up a list of O-SIIs in 2015 and regularly reviews its composition (see section 5.2.3). Like several other EU countries, it uses the SRB to mitigate risks associated with domestic systemically important banks. The SRB rate is no more than 3% in the countries under review. Other Member States have reduced the risks associated with domestic systemically important banks using a capital buffer for O-SIIs, which can be no more than 2%. In some countries, a combination of an SRB and an O-SII buffer is used. The identified G-SIIs started to fill up the buffer during 2016. The buffer should reach full capacity corresponding to their systemic importance by

35 Annex 2 of *Review of Macroprudential policy in EU 2017* deals in more detail with the issue of the approach to setting the CCyB. The CNB describes the current framework for setting the countercyclical buffer in the first thematic article of FSR 2016/2017 *The countercyclical capital buffer in the Czech Republic*.

36 Société Générale as the parent banking group of Komerční banka and UniCredit Group as the parent banking group of UniCredit Bank CZ/SK.

2019. The gradual filling of capital buffers in other Member States is one reason why the capital adequacy of foreign EU banks has recently exceeded that in the Czech banking sector (see section 3.1 for details).

The residential property sector continues to be a source of risks to financial stability in many Member States. Around 70% of the Member States use at least one measure targeted at risks arising in the residential property sector. The most common measure is an upper LTV limit combined with an LTI/DTI limit or an LSTI/DSTI limit. A minimum risk weight increasing the capital requirements for mortgage loan providers is also used. The residential property sector is thus the area where macroprudential policy instruments are most often applied (ten measures in 2017). Some of them, however, are not governed by CRD/CRR, so national legislative frameworks necessary for the use of such measures are being created. Austria and Luxembourg, for example, undertook such initiatives in 2017, possibly also in response to the warnings issued to these and other countries by the ESRB in 2016.

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. Based on voluntary reciprocity,[37] the Member States did not decide on the reciprocation of any macroprudential measures in 2017.

37 For details see FSR 2015/2016, section 4.4.2.

TABLE V.4

Overview of active macroprudential instruments in the EU and Norway

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
Excessive credit growth and leverage	Capital conservation buffer			●	●	●		●	●		●			●			●	●	●	●			●	●	●	●	●		●	
	Countercyclical capital buffer (CCyB)					●																	●				●		●	
	Leverage ratio																													●
	Loan-to-value (LTV)				●	●		●	●		●				●	●		●		●		●	●	●		●	●	●	●	
	Debt-service-to-income (DSTI) or loan-service-to-income (LSTI)				●				●						●			●						●		●		●	●	
	Loan-to-income (LTI) or debt-to-income (DTI)							●								●							●							●
	Loss-given-default (LGD)																						●							
	Risk weights		●								●			●		●			●				●			●	●	●		●
Misaligned incentives	Systemic risk buffer (SRB)	●		●		●		●	●					●	●							●	●	●		●	●		●	
	Global systemically important institution buffer (G–SII buffer)						●			●		●					●					●					●			●
	Other systemically important institution buffer (O–SII buffer)	●	●	●			●		●	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●
Liquidity	Liquidity ratio			●											●								●	●			●			
	Loan-to-deposit (LTD)																											●		
Other	Pillar II		●		●																●						●	●		
	Loan amortisation																					●	●				●		●	
	Loan maturity								●									●						●		●			●	
	Stress test			●	●											●			●				●			●			●	●
	Other measures	●		●		●	●								●	●		●			●			●		●	●		●	

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. Red dots denote a tightening of the measures in 2017.

5.4.2 The Basel Committee on Banking Supervision Has Completed the Basel III Reform Package

At the end of 2017, the Basel Committee on Banking Supervision (BCBS) presented a package of proposals aimed at strengthening the Basel III risk capital framework. These proposals follow up on the first phase of Basel III launched in 2010[38] and are thus sometimes referred to as Basel IV. While the initial Basel III reforms concentrated largely on the capital side of the capital ratio calculation, the 2017 set of proposals mainly covers the calculation of risk weights. The common denominator of the proposed measures is that they improve the stability and credibility of Basel III, especially in the area of capital for credit risks, and facilitate the comparability of banks' capital ratios.

One of the key instruments is a newly presented set of minimum limits for risk weights and parameters in banks' internal models (IRB approach). The basic backstop as regards prudential risk assessment will be a lower limit for risk weights under the IRB approach (the output floor), which should correspond to 72.5% of risk-weighted assets under the standardised approach (STA approach). This value redefines the relationship between the two approaches.[39] The second backstop involves the adoption of minimum estimates of probability of default and loss given default. In the case of probability of default, the floor is 0.05% for corporate and most retail exposures, including mortgages. The floor for loss given default ranges between 0% and 50% depending on the exposure category and collateral type.

The emphasis on greater stability and comparability of risk weights is also reflected in a shift towards more robust approaches for calculating risk weights. For selected exposures[40] the reform package constrains the application of internal models for calculating capital requirements. It no longer allows the use of the advanced IRB approach for exposures to financial institutions and large corporations while permitting only the STA approach for equity exposures.

Another substantial change is an effort to take a more faithful account of risks in the STA approach for credit risk, which is used by most banks around the world.[41] In the case of the STA approach, it will be possible to apply different weights to exposures that are currently subject to a flat risk weight. The risk weights for housing and commercial property loans will thus depend on the loan-to-value ratio.[42] For other types of exposures, the revised Basel III framework applies a more granular approach and assigns risk weights in a more detailed breakdown in the STA approach.

38 At the same time, the BCBS postponed the finalisation of reforms in the area of market risk (Fundamental Review of the Trading Book, FRTB) until 2022 and put off further work on the regulatory approach to sovereign risk.
39 The differences between the STA and IRB approaches are discussed in more detail in Box 5.3.
40 For example, exposures with low default occurrence.
41 Such exposures account for 29.2% of the Czech banking sector's exposures.
42 The potential impacts of the new approach on future risk weights are presented in Box 3.2.

BOX 5.2: THE REVISED BASEL III RULES AND THE CAPITAL INTENSITY OF RETAIL EXPOSURES SECURED BY RESIDENTIAL PROPERTY

This box presents the revised approach for setting risk weights for retail loans secured by residential property as proposed by the BCBS in December 2017 and to be implemented by 2022. The new rules should significantly change both approaches to setting risk weights. This box shows how these revised rules would affect the average risk weight in the category of retail exposures secured by residential property using data as of 31 December 2017.

STA approach

Under the current Basel III rules, the STA risk weight in this exposure category is 35% up to an LTV of 80%. The part of the exposure above this LTV level is treated as an unsecured loan and assigned a risk weight of 75%. By the CNB's calculation, the estimate of the resulting average risk weight in this exposure category is 35.9%.

Under the revised Basel III rules, exposures in this category, where debtors' ability to repay is not materially dependent on the cash flows generated by the residential property securing the loan, should be risk-weighted according to the LTV ratios as set out in Table V.1 Box.

The LTV ratio for this approach will have to be set in a prudent manner and the value of the collateral entering the denominator of the LTV calculation will be limited from above by its initial value when the loan was provided (more detailed information can be found in Basel Committee on Banking Supervision, 2017).[43] Alternatively, an approach can be applied where the part of the exposure up to an LTV ratio of 55% is assigned a risk weight of 20% and the part above this level a risk weight of 75%.[44] Calculations made using data as of 31 December 2017 show that the application of the revised rules would lead to the average risk weight in this category dropping by 17.5% (6.3 pp) to 29.6% if the approach in Table V.1 Box were used and by 20.3% (7.3 pp) to 28.6% if the alternative approach were used.

The revised Basel III rules imply lower risk weights for more mature loan portfolios with a lower average LTV ratio. However, the mortgage portfolio of banks in the Czech Republic is still relatively young, so there could be a much larger decline in risk weights relative to the current regulatory approach than that estimated using the end-2017 data.

TABLE V.1 BOX

Risk weights for retail loans secured by residential property

LTV	Risk weight
LTV ≤ 50%	20%
50% < LTV ≤ 60%	25%
60% < LTV ≤ 80%	30%
80% < LTV ≤ 90%	40%
90% < LTV ≤ 100%	50%
LTV > 100%	70%

Source: BCBS

43 Basel Committee on Banking Supervision (2017): *Finalising post-crisis reforms*, Bank for International Settlements, https://www.bis.org/bcbs/publ/d424.htm.

44 According to the revised Basel III rules, the competent regulator should decide on which approach to use.

IRB approach
One of the most significant changes for IRB banks under the revised Basel III rules is the output floor proposed to be phased in between 1 January 2022 and 1 January 2027. The output floor sets a lower limit for the aggregate risk-weighted exposures of IRB banks at 72.5% of aggregate risk-weighted exposures calculated using the STA approach. The average output floor for IRB banks and the category of retail exposures secured by residential property would be 21.7% if the approach in Table V.1 Box and the data as of 31 December 2017 were used. For comparison, the average risk weight in this exposure category is currently 22.6%.

The reform package also focuses on the leverage ratio, where it proposes the introduction of an additional capital buffer to limit the leverage of global systemically important banks (the leverage ratio buffer). Other areas addressed by the reform package include the regulation of operational risk and credit valuation adjustment (CVA) risk. All the changes should be implemented by 1 January 2022. The only exception is the phase-in period of the output floor, which should end on 1 January 2027. In addition, national supervisors may cap the increase in banks' risk-weighted assets during the phase-in period at 25%.

5.4.3 The ESRB Has Clarified the Framework for Voluntary Reciprocity of Macroprudential Measures

Voluntary reciprocity (i.e. mutual recognition of measures) is an important means to maintain a level regulatory playing field and prevent undesirable cross-border leakages of EU Member States' macroprudential measures. The macroprudential authorities of a Member State that has activated a measure can request reciprocal application in other EU countries through the ESRB under Recommendation ESRB/2015/2.[45] The ESRB will assess the request and, if it regards it as being justified, issue a recommendation to the EU's macroprudential authorities to recognise the measure of the activating state.

Relevant authorities in Member States do not have to recognise the macroprudential requirements of the activating country across the board. In accordance with the de minimis principle, a recognised macroprudential measure may be applied only to financial institutions with material exposures to the activating country. However, the ESRB set no threshold defining material exposures in the context of voluntary reciprocity. Moreover, the initial experience with the application of the framework for voluntary reciprocity in the EU revealed a need to clarify the conditions under which the de minimis principle can be applied.

45 Recommendation ESRB/2015/2 on the assessment of cross-border effects of and voluntary reciprocity for macroprudential policy measures (https://www.esrb.europa.eu/pub/pdf/recommendations/2015/ESRB_2015_2.en.pdf).

In 2017, therefore, the ESRB clarified the voluntary reciprocity framework and the application of the *de minimis* principle. Under Recommendation ESRB/2017/4,[46] a Member State seeking reciprocity should now set a materiality threshold at the financial service provider level. This quantitative value proposed by the activating Member State is then assessed by the ESRB's permanent Assessment Team, which may recommend a different threshold if deemed necessary. The relevant authorities in Member States may apply the resulting threshold for their jurisdiction, set a lower threshold where appropriate or reciprocate the measure without any materiality threshold.

Of the EU Member States, voluntary reciprocity had been applied by the macroprudential authorities of Belgium and Estonia by the end of 2017. The CNB decided not to apply the measures reciprocally in either case[47] given domestic banks' minimal exposures to the activating countries. The CNB publishes its positions on proposed reciprocations on its website.[48]

The concept of reciprocity is crucial for the conduct of macroprudential policy in the case of foreign bank branches, to which some macroprudential policy tools can be applied only through reciprocity, not directly. See Box 5.3 for more details.

BOX 5.3: THE CONVERSION OF SUBSIDIARIES INTO BRANCHES AND ITS CONSEQUENCES FOR THE EFFECTIVENESS OF MACROPRUDENTIAL POLICY

The low profitability of European banks, which is due, among other things, to the low interest rate environment, is encouraging banks to look for ways to increase their profits. One such way, leading through cost reductions and more relaxed regulatory requirements, is to convert a bank with legal personality in a given country (a subsidiary) into a branch of a foreign bank (a branch). In the past, such conversions usually concerned small subsidiaries and had no major impact on the effectiveness of the regulatory mechanisms in host countries' financial systems. Recently, however, financial institutions with significant market shares in host countries have been converted into branches. In early 2017, for example, Swedish bank Nordea announced the conversion of its subsidiaries in Northern Europe into branches. Their shares in total banking sector assets stood at 40% (Finland), 10% (Denmark) and 9% (Norway) on the date of the announcement.

46 Amending Recommendation ESRB/2015/2 on the assessment of cross-border effects of and voluntary reciprocity for macroprudential policy measures (OJ C 431 of 15.12.2017); see https://www.esrb.europa.eu/pub/pdf/recommendations/2017/ESRB_2017_4.en.pdf.

47 The request of the Estonian macroprudential authority to apply a systemic risk buffer of 1% was reciprocated indirectly through the setting of a systemic risk buffer rate in the Czech Republic applying to all exposures, including cross-border ones.

48 See: http://www.cnb.cz/en/financial_stability/macroprudential_policy/mutual_recognition_macroprudential_measures.html.

TABLE V.2 BOX

Macroprudential measures and foreign bank branches

Macroprudential measures (legal basis)	Applicability to branches	Reciprocity under EU law
O-SII buffer (Art. 131 CRD)	Not applicable	Not reciprocal
Systemic risk buffer (Art. 133–134 CRD)	Indirectly (reciprocity)	Voluntary (Art. 134 CRD)
Countercyclical capital buffer (Art. 130, 135–140 CRD)	Indirectly (reciprocity)	Mandatory up to 2.5%, Voluntary above 2.5% (Art. 140 CRD)
National macroprudential methods (Art. 458 CRR)	Indirectly (reciprocity)	Voluntary (Art. 458 CRR)
LTV/LTI/DSTI and other national measures (national law)	Directly (under national law)	Voluntary*/ Not necessary
	Indirectly (reciprocity)	
Regulation of risk weights for STA banks (Art. 124 CRR)	Indirectly (reciprocity)	Mandatory (Art. 124 CRR)
Regulation of risk weights for IRB banks (Art. 164 CRR)	Indirectly (reciprocity)	Mandatory (Art. 164 CRR)
Pillar II measures (Art. 103 CRD)	Indirectly (reciprocity)	Voluntary*

Source: CNB
Note: * Voluntary reciprocity under Recommendation ESRB/2015/2 also applies to instruments that do not explicitly fall under voluntary reciprocity as defined in CRD IV/CRR.

The subsidiaries also rank among other systemically important banks (O-SIIs) in the countries concerned. The bank's headquarters are expected to be moved to Finland at the end of this year. Other banking groups in this region are also considering converting systemically important subsidiaries into branches.[49] In the Czech banking sector, five of the seven O-SIIs – accounting for 64.1% of total assets – are foreign subsidiaries.[50] If a group was to consider converting domestic subsidiaries into branches, the potential impacts on the effectiveness of macroprudential policy would be a very important issue from the CNB's perspective.

The conversion of subsidiaries into branches may not have clear-cut impacts on the host country's financial stability. Unlike subsidiaries, branches are not independent legal entities and form an integral part of the parent company. Developments in other parts of the company or the group as a whole thus have a more immediate impact on its business. This can be reflected, for example, in increased sensitivity of credit supply to external economic developments and amplification of the host country's credit cycle. However, financial stability is affected more strongly by the parent company's solvency and exposures than by legal form.[51] They depend to a large extent on the branch's position in the strategic plan, its profitability and its reputational risk for the parent group as a whole.

From the macroprudential policy perspective, the conversion of subsidiaries into branches could significantly affect the choice and effectiveness of the instruments used by domestic macroprudential authorities to maintain financial stability, as most macroprudential measures can be applied directly only to institutions established under national law, not to branches. In this case, macroprudential instruments are applied to branches only indirectly through reciprocity (i.e. mutual recognition of measures). European legislation distinguishes between mandatory and voluntary reciprocity. Mandatory reciprocity applies to just a few instruments defined in CRD IV/CRR, whereas voluntary reciprocity allows macroprudential authorities to request reciprocation of measures even if they have not been harmonised in the EU (see Table V.2 Box).[52]

49 One example is Luminor, which was established through the merger of the businesses of Nordea and DNB in the Baltic States. The conversion into branches may start in 2019–2020.
50 Foreign subsidiaries account for 9.5% of the banking sector's total assets.
51 For more details see, for example, Cerutti, E. and Claessens, S. 2014. *The Great Cross-Border Bank Deleveraging; Supply Constraints and Intra-Group Frictions*, IMF Working Papers 14/180, International Monetary Fund.
52 See Recommendation ESRB/2015/2 on the assessment of cross-border effects of and voluntary reciprocity for macroprudential policy measures. https://www.esrb.europa.eu/pub/pdf/recommendations/2015/ESRB_2015_2.en.pdf).

However, indirect application of macroprudential measures through reciprocity faces a number of restrictions. Measures relating to a specific institution that cannot be reciprocated (such as the O-SII buffer) are one example. In other cases, application of the instruments of the activating macroprudential authority may not be recognised because of the voluntary nature of reciprocity, or their effectiveness may be limited by the absence of an equivalent instrument in the country where the parent company is established. In its positions, the CNB therefore advocates a strengthening of mandatory reciprocity and an extension of macroprudential powers (including LTV, DTI and DSTI) in EU legislation, as this would facilitate reciprocation in the European context. At the national level, it will always be generally conducive to the effectiveness of macroprudential policy to anchor the key macroprudential instruments not covered by EU legislation in law so that they also apply to foreign bank branches.[53] This limits regulatory arbitrage and establishes true enforceability of macroprudential measures.

Last but not least, the issue of the conversion of systemically important subsidiaries into branches is linked with that of the availability of reliable and timely information for macroprudential policy purposes. Compared to subsidiaries, branches have limited information duties towards host country supervisory authorities. Close cooperation and exchange of information between the supervisory and macroprudential authorities of international banks are therefore crucial for high-quality analyses of systemic risks and the formulation of effective macroprudential policy. This should be aided by the EBA's guidelines on supervision of significant branches,[54] which take into account the importance of very significant ("significant-plus") branches as regards their potential impact on the host country's financial stability and substantially expand cooperation and exchange of information in colleges of supervisors. Where foreign branches hold a significant position in the national banking system, effective cooperation between supervisory and macroprudential authorities also gains in importance.

53 This applies to the proposed amendment to the Act on the CNB, which provides for the use of credit ratios (LTV/DTI/DSTI) if systemic risk materialises in the area of consumer credit secured by residential property.

54 These guidelines took effect on 1 January 2018. For more details, see https://www.eba.europa.eu/documents/10180/2126653/Guidelines+on+supervision+of+significant+branches+%28EBA-GL-2017-14%29_EN.pdf.

5.4.4 The CNB as a Resolution Authority

The CNB became a resolution authority for credit institutions and some investment firms and their groups in the Czech Republic on 1 January 2016, when Act No. 374/2015 Coll., on the Recovery and Resolution, came into effect.

The main purpose of the European[55] resolution framework is to establish a system providing relevant authorities with a credible set of tools to intervene sufficiently early and quickly in an unsound or failing institution so as to ensure the continuity of the institution's critical financial and economic functions, while minimising the impact of an institution's failure on the economy and financial system.

In its areas of responsibility, the CNB therefore prepares resolution plans for institutions and groups, or is involved in their preparation within colleges in the case of cross-border entities.

Planning and assessment of resolvability

In order to avoid moral hazard, any failing institution should be able to exit the market, irrespective of its size and interconnectedness, without causing systemic disruption. A failing institution should in principle be liquidated under normal insolvency proceedings. However, liquidation under normal insolvency proceedings might in some cases jeopardise financial stability, disrupt the provision of critical functions and affect the protection of depositors. In such cases there is a public interest[56] in placing the institution under resolution and applying resolution tools.

Therefore, if the CNB concludes that the liquidation of an institution or group entities under normal insolvency proceedings may not be feasible and credible or that it may be necessary to take resolution action in the public interest because liquidation under normal insolvency proceedings would not achieve the resolution objectives[57] to the same extent, it will choose a suitable resolution strategy for the institution or group.

The feasibility and credibility of liquidation under normal insolvency proceedings is thus, among other things, part of the regular assessments of the resolvability of institutions and groups[58] which the CNB conducts in the process of preparing plans and before making actual decisions on the use of resolution tools and powers.

55 Directive 2014/59/EU of the European Parliament and of the Council of 15 May 2014 establishing a framework for the recovery and resolution of credit institutions and investment firms and amending Council Directive 82/891/EEC, and Directives 2001/24/EC, 2002/47/EC, 2004/25/EC, 2005/56/EC, 2007/36/EC, 2011/35/EU, 2012/30/EU and 2013/36/EU, and Regulations (EU) No 1093/2010 and (EU) No 648/2012, of the European Parliament and of the Council.
56 See Article 80 of the Recovery and Resolution Act.
57 See Article 75 of the Recovery and Resolution Act.
58 Especially with reference to Articles 22 et seq. of the Recovery and Resolution Act and the related Commission Delegated Regulation (EU) 2016/1075.

Indicative thresholds for determining the basic approach and resolution strategy

Having regard to the differences in the nature of their business, their shareholding structures, legal forms, risk profiles, sizes and interconnectedness to other institutions, and the scope and the complexity of their activities, it is obvious that different institutions and groups require different approaches.

Any failure of an institution or group in the Czech Republic will therefore probably proceed under one of three basic strategic approaches to resolution: (i) liquidation or procedures under the Insolvency Act, (ii) the use of the tool for the (partial) transfer of the business to a private acquirer (the sale of business tool),[59] or (iii) strategy involving the application of the bail-in tool.[60]

For this reason, the CNB has set general thresholds serving as a guide to selecting the preferred approach. However, since each such decision is specific to the given situation, institution or group, these internally set thresholds are only indicative.

TABLE V.5

General thresholds for determining the basic approach and resolution strategy

Category	Thresholds, criteria	Basic strategic approach
Small and systemically insignificant institutions and groups which the CNB has not identified as significant providers of critical functions.	The existence of a public interest in taking resolution action is not anticipated, mainly because such institutions are not systemically significant and not significant providers of any critical functions. Liquidation under normal insolvency proceedings is assessed as credible and feasible by the CNB. Simplified obligations can be applied to the institution or group (Article 8 of the Recovery and Resolution Act).	**Liquidation of the institution or group entities under normal insolvency proceedings.** If an institution fails, the Financial Market Guarantee System will compensate depositors for insured deposits up to the amount stipulated by law (Act No. 21/1992 Coll.).
Institutions and groups which the CNB has identified as significant providers of one or a very limited number of critical functions, especially in the area of accepting deposits and making related payments.	The existence of a public interest in taking resolution action is anticipated, mainly because of the critical functions identified. Liquidation under normal insolvency proceedings is assessed as not credible by the CNB. Simplified obligations cannot be applied to the institution or group. Number of transaction accounts * > 50 000 – 70 000 Covered deposits > CZK 30 – 40 billion Total assets < CZK 150 – 200 billion	**Resolution strategy using the sale of business tool.** Given the specificities of the local market and the size of the institution, there is still high probability that a potential private acquirer will be found relatively quickly. Alternatively, the tool for the transfer of (part of) the business to a bridge institution can be applied (Articles 102 et seq. of the Recovery and Resolution Act).
Complex and systemically important institutions and groups which the CNB has identified as significant providers of a large number of critical functions and whose potential failure would lead to a serious threat to or disruption of financial stability.	The existence of a public interest in taking resolution action is anticipated, mainly because of the large number or complex nature of the critical functions provided and the high risk of financial stability being threatened or disrupted in the event of default. Liquidation under normal insolvency proceedings is assessed as not credible by the CNB. Simplified obligations cannot be applied to the institution or group. Total assets > CZK 150 – 200 billion	**Resolution strategy using the bail-in tool.**

Source: CNB
Note: * See Article 24 of Commission Delegated Regulation (EU) 2015/61. The number of transaction accounts criterion is related to the assessment of the critical function of accepting deposits and the anticipated significant negative impact of disruption to it on third parties. The same applies to the size criterion expressed in relation to total compensation for insured deposits and the related potential significant negative impact of the institution's failure and liquidation under normal insolvency proceedings on third parties, market trust and contagion risk.

59 See Articles 96 et seq. of the Recovery and Resolution Act.
60 Interference with property rights through the use of resolution action (instead of normal insolvency proceedings) should not be disproportionate. Affected shareholders and creditors should not incur greater losses than those which they would have incurred if the institution had been wound up at the time that the resolution decision is taken.

5.4.5 Macroprudential Policy Beyond Banking

The debate about systemic risk in insurance is gaining in intensity at the EU level

As non-bank segments of the financial sector increase in importance, macroprudential and supervisory authorities are starting to focus on systemic risk beyond banking.[61] The European Insurance and Occupational Pensions Authority (EIOPA) published two documents on systemic risk in insurance in the first quarter of 2018. The first document presents the sources of and channels for the spread of systemic risk in the insurance sector and the role of macroprudential policy.[62] The second document provides an overview of the existing Solvency II tools that have a macroprudential dimension.[63] A third document presenting potentially suitable new macroprudential instruments will be finalised in 2018. The ESRB sees systemic risk in insurance from a rather different perspective. It is preparing a document examining the systemic importance of insurance companies in both the financial sector and the real economy. It derives two main types of systemic risks and presents both the existing and potentially new macroprudential tools suitable for mitigating these risks.

Systemic risk has different sources in insurance than in banking

The EIOPA identified three main sources of systemic risk – transmission channels and mechanisms of action – in insurance.[62] The first is the channel of fire sales, which affects the industry through a fall in market prices of investment assets. Repricing of insurance companies' unit-linked products affects their clients. Clients may terminate their policies in response to a drop in the value of life insurance units. Insurance companies may then be forced to sell investment assets to be able to pay redemption amounts. This may exacerbate the initial fall in asset prices and cause it to take on a systemic dimension. The second channel of systemic risk can arise if the insurance sector as a whole faces adverse conditions (such as a low-yield environment) or increased competition. This can result in a decline in the profitability of some insurance products and a decrease in available capital. This may lead to the termination of the provision of economically vital insurance products and the failure of one or more insurance companies, which may have systemic impacts. The third channel of systemic risk is the interconnectedness of insurance companies with the rest of the financial sector. Insurance companies may spread an initial local shock across the entire financial sector through direct balance-sheet interconnectedness, their position in financial groups, the provision of non-traditional insurance services and products, and common exposures.

61 In 2016, the European Systemic Risk Board (ESRB) published a strategic document defining systemic risks and macroprudential policy beyond banking (*Macroprudential policy beyond banking: an ESRB strategy paper*. ESRB, July 2016). The document concludes that certain systemic risks originate in the non-bank sector. However, they are smaller in significance and different in nature, emergence and effect than those in banking. An introduction to the issue of systemic risks for the Czech insurance sector is presented in the thematic article *Could the Czech insurance sector be a source of systemic risk?* in FSR 2015/2016.

62 *Systemic risk and* macroprudential *policy in insurance*. EIOPA, 2018.

63 *Solvency II tools* with *macroprudential impact*. EIOPA, 2018.

The current insurance legislation already offers tools with macroprudential elements…

The current Solvency II legislation offers some instruments containing macroprudential elements. One of the main tools is volatility adjustment. It was originally used as a microprudential instrument to reduce the volatility in insurance companies' profits caused by excessive changes in bond prices. Likewise, symmetric adjustment introduces a countercyclical capital requirement in relation to equity exposures. Both these instruments should reduce the procyclicality in insurance companies' investment decision-making and thus dampen the transmission and impacts of risks associated with fire sales. The current insurance legislation also increases the significance of qualitative instruments (such as ORSA[64]) and vests supervisory authorities with the power to restrict certain financial activities or the provision of investment products by insurance companies. These types of instruments may potentially also have macroprudential applications.

…and possible new macroprudential tools are being debated at the EU level.

Instruments that might curb the impact of yet unregulated systemic risks in insurance (see Table V.6) have been presented in Europe as a follow-up to the already existing regulatory options.[65] Their specific form, effectiveness and operationalisation have only started to be debated. The current proposals for the introduction and calibration of these instruments emphasise the need to maintain the significant role of national macroprudential authorities. The most important tools considered include additional macroprudential capital requirements which could, like in banking, function in relation to procyclicality risk and take into account risks associated with systemically important insurance companies. Instruments related to liquidity risks are also being considered. Instruments that would enable insurance companies to slow or defer the payment of redemption amounts in the event of increased terminations of investment products are intended to prevent fire sales. Limits on excessive concentrations are targeted at concentration risk in relation to individual counterparties and sectors (especially government and corporate bonds, property exposures, loans provided and exposures to individual banks). The proposals also consider the establishment of a framework for the resolution of insurance companies.

64 The own risk and solvency assessment (ORSA) under Solvency II requires every insurance company to create an internal procedural framework for regularly assessing its solvency needs, risk profile, capital structure, methodology for calculating technical provisions and so on. The ORSA should be integrated with the insurance company's medium to long-term strategic planning. The framework should also include internal stress testing and sensitivity analyses. Insurance companies submit reports on the results of ORSAs to supervisory authorities.

65 See the above-mentioned EIOPA and ESRB initiatives.

TABLE V.6

Overview of potential macroprudential instruments in insurance

INSTRUMENT	DESCRIPTION, SETTINGS UNDER CONSIDERATION
Capital instruments	
Leverage ratio	Ratio of Tier I capital to exposures.
Minimum solvency capital requirement	Additional minimum solvency capital requirement set in relation to minimum capital requirement.
Variable capital requirement similar to CCyB	Targeted at cyclical risks.
Additional capital requirement for systemic risk	Should cover requirements for systemically important institutions and requirements in relation to certain activities or products.
Measure preventing inadequate creation of provisions	For example, in the form of binding values of certain parameters entering calculation of technical provisions.
Liquidity instruments	
Enhanced reporting and monitoring duties in relation to liquidity risk	
Liquidity coverage ratio	Requirement for coverage of liquidity needs using available liquidity sources.
Liquidity buffer requirement	Requirement to maintain sufficient cash or other highly liquid assets, set on the basis of needs considered in stress situations.
Concentration limits and restrictions on certain activities	
"Soft" measures against excessive concentrations	For example, inclusion of risks associated with excessive concentration in stress tests and own risk assessments (ORSAs).
Concentration limits	Explicitly set limits.
Temporary restrictions on some types of transactions or activities, including payment of redemption amounts	In particular, limits on payment of redemption amounts where amount of exit requests could lead to growth in systemic risk (in the event of fire sales).
Preventive planning	
Recovery planning requirement	Aimed at reducing probability of default in systemically important insurance companies.
Resolution planning requirement	Aimed at reducing impacts of failure of systemically important insurance companies.
Systemic risk management planning requirement	Insurance companies' own plans for mitigating systemic risks in financial groups; currently only required of global systemically important insurance companies.
Liquidity risk management planning requirement	Insurance companies' own plans for mitigating liquidity risks in financial groups.

Source: EIOPA, ESRB, adapted by CNB

Systemic risk in the investment fund segment arises from liquidity transformation and leverage…

The ESRB presented an analysis of systemic risk in the investment fund segment in 2016. The first source of systemic risk is liquidity transformation in open-ended funds, where investors' highly liquid shares are placed in less liquid assets. The second source of systemic risk is leverage. Alternative investment funds may be partly financed by loans. Leverage increases the risk of illiquidity in the event of uncertainty on financial markets. Loan financing interlinks investment funds with other segments of the financial market, thereby contributing to the structural element of systemic risk.

…the ESRB issued recommendations focusing on risks in this segment

The ESRB issued five specific recommendations for the European Commission and the ESMA in 2017 in connection with the risks identified.[66] These recommendations are aimed at reducing the potential systemic consequences of liquidity transformation and leverage of investment funds. They contain (1) a broadening of the portfolio of liquidity management tools used by open-ended investment funds in the event of an increase in exit requests, (2) an extension of the reporting duty to limit liquidity mismatches at the asset level, (3) guidance for stress testing by investment funds, (4) an extension of the reporting duty for

66 Recommendation of the European Systemic Risk Board of 7 December 2017 on liquidity and leverage risks in investment funds (ESRB/2017/6).

standard funds to a level equivalent to that applying to alternative funds, and (5) clarification of the methodology for the assessment and management of systemic risks arising from leverage of alternative funds. The proposals maintain the significant role of national authorities and are generally accepted positively at the European level. The CNB supports these initiatives.

PART II – THEMATIC ARTICLES

THE INTRODUCTION AND CALIBRATION OF MACROPRUDENTIAL TOOLS TARGETED AT RESIDENTIAL REAL ESTATE EXPOSURES IN THE CZECH REPUBLIC

Hana Hejlová, Libor Holub, Miroslav Plašil

This article sets out to describe how the CNB makes decisions on the introduction and calibration of macroprudential tools targeted at risks associated with exposures secured by residential property. It answers the following questions: How does the CNB assess the risks associated with exposures secured by residential property? Which macroprudential tools can and should be used to target such exposures, and when? What sorts of risks are DTI and DSTI caps targeted at? How does the CNB determine risky LTV, DTI and DSTI levels? In what situations is it desirable to combine macroprudential tools?

1. INTRODUCTION

Risks to financial stability can arise in an upward phase of the economic and financial cycle accompanied by overvalued house prices, easy credit standards and growth in loans secured by residential property (also referred to as "loans" or "mortgage loans" in this article). These risks consist in the financial sector incurring credit losses on a systemic scale, losses that can lead to a financial crisis. Given its mandate, the CNB has to respond to such developments in a timely manner by deploying macroprudential policy tools.

Some of the macroprudential tools the CNB has available to mitigate such risks are set out in the CRR/CRD IV banking regulation, which primarily contains capital requirements and capital buffers. Other tools are defined in a recommendation of the European Systemic Risk Board (ESRB)[1] but are missing from the legislation at EU level.[2] These include limits for loan-to-value (LTV), loan-to-income/debt-to-income (LTI/DTI) and loan service-to-income/debt service-to-income (LSTI/DSTI).[3]

Faced with emerging risks associated with the residential property market, the CNB in 2015 issued a *Recommendation on the management of risks associated with the provision of retail loans secured by residential property*. It was aimed at preventing these risks from growing and threatening the sound functioning of the financial sector. Owing to property and credit market developments, the CNB tightened and expanded this Recommendation in June 2016 and June 2017. Among other things, the Recommendation sets LTV limits. It also defines DTI and DSTI thresholds at which lenders should assess loan applications particularly prudently.

Although LTV, LTI/DTI and LSTI/DSTI caps are commonly used in EU countries, they are seldom calibrated in a rigorous manner and are often based solely on a breakdown of new loans according to the values of individual indicators.[4] This is most often due to a lack of necessary data on new loans. For such analyses, the CNB can draw on anonymised survey-based data on new loans, which it has been collecting from bank lenders since the Recommendation entered into force.[5,6] As well as the information needed to calculate the LTV, LTI and LSTI ratios, this data contains demographic, social and geographical information allowing the riskiness of such loans to be assessed more accurately.

This article sets out to describe how the CNB makes decisions on the introduction and calibration of macroprudential tools targeted at risks associated with exposures secured by residential property. Section 2 presents a breakdown of those risks. Section 3 describes the macroprudential tools used to mitigate them. Section 4 sets out the approach currently used by the CNB to evaluate the direct risks associated with borrowers. Section 5 outlines how the tools are used. Section 6 contains an illustrative calibration and an example of the possible use of several tools simultaneously.

1 ESRB Recommendation on intermediate objectives and instruments of macro-prudential policy (ESRB/2013/1).
2 However, several countries (e.g. Austria, Belgium, Luxembourg and Slovakia) have already incorporated the recommendation into national law in legally binding form.
3 The definitions of these indicators differ to some extent across the countries that apply such limits (for example in the inclusion of gross or net income). The definitions currently applied by the CNB can be found in its *Recommendation on the management of risks associated with the provision of retail loans secured by residential property* (https://www.cnb.cz/miranda2/export/sites/www.cnb.cz/en/legislation/official_information/vestnik_2017_07_20717180_en.pdf).
4 See the *Overview of measures* at https://www.esrb.europa.eu/national_policy/other/html/index.en.html.
5 The first Recommendation of June 2015 was based on aggregate data from a survey of the largest lenders.
6 Following the adoption of the Consumer Credit Act No. 257/2016 Coll., the June 2017 Recommendation covers other consumer credit providers in addition to banks, branches of foreign banks and credit unions.

TABLE 1

OVERVIEW OF RISKS TO FINANCIAL STABILITY ASSOCIATED WITH EXPOSURES SECURED BY RESIDENTIAL PROPERTY

Breakdown of risks	Risks associated with collateral value/house prices	Risks associated with borrowers' debt servicing capacity	Risks associated with lenders' capitalisation
	Borrower-related risks		Lender-related risks
	- direct	- indirect	- direct / - indirect
Sources of risks	house price overvaluation potential fall in house prices method for determining collateral value	excessive household debt potential loss of, or fall in, income and rise in interest rates	undercapitalisation relative to risks associated with house prices and debt servicing capacity
Ways in which risks materialise	↑ mortgage defaults ↓ house prices	↓ income ↑ unemployment ↑ interest rates	↑ losses on mortgages / ↑ losses on other loans
Impacts of risks materialising	↑ losses on mortgages *of which:* ↑ default rate ↑ loss given default	↑ mortgage defaults / ↑ other loan defaults ↓ household consumption ↑ credit losses, e.g. on loans to NFCs	↓ bank capital ↓ lending constraints application of resolution mechanisms
Risk mitigation tools	LTV limits	LTI/DTI, LSTI/DSTI limits	countercyclical capital buffer systemic risk buffer increase in risk weights minimum LGD

Source: CNB

Note: Arrows indicate links between the ways in which risks materialise and the impacts of them materialising. Defaults can occur in a situation of excessive household indebtedness coupled with a decline in income, a rise in unemployment or an increase in interest rates. This can lead to a decrease in household consumption and to credit losses, for example on loans to non-financial corporations (risks associated with borrowers' debt servicing capacity). If defaults are accompanied by a decline in house prices, losses on mortgages can occur (risks associated with house prices). Losses on mortgages or, for example, loans to non-financial corporations can exceed the funds that lenders have available to cover such losses (risks associated with lenders' capitalisation).

2. RISKS ASSOCIATED WITH EXPOSURES SECURED BY RESIDENTIAL PROPERTY

Current international practice distinguishes risks associated with (i) collateral value, i.e. property prices, (ii) consumers' income and debt servicing capacity and (iii) institutions' loan portfolios and capitalisation (see ESRB, 2016, and Table 1).

i) The dominant type of collateral used for mortgage loans is property, which is usually also financed with the loan. A risk can arise when house prices increase above their equilibrium level (and become "overvalued"), as this increases the potential loss given default in the event of a subsequent fall in house prices to, or below, their equilibrium level. The risk consists in the fact that lenders do not take house price overvaluation into account when valuing property serving as collateral.[7] The same LTV ratios amid more overvalued house prices mean that lenders are taking on more risk. House prices tend to be overvalued in economic good times, which are associated with growth in incomes and lending and easy credit conditions. This generates growth in demand for property, which tends to face less elastic supply. A major factor fuelling this growth in demand is that households expect house prices and interest rates to rise further, which in turn can lead them to rush into buying property. Risks can materialise when the economy takes a turn for the worse and non-performing loans (NPLs) start to increase. In this situation, a fall in property prices can give rise to credit losses when the property serving as collateral for such loans is sold.

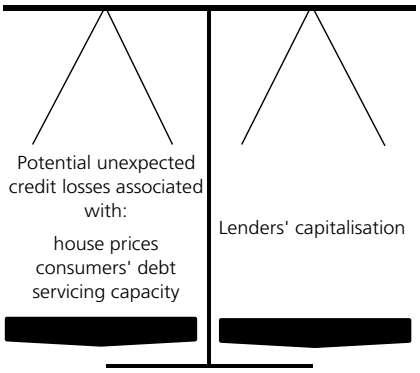
7 For an evaluation of the collateral value of property, see the Box 5.1 *Assessment of house price valuation by banks* in this Report.

ii) Income tends to be the main source of funds used to repay mortgage loans. Given the length of mortgage repayment terms and the possibility of loss of employment or other sources of income, borrowers' debt servicing capacity hinges on the sustainability of their income. A risk can arise if households accumulate excessive debt, as this increases the probability of default in a period of economic stress. Risks can materialise in the event of losses of, or declines in, borrowers' income, or an increase in interest rates. In such a situation, debt service costs can exceed income net of necessary expenditure, leading to default. If house prices simultaneously fall, credit losses can occur as described above. In addition, growth in household debt can lead to a decrease in consumption and indirectly put financial stability at risk, for instance through credit losses on loans to non-financial corporations. Such losses can result from economic difficulties caused by firms cutting production or service provision in response to the fall in household consumption.

iii) Lenders' credit portfolios are made up of loans with certain risk characteristics, characteristics which together tend to form a large part of their credit standards.[8] Lenders use these characteristics as a basis for determining the risk component of the interest rate, which is largely a function of risk. This interest rate is meant to cover not only the expected losses on those loans, but also the costs of the capital held to cover unexpected losses (along with other components such as liquidity costs). A risk can arise in situations where loan rates and the capital held by lenders do not take into account the risks associated with collateral value (i) and consumers' income and debt servicing capacity (ii). An easing of credit standards is particularly common in economic good times, driven by optimistic expectations and increased competition in the credit market. Risks can materialise in the event of a sharp increase in NPLs accompanied by a fall in house prices. In such a situation, credit losses can reduce capital below the regulatory minimum, leading to a credit crunch in the real economy and even to a need to apply resolution mechanisms in the banking system.[9]

TABLE 2

DESIRABLE BALANCE BETWEEN LOAN PORTFOLIO RISKS AND LENDER RESILIENCE



Source: CNB

The first two categories of risks are referred to jointly as *borrower-related* (see Table 1) and can lead to the emergence of spirals between house prices and house purchase loans. In such case, house price overvaluation and credit growth gradually reinforce one another. The third category of risks is referred to as *lender-related*. Such risks arise when the potential loan losses are not adequately balanced by lender resilience (see Table 2).

8 The CNB's Recommendation and its 2017 Supervisory Benchmark both work with such characteristics (https://www.cnb.cz/miranda2/export/sites/www.cnb.cz/cs/dohled_financni_trh/vykon_dohledu/dohledove_benchmarky/download/dohledove_sdeleni_2017_01.pdf – available in Czech only).

9 See the work of SAREB in Spain (https://www.bde.es/bde/en/secciones/prensa/infointeres/reestructuracion/) and the lessons of the financial crisis in Ireland (https://www.imf.org/external/pubs/ft/dp/2015/eur1501.pdf), including the Mortgage Arrears Resolution (Family Home) Bill 2017 (https://www.oireachtas.ie/viewdoc.asp?DocID=36550&&CatID=59).

3. MACROPRUDENTIAL TOOLS FOR MITIGATING RISKS ASSOCIATED WITH LOANS SECURED BY RESIDENTIAL PROPERTY

Tools can be used to mitigate both borrower- and lender-related risks.

The tools that target borrower-related risks directly restrict the volume of credit provided in relation to its riskiness. Macroprudential authorities in numerous countries set LTV limits, which are aimed at reducing lenders' losses given default by borrowers and a simultaneous fall in house prices, and LTI/DTI or LSTI/DSTI limits, which are targeted at reducing the probability of default by borrowers during an economic downturn (ESRB, 2014).[10] The limits are applied to new loans and can be defined either as hard caps or as soft limits allowing a percentage of loans to be provided in excess of the limit. They restrict the volume of loans which would otherwise be granted with riskier characteristics (i.e. with ratios exceeding the limits) and, when used in a timely fashion, can thus help prevent the emergence of spirals between house price growth and house purchase loans.

The tools that target lenders are aimed at increasing the resilience of lenders during periods of financial stress and therefore influence the amount of capital they hold. They can work directly through the setting of higher capital requirements on the basis of a whole range of factors, including risks associated with real estate exposures. Such instruments include the countercyclical capital buffer and the systemic risk buffer. Others can work indirectly through variables that affect capital requirements connected with exposures secured by residential property. They include higher risk weights for banks using the STA approach to determine capital requirements for credit risk (under Article 124 of the CRR), a higher loss given default for banks using the internal rating based approach (under Article 164 of the CRR) and temporarily higher risk weights in the residential or commercial property sector (under Article 458(2)(d)(vi) of the CRR). These tools increase the amount of capital held by banks in relation to their risk-weighted exposures, enabling them to better absorb unexpected losses on existing loans secured by residential property. A side-effect is that they can again prevent the emergence of spirals as a result of the higher capital requirements passing through to interest rates, and thereby contain or slow economic growth.

The use of the above instruments is contingent on the observed risk levels and dynamics. As a preventive measure (when risks are rising but still not elevated), it can be particularly appropriate to use tools that target borrowers. They can work more effectively against further growth in risks by directly restricting the provision of new loans with riskier characteristics. When the risks are already elevated, it can be more appropriate to deploy instruments that strengthen lenders' capitalisation. They can be complemented with tools that target borrowers, configured so as to restrict any further growth in the existing risks.[11] A combination of the two categories of instruments can be desirable in certain situations, because tools that target lenders can be applied to all existing loans, whereas tools targeted at borrowers apply solely to new loans. In this context, the use of instruments that target lenders is more universal, as they can be used preventively even in a situation of rising but still not elevated risks.

4. APPROACH TO EVALUATING RISKS ASSOCIATED WITH LOANS SECURED BY RESIDENTIAL PROPERTY

Given the current nature of the risks, which are rising but still not elevated, we will deal from now on with borrower-related risks and tools. Specifically, we will consider the situation where there are risks associated with collateral value and at the same time risks associated with borrowers' income and debt servicing capacity. We will focus on the direct risks associated with exposures secured by residential property and abstract from the indirect risk of a threat to financial stability resulting from a sharp fall in household consumption caused by household overindebtedness (see Table 2).

The CNB evaluates the risks described above as a function of three variables: house price overvaluation, credit standards and credit volume (see Equation 1). House price overvaluation and credit standards together determine the potential losses on the average unit volume of credit and hence are indicators of the riskiness of loans. Combined with the volume of credit, they indicate the total potential losses on those loans and are thus indicators of the total size of the risks associated with such loans. To identify the

10 These tools are not set forth in CRR/CRD IV, so national authorities either apply them as recommendations or initiate amendments to incorporate them into national law.

11 One example of such use of macroprudential instruments is the Netherlands, where an LTV cap of 106% was introduced in 2012 and lowered by 1 pp a year to 100% in 2018.

risks as early as possible, the CNB relates these variables to new loans:

$$\text{risks} = f(\underbrace{\text{price overvaluation, credit standards}}_{\text{indicator of } \textit{riskiness} \text{ of individual loans}}, \underbrace{\text{credit volume}}_{\text{indicator of risks associated with total credit volume}}) \quad (1)$$

For evaluation purposes, the key quantitative measures of credit standards are the LTV, which, together with house price overvaluation, determines the *loss given default* (LGD), and also the ratio of loans with excessive debt service or loan size levels (the ratio of loans at risk of default under stress), which indicate the *probability of default* (PD):

$$\text{MIPZ} = \underbrace{\frac{\sum_i loan\ size_i}{\text{credit volume}}}_{\substack{\text{ratio of loans at risk of} \\ \text{default under stress}}} \cdot \underbrace{\sum_i \min\left[(100\,\% - \text{LTV}_i) - \text{overvaluation}; 0\right] \cdot \text{credit volume}}_{\substack{\text{loss given default of those} \\ \text{loans}}}, \quad (2)$$

where MIPL denotes the macroprudential indicator of potential losses on new loans, *i* denotes individual loans with at risk of default under stress, *(100% – LTV)* denotes the share of over/undercollateralisation by property, *(100% – LTV) – overvaluation* denotes the proceeds from the sale of the collateral given a fall in house prices and *min[(100% – LTV) – overvaluation; 0]* restricts the proceeds to negative values or zero, i.e. to credit losses.

Some simple examples can be given to facilitate a better understanding of equation (2). If the LTV is 80%, the overcollateralisation is 20% and there will be no loss on the sale of the collateral if house prices fall by 15% (*min[(100% – 80%) – 15%; 0] = 0*).[12] If, however, house prices fell by 25%, the loss on the sale of the collateral would equal 5% of the credit volume (*min[(100% – 80%) – 25%; 0] = –5%*).[13] If the LTV was 110%, the undercollateralisation would equal 10% and a drop in house prices of 15% would give rise to a loss on the sale of the collateral of 25% of the credit volume (*min[(100% – 110%) – 15%; 0] = –25%).* House price overvaluation is estimated using the techniques described in section 2.2 of this Report. Loans with excessive debt service or loan size values according to the method described in sections 6.2 and 6.3 of this article (i.e. individual loans for which the financial reserve under stress is lower than the set threshold or for which the loan size is higher than the hypothetical repayable loan under stress) are deemed to be loans at risk of default under stress. The possibility of default is evaluated at the horizon of five years from the provision of the loans, so the LTV and the loan size for the calculation of the indicator relate to that moment in time.

The MIPL is not an exact estimate of credit losses on new loans in the event of stress. Rather, it is an indicator of such losses for macroprudential purposes, one which uses certain prudent assumptions to express those losses. The loss given default can be favourably affected by lenders' ability to put the sale of collateral on hold until house prices start to go up again.[14] It can be adversely affected by the actual situation on the property market and by its duration in the event of a significant price correction of a systemic nature following a long period of growth above the equilibrium level.

A rise in the MIPL over time nonetheless indicates growth in risks, to which it may be appropriate to respond with macroprudential policy (see Chart V.31 in section 5.3.1 of this Report). The evolution of the components of this indicator can meanwhile help determine which macroprudential instrument to use. A fall in the MIPL following the introduction of macroprudential instruments can then indicate the degree of effectiveness of the instruments.

5. HOW THE INSTRUMENTS ARE USED

If risks associated with collateral value are identified, the primary tool used to mitigate them is LTV limits, which represent a requirement for overcollateralisation[15] and thus allow for direct or preventive restriction of credit losses in the event of default and a decline in house prices. LTV limits are by far the most commonly used macroprudential tools

12 We abstract from transaction costs arising from the sale of the property and the termination of the credit relationship.
13 In this example, we abstract from the fact that the loan may have been partially repaid.
14 This ability is given by lenders' capitalisation.
15 Overcollateralisation relates to the collateral value, which, under the present regulations, can be determined as the estimated market value of the real estate used as collateral. Depending on the degree of overvaluation of house prices, a loan may also be undercollateralised with respect to the equilibrium value of the collateral.

targeted at real estate exposures in current international practice (see Table V.4 in section 5.4.1 of this Report).[16]

If the main risks identified are associated with borrowers' debt servicing capacity, the primary tool used to mitigate them is LTI/DTI or LSTI/DSTI limits. These can also be used to enhance the effectiveness of LTV limits. A combination of LTV and LTI/DTI or LSTI/DSTI caps will restrict the volume of loans that have simultaneously high PD and LGD levels. If the caps are defined as soft limits, moreover, the introduction of LTI/DTI or LSTI/DSTI caps will not necessarily lead to any significant additional restriction on the total volume of new loans above that given by the LTV limits, because lenders will probably decide initially to restrict those loans which exceed the caps on all the chosen credit ratios simultaneously (an illustrative example of such a case is given in section 6.5), thereby minimising the impacts of the additional measures. This can therefore be a more effective risk mitigation technique than tightening the LTV limits. The important question in such a situation is which income ratio to use.

LSTI/DSTI caps can reduce the probability of borrowers being unable to service loans continuously in accordance with their chosen repayment schedule. LTI/DTI caps can lower the probability of them failing to repay loans in full over their remaining period of economic activity (i.e. even after the loan has been restructured and the repayment schedule changed). LTI/DTI caps may be appropriate when the constraints created by the LSTI/DSTI cap are softened by a lengthening of the repayment term or by low interest rates. As LTI/DTI caps do not work with components that can give the impression of a sustainable level of debt service in the short term (LSTI/DSTI), they can slow the pace at which consumers become overindebted in real terms.

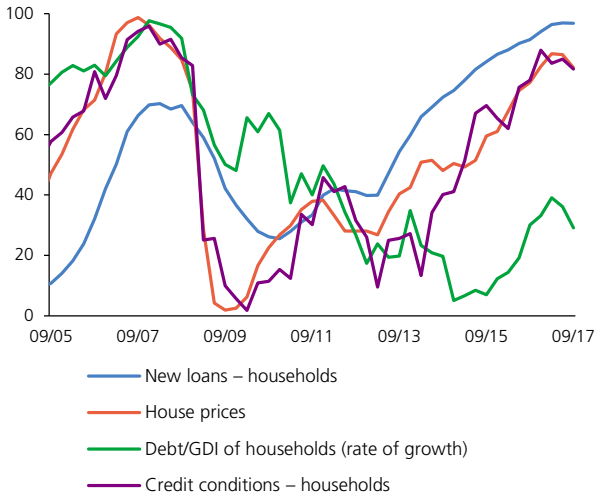
The CNB prefers the DTI ratio to the LTI ratio. The DTI ratio better captures the risks associated with borrowers' debt servicing capacity, because it takes their overall debt into account. In addition, it averts the problem of LTI and LTV limits being circumvented through the provision of unsecured loans and can thus also enhance the effectiveness of LTV limits. However, the CNB only has information on new loans, not on the total debt of applicants for such loans. For this reason, data on the LTI ratio are used to determine the risky levels in section 6. The DTI ratio is meanwhile always equal to or higher than the LTI ratio for individual borrowers. Further loans in excess of the secured loans contained in the LTI ratio, i.e. higher DTI ratios, imply higher debt service costs and a higher risk of default at the same level of income in the event of economic stress. In addition, the same DTI levels among one set of borrowers are usually just as risky, if not more so, as the same LTI levels among other borrowers with similar income. This is because the total debt from which the DTI ratio is calculated can have a different loan structure than the loans considered for the LTI ratio. Specifically, the total debt can contain unsecured loans in place of a proportion of secured ones. Unsecured loans typically have higher interest rates and shorter repayment terms than secured ones. Total debt can therefore imply higher debt service for a borrower than a secured loan of the same amount. Higher debt service in turn implies a higher risk of default at the same level of borrower income. One can therefore regard DTI levels equal to or lower than those determined on the basis of LTI data as risky. Likewise, the CNB prefers the DSTI ratio to the LSTI ratio; here again, the DSTI ratio is always equal to or higher than the LSTI ratio for individual borrowers.

In its decisions on the introduction and calibration of macroprudential tools, the CNB considers the cyclical position and structural characteristics of the financial sector and the real economy. The cyclical position has a significant bearing on the timing of the introduction and withdrawal of these tools and on their calibration. The financial cycle indicator (Plašil et al., 2014; see Chart 1) is a useful measure for estimating the cyclical position of the Czech economy. Structural characteristics – especially the size of exposures secured by residential property in lenders' balance sheets – are a key factor in deciding whether existing or emerging risks may take on a systemic scale for the financial sector and whether the CNB therefore needs to apply its powers to ensure financial stability.

16 A total of 16 EU countries were using macroprudential tools targeted at real estate exposures as of the end of 2017. Fiveteen of them were using LTV caps. The first EU country to introduce LTV caps was Lithuania in 2007. Such limits were applied even earlier in Hong Kong in 1997. The effectiveness of this instrument in reducing systemic risks associated with the cyclicality of house prices is documented by, for example, Wong, E., et al. (2011): *Loan-to-value ratio as a macroprudential tool – Hong Kong's experience and cross-country evidence*, Hong Kong Monetary Authority.

CHART 1

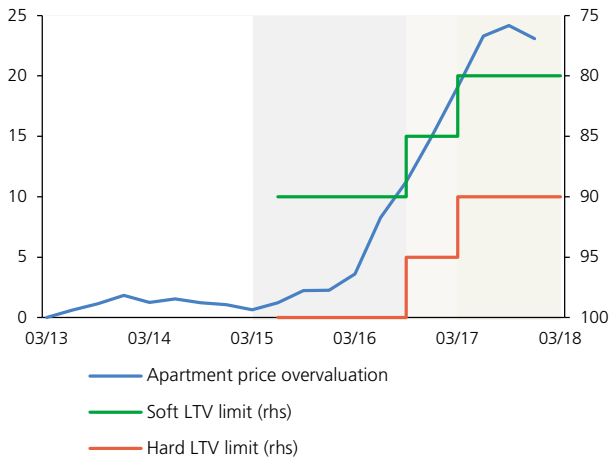
COMPONENTS OF THE FINANCIAL CYCLE INDICATOR RELATING TO PROPERTY MARKETS AND LOANS TO HOUSEHOLDS
(%)



Source: CNB
Note: GDI stands for gross disposable income. Credit conditions applying to households are quantified as the spread between interest rates on loans to households and the PRIBOR.

CHART 2

DIFFERENCE BETWEEN GROWTH IN APARTMENT PRICES AND INCOMES AND LTV LIMITS SET IN THE CNB RECOMMENDATION
(overvaluation in %; rhs: LTV in %)



Source: CZSO, CNB, CNB calculation
Note.: Difference between growth in apartment prices and incomes since 2013 Q1, when apartment prices last hit a low. This indicator of apartment price overvaluation assumes that prices were at equilibrium at the low point. This is a cautious assumption, because prices might have been undervalued at that point and hence may not reverse their entire growth in the event of stress, The grey areas indicate, respectively, the phases of the entry into force and tightening of the recommended LTV limits in the CNB's June 2015 and June 2016 Recommendation on the management of risks associated with the provision of retail loans secured by residential property.

6. ILLUSTRATIVE CALIBRATIONS

The aim of the calibration is to restrict loans with LTV, DSTI and DTI levels that could lead to credit losses that would not be absorbed by lenders' capital. However, the potential losses that would be generated by a sustained spiral between house prices and house purchase loans are hard to estimate. For this reason, the CNB determines risky credit ratio levels on a relative basis. This approach involves seeking the thresholds at which the risk of default or the loss rate starts to increase substantially. Higher LTV levels (i.e. lower collateralisation) almost always imply a higher loss given default. For the DSTI and DTI ratios, the probability of default depends on a whole range of factors, such as the borrower's income and age, the nature of the household and the probability of loss of income. The illustrative determination of risky LTV, DSTI and DTI levels in sections 6.1–6.3 draws on granular data on loans secured by residential property provided by banks in the second half of 2017.

6.1 LTV

The determination of risky LTV levels is derived from the method used by lenders to determine collateral value. Under the regulations currently in force, the collateral value can be determined as an estimate of the market price of the property[17] and can thus contain the cyclical component of such prices.[18] To determine risky LTV levels, the CNB therefore primarily monitors the estimated overvaluation of house prices (see Chart 2). This determines the degree of overcollateralisation needed to restrict the credit losses given default and given a decline in house prices. The degree of overcollateralisation is equal to *(100% – LTV)*. The risky LTV levels (LTV_R) are thus given by:

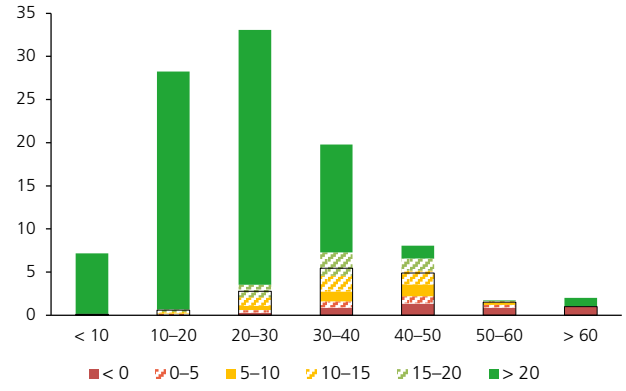
$$LTV_R \geq 100\% - \text{overvaluation} \qquad (3)$$

17 See Articles 124(1) and 229(1) of the CRR.
18 In Article IV(4) of the Recommendation, the CNB therefore states: "Lenders should apply a conservative approach to determining the value of collateral for the purposes of calculating LTV and take the risk of house price overvaluation into account".

CHART 3

DISTRIBUTION OF LOANS BY LSTI AND FINANCIAL RESERVE UNDER STRESS

(x-axis: LSTI in %; y-axis: share of loans in %; reserve in % of net income; 2017 H2)

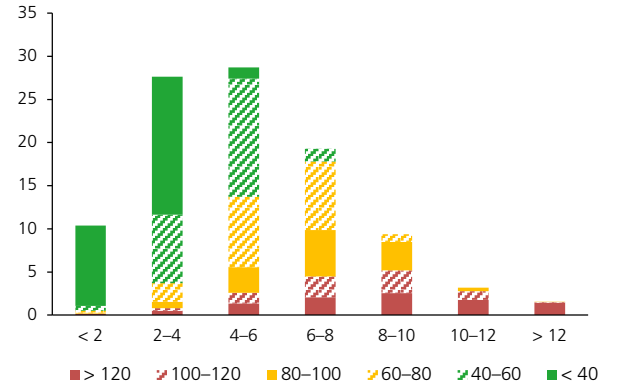


Source: CNB
Note: Risky LSTI levels are determined using the financial reserve under stress for individual new loans reported in the Survey. Risky LSTI levels are those for which a significant proportion of new loans have a reserve below the threshold. Those loans are indicated with a frame.

CHART 4

DISTRIBUTION OF LOANS BY LTI AND RATIO OF THE LOAN PROVIDED TO THE HYPOTHETICALLY REPAYABLE LOAN UNDER STRESS

(x-axis: LTI in %; y-axis: share of loans in %; ratio in %; 2017 H2)



Source: CNB
Note.: Risky LTI levels are determined using the hypothetically repayable loan under stress (the loan size with the longest permissible maturity and the highest permissible ratio of instalments to income) for individual new loans reported in the Survey, which is compared with the actual loan size. Risky LTI levels are those for which a significant proportion of new loans exceed the hypothetically repayable level.

6.2 DSTI

The CNB determines risky DSTI levels using the concept of the *financial reserve under stress* (FRs):

$$FR_S = \text{net income}_S - \text{other living costs} - \text{loan repayments}_S - \text{prop. maintenance costs} \quad (4)$$

This reserve denotes the consumer's net income minus the subsistence level, loan repayments and property maintenance costs under the simulated stress (the variables in Equation (4) subject to the stress are indicated by the subscript "$_S$"). Subsistence costs are based on the values set by the Ministry of Labour and Social Affairs for the first and other persons in the household and take into account the number of borrowers and their dependants for loans reported in the Survey. The true repayments of these loans are used as the loan repayments. Property maintenance costs are set at 1.5% of the collateral on these loans per year. The stress consists in a 10% decrease in income – expressing the probability of loss of employment or a drop in income for a certain period of time – and a steady rise in interest rates of 0.6 pp a year for five years (i.e. a cumulative increase of 3 pp). The impact of the interest rate stress respects the fixation and repayment periods of the individual loans reported in the Survey. So, if the loan has a fixation period of five years, the interest rate increase will happen all at once in the fifth year and will affect subsequent instalments only up to the amount of the unrepaid part of the principal. If such a loan has a maturity of five years, the rise in interest rates will not affect it at all.

FR_S levels lower than the financial reserve threshold (FR_{TH}) are deemed risky. The CNB applies a threshold of 10% of net income,[19] or CZK 5,000. The requirement for a minimum absolute FR_S serves to cover sudden necessary expenditures, which to some extent are independent of income level. This test is always conducted on a sample of newly provided loans reported in the Survey on the basis of the calculation of LSTI ratios for individual loans.[20] The share of loans provided in 2017 H1 for which FR_S falls below the reserve threshold (and those loans thus have excessive LSTI levels) increases significantly for loans with an LSTI ratio above 40% (see Chart 3). Such loans are currently regarded as risky.[21,22]

19 Threshold of 10% is roughly the average long-term household saving rate observed in the Czech Republic. CZK 5,000 is 10% of the average income documented by applicants for new loans (according to the Survey).

20 The CNB has information only on new loans, not on the total debt of applicants for such loans. For this reason, the risky levels are determined on the basis of data on LSTI ratios, not DSTI ratios.

21 Other macroprudential authorities have arrived at similar figures (see, for example, https://www.esrb.europa.eu/national_policy/shared/pdf/overview_macroprudential_measures.xlsx).

22 Given the different levels of house prices in relation to income in various regions of the Czech Republic, the riskiness of loans with a given LSTI level – like that of loans with a given LTI level in section 6.3 – differs slightly across those regions. Under the methodology presented here, however, these loans are regarded as risky in all regions.

6.3 DTI

To determine risky DTI levels, the CNB uses the concept of the hypothetically repayable loan under stress (HRL_S):

$$HRL_S = (1 - FR_{TH}) \cdot (income_S - \text{property maintenance costs} - \text{other necessary costs}) \cdot \text{max maturity} \quad (5)$$

HRL_S represents the biggest loan the consumer would be able to service over the longest possible maturity if her monthly repayments were at the maximum possible level. After paying such instalments, the consumer would be left at the financial reserve threshold ($FR_S = FR_{TH}$). The consumer's remaining period of economic activity up to the age of 65, or 30 years, whichever is the shortest, is taken as the longest possible maturity.

The HRL_S of individual consumers are compared with the size of the loans actually provided to them. The CNB thus monitors the share of loans (L) which are larger than those which consumers would, under stress, be able to service over their period of economic activity ($L > HRL_S$ or also $L/HRL_S > 100\%$). This test is again conducted on a sample of newly provided loans reported in the Survey on the basis of the calculation of LTI ratios for individual loans. The share of loans provided in 2017 H1 with $L > HRL_S$ increases significantly for loans with an LTI ratio above 8 (see Chart 4). Such loans are therefore currently regarded as risky.

6.4 Relationship between DSTI and DTI limits

It is apparent from the HRL_S expression that determining DTI limits is quantitatively equivalent to determining DSTI limits and maximum maturity. This is because DSTI limits perform the function of regulatory maximum instalments in relation to income in the HRL_S expression:

$$HRL_S = \text{max maturity} \cdot \underbrace{(1 - FR_{TH}) \cdot (income_S - property\ maintenance\ costs - other\ necessary\ costs)}_{\text{maximum debt service}} \quad (6)$$

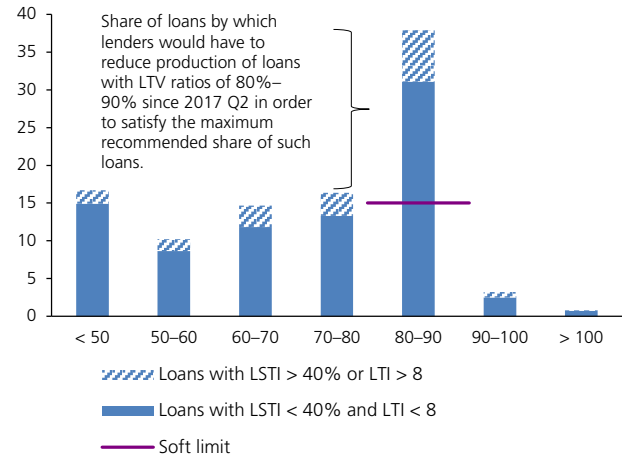
The determination of risky DTI levels using findings about risky DSTI levels guarantees that the resulting risky DTI levels take into account the level of interest rates and the possibility of rates increasing, even though the DTI ratio does not contain this information directly.

6.5 Example of parallel use of multiple instruments

The CNB set quantitative LTV limits in its June 2015 Recommendation. The June 2016 Recommendation introduced a phased tightening of these limits. As from 2017 Q2, it is recommended that loans with LTV ratios of 80%–90% should account for no more than 15% of the volume of new loans per quarter. In 2017 Q1 (i.e. before the latest tightening of the LTV limits entered into force), such loans accounted for 30% of credit production. The June 2017 Recommendation subsequently stated that lenders should be particularly cautious when providing loans with DSTI ratios of over 40% or DSTI ratios of over 8, especially within the permitted 15% of the volume of loans with LTV ratios of 80%–90%. Loans exceeding the aforementioned levels for at least one of the ratios have accounted for around 15% of credit production for as long as the Survey has been conducted. In 2017 Q1, roughly half of these loans had LTV ratios above 80% (see Chart 5).

CHART 5

DISTRIBUTION OF NEW LOANS BY LTV, LTI AND LSTI IN 2017 Q1
(x-axis: LTV in %; y-axis: share of loans in %)



Source: CNB

It can be illustrated using this example that the introduction DSTI or DTI limits in excess of the LTV limits would not necessarily imply any further significant constraints on the total volume of loans provided, but would only enhance the credit characteristics of those loans. Take, for example, DSTI or DTI caps imposed on top of the existing soft LTV limit (i.e. an LTV cap of 90% and an aggregate LTV cap of 80% with 15% of credit production permitted to exceed that level). If, for example, the caps were set at 40% and 8 respectively, with loans having ratios in excess of these levels allowed to account for no more than 5% of credit production, lenders would probably have reacted as follows during the most recent tightening of the LTV limits. They might have first reduced the share of loans with LTV ratios of 80%–90% by 7 pp by restricting the provision of loans with higher DSTI/DTI levels, because in the process of

reducing the volume of loans in response to the tighter LTV limits they would thus have directly fulfilled these hypothetical DSTI/DTI limits. The permitted 5% of credit production would have roughly covered the remaining 8% of the volume of loans with LTV ratios below 80% that were provided with LSTI ratios above 40% or LTI ratios above 8.[23]

7. CONCLUSION

The CNB assesses risks associated with exposures secured by residential property by evaluating the degree of overvaluation of house prices, the easiness of credit standards and the evolution of new loans. Overvalued prices and easy credit standards are indicators of the riskiness of new loans. Together with the volume of new loans, they indicate the total size of the risks associated with the provision of new loans.

LTV caps can limit loss given default, while DTI or DSTI caps can reduce the probability of default. DSTI caps can reduce the probability of default with respect to the chosen repayment schedule, while DTI caps can reduce the probability of borrowers failing to repay over their remaining period of economic activity (i.e. even after the loan has been restructured). Nonetheless, the caps themselves cannot substitute for financial institutions' internal risk management systems or for individual supervisory work (nor are they intended to). Likewise, they cannot substitute for borrowers' own responsibility and realistic estimation of their future debt servicing capacity.

The CNB determines risky LTV levels on the basis of the estimated overvaluation of house prices, taking into account the share of loans with currently risky DSTI and DTI levels. It determines risky DSTI and DTI levels using the concepts of the financial reserve under stress and the hypothetically repayable loan under stress respectively. To do so, it uses anonymised data on all newly provided loans. In order to respond to emerging risks in a preventive and timely manner, the CNB monitors the DSTI and DTI thresholds at which the probability of default increases significantly. The results of this analysis could be used to set caps on both ratios.

23 Owing to data unavailability, the ratios presented here (as in the previous subsections) relate to newly provided credit (LTI/LSTI), not total debt (DTI/DSTI).

REFERENCES

ESRB (2013): *Recommendation of the European Systemic Risk Board of 4 April 2013 on Intermediate Objectives and Instruments of Macro-Prudential Policy* (ESRB/2013/1).

ESRB (2014): *The ESRB Handbook on Operationalising Macro-Prudential Policy in the Banking Sector, March* 2014.

ESRB (2016): *Vulnerabilities in the EU Residential Real Estate Sector,* November 2016.

PLAŠIL, M., SEIDLER, J., HLAVÁČ, P., KONEČNÝ, T. (2014): *An Indicator of the Financial Cycle in the Czech Economy, Financial Stability Report 2013/2014, Czech National Bank, pp. 116–124.*

WONG, E., FONG, T., LI, K., CHOI, H. (2011): *Loan-To-Value Ratio as a Macroprudential Tool – Hong Kong's Experience and Cross-Country Evidence*, Working Paper 1101, Hong Kong Monetary Authority.

THE EFFECT OF ACCOMMODATIVE MONETARY POLICY ON THE RISK WEIGHTS APPLIED BY DOMESTIC BANKS

Simona Malovaná, Dominika Kolcunová, Václav Brož

This article examines the effect of accommodative monetary policy on risk perception and risk measurement by domestic banks that use internal models to estimate the risk parameters entering the calculation of their capital requirements. Low interest rates can influence risk parameter estimates either directly or indirectly through their impact on asset prices, asset price volatility, valuation, firms' cash flow and so on. They can also affect the perceived riskiness of existing borrowers and new loan applicants, thereby further reducing risk parameter estimates. The results of our empirical analysis point to the existence of a risk-taking channel for banks that use the IRB approach for at least a portion of their exposures, as we find a positive, statistically significant relationship between the implicit risk weights of those banks and a number of monetary policy variables.

1. INTRODUCTION

Over the last ten years or so, increasing attention has been paid to the long-run impact of easy monetary policy on banks' risk behaviour via the risk-taking channel. In the short run, a monetary policy easing generally enhances the stability of banks, as low interest rates improve the overall quality of their loan portfolios. In the long run, though, low interest rates may induce banks to increase both the size and the riskiness of their assets in order to attain their original target yields (the search-for-yield hypothesis;[1] Gambacorta, 2009; Diamond and Rajan, 2012). Risks can also increase on the liability side – low monetary policy rates can lead in the long run to growth in asset prices, which can induce banks to provide short-term funding secured by those assets and in turn give rise to increasing maturity transformation (Adrian and Liang, 2014). In addition, accommodative monetary policy can affect estimates of risk parameters such as the probability of default (PD) and the loss given default (LGD), which then enter the calculations of the capital requirements of banks that use internal models and the calculations of implicit risk weights[2] (Gambacorta, 2009).

This article sets out to test empirically the relationship between the monetary policy stance and the implicit risk weights characterising banks' assessment of the riskiness of their assets. A bank quantifies a larger capital requirement for assets that it evaluates as riskier. This is reflected in a higher implicit risk weight. If the implicit risk weight decreases, the bank can expand its credit portfolio without increasing its capital. Our empirical analysis is conducted using data for a period of predominantly accommodative monetary conditions, so its results cannot automatically be interpreted in terms of monetary policy tightening. Consequently, the article focuses primarily on discussing the effect of easy monetary policy.

The article is structured as follows. Section 2 is devoted to the approaches used to determine capital requirements for credit risk. Section 3 discusses the mechanism of monetary policy transmission through the risk-taking channel. Section 4 presents the methodology and data used. Section 5 gives the results of the empirical analysis. Section 6 discusses their implications for financial stability and central bank policy. Section 7 concludes.

2. APPROACHES TO DETERMINING CAPITAL REQUIREMENTS FOR CREDIT RISK

The current CRD IV/CRR regulatory framework[3] allows the use of two approaches to determining capital requirements for credit risk: a standardised approach (STA) and/or an internal rating-based approach (IRB). The STA approach takes account of the type, external rating and collateral

1 Search for yield is a phenomenon where, at a time of generally low asset yields, economic agents try to compensate for this fact by seeking riskier-than-usual investment opportunities, which carry a premium for the increased risk. Such behaviour can increase the future risks to the financial system.

2 For simplicity, we refer here to risk weights even though under the internal rating-based (IRB) approach the capital requirement is set for a given asset and the resulting risk weight is thus implicit (the ratio of risk-weighted exposures to the total exposures of banks).

3 CRD IV (the Capital Requirements Directive) is Directive 2013/36/EU of the European Parliament and of the Council of 26 June 2013 on access to the activity of credit institutions and the prudential supervision of credit institutions and investment firms; CRR (the Capital Requirements Regulation) is Regulation (EU) No 575/2013 of the European Parliament and of the Council of 26 June 2013 on prudential requirements for credit institutions and investment firms; it was published in the Official Journal on 27 June 2013 and has been in force since 28 June 2013. For more details, see https://www.cnb.cz/en/faq/faqs_the_capital.html.

quality of the exposure. The IRB approach is based on an internal rating set by the bank and reflects the perceived riskiness of individual asset classes in the given economic environment. A bank uses the IRB approach to derive capital requirements from its own evaluation of the riskiness of its portfolio, i.e. on the basis of its own model-based estimates of the probability of default (PD) and the loss given default (LGD). These risk parameters, along with the exposure at default (EAD) and the maturity of the exposure (M), are used to calculate risk-weighted exposures and regulatory capital requirements according to formulas defined in CRD IV/CRR. The IRB approach is subdivided into the Foundation IRB (F-IRB) and Advanced IRB (A-IRB) approaches, which differ in terms of the extent of internal risk parameter estimates. Under the F-IRB approach, banks only estimate PD, while the other risk parameters are determined by the regulator. Under the A-IRB approach, banks estimate their own PD, LGD and EAD values.

The risk parameters can be estimated using various modelling techniques and usually encompass a broad set of macroeconomic and financial indicators (such as GDP growth rates, inflation, labour market data, interest rates, spreads and volatility indices, asset price growth and market prices of bonds and equity) and obligor-specific characteristics (such as corporate soundness ratios and the type and amount of collateral used). There are numerous studies in the literature dealing with risk parameter estimation methods and analysing the relationship between the explanatory variables and the resulting risk parameters. The relevant studies from our perspective examine the relationship between risk parameter estimates and interest rates (as a proxy for the monetary policy stance). They include, for example, Drehmann et al. (2008), who find a statistically significant positive relationship between the real interest rate and PD for corporate exposures, and Volk (2013) and Bonfim (2009), who find a statistically significant positive relationship between interest rates on loans to corporations and PD for corporate exposures. Jiménez and Saurina (2006) find a similar relationship between interest rates and non-performing loans, which are closely related to PD. Less attention is given in the literature to LGD estimates. Altman et al. (2002) estimate a statistically significant positive correlation between LGD and PD, while Jiménez and Saurina (2006) stress that during recessions (when PD usually increases) banks may require higher collateral from their customers, which would reduce LGD; in such case, LGD and PD would be negatively correlated.

3. THE EFFECT OF EASY MONETARY POLICY ON THE IMPLICIT RISK WEIGHTS APPLIED BY BANKS

As mentioned in the introduction, the risk-taking channel refers to a broad set of possible ways in which monetary policy can influence the risk behaviour of banks and other financial institutions. This article is devoted to just one of these ways, as depicted in Figure 1. The figure describes the process whereby low interest rates affect the risk parameter estimates that enter the calculation of banks' capital requirements under the IRB approach. Low interest rates can influence risk parameter estimates either directly (by entering as one of the variables) or indirectly through their impact on asset prices, asset price volatility, valuation, firms' cash flow and so on. They can also affect the perceived riskiness of existing borrowers and new loan applicants, thus further reducing risk parameter estimates. In the case of existing borrowers, lower interest rates are reflected in a decline in their debt service costs and hence in their probability of default.[4] As for new loan applicants, low interest rates can make them less risky (which may be reflected in a better credit rating), i.e. applicants who would not get a loan at higher interest rates may be seen as creditworthy. Lower risk parameter estimates translate into lower risk-weighted exposures or lower implicit risk weights, leading, ceteris paribus, to a higher capital ratio.

There is little empirical analysis of this relationship in the literature. One paper on a related theme is that by Gambacorta (2009), who finds a statistically significant link between a prolonged period of low interest rates and banks' risk-taking. Bank expected default frequencies (EDFs) are used as a proxy for bank riskiness, and the number of consecutive quarters with interest rates below both the natural rate[5] and the rate implied by a Taylor rule is used to proxy for an extended period of low interest rates. De Nicolò et al. (2010) support the existence of the risk-taking channel by estimating the effect of interest rates on banks' risk weights using data for the USA. They show that lower interest rates are generally associated with greater risk-taking by banks (through a search for yield and the effect on asset prices).

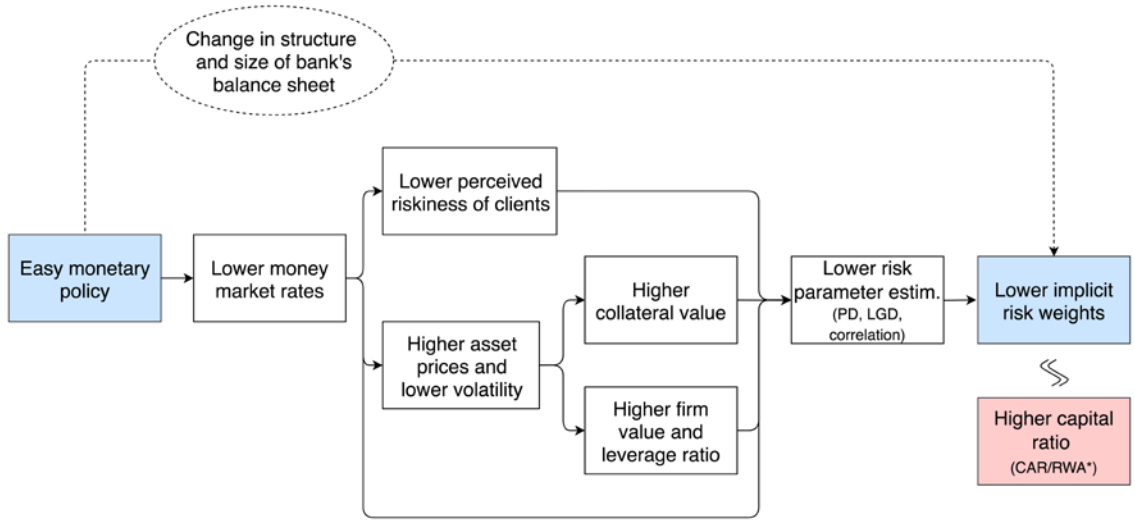
As indicated in Figure 1, implicit risk weight levels are affected not only by the chosen regulatory approach and the internal risk parameter estimates, but also by the bank's

4 The speed of transmission through this channel will depend on the residual fixation of interest rates on the existing loan portfolio; the higher the residual fixation, the slower the transmission.

5 Gambacorta (2009) defines the natural rate as the average real rate in 1985–2000 (for Japan, 1985–1995; for Switzerland, 2000–2005) plus the four-quarter growth in potential output less its long-term average (see Graph 1, p. 46).

FIGURE 1

SIMPLIFIED SCHEME OF THE EFFECT OF EASY MONETARY POLICY ON THE IMPLICIT RISK WEIGHTS OF IRB BANKS



Source: Authors
Pozn.: * CAR/RWA – ratio of regulatory capital to risk-weighted assets.

asset structure, which monetary policy can also influence (through the credit channel, for example). In order to filter out this effect, we additionally use control variables for bank asset structure in the empirical specification (see section 4 for more details). Consequently, the resulting estimate of the relationship between the monetary policy stance and banks' risk weights should not reflect change in the structure of banks' assets.

4. EMPIRICAL MODEL AND DATA

The effect of monetary policy on banks' implicit risk weights is analysed by means of an empirical model and bank-level supervisory panel data. Implicit risk weights are generally affected by three main factors – the regulatory approach (STA versus IRB), the bank's asset structure and the business cycle. To capture the effect of monetary policy, we need to use control variables for all these factors in the empirical specification, although we additionally use a number of other control variables:

$$RW_{i,t} = \alpha_1 RW_{i,t-1} + \alpha_2 MP_t + \alpha_3 X_{i,t-1} + \alpha_4 \%\Delta GDP_t + \alpha_5 VIX_t + \alpha_6 Reg_{i,t} + \upsilon_i + \varepsilon_{i,t}, \quad (1)$$

where $RW_{i,t}$ denotes the implicit risk weights (the ratio of risk-weighted exposures to total assets[6]) for bank *i* at time *t*, MP_t is a monetary policy proxy, $X_{i,t-1}$ is a vector of control variables, $\%\Delta GDP_t$ is annual real GDP growth and VIX_t is the Chicago Board Options Exchange Volatility Index.[7]

Real GDP growth is used to capture the business cycle in the domestic economy and the VIX index to capture volatility on global financial markets. $Reg_{i,t}$ is a dummy variable which takes the value of 1 if the bank's total regulatory capital ratio is less than 1.5 pp above the regulatory minimum of 8% and zero otherwise (Berrospide and Edge, 2010). This variable captures potential pressures arising from low bank capitalisation (or capitalisation close to the regulatory minimum); such pressures may come both from the regulator and from investors and creditors; υ_i captures bank-level fixed effects and $\varepsilon_{i,t}$ is a random error term.

The vector of control variables $X_{i,t-1}$ includes proxies for bank size (the natural logarithm of total assets), credit risk (the ratio of loan loss provisions to total assets) and

6 To calculate the implicit risk weights, we work solely with the risk-weighted exposures for credit risk, which accounted for around 90% of all risk-weighted exposures as of 2016 Q4. We also deal only with balance sheet items and unconsolidated data.
7 The VIX index is a measure of implicit volatility for S&P 500 index (SPX) put and call options traded on the Chicago Board Options Exchange.

capitalisation (the ratio of regulatory capital to total assets) and variables capturing bank asset structure (various categories of loans to the private sector, interbank loans, government bonds and claims on central banks, as a percentage of total assets in each case).[8]

The proxy for bank size captures the fact that large banks tend to face less risk than small ones (Berger et al., 2008; Flannery and Rangan, 2008; Brei and Gambacorta, 2014). The inclusion of this variable is also relevant from the perspective of the too-big-to-fail hypothesis: larger banks may tend to behave less prudently because they can implicitly rely on government support if they run into serious difficulty (Afonso et al., 2014).

The ratio of loan loss provisions to total assets serves as an indicator of the riskiness of banks' loan portfolios (Brei and Gambacorta, 2014). Banks build up loan loss provisions in response to increased credit risk (Frait and Komárková, 2013). Higher credit risk should also be reflected in the risk parameter estimates used to calculate the capital requirements of IRB banks, hence a positive correlation can be expected between the two variables (Cummings and Durrani, 2016).

The ratio of regulatory capital to total assets captures any tendency of banks with more capital to take on more risk (Flannery and Rangan, 2008). It can therefore be regarded as a proxy for banks' loss-absorbing capacity.

The asset structure variables capture the different levels of risk associated with different assets. For instance, loans tend to be regarded as riskier than bonds issued by countries with high credit ratings,[9] unsecured loans as riskier than secured loans, and so on.

The final dataset covers 20 domestic banks from 2003 Q1 to 2016 Q4 (56 quarters altogether).[10] This gives us a total of 963 observations. The dynamic panel model in equation (1) is estimated using a bootstrap method based on De Vos et al. (2015).[11]

4.1 Implicit risk weights and regulatory approaches

In the Czech Republic, the IRB approach is used by all large banks and some medium-sized banks and their building societies (with a combined market share of approximately 80% as of the end of 2016); Chart 1 compares the implicit risk weights of IRB and STA banks.[12] The first wave of migration to the IRB approach occurred in 2007 Q3. Chart 1a shows that the implicit risk weights of IRB banks fell sharply immediately after the switch to the IRB approach. This contrasts with the STA approach, where risk weights began to decrease a few quarters later. In the case of the STA approach, the decline was caused by a fall in the ratio of loans to total assets (see CNB, 2016, p. 144) and a rise in the ratio of less risky exposures to central governments and central banks (see Chart 3b). The fall in the implicit risk weights of IRB banks cannot be explained solely by the change in asset structure, so migration to the IRB approach also played a role.

Chart 2 compares implicit risk weights divided into four main asset classes: (i) exposures to central governments and central banks, (ii) exposures to institutions, (iii) corporate exposures and (iv) retail exposures.[13] The implicit risk weights for banks that use the STA and IRB approaches differ across the main asset classes, the difference increasing with increasing riskiness of the asset class. The difference is due to the nature of the IRB approach, under which a bank implicitly derives risk weights on the basis of an internal assessment of the riskiness of its portfolio, i.e. on the basis of its own model-based PD and LGD estimates. Except for exposures to central governments and central banks, the implicit risk weights of IRB banks are lower than those of STA banks, especially for retail exposures.

8 The bank-level control variables are included with a lag of one quarter, as, for example, in Brei and Gambacorta (2014).

9 For example, a credit rating of AA or higher (or the equivalent thereof for external credit assessment institutions using different scales) corresponds to a credit quality step of 1, which, under Article 114 of the CRR, is assigned a risk weight of 0%. For more details, see Article 136 of the CRR and Annex III of Commission Implementing Regulation (EU) 2016/1799 of 7 October 2016.

10 We use unconsolidated data. The Czech Export Bank (CEB) and the Czech-Moravian Guarantee and Development Bank (CMGDB) were excluded from the analysis because they are wholly owned by the Czech state (which thus guarantees their liabilities, including, in the case of the CEB, those arising from derivatives) and have different business models and volatile credit portfolios. ERB bank was also excluded due to insolvency.

11 This method is used for the following reasons. When estimating model (1), we need to take into account the inclusion of the lagged dependent variable among the independent variables on the right-hand side of the regression equation (we work with dynamic panel data); otherwise, the estimates would be biased. In the literature, this problem is typically solved by applying generalised method of moments (GMM) estimators. However, their use is only justified when the data panel contains just a small number of observations in the time dimension (De Vos et al., 2015). Our panel does not satisfy this condition. We therefore use a dynamic panel model estimated using the bootstrap method of De Vos et al. (2015), which is presented in the literature as an alternative to GMM estimators if the time dimension of the panel is relatively high. The estimation technique is discussed in more detail in Malovaná et al. (2017).

12 We define IRB banks as those using the IRB approach for at least some portion of their exposures as of the end of 2016. We define STA banks as those using solely the STA approach as of the end of 2016.

13 We classify other exposures for STA banks as "others". This class contains a wide range of exposures that are not distinguished under the IRB approach, such as exposures secured by property and exposures in default.

CHART 1a)

IMPLICIT RISK WEIGHTS OF IRB BANKS
(%)

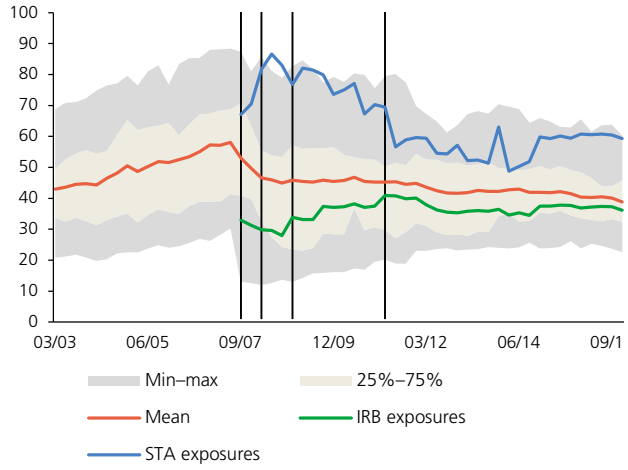
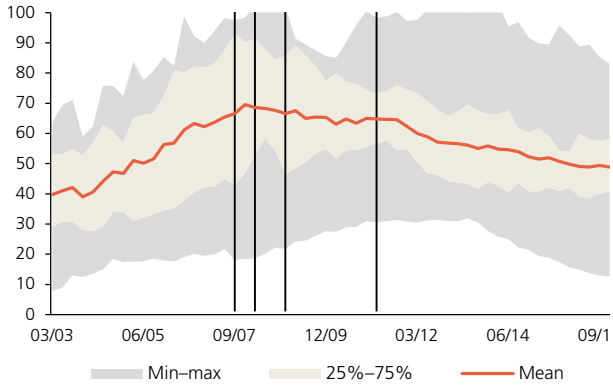


CHART 1b)

IMPLICIT RISK WEIGHTS OF STA BANKS
(%)



Source: CNB, authors' calculation
Note: Implicit risk weights are calculated as risk-weighted exposures divided by total assets. IRB banks – banks using the IRB approach for at least some portion of their exposures as of 2016 Q4; STA banks – banks using solely the STA approach. All IRB banks simultaneously use the IRB approach (IRB exposures) and the STA approach for a certain (usually relatively small) portion of their exposures (STA exposures). The vertical lines denote the four waves of migration of domestic banks to the IRB approach – 2007 Q3, 2008 Q1, 2008 Q4 and 2011 Q1.

CHART 2a)

IMPLICIT RISK WEIGHTS BY ASSET CLASSES – IRB BANKS
(%)

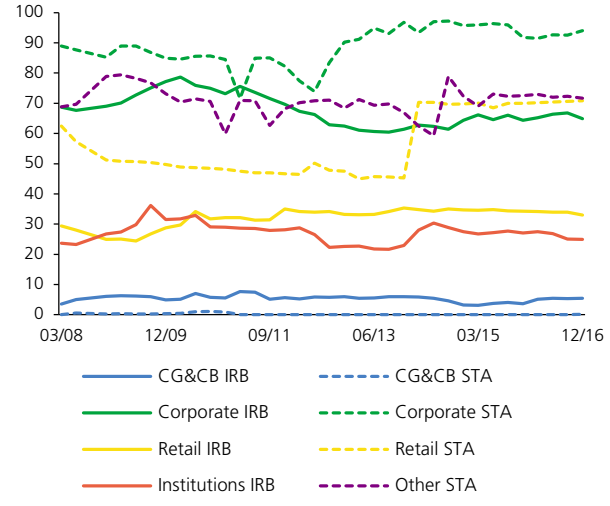
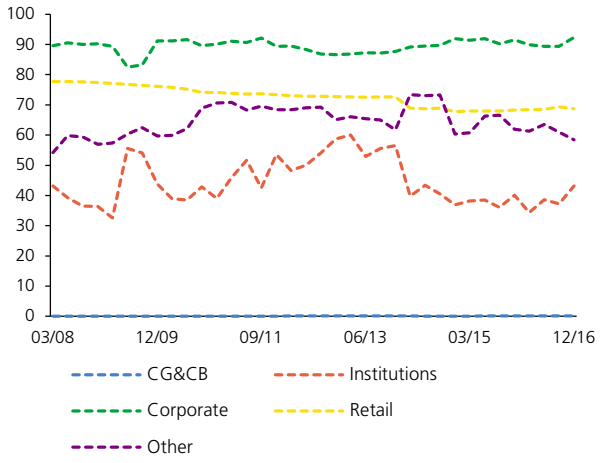


CHART 2b)

IMPLICIT RISK WEIGHTS BY ASSET CLASSES – STA BANKS
(%)



Source: CNB, authors' calculations
Note: Implicit risk weights are calculated as risk-weighted exposures divided by total assets. IRB banks – banks using the IRB approach for at least some portion of their exposures as of 2016 Q4; STA banks – banks using solely the STA approach. All IRB banks simultaneously use the IRB approach (solid lines) and the STA approach for a certain (usually relatively small) portion of their exposures (dashed lines). The share of STA exposures to institutions of IRB banks is zero or nearly zero for the majority of the period analysed, so the average risk weight for this exposure category is not reported in the chart. CG&CB – exposures to central governments and central banks.

CHART 3a)

EXPOSURES BY ASSET CLASSES – IRB BANKS

(%)

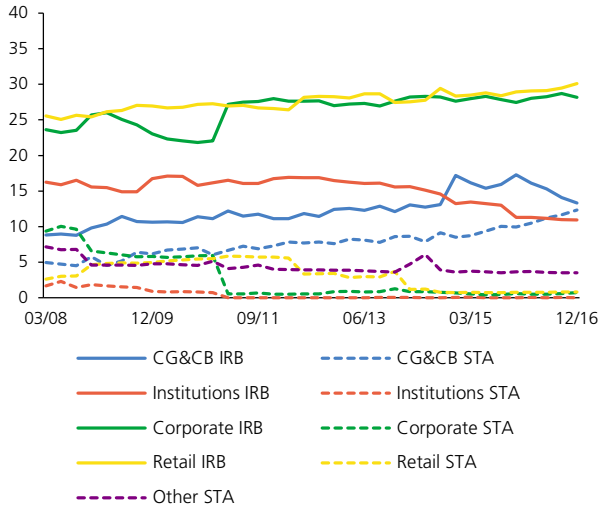
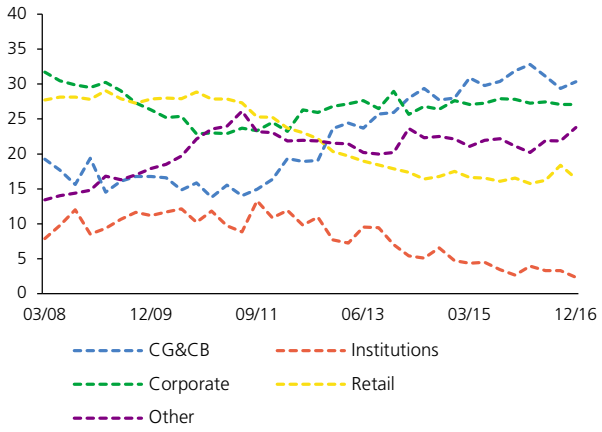


CHART 3b)

EXPOSURES BY ASSET CLASSES – STA BANKS

(%)



Source: CNB, authors' calculations

Note: IRB banks – banks using the IRB approach for at least some portion of their exposures as of 2016 Q4; STA banks – banks using solely the STA approach. All IRB banks simultaneously use the IRB approach (solid lines) and the STA approach for a certain (usually relatively small) portion of their exposures (dashed lines). CG&CB – exposures to central governments and central banks.

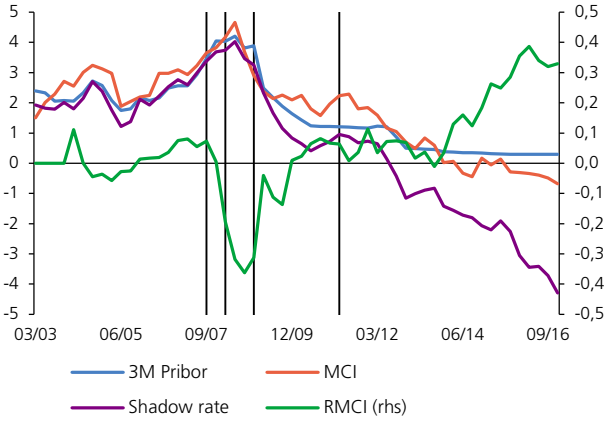
4.2 Monetary policy variables

The monetary policy stance is proxied in the model by four different variables: the 3M PRIBOR, the monetary policy index (MCI) proposed by Malovaná and Frait (2017),[14] the real monetary conditions index (RMCI) estimated by the CNB (2015)[15] and shadow rates as suggested by Krippner (2012).[16] Chart 4 shows the evolution of the monetary policy variables between 2003 and 2016. The monetary policy indices and shadow rates are used to account for the effect of both conventional and unconventional monetary policy and to reflect the problem of the zero lower bound on interest rates. In the specification with the 3M PRIBOR, we additionally control for the yield curve slope (the spread between the 3M PRIBOR and the 10-year government bond yield), which should also help overcome the problem of the zero lower bound and at least partially capture the effect of the prolonged period of monetary easing (Borio et al., 2015; Brei and Gambacorta, 2014).

CHART 4

MONETARY POLICY VARIABLES

(3M PRIBOR and shadow rate in %; MCI and RMCI indices)



Source: CNB, authors' calculations

Note: MCI – the monetary conditions index as estimated by Malovaná and Frait (2017), positive values refer to tight monetary conditions, index standardised by the 3M Pribor; RMCI – the real monetary conditions index as estimated by CNB (2015a), positive values refer to easy monetary conditions; the shadow rate as estimated by Krippner (2012). The vertical lines denote the four waves of migration of domestic banks to the IRB approach – 2007 Q3, 2008 Q1, 2008 Q4 and 2011 Q1.

14 The MCI is estimated using a dynamic factor model containing a wide range of monetary policy variables, including interest rates and yields at various maturities and the exchange rate.

15 The RMCI is constructed as a weighted average of the deviations of the domestic ex ante real interest rate and the real exchange rate from their equilibrium levels.

16 The shadow rate is constructed as a hypothetical shadow yield curve by adjusting the standard yield curve for the effect of the existence of cash holdings imposing the lower bound on interest rates.

5. EMPIRICAL RESULTS

The model in equation (1) is estimated for each of the monetary policy variables and regulatory approaches in turn (see Table 1). Column 1 shows the estimation results for the specification with the total implicit risk weights of all banks, column 2 those for the specification with the total implicit risk weights of IRB banks (i.e. banks using the IRB approach for at least a portion of their exposures), and column 3 those for the specification with the IRB implicit risk weights (i.e. the risk weights of exposures under the IRB approach) of banks with at least 75% of their risk-weighted exposures calculated under the A-IRB approach as of the end of 2016. For the sake of brevity, only the estimates of the coefficients for the relationship between the monetary policy variable and the implicit risk weights are reported in Table 1; complete estimates of all the coefficients can be found in Malovaná et al. (2017) on the CNB website.

TABLE 1

ESTIMATION RESULTS – BASELINE SPECIFICATION

	(1)	(2)	(3)
Banks:	All	IRB	A-IRB
Dependent variable:	RW	RW	RW IRB
3-month Pribor	-0.047	0.696**	0.885***
	(0.152)	(0.269)	(0.300)
Shadow rate	0.074	0.307**	0.382***
	(0.085)	(0.127)	(0.135)
MCI	0.084	0.583***	0.721***
	(0.126)	(0.189)	(0.190)
RMCI	-0.287	-3.469***	-2.451**
	(0.968)	(1.189)	(1.223)
Observations	963/899	310	204

Source: CNB, authors' calculations
Note: This table presents the bootstrap-based corrected LSDV regression (De Vos et al., 2015) estimates of equation (1). Bootstrapped standard errors are reported in parentheses. ***, ** and * denote the 1%, 5%, and 10% significance levels. RW – implicit risk weights calculated as risk-weighted exposures divided by total assets; RW IRB – IRB risk weights calculated as risk-weighted exposures under the IRB approach divided by non-risk-weighted exposures under the IRB approach. The lower number of observations in column 1 is due to the fact that the time series of the real monetary conditions index (RMCI) is available only from 2004 Q1.

TABLE 2

ESTIMATION RESULTS FOR IRB BANKS – SPECIFICATIONS WITH VARIOUS DATASET LENGTHS

	(1)	(2)	(3)	(4)	(5)
End of sample	2012 Q4	2013 Q4	2014 Q4	2015 Q4	2016 Q4
3-month Pribor	0.448	1.137***	1.177***	1.026***	0.696**
	(0.415)	(0.409)	(0.354)	(0.31)1	(0.269)
Shadow rate	-0.027	0.558**	0.634***	0.531***	0.307**
	(0.298)	(0.278)	(0.208)	(0.166)	(0.127)
MCI	0.589	1.064***	0.890***	0.799***	0.583***
	(0.372)	(0.308)	(0.237)	(0.217)	(0.189)
RMCI	1.002	-1.072	-3.991**	-4.674***	-3.469***
	(1.735)	(1.819)	(1.789)	(1.464)	(1.189)
Observations	166	202	238	274	310

Source: CNB, authors' calculations
Pozn.: Bootstrapped standard errors are reported in parentheses. ***, ** and * denote the 1%, 5%, and 10% significance levels.

The results are consistent across all four monetary policy variables and generally confirm the existence of the risk-taking channel for banks that use the IRB approach for at least a portion of their exposures: there turns out to be a strong, statistically significant relationship between monetary policy easing and lower implicit risk weights of IRB banks (column 2 in Table 1). Specifically, a 1 pp decrease in the 3M PRIBOR, the shadow rate and the MCI transmits, on average, to a 0.3–0.7 pp decrease in implicit risk weights. The relationship is even stronger for banks mainly using the A-IRB approach (column 3 in Table 1). In this case, a 1 pp decrease in the 3M PRIBOR, the shadow rate and the MCI leads, on average, to a 0.4–0.9 pp decrease in implicit risk weights.[17] As for the RMCI, it can be said that more accommodative monetary conditions (a greater deviation from the equilibrium levels) are associated with lower implicit risk weights of both IRB banks and banks mainly using the A-IRB approach. For the whole sample covering both STA and IRB banks, the relationship is statistically insignificant (column 1 in Table 1). This is consistent with the transmission mechanism discussed in section 3.[18]

In addition to the results presented in Table 1, we conducted estimates using datasets ending in different years by progressively excluding the years 2013 to 2016, characterised by very accommodative monetary conditions, from the original dataset (see Table 2). The dataset ending in 2012 Q4 (column 1) covers only two months of the zero lower bound period (starting in November 2012) and does not cover the exchange rate commitment period (November 2013–April 2017).[19] As the dataset gets progressively longer, an increasingly long period of accommodative monetary conditions becomes incorporated into the estimate. This allows us to track the gradually changing relationship between easing monetary conditions and banks' implicit risk weights. The existence of the risk-taking channel turns out to depend on the inclusion of the period 2013–2016. We interpret this finding as meaning that the prolonged period of accommodative monetary conditions has been key to the existence of the risk-taking channel in the Czech Republic.[20]

A wide range of control estimates corroborating the findings presented here can be found in Malovaná et al. (2017). The baseline specification of model (1) is estimated for the Visegrad Four countries (the Czech Republic, Hungary, Poland and Slovakia), whose banking sectors are similar in several regards. These results support the existence of the risk-taking channel. Estimates conducted for banks with different levels of capital reveal that the relationship between accommodative monetary policy and implicit risk weights is stronger for less-capitalised banks.[21] Berger et al. (2008), who examine the capital adequacy of US banks, come to a similar conclusion. The inclusion of an additional variable for growth in residential property prices does not influence this relationship.

6. IMPLICATIONS FOR FINANCIAL STABILITY AND CENTRAL BANK POLICY

The results of our analysis indicate that the effect of monetary policy on financial stability cannot be considered neutral.[22] The relationships identified between the monetary

17 The results remain quantitatively the same when we omit the first two quarters following the switch to the IRB approach from the analysis for individual banks.

18 The coefficient estimates of the remaining control variables mostly have the intuitive sign. For example, a higher ratio of loan loss provisions to total assets is associated with higher implicit risk weights of IRB banks, i.e. banks' average risk weights increase with increasing credit risk (decreasing loan quality). The coefficient on VIX is also positive and statistically significant in the specifications with IRB banks, indicating that banks take into account changes in global market volatility in their estimation of implicit risk parameters. The coefficient on the dummy for regulatory pressures is positive and statistically significant in the majority of the specifications. This suggests that banks with capital close to the regulatory minimum of 8% attain higher risk weights on average. With regard to asset structure, the results indicate a negative, statistically significant relationship between the risk weights of banks that use the A-IRB approach for the majority of their exposures and the share of retail loans other than mortgage loans. The average implicit risk weight for this category of loans is lower than the total average implicit risk rate of this category of banks, so the relationship is as expected. The coefficients on the remaining asset class variables for the most part have the intuitive sign (the implicit risk weight increases/decreases with an increasing/decreasing share of riskier assets) but are not statistically significant at the 10% significance level.

19 Monetary policy started to be eased in August 2008; the two-week repo rate was lowered by 3.7 pp between July 2008 and November 2012 (when the zero lower bound, i.e. technical zero of 0.05%, was reached).

20 Economic growth in the domestic economy started to recover gradually in the same period. A question may thus arise regarding the significance of the contribution of the easy monetary conditions by comparison with that of the renewed growth. The empirical model uses a control variable for annual real GDP growth to capture the business cycle in the domestic economy. For this reason, we regard the relationship identified after the inclusion of the years 2013–2016 as a consequence of the protracted easy monetary policy, not economic growth. Moreover, GDP started rising sharply in annual terms only in 2014 (by 6.3% in nominal terms and 3.4% in real terms, as opposed to just 0.5% and -0.5% respectively in 2013).

21 We define less-capitalised banks as those whose total regulatory capital ratio lies in the first quartile of the distribution of this ratio.

22 Numerous other studies have documented the effect of monetary policy on financial stability. On the one hand, monetary policy affects the conditions on financial markets, for example by influencing asset prices or banks' risk behaviour (Bernanke and Kuttner, 2005; Altunbas et al, 2010). On the other hand, in a situation where a financial crisis is developing, monetary policy can support financial stability (for instance by providing funds at longer maturities), even if it cannot guarantee it

TABLE 3

RELATIONSHIP BETWEEN THE MONETARY POLICY STANCE AND THE IMPLICIT RISK WEIGHTS OF IRB BANKS IN VARIOUS PHASES OF THE FINANCIAL CYCLE

	Relationship identified:	
	Easy monetary conditions	Tight monetary conditions
High or rising financial imbalances: High systemic risk, over-optimism, high private sector leverage, high overvaluation of asset prices, etc.	↓ RW	↑ RW
Low and stable or falling financial imbalances: Low systemic risk, sustainable private sector leverage, near-equilibrium asset prices, etc.	↓ RW	↑ RW

Source: Authors
Note: Red field – risk of undervaluation (upper left) or overvaluation (lower right) of the necessary level of capital; green field – low risk of undervaluation/overvaluation of the necessary level of capital.

policy stance and the implicit risk weights of banks that use internal models are summarised in Table 3; the potential risks to financial stability arising from these relationships will differ depending on the position of the economy in the financial cycle and on the current level and expected evolution of financial imbalances.

If financial imbalances are at a low level, for example, following the financial crisis, accommodative monetary policy need not cause increased risk-taking. In this situation, the tendency to take on more risk is low and accommodative monetary policy can conversely help maintain the supply of credit to the sound part of the real economy. Along with the decline in risk weights, the bank could release part of its capital and use it to cover the capital requirements brought about by the expansion of its loan portfolio.

If, however, the economy is in an expansionary phase of the financial cycle and credit growth is rising, the ability of banks and their customers to perceive risk may decrease and financial imbalances may start to form. In the long run, a monetary policy easing may therefore contribute to the generation of hidden risks – risks that could materialise in the future as a sharp deterioration in loan portfolio quality. A decline in implicit risk weights, whether as a result of accommodative monetary policy or a growth phase of the cycle,[23] may thus pose a risk of *undervaluation* of the necessary level of capital. In such case, it would be justified to take the evolution of risk weights into account when applying the relevant macroprudential policy tools, which are the main line of defence against the build-up of systemic risks.

The empirical relationship between monetary policy and the implicit risk weights of banks that use internal models was estimated using data for a period of predominantly accommodative monetary conditions. For this reason, we cannot automatically assume that it worked or will work at times of tightening monetary conditions. If we were to assume this, however, we could interpret it in the logic of Table 3. Monetary policy tightening might then not be desirable from the financial stability perspective in a situation where the economy is starting to recover slowly from a financial crisis and the level of systemic risk is low. In such conditions, growth in implicit risk weights could pose a risk of *overvaluation* of the necessary level of capital. This could depress the supply of credit by banks and in turn slow the overall economic recovery.

Numerous international studies and supranational regulatory authorities have also pointed to potential weaknesses in the current regulatory framework governing the IRB approach and the related possibility of inappropriate risk assessment. These studies state that the risk-weight estimates, which are used to determine capital requirements, are highly heterogeneous across countries and banks (EBA, 2013; BCBS, 2013; BCBS, 2016; Danielsson et al., 2016). This means that different banks may assess the same risk differently to some extent. Some studies also point out that the estimated risk weight assigned to each asset may not correspond to its true risk, i.e. the risk may be underestimated (Behn et al., 2016a;

(Gameiro et al., 2011). Villeroy de Galhau (2017) goes as far as to say that monetary policy is never neutral with respect to financial stability and that the two interact even in normal times.

23 In an expansionary phase of the financial and economic cycle, banks' asset quality rises and their credit risk falls. This is reflected in lower estimates of the risk parameters entering the calculation of banks' capital requirements under the IRB approach and hence in lower implicit risk weights.

Mariathasan and Merrouche, 2014).[24] It is therefore desirable to regularly assess whether the evolution and current level of risk weights pose a risk of undervaluation of the necessary level of capital and imply a need to take that risk into account when applying the relevant macroprudential policy tools**.**

7. CONCLUSION

Easy monetary conditions can influence banks' risk behaviour in a number of ways. Among other things, they can affect estimates of risk parameters such as the probability of default and the loss given default, which then enter the calculations of the capital requirements of banks that use internal models and the calculations of implicit risk weights. Low interest rates can influence risk parameter estimates either directly or indirectly through their impact on asset prices, asset price volatility, valuation, firms' cash flow and so on. They can also affect the perceived riskiness of existing borrowers and new loan applicants, thereby further reducing risk parameter estimates.

This article empirically estimates the relationship between accommodative monetary policy and the implicit risk weights of domestic banks. The results point to the existence of a risk-taking channel for banks that use the IRB approach for at least a portion of their exposures, i.e. to a positive, statistically significant relationship between the implicit risk weights of those banks and a number of monetary policy variables. At the same time, the inclusion of the period 2013–2016, a prolonged period of accommodative monetary conditions, turns out to be key to the existence of this relationship.

The potential risks to financial stability arising from these relationships will differ depending on the position of the economy in the financial cycle and on the current level and expected evolution of financial imbalances. At times of low financial imbalances, for example in the period following the financial crisis, the tendency to take on more risk is low and accommodative monetary policy thus need not cause increased risk-taking. By contrast, in an expansionary phase of the financial cycle, when financial imbalances are starting to form, a monetary policy easing may in the long run contribute to the generation of hidden risks and potentially pose a risk of undervaluation of the necessary level of capital. In such case, it would be justified to take the evolution of risk weights into account when applying the relevant macroprudential policy tools. The primary and preferred way of ensuring financial stability in such a situation would be to use macroprudential policy tools, while keeping monetary policy instruments targeted at price stability.[25]

REFERENCES

ADRIAN, T., LIANG, N. (2014): *Monetary Policy, Financial Conditions, and Financial Stability*, Federal Reserve Bank of New York Staff Report 690.

AFONSO, G., SANTOS, J. A., TRAINA, J. (2014): *Do "Too-Big-to-Fail" Banks Take on More Risk?*, Federal Reserve Bank of New York Economic Policy Review 20(2), p. 41.

ALTMAN, E. I., BRADY, B., RESTI, A., SIRONI, A. (2002): *The Link between Default and Recovery Rates: Implications for Credit Risk Models and Procyclicality*, NYU Working Paper No. 2451/26764.

ALTUNBAS, Y., GAMBACORTA, L., MARQUES-IBANEZ, D. (2010): *Does Monetary Policy Affect Bank Risk-Taking?*, ECB Working Paper 1166.

BCBS (2005): *An Explanatory Note on the Basel II IRB Risk Weight Functions.*

BCBS (2013): *Regulatory Consistency Assessment Programme (RCAP): Analysis of Risk Weighted Assets for Credit Risk in the Banking Book*.

BCBS (2016): *Regulatory Consistency Assessment Programme (RCAP): Analysis of Risk Weighted Assets for Credit Risk in the Banking Book*.

BEHN, M., HASELMANN, R., VIG, V. (2016a): *The Limits of Model-Based Regulation*, ECB Working Paper 1928.

24 Another potential weakness of risk-sensitive capital regulation is its inherent procyclicality. This consists in the fact that risk parameter estimates are highest at the lowest point of the financial cycle (owing to a high NPL ratio and worsening quality of other assets); in the expansionary phase of the cycle, by contrast, asset quality rises and risk parameter estimates fall (for more details, see, for example, Borio et al., 2001; Rochet, 2008; Repullo et al., 2010; Behn et al., 2016b, Brož et al., 2017; BCBS, 2016).

25 For more details, see the blog article by Vladimír Tomšík and Jan Frait *Pro plnění dvou cílů potřebuje ČNB minimálně dva nástroje* (*The CNB needs at least two instruments to fulfil two targets*, available in Czech only) at http://www.cnb.cz/cs/o_cnb/blog_cnb/prispevky/tomsik_frait_20160307.html.

BEHN, M., HASELMANN, R., WACHTEL, P. (2016b): *Procyclical Capital Regulation and Lending*, Journal of Finance 71(2), pp. 919–956.

BERGER, A., DEYOUNG, R., FLANNERY, M., LEE, D., OZTEKIN, O. (2008): *How Do Large Banking Organizations Manage their Capital Ratios?*, Journal of Financial Services Research 34(2-3), pp. 123–149.

BERNANKE, B. S., KUTTNER, K. N. (2005): *What Explains the Stock Market's Reaction to Federal Reserve Policy?*, The Journal of Finance 60(3), pp. 1221–1257.

BERROSPIDE, J. M., EDGE, R. M. (2010): *The Effects of Bank Capital on Lending: What Do We Know and, What Does It Mean?*, FEDS Working Paper 2010–44.

BONFIM, D. (2009): *Credit Risk Drivers: Evaluating the Contribution of Firm Level Information and of Macroeconomic Dynamics*, Journal of Banking & Finance 33(2), pp. 281–299.

BORIO, C., FURFINE, C., LOWE, P. (2001): *Procyclicality of the Financial System and Financial Stability: Issues and Policy Options*, In Marrying the Macro and Microprudential Dimensions of Financial Stability. BIS Papers No. 1. Bank for International Settlements.

BORIO, C., GAMBACORTA, L., HOFMANN, B. (2015): *The Influence of Monetary Policy on Bank Profitability*, BIS Working Papers 514.

BREI, M., GAMBACORTA, L. (2014): *The Leverage Ratio over the Cycle*, BIS Working Papers 471.

BROŽ, V., PFEIFER, L., KOLCUNOVÁ, D. (2017): *Are the Risk Weights of Banks in the Czech Republic Procyclical? Evidence from Wavelet Analysis*, CNB Working Paper 15/2017.

CUMMINGS, J. R., DURRANI, K. J. (2016): *Effect of the Basel Accord Capital Requirements on the Loan-Loss Provisioning Practices of Australian Banks*. Journal of Banking & Finance 67, pp. 23–36.

CNB (2015): Inflation Report II/2015, Czech National Bank.

CNB (2016): Financial Stability Report 2015/2016, Czech National Bank.

DANIELSSON, J., JAMES, K. R., VALENZUELA, M., ZER, I. (2016): *Model Risk of Risk Models*. Journal of Financial Stability 23, pp. 79–91.

DE NICOLÒ, G., DELL'ARICCIA, G., LAEVEN, L., VALENCIA, F. (2010): *Monetary Policy and Bank Risk Taking*, IMF Staff Position Note SPN/10/09.

DE VOS, I., EVERAERT, G., RUYSSEN, I. (2015): *Bootstrap-based Bias Correction and Inference for Dynamic Panels with Fixed Effects*, The Stata Journal 15(4), pp. 986–1018.

DIAMOND, D. W., RAJAN, R. (2012): *Illiquid Banks, Financial Stability, and Interest Rate Policy*. Journal of Political Economy 120(3), pp. 552–591.

DREHMANN, M., SORENSEN, S., STRINGA, M. (2008): *The Integrated Impact of Credit and Interest Rate Risk on Banks: an Economic Value and Capital Adequacy Perspective*, Bank of England Working Paper 339.

EBA (2013): *Summary Report on the Comparability and Pro-cyclicality of Capital Requirements under the Internal Ratings Based Approach in accordance with Article 502 of the Capital Requirements Regulation*.

FLANNERY, M., RANGAN, K. (2008): *What Caused the Bank Capital Build-up of the 1990s*, Review of Finance 12(2), pp. 391–429.

GAMBACORTA, L. (2009): *Monetary Policy and the Risk-taking Channel*, BIS Quarterly Review, Bank for International Settlements.

GAMEIRO, I. M., SOARES, C., SOUSA, J. (2011): *Monetary Policy and Financial Stability: an Open Debate*, Banco de Portugal Economic Bulletin and Financial Stability Report Articles.

JIMÉNEZ, G., SAURINA, J. (2006): *Credit Cycles, Credit Risk, and Prudential Regulation*, International Journal of Central Banking 2(2), pp. 65–98.

FRAIT, J., KOMÁRKOVÁ, Z. (2013): *Loan Loss Provisioning in Selected European Banking Sectors: Do Banks Really Behave in a Procyclical Way?*, Czech Journal of Economics and Finance 63(4), pp. 308–326.

KRIPPNER, L. (2012): *Modifying Gaussian Term Structure Models When Interest Rates Are Near the Zero Lower*

Bound, Reserve Bank of New Zealand Discussion Paper Series DP2012/02.

MALOVANÁ, S., FRAIT, J. (2017): *Monetary Policy and Macroprudential Policy: Rivals or Teammates?*, Journal of Financial Stability 32(C), pp. 1–16.

MALOVANÁ, S., KOLCUNOVÁ, D., BROŽ, V. (2017): *Does Monetary Policy Influence Banks' Perception of Risks?*, CNB Working Paper 9/2017.

MARIATHASAN, M., MERROUCHE, O. (2014): *The Manipulation of Basel Risk-Weights*, Journal of Financial Intermediation 23(3), pp. 300–321.

REPULLO, R., SAURINA, J., TRUCHARTE, C. (2010): *Mitigating the Pro-Cyclicality of Basel II*, Economic Policy 25(64), pp. 659–702.

ROCHET, J. C. (2008): *Procyclicality of Financial Systems: Is There a Need to Modify Current Accounting and Regulatory Rules?*, Banque de France Financial Stability Review No. 12, October 2008, Banque de France.

VILLEROY DE GALHAU, F. (2017): *Monitoring Financial Stability, with Active Monetary Policies*, příspěvek na konferenci na London Business School, London 23 November 2017.

VOLK, M. (2013): *Estimating Probability of Default and Comparing It to Credit Rating Classification by Banks*, Economic and Business Review 14(4), pp. 299–320.

CONSUMER CREDIT IN THE CZECH REPUBLIC: WHAT DOES ITS CURRENT GROWTH IMPLY FOR FINANCIAL STABILITY?

Václav Brož, Michal Hlaváček

This article analyses structural changes in the evolution of consumer credit with regard to loan type, maturity category and extent of refinancing. We also examine changes in the interest rate distribution of consumer loans, which is multimodal. We go on to explore the determinants of consumer credit rates and identify growing competition and partially also easy monetary policy as the main determinants of the shift of the distribution of consumer credit rates towards lower client rates.

1. INTRODUCTION

Consumer loans[1] are an important item in Czech banks' portfolios. Although loans to households for house purchase have been getting most of the attention recently, the renewed growth in consumer loans combined with falling consumer credit rates is also relevant to macroprudential policy. Consumer loans also make up a large part (around 39%) of total non-performing loans (NPLs) to households, despite accounting for a relatively small proportion of loans to households (approximately 14%)[2] and even though the NPL ratio has fallen quite sharply over the last two years.[3] According to the Bank Lending Survey, moreover, the terms and conditions for approving consumer loans were eased further and demand for consumer credit went up in the course of 2017.[4]

From the financial stability perspective, there are several reasons why it is important to study the evolution and determinants of consumer loans. First, given their higher NPL ratio and its greater volatility over the business cycle (see Chart 7), such loans are a major source of credit risk for consumer credit providers. Compared with loans for house purchase, this credit risk is amplified by the fact that consumer loans tend to display a higher loss given default (LGD) at any given probability of default (PD), as they are not collateralised. Second, given that interest rates on consumer loans are higher than those on other sorts of loans, consumer credit accounts for a large part of commercial banks' margins and thus contributes to their interest income.[5] The decline in consumer credit rates has been a major driver of the recent fall in banks' margins. Third, given that consumer loans are taken out more frequently by lower-income households,[6] they can have a greater influence on the balance sheets, overindebtedness, solvency and consumer behaviour of households themselves. Repayment difficulties can affect consumer credit providers more quickly than providers of loans for house purchase.

Despite these arguments, consumer credit has never been central theme of any previous article in the Financial Stability Report or of any of the CNB's research publications. Nevertheless, there have been studies that deal at least partially with consumer loans and the determinants of consumer credit rates. Brůha (2011), for example, examines the relationship between retail credit premiums and macroeconomic indicators and states that consumer credit rates appear correlated with neither the business cycle, nor market interest rates. Other studies likewise find no

1 Consumer credit is defined in Act No. 257/2016 Coll., on consumer credit, as "a deferred payment, loan or other similar financial accommodation granted or intermediated to a consumer" (Article 2(1)). Under this act, consumer credit for real estate is therefore treated as consumer credit, whereas in the CNB's statistics it is classed under loans for house purchase. For the purposes of this article we use the CNB definition, so we abstract from consumer credit for real estate in our analyses. In line with the CNB definition, we consider consumer credit in the narrower sense of specific-purpose consumer credit for goods and services for personal consumption and non-specific consumer credit and in a wider sense additionally including bank overdrafts and debit balances on current accounts and credit card credit. We do not consider consumer credit granted by non-banks in this article.

2 Consumer credit accounted for 14% of the outstanding amount of loans to households at the end of 2017 (or 16% including debit balances on current accounts) and for 23% of new loans to households for 2017 as a whole. Consumer loans account for 6.5% of the outstanding amount of bank loans.

3 The NPL ratio for consumer loans stood at 12.2% in mid-2015 and 6% at the end of 2017 (see Chart 7).

4 See the surveys for 2017 Q1–2017 Q4 (https://www.cnb.cz/en/bank_lending_survey/index.html). The terms and conditions for approving consumer loans were relaxed in all four quarters, primarily through a reduction in interest margins. With the exception of 2017 Q3, when it was unchanged, households' demand for consumer loans increased. The growth was due primarily to rising consumer confidence, falling/low interest rates and growth in the consumption expenditure of households. However, the credit standards applied to consumer loans changed little overall during 2017. They were tightened by a net market share of 13% in Q1 and relaxed by the same amount in Q3. In the other quarters of the year, credit standards were unchanged.

5 The high consumer credit rates are also due to higher expected losses on consumer loans. The effect of the higher margins on such loans on operating profits is thus partly offset by higher risk costs and provisioning.

6 According to the CZSO's Household Budget Survey, the average income of households with consumer or similar loans is 91% of that of households with mortgage loans. Brůha et al. (2018) meanwhile find that debt servicing has a negative effect on household consumption.

evidence of any pass-through from market rates to retail consumer credit rates (e.g. Havránek et al., 2016, Horváth and Podpiera, 2012, and Hainz et al., 2014). However, some studies identify competition and credit risk as potentially significant factors affecting rates on consumer loans (Horváth and Podpiera, 2012, who nonetheless do not themselves include these indicators in their analysis).

One reason why consumer loans have previously been neglected is their apparent heterogeneity. The consumer credit category covers not only specific-purpose credit for goods and services (typically durables such as electronic items, furniture and cars) and non-specific credit, but also bank overdrafts and debit balances on current accounts and credit card credit, which, however, can also be the first manifestation of household insolvency (see Chart 1 below for the structure of loans). Following the implementation of the CNB's *Recommendation on the management of risks associated with the provision of retail loans secured by residential property*,[7] there is also a debate about whether some consumer loans are being provided in order to circumvent the LTV limit (see also section 5.3 of this Report). These types of consumer loans nonetheless differ considerably in terms of risk characteristics, maturity and interest rates.

The evolution of consumer loans described above raises a number of questions that need to be answered before we can assess their credit risk and its implications for financial stability. In this article, we focus on the following questions. Do the decline in interest rates and the related relaxation of the terms and conditions for approving consumer loans reflect a genuine reduction in their credit risk, or are they merely a consequence of growing competition in the market? Is the decline in interest rates a sign of overoptimism and underestimation of credit risk on the part of banks in a favourable phase of the cycle? Do the lengthening maturity of consumer credit and the increasing share of refinanced loans reflect desirable consolidation of consumer loans leading to a lower debt service burden on households, or are they conversely a manifestation of problem loans being deferred into the future? What role are the easy domestic monetary conditions playing in all this?

7 https://www.cnb.cz/en/financial_stability/macroprudential_policy/recommendation_on_the_management_of_risks/index.html

2. CURRENT CONSUMER CREDIT TRENDS

In this section, we present a detailed description of structural changes in consumer credit. In particular, we try to assess whether such changes reflect a reduction in the riskiness of such loans and in the debt service burden on households, or whether they represent credit risk being wrongly assessed by banks and being deferred into the future. At the start of the section, we will work with consumer credit in the wider sense (including overdrafts and credit card credit). In the latter part of this section and also in sections 3 and 4, however, we will deal only with consumer credit in the narrower sense (excluding overdrafts and credit card credit). This is due mainly to data constraints.

The structure of consumer loans in the broader sense indicates that non-specific consumer credit has long been dominant. In the past, it made up more than 70% of all consumer credit, and it still accounts for more than half (see Chart 1). Specific-purpose consumer credit has recently been showing the highest growth.[8] It increased fivefold between 2008 and 2017 and now accounts for over 20% of total consumer credit (including debit balances and credit card credit). Specific-purpose credit can be viewed as less risky than non-specific credit.

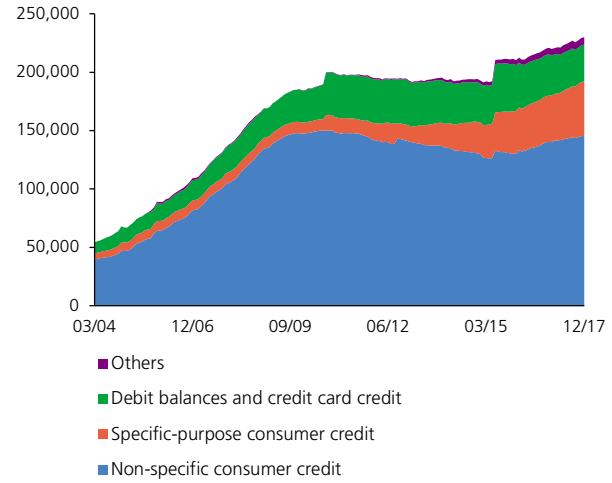
Before the financial crisis, consumer credit was showing strong year-on-year growth in both new loans and outstanding amount (see Chart 2). After the financial crisis broke out, growth in the outstanding amount of consumer credit halted and new loans even started to decline (a fall of more than one-third was recorded between 2008 and 2010). Credit risk subsequently increased, with the NPL ratio rising by more than 5 pp in 2008–2010 (see Chart 7). New loans started to go up again in 2013, but the outstanding amount remained flat. This was reflected in the growth in the calculated outflow of consumer loans,[9] which equalled the amount of new loans. The growth in the outflow of loans may have reflected a rise in the share of refinanced

8 Specific purpose consumer credit is credit granted to clients for goods and services for personal consumption. Such credit is tied to the purchase of specific goods or services. It includes, for example, non-cash consumer credit for the purchase of goods and services, consumer credit for the purchase of motor vehicles and loans granted to clients for other purposes (such as loans for education).

9 The outflow of loans is an indicator calculated by the authors from the reported outstanding amount of credit and new loans. It is computed as the difference between new loans and the change in the outstanding amount in the given month. It is therefore a "residual". One-off changes in the outflow of loans may reflect, for example, the write-off or sale of NPLs or the entry of a new entity onto the market. Longer-term changes in the outflow of loans may reflect changes in maturity structure or in the loan refinancing area.

CHART 1

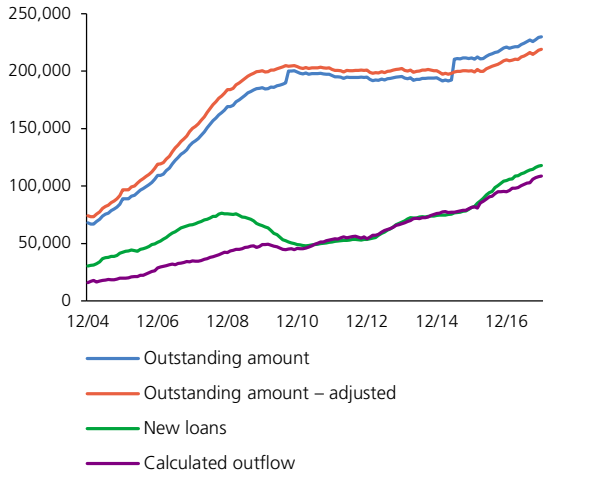
STRUCTURE OF CONSUMER LOANS BY LOAN TYPE
(CZK millions)



Source: CNB
Note: The data break in June 2015 was caused by the transfer of non-bank lender Cetelem to BNP Paribas.

CHART 2

CONSUMER LOANS – OUTSTANDING AMOUNT AND NEW LOANS
(CZK millions)



Source: CNB, authors' modifications
Note: The outstanding amount is adjusted for one-off factors dating from September 2010 (the transfer of a subsidiary to GE) and June 2015 (the transfer of non-bank lender Cetelem to BNP Paribas). The outflow of loans is calculated as the difference between new loans and the change in the adjusted outstanding amount in the given month. New loans and outflows are converted into 12-month moving totals to adjust for seasonality.

loans[10] (see Chart 3) or a change in the loan maturity structure (see Chart 4). In 2016 and 2017, the recovery in new consumer credit continued and new loans reached historical highs. The outflow of consumer loans also increased, but it was outweighed by the inflow of new loans, such that the total outstanding amount of credit rose at a year-on-year pace of more than 4% in those years.

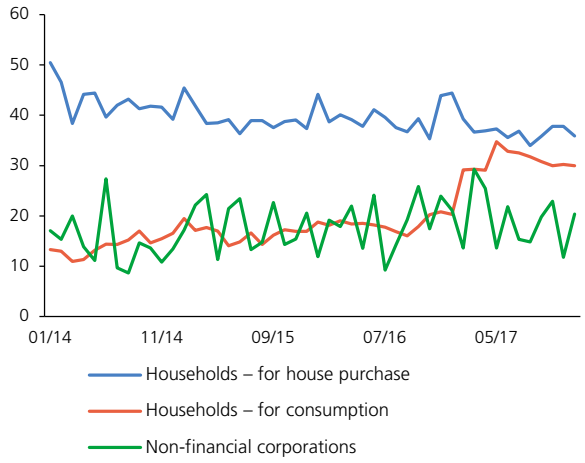
While consumer credit is traditionally seen as short-term in nature, its growth in recent years has been dominated by loans with a maturity of over five years (see Chart 4). In 2017, loans with that maturity accounted for almost 75% of new loans and 70% of the outstanding amount of consumer credit (excluding debit balances and credit card credit). Some past structural breaks can be observed (such as in March 2006 for loans with a maturity of over five years and in January 2012 for loans with a maturity of up to one year[11]), reflecting changes in bank reporting and in the classification of some loan categories, but longer-term consumer loans are clearly dominant.

Growth in the share of longer-term loans should theoretically be reflected in a decline in the outflow of loans and growth in the outstanding amount.[12] This, however, is not happening. On the contrary, the outflow of loans is rising continuously, as Chart 2 shows. One possible explanation is that the share of refinanced loans has increased, as refinancing usually involves replacing one or more short-term loans with a longer-term one (loan consolidation). Unfortunately, data on refinanced loans are only available from 2014 onwards (see Chart 4). However, it is evident from those data that the share of refinanced consumer credit did indeed roughly treble between 2014 and 2017, approaching the level typical of house purchase loans. There may also be some refinancing that is not captured in the statistics. Specifically, consumers may be letting their existing loans run to term and repaying them by taking out new longer-term consumer loans. The growth in the calculated outflows of loans can also be explained by an

10 Refinanced loans are recorded under new loans, but the provision of such loans involves an inflow of new loans and a parallel outflow of old existing loans.
11 Both of these structural breaks are linked with the fact that in January 2012 some banks started to report a proportion of new consumer loans as loans with a long initial rate fixation.
12 A rise in the maturity of loans *ceteris paribus* reduces their "turnaround time" and hence also the amount of credit repaid in any given period (i.e. the outflow of loans). At any given level of new loans, the outstanding amount of credit should thus also be higher.

CHART 3

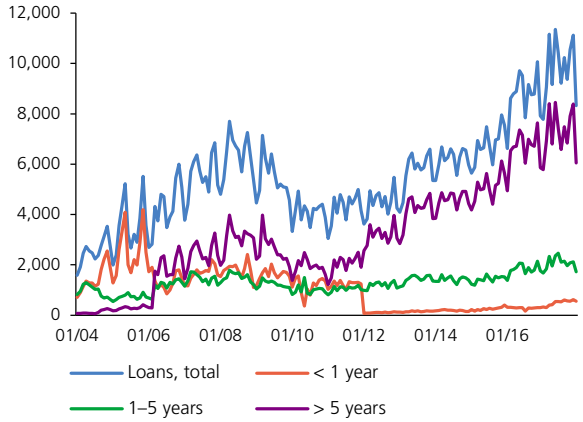
SHARE OF REFINANCED LOANS AND OTHER RENEGOTIATIONS IN TOTAL NEW LOANS
(%)



Source: CNB
Note: Loans for consumption exclude debit balances and credit card credit.

CHART 4

NEW CONSUMER LOANS BY MATURITY
(CZK millions; excluding debit balances and credit card credit)



Source: CNB

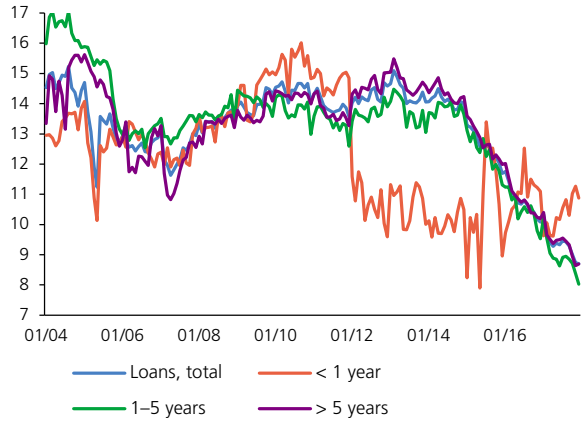
increase in sales of NPLs to third parties, with banks not holding NPLs on their books because it is unfavourable for them to do so. The lengthening maturity of consumer loans and the increasing share of refinanced loans may reflect desirable consolidation of consumer credit, with a combination of lower interest rates and the spreading of instalments over a longer period of time leading to a lower debt service burden on households. On the other hand, however, they may be a manifestation of the deferral of potential problem loans into the future.

The credit risk perceived by banks combined with the cost of funding of banks is also reflected in interest rates on new consumer loans broken down by maturity (see Chart 5). A decrease in these rates is apparent in the period before the financial crisis. This can be explained by a parallel decline in the NPL ratio and money market rates. The subsequent growth in rates in 2008–2009 most likely reflects the increase in perceived future credit risk that occurred during the financial crisis (see Chart 7). The roll-out of the IRB approach in large banks may also have been a factor here. Interest rates fluctuated at high levels across maturity categories over the following five years and did not start to come down until 2014. In 2014–2017, rates on new consumer loans fell from around 14% to a historical low of 8.7%. This fall was driven by a decline in rates on loans with longer maturities rather than by a change in the maturity structure of loans. The decline in client rates was linked with a drop in money market rates (in response to the easing of monetary policy), which reached all-time lows in 2014–2016. However, the spread between client rates and money market rates narrowed at the same time (see Chart 6).[13] For the dominant maturity categories, this spread is also at historical lows and is thus showing procyclical behaviour – the interest rate component of the credit conditions is easing at a time of high economic growth, low unemployment and low interest rates. As we saw during the financial crisis, however, client premia on consumer loans and credit premia can rise quickly if the economy takes a turn for the worse and households start to run into repayment difficulties.

13 The spread calculated as the difference between the client rate and the 6M Pribor for loans of up to 1 year, the 3Y IRS rate for loans of 1–5 years and the 7Y IRS for loans of over 5 years.

CHART 5

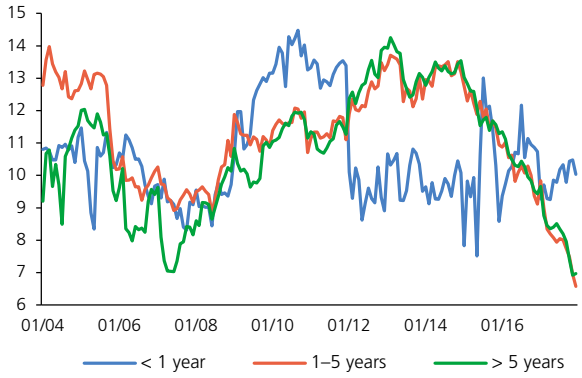
AVERAGE INTEREST RATES ON NEW CONSUMER LOANS BY MATURITY
(%; excluding debit balances and credit card credit)



Source: CNB

CHART 6

SPREAD BETWEEN CLIENT CONSUMER CREDIT RATES AND MONEY MARKET RATES
(%; excluding debit balances and credit card credit)

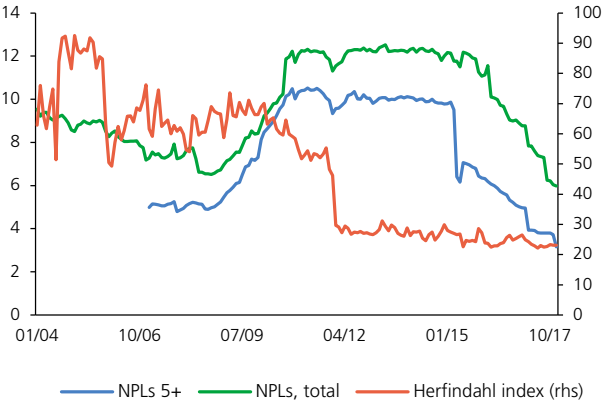


Source: CNB, authors' calculations
Note: Difference between the client rate and the 6M Pribor for loans of up to 1 year, the 3Y IRS rate for loans of 1–5 years and the 7Y IRS for loans of over 5 years.

Consumer credit rates are also correlated with credit risk, which we measure using the ratio of NPLs to total consumer loans (see Chart 7). The NPL ratio, like interest rates, displays procyclical behaviour. During the financial crisis, it rose from below 7% to above 12%. In recent years, it has returned to and even fallen below its pre-crisis level. An increase in the ratio of loans with long maturity has also played a role here. The current very low level of credit risk, however, could change very quickly in the event of adverse developments. The decline in consumer credit rates is also linked with increasing competition in this segment of the credit market. The traditional indicator of concentration, the Herfindahl index[14] (see Chart 7), reveals that in the past competition in the banking sector was increasing (concentration was decreasing), but at the start of 2012 a structural break occurred. At the same time, the consumer credit segment has also been affected to a greater extent than other segments of the credit market by competition from non-bank lenders..

CHART 7

NPL RATIOS AND CONCENTRATION OF CONSUMER LOANS
(%)



Source: CNB

14 The Herfindahl (or Herfindahl-Hirschman) index is calculated as the sum of the squares of the market shares of all firms operating in the sector of interest. It takes values of 0 to 100. The higher the index, the greater the concentration (and the lower the competition) in the sector. In our case, the index is calculated from the market share of each bank in new consumer credit excluding debit balances and credit card credit.

3. INTEREST RATE DISTRIBUTION OF CONSUMER LOANS

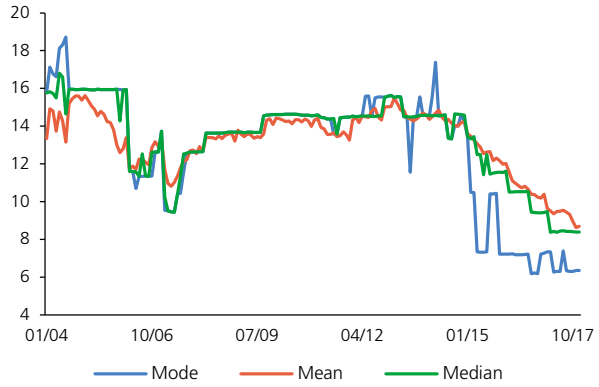
In the previous section, we illustrated that consumer loans have gone through several structural breaks in the past. One factor underlying these breaks is the fact that the consumer credit category is highly heterogeneous, being composed of different types of loans with different levels of credit risk and interest rates. In the event of change in the credit structure (such as a rise in the share of specific-purpose credit), the parameters of the consumer credit aggregate can change without there being any apparent changes in its individual components. The available statistics unfortunately do not allow us to break down interest rates by subcategories and types of credit, so the rates on consumer loans are highly heterogeneous and the average rate may not be sufficiently informative. That said, information on the interest rate distribution of consumer loans can be used to make an evaluation and potentially filter out various loan types.[15]

Given the changes in the distribution of consumer loans over time, it is important to examine other characteristics of the distribution besides mean interest rates (which can be affected by outliers). The mean, median and modal interest rates are plotted in Chart 8.[16] It can be seen that all three increased more or less in parallel in the wake of the financial crisis. A structural break then occurred at the start of 2015. Between 2015 and 2017, all three measures dropped sharply, although the mode decreased substantially more than the mean. This indicates that the distribution is skewed to the left. The distribution of client rates on consumer loans supports this assertion (see Charts 9 and 10).

The interest rate distribution for consumer loans differs from that for other types of loans in being distinctly multimodal (see Charts 9 and 10).[17] The relative weights and positions of the peaks have often changed in the past. Before the financial crisis, the distribution was dominated by a "left-hand peak" with the lowest rates. In response to the financial crisis, the weight shifted in 2008–2012 to a peak with high interest rates of around 15%. This peak gradually came to dominate the distribution as the weight of the peak with lower rates fell and the distribution became more sharply pointed. The right-hand peak simultaneously moved to higher rates, reflecting growth in credit risk. In 2011 and 2012, the distribution turned bimodal again, with the right-hand peak initially dominating. The weight of the left-hand peak then grew steadily and started to dominate the distribution again in 2015. At the same time, it shifted to the left and its probability density increased, while the right-hand peak almost disappeared from the distribution. This caused the entire distribution to skew to the left.

CHART 8

MEASURES OF THE CENTRE OF THE DISTRIBUTION – CONSUMER LOANS WITH AN INITIAL RATE FIXATION OF OVER FIVE YEARS
(%)



Source: CNB

The changes in the distribution from year to year indicate that the character of consumer loans has changed quite substantially over time. They also clearly reveal the specific nature of the present situation, where a structural break has evidently occurred. In Brož and Hlaváček (2018),[18] we used bank-level microdata for 2015–2017 to investigate whether the recent aggregate changes in the rate distribution were caused by changes in the rate distribution in just a few banks and by growth in their market shares, or whether the majority of banks recorded shifts of similar size. Of the total of ten banks tested, five recorded a significant shift of their rate distribution to lower values, three saw a less significant shift and two recorded essentially no change. Shifts in the

15 In sections 3 and 4, we work with consumer credit in the narrower sense, i.e. excluding debit balances and credit card credit.

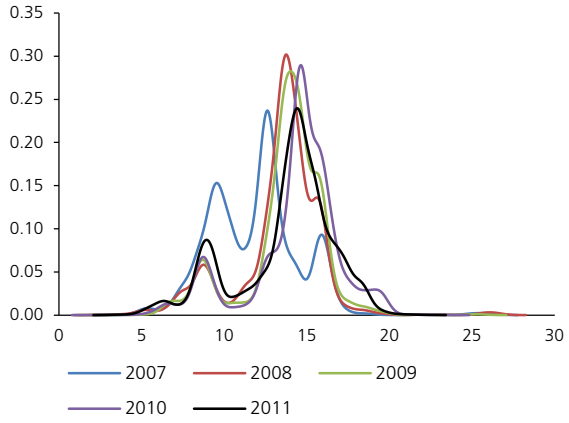
16 The median is the interest rate where exactly half the total amount of credit has a lower rate and half has a higher rate. The mode is the most frequently provided interest rate. It is therefore the coordinate of the peak of the distribution in Charts 9 and 10. For the normal distribution, the mean, median and mode are identical. However, they can differ if the interest rate distribution is skewed or multimodal.

17 To filter out changes in the maturity structure of consumer loans (see Chart 3), we construct the distribution for each maturity category separately. Our analysis focuses on the dominant maturity category of over five years. To estimate the distribution function, we use data from the CNB's internal SNOB database, which contains information on loan amounts broken down into interest rate ranges. We estimate the distribution function from these data by means of kernel density estimation with a parameter of 0.53. For more details on the estimation method, see Brož and Hlaváček (2018).

18 This article is currently going through the refereeing process and should be publicly available by the time the Financial Stability Report is published.

CHART 9

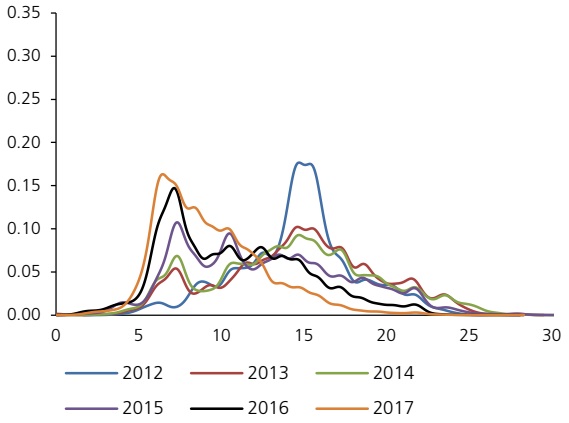
DISTRIBUTIONAL DYNAMICS OF CLIENT RATES ON CONSUMER LOANS WITH AN INITIAL RATE FIXATION OF OVER FIVE YEARS
(x-axis: interest rate in %, y-axis: density)



Source: CNB, authors' calculations
Note: The density of the distribution is approximated by means of kernel density estimation with a parameter of 0.53.

CHART 10

DISTRIBUTIONAL DYNAMICS OF CLIENT RATES ON CONSUMER LOANS WITH AN INITIAL RATE FIXATION OF OVER FIVE YEARS
(x-axis: interest rate in %, y-axis: density)



Source: CNB, authors' calculations
Note: The density of the distribution is approximated by means of kernel density estimation with a parameter of 0.53.

distribution of interest rates to lower levels hence represented the prevailing trend among Czech banks.

The changes in the nature of the distribution over time may have fundamentally affected not only the estimation of credit risk by banks, but also the transmission of monetary policy. The relative frequency of changes in the rate distribution provides one explanation of why previous studies, most of which were based on an assumption of normally distributed rates, were unable to identify transmission to consumer credit rates.

4. ESTIMATION OF THE DETERMINANTS OF CONSUMER CREDIT RATES

In the previous section, we illustrated that the changes in the consumer credit area stem from changes in the structure of consumer loans. In order to understand these effects at least partially, we analyse the determinants of consumer credit rates using the dynamic panel estimation method, similarly to Hainz et al. (2014). In our analysis, we also follow the recommendation of Brůha (2011) and take into account the maturity of each loan type and link client rates with money market rates of similar maturity. We focus on consumer loans with a maturity of over five years, which currently dominate consumer credit and are thus sufficiently representative while also having a distinctly bimodal distribution. We use detailed regulatory data on the empirical distributions of consumer loans for a panel of ten banks for the period of 2007–2017.[19] Using those data, we estimate the following regression equation:

$$consrate_{i;t} = \alpha_i + \beta_1 \cdot consrate_{i;t-1} + \beta_2 \cdot IRS7Y_t + \beta_3 \cdot defrate_{i;t} + \beta_4 \cdot Herfindahl_t + \varepsilon_{i;t}; \quad (1)$$

where *consrate* denotes the mean or modal interest rate of bank *i* at time *t*, *IRS7Y* is the 7-year interest rate swap rate, which we use as a proxy for the effect of financial market rates, *defrate* measures credit risk, which we define as the change in NPLs 12 months ahead ($defrate_{i;t} = \Delta NPL_{i;t+12}$), *Herfindahl* is the Herfindahl index of market concentration, reflecting the level of competition, and ε denotes a white noise process.

The market concentration and IRS rate levels at time *t* are the same for all banks, whereas the mean rate, the modal rate and the default rate differ across banks. We also took into account the clear structural break in the concentration index (see Chart 7) and the amount of short-term consumer loans (see Chart 4) in 2012[20] and divided the dataset into two periods: January 2007–December 2011 and January

19 We thus have 11 years of monthly data, i.e. a total of 132 observations for each bank. Nonetheless, the panel is not balanced. The time range is limited by the availability of data on NPLs for the maturity category of over five years. Moreover, long-term consumer loans were not sufficiently representative in 2004–2006 (see Chart 4).

20 Both structural breaks were linked with the fact that in January 2012 some banks started to report a proportion of new short-term consumer loans as loans with a long initial rate fixation.

TABLE 1

ANALYSIS OF THE DETERMINANTS OF CONSUMER CREDIT RATES

Proměnná	Dependent variable			
	Mean		Mode	
	Period 1 01/07–12/11	Period 2 01/12–12/17	Period 1 01/07–12/11	Period 2 01/12–12/17
Mean/mode (t-1)	0.801***	0.898***	0.680***	0.775***
IRS7Y (t)	-0.128	0.161	-0.175	0,292*
Default rate (t)	-0.076	0.113	-0.123	0.19
Herfindahl (t)	-0.001	0.0572***	0.002	0.1466***
No. of obs.	281	505	281	505

Source: CNB
Note: ***, ** and * denote statistical significance at the 1%, 5% and 10% levels. Estimated using the bootstrap method of De Vos et al. (2015) based on 800 iterations.

2012–December 2017. This division also makes sense with respect to the reaching of the lower bound on monetary policy rates (November 2012–August 2017) and the introduction of an exchange rate commitment by the CNB as an additional instrument for easing monetary policy (November 2013–April 2017).

The estimation results are presented in Table 1 and can be summarised as follows. First, both the mean rate and the modal rate were persistent over time in both periods tested. However, we did not find evidence of a unit root.

Second, we found evidence of a limited effect of market rates on client rates for the mode in 2012–2017. This indicates that the easy monetary policy in recent years may have been instrumental in shifting the distribution of consumer credit rates to a lower level. The coefficient on *IRS7Y* is approximately 0.29, indicating that the immediate effect of market rates on client rates is fairly small and incomplete. Given the high persistence of interest rates, however, the overall effect may be stronger in the long run. These results seem to be analogous to the findings of foreign studies investigating the pass-through of market rates to client rates (De Graeve et al., 2007; Egert and MacDonald, 2009; Aristei and Gallo, 2014; Gropp et al., 2014).[21]

Third, falling market concentration (i.e. rising competition) led to lower client rates for both measures of the interest rate level in 2012–2017. Growth in competition, coupled with easy monetary policy, thus contributed significantly to the recent shifts in the distribution of consumer credit rates to lower rates.

Fourth, in none of the four estimates did the indicator of future credit risk (the default rate) turn out to be statistically significant. For the period of 2007–2011, moreover, the coefficient had the opposite sign than expected. This indicates that when setting their client rates, banks do not need to take account of credit risk or of the fact that the default rate that ultimately materialised was different to the one they had expected.

Fifth, none of the determinants of client rates under consideration was found to be significant for the period of 2007–2011. This indicates that the current evolution of consumer credit rates is specific by comparison with previous periods. The ambiguous results for the period of 2007–2011 may also be linked with the low credit volumes, immature portfolios and more limited lending experience of banks at the start of the period of interest.

We conducted several robustness checks to confirm the results of our analysis for 2012–2017 (for more details, see Brož and Hlaváček, 2018). Following Havránek et al. (2016), we included six other bank-level statistics among the explanatory variables: the capital adequacy ratio, the ratio of costs to revenues, the ratio of deposits to liabilities, a liquidity risk indicator (quick assets to total assets), return on assets and bank size (the logarithm of assets). The results of this robustness check reveal that the level of competition remains a significant determinant of client interest rates, but *IRS7Y* loses statistical significance. Of the newly added indicators, bank size turns out to be significant in some specifications – its negative coefficient implies that large banks may have been forced to reduce their consumer credit rates by smaller competitors. We performed a further

21 Unlike this article, the aforementioned literature works with empirical specifications based on the cointegration principle, so the results are not directly comparable.

robustness check using the GMM method, which crops up frequently in similar types of analyses in the literature (e.g. Hainz et al., 2014). As in the main analysis, market concentration/competition is a significant determinant, and *IRS7Y* is also significant in the case of the mean.

5. CONCLUSION

Based on an analysis of the structure of consumer loans, we illustrated that their current evolution is historically specific in the context of the Czech economy. Besides a decline in interest rates, the structure of consumer credit is changing towards loans with long maturities. The share of specific-purpose loans is meanwhile rising and the NPL ratio is falling. We also identified growth in the share of refinanced loans on the basis of both a reported increase in those loans in 2017 and a rise in the calculated outflow of loans. We provided additional evidence of the specific nature of the present situation by analysing the interest rate distribution of loans, which was multimodal in the past and is currently dominated by a peak with low interest rates. We then used regression analysis to show that the shift in the distribution of loans towards lower client interest rates in recent years has been determined primarily by growth in competition and partly also by easy monetary policy.

On the one hand, the current change in the consumer credit market can be seen as positive, as the lengthening maturity and the increasing share of refinanced loans in a situation of low interest rates may reflect consolidation of consumer loans. Such consolidation usually reduces the debt service burden on households and the sensitivity of their balance sheets to external shocks. On the other hand, the current trend is distinctly procyclical. Given the current position of the economy in a growth phase of the financial cycle, the lengthening loan maturity may result in a potential increase in problem loans in the future. In this context, with the CNB having indicated that it "*steps up its supervision of the provision of such loans primarily at times of rising growth in total household debt and increasing macroeconomic risks (including the emergence of a spiral between house prices and house purchase loan volumes)*", the tightening of supervisory benchmarks thus sends out a strong signal to banks.[22]

22 For more details, see Dohledové sdělení č. 1/2017 K poskytování úvěrů domácnostem úvěrovými institucemi (Supervisory Communication No. 1/2017 on the provision of loans to households by credit institutions) at http://www.cnb.cz/cs/dohled_financni_trh/vykon_dohledu/dohledove_benchmarky/ (available in Czech only).

LITERATURA

ARISTEI, D., GALLO, M. (2014): *Interest Rate Pass-Through in the Euro Area during the Financial Crisis: A Multivariate Regime-Switching Approach,* Journal of Policy Modeling 36(2), pp. 273–295.

BROŽ, V., HLAVÁČEK, M. (2018): *What Drives Distributional Dynamics of Client Interest Rates on Consumer Loans in the Czech Republic? A Bank-Level Analysis,* CNB Working Paper 6/2018.

BRŮHA, J. (2011): *Retail Credit Premiums and Macroeconomic Developments,* Financial Stability Report 2010/2011, Czech National Bank, pp. 96–109.

BRŮHA, J., HLAVÁČEK, M., KOMÁREK, L. (2017): *House Prices and Household Consumption: The Case of the Czech Republic,* CNB Working Paper 11/2017.

DE GRAEVE, F., DE JONGHE, O., VANDER VENNET, R. (2007): *Competition, Transmission and Bank Pricing Policies: Evidence from Belgian Loan and Deposit Markets,* Journal of Banking & Finance 31(1), pp. 259–278.

DE VOS, I., EVERAERT, G., RUYSSEN, I. (2015): *Bootstrap-based Bias Correction and Inference for Dynamic Panels with Fixed Effects,* The Stata Journal 15(4), pp. 986–1018.

EGERT, B., MACDONALD, R. (2009): *Monetary Transmission Mechanism in Central and Eastern Europe: Surveying the Surveyable,* Journal of Economic Surveys 23(2), pp. 277–327.

GROPP, R., KOK, C., LICHTENBERGER, J.-D. (2014): *The Dynamics of Bank Spreads and Financial Structure,* The Quarterly Journal of Finance 4(04), pp 1-53.

HAINZ, C., HORVÁTH, R., HLAVÁČEK, M. (2014): *The Interest Rate Spreads in the Czech Republic: Different Loans, Different Determinants?,* Economic Systems 38(1), pp. 43–54.

HAVRÁNEK, T., IRŠOVÁ, Z., LEŠANOVSKÁ, J. (2016): *Bank Efficiency and Interest Rate Pass-Through: Evidence from Czech Loan Products,* Economic Modelling 54, pp. 153–169.

HORVÁTH, R., PODPIERA, A. (2012): *Heterogeneity in Bank Pricing Policies, The Czech Evidence*, Economic Systems 36(1), pp. 87–108.

GLOSSARY

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.

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.

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.

Consumer credit Credit used to finance household consumption. It also includes bank overdrafts and debit balances and credit card credit.

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 total debt service to the net income of the loan applicant.

Debt-to-income The ratio of debt to the net income of the loan applicant.

Default Default is defined as a breach of the debtor's payment discipline. 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.

IFRS 9 The financial reporting standard IFRS 9 *Financial instruments*, the final version of which was introduced in July 2014 by the International Accounting Standards Board (IASB), took effect on 1 January 2018 pursuant to Commission Regulation (EU) 2016/2067, replacing the previously valid IAS 39 standard. IFRS 9 lays down requirements for the recognition, valuation, impairment and derecognition of financial assets and financial liabilities and general hedge accounting. It aims to provide financial statement users with relevant information for assessing the size, timing and uncertainty of an entity's future cash flows.

Institutional investor Either (a) a bank executing trades in investment instruments on its own account on the capital market, a management company, an investment fund, a pension 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 margin The difference between a bank's loan rate and its deposit rate.

Interest rate spread Also interest rate differential; the spread between the interest rate on a contract (deposit, security) and a reference interest rate.

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.

Liquidity coverage ratio A requirement to cover net liquidity outflows over a 30-day time horizon with liquid assets. It is calculated as the ratio of the liquidity buffer to the net liquidity outflow.

Loan for house purchase A loan intended for the acquisition of residential property.

Loan service-to-income The ratio of loan-related debt service to the net income of the loan applicant.

Loan-to-income (LTI) The ratio of the amount of a loan to the net income of the loan applicant.

Loan-to-value (LTV) The ratio of the amount of a loan to the value of collateral.

Loss given default (LGD) The ratio of the loss on an exposure in the event of counterparty default to the amount owed at the time of default.

Macroprudential policy A key component of financial stability policy. It focuses on the stability of the financial system as a whole. Its main objective is to help prevent systemic risk.

Market liquidity The ability of market participants to carry out financial transactions in assets of a given volume without causing a pronounced change in their prices.

Minimum Requirement for Own Funds and Eligible Liabilities (MREL)

A sufficient volume of eligible liabilities is necessary for a failed bank to be recapitalised using internal funds (bail-in). In the event of a crisis, the CNB writes off or converts these liabilities. A sufficient MREL together with the application of a suitable combination of resolution tools thus enables a failed institution to be resolved without the use of public money.

Mortgage 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.

Net stable funding ration (NSFR)

A structural liquidity requirement monitored over a one-year time horizon. It is defined as the ratio of available stable funding to required stable funding.

Non-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.

Overnight indexed swap A term contract between economic agents consisting in the mutual exchange of interest payments corresponding to a fixed rate and a floating overnight financial market reference rate.

Pension funds In the Czech environment, pension funds are transformed and participation funds which are managed by pension management companies. Participation funds are further classed into obligatory conservative funds and other funds. Obligatory conservative funds are only allowed to invest in a significantly restricted group of assets.

Pillar 1 The first part of the CRD directive, focused on the determination of minimum capital requirements for all credit institutions to cover credit, market and operational risks.

Pillar 2 The second part of the CRD directive, requiring credit institutions to assess whether the Pillar 1 capital requirement is sufficient to cover all the risks to which they are exposed. This assessment process is reviewed by the supervisory authority under the supervisory review and evaluation process (SREP). The supervisory authority then can apply a wide range of instruments, including setting an additional capital requirement, for example to cover concentration risk.

Prague InterBank Offered Rate (PRIBOR)
The reference interest rate on the interbank deposit market for deposit sales. Reference banks quoting the PRIBOR must be important participants in the interbank market.

Price-to-income (PTI) 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 assets (RoA) The ratio of pre-tax profit and interest to total assets of a firm.

Return on equity (RoE) The ratio of net profit to equity of a firm.

Risk premium The risk premium an investor demands on investments in riskier financial instruments.

Saving rate (households) A flow indicator showing the ratio of savings to gross disposable income of households. In simplified terms, savings are the part of income not spent on consumption in a given period.

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.

SKEW An index of expectations of extraordinary events (tail risk) for US stock (S&P 500 index), derived from market prices of options traded at the Chicago Board Options Exchange. The calculation is based on options with a significantly lower strike price than the current value of the stock index. SKEW typically ranges from 100 to 150, with a higher value indicating a higher probability that the stock market will fall sharply and such options will be exercised.

Solvency (insurance companies)

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 European regulatory framework (directive) for European insurance companies and reinsurers laying down quantitative and qualitative requirements and prudential rules, including requirements to comply with market discipline and disclosure duties. It entered into force in 2016, when it replaced the Solvency I regulatory framework.

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.

VIX An index of expected 30-day volatility of US stocks (S&P 500 index), derived from market prices of options traded at the Chicago Board Options Exchange. A higher value indicates higher expected volatility of the stock index, and therefore higher market uncertainty.

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)
AIRB	Advanced Internal Rating Based Approach
ASF	available stable funding
ASRF	asymptotic single risk factor model
BCBS	Basel Committee on Banking Supervision
BIS	Bank for International Settlements
BoE	Bank of England
BLS	Bank Lending Survey
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
CDS	credit default swap
CEB	Czech Export Bank
CET1	common equity Tier 1
CMGDB	Czech-Moravian Guarantee and Development Bank
CNB	Czech National Bank
CPI	Consumer Price Index
CRD	Capital Requirements Directive
CRMT	credit risk mitigation techniques
CRR	Capital Requirements Regulation
CZK	Czech koruna
CZSO	Czech Statistical Office
DSCR	debt service coverage ratio
DSTI	debt service-to-income
DTI	debt-to-income
EA	euro area
EAD	exposure at default
EBA	European Banking Authority
EC	European Commission
ECB	European Central Bank
EGAP	Export Guarantee and Insurance Company
EIB	European Investment Bank
EIOPA	European Insurance and Occupational Pensions Authority
EME	emerging markets
ESA 95/2010	European System of Accounts (Eurostat methodology)
ESCB	European System of Central Banks
ESMA	European Securities and Markets Authority
ESRB	European Systemic Risk Board
EU	European Union
EUR	euro
EURIBOR	Euro InterBank Offered Rate (reference interest rate on the interbank market)
FCI	financial cycle indicator
Fed	Federal Reserve System

FIRB	Foundation Internal Rating Based Approach
FOMC	Federal Open Market Committee
FSB	Financial Stability Board
FSR	Financial Stability Report
GB	government bond
GDI	gross disposable income
GDP	gross domestic product
GFCF	gross fixed capital formation
GNI	gross national income
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
IAS	International Accounting Standards
ICAAP	Internal Capital Adequacy Assessment Process
IFRS	International Financial Reporting Standards
IL	Liquidity indicator
ILI	investment life insurance
ILO	International Labour Organisation
IMF	International Monetary Fund
IRB	Internal Rating Based Approach, an approach within the Basel II framework for capital adequacy of banks
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
LSTI	loan service-to-income
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
MRD	Ministry for Regional Development
MREL	minimum requirement for own funds and eligible liabilities
NACE	General Industrial Classification of Economic Activities
NBP	National Bank of Poland
NBS	National Bank of Slovakia
NFC	non-financial corporation
NFCEL	non-bank financial corporations engaged in lending
NLI	non-life insurance
NPISH	non-profit institutions 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
OIS	overnight indexed swap
OLS	ordinary least squares
OPEC	Organization of the Petroleum Exporting Countries
ORSA	Own Risk Solvency Assessment
O-SIIs	other systemically important institutions
p.a.	per annum
P2P	peer-to-peer lending
PD	probability of default
PMC	pension management company
pp	percentage point
PPS	purchasing power standard
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 weighting
RWA	risk-weighted assets
RWR	overall capital ratio
SBBS	sovereign bond-backed securities
SII	Solvency II Directive
SILC	Survey of Income and Living Conditions
SMEs	small and medium-sized enterprises
SMP	Securities Markets Programme
SOLUS	Sdružení na ochranu leasingu a úvěrů spotřebitelům (Association for the Protection of Leasing and Loans to Consumers)
SRB	systemic risk buffer
SREP	Supervisory Review and Evaluation Process
SSM	Single Supervisory Mechanism
STA	standardised approach to credit risk
TF	transformed fund
TLTRO	Targeted Longer-Term Refinancing Operations
TSCR	total supervisory capital requirement
UFR	ultimate forward rate
USA	United States
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
EA	Euro area	PL	Poland
EE	Estonia	PT	Portugal
ES	Spain	RO	Romania
FI	Finland	RU	Russia
FR	France	SE	Sweden
GR	Greece	SI	Slovenia
HR	Croatia	SK	Slovakia
HU	Hungary	TR	Turkey
CH	Switzerland	UK	United Kingdom
IE	Ireland	US	United States
IN	India		

FINANCIAL STABILITY INDICATORS – PART 1

		2012	2013	2014	2015	2016	2017	2018 Jan.	Feb.	Mar.	Apr.
Macroeconomic environment											
ME.1	Real GDP growth (year on year, %)	-0.7	-0.5	2.7	5.4	2.5	4.5				
ME.2	Consumer price inflation (average annual index growth, %)	3.3	1.4	0.4	0.3	0.7	2.5	2.2	1.8	1.7	
ME.3	Public finance deficit / surplus / GDP (%)	-3.9	-1.2	-1.9	-0.6	0.7	1.6				
ME.4	Public debt / GDP (%)	44.5	44.9	42.2	40.0	36.8	34.7				
ME.5	Trade balance / GDP (%)	3.0	4.1	5.1	4.1	5.1	4.8				
ME.6	External debt in % of banking sector external assets	162.6	149.4	152.7	133.7	120.2	114.1				
ME.7	Balance of payments current account / GDP (%)	-1.6	-0.5	0.2	0.2	1.6	1.1				
ME.8	Monetary policy 2W repo rate (end of period, %)	0.05	0.05	0.05	0.05	0.05	0.50	0.50	0.75	0.75	
Non-financial corporations*											
NC.1	Return on equity (%)	8.7	9.5	10.1	11.1	10.8	11.1				
NC.2	Debt (% of total liabilities)	55.3	56.9	57.2	56.3	57.1	56.6				
NC.3	Credit indebtedness (% of GDP)	51.7	56.7	53.8	51.1	51.5	51.0				
NC.4	– loans from Czech banks (% of GDP)	20.6	21.2	20.3	20.0	20.4	20.2				
NC.5	– loans from Czech non-bank financial corporations (% of GDP)	4.2	4.0	4.0	4.1	4.4	4.5				
NC.6	– other (including financing from abroad, % of GDP)	26.8	31.6	29.6	27.0	26.6	26.2				
NC.7	Interest coverage (pre-tax profit + interest paid/interest paid, %)	11.6	11.4	11.5	14.2	14.0	15.1				
NC.8	12M default rate (%)	1.7	1.4	1.5	1.4	1.0	0.8				
Households (including sole traders)											
H.1	Debt / gross disposable income (%)	54.3	56.2	56.5	57.3	59.5	60.3				
H.2	Debt / financial assets (%)	29.7	29.5	28.8	28.4	26.4	26.8				
H.3	Net financial assets (total financial assets – total liabilities, % of GDP)	78.8	81.4	83.3	83.7	84.3	83.3				
H.4	Debt / GDP (%)	29.9	30.7	30.3	30.1	31.1	31.4				
H.5	– loans from Czech banks to households (% of GDP)	25.7	26.7	26.5	26.9	27.9	28.4				
H.6	– loans from Czech non-bank fin. corporations to households (% of GDP)	1.9	1.8	1.8	1.3	1.3	1.2				
H.7	– loans from Czech banks to sole traders (% of GDP)	0.9	0.9	0.8	0.8	0.8	0.8				
H.8	– loans from Czech non-bank fin. corporations to sole traders (% of GDP)	0.3	0.2	0.2	0.2	0.2	0.2				
H.9	– other (including financing from abroad, % of GDP)	1.1	1.1	1.1	1.0	0.9	0.9				
H.10	Net interest expenses / gross disposable income (%)	1.9	1.9	1.7	1.9	1.9	1.8				
H.11	12M default rate (%, excluding sole traders)	4.5	4.3	4.0	3.1	2.4	2.0				
Financial markets											
FM.1	3M PRIBOR (average for period, %)	1.0	0.5	0.4	0.3	0.3	0.4	0.8	0.9	0.9	
FM.2	1Y PRIBOR (average for period, %)	1.5	0.7	0.5	0.5	0.5	0.6	1.0	1.1	1.1	
FM.3	10Y government bond yield (average for period, %)	2.8	2.1	1.6	0.6	0.4	1.0	1.8	1.8	1.8	
FM.4	CZK / EUR exchange rate (average for period, %)	25.1	26.0	27.5	27.3	27.0	26.3	25.5	25.3	25.4	
FM.5	Change in PX stock index (% year on year, end of period)	14.0	-4.8	-4.3	1.0	-3.6	17.0	21.3	17.5	14.5	12.8
Property market											
PM.1	Total change in residential property prices (transaction prices, % year on year)	0.4	1.1	1.5	2.8	8.7	8.4				
PM.2	Change in apartment prices (asking prices according to CZSO, % year on year)	-1.4	0.8	2.1	4.3	15.4	12.6				
PM.3	Apartment price / average annual wage	3.8	3.9	3.9	3.9	4.5	4.7				
PM.4	Apartment price / annual rent (according to IRI)	21.3	21.6	20.7	21.5	21.4	21.1				

* Estimate based on CZSO transaction prices and house price index.
** Estimate based on CZSO transaction prices.
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FINANCIAL STABILITY INDICATORS – PART 2

		2012	2013	2014	2015	2016	2017	2018 Jan.	2018 Feb.	2018 Mar.	2018 Apr.
Financial sector											
FS.1	Financial sector assets / GDP (%)	148.0	160.5	160.0	158.0	163.3	176.2				
FS.2	Shares of individual segments in financial sector assets (%)										
FS.3	banks	77.2	78.1	77.8	77.4	77.4	78.7				
FS.4	credit unions	0.7	0.5	0.5	0.5	0.4	0.3				
FS.5	insurance companies	7.8	7.3	7.1	6.8	6.4	5.8				
FS.6	pension management companies and funds	4.6	4.7	4.9	5.3	5.2	5.0				
FS.7	investment funds*	3.6	3.8	4.3	4.8	5.2	5.5				
FS.8	non-bank financial corporations engaged in lending	5.8	5.3	5.2	5.0	5.0	4.6				
FS.9	investment firms	0.4	0.4	0.3	0.3	0.3	0.3				
Banking sector											
BS.1	Bank assets / GDP (%)	114.6	126.1	124.6	122.3	126.4	146.9				
BS.2	Assets structure (%, end of period)										
BS.3	loans to central bank	8.3	12.9	8.8	11.6	12.5	10.5				
BS.4	interbank loans	9.6	9.1	6.4	4.5	3.8	4.0				
BS.5	client loans	50.5	50.0	50.7	51.8	50.8	44.5				
BS.6	bond holdings	24.1	21.7	22.8	21.0	18.2	13.6				
BS.7	– government bonds	18.3	15.8	16.3	14.1	11.4	7.6				
BS.8	– Czech government bonds	16.9	14.6	14.8	12.5	10.0	6.7				
BS.9	other	7.5	6.3	11.3	11.1	14.8	27.3				
BS.10	Liabilities structure (%, end of period)										
BS.11	liabilities to central bank	0.2	0.0	0.1	0.2	0.2	0.3				
BS.12	interbank deposits	8.9	11.3	10.5	7.6	10.2	18.1				
BS.13	client deposits	69.1	67.8	66.9	66.4	65.3	60.4				
BS.14	bonds issued	8.1	8.3	8.6	11.9	11.5	10.6				
BS.15	other	13.7	12.5	13.9	13.8	12.9	10.6				
BS.16	Client loans / client deposits (%)	73.1	73.8	75.8	78.0	77.8	73.7				
BS.17	Sectoral breakdown of total loans (%)										
BS.18	non-financial corporations	35.4	34.5	33.2	33.1	33.1	33.1	32.6	32.7		
BS.19	households	44.3	43.4	43.3	44.4	45.1	46.6	46.2	46.1		
BS.20	sole traders	1.5	1.5	1.3	1.3	1.2	1.3	1.3	1.3		
BS.21	others (including non-residents)	18.8	20.6	22.1	21.2	20.6	19.0	19.9	19.9		
BS.22	Growth in loans (%, end of period, year on year):										
BS.23	total	2.4	6.5	4.8	5.6	6.0	4.6	4.2	4.2		
BS.24	non-financial corporations	0.9	3.8	0.9	5.3	6.0	4.7	3.7	4.0		
BS.25	– real estate activity (NACE L)	0.7	6.3	3.6	5.6	12.1	-1.7	-3.4	-2.0		
BS.26	households	3.6	4.5	4.5	8.2	7.7	8.0	8.0	8.0		
BS.27	– loans for house purchase	4.8	5.2	5.6	8.0	8.4	9.0	9.0	8.8		
BS.28	– consumer credit	-0.7	0.4	-0.6	8.9	4.5	4.1	4.3	4.2		
BS.29	sole traders	-5.0	1.0	-4.0	0.0	4.4	10.1	10.4	10.3		
BS.30	Non-performing loans / total loans (%):										
BS.31	total	6.0	5.9	6.1	5.8	4.8	4.0	3.8	3.7		
BS.32	non-financial corporations	7.4	7.2	6.7	5.7	5.2	4.2	4.2	3.9		
BS.33	households	5.1	5.0	4.7	4.0	3.2	2.5	2.6	2.6		
BS.34	– loans for house purchase	3.4	3.3	3.1	2.6	2.0	1.8	1.9	1.9		
BS.35	– consumer credit	12.3	12.2	12.0	11.1	8.9	6.0	6.1	6.0		
BS.36	sole traders	13.7	13.0	12.6	11.0	8.6	6.7	6.4	6.4		
BS.37	Coverage of non-performing loans by provisions (%)	53.8	55.0	55.6	54.6	56.3	55.0	55.6	55.1		
BS.38	Aggregate LTV for housing mortgages	58.7	59.4	54.6	55.8	55.8	54.9				
BS.39	Capital ratio (%)	16.4	17.1	18.0	18.4	18.4	19.3				
BS.40	Tier 1 capital ratio (%)	15.7	16.5	17.5	17.9	17.9	18.7				
BS.41	Leverage (assets as a multiple of Tier 1)	13.7	13.1	12.4	12.1	12.6	14.7				
BS.42	Leverage ratio (approximation of Basel III definition, Tier 1 / exposures)	n.a.	n.a.	7.2	7.6	7.2	6.3				
BS.43	Return on assets (%)	1.4	1.3	1.2	1.2	1.3	1.2				
BS.44	Return on Tier 1 (%)	21.8	18.6	16.8	16.7	17.9	18.1				
BS.45	Quick assets / total assets (%)	29.1	30.6	31.0	32.0	34.4	41.5	42.4	41.8		
BS.46	Quick assets / client deposits (%)	42.5	45.6	46.4	48.3	52.8	69.8	71.2	69.2		
BS.47	Net external position of banking sector (% of GDP)	6.1	3.1	1.6	-1.0	-7.5	-20.1				
BS.48	Banking sector external debt / banking sector total assets (%)	10.1	12.2	13.9	15.3	18.7	25.7				

* 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.

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FINANCIAL STABILITY INDICATORS – PART 3

		2012	2013	2014	2015	2016	2017	2018 Jan.	Feb.	Mar.	Apr.
Non-bank financial corporations											
NI.1	Share in financial sector assets (%)	21.7	21.0	21.5	21.9	21.8	20.8				
	Insurance companies*										
NI.2	Premiums written / GDP (%)	3.8	3.8	3.7	3.3	3.1	3.0				
NI.3	Equity / Technical provisions (%)	n.a.	n.a.	n.a.	n.a.	238.1	230.1				
NI.4	Change in financial investment of insurance companies (%, year on year)	7.4	1.3	2.2	-1.6	0.9	4.2				
NI.5	Return on equity of insurance companies (%)	17.3	16.7	16.4	17.0	15.8	15.1				
NI.6	Claim settlement costs / net technical provisions (life, %)	16.4	17.7	20.0	17.8	15.1	14.4				
NI.7	Claim settlement costs / net technical provisions (non-life, %)	51.4	54.6	51.5	55.6	58.1	59.4				
	Pension management companies (PMCs) and PMC funds										
NI.8	Change in assets of funds managed by PMCs (%)	10.4	8.4	14.1	10.0	7.8	10.8				
NI.9	Nominal change in value of assets of PMC funds**	7.0	-0.1	3.3	1.0	0.3	3.6				
	Investment funds										
NI.10	Growth in net assets (= equity; year on year, %)	17.1	19.4	19.0	17.8	17.8	20.2				
	Non-bank financial corporations engaged in lending										
NI.11	Growth in loans from non-bank financial corporations engaged in lending (%):***										
NI.12	total	-3.6	-4.1	3.3	0.8	8.9	7.3				
NI.13	households	-2.5	-2.3	5.0	-26.4	7.0	-2.6				
NI.14	non-financial corporations	-3.1	-4.4	3.7	11.4	10.1	9.7				

* The indicators cover domestic insurance companies only.
** Change in the assets of pension funds adjusted for contributions and benefits.
The figure for 2017 is distorted by an increase in the balance sheet caused by the use of cross-currency repos to manage foreign exchange risk.
*** 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.

Pozn.: Owing to data revisions, some historical values of the indicators may not be comparable to those published in previous FSRs.

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